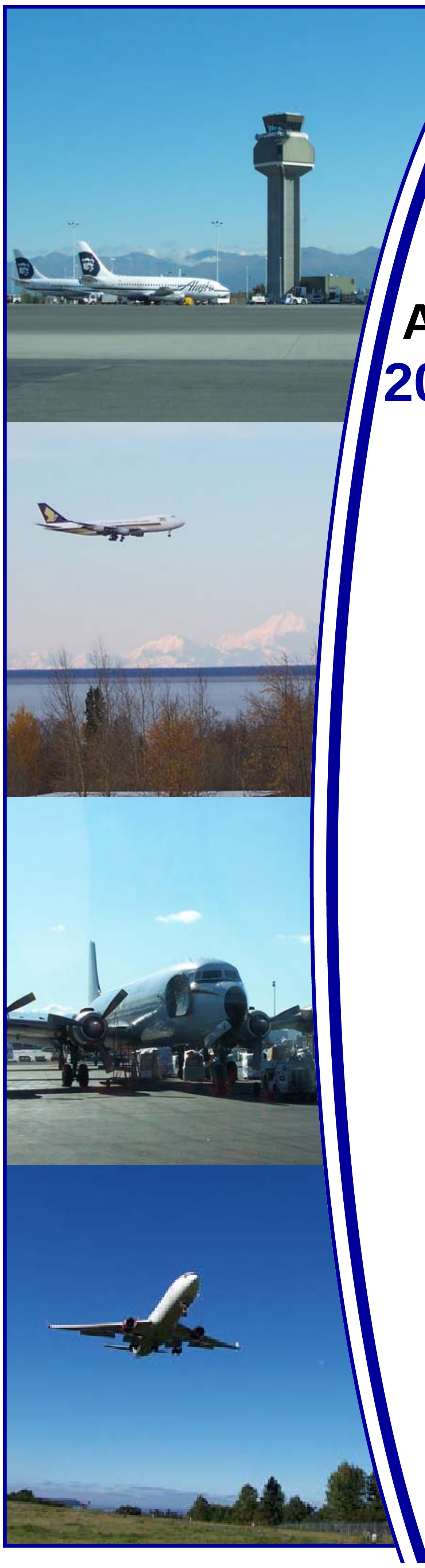


Ted Stevens
Anchorage International Airport
2008 Master Plan Study Report
Draft

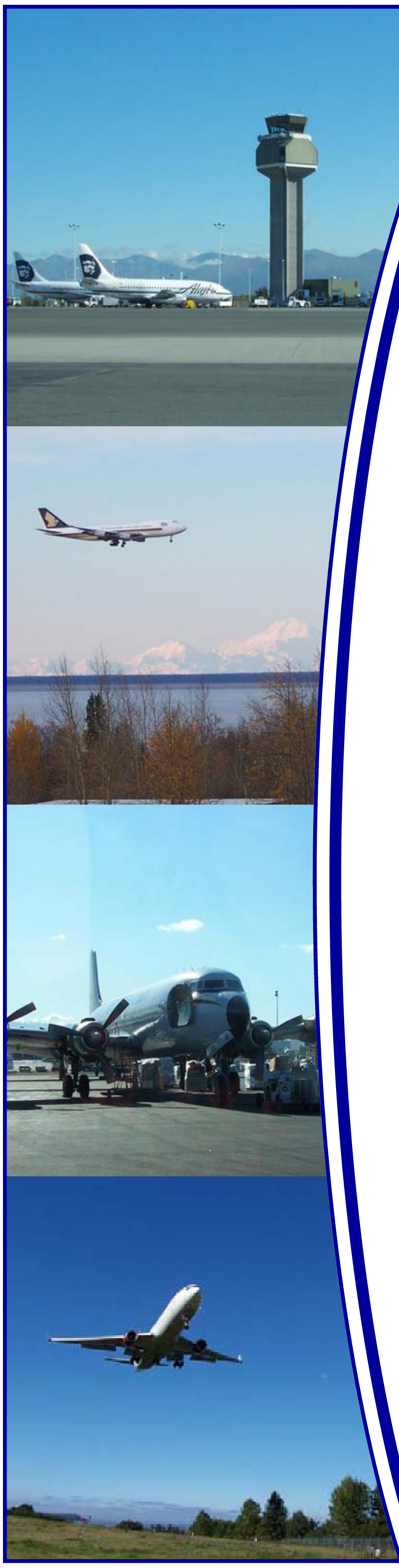
January 2009

Ted Stevens Anchorage International Airport

Produced by:

WHPacific

with
HNTB Corporation
and
DOWL Engineers



Executive Summary

Executive Summary

Ted Stevens Anchorage International Airport

2008 Master Plan Study Report

January 2009

Ted Stevens Anchorage International Airport

2008 Master Plan Study Report

Executive Summary

Ted Stevens Anchorage International Airport (ANC) is the primary air transportation facility in Alaska, serving local, regional, state, national, and international aviation needs. ANC's last Airport Master Plan Update, completed in 2002, was in need of an update due to the growth of aircraft operations (landings and take-offs), passengers, and cargo tonnage at ANC.

Work on the Master Plan update started in September 2006. The initiation of the Master Plan included an updated forecast of operations, passengers, and cargo that was completed in March 2007 and approved by FAA. Though the forecast predicted strong growth in operations and cargo tonnage, during the summer of 2008, rising fuel prices were followed by declines in national and international activity at ANC and throughout the U.S. As a consequence, ANC decided to stop work on the Master Plan Update. At the time the Master Plan Update was stopped, ANC was completing an evaluation of concepts and alternatives. Prior to the work stoppage, the Master Plan Inventory of Existing Conditions (chapter 1), Airport Activity Forecast (chapter 2), and Facility Requirements (chapter 3) were completed. At the time of the work stoppage, a preferred alternative had not yet been selected; therefore, the Airport Layout Plan has not been updated at this time, and the 2002 Master Plan Update remains the most current completed master plan. Though the concept development and alternatives evaluation included some cursory evaluation of environmental impacts and costs associated with the various alternatives, no formal environmental analysis has been initiated under the National Environmental Policy Act (NEPA), nor has the airport's Capital Improvement Program (CIP) been updated to include special projects developed in the 2008 planning effort.

For these reasons, this interim document is titled "2008 Master Plan Study Report."

While the recent master planning process is incomplete, the documentation includes valuable information regarding existing conditions at ANC, facility improvements at increased traffic levels, and an evaluation of alternatives for providing additional runway capacity. As stated above, no alternative has been recommended or selected for implementation. However, the analysis completed under the development of this 2008 Master Plan Study Report is valuable and provides a strong foundation for development of preferred alternatives at a future date.

2008 Master Plan Study Report Contents

The ANC 2008 Master Plan Study Report data has been compiled in accordance with FAA Advisory Circular 150/5070. The contents of this report include an inventory of existing conditions, an FAA approved forecast of passengers, cargo tonnage, and operations, facility requirements for both airfield and support facilities needed to accommodate forecast activity levels, and an evaluation of alternatives for accommodating future traffic levels. It also included development of goals and objectives and an extensive public and stakeholder involvement process that included over fifty public meetings and technical committee meetings. Because the Master Plan Study Report was stopped during the development of alternatives, it does not include a recommended alternative, financial plan, or airport layout plan. The following summarizes the four chapters.

Inventory of Existing Conditions

Many facilities were constructed at ANC since the 2002 Master Plan Update was completed. Significant airport construction included Taxiway Z, completion of Taxiway Y, widening of Taxiways R and K for Design Group VI aircraft, three remain over-night (RON) aircraft parking positions, an engine run-up pad, a new maintenance facility, completion of Concourse C and the start of the Concourse B remodel.

Significant construction by airport tenants included a railroad station, a consolidated rental car center, and new aircraft parking aprons for FedEx, UPS and Alaska Cargo Port.

Airport Activity Forecast

An aviation forecast was prepared for the Master Plan Update. The forecast analyzed local and state socio-economic projections, historic aviation activity, projected passenger activity, projected cargo activity, projected activity for military and general aviation. The forecast assumed that the necessary facilities to accommodate the projected aviation activity would be available and the aircraft operations would therefore be "unconstrained". The forecast developed the following projections:

Passenger Enplanements:

- The growth rate is 1.8% through the forecast period.

Cargo Tonnage:

- The growth rate is 6.1% through the forecast period.

Operations (including Lake Hood):

- The growth rate is 2.4% through the forecast period.

Operations (International Airport only):

- The growth rate is 2.8% through the forecast period.

This forecast was accepted by FAA in March 2007 and was used to update the FAA Terminal Area Forecast (TAF) for ANC activity.

Facility Requirements

Based on the TAF, substantial additional facilities will be needed to meet the forecast aviation activity predominantly in the area of runway capacity and cargo facilities. These include a new runway, new taxiways and additional aircraft parking. The analysis shows that the existing terminal complex should have adequate capacity to meet the 20-year forecast with limited improvements. Other facilities that will be needed in the future include additional field maintenance space, sand and deicing chemical storage, snow storage, aviation fuel storage, and facilities for general aviation.

Concept Development and Alternative Analysis

Facility Requirements projections identify that additional runway capacity will be needed to address 1) an imbalance in capacity in the north-south versus east-west directions and 2) increased Instrument Flight Rules (IFR) arrival capacity.

Workshops were held with the airport staff and FAA officials to develop alternatives for an additional future runway. During the previous Master Plan, alternatives for adding an additional east-west runway south of the existing runway were analyzed. However, alternatives encroaching into Kincaid Park were rejected from consideration for two reasons. First, the community strongly objected to any airfield expansion into Kincaid Park. Second, providing an additional east-west runway would not meet the identified requirements by providing an additional north-south runway.

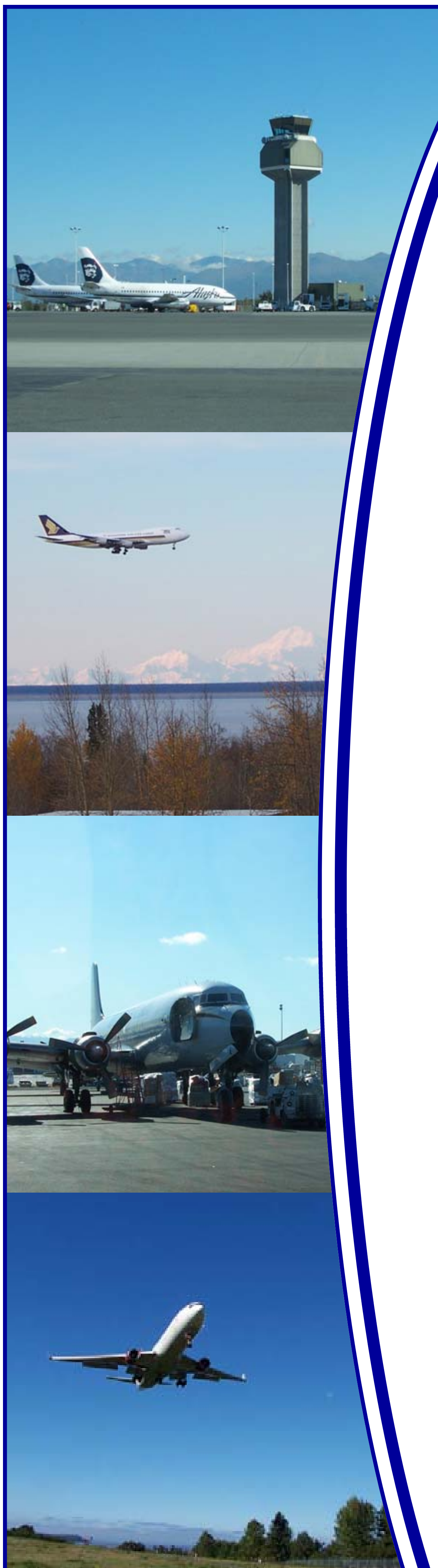
In this effort twenty-five initial concepts were developed for providing additional runway capacity. Some concepts included the addition of two runways. After further screening, these were reduced to four “build” alternatives plus the “no-build” alternative. The remaining four alternatives evaluated in detail and are listed below.

1) Closely Spaced N/S Runway 906’ West of Runway 14/32 10,000’ Long
2) Widely Spaced N/S Runway 3,000’ West of Runway 14/32 8,000’ Long
3) Widely Spaced N/S Runway 3,000’ West of Runway 14/32 10,000’ Long
4) Closely Spaced N/S Runway 906’ West of Runway 14/32 10,000’ Long Plus RW 7R/25L Shifted 500’ South

An alternatives evaluation matrix was developed that included both qualitative and quantitative selection criteria. Criteria included airfield safety, delay reduction and capacity, environmental impacts including noise, and cost. Though a quantitative evaluation of alternatives was completed, a qualitative evaluation of the alternatives remains incomplete and a recommendation has not been made at this time.

Conclusion

Ted Stevens Anchorage International Airport remains confident that airport activity will increase in future years. However, the 2008 global economic instability has adversely affected international and domestic aviation activity greatly, and led to uncertainty regarding the timing of any needed improvements. Though the global economic instability continues to impact aviation, the price of crude oil has plummeted by more than 50% in less than four months providing some optimism for growth in aviation. Though the Master Plan Study Report has been stopped, the information, data and analysis completed to date is valuable and can be utilized to select an alternative at a future date. A revised forecast, if necessary, can be utilized in tandem with the completed capacity and delay analysis to determine appropriate timing for any future improvements. Because the updated Master Plan Study Report remains incomplete at this time, the recommendations from the 2002 Master Plan remain the most current plans formally adopted by the ANC and FAA.



Chapter One:
Inventory of Existing Conditions
Draft

Ted Stevens Anchorage International Airport
2008 Master Plan Study Report
January 2009

Ted Stevens Anchorage International Airport
2008 Master Plan Study Report

Introduction and
Chapter One – Inventory of
Existing Conditions

January 23, 2009
Draft

AKSAS Project Number: 59585

Prepared for:
Alaska Department of Transportation and Public Facilities,
Ted Stevens Anchorage International Airport

Prepared by:
WHPacific
with
HNTB Corporation and DOWL Engineers

Table of Contents

Figures

Tables

Update on Effects of Recent World Economic Events

The Master Plan Forecast of Aviation Activity for the Ted Stevens Anchorage International Airport is based on economic and airline projections in 2006. It was found to be technically valid by the FAA in March, 2007 based on industry information available at the time. The rise in crude oil prices to as high as $140 per barrel and other major economic events in 2007 and 2008 have dramatically changed and continue to affect the aviation industry. Not only have costs risen, the demand for commercial passenger and general aviation passenger as well as air cargo services has decreased. The outlook as of late 2008 is unclear.

Future aviation demand levels presented in Draft Chapter 2, Aviation Activity Forecast, were used as the foundation for the Draft Chapter 3, Facility Requirements and the Draft Chapter 4, Concept Development and Alternatives Evaluation. However, due to the current uncertainty of business costs and the general economic activity levels, it is expected that future demand levels will not materialize as soon as originally projected.

Therefore, the Airport intends to monitor the economic outlook and, at an appropriate time, start a Master Plan Update with a new or updated forecast and development timetable. Accordingly, working with airline partners, the Airport is deferring further planning of a new runway until the economic outlook improves.

Introduction

Ted Stevens Anchorage International Airport (ANC) serves as the primary air transportation facility in Alaska, providing important local, regional, state, national, and international aviation needs. It is owned and operated by the State of Alaska Department of Transportation and Public Facilities (ADOT&PF).

"An airport master plan is a comprehensive study of an airport and usually describes the short-, medium-, and long-term development plans to meet future aviation demand."[1] This report documents the airport master plan study begun in 2006 by ANC. The purpose of the study is to update the 1996 airport-wide Master Plan and to reconfirm many aspects of the November 2002 Master Plan. Among other tasks, the study scope includes addressing the following:

Feasibility analysis for a new north-south runway west of Runway 14-32, which was recommended by the 2002 Master Plan

Needed airport improvements resulting from potential near-term fleet mix changes at the airport, including new large cargo aircraft

Redevelopment plans for East and North Airparks and Kulis Air National Guard (ANG) Base

Development plans for lands south of Runway 7R-25L and West Airpark

Other development needed over the next 20 years will be identified as the study progresses.

To guide the master planning effort, airport development goals were established after a review of previous ANC Airport Master Plans, identification of current issues at the airport, interviews with airport staff, and discussions at the Airport stakeholder meetings and technical, agency and public meetings.

The mission statements that are the foundation of the airport development goals follow:

ADOT&PF Mission: Provide for the movement of people and goods and the delivery of State services.

Airport Mission: To safely, effectively, and efficiently operate and maintain the airport consistent with federal regulatory requirements, high customer service standards, sensitivity to user needs and awareness of community goals.

Airport facilities should provide the optimal setting for people to carry out ANC's mission. Consequently, the airport development goals are aligned closely with the Mission, with a focus on airport development. The following goals and their subordinate objectives are intended to guide the master plan formulation and provide the criteria for choosing the best concept for airport development.

Goal: Enhance airport safety.

- Objective: Comply with Federal Aviation Administration (FAA) design standards and other federal aviation regulations, such as those regarding airspace obstructions, airport certification, and security, in the development of airport facilities.
- Objective: Reduce the potential for runway incursions and unsafe uses in and around the Runway Protection Zones.

[1] Federal Aviation Administration Advisory Circular 150/5070-6B, *Airport Master Plans*.

- Objective: Make safety a primary criterion for the layout of the airfield to provide adequate operational capability during snow removal, periodic airfield closures during maintenance and closures during construction.
- Objective: Lay out roads and other facilities to maximize safety.
- Objective: Acquire adjacent property to enhance safe aviation operations.

Goal: Limit and mitigate adverse environmental impacts as practicable.

- Objective: Encourage over-water operations and employ other measures to reduce noise exposure in neighborhoods.
- Objective: Work cooperatively with the Municipality of Anchorage (MOA), and within aviation related constraints, to allow Airport property that is not presently in demand for Airport functions, including revenue generation, to be used on an interim basis for recreational activities that do not limit or complicate prompt conversion to use for Airport purposes.
- Objective: Develop the Airport in such a way as to achieve transportation goals while limiting and mitigating adverse impacts to the surrounding community.
- Objective: Design storm drainage and storm drainage treatment systems and perform fueling, deicing, snow storage, and other airport activities to maintain or improve water quality.
- Objective: Reduce airfield and road traffic congestion and delays to reduce air pollution and noise.

Goal: Maximize economic benefit to Southcentral Alaska, the State of Alaska, and the national air transportation system.

- Objective: Facilitate the Airport's capacity to accommodate the fast-growing air cargo market to Asia, particularly China.
- Objective: Increase other opportunities for revenue generation at the Airport, including future land development.
- Objective: Plan Airport development that is timely, right sized, and financially feasible to implement.

Goal: Enhance effectiveness, efficiency, and customer service; meet the needs of Airport users; and balance air transportation needs with other ANC goals.

- Objective: Balance the capacity provided with the projected demand.
- Objective: Provide efficient circulation routes for aircraft, cargo, people (passengers, employees, visitors and pedestrians), baggage, vehicles, and support services.
- Objective: Redevelop Kulis ANG Base so that it contributes to Airport goal fulfillment.
- Objective: Develop the Airport in a way that maximizes flexibility in use and preserves options to accommodate anticipated future changes in aviation.

Chapter One - Inventory of Existing Conditions

1.1. Introduction

The initial step in the preparation of a master plan is to collect data pertaining to an airport and the area it serves. The inventory task was accomplished in the fall of 2006 through a review of ANC records, on-line research, and discussions with ANC staff, airport tenants, and others.

1.2. Existing Airport Facilities

ANC and Lake Hood Seaplane Base (LHD) occupy about 4,600 acres[2] located three miles southwest of the Anchorage central business district. The combined airports, shown in Figure 1-1, are owned by the State of Alaska and operated by the Department of Transportation and Public Facilities.

The northern boundary is formed by the coastline of the Knik Arm of Cook Inlet and Earthquake Park. The northeast boundary abuts the residential neighborhoods of Turnagain and Spenard and the southern boundary abuts the Sand Lake neighborhood. The extreme eastern part of ANC is referred to as Conners Bog and is bounded by International Airport Road to the north, Northway Drive to the east and Conners Lake subdivision to the south. The southeastern boundary runs along Jewel Lake Road, DeLong Lake, Air National Guard Road and Raspberry Road, except for land north of Raspberry Road belonging to the Federal Communication Commission (FCC). Kincaid Park abuts the southwestern airport boundary and the western boundary is adjacent to Municipal lands or the coastline. The wastewater treatment plant, Clithroe Center and a composting operation are facilities located on Municipal land in this area.

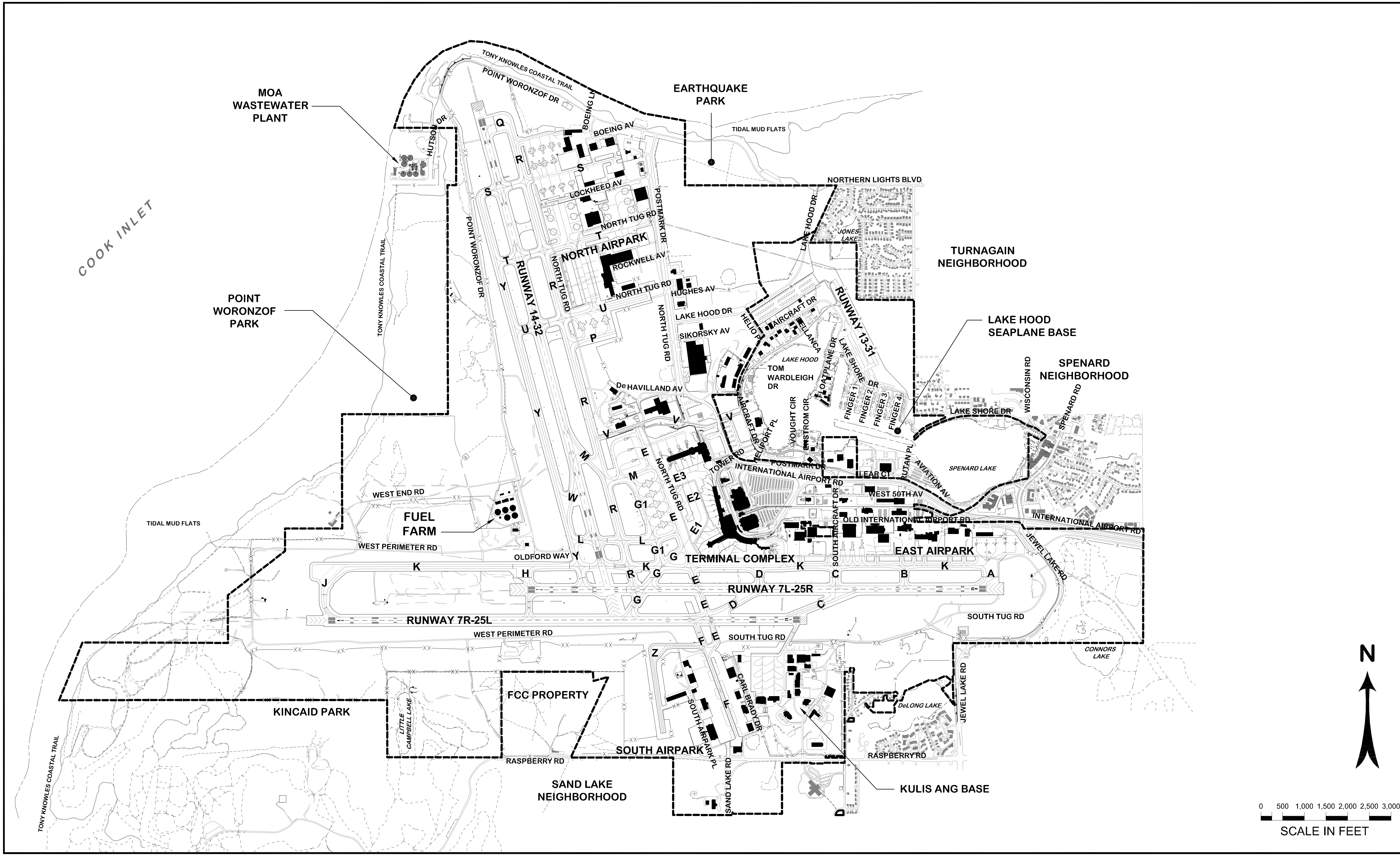
There is a four-acre FAA in-holding located in East Airpark and a 17-acre US Fish and Wildlife Service in-holding located at the south east edge of Lake Hood.

Figure 1-2 shows land uses on the airport and lists the acreage of each of these land uses.

The Airport reference elevation is 152 feet mean sea level (MSL). The mean daily maximum temperature during the warmest month is 65F.

The following sections present detailed descriptions of the existing airport facilities.

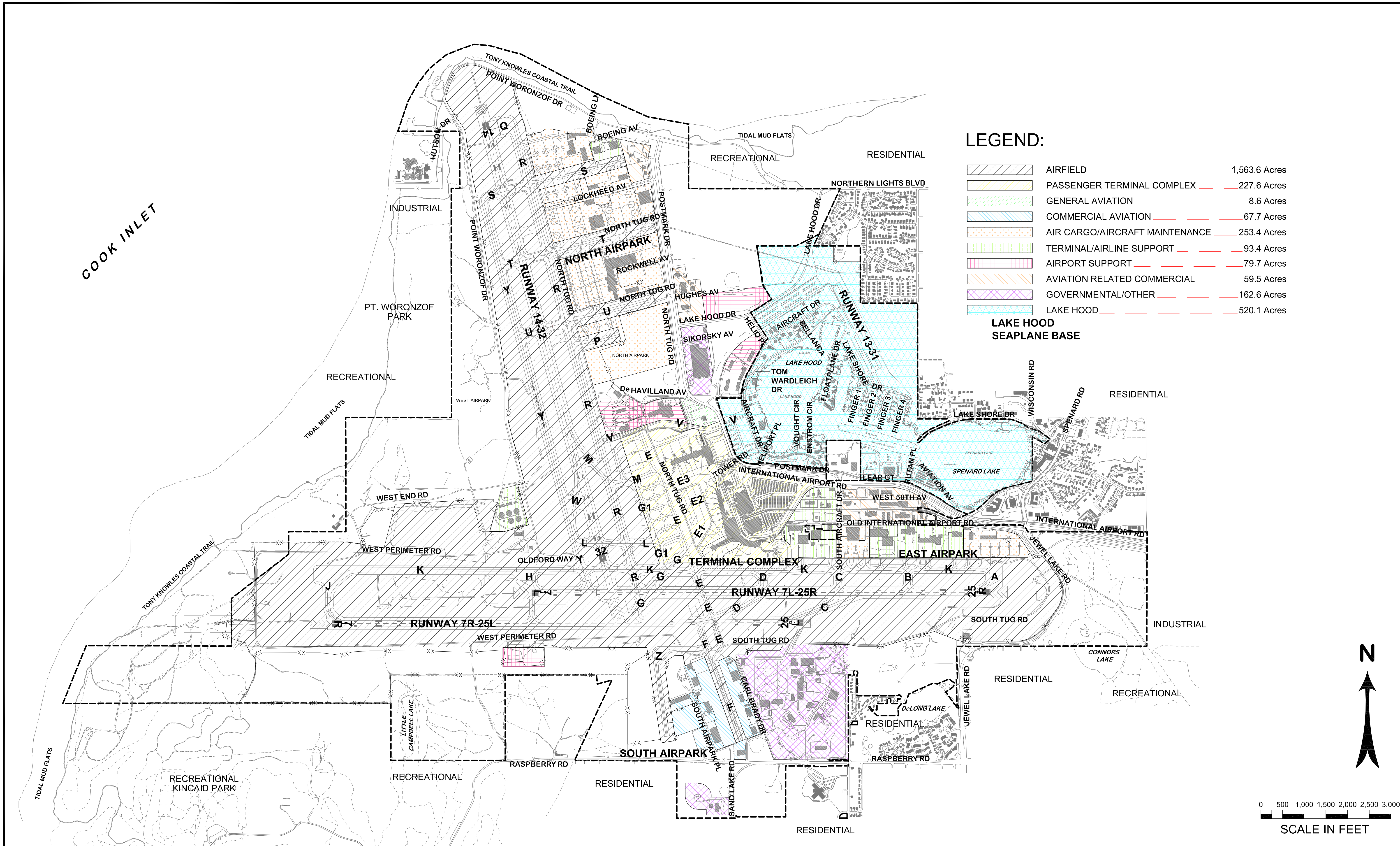
[2] The total acreage of 4,600 acres includes the land uses itemized on Figure 1-2 plus roadways.



Ted Stevens Anchorage International Airport Master Plan

EXISTING CONDITIONS

FIGURE 1-1



Ted Stevens Anchorage International Airport Master Plan

EXISTING LAND USE

FIGURE 1-2

1.2.1. Airfield and Air Traffic Control

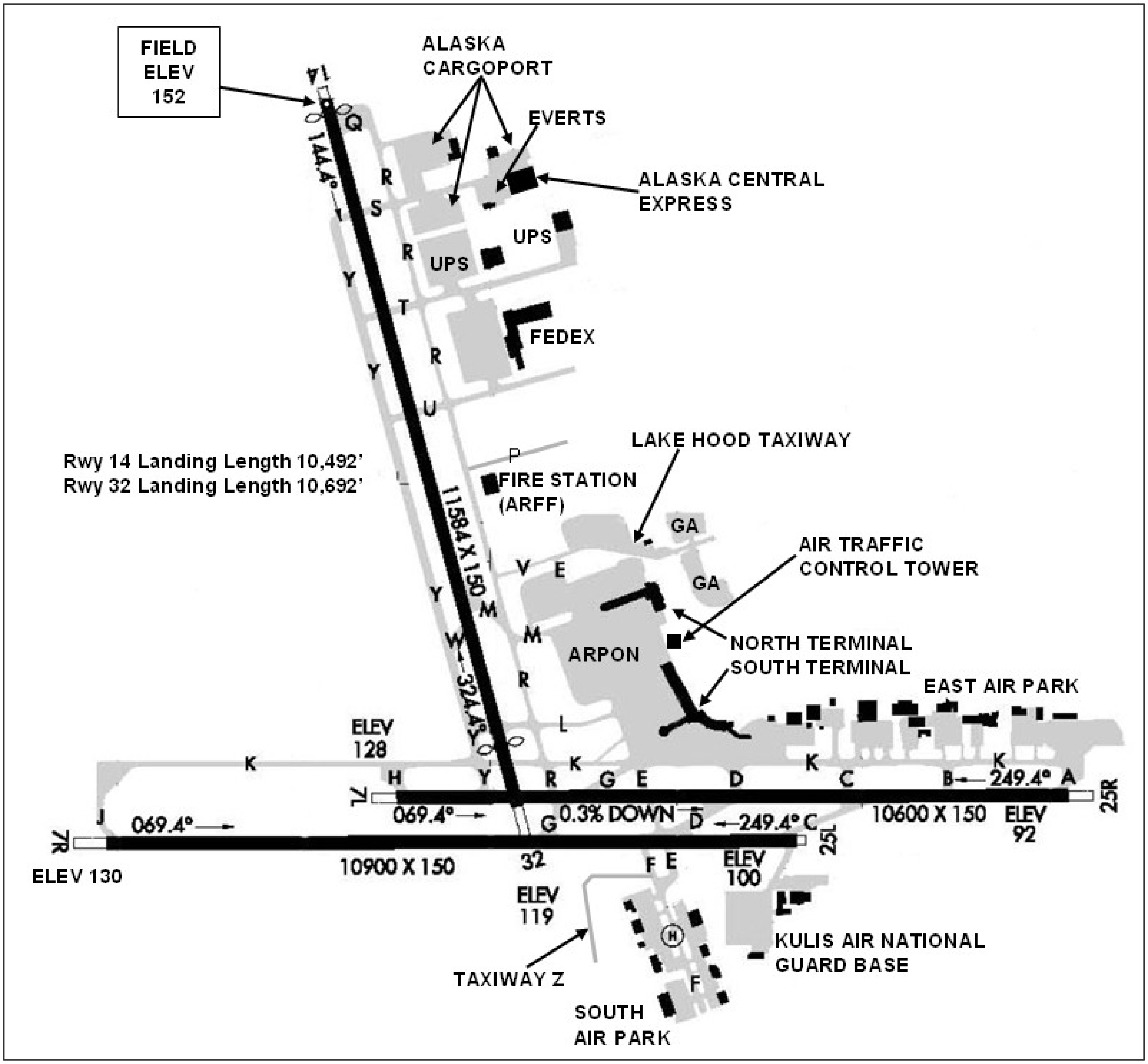
Airfield

The airfield complex at ANC, as depicted on Figure 1-3**,** consists of three runways and a full complement of supporting taxiways. The two parallel east-west runways, Runway 7R-25L and Runway 7L-25R, are separated by 700 feet. The north-south runway, Runway 14-32, is located to the north of the parallel east-west runways. The general runway characteristics are summarized in Table 1.1

Table 1.1 Air Carrier Runway Data

	Runway		
	7L-25R	**7R-25L**	**14-32**
Category	Transport	Transport	Transport
Length (feet)	10,600	10,897	14 - 10,492 32 - 11,584
Width (feet)	150	150	150
Threshold Displacement	None	None	14 – 200 feet 32 – 893 feet
Marking	Precision	Precision	Precision
Surface material	Asphalt	Asphalt	Asphalt
Pavement strength (thousands of pounds)			
Single-wheel (e.g., DC-3)	75	75	75
Twin-wheel (e.g., DC-6)	175	175	175
Single tandem (e.g., C-130)	175	175	175
Twin tandem (e.g., B-727)	400	400	400
Double-dual tandem (e.g., B-747)	900	885	900
Airport Reference Code	D-V	D-V	D-V
Effective gradient (%)	.3883	.2753	.2504

Source: Federal Aviation Administration.



Ted Stevens Anchorage International Airport

EXISTING AIRFIELD COMPLEX

FIGURE 1-3

The runway complex includes a complement of parallel and exit taxiways. These taxiways, also depicted in Figure 1-3, are briefly summarized below for each runway.

Runway 7L-25R is served by full length parallel taxiway, Taxiway K, located on the north side of the runway. Exit taxiways on the north side of the runway are designated A, B, C, D, E, G, R, Y and H. Exit taxiways to the south side of the runway are designated C, D, E and G.

Runway 7R-25L is served by parallel Taxiway K north of Runway 7R-25L. There is no parallel taxiway between the parallel runways or on the south side of the runway. Exit taxiways on the north side of the runway are designated C, D, E, G, H, and J. Exit taxiways on the south side of the runway are designated E and F. New Taxiway Z extends from Taxiways E and F serving the existing South Airpark, and future South Airpark development. These taxiways serve the South Airpark. There is also a taxiway exit located at the threshold of Runway 25L that serves the Kulis ANG Base.

Runway 14-32 is served by full length parallel Taxiway R on the east side of the runway and a partial-length parallel Taxiway Y on the west side of the runway. Exit taxiways serving both Taxiways R and Y are designated K, L, U, T and S. Additional taxiway exits M and Q are located on the east side of Runway 14-32, and Taxiway W is an exit taxiway on the located on the west side of the runway. Taxiway V intersects Taxiway R and provides ANC airfield access from Lake Hood Seaplane Base.

Navigational Aids and Published Approaches

ANC has nine published approaches, including both precision and nonprecision. These approaches rely on both on-airport and off-airport electronic navigational aids (NAVAIDs) and visual approach lighting aids. The following NAVAIDs supplement these published approaches.

- Airport Surveillance Radar (ASR)
- Very high frequency omnidirectional range (VOR)
- Non-directional beacon (NDB)
- Tactical air navigation (TACAN) equipment
- Distance measuring equipment (DME)
- Localizer—Runways 7L, 7R, 14
- Glide Slope – Runways 7L, 7R, 14
- Runway Visual Range Equipment – Runways 14-32, 7R-25L, 7L.
- Rotating beacon
- Remote Transmitter Receiver (RTR)

General data on the instrumentation and visual approach lighting for each runway is summarized in Table 1.2. The published approach procedures are summarized in Table 1.3**.**

Table 1.2 Instrumentation and Lighting Data

	Runway					
	7R	25L	7L	25R	14	32
Instrumentation						
Precision	X		X		X	
Nonprecision	X		X		X	
Runway Lighting						
HIRL	X	X	X	X	X	X
CL	X	X	X	X	X	X
TDZ	X		X		X	X
REIL						X
Approach Lighting						
ALSF-II	X					
MALSR			X			
ODALS					X	
VASI		X		X		
PAPI	X		X		X	X
RVR	X	X	X		X	X

HIRL High intensity runway lights
CL Centerline lighting
TDZ Touchdown zone lighting
REIL Runway end identifier lights
ALSF-II High intensity approach light system with sequenced flashers, Category II/III configuration
MALSR Medium intensity approach light system with runway alignment indicator lights
ODALS Omnidirectional approach light system
VASI Visual approach slope indicator
RVR Runway visual range
PAPI Precision approach path indicator
Source: ANC

Table 1.3 Summary of Published Approach Procedures

RWY	Procedure	Weather minimums by aircraft approach category (a) A(b)	B (c)	C (d)	D (e)
7R	**ILS or LOC/DME** ILS	330' and RVR 1,800' or ½-mile visibility	(Same as A)	(Same as A)	(Same as A)
	LOC/DME	500' and RVR 2,400' or ½-mile visibility	(Same as A)	(Same as A)	500' and RVR 4000' or ¾-mile visibility
7R	**ILS CAT II**	230' and RVR 1,200'	(Same as A)	(Same as A)	(Same as A)
7R	**ILS CAT III** CAT IIIA	RVR 700'	(Same as A)	(Same as A)	(Same as A)
	CAT IIIB	RVR 600'	(Same as A)	(Same as A)	(Same as A)
7R	**VOR**	700' and RVR 2,400' or ½-mile visibility	(Same as A)	700' and RVR 5,000' or 1-mile visibility	700' and RVR 6,000' or 1 ¼-mile visibility
7R	**RNAV** LVP DA	380' and RVR 2,400' or ½-mile visibility	(Same as A)	(Same as A)	(Same as A)
	LNAV/VNAV DA	660' and RVR 6,000' or 1 ¼-mile visibility	(Same as A)	(Same as A)	(Same as A)
	LNAV/VNAV DA	640' and RVR 2,400' or ½-mile visibility	(Same as A)	640' and RVR 5,000' or 1-mile visibility	(Same as C)
7L	**ILS or LOC/DME** ILS	328' and RVR 1,800' or ½-mile visibility	(Same as A)	(Same as A)	(Same as A)
	LOC/DME	460' and RVR 2,400' or ½-mile visibility	(Same as A)	(Same as A)	460' and RVR 4,000' or ¾-mile visibility
7L	**RNAV** LVP DA	390' and RVR 2,400' or ½-mile visibility	(Same as A)	(Same as A)	(Same as A)
	LNAV/VNAV DA	720' and 2 ¼-mile visibility	(Same as A)	(Same as A)	(Same as A)
	LNAV/VNAV DA	620' and RVR 2,400' or ½-mile visibility	(Same as A)	640' and RVR 4,000' or ¾-mile visibility	640' and RVR 5,000' or 1-mile visibility
14	**ILS**	351' and RVR 4,000' or ¾-mile visibility	(Same as A)	(Same as A)	(Same as A)
14	**RNAV** LVP DA	410' and RVR 4,000' or ¾-mile visibility	(Same as A)	410' and RVR 5,000' or 1-mile visibility	N/A
	LNAV/VNAV DA	500' and RVR 5000 or 1 mile visibility	(Same as A)	(Same as A)	500' and RVR 6,000' or 1 ¼-mile visibility
	LNAV/VNAV DA	500' and RVR 5,000' or 1-mile visibility	(Same as A)	(Same as A)	500' and RVR 6,000' or 1 ¼-mile visibility

ILS Instrument landing system RNAV Area Navigation
RVR Runway visual range LOC Localizer

VOR Very high frequency omnidirectional range   DME Distance Measuring equipment

(a) Weather minimums for precision approach procedures (e.g., ILS) are stated in terms of cloud ceiling (in feet above touchdown ground level converted to feet above MSL) and visibility, according to aircraft approach category. Aircraft approach categories are defined in the Federal Aviation Administration's Airman's Information Manual as "groupings of aircraft based on a speed of 1.3 times the stall speed in landing configuration at maximum gross landing weight." Weather minimums for nonprecision approaches (no electronic glide path information provided) are stated in terms of a minimum descent altitude (in feet above mean sea level) and visibility.

(b) Speed less than 91 knots (small aircraft).

(c) Speed 91 knots or more but less than 121 knots (most twin-engine propeller aircraft).

(d) Speed 121 knots or more but less than 141 knots (e.g., MD-80 and B 737).

(e) Speed 141 knots or more but less than 166 knots (heavy or "widebody" jets e.g., B-747).

Source: US Terminal Procedures, December 2006

Approach Surfaces

14 Code of Federal Regulations (CFR) Part 77 defines imaginary approach surfaces for runway approaches. The primary purpose of these surfaces is to identify potential obstructions to navigable airspace. The runway approach surfaces are based on the type of aircraft that use the runway and instrumentation that is available on that runway. The following lists the approach slopes that have been established for each runway:

Runway	Approach slope ratio
14	50:1
32	20:1
7L	50:1
25R	20:1
7R	50:1
25L	20:1

Airspace and Air Traffic Control

This section provides a brief summary of the current airspace structure centered on ANC, the interactions among area aviation facilities, and how changes in airfield capacity may affect the Anchorage area's overall airspace capacity.

The unique aspects of the Anchorage airspace add to its overall complexity. ANC is close to Elmendorf Air Force Base (EDF), an active military facility, and LHD, a very large and active seaplane base, which serves the entire state. The mountainous terrain in the area limits the available airspace. The physical shape of Cook Inlet also affects airspace. The water in Cook Inlet is so cold that single engine piston aircraft prefer to cross the Inlet at its narrowest points, which effectively limits the amount of airspace available to those users.

Airspace Management System

The airspace over the Anchorage area and all of the United States is under the jurisdiction of the FAA. This authority was granted by Congress via the Federal Aviation Act of 1958. The FAA established the National Airspace System (NAS) to protect persons and property on the ground and to establish a safe and efficient airspace environment for civil, commercial, and military aviation. The NAS is defined as the common network of US airspace, including air navigation facilities; airports and landing areas; aeronautical charts; associated rules, regulations, and procedures; technical information; personnel; and material. System components shared jointly with the military are also included.

Airspace Structure

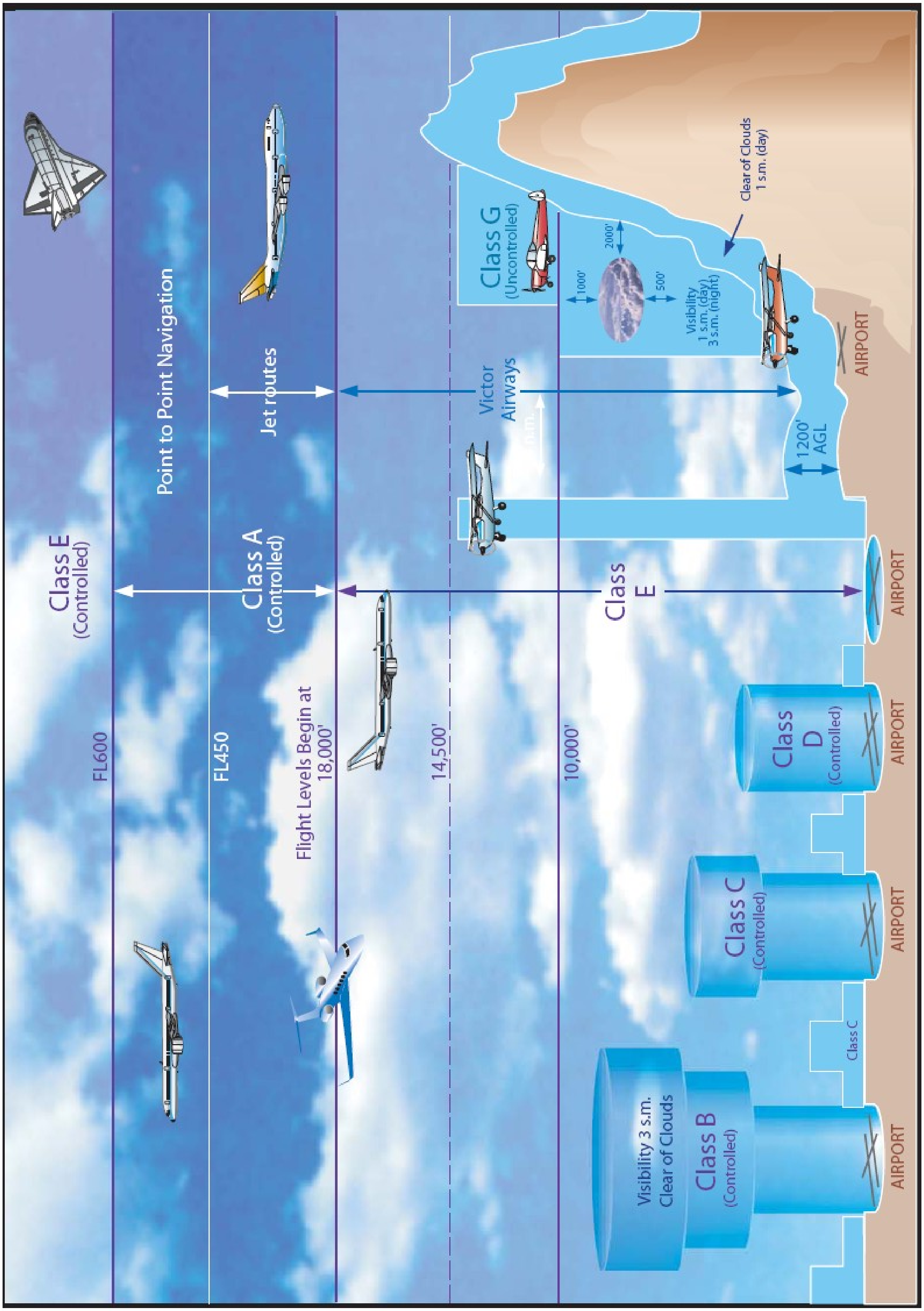
Airspace is currently classified as either controlled or uncontrolled. Controlled airspace is supported by ground-to-air communications, NAVAIDs, and air traffic services. The FAA's airspace classifications are depicted in Figure 1-4**.**

The types of controlled airspace in the vicinity of ANC include the following:

- Class A airspace generally includes all airspace from 18,000 feet MSL up to and including 60,000 feet MSL (as well as airspace overlying waters within 12 nautical miles (nm) of the coast of the 48 contiguous states).
- Class C airspace generally includes all airspace from ground surface up to 4,000 feet above the established elevation of an airport. The elevation of Class C airspace is expressed in MSL on charts.

  Although the configuration of each Class C airspace area is individually tailored, the airspace usually consists of a 5-nautical-mile radius core surface area that extends from ground surface up to 4,000 feet above airport elevation and a 10-nautical-mile radius shelf area that extends from 1,200 feet to 4,000 feet above an airport elevation. This airspace surrounds airports that have an operational Air Traffic Control Tower (ATCT), are serviced by a radar approach control, and have a certain number of instrument flight rules (IFR) operations or passenger enplanements.
- Class D airspace normally extends from ground surface to 2,500 feet above an airport's established elevation (but is charted in MSL) and is under the jurisdiction of a local ATCT. The Class D airspace surrounding the airports in the Anchorage area is individually configured.
- Class E airspace includes all controlled airspace other than Class A, C, or D. Class E airspace extends upward from either ground surface or a designated altitude to the overlying or adjacent controlled airspace.
- Class G airspace refers to uncontrolled airspace.

Only those airspace areas pertaining to the objectives of this airspace study (Classes C and D) are described further in the following paragraphs.



Ted Stevens Anchorage International Airport

FAA AIRSPACE CLASSIFICATIONS

FIGURE 1-4

Class C Airspace

All aircraft must contact the ATC before entering Class C airspace. Class C airspace in the Anchorage area is centered on ANC and contains a 5.2-nautical-mile radius core surface area and a 10-nautical-mile radius shelf surface. The circles are truncated significantly to the east of ANC. The elevation of the airspace within the core circle extends from the Airport elevation of 152 feet MSL up to 4,100 feet MSL, with the exception of an area south of Campbell Lake where the elevation extends from 600 feet MSL to 4,100 feet MSL. The elevation of the shelf surface extends from 1,400 feet MSL up to 4,100 feet MSL, with the exception of an area located north of ANC across the Knik Arm where the elevation extends from 1,900 feet MSL to 4,100 feet MSL. Airspace centered on ANC is active during the hours of Terminal Radar Approach Control (TRACON) operation, which is 24 hours per day.

Class D Airspace

In Class D airspace, an ATCT can control aircraft in the vicinity of an airport. Class D airspace typically encompasses airspace associated with instrument procedures. Aircraft operating within this area are required to maintain radio communication with the ATCT. Class D airspace encompasses three airports and one seaplane base in the vicinity of ANC, including Merrill Field (MRI), Lake Hood Strip Airport (Z41), EDF, and LHD. Class D airspace for these facilities has been delegated to three ATCTs: ANC, MRI, and EDF. The top elevation of each facility's Class D airspace is 2,500 feet MSL, 2,500 feet MSL, and 3,000 feet MSL respectively.

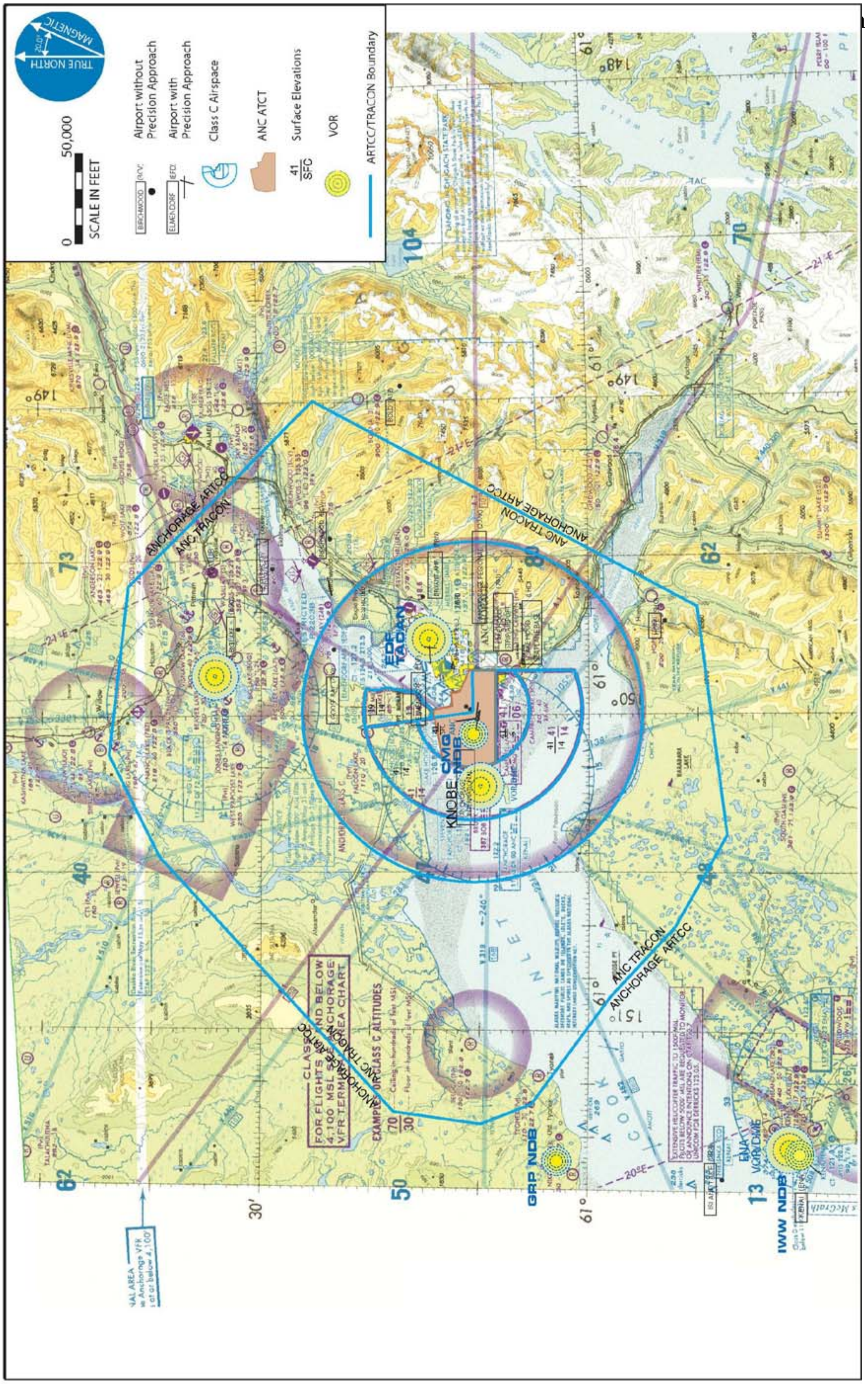
The Class D airspace for LHD is encompassed and intersected by Class C airspace for ANC. The ATCT for ANC controls the Class D airspace in areas that intersect the Anchorage Class C airspace up to 2,500 feet MSL.

The Class D airspace for Anchorage area airports is active only during the operational hours of the three ATCTs. MRI's hours are 6 a.m. to 10 p.m. during the winter and 6 a.m. to 12 p.m. during the summer. The ATCTs at ANC and EDF operate 24 hours per day.

Delegation of Air Traffic Control Responsibilities

Air Route Traffic Control Center

ANC is located in one of the nation's 22 FAA-operated Air Route Traffic Control Centers (ARTCC). These facilities control aircraft operating under IFR within controlled airspace while in the en route phase of flight. The Anchorage ARTCC controls airspace that encompasses all of Alaska. The ANC ARTCC and TRACON boundaries are depicted in Figure 1-5. A Letter of Agreement (LOA) between the ANC TRACON and the ARTCC formalizes the two parties' lines of authority. Control of the airspace in the vicinity of Anchorage has been delegated to the TRACON by the ARTCC.



Ted Stevens Anchorage International Airport

ANCHORAGE ARTCC/TRACON AIRSPACE

FIGURE 1-5

The Anchorage ARTCC controls activity into and out of the ANC TRACON area through remote radar and radio facilities located throughout the region. All air controllers employed by the Anchorage ARTCC are located at a single operation site near EDF. From this location, controllers manage air traffic throughout the Alaskan region. The Anchorage ARTCC maintains LOAs with other FAA agencies and users throughout the ARTCC's area of responsibility. These agreements establish procedures for handing off air traffic from one agency to another, and define local ATC procedures and responsibilities. The ARTCC also maintains a LOA with other radar-equipped FAA agencies to assume en route ATC responsibilities in the event of an emergency that renders any agency incapable of control.

Anchorage Area Air Traffic Control

There are two levels of ATC in the Anchorage area: TRACON surrounding ANC and tower control by the ATCT for ANC, LHD, EDF, and MRI.

ANC TRACON. The ANC TRACON controls arriving and departing aircraft within the ANC area. According to agreements between ANC TRACON and the ARTCC, the TRACON is responsible for airspace within an irregularly shaped area extending approximately 33 nautical miles north, 22 nautical miles south, 20 nautical miles east, and 36 nautical miles west of ANC. The TRACON airspace extends from the surface to 20,000 feet MSL (FL200). The ANC TRACON is also responsible for the Class C airspace centered on ANC, except for that portion delegated to ANC ATCT. The TRACON has control of both IFR and visual flight rules (VFR) aircraft within the Class C airspace. The TRACON controls operations 24 hours per day.

ANC ATCT. The ANC ATCT controls aircraft operations on the ground and within delegated airspace at ANC. The ANC ATCT also controls air traffic at LHD and Z41.

EDF ATCT. The EDF ATCT controls aircraft operations on the ground and in the airport traffic control area (Class D) at EDF. The EDF Class D airspace is located outside the ANC Class C airspace and extends from the ground to 3,000 feet MSL.

MRI ATCT. The MRI ATCT controls aircraft operations on the ground and in the airport traffic control area (Class D) at MRI. The MRI Class D airspace is located outside the ANC Class C airspace and extends from the ground to 2,500 feet MSL.

LOAs exist between the ANC ATCT and the EDF and MRI ATCT facilities. These LOAs formalize the parties' understanding regarding lines of authority.

En Route Navigation Aids

En route NAVAIDs are established to maintain accurate en route air navigation. NAVAIDs use ground-based transmission facilities and onboard receiving instruments. Several en route NAVAIDs operate in the Anchorage area.

The NDB is a general purpose, low-frequency radio beacon that a pilot can use to determine a bearing. ANC is served by the Campbell Lake NDB, which is located 0.5 nautical miles southwest of Runway 7L at ANC.

Another important NAVAID is the VOR station. The VOR is a ground-based NAVAID that transmits high frequency radio signals 360 degrees in azimuth from the station. These radio signals enable pilots to turn at a given point above the ground or fly along a radial to or from the station. VORs are often combined with DME or TACAN, which emit signals enabling pilots to determine their line-of-sight distance from the facility. The TACAN also provides azimuth information for military aircraft.

There are two VORs located within the ANC TRACON area: ANC and Big Lake (BGQ). A third VOR is located just outside the ANC TRACON airspace: Kenai (ENA).

The BGQ VOR, located within the ANC TRACON airspace, is combined with a TACAN unit. The two remaining VORs are combined with DME.

VORs are also used to define low altitude (Victor) and high altitude (Jet route) airways through the area. Low altitude airways are designated from 1,200 feet above ground level (AGL) up to, but not including, 18,000 feet MSL (Class E airspace). Low altitude airways are generally used to accommodate slower, non-turbojet aircraft, and are also sometimes used to vector turbojet traffic into and out of airports. The Jet routes are located at and above 18,000 feet MSL and are used by high-speed, pressurized turbojet aircraft.

Neighboring Airports

Table 1.4 lists the 15 aviation facilities within 50 nautical miles of ANC.

Table 1.4 Neighboring Airports

Civil	Military
Lake Hood Seaplane Base (LHD)	Elmendorf Air Force Base (EDF)
Lake Hood Strip Airport (Z41)	Bryant Army Heliport (FRN)
Hope Airport (5HO)	
Kenai Municipal Airport (ENA)	
Alaska Regional Hospital Heliport (20AK)	
Bold Airport (A13)	
Goose Bay Airport (Z40)	
Birchwood Airport (BCV)	
Big Lake Airport (BGQ)	
Merrill Field (MRI)	
Palmer Municipal Airport (PAQ)	
Wasilla Airport (IYS)	
Willow Airport (UUO)	

Table 1.5 lists the type of published instrument approach procedures, if any, at each airport identified in Table 1.4. The far right-hand column of Table 1.5 identifies any known airspace conflicts/interactions associated with these approaches, relative to operations into ANC.

Table 1.5 Instrument Approaches at Neighboring Airports

Airport	Instrument Approach	Airspace Conflict
Civil		
Big Lake Airport	VOR Runway 07 RNAV (GPS) Runway 07 RNAV (GPS) Runway 25	
Kenai Municipal Airport	ILS or LOC Runway 19R VOR/DME Runway 01L HI-VOR/DME Runway 19R VOR Runway 19R RNAV (GPS) Runway 01L RNAV (GPS) Runway 19R	
Wasilla Airport	RNAV (GPS) Runway 03	
Palmer Municipal Airport	GPS A	
Merrill Field Airport	GPS A	
Willow Airport	RNAV (GPS) Runway 13 RNAV (GPS) Runway 31	
Military		
Elmendorf Air Force Base	ILS or LOC/DME Runway 06 TACAN Runway 06	Dependencies between Runway 14 and 32 departures at ANC and Runway 06 arrivals and Runway 24 departures at EDF

General Airspace Management

Visual Flight Rules Procedures

Aircraft operating under VFR and departing ANC are under positive control of the Anchorage ATCT. Pilots of aircraft transitioning from ANC Class D airspace to ANC Class C airspace must establish radio contact with ANC TRACON. Pilots must receive clearance to transition from ANC Class D airspace to EDF or MRI Class D airspace and must comply with local airspace restrictions. Pilots landing at ANC must contact ANC TRACON prior to entering ANC's Class C airspace. Pilots of aircraft transitioning from ANC Class C airspace to ANC Class D airspace for arrivals must contact ANC ATCT and receive permission prior to entering. The arrival procedure will vary, depending on the operational flow and volume of traffic.

A unique aspect of the Anchorage airspace is that it is governed by procedures outlined in Federal Aviation Regulation (FAR) Part 93 Special Air Traffic Rules and Airport Traffic Patterns. FAR 93 dictates special procedures that VFR aircraft must follow when arriving in or departing from the general Anchorage area. The purpose of this FAR is to help separate slower VFR aircraft traveling into and out of the area from the high-performance aircraft using ANC and EDF.

In general, FAR 93 specifies the six segments— International, Merrill, Lake Hood, Elmendorf, Bryant and Seward Highway—of VFR approach procedures and airport traffic patterns that aircraft are to fly when going to or from any given airport in the area. Specific altitudes are associated with each segment.

Following are the general rules outlined by FAR Part 93 for the Anchorage area:

- Each person operating an aircraft to, from, or on an airport within the Anchorage Terminal Area shall operate that aircraft according to the rules set forth in FAR Part 93 as applicable, unless otherwise authorized or required by ATC.
- Each person operating an airplane within the Anchorage Terminal Area shall conform to the flow of traffic depicted on the appropriate aeronautical charts.
- Each person operating a helicopter shall operate it in a manner so as to avoid the flow of airplanes.
- Except as provided in FAR Part 93, each person operating an aircraft in the Anchorage Terminal Area shall operate that aircraft only within the designated segment containing the arrival or departure airport.
- Except as provided in FAR Part 93, each person operating an aircraft in the Anchorage Terminal Area shall maintain two-way radio communications with the ATCT serving the segment containing the arrival or departure airport.

The VFR arrival/departure procedures for the Anchorage, Lake Hood, and Merrill Part 93 segments are briefly described below.

ANC VFR Departure Procedures:

- NORTH SHORE DEPARTURE—issued to aircraft departing ANC westbound through northeast bound.
- CHICKALOON DEPARTURE—issued to aircraft departing ANC to the south.
- LITTLE SU DEPARTURE—issued to aircraft departing ANC to the west.
- MACKENZIE ARRIVAL—issued to aircraft arriving to ANC from the north.
- DIMOND MALL ARRIVAL—issued to aircraft arriving to ANC from the northeast or south.

LHD VFR Procedures:

- WEST ROUTE ARRIVAL/DEPARTURE—issued when LHD is operating in a west flow (landing and departing west, north, or northwest waterlanes and Runway 31).
- EAST ROUTE ARRIVAL/DEPARTURE—issued when LHD is operating in an east flow (landing and departing east, south or southeast waterlanes and Runway 13).
- TUDOR OVERPASS ARRIVAL/ DEPARTURE—used to provide an orderly route for entering and exiting LHD airspace while avoiding Class C airspace and reducing potential conflict with aircraft using established routes to and from adjacent airports.
- CHICKALOON DEPARTURE—issued to aircraft departing LHD to the south.
- LITTLE SU DEPARTURE—issued to aircraft departing LHD to the west.
- GRAVEL PIT ARRIVAL—direct routing to LHD from the south (not used when ANC is departing Runway 14).

MRI VFR Procedures:

- POTTER DEPARTURE—issued to aircraft departing MRI to the south.
- SHIP CREEK DEPARTURE—issued to aircraft departing MRI to the west and northwest.

- CHESTER CREEK DEPARTURE—issued to aircraft departing MRI to the west and northwest at or below 600 feet MSL.
- CITY HIGH DEPARTURE (RWYS 15 & 21)—issued to aircraft departing MRI to the west and northwest at or above 2,200 feet MSL.
- CITY HIGH DEPARTURE (RWYS 24 & 33)—issued to aircraft departing MRI to the west and northwest at or above 2,200 feet MSL.
- MULDOON DEPARTURE—issued to aircraft departing MRI to the north.
- POTTER ARRIVAL—issued to aircraft arriving MRI from the south.

Instrument Flight Rules Procedures

Aircraft under IFR are generally under control of the ARTCC outside of Anchorage TRACON airspace.

When ARTCC personnel prepare to transfer arriving turbojet or other high-performance IFR aircraft to Anchorage TRACON control, they clear aircraft to ANC via a standard terminal arrival route (STAR). A STAR is a preplanned IFR ATC arrival procedure published for pilot use. STARs use a combination of published VOR radials and intersections and ATC-assigned vectors, altitudes, and speeds to route aircraft into the arrival flow sequence.

Seven STARs are used by Anchorage ARTCC and Anchorage TRACON/ATCT personnel for arrivals to ANC and two STARs are used by Anchorage ARTCC, TRACON, and EDF ARTCC for arrivals to EDF. STARs are generally utilized by heavier and faster turbojet aircraft. The seven ANC STARs and two EDF STARs are briefly described below.

ANC STARs:

- AMOTT FIVE ARRIVAL—for aircraft arriving from the southwest.
- DENALI ONE ARRIVAL—for aircraft arriving from the north.
- ELLAM TWO ARRIVAL—for aircraft arriving from the southeast.
- KELYE ONE ARRIVAL (RNAV)—for aircraft arriving from the east/southeast.
- MUDIE ONE ARRIVAL (RNAV)—for aircraft arriving from the north.
- TAGER THREE ARRIVAL—for aircraft arriving from the north/northwest.
- YESKA TWO ARRIVAL—for aircraft arriving from the southeast.

EDF STARs:

- DESKA THREE ARRIVAL—for aircraft arriving from the west and northwest.
- MATSU FIVE ARRIVAL—for aircraft arriving from the northeast.

Other aircraft are brought into the Airport's airspace using one of seven Arrival Transition Areas (ATAs) (TAGER, MATTA, ELLAM, YESKA, NAPTO, KENAI, and GASTO). The STAR or ATA that an aircraft is directed through depends on which runway has been designated as the arrivals runway at ANC.

Table 1.6 lists clearance/instructions for arriving aircraft, as outlined in the LOA between the ANC ARTCC and the ANC TRACON.

Table 1.6 Clearance/Instructions – Arriving Aircraft

ATA	Defining Radial (ANC VOR)	Assigned Altitude Turbojets	Assigned Altitude Non-Turbojets	Holding Fix
TAGER	R-315 R-332	10,000 - 14,000	7,000	TAGER
MATTA	R-004 R-020	11,000	11,000	MATTA
ELLAM (RWY 14)	R-039 R-061	11,000	11,000	ELLAM
YESKA (RWY 6-32)	R-074 R-097	11,000	10,000	YESKA
NAPTO	R160 R185	10,000	3,000, 5,000 10,000 - 7,000	NAPTO
KENAI	R-185 R-210	N/A	3,000, 5000 10,000 - 7,000	ANC 25 DME
GASTO	R-210 R-229	10,000 - 12,000	7,000	AMOTT

Notes:
When A11 is using Runway 14 as the arrival runway, MATTA ATA shall not be used for aircraft landing at ANC except aircraft filed via V456 at or below 16,000 feet.
At KTA, aircraft may use two of the noted altitudes without sequencing.
Headings shall be assigned that will keep the aircraft within the confines of the ATA. The individual headings need not be coordinated.
On top (OTP) is an acceptable altitude at any ATA.
Turbojets and non-turbojets shall be a minimum of 5 miles in trail.

ATA – Arrival Transition Area
Source: HNTB Analysis

For departing IFR turbojet aircraft, the FAA issues departure procedures (DPs). There are three DPs available for ANC departures—ANCHORAGE THREE, KNIK SIX, and TURNAGAIN TWO—and one DP for EDF departures—EAGEL ONE. DPs are usually used only by heavier and faster turbojet aircraft. In addition to these DPs, aircraft are vectored toward Departure Transition Areas (DTAs). There are seven DTAs, which are defined in the agreements between the ANC TRACON and the ANC ARTCC.

Table 1.7 lists clearance/instructions for departing aircraft, as outlined in the LOA between the ANC ARTCC and the ANC TRACON.

Table 1.7 Clearance/Instructions - Departing Aircraft

DTA	Defining Radial	Associated Departure Route	Instructions
BIG LAKE	R-341 R-357	J115, J124, J125, J511, G8 V436, V438, V456, V491,V510	
ELLAM	R-039 R-061	V319, J111,J133 J501, J804R, MDO	
YESKA	R-074 R-128	SAME AS ELLAM & SEWARD	
SEWARD	R-108 R-128	V319, V320, V440, V441, A1, J111, J133, J501, J804R, MDO	
KENAI	R185 R210	DEPARTURES FILED VIA AIRWAYS OR DIRECT ON ANC R-160 THRU R-221	
SPARREVOHN	R-253 R-272	J111, J501, V319, V440, A1, J888R, J996R, R220, R580	
NAPTO	R-160 R-185	DEPARTURES FILED VIA AIRWAYS OR ON ANC R-160 THRU R-221	
Notes: Aircraft filed on direct routings shall be vectored via the DTA associated with the route of flight. All shall ensure aircraft utilizing the KENAI or NAPTO DTA cross the ANC ARTCC (ZAN)/A11 boundary at or above 6,000 feet or level at 2,000 or 4,000 feet. Non-turbojet aircraft filed westbound on V319 or J501 shall be cleared via the airway. Direct routes westbound for non-turbojet aircraft shall be coordinated on an individual basis. Aircraft filed westbound on V440, A1, or J111 may be cleared via the airway unless DESKA Letdown is active. Aircraft filed northeast-bound via V456, G8, J124, J511, or direct on ANC R-358 through R-020 may be cleared via their filed routes unless the MATSU Letdown is active. Aircraft filed northwest-bound on J133 may be cleared via the airway at all times. All aircraft filed V319 eastbound at or below 13,000 feet shall be vectored via the SEWARD DTA.			

DTA – Departure Transition Area
Source: HNTB Analysis

Local Air Traffic Control Procedures

Runway Usage

Anchorage Runway Operating Restrictions. As summarized in Table 1.8, a preferential runway use system is in effect at the Airport as part of ANC's noise abatement program, which applies to all turbojet aircraft and all other aircraft with a Certified Gross Maximum Takeoff Weight (CGMTW) of 11,500 pounds or more with two or more engines. The preferential runway use system is in effect 24 hours per day and differs based on time of day. General flow of traffic operations for ANC's six runway ends is arrivals to the east or south and departures to the north or west.

Table 1.8 Preferential Runway Use Program (In Priority Order)

Operation	Daytime (0700-2200)	Nighttime (2200-0700)
Departures	Runway 32 (RAN) Runway 7R* Runway 7L* Runway 25L Runway 25R Runway 14	Runway 32 Runway 25L (R1\N) Runway 25R Runway 7R Runway 7L Runway 14
Arrivals	Runways 7R Runway 7L/14 (RAN) Runway 32 Runways 25L/25R	Runways 7R Runway 7L/14 Runway 32 Runway 25L/25R

* Runway 25L should be used as the second priority departure runway during daytime hours if weather and traffic conditions allow. Runways 7R and 7L are only listed as the second and third priority during daytime hours in recognition of air traffic considerations.

Source: *Anchorage International Airport Noise Abatement Procedures and Preferential Runway Use Program* (Obtained from ANC website on December 6, 2006).

For Runway 32, all turbojet departures not on a DP are assigned a heading of 300 degrees during daylight hours, while non-turbojet aircraft weighing less than 75,000 pounds may be assigned a heading of 320 degrees. During nighttime hours, Runway 32 departures may be assigned runway headings without coordination with the TRACON. For Runway 14, all turbojet aircraft or aircraft weighing more than 75,000 pounds are required to operate using the published DP.

Departures by non-turbojet and other aircraft weighing less than 75,000 pounds are assigned headings between 160 and 190 degrees. This 75,000-pound rule does not apply to certain large reciprocating engine aircraft (e.g., DC-3s, DH-4s, and C-46s).

There are also special landing and takeoff procedures that must be observed by pilots operating on Runway 14-32. Pilots are not allowed to utilize this runway when aircraft are holding between the Runway and Taxiway R. Small GA aircraft may be instructed to make a base leg (i.e., the portion of their approach perpendicular to the runway) to Runway 32 prior to Taxiway K.

Turbojet aircraft may not practice circling approaches (except to Runway 14), touch-and-go operations, low approaches, and options between 10:00 p.m. and 7:00 a.m. For aircraft weighing more than 12,500 pounds, practice approaches, touch-and-go operations, low approaches, and options are not permitted on either Runway 14 or Runway 32 (except when either runway is the primary arrival runway).

Wake turbulence created by heavy aircraft on the ground at ANC has also given rise to certain runway use restrictions. Adequate separation must be maintained between heavy jets or Boeing 757s departing Runway 32 (from the extension) and between aircraft landing and taking off from Runway 7R-25L. This restriction also applies when Runway 32 departures are leaving the approach end (Taxiway K). When Runway 7L-25R and Runway 32 are used in tandem, restrictions are placed on heavy jets, Boeing 757s, Boeing 737s, and L188s regarding the location on the runway from which they are allowed to takeoff. These restrictions exist to avoid adversely affecting arrivals/departures by smaller aircraft on Runway 7L-25R. When a heavy jet[3] is in position to depart on Runway 32 from the Runway 32 extension or Taxiway K, no Category I and II operations are allowed on Runway 7R-25L or Runway 7L-25R.

The following summarizes miscellaneous restrictions placed on departures and arrivals at ANC:

- Departure Procedure Restrictions – The headings imposed by Anchorage TRACON on aircraft departing ANC are included in Table 1.10.

Table 1.9 Departure Headings

Runway	Turn Restrictions
25R/25L	RT (RH to 025)
	LT (RH to 120)
7R/7L	RT 190 to 025
	LT 330 to 160
32	RT (RH to 025)
	LT (RH to 120)
	RT to 190 (</=17,000 lbs.)
14	RT 160 to 025
Notes:	RT = Right Turn, LT = Left Turn, RH = Runway Heading

- Approach Procedure Restrictions – Both parallel runways at ANC have precision approaches. Landings to Runway 7R, however, can be accomplished in poorer weather conditions because it has CAT II/III-rated equipment. The two parallel runways do not have the appropriate separation to allow for simultaneous precision instrument approaches in all weather conditions. The parallel runways are also too close to allow independent IFR arrivals and departures simultaneously. During IFR conditions, a departure cannot be released on the parallel runway if an approach is being made to the other parallel unless single runway separation criteria can be applied or the arrival is in sight.

Major Airspace Interactions

A major airspace interaction in the ANC area occurs between departures on Runway 32 at ANC and arrivals to Runway 6 at EDF. All large aircraft departures from ANC are an airspace conflict with straight-in arrivals to Runway 6 at EDF. The only aircraft that do not require straight-in arrivals to Runway 6 are high-performance fighters during VFR weather conditions. Because of this, every Runway 32 departure from ANC must be approved for departure by the controller handling EDF Runway 6 arrivals and before the ANC tower controller can clear the 32 departure for takeoff. This coordination adds to controller workload and can potentially delay departures.

The ANC ATCT has alleviated some of these problems by devising a signal light system. When there are no aircraft on approach to EDF, the approach controller turns on a green light, which has an indicator in the tower. The tower controller knows he is then free to give Runway 32 departures their takeoff clearance without regard to EDF traffic. When the light is red, the ANC

[3] "Heavy" aircraft are defined as those weighing over 300,000 pounds at Maximum Certified Take-Off Weight (MTOW). All current wide-body (twin isle) aircraft are categorized as "Heavy." The Boeing 757 is categorized as a heavy jet though it is a narrow-body aircraft.

tower controller must call the EDF approach controller to coordinate each Runway 32 large aircraft departure.

An approach to Runway 15 at EDF would alleviate this problem, but Runway 15 is pointed at downtown Anchorage, making an instrument approach difficult.

Another airspace concern is large aircraft departing ANC Runway 32, and GA aircraft operating in the area of Point McKenzie.

High concentrations of GA aircraft pass over Point McKenzie due to the geography of the area. The water is so cold in Cook Inlet that pilots prefer to cross the Inlet at its narrowest point. Other topography, such as mountains, funnels aircraft over Point McKenzie. Wake turbulence from low altitude departing transport aircraft is a concern to smaller GA aircraft passing underneath.

Planned Improvements

As part of the FAA's continuing facilities planning program, a number of NAVAID improvements are being planned or considered for the Airport. The improvements are summarized below. This summary is presented for information purposes only, as firm commitments have not been made for the improvements.

- Runway 25R
  - Precision Approach Path Indicator (PAPI)
- Airport (timing uncertain for some systems)
  - Upgrade Airport Surface Detection Equipment (ASDE) with Airport Movement Area Safety System (AMASS)
  - Replace Airport Surveillance Radar (ASR) 8 with ASR 11 (ASR 11 currently installed but not commissioned due to operational conflicts, existing ASR 8 remains in operation while FAA identifies potential solutions including installation of ASR 9 or SR 10)
  - Low Level Wind Shear Alert System (LLWAS)
  - Automated Surface Observation System (ASOS)
  - Automated Weather Information System (AWIS)

1.2.2. Passenger Terminal Complex

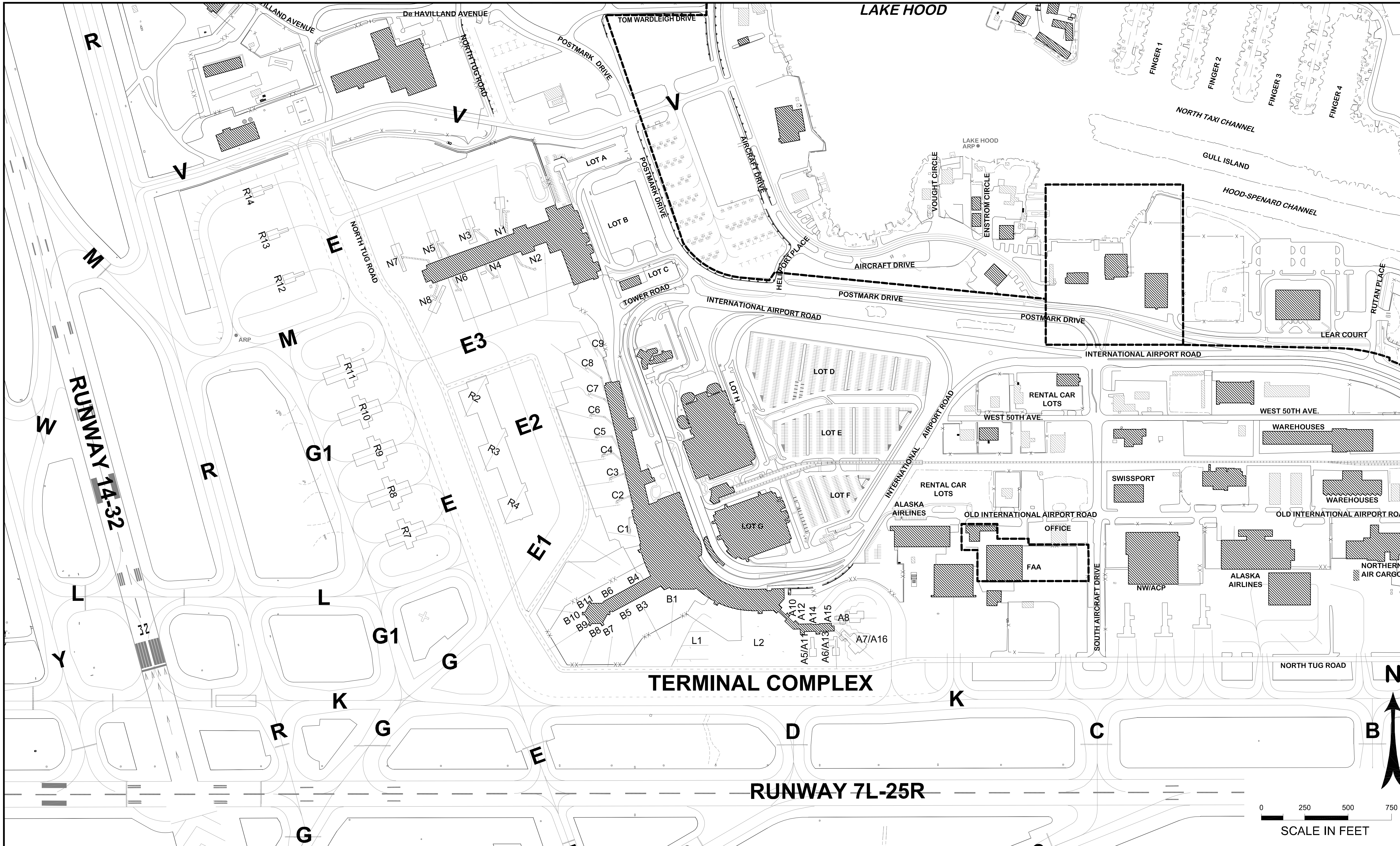
The approximately 228-acre passenger terminal complex supports two passenger terminals and their associated aircraft parking aprons. Roadway access, curbside, rental car facilities, and parking are detailed in Section 1.2.3 Ground Access and Parking. The passenger terminal complex is illustrated in Figure 1-6.

Table 1.10 lists the scheduled air carriers providing passenger service at ANC.

Table 1.10 Scheduled Air Carriers Providing Passenger Service

DOMESTIC	INTERNATIONAL
Passenger Operations	**Passenger Operations**
Alaska Airlines	Cathay Pacific Airways*
American Airlines	China Airlines
Continental Airlines	Air Canada
Delta Air Lines	* indicates transit only
Era Aviation	
Frontier Airlines	**International Passenger Charters**
Frontier Flying Service	Condor / Thomas Cook
Grant Aviation	Japan Air Charter
Hageland	
Hawaiian Airlines	**Domestic Passenger Charters**
Northwest Airlines	Sun Country
Peninsula Airways	Shared Services Aviation
United Airlines	Omni Air International
US Airways	ATA
	North American Airlines

Source: ANC web site, October 2006.



Ted Stevens Anchorage International Airport Master Plan

EXISTING TERMINAL COMPLEX

FIGURE 1-6

Table 1.11 lists all-cargo operations conducted or serviced (primarily fueling) at the terminal complex.

Table 1.11 All-Cargo Operations Conducted or Serviced at the Terminal Complex

Domestic	International	Charter
Alaska Central Express	Air Atlanta Icelandic	Gemini
Alaska Airlines	Air China	
Empire Airlines	Air Hong Kong	
Era Aviation	All Nippon Airways	
Everts Air Cargo	American Transair	
Lynden Air Cargo	Asiana Airlines	
Northern Air Cargo	Atlas Air	
	Cargo 360	
	Cathay Pacific Airways	
	China Airlines	
	China Cargo	
	China Southern	
	Eva Air	
	Evergreen International Airlines	
	FedEx	
	Japan Airlines	
	Kalitta	
	Korean Air	
	Nippon Cargo Airlines	
	Northwest Air Cargo	
	Polar Air Cargo	
	Quantas	
	Shanghai Airlines	
	Singapore Airlines	
	Southern Air	
	Tradewinds	
	Transmile	
	United Parcel Service	
	Yangtze River Express	

Source: ADOT&PF

Aircraft Parking Apron

There are 37 designated gates at the two airline passenger terminals, though usage of each gate varies and some gates are not currently used. There are eight air carrier gates at the North Terminal and 26 functioning air carrier gates are at the South Terminal. Some of the commuter gates at the South Terminal provide access for more than one aircraft parking position, though they are defined as a single gate. The existing gate assignments, gate types, and maximum aircraft sizes that can be independently accommodated at each gate are identified in Table 1.12.

Table 1.12 Existing Airline Gate Inventory

Position No.	Designation	Design Aircraft	Gate Use
N1	Preferential – Delta	747-300	Passenger, Cargo
N2	Airport Administered	747-300	Passenger, Cargo
N3	Preferential – Delta	747-300	Passenger, Cargo
N4	Airport Administered	747-300	Passenger, Cargo
N5	Airport administered	747-300	Passenger, Cargo
N6	Airport Administered	747-300	Passenger, Cargo
N7	Airport Administered	747-300	Passenger, Cargo
N8	Airport Administered	747-300	Passenger, Cargo
C1	Preferential – Alaska	737-900	Passenger
C2	Preferential – Alaska	737-900	Passenger
C3	Preferential – Alaska	737-900	Passenger
C4	Preferential – Alaska	737-900	Passenger
C5	Preferential – Alaska	737-900	Passenger
C6	Preferential – Alaska	737-900	Passenger
C7	Preferential – Alaska	737-900	Passenger
C8	Preferential – Alaska	737-900	Passenger
C9	Preferential – Alaska	737-400	Passenger
A5	Airport Administered	737-300	Passenger
A6	Airport Administered (A13)	737-300	Passenger
A7	Airport Administered	DC-10-30/40	Passenger
A8	Preferential – Continental	DC-10-30/40	Passenger
A10	Not in Service	n/a	n/a
A11	Combined with A5	n/a	n/a
A12	Not in Service	n/a	n/a
A13	Grant Aviation	n/a	n/a
A14	Pref. – Frontier F.S.	(6,000 SF)	Passenger
A15	Pref. – Frontier F.S.	(6,000 SF)	Passenger
A16	Combined with A7	n/a	n/a
B1	Not in Service	n/a	n/a
B3	Preferential – Alaska	757-200	Passenger
B4	Preferential – Alaska	737-900 (W)	Passenger
B5	Pref.-Northern Frontier	737-900	Passenger
B6	Preferential – Alaska	737-900 (W)	Passenger
B7	Airport Administered	737-400	Passenger
B8	Preferential – United	757-200 (W)	Passenger
B9	Preferential – United	767-300	Passenger
B10	Preferential – Northwest	757-200	Passenger
B11	Preferential – Northwest	757-200	Passenger
L1	Preferential – Pen Air	(71,400 SF)	Passenger
L2	Preferential – ERA	(101,920 SF)	Passenger
R2	Airport Administered	747-400	Cargo, Fuel
R3	Airport Administered	747-400	Cargo, Fuel
R4	Airport Administered	747-400	Cargo, Fuel
R7	Airport Administered	747-300	Cargo, Fuel
R8	Airport Administered	747-300	Cargo, Fuel
R9	Airport Administered	747-300	Cargo, Fuel
R10	Airport Administered	747-300	Cargo, Fuel
R11	Airport Administered	747-300	Cargo, Fuel
R12	Airport Administered	747-400	Cargo, Fuel
R13	Airport Administered	Group VI	Cargo, Fuel
R14	Airport Administered	747-400	Cargo, Fuel

Source: DOT&PF

In addition, there are 11 remote hardstands (aircraft parking positions) located west of the terminal building complex for fueling and overnight aircraft parking. Each of the aircraft hardstands are equipped with aircraft fueling pits served by a fuel hydrant system extending from the fuel farm. These aircraft parking positions are designed to accommodate wide-body aircraft, typically long-haul cargo aircraft making technical stops at ANC. These positions are commonly referred to as "The R Spots" and are so named due to their proximity to Taxiway R. Positions R2, R3, and R4 are located closest to the passenger terminal complex, were recently repaved, and can accommodate three B747 aircraft or five B757 aircraft. These positions are utilized by both passenger aircraft and cargo aircraft. Positions R7 to R11 are utilized primarily for cargo aircraft making technical stops at ANC. These five positions can currently accommodate five B747-200s or three B747-400s and two MD-11 aircraft. These positions cannot currently accommodate five B747-400 aircraft at adjacent positions due to the wingspan of the aircraft. Positions R12, R13, and R14 accommodate all Design Group V[4] aircraft, including B747-400s. Positions R12 and R13 are capable of accommodating Design Group VI[5] aircraft such as the Airbus A380 which is expected to enter commercial service at ANC by 2010.

Passenger Terminal Buildings

All passenger-processing facilities are located in the North and South Terminals. The two terminals are adjacent to each other but are separated by approximately 700 feet. A pedestrian sidewalk links the two terminals. The South Terminal accommodates domestic scheduled air carrier, commuter, and charter operations, while the North Terminal accommodates domestic, and international scheduled air carrier and charter operations.

South Terminal

The South Terminal is a 759,000 square foot structure that was expanded and activated in 2004. The original portion of the structure is two stories with a mezzanine floor. The South Terminal expansion included a new baggage claim level, ticketing and check-in, security check-point, passenger circulation, hold-rooms, concessions areas, offices and ancillary support facilities for airline and airport staff. The newly constructed addition has four above ground levels. The South Terminal serves three passenger-boarding concourses. The below ground level contains mechanical rooms, staff support rooms such as a break room, storage, circulation to and from the terminal garage, rental car facilities (existing and planned) as well as the Alaska Railroad Depot. The ground level of the terminal building contains baggage handling, baggage claim, public lobbies, mechanical rooms, airline operations offices and other support. The second level contains airline ticketing, passenger security screening, primary concession facilities, and passenger holdrooms. The third level contains a passenger lounge, a VIP passenger lounge (the Alaska Airlines "Board Room"), offices for airlines and other airport tenants, and airport administrative offices scheduled to be occupied in 2007. The fourth level is primarily mechanical rooms, but also contains approximately 8,000 square feet of office space currently being finished for ANC staff. The baggage claim and ticketing areas that were constructed as part of the South Terminal expansion accommodate Alaska Airlines and their partners, such as American Airlines. The original baggage claim and ticketing facilities, located south of the security checkpoint, serve all other South Terminal airlines. Approximately half of the original South Terminal ticket

[4] Airplane Design Group V – wingspan up to 214 feet or tail height up to 66 feet.

[5] Airplane Design Group VI – wingspan up to 262 feet or tail height up to 80 feet.

lobby has been renovated to provide additional space for circulation. The remaining half will be renovated along with Concourse B as part of the South Terminal Seismic and Security Upgrade Project (see below for further detail).

The three passenger concourses in the South Terminal are designated as Concourses A, B, and C. Concourse A is a two-story structure, opened in 1985, with 11 aircraft gates. Though there are 11 numbered gates, three are shared, resulting in a total of eight boarding positions. Gates A13, A14 and A15 are used for loading of intrastate commuter aircraft from the ramp level. Gates A10, A11, and A12 are not currently in use. These ramp level gates contain airline operations space and commuter passenger holdrooms for Gates A10 through A15. Frontier Flying Service and Grant Aviation use the ramp level gates. These airlines are considered air taxis and are not subject to the same security regulations as other scheduled air carriers. The lower level of Concourse A, Gates A10 to A15, has a separate access point from the South Terminal that is non-secure, and passengers are able to proceed directly to these ramp level gates without clearing the Transportation Safety Administration (TSA) managed security check-point. The second level contains passenger holdrooms for air carrier Gates A5 through A8 and airline office space. These gates are on the secure side as are all other gates at the Airport.

Concourse B is a two-story structure that serves ten narrow-body and wide-body gates. Gate B1 is not currently in service. The ramp level contains airline operations, concession support, and baggage handling space. The second level contains passenger holdrooms and secondary concession areas. A third level exists in the main ticketing area and is occupied by airline offices and airport staff. Concourse B will undergo an extensive seismic and security retrofit beginning in 2008 and will be closed for approximately two years. The renovation and retrofit of this facility will not provide any additional aircraft gates upon completion.

Concourse C is entirely located within the South Terminal expansion. Concourse C has nine gates, a mezzanine lounge area, concessions including a full-service restaurant, moving walkways, and a passenger lounge area. Concourse C is utilized exclusively by Alaska Airlines and their partner airlines including American. Concourse C also includes a customer service center for Alaska Airlines customers.

The rental car counter area in the South Terminal is located below the main access roadway and is accessible from a tunnel under the roadway connecting the South Terminal to the parking garage. Once the rental car garage, which is currently under construction, is completed, the rental car counter area will be relocated to that facility. A second tunnel connects the South Terminal to the Alaska Railroad Depot.

North Terminal

The North Terminal, which opened in 1982, consists of a 1-story terminal building with an adjoining 3-story passenger concourse. The floor level of the terminal building approximates the apron level of the concourse. Space in the terminal building is dedicated primarily to accommodating airline facilities related to enplaning passengers (e.g., ticketing, flight check-in, and baggage handling), public circulation, and amenity facilities for both enplaning and deplaning passengers, and various building-support mechanical areas.

The concourse is perpendicular to the terminal building, serves eight wide-body gates, and extends through the terminal building at the boarding and upper levels. The apron level accommodates airline support and aircraft servicing facilities, a Federal Inspection Services Facility (FIS) at the end closest to the terminal building for the clearance of arriving international passengers entering the U.S., and offices for ANC staff. The boarding level accommodates holdrooms (several of which can also serve domestic-flight boarding procedures), general and duty-free concessions, and offices for the FIS agencies, airlines, and, above the lobby area, offices for ANC staff. The uppermost level accommodates offices and meeting rooms for airlines and ANC staff, several concession areas (now closed) that served the boarding level by way of stairs near the central atrium space, tenant storage spaces, and various building support spaces (e.g., mechanical rooms). A domestic baggage claim is located on the south end of the ticket lobby.

Table 1.13 shows the approximate current allocation of floor space in the South and North Terminals.

Table 1.13 Approximate Current Floor Space Allocation in the South Terminal

South Terminal Space Allocation		
Space	Area (square feet)	Percent
Public Space*	548,133	72%
Non-Public Space**	217,661	28%
Subtotal	765,794	100%
North Terminal Space Allocation		
Space	Area	Percent
Public Space*	171,400	63%
Non-Public Space**	100,100	37%
Subtotal	271,500	100%
Total Public Space*	719,533	69%
Total Non-Public Space**	317,761	31%
Total	1,037,294	100%

* Public Space includes all building areas accessible to passengers, airline personnel, security personnel, and areas necessary for the function of these spaces

** Non-Public Space includes all building areas utilized by airport staff that are inaccessible to airport users, and are not essential to the function of the building.

Passenger Terminal Complex Planned Improvements

The South Terminal Seismic and Security Upgrade Project will provide upgrades and corrections to existing seismic and code-related deficiencies, enhance life safety and security systems, and generally renovate the older portions of ANC's South Terminal. The portion of the South Terminal that is planned to undergo renovation consists of approximately 360,000 square feet and encompasses Concourses A and B, portions of the ticket lobby, baggage claim, baggage make-up, airline operations areas and concessions space. This portion of the South Terminal is the original portion that existed prior to the 2004 expansion that more than doubled the size of the South Terminal. Preparations for this project are underway while the enhancements remain in the design phase. In late 2006, ANC began relocation of some airline operations from Concourse B to the North Terminal and to Concourse A. The renovation of Concourse B will be the first phase of the construction once all Concourse B airlines have been relocated. The ticket lobby and Concourse A renovation will follow as will a relocation of the existing security checkpoint.

The R Spots/Taxiway L upgrade will realign Taxiway L and aircraft parking positions R7 to R11 such that they can accommodate five B747-8 aircraft simultaneously. The Boeing 747-8 is a modified version of the B747 series aircraft that will have a larger wingspan than the existing B747 series aircraft. Though the B747-8 will qualify as a Design Group VI aircraft, its wingspan will not be as large as the Airbus A380. There are currently four cargo airlines operating at ANC that have ordered a total of 35 B747-8 freighter aircraft. This project is expected to commence in 2007 and take approximately 18 months to complete.

Planned Facilities

The South Terminal Seismic and Security Upgrade Project will provide upgrades and corrections to existing seismic and code-related deficiencies, enhance life safety and security systems, and generally renovate the older portions of ANC's South Terminal. The portion of the South Terminal that is planned to undergo renovation consists of approximately 360,000 square feet and encompasses Concourses A and B, portions of the ticket lobby, baggage claim, baggage make-up, airline operations areas and concessions space. This portion of the South Terminal is the original portion that existed prior to the 2004 expansion that more than doubled the size of the South Terminal. Preparations for this project are underway while the enhancements remain in the design phase. Beginning in late 2006, ANC will begin relocations of some airline operations from Concourse B to the North Terminal and to Concourse A. The renovation of Concourse B will be the first phase of the construction once all Concourse B airlines have been relocated. The ticket lobby and Concourse A renovation will follow as will a relocation of the existing security checkpoint.

The R Spots/Taxiway L upgrade will realign Taxiway L and aircraft parking positions R7 to R11 such that they can accommodate up to five B747-8 aircraft simultaneously. The Boeing 747-8 is a modified version of the B747 series aircraft that will have a larger wingspan than the existing B747 series aircraft. Though the B747-8 will qualify as a Design Group VI aircraft, its wingspan will not be as large as the Airbus A380. There are currently four cargo airlines operating at ANC that have ordered a total of 35 B747-8 freighter aircraft. This project is expected to commence in 2007 and take approximately 18 months to complete.

1.2.3. Ground Access and Parking

Access Roadways

Regional and terminal area access roadways were shown on Figure 1-1 and are described below.

Regional Access Roadways

International Airport Road is the primary access road to the airport. It is a four-lane controlled access highway providing access to the Airport from the east. The west end of the road transitions to a loop serving the South Terminal arrival, departure and commercial vehicle ramps. Exit ramps provide access to vehicle parking, railroad depot, and the Air Traffic Control Tower located within the loop.

Northern Lights Boulevard is a two-lane minor arterial providing access to the east side of the northern part of the airport. From the airport boundary to Wisconsin Street, the road consists of two-lanes with center turn pockets available to cross into side streets. East of Wisconsin Street, the road expands to four lanes. The MOA has prohibited vehicles larger than 10 tons from using Northern Lights Boulevard. West of Lake Hood Drive, the road is named Point Woronzof Drive and provides access to the western side of the airport.

Raspberry Road provides access to the South Airpark area and the adjacent Kulis ANG Base at the southern boundary of the Airport. Raspberry Road is a minor arterial running east-west with its west end terminating in Kincaid Park.

Jewel Lake Road begins at International Airport Road and continues south through the eastern area of the airport, then west along the airport's southern border then south to the intersection of Raspberry Road. Jewel Lake Road is classified as a major arterial. It has one southbound lane and two north bound lanes from International Airport Road to Coronado Street. From Coronado Street to Raspberry Road it has two travel lanes with a center turn lane.

Regional Access Roadways - Planned Improvements

International Airport Road/Jewel Lake Road Interchange – This project constructs an interchange and separates the railroad crossing at Jewel Lake/Spenard Road and International Airport Road. This project is currently listed in the DOT/PF FY04-06 Needs List.

On-Airport Roadways - Existing Facilities

Postmark Drive connects Northern Lights Boulevard with International Airport Road. It is a minor arterial with two travel lanes and a center turn lane. Postmark Drive provides access to the North Airpark, North Terminal and the Post Office. Lockheed Avenue, Rockwell Avenue, Hughes Avenue and De Havilland Avenue provide access into North Airpark. A tugroad is located on the west side of Postmark Drive between Lockheed Avenue and De Havilland Avenue.

Lake Hood Drive connects Northern Lights Boulevard to Postmark Drive at a location just north of the Post Office. Lake Hood Drive provides access to the snow storage facility and northern edge of Lake Hood Seaplane Base.

Aircraft Drive begins at the U.S Fish and Wildlife in-holding located at the south end of Lake Hood and extends to the northern end of Lake Hood. There it changes its name to Lakeshore Drive and continues east along the shoreline until intersecting with Wisconsin Street at the northeast corner of Spenard Lake. A gate is in place at the airport boundary and is closed in the evenings. Aviation Avenue provides access to the southern edge of Spenard Lake. Heliport Place and DeHavilland Avenue provide links between Postmark Drive and Aviation Avenue. Helio Place connects Lake Hood Avenue to Aircraft Drive. Floatplane Drive and Enstrom Circle provide access to lease lots.

Old International Airport Road is a two-lane roadway providing access to East Airpark via Jewel Lake Road. West 50th Avenue is a two-lane roadway parallel to and running north of Old International Airport Road. The primary functions of Old International Airport Road and West 50th Avenue are to provide local access to properties in East Airpark. Old International Airport Road is also a service road for airfield and aircraft-related unlicensed vehicles that operate in the airport operations area (AOA).

South Aircraft Drive is a two-lane roadway that provides access between the eastbound lanes of International Airport Road on the north and various service facilities located along Old International Airport Road, West 50th Avenue, and the airfield. A gate manned by a security guard at the south terminus of the South Aircraft Drive provides airfield access for the various service vehicles traveling between the Old International Airport Road area and the airfield.

South Airpark Place and Carl Brady Drive provide access to the lease lots in South Airpark.

On-Airport Roadways - Planned Improvements

Improvements that are currently under consideration by ANC to improve Airport access, circulation, and vehicular safety are described below.

Old International Airport Road – The existing two-lane road has remained unchanged for over fifty years. A project to improve drainage and provide pedestrian facilities is currently planned for FY2009.

South Airport Access – Taxiway Z was recently constructed to provide taxiway access for new lease lots. South Airpark Place provides access to the eastern lots along Taxiway Z. There is no public vehicle access for future western lots along Taxiway Z. This project will provide this access. This project is planned for FY2008.

North Terminal Commercial Lane – This project will construct a separate lane for commercial vehicles serving the North Terminal. This project is scheduled for construction in FY2007.

Logistics Drive – A right-of-way has been reserved to the east of Postmark Drive to construct a replacement road between Taxiway V and Northern Lights Boulevard to be named Logistics Drive. This road would provide additional lands for North Airpark development including the existing FedEx and UPS leaseholds. This project is planned to start design in FY2011.

On-Airport Terminal Roadways

West of the Postmark Drive/South Aircraft Drive intersection, International Airport Road is a two-lane, one-way roadway heading west toward the South Terminal. The one lane return-to-terminal road then adds a lane to the entrance road briefly before exiting to the left at the parking and rental car entrance. After the parking/rental car entrance, International Airport Road widens to five lanes for the approach to the terminal curbsides. The leftmost lane provides access to the commercial vehicle curbside and staging area and the FAA tower parking lot. The next two left lanes are designated for the upper level departures curbside. The two right entrance lanes are designated for the lower level arrivals curbside and continue under the upper level roadway.

The upper level departures roadway widens to four lanes in front of the terminal with the rightmost lane adjacent to the terminal designated for vehicle unloading. The lower level arrivals roadway widens to three lanes in front of the terminal with the rightmost lane adjacent to the terminal designated for vehicle loading. The lower level commercial vehicle roadway is four lanes wide with the rightmost lane adjacent to the island curbside designated for vehicle loading and unloading.

At the south end of the terminal the three curbside roadways merge into three exit lanes. The parking/rental car exit adds a fourth lane on the left and this lane then becomes the return-to-terminal roadway. The three right lanes merge into two lanes and continue east out of the terminal area to the intersection with Postmark Drive/South Aircraft Drive.

The North Terminal can be accessed from International Airport Drive via the intersection with Postmark Drive. After continuing north and then east from the intersection along Postmark Drive, the North Terminal is located on the west side of the road. A left turn pocket on Postmark Drive allows vehicles to turn onto the one-way, two-lane North Terminal access roadway. The access roadway widens to four and then five lanes. The two lanes on the left enter the short-term parking area and the three on the right become the curbside roadway with the rightmost lane adjacent to the terminal designated for vehicle loading and unloading. At the end of the terminal, two lanes curve back to the east connecting with Postmark Drive, and one lane continues straight, connecting with Tower Road and the charter bus staging for Concourse C at the South Terminal. Bus staging is also provided off of this lane immediately south of the North Terminal.

Terminal Curbsides

The South Terminal is served by a two-level curbside roadway while the North Terminal is served by a single level curbside roadway. The curbside roadways, ground transportation services and associated commercial vehicles staging areas are described below.

Curbside Roadways

The upper level of the South Terminal's curbside roadway system is a four-lane enplaning curbside, approximately 950 feet long, that provides space for private and commercial vehicles to drop off departing passengers. One lane adjacent to the terminal is used for passenger drop off, one lane for vehicle maneuvering and two lanes for through traffic. The lower level deplaning curbside has a three-lane inner roadway, approximately 825 feet long, which provides space for private vehicles to pick up arriving passengers. One lane is used for passenger drop off, one lane for vehicle maneuvering and one lane for through traffic.

An island curbside and four-lane commercial vehicle roadway, approximately 970 feet long, is also located on the lower level between the private vehicle roadway and parking garage. An enclosed passenger waiting area is provided on the island and escalators and elevators connect this area to the Transportation Lobby on the bottom level of the terminal. The commercial vehicle curb is used by hotel and motel courtesy vehicles, taxicabs, limousines, the MOA People Mover Bus (public bus), and charter buses to load passengers. The People Mover and charter buses also use this curb to drop off passengers. At Concourses A and B, charter buses use the curbside at the southeastern end of the building for passenger loading and unloading. At Concourse C, charter bus loading areas are provided in saw tooth parking spaces directly north of the South Terminal building and adjacent to Concourse C.

The North Terminal has a 400-foot-long, single level curbside roadway with three lanes for private and commercial vehicle drop off and pick up activity. Space for the People Mover bus and airport shuttle is provided at the south end of the terminal building. As previously described, future expansion of this roadway is planned in the western portion of the public parking area for commercial vehicles.

Ground Transportation Services

The following paragraphs identify the main ground transportation services providing transportation between the Airport and locations in and around Anchorage. Additional services such as limousines are also available on a pre-arranged basis.

<u>Airport Shuttle Bus</u>: A free Airport shuttle bus operates between the North Terminal, South Terminal, public long-term, employee, and rental car parking lots. The shuttle operates 24 hours a day, seven days a week and leaves each location every 15 minutes. The shuttle stops on the upper level curbside at the South Terminal and on the curbside in front of the North Terminal.

Charter Bus: Cruise ship operators and other tour companies use charter buses to transport passengers between the Airport and their facilities. Parking for these buses is provided at the North and South Terminals and additional staging areas are provided as described in the next section.

Hotel and Motel Courtesy Shuttles: Many hotels and motels surrounding the Airport provide free shuttle service to transport customers between the Airport and their facilities. The hotel and motel courtesy shuttles pick up passengers on the north and south ends of the lower level commercial vehicle curb at the South Terminal and on the curbside at the North Terminal.

Off-Airport Shuttles: Four off-airport shuttle operators provide scheduled and non scheduled transportation services between the Airport and various locations in and around Anchorage. The shuttle operators include Eagle River Shuttle, Shuttle Man, Talkeetna Shuttle, and Airport-Valley Shuttle

Public Bus: The Municipality of Anchorage People Mover Bus Route 7 connects the Airport with downtown Anchorage to the north and the Dimond Transit Center to the south. The People Mover serves the Airport Monday through Friday between 6:40 a.m. and 11:20 p.m. with service every 30 minutes alternating between downtown and the Dimond Transit Center. Airport bus stops are located on the southeast end of the lower level commercial vehicle curbside at the South Terminal and at the southern end of the North Terminal curbside.

Taxicabs: Three taxicab companies provide on-demand transportation from the airport: Alaska Cab, Checker Cab, and Yellow Cab. Taxicab queues for arriving passengers are located on the lower level commercial vehicle curbside at the South Terminal and on the curbside outside the main lobby at the North Terminal.

Commercial Vehicle Staging Areas

In addition to the curbside area provided for short term queuing and passenger loading, dedicated commercial vehicle staging areas are provided for taxicabs and charter buses at the South Terminal. Space for up to nine taxicabs is provided at the South Terminal commercial vehicle curbside and additional taxicab staging is provided in the west portion of the staging area east of the tower. The east portion of this staging area is used by charter buses serving the A and B Concourses. Space for up to five charter buses is also available at the southeast end of the curbside near Concourses A and B, one designated and four undesignated parking spaces.

Directly north of the South Terminal between Concourse C and the lower level arrivals curbside entrance, staging for up to 13 charter buses serving Concourse C is provided in parallel parking spaces. An additional five spaces are designated for passenger loading at the front of this area, four for charter buses and one for limousines over 28 feet long. Access is provided from Postmark Drive via Tower Road and a second access/egress point is provided off of the terminal curbside entrance roadway prior to the beginning of the private vehicle curbside pick up area.

Six parking spaces for bus staging are also provided immediately south of the North Terminal in addition to the one parking space on the curbside allocated signed for tour bus unloading.

Parking

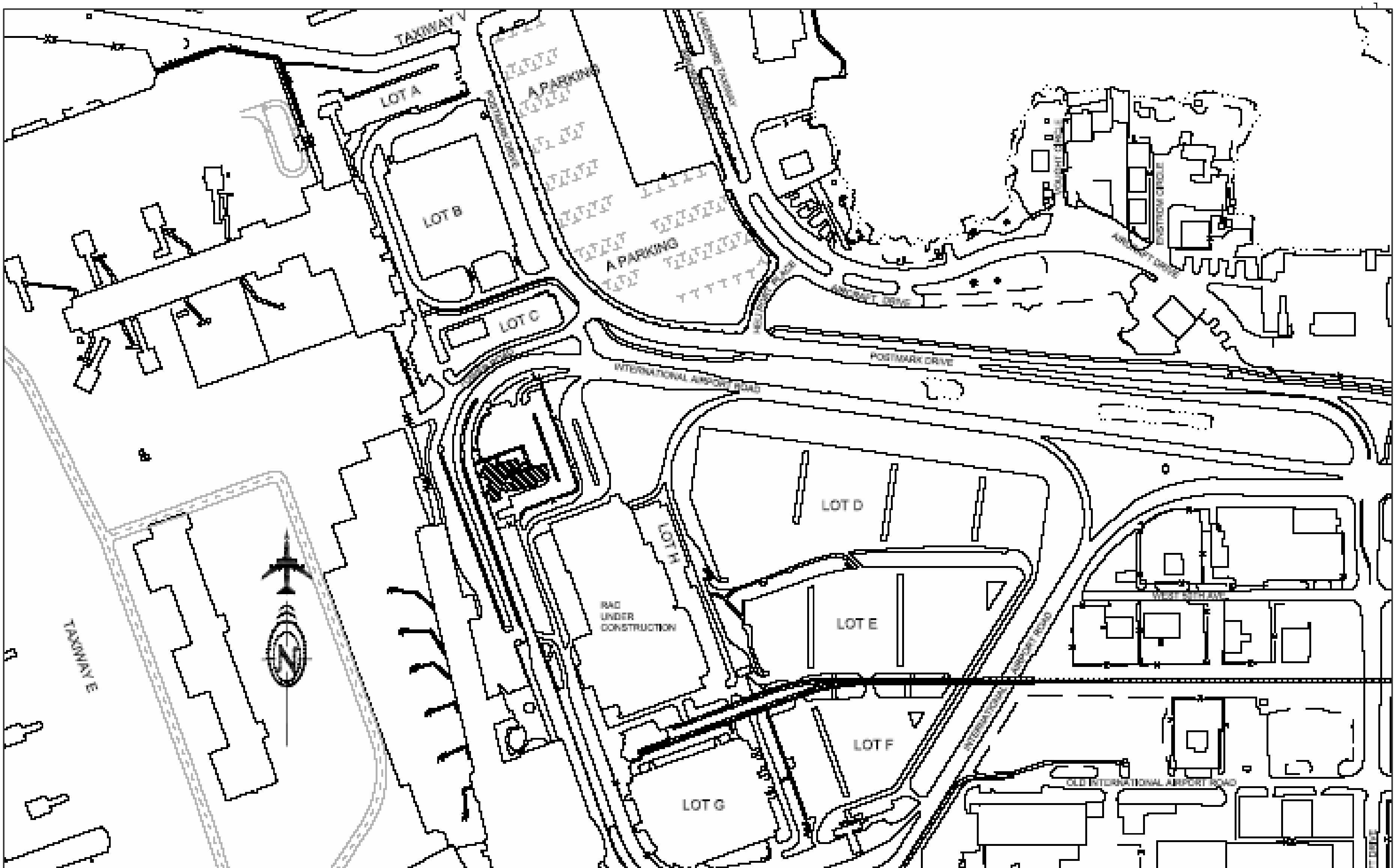
As summarized on Table 1.14 and shown on Figure 1-7, three public and four main employee parking facilities are located within the North and South Terminal areas. An additional 11 parking spaces are provided adjacent to the long-term parking lot for exit plaza workers. Rental car ready and return facilities are currently located on the ground floor of the public parking garage and at the end of the long-term parking lot. As shown, after construction of a consolidated rental car facility, additional public and rental car parking will be available within the terminal area.

In addition, a cell phone lot with approximately 15 parking spaces was opened in December 2006 and is located in a portion of the DOT building parking lot near Lake Hood. The cell phone lot allows meters and greeters who arrive at the Airport early to connect to with their passengers via cell phone before proceeding to the curbside for passenger pick-up.

Table 1.14 Inventory of Public, Employee, and Rental Car Parking Spaces

	Parking Lot Location	**Public**	**Employee**	**Rental Car**
	Current			
A	Employee – North Terminal	--	125	--
B	Public Short-Term – North Terminal	200	--	--
C	Employee – North Terminal Project Lot	--	125	--
D	Employee – South Terminal	--	891	--
E&F	Public Long-Term – South Terminal	644	--	238
G	Garage - South Terminal	900	--	300
H	Public Short-Term Oversize – South Terminal	--	--	--
-	FAA Tower	--	89	--
-	Parking Revenue Gate Employees	--	11	--
-	Rental Car Garage	Under Construction		
Total		*1,744*	*1,241*	*538*
	After Completion of Rental Car Facility			
A	Employee – North Terminal	--	125	--
B	Public Short-Term – North Terminal	200	--	--
C	Employee – North Terminal Project Lot	--	125	--
D	Employee – South Terminal	--	891	--
E&F	Public Long-Term – South Terminal	882	--	--
G	Garage - South Terminal	1,200	--	--
H	Public Short-Term Oversize – South Terminal	68	--	--
-	FAA Tower	--	89	--
-	Parking Revenue Gate Employees	--	11	--
-	Rental Car Garage	--	--	1,080
Total		*2,350*	*1,241*	*1,080*

Source: ANC staff



Ted Stevens Anchorage International Airport

PARKING LOT DESIGNATORS

FIGURE 1-7

Public Parking

As shown on Table 1.14, ANC currently operates approximately 1,744 public parking spaces at the Airport. After completion of the rental car garage, ANC will operate 2,350 public parking spaces. All of these spaces are located within the North and South Terminal roadways. At the North Terminal, 200 parking spaces are located adjacent to the curbside roadway in front of the terminal building. At the South Terminal, a public parking garage is located across the curbside roadways near the terminal building. The four-level garage provides 900 short-term public parking spaces on three levels and 300 rental car ready spaces on the ground floor. After construction of the consolidated rental car garage is complete, the parking garage will provide 1,200 short-term public parking spaces. Long-term parking at the South Terminal is in a surface lot adjacent to and east of the public parking garage. The long-term surface lot currently provides 644 public parking spaces; rental car return operations are conducted in the north east corner of the lot. After construction of the consolidated rental car garage is complete the 238 rental car spaces will be returned to long-term public parking and 882 public parking spaces will be available in the long-term parking lot.

The Airport Shuttle transports passengers between the long-term parking lot and North and South Terminals. In addition, a pedestrian walkway connects the long-term parking lot and the South Terminal.

Table 1.15 shows the public parking rates at the North Terminal, South Terminal parking garage and South Terminal long-term parking lot. Short-term parking at the North Terminal and the South Terminal parking garage both provide 30 minutes of free parking. Daily rates for the North Terminal, South Terminal parking garage and South Terminal long-term parking lot are $10, $11 and $9, respectively.

Table 1.15 Public Parking Rates

	North Terminal	South Terminal Parking Garage	South Terminal Long-Term Lot
First 30 minutes	No charge	No charge	$1.50
31 minutes to 1 hour	$2.00	$2.00	$1.50
Additional hour	$2.00	$2.00	$1.50
Maximum per day	$10.00	$11.00	$9.00
Maximum per week	$70.00	$70.00	$60.00
Maximum stay	10-day	30-day	90-day

Source: Alaska Department of Transportation, Ted Stevens Anchorage International Airport website.

One privately operated remote parking facility, Diamond Airport Parking, is located at Northwood Drive and International Airport Road. Diamond Airport Parking charges $6 per day for uncovered parking and $8 per day for covered parking.

Employee Parking

Employee parking is primarily provided in four surface lots within the North and South Terminal roadways. As shown on Table 1.14, employee parking spaces total 1,241, 250 spaces at the North Terminal, 891 spaces at the South Terminal, 89 spaces at the FAA Tower located within the South Terminal roadway loop, north of the future consolidated rental car garage and 11 spaces for the parking revenue gate employees between the long-term parking lot and exit plaza. The Airport Shuttle transports employees between the employee parking lot at the South Terminal and both the North and South Terminals.

Rental Car

Currently eight on-Airport rental car companies serve ANC: Alamo/National, Avis, Budget, Dollar, Enterprise, Hertz, Payless, and Thrifty. In addition, three companies serve the Airport from off-Airport locations: High Country Rental Car, U-Save, and Value Car. As shown on Table 1.14, the on-Airport rental car companies currently operate 300 ready spaces on the ground floor of the public parking garage and 238 return spaces at the back of the public long-term surface lot at the South Terminal. The Airport Shuttle transports passengers between the rental car return area and the North and South Terminals. In addition to the airport shuttle, a pedestrian walkway connects the rental car return lot and the South Terminal.

A consolidated rental car facility is under construction and scheduled to open in June 2007 north of the public parking garage adjacent to the curbside roadways. According to the September 1, 2005, *Financial Feasibility Report for the Consolidated Rental Car Facility at Ted Stevens Anchorage International Airport* prepared by Unison Maximus Consulting Services, the rental car facility will be a four-level parking structure with 1,080 rental car ready/return and storage parking spaces. The garage will house quick-turnaround areas with vehicle washing and cleaning facilities for each rental car operator. A vehicle fueling area will be located adjacent to the garage and a customer service lobby will provide counters for the rental car companies operating in the consolidated facility.

Alaska Railroad

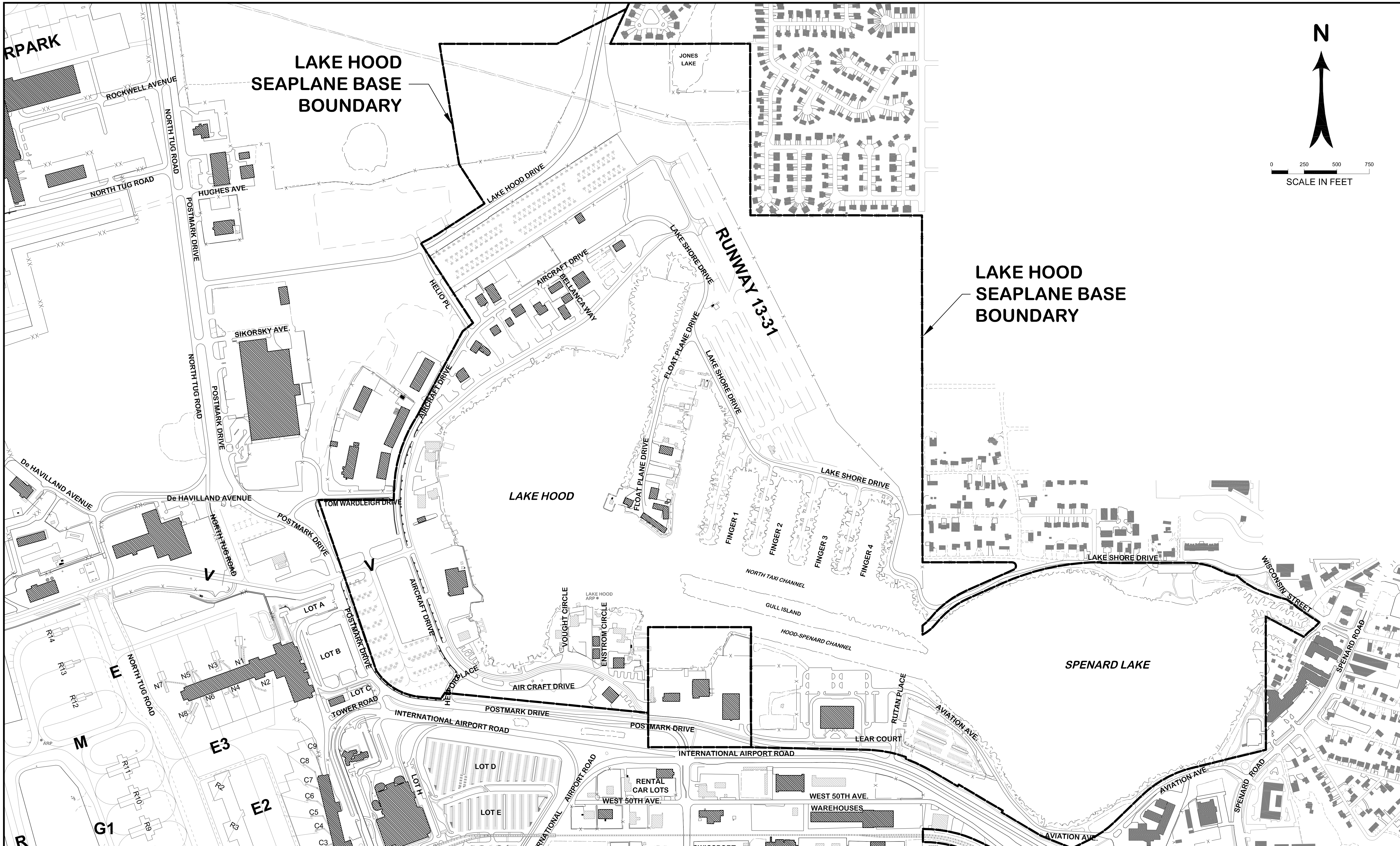
In 2002 the Alaska Railroad Corporation opened a rail station at the Airport. The train depot is located north of the parking garage and connects to the South Terminal with a pedestrian tunnel. The station is used for chartered rail service, primarily to transport passengers between the Airport and cruise ships in Seward and Whittier between May and September.

1.2.4. General Aviation

Most of the general aviation activity at the airport occurs at LHD, shown in Figure 1-8. LHD includes three waterlanes (East-West, North-South, and Northwest-Southeast) and one gravel-surfaced runway (13-31), which is designated Z41 in the FAA's Airport Facility Directory, Alaska Supplement. Taxiway V connects LHD and Z41 to the ANC airfield, and some of the aircraft based at LHD and Z41 use the ANC airfield at times.

The *General Aviation Master Plan for Lake Hood Seaplane Base and Anchorage International Airport* (GA Plan) was completed in 2006. The GA Plan slightly changed the boundary that was first established for Lake Hood in 1999 and was used in the 2002 ANC Master Plan. Figure 1-8 shows the new boundary for Lake Hood Seaplane Base.

The GA Plan developed a program of phased capital improvement projects for the next 20 years and designated land for future tenant development. Most of the airport improvements identified in the GA Plan are within the Lake Hood Seaplane Base boundary, but the GA Plan also identified the need to retain Charlie Parking (30 tiedowns in North Airpark) and the Taxiway V connection to the ANC airfield.



Ted Stevens Anchorage International Airport Master Plan

EXISTING LAKE HOOD SEAPLANE BASE

FIGURE 1-8

The GA Plan projected the need for 18 acres of tenant expansion for higher performance general aviation aircraft by 2023. The land made available for development by the construction of Taxiway Z west of South Airpark provides more than 18 acres for future general aviation-related development.

According to the GA Plan, 1,090 GA aircraft are based at ANC and LHD. The based aircraft that primarily use LHD and Z41 number 1,049, including approximately 30 aircraft based at Charlie Parking, which is located outside the LHD boundary on the west side of Postmark Drive and adjacent to Taxiway V. Another 41 general aviation aircraft are based at East and South Airparks. The fixed wing aircraft based at East and South Airparks are types that need the longer, paved runways and instrument approaches available at the ANC airfield. The aircraft based at East and South Airparks are typically higher performance and larger aircraft than those based at LHD.

Two full-service Fixed Base Operators (FBOs)[6] serve general aviation at three locations on ANC. Signature Flight Support has separate facilities at East and South Airpark. Era FBO, dba Million Air, also has an FBO complex at South Airpark. Other airport tenants provide specific general aviation services, such as aircraft maintenance, charter flights, and fuel sales.

1.2.5. Air Cargo Facilities

There are approximately 253 acres dedicated to air cargo facilities at the airport. These areas include over one million square feet of building, 471,000 square yards of apron and 37 acres of auto parking and landside support. These facilities are located in each of the three principal development areas of the airport, the North Airpark, East Airpark and South Airpark. The following sections provide a summary of the cargo facilities in each of these areas.

North Airpark

The North Airpark supports the majority of the air cargo operations at the airport. For the purposes of this analysis the North Airpark includes the area from Taxiway U to the south, the Runway 14 threshold to the north, Taxiway R to the west and Postmark Drive to the east. The Operators include FedEx, UPS, Alaska CargoPort, Everts Air Cargo and Alaska Central Express Air Cargo. Following is a brief description of each facility. Figure 1-9 depicts the location of each operator in the North Airpark. Table 1.16 provides a summary of each of facility.

[6] FBOs provide a range of services, including fuel sales, aircraft storage and repair, aircraft ground handling, and crew/passenger amenities such as lounges, conference facilities, and catering.

Ted Stevens Anchorage International Airport Master Plan

EXISTING NORTH AIRPARK

FIGURE 1-9

Table 1.16 Summary of Air Cargo Facilities

North Airpark

Address	Tenant	Lot (ac)	Warehouse (sf)	Cold Storage (sf)	Office (sf)	Total Cargo Building Area (sf)	Aircraft Parking Positions	Apron Area (SY)	Load Docks	Landside (AC)	Other Facilities (sf)	
Boeing Avenue												
6200, 6201, 6300	Alaska Cargoport/LYNS	37.8	148,212	n/a	6,800	155,012	10-widebody	122,500	30	3.5	55,354	Maint.
	Korean Air Cargo						1-narrowbody					
	Northwest Air Cargo											
	United Cargo								7		n/a	
	Matheson											
6111	Everts Air Cargo	4.9	9,100	n/a	1,000	10,100	n/a	17,200	8	1.6	9,000	A/C Maint.
5901	Alaska Central Express Air Cargo	5.2	11,040	n/a	3,600	14,640	n/a	8,230	4	1.3	15,600	A/C Maint.
6200	UPS	36.5	93,000	n/a	100,000	193,000	11-widebody	120,560	n/a	2.5	n/a	
3501	DHL	2.5	24,800	n/a	4,200	29,000	n/a	n/a	3	0.5	n/a	
6050	FedEx	62	364,282	n/a	45,552	409,834	10-widebody	120,500	n/a	7	53,033	A/C Maint.

Table 1.16 Summary of Air Cargo Facilities, page 2

Address	Tenant	Lot (ac)	Warehouse (sf)	Cold Storage (sf)	Office (sf)	Total Cargo Building Area (sf)	Aircraft Parking Positions	Apron Area (SY)	Load Docks	Landside (AC)	Other Facilities (sf)	
East Airpark												
Old International Airport Drive												
4700	Reeve Aleutian Airways, Inc.	N/A	4,000	417	n/a	4,417	n/a	n/a	n/a	n/a	n/a	
4100	Alaska	11.2	70,000	n/a	n/a	70,000	n/a	30,300	n/a	14	40,000	A/C Maint.
3900	Northern Air Cargo	8	23,232	2,604	19,200	45,036	6- narrowbody	27,600	15	1.2	n/a	
3830	Delta Air Cargo	12.3	24,298	n/a	n/a	24,298	n/a	15,150	17	4.2	27,377	Caterair
	Frontier											
	JAL											
	Arctic Circle Air											
	Polar Air											
	SITA											
3444	FedEx - ANC City Station	15.6	39,000	n/a	n/a	39,000	5- widebody	37,655	19	1	n/a	
South Airpark												
Address	Tenant	Lot (ac)	Warehouse (sf)	Cold Storage (sf)	Office (sf)	Total Cargo Building Area (sf)	Aircraft Parking Positions	Apron Area (SY)	Load Docks	Landside (AC)	Other Facilities (sf)	
South Air Park Place												
6441	Lynden Air Cargo	8.7	35,000	n/a	n/a	35,000	n/a	28,900	10	1	n/a	

Source: HNTB Analysis

FedEx

FedEx's Regional Hub facility is the largest cargo leasehold at the airport with approximately 62 acres. Their site includes over 500,000 square feet for customs clearance, sorting, operations, maintenance, and city station, 10 dedicated wide-body aircraft parking positions and 7 acres of auto parking. Their aircraft apron is accessed via Taxiway U to the south and Taxiway T to the north. A 29,000 square foot building for ground support equipment is planned for construction in 2007. Three 777F parking positions are scheduled for opening in early 2007.

UPS

UPS occupies a 36.5-acre parcel just north of FedEx. Their site includes a 193,000 square foot customs clearance, operations, sorting, warehouse, maintenance and city station center, 11 dedicated wide-body aircraft positions and 2.5 acres of auto parking. They have two separate apron areas that are accessed via Taxiway T located on the south side of the facility.

Alaska Cargo Port

Encompassing nearly 38 acres, the Alaska CargoPort occupies the second largest lease hold in the North Airpark. This multi-tenant facility serves Northwest Air Cargo world cargo hub, Korean Air Cargo, Atlas Air and Matheson Flight Extenders. The facility includes over 155,000 square feet of building and 11 dedicated parking positions. Seven of the parking positions are accessed via Taxiway S and four are accessed via north Taxiway R. Approximately 3.5 acres support the landside functions associated with these facilities.

Everts Air Cargo/Alaska Central Express (ACE) Air Cargo

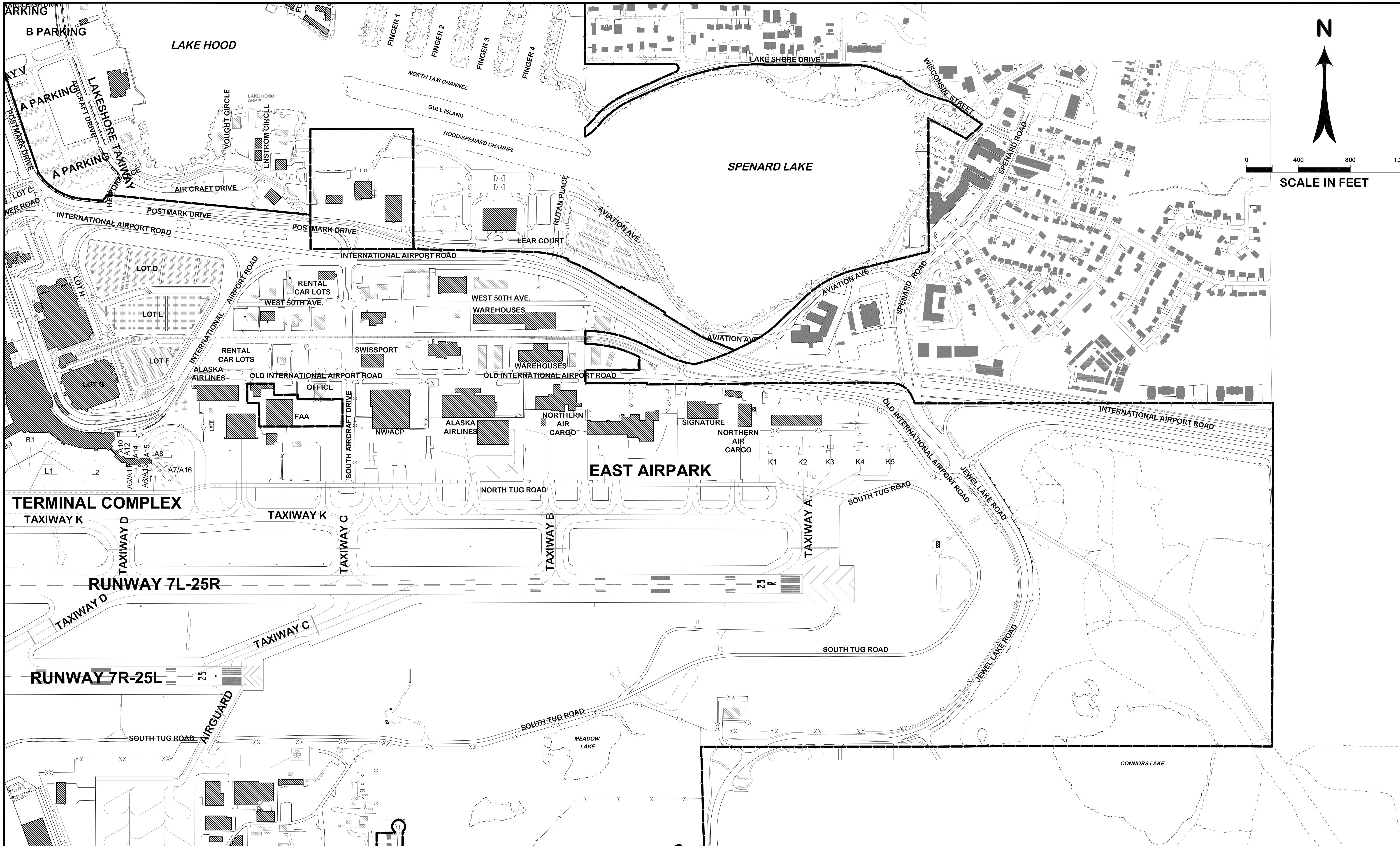
Everts and ACE are intrastate air cargo carries. They are located between UPS and the Alaska CargoPort. Their combined facilities occupy slightly over 10 acres with 25,000 square feet of building and 26,000 square yards of apron. Taxiway S provides airside access to their facilities.

DHL

DHL operates a freight forwarding facility on a 2.5 acres site on the east side of Postmark Drive. They have approximately 25,000 square feet of warehouse. There is no airside access at this location.

East Airpark

The East Airpark is bounded by International drive to the north, east and west and Taxiway K to the south. The primary air cargo operators in the East Airpark include Alaska Airlines and Northern Air Cargo. Delta Air Cargo also has a facility in the East Airpark and subleases to a number of carriers. A brief description of each facility is described below. Figure 1-10 depicts the location of each operator in the East Airpark. Table 1.16 provides a summary of each facility.



Ted Stevens Anchorage International Airport Master Plan

EXISTING EAST AIRPARK

FIGURE 1-10

Alaska Airlines

Alaska operates a 70,000 square foot cargo facility on an 11-acre site that primarily supports airline belly cargo. This site also includes a 40,000 square foot hangar that supports their aircraft maintenance operations.

Northern Air Cargo

An 8 acre site supports Northern Air Cargo operations. The site includes a 45,000 square foot cargo facility, six dedicated aircraft parking positions, and more than an acre of landside support.

Delta Air Lines

Delta has a 75,000 square foot facility of which half is dedicated to air cargo. Operators in this facility include Frontier, JAL, Polar, Arctic Circle and SITA. Approximately 15,000 square yards of apron is adjacent to the facility. This area is primarily used for ground service equipment staging. The other half of the facility is currently unoccupied.

Former FedEx Anchorage City Station

The facility, currently managed by ANC, includes five B747 parking positions, one acre of landside support, and one acre of undeveloped land.

South Airpark

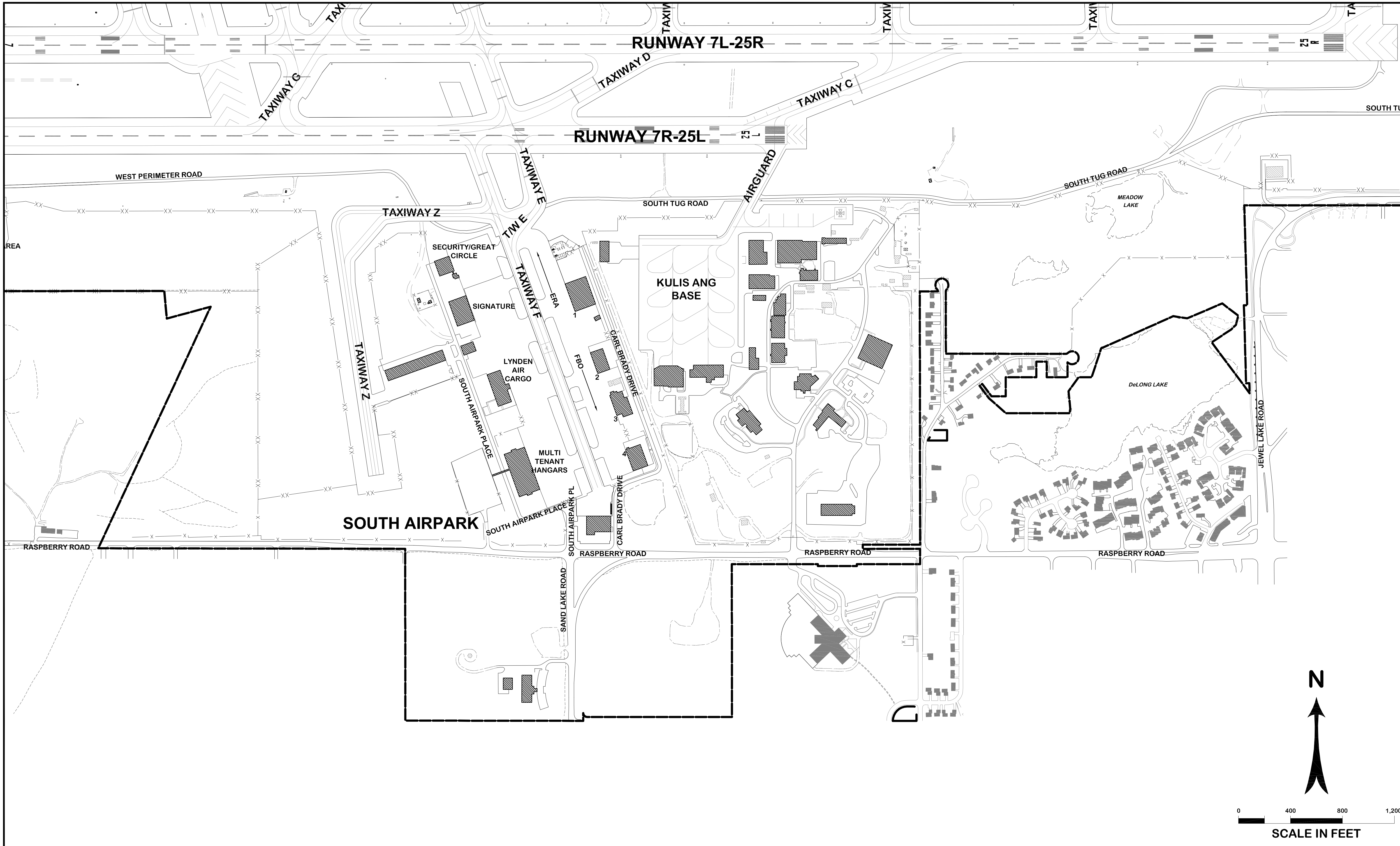
Lynden Air Cargo is the single cargo operator located in the South Airpark. Figure 1-11 depicts the location of Lynden air Cargo in the South Airpark. Table 1.16 provides a summary of each of facility.

1.2.6. Airport Support

Existing Airport Support Facilities

Airport support facilities are found throughout the airport and include Field Maintenance facilities, the Aircraft Rescue and Firefighting (ARFF) facility, the FAA ATCT, and the Airport Fuel Storage Facility.

The new Field Maintenance Building occupies an 8.6-acre site between DeHavilland Avenue and Taxiway V, west of Postmark Drive. This 116,000 square foot building was opened in 2005. The new facility provides offices, shop space for equipment maintenance and storage for material and equipment. A paved parking lot provides space for outside equipment staging and employee and visitor parking. The old Field Maintenance Complex east of Postmark Drive and west of Lake Hood includes several buildings that are used for material and equipment storage less critical to be located with immediate airfield access. North of the old Field Maintenance Complex is a large snow storage area. Only snow that is not contaminated with aircraft deicing fluid is stored here. This snow storage area is primarily for landside use.



Ted Stevens Anchorage International Airport Master Plan

EXISTING SOUTH AIRPARK

FIGURE 1-11

The ANC ARFF facility is located at the southwest corner of the North Airpark, near the intersection of Taxiways R and V. This facility is a consolidation of the two former ARFF facilities. Former ARFF Station No. 1 was demolished after exceeding its useful life. Former ARFF Station No. 2 is located south of the fuel tank farm and is being used for warm storage of equipment and deicing materials. The consolidated ARFF facility has direct access to Taxiways R and V to provide reduced response time to all parts of the airfield. An ARFF training area is located on the southwest side of the airfield.

The FAA ATCT is located south of Tower Road, along the South Terminal access road, about equidistant between the north and south passenger terminals. A one story building accommodating FAA offices is at the base of the tower. Tower levels contain the ATC equipment and additional FAA offices.

Planned Airport Support Facilities

There is a project scheduled for construction in 2007 to add two additional water tanker bays with storage to the ARFF facility. Anchorage Fueling and Service Company (AFSC) is planning to construct one or two additional 4.2-million-gallon tanks at the aviation fuel farm by 2011 to assure adequate fuel supply at the airport.

Other Airport Facilities

Kulis Air National Guard Base

Opened in 1955, Kulis ANG Base is located east of South Airpark on 129 acres leased from the Airport. The 176th Wing of the ANG conducts its federal and state missions with a fleet of C-130 fixed wing, HC-130 (C-130 with rescue platform) fixed wing, and HH-60 Pave Hawk rotary wing aircraft. Kulis ANG Base has a weekend population of about 1,500 people.

According to Base Realignment and Closure (BRAC) legislation, Kulis ANG Base will be vacated by the fall of 2011. The 176th Wing is supposed to relocate to Elmendorf Air Force Base; however, relocation is contingent on funding for replacement facilities at Elmendorf.

The main gate is on the south side of the base, providing access from Raspberry Road. The base has a secured perimeter separating it from the rest of the airport except for a taxiway connecting to Runway 7R-25L and a secondary, normally closed gate to Carl Brady Drive on the west side of the base.

The main ramp has 11 C-130 parking positions and the helicopter ramp on the north side consists of a helipad and adjacent helicopter parking. A small fire station provides 24-hour rescue capability for the base and supports a mutual aid agreement with the Airport. Other base facilities include three C-130 hangars, a helicopter maintenance hangar, bulk fuel storage, warehousing, vehicle and physical plant maintenance shops, communications facilities, offices, training facilities, a dining facility, a non-commissioned officers club, and a ball park.

FAA Offices

The FAA maintains several facilities on the Airport, including offices and a hangar facility in the East Airpark.

US Postal Service Facilities

The existing USPS facility occupies a 20-acre site along Postmark Drive just north of DeHavilland Avenue. The site has access for trucks along Postmark Drive. Tug crossings for mail transfer to/from the airfield are also provided across Postmark Drive. Visitor access to the facility is from Postmark Drive.

1.2.7. Utility Services

Water System

Existing Facilities

The water distribution system serving the airport is owned and operated by the Anchorage Water and Wastewater Utility (AWWU). Main water lines serving the airport include a centrally located 16-inch pipe along Old International Airport Road, providing water to the South and North Terminals and then traversing north along Postmark Drive to connect to the 16-inch north water main along Northern Lights Boulevard. Another centrally located 12-inch water main extends west from the City near the LHD gravel strip along Aircraft Drive and connects to the 16-inch main pipe at the South Terminal. The north water main is a 16-inch pipe along Northern Lights Boulevard providing water to the North Airpark areas and connecting to the 16-inch central main. A 30-inch water main along Raspberry Road provides water to the South Airpark and Kulis ANG.

There are several on-airport branch mains which connect to the four main lines and serve other parts of the airport. A 24-inch water main connector crosses under Runways 7L-25R and 7R-25L between Raspberry Road and Old International Airport Road at South Aircraft Drive. Another 24-inch line brings water to the South Airpark from Raspberry Road north along South Airpark Place, then crossing Taxiways F and E and looping around to Carl Brady Drive. There is a 16-inch water branch connecting to the 16-inch main at Postmark Drive and traveling west under Runway 14-32, then north along Point Woronzof Drive to serve the AWWU wastewater treatment facility. This branch provides water to the ASIG Fuel Tank Farm and will provide a portion of the water needed for future West Airpark development. A 12-inch water line runs along West 50th Avenue serving facilities in that area. Three 12-inch lines branch off the north 16-inch main and provide service to the North Airpark area.

AWWU constructed the Kincaid Reservoir in 1993 south of the airport to provide water storage and increase the water delivery capacity for firefighting functions at the airport.

Recent water line improvements include a 10-inch service pipe to the new terminal expansion, connecting between terminal Concourse B and the 16-inch central main at the north end of the new Concourse C.

Planned Facilities

Future water main extensions to the West Airpark will occur as the area is developed. AWWU is planning to install a 16-inch water main sometime after 2009 that will cross under Runways 7R-25L and 7L-25R and Taxiway K between Raspberry Road and the existing 16-inch water branch along Point Woronzof Drive. This new water main will provide additional capacity to the West Airpark.

Sewer System

Existing Facilities

AWWU owns and operates the public sanitary sewer system serving the airport. The major collection line from the terminal area and the west end of East Airpark runs north along Postmark Drive, around the east side of the US Post Office building and then north into the AWWU 96-inch main trunk line. Branches from this line serve the West Airpark and a line along 50th Avenue in the East Airpark. A separate branch from the South Airpark traverses around the east side of the airport and joins another branch from East Airpark, then travels north around the east side of Spenard Lake and into the main trunk line.. The trunk line runs west across the north end of the airport and ends at the John M. Asplund Wastewater Treatment Facility west of Point Woronzof Drive.

Recent improvements include connecting the expanded terminal to the system.

Planned Facilities

Future sanitary sewer extensions to the West Airpark and undeveloped areas of the North Airpark will occur as these areas are developed.

Storm Drain System

Existing Facilities

The airport's storm drain system is documented in the *ANC Storm Drainage Master Plan* (SDMP), dated November 2000. The airport watershed consists of three drainage basins and nine individual drainage systems, all eventually draining into Cook Inlet. The three drainage basins are 1) Turnagain Arm basin, which drains to Turnagain Arm, 2) Knik Arm basin, which drains to Knik Arm, and 3) Lake Hood/Lake Spenard basin which drains to the lakes. The Turnagain Arm basin is the largest in land area, covering the area bounded by Taxiways F and R centerlines at the eastern boundary and that portion of the east-west runways west of these two taxiways. The Knik Arm drainage basin covers the smallest area and contains primarily the North Airpark and Turnagain Bog areas. The Lake Hood-Lake Spenard basin contains the majority of the densely developed areas of the airport, including East Airpark and the terminal areas. This basin drains to Lake Hood, then to Jones Lake and then to Cook Inlet. The Lake Hood-Lake Spenard drainage basin presents the most challenging issues, due to water quality and water level concerns in the lakes, lower ground elevations throughout the basin, and a lack of stormwater storage area.

Existing storm drain structures at the airport include both closed conduits and open channels. Sub-drain systems are located beneath some runways and taxiways to direct groundwater from the structural prism to the storm drain system. Various storm drain improvements have been constructed to improve drainage and address water quality concerns. An example is a drainage diversion structure at the north end of the terminal area that allows drainage to be diverted from the Lakes drainage basin to the Knik Arm basin. This diversion structure is located adjacent to a spill response station that filters surface water and reduces pollutant flow to Lake Hood from the west side of the lake. A second spill response station was installed at the south edge of Lake Hood. Each station is combined with an oil/grease separator that treats stormwater prior to its entering Lake Hood.

Recent upgrades to the airport storm drain system include improvements installed at UPS, FedEx, East Airpark along 50th Avenue, International Airport Road, and along the Remote Fueling Apron.

UPS installed new trench drains, eliminated some open ditches, and installed buried storm drain pipe draining to Tug Road along Taxiway T and then connecting to the Postmark Drive system near the east end of Taxiway T.

FedEx installed buried storm drains along the south side of Taxiway T which drain to the ditch at Tug Road. Storm drains and manholes were installed on the south side of the building, draining east along Rockwell Avenue to Postmark Drive.

Recent drainage improvements in East Airpark include installation of buried pipe along 50th Avenue. Stormwater is collected in underground pipe and drains to a lift station just east of South Aircraft Drive, then is pumped to an open ditch along South Aircraft Drive, flowing north under International Airport Road to the spill response station prior to entering Lake Hood.

Drainage improvements were constructed as part of the International Airport Road realignment for access to the new terminal expansion. Drainage swales, open ditches and culverts were installed along and across International Airport Road and Postmark Drive to direct stormwater to Lake Hood. Stormwater from the new employee and short/long term parking lots are also directed to Lake Hood.

A short section of buried storm drain was installed along the Remote Fueling Apron (P1, P2, and P3) on the south side of Taxiway U draining to the undeveloped low ground to the east. Future development of this area will connect to this pipe and continue with additional storm drain as needed.

Planned Facilities

A project scheduled for construction in 2007 will route storm water from East Airpark to the Postmark Drive storm drain pipe. Design is by CRW at this writing.

Development of the area just north of the ARFF building by AGLAD is in the planning stage at this time, with construction anticipated to begin in 2007.

Aviation Fuel Facilities

Existing Facilities

Several commercial service companies provide airport fueling services through a variety of delivery and storage facilities. These facilities are located both on and off the airport, and accommodate general aviation (GA) fuel requirements, passenger and cargo jet aircraft. Nearly 85 percent of the turbine-engine fuel delivered to the airport is purchased by AFSC, an airline fuel consortium consisting of 19 members. Jet fuel is delivered by pipeline from Nikiski and by rail from Fairbanks to three 4.2-million-gallon storage tanks at the POA. Fuel is pumped from the POA to the airport through a buried 12-inch pipeline to three 4.2-million-gallon tanks at the aviation fuel farm in the West Airpark. The fuel is then pumped to underground hydrants located at the aircraft parking positions of consortium members. AFSC also conducts into-plane fueling from the hydrants. The consortium owns all storage facilities and delivery equipment.

Fuel is distributed to operators on the airport through various methods. In addition to the underground pipeline serving most of the air carrier parking positions in the terminal area, an underground pipeline serves portions of the North, South, and East Airparks. A large fueling apron with underground fueling is located at the international cargo apron. This apron contains fueling for 11 wide-body cargo aircraft.

Airlines not using the system are served by private fuel service companies through mobile tank trucks. Most commuter airlines are served by fuel trucks.

GA fuel requirements are met by both on- and off-airport fuel facilities. Most commercial operators at LHD fuel aircraft using their own personnel. Some of this fuel is supplied by on-airport distributors; however, some operators purchase fuel from off-airport fuel suppliers.

Planned Facilities

AFSC is planning to construct one or two additional 4.2-million-gallon tanks at the aviation fuel farm in the West Airpark by 2011 to assure adequate fuel supply at the airport. Additional tanks will be constructed in the future as needed.

Electric Power, Natural Gas, and Telephone Service

Electric Power

Existing Facilities

Electric power is provided to all developed areas on the airport by Chugach Electric Association (CEA). The airport is served by a single distribution substation west of Spenard Road at the intersection of Old International Airport Road. Other feeder ties, overhead or underground primary voltage lines that interconnect substations provide backup. CEA also has electric transmission substations located on airport property. The Woronzof Substation is located north of the AWWU wastewater treatment plant and straddles AWWU and airport property. The Woronzof transmission substation connects Anchorage to CEA’s major power supply from Beluga Power Plant on the west side of Cook Inlet. This station connects the submarine cables from Beluga Power Plant under Cook Inlet to the Anchorage power grid. CEA has two major underground transmission cables that are routed from the Woronzof substation around the north end of Runway 14-32 and east to the Airport East terminal. The Airport East terminal is located in the North Airpark south of Point Woronzof Drive and west of Postmark Drive. This terminal serves as a cable terminal station, allowing transition from underground to overhead cable. This terminal is being reconstructed into a new distribution substation as described in the next paragraph.

Planned Facilities

CEA is constructing a new distribution substation on dedicated CEA right-of-way adjacent to Point Woronzof Drive and west of Boeing Lane to serve the growing demand for power at the airport. This project is scheduled for completion by December 2007.

Natural Gas

Enstar Natural Gas Company supplies natural gas service through an extensive distribution system serving nearly all developed areas on the airport. Enstar installs and upgrades the natural gas distribution system as needed.

Telephone Service

Private and public telephone service is available to all developed areas at the airport. This service is maintained by Alaska Communications Systems (ACS). Public telephones are located throughout the international and domestic terminals.

1.3. Environmental Conditions

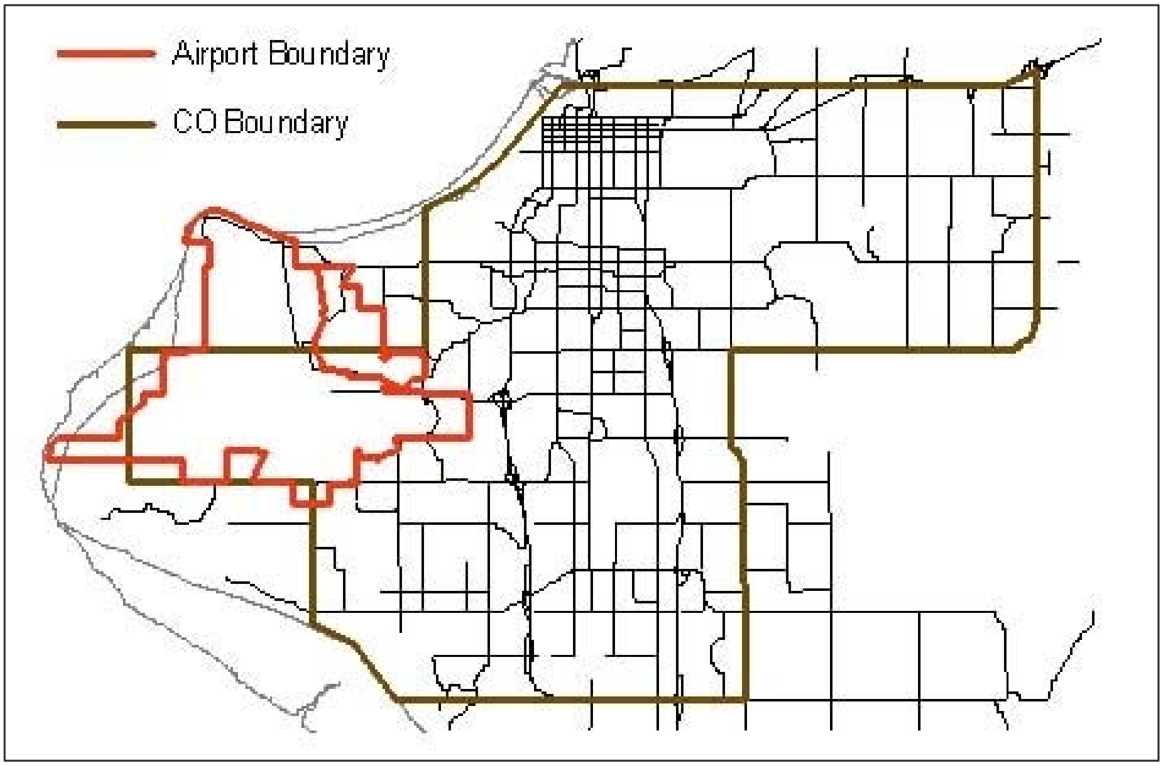
The following section provides an overview of the environmental resources associated with ANC. This overview of environmental conditions is organized according to the list of categories identified in FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instruction for Airport Actions.

1.3.1. Air Quality

The Clean Air Act requires the EPA to set National Ambient Air Quality Standards (NAAQS) for ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, and particulate matter. The Anchorage Bowl is in attainment for five of the six NAAQS criteria pollutants.

Figure 1-12 Carbon Monoxide Maintenance Boundary

In the early 1970s, the MOA was identified as experiencing high levels of carbon monoxide, as it violated the carbon monoxide NAAQS every year from 1972 to 1994 and in 1996. In July 1998, the EPA classified Anchorage as a “serious” carbon monoxide non-attainment area, but with reductions in carbon monoxide emissions, the MOA was later reclassified to a “maintenance area.” The MOA Department of Health and Human Services (DHHS) carbon monoxide maintenance plan indicates that the MOA should remain in compliance through at least 2023 (DHHS, 2006). Figure 1-12 shows part of ANC is within the carbon monoxide boundary.



Ted Stevens Anchorage International Airport Master Plan

Carbon Monoxide Maintenance Boundary

Figure 1–12

In 2004, an inventory compiled for the Anchorage bowl area indicated that 77 percent of winter carbon monoxide emissions in the MOA come from motor vehicles. Other significant sources of carbon monoxide emissions in Anchorage included airport operations and residential wood burning. The inventory found that on a typical winter weekday ANC operations made up about 10 percent of the total carbon monoxide emissions in 2004. ANC emits 11.8 tons of carbon monoxide on an average winter day, compared to the 67.6 tons emitted by motor vehicle road travel (DHHS, 2006).

As aircraft operation increase, carbon monoxide emissions are expected to increase as well, so ANC has implemented measures to address carbon monoxide emissions at the airport. These measures include 1) providing plug-ins for State vehicle parking areas, 2) reducing single occupancy vehicle trips to the airport, and 3) requesting less use of auxiliary power units on aircraft ramps (HNTB, 2002).

ANC operates under an Owner Requested Limit under the State's air quality regulations (Alaska Statute 46.14 and 18 AAC50.225). Under this permit, ANC submits an annual report to the Alaska Department of Environmental Conservation (ADEC) to document that it is emitting less than 100 tons per year of each criteria pollutant for stationary sources.

In 2002, in response to concerns and complaints regarding odors from residents living near the airport and recreation users in the area, the DHHS conducted an ambient monitoring study to address concerns about toxic air pollution and associated odors. The study suggested that the compounds causing odors were not among the compounds analyzed or that the compounds creating odors were present at levels below the reporting limit of the analytical method used in the study. Of the compounds tested, 28 of the 33 compounds were consistently below their reporting limit. For example, Benzene, Toluene Ethylbenzene, and Xylene (BTEX) concentrations were lower at the monitoring sites nearest the airport than at non-airport monitoring sites in the MOA (DHHS, 2006)

1.3.2. Coastal Zone

Part of ANC is located within the MOA Coastal Zone Management Boundary. The inland coastal boundary of the MOA is defined as along the coast between the Matanuska-Susitna Borough and Potter Creek and includes all lands and waters within: 1) a zone extending 1,320 feet inland, measured horizontally, from the extent of the 100-year coastal flood; 2) the 100-year floodplain or 200 feet from the center (whichever is greater) of each river and stream intersected by the 1,320-foot zone up to the 1,000-foot elevation contour; and 3) other areas as delineated on the Alaska Coastal Management Program map (map #94, Coastal Zone Boundaries of Alaska, ACMP, June 1988).

1.3.3. Compatible Land Use

Existing land use south of ANC is characterized primarily by park/open space lands and residential development. The area to the northeast is also primarily residential with some institutional use. Development to the east, northeast and southeast beyond the lands directly adjacent to ANC are increasingly urban with a mixture of residential, commercial and industrial uses.

Public and recreational lands bound ANC from the northeast boundary (Earthquake Park), along the western boundary (Point Woronzof Park), southeastern boundary (Conners Lake Park) and southwestern boundary (Kincaid Park). Additionally, the MOA leases ANC lands for recreational uses near Kincaid and Conners Lake Parks. These areas currently function as a park but are not designated as such. ANC lands under permit to MOA for interim park use until they are needed for airport purposes include:

- Point Woronzof Overlook
- Little Campbell Lake Park
- Delong Lake Park (part of)
- Conners Lake Park
- Spenard Beach Park
- Portions of the Tony Knowles Coastal Trail

The Tony Knowles Coastal Trail, one of the area’s most popular recreation facilities, is located along the north and west perimeters of ANC. The trail crosses ANC property south of Point Woronzof Park and north of Kincaid Park.

Land use adjacent to ANC is controlled primarily through the implementation of the MOA zoning regulations under Chapters 21.35 through 21.55 of the Anchorage Municipal Code. These zoning regulations are based on the MOA Comprehensive Plan (*Anchorage 2020*) adopted in 2001, which is being revised at this time.

The MOA has recently developed a Land Use Plan Map that is designed to help implement *Anchorage 2020*. The MOA Planning and Zoning Commission has given ‘concept approval’ of the Anchorage Bowl Land Use Plan Map. Concept approval means that public officials and community members will continue to have an opportunity to review, discuss and revise the draft Land Use Plan Map before it is adopted as an amendment to the *Anchorage 2020*.

The Anchorage 2020 Concept Land Use Map designates ANC as a ‘major transportation facility,’ meaning that it is essential to Anchorage’s economy (MOA, 2006). The Concept Land Use Plan Map also designates some areas on ANC property as special study areas due to conflicting ideas on land use designation between ANC, the MOA, and adjacent community councils. The MOA recognizes these areas of concern and has designated them as special study areas. These areas include Turnagain Bog, municipal land east of the AWWU sewage treatment plant and Tony Knowles Coastal Trail, and municipal land west of ANC (MOA, 2006).

1.3.4. Section 4(f) Resources

Department of Transportation Act Section 4(f) of 1966 (recodified at 49 USC. 303(c)) is designed to protect “public parks and recreation lands, wildlife and waterfowl refuges, and historic sites” from encroachment by public transportation facilities. Section 4(f) of the Department of Transportation Act applies to projects which may impact a significant publicly owned park, recreation area, wildlife or waterfowl refuge, or historic site (23 CFR 771.135).

Publicly owned areas, such as Kincaid Park, Woronzof Park, Earthquake Park, Conners Park, and the Tony Knowles Coastal Trail, are subject to Section 4(f) analysis. The lands ANC leases to the MOA for park use (mentioned above in Compatible Land Use) may potentially also be considered 4(f) lands. Lands that are purchased and designated for transportation uses, but leased in the interim for recreational use, have sometimes been found to be subject to Section 4(f).

1.3.5. Fish, Wildlife, and Plants

Fish

The Alaska Department of Fish and Game (ADF&G) does not have reports on the biology of the Lakes Hood and Spenard; however, based on studies conducted in other lakes in cold region climates, the likely inhabitants include the tree-spine stickleback (*Gasterosteus aculeatus*) and the Alaska blackfish (*Dallia pectoralis*) (CH2M Hill, 2004a).

Wildlife

Wetlands on ANC property provide habitat for various bird species. The wetland and deep-water habitats of Postmark and Turnagain Bogs have supported up to 46 species of birds from spring through fall. The majority of the bird activity occurs during spring migration and the breeding season, with relatively small use during the fall (USACE, 1999). The major species group identified in these areas includes the passerines, with savannah sparrow (*Passerculus sandwichensis)* and white-crowned sparrows (*Zonotrichia leucophrys)* being the most abundant. Common waterfowl include Canada goose (*Branta canadensis),* mallard (*Anas platyrhynchos),* Northern Pintail (*Anas acuta)*, American widgeon (*Anas americana)*, green-winged teal (*Anas crecca)*, and greater scaup (*Aythya marila)*. Common shore birds include lesser yellowlegs

(*Tringa flavipes*)**,** short-billed dowitcher (*Limnodromus griseus),* least Sandpiper (*Calidris minutilla)* and common snipe (*Gallinago delicate).*

Three known bald eagle *(Haliaeetus leucocephalus)* nests are located on ANC property (Figure 1-13). One nest is located west of Point Woronzof Drive near Taxiway Y and two nests are also located south of Point Woronzof Drive adjacent to the east end of Taxiway Q. Bald eagles, and active nests, are protected under the Bald Eagle Protection Act. The Act imposes criminal and civil penalties on anyone who takes, possesses, sells, purchases, barters, transports a bald eagle, alive or dead, or any part, nest or egg.

The bogs on ANC also provide habitat for moose (*Alces alces*) and small mammals such as coyotes (*Canis latrans incolatus*), snowshoe hare (*Lepus americanus),* ermine (*Mustela* spp.), shrews (*Sorex* spp.), voles and other small rodents. Moose generally tend to forage in these areas, with minimal foraging in the winter months. The numbers of moose vary according to snow depth, availability of browse, and accessibility of other habitats (USACE, 1999). The majority of moose movement generally occurs west of the airport from Kincaid Park north to Earthquake Park.

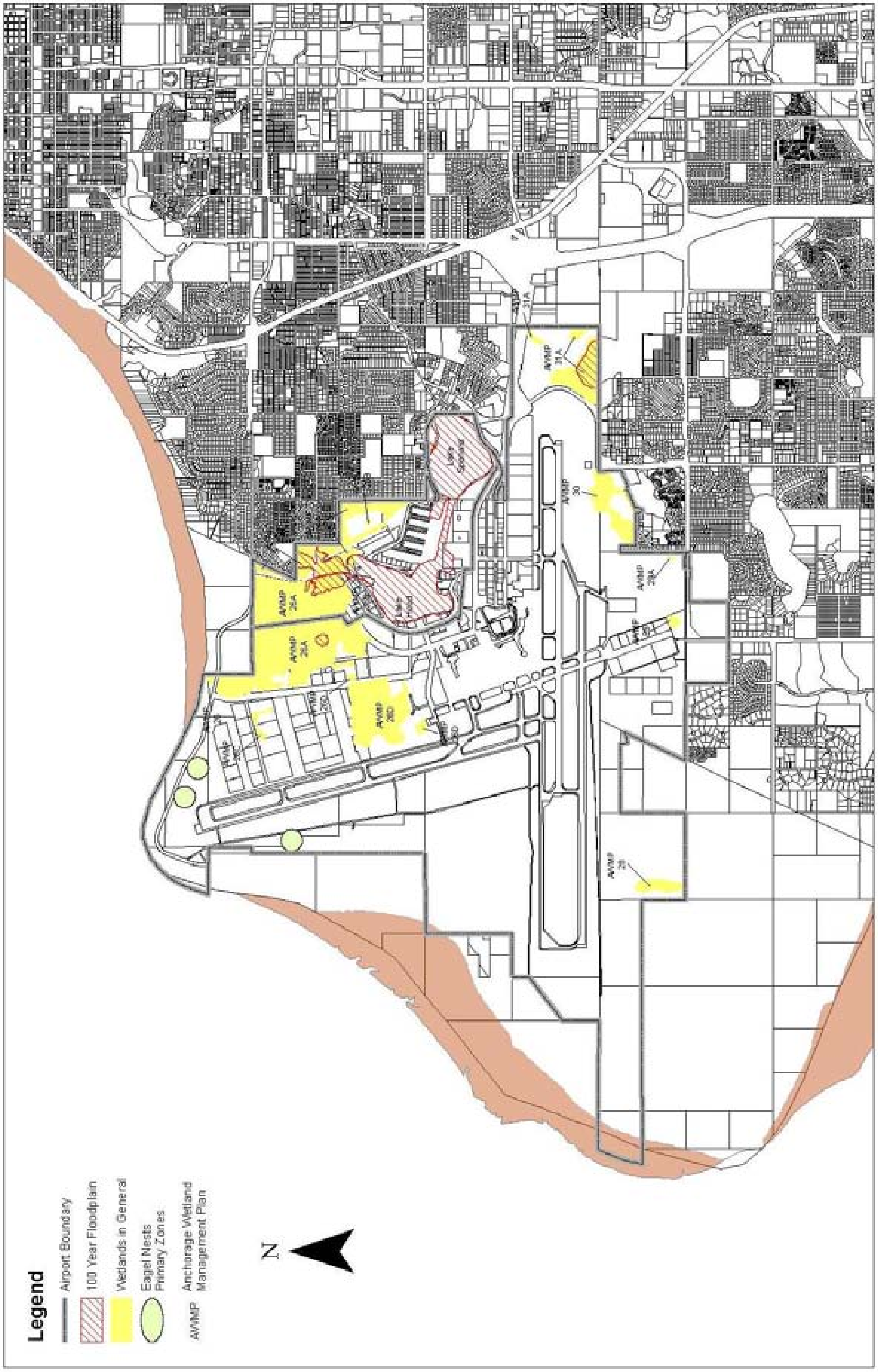
The FAA adopted and approved a wildlife hazard management plan in 1977, due to the high number of incidents and the significant wildlife population in the vicinity of ANC. Postmark Bog is actively hazed throughout the open water season to disperse the larger-bodied birds such as geese, ducks and cranes. Moose are also hazed from the Postmark Bog area and portions of Turnagain Bog near Lake Hood (USACE, 1999).

Plants

Both upland and wetland communities are present within ANC property. Upland communities include mixed forests, consisting primarily of paper birch, as well as white and black spruce. Upland communities are more commonly found in the north, northeast and western sections of the ANC property.

Wetland communities consist of predominantly shrub-ericaceous bog complexes, in addition to black spruce forests. Vegetation species present within these communities include buckbean (*Menyanthes trifoliate),* marsh cinquefoil *(Potentilla palustris),* water sedge *(Carex aquatilis),* livid sedge *(Carex livida),* and sweet gale *(Myrica gale)* in wetter locations.

A higher density of shrubs, such as dwarf birch (*Betula nana)* and shrubby cinquefoil (*Potentilla fruticosa),* including ericaceous shrubs such as Labrador tea (*Ledum decumbens),* crowberry (*Empetrum nigrum)* and bog blueberry (*Vaccinium uliginosum),* are found in less wet locations. Black spruce (*Picea mariana)* forests can also be found in less wet locations within the ANC property.



Ted Stevens Anchorage International Airport

Development Constraints

Figure 1-13

1.3.6. Floodplains

Executive Order 11988 directs federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural beneficial values served by floodplains. Floodplains are the lowland and relatively flat areas adjoining inland and coastal waters, including flood prone areas of offshore islands that are subject to a one percent or greater chance of flooding in any given year.

A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) indicates that the majority of ANC is located within a Zone C designation, which indicates areas of minimal flooding. Lakes Hood and Spenard as well as the area between Lake Hood and Jones Lake (north of Lake Hood) are designated as Zone A, which are areas of 100-year floods (Figure 1-13).

1.3.7. Hazardous Materials

Hazardous materials (including hazardous substances and hazardous wastes as defined by 49 CFR 172) present within Airport property boundaries include aviation fuel, hydraulic fluids, antifreeze, and deicing fluids. Due to the presence of these materials, operations on ANC are regulated under the Resource Conservation and Recovery Act (RCRA). ANC is listed and regulated under RCRA normally as a Conditionally Exempt Small Quantity Hazardous Waste Generator, meaning ANC generates 220 pounds or less of hazardous waste or less than 2.2 pounds of acute hazardous waste per calendar month.

ANC has pollution prevention and control programs in effect that are outlined in a number of ANC documents. They include:

- *2004 Waterbody Recovery Plan for Lakes Hood and Spenard* (CH2M Hill, 2004)
- *Airport Drainage Plan for AIA* (HDR, 1993)
- *ANC SWPPP - Final.* Tenant Templates (CH2M Hill, 2001)
- *Deicing Management Program* (Limno-Tech and CH2M Hill, 2004)
- *EPA Individual NPDES Permit Application For Stormwater Discharges Associated with Industrial Activity* (CH2M Hill, 2004)
- *Storm Drainage Master Plan* (CRW, 2000);
- *Airport Drainage Plan Condition Survey* (ASCG, 1998)
- *AIA Phase I Storm Drainage Improvements Design Study Report* (CRW, 1998)

A search of the ADEC Contaminated Sites database yielded 55 contaminated site listings (four closed/No Further Action) and 80 Leaking Underground Storage Tanks (LUST) (28 closed/No Further Action) within ANC boundaries. Seven open contaminated sites are related hydrocarbon contamination including diesel-range organics (DRO), gasoline range organics (GRO) and residual range organics (RRO). Many contaminated sites have low concentrations of DRO or GRO resulting from underground storage tanks or piping used during fueling operations or disturbed during removal efforts.

Five of the open LUST sites all have concentrations of DRO, GRO or benzene in the surrounding soil that exceed applicable ADEC cleanup levels. All of the LUST sites and tank or tanks associated with the contamination were removed. Furthermore, each LUST site is currently in remediation processes ranging from soil characterization to long-term groundwater monitoring.

ANC has established a Landspreading Area between Taxiway K and Runway 7L to treat contaminated soils from on-airport sites. This area currently holds over 35,000 cubic yards of soils contaminated with initial levels of DRO up to 12,500 milligrams pre kilogram (mg/kg). Most of the soils have been remediated through the tilling process. In October 2006, ADEC allowed ANC to transport approximately 1,000 cubic yards of DRO contaminated soils (levels of DRO contamination did not exceed 12,500 mg/kg) excavated during the N4 gate construction.

To address the remediation of hazardous substances on ANC property, ANC developed an *Airport-Wide Risk Management Plan* to effectively manage multiple contaminated sites and to protect human health and the environment from adverse effects associated with these substances (Shaw Environmental, 2004). ANC property is divided into three risk management zones:

- Airside Risk Management Zone: This zone consists of paved and sealed airfields, taxiways, hardstands, and the terminal complex.
- Commercial Risk Management Zone: This zone includes land used as commercial properties and those that will be developed as commercial lands.
- Ecological Risk Management Zone: This zone includes lands and surface waters that may support important ecological receptors.

This streamlined assessment and management approach of contaminated areas recognizes the multiple responsible entities and sources of ANC contaminated sites and establishes cleanup levels for each zone.

1.3.8. Historical, Architectural, Archaeological, and Cultural

The National Historic Preservation Act (NHPA) of 1996, as amended, established the Advisory Council on Historic Preservation and the National Register of Historic Places (NRHP) within the National Park Service. Section 106 of the Act requires federal agencies to consider the effects of their undertaking on properties eligible for inclusion in the NRHP and to consult with the State and, if applicable, Tribal Historic Preservation Officer on projects that may impact historic resources (FAA, 2004).

The Alaska Heritage Resource Survey (AHRS) files, maintained at the Office of History and Archaeology (OH&A), and the NHRP were reviewed to determine if there are any known historic sites documented on ANC property. Although no sites were identified on ANC, a rare aircraft, the Grumman J2F-6 Duck Aircraft that served the 10th Air Force Rescue Squadron at Elmendorf during World War II is located at the aviation museum near Lake Hood.

The OH&A office does not have a record of historical, architectural, archaeological, and cultural resource surveys that have been conducted on ANC property.

1.3.9. Light Emissions and Visual Effects

ANC operates 24 hours per day and requires lighting at the terminal and other operational areas. Undeveloped areas outside of the main operational area are not typically lighted. Concerns regarding lighting have been raised on some recent improvement projects, but lighting analysis found that the lighting of facilities could be accomplished with minimal adverse effect to off-airport areas.

1.3.10. Natural Resources and Energy Supply

AWWU provides water and sewer services for ANC. Electricity is provided by Chugach Electric Association and Enstar provides natural gas to ANC.

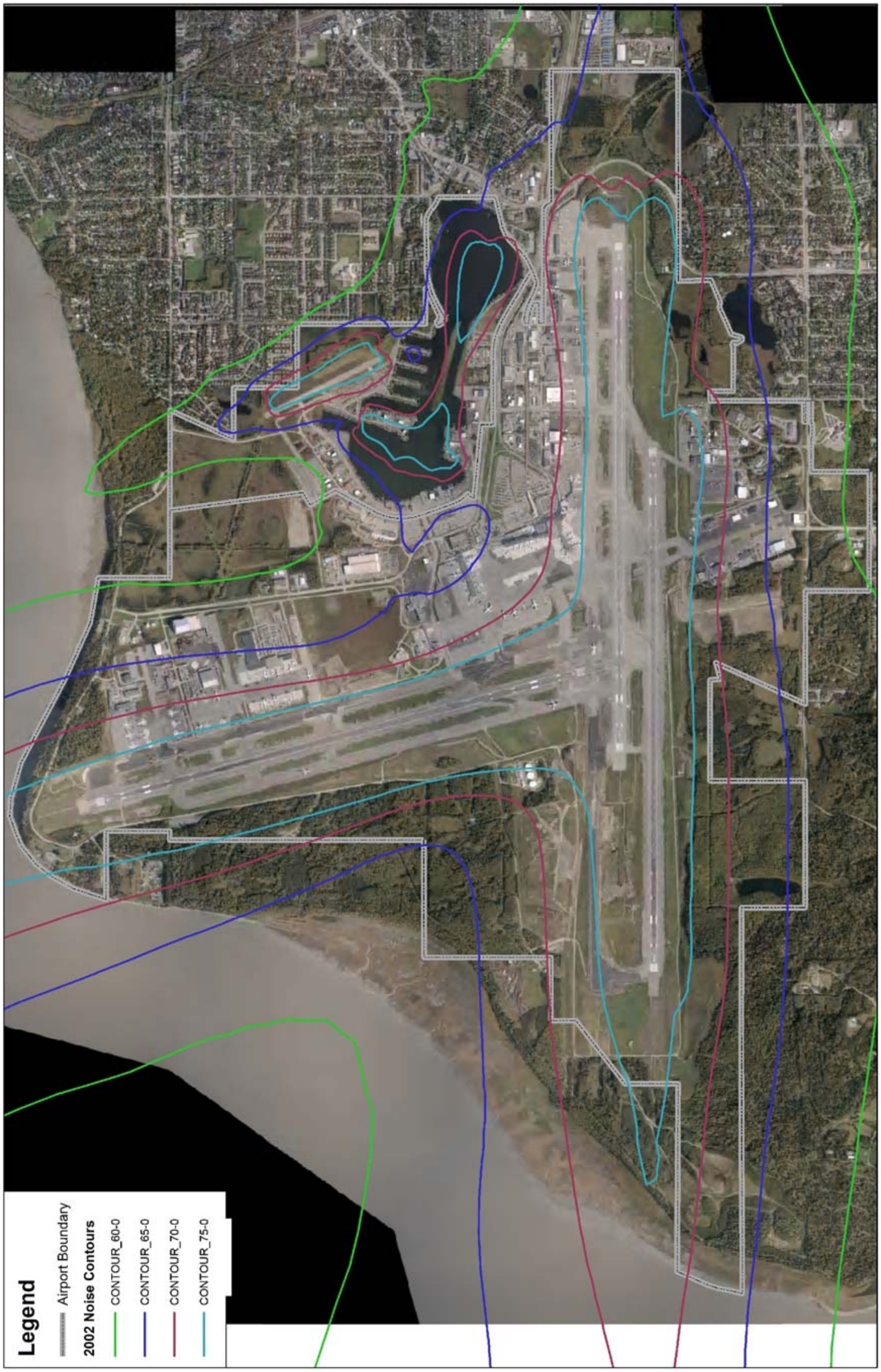
1.3.11. Noise

Airport noise associated with air operation is regulated under Title 14 of the Code of Federal Regulations Part 150, Airport Noise Compatibility Planning. ANC has developed an FAA Approved Noise Exposure Map (NEM) and Noise Compatibility Program (NCP). The 2002 NEM shows the following noise-sensitive land areas within the 65 DNL (Day-Night Average Sound Level) (Figure 1-14):

- Sections of publicly owned park land (Kincaid Park, Tony Knowles Coastal Trail, Point Woronzof Park, Conners Lake Park, DeLong Lake Park)
- Multi-family and single family residential land south of Runway 25
- The preschool south of Runway 25

The 1999 Final NCP proposed noise abatement elements to reduce the amount of noise generated at the airport or shift the noise from noise sensitive areas. ANC's preferential runway use program, where aircraft depart to the north or west over water, has been the single most important measure minimizing noise impacts on Anchorage. Other noise abatement measures implemented by ANC include departure thrust cutbacks over Runways 7 and 14, a proposed new departure track for commuter aircraft departing from Runway 7, land use initiatives (e.g. compatible use zoning, sound barriers, and comprehensive planning), and continuing programs such as noise advisory committee, noise and operations monitoring system, and noise web page (HMM&H, 1999).

ANC has also implemented a Quieter Home Program to reduce the impacts of aircraft noise on homes within the 65 DNL contour. Soundproofing improvements are made to eligible homes to reduce interior noise to, or below, a level equivalent to 45 DNL, which allows for normal speech with minimal disruption (ANC, 2006).



Ted Stevens Anchorage International Airport

Noise Contours

Figure 1-14

In 2002, ANC completed a Ground Noise Study to investigate ground-based noise sources and to identify potential mitigation measures to address ground noise, including low frequency noise, created by aviation operations (HMM&H, 2002). The study identified noise sources associated with airport activity such as start of takeoff, reverse, thrust, taxiing and idle, auxiliary power units (APU), maintenance run-ups, GA aircraft start-up and departure, and field maintenance equipment. Some of the mitigation measures identified to reduce noise impacts to adjacent land include the following:

- Utilizing Taxiway K, L, and M intersection departures on Runway 32 when feasible
- Prioritizing arrivals on Runway 7R
- Queuing Runway 32 departures on Taxiways K and L (rather than R)
- Parking aircraft with APU exhaust directed away from residences
- Providing education to GA pilots in noise-sensitive departure procedures
- Limiting nighttime field maintenance operations near residential areas when feasible

1.3.12. Socioeconomic, Environmental Justice, and Children's Health and Safety Risks

Socioeconomic

The MOA is firmly established as the State's trade, finance, service, and administrative center. It also serves as the distribution center for central, western, and northern Alaska. ANC is recognized as the air transportation gateway to the MOA, as well as one of the most important economic generators for the MOA and Southcentral Alaska, providing 8,200 on-site jobs in the 1990s. This trend will continue as increased aviation activity in the future will bring more on-site jobs and associated building space by 2020 (MOA, 2001).

ANC also generates off-site employment from local spending from ANC employees, local purchases of goods and services by the businesses and government agencies at the airport, and purchases by layover flight crews. In the 1990s, the total off-site employment as result of ANC amounted to approximately 5,300 jobs, with the majority associated with trade, service, and finance sectors of the economy (UAA, 1998).

Environmental Justice

Executive Order 12898, Environmental Justice, requires that federal agencies determine and take necessary steps to identify and address disproportionately high and adverse effects on the health or environment of minority and low-income populations. The census results for neighborhoods surrounding ANC (Census Tracts 22.01, 23.01, 23.02, and 24) indicate that the percent of those in poverty or minority is comparable to the statewide poverty, minority, and children percentages.

Children's Health and Safety Risks

Executive Order 13045, Protection of Children from Environmental Health and Safety Risks, requires federal agencies to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children. Environmental health risks and safety risks include risks to health or to safety that are attributable to products or substances that a child is likely to come in contact with or ingest, such as air, food, drinking water, recreational waters, and soil (FAA, 2004). While there are hazardous wastes and contaminated sites on ANC, children do not have access to these areas and are not exposed to them.

1.3.13. Solid Waste

Solid waste generated at ANC is removed in accordance with ADEC's Solid Waste Program.

1.3.14. Water Quality

The Clean Water Act (CWA) provides authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, regulate location with regard to an aquifer or sensitive ecological area such as a wetland area, and regulate other issues concerning water quality (FAA, 2004).

ANC has developed an *Annual Watershed Assessment Report* that provides a comprehensive description of watershed areas on ANC (CH2M Hill, 2003). This document assists ANC in watershed management, providing information on what waterways and wetlands receive runoff from ANC and planning pollution control efforts.

As indicated in the ANC National Pollutant Discharge Elimination System (NPDES) permit application, ANC has seven facilities related to industrial activity that have the potential to introduce significant materials, or pollutants, to stormwater. The pollutants of concern at the seven facilities are hydrocarbons. ANC has implemented several Best Management Practices (BMPs) and measures to control the pollutants to reduce stormwater runoff. Some BMPs and control measures include, but are not limited to:

- Materials are stored away from steep slopes and waterbodies
- Tanks are checked regularly for leaks
- Spill response plans
- Outfall containment booms
- Secondary containment berms
- Catch basin protection

ANC tracks and records significant spills and leaks that are generated by its facilities. All spills are remediated or cleaned up immediately (CH2M Hill, 2004a).

Stormwater runoff from ANC drains into five outfalls. Receiving waters of the outfalls include Knik Arm, Lake Hood, and Spenard Lake. The Knik Arm has a very low abundance and diversity of benthic organisms due to high tidal range and velocities, low and variable salinities, high suspended solids, and intertidal ice scouring. However, Knik Arm is a conduit for anadromous fish passage and is used by Cook Inlet beluga whales (*Delphinapterus leucas*) (CH2M Hill, 2004a). The Cook Inlet beluga whale stock declined dramatically between 1994 and 1998 and, as a response, the National Marine Fisheries Service (NMFS) designated the Cook Inlet stock of beluga whales as depleted under the Marine Mammal Protection Act in 1999 (NMFS, 2005). A draft Conservation Plan is in place to promote the conservation and recovery of these whales.

The semidiurnal mixed tides of the Knik Arm produce swift currents and vigorous mixing. Dissolved oxygen levels exceed the Alaska water quality standard for the protection and propagation of fish, shellfish, and other aquatic life. The Knik Arm suspended solid concentrations exceed ANC's stormwater effluent concentration by a factor ranging from 2 to 25 (CH2M Hill, 2004a).

Lakes Hood and Spenard are located on the eastern portion of ANC. The lakes were originally two separate bog lakes that were connected between 1940 through 1975 by dredging channels to serve as runways and taxiways for floatplanes. From mid-October to mid-April the lakes are iced over and, consequently, light penetration is reduced and surface re-aeration is nonexistent. During these winter months oxygen concentrations decrease and colder water temperature slows down biological and chemical processes, and result in residual biochemical oxygen demand (BOD) in the lakes from inputs that were not degraded prior to the onset of ice cover (CH2M Hill, 2004a).

Both Lakes Hood and Spenard have been listed by ADEC (originally in 1994) as 'impaired,' according to Section 303(d) of the Clean Water Act for fecal coliform, lead, nitrates, and phosphates. However, according to Alaska's *Final 2004 Integrated Water Quality Monitoring and Assessment Report*, both Lakes Hood and Spenard have completed a Total Maximum Daily Load (TMDL) and are now rated as Category 4a, impaired or threatened waters that do not need or have already completed a TMDL. Prior to the completion of the TMDL, both lakes were listed as Category 5 for fecal coliform, impaired waters for which a TMDL is required. The source of the fecal coliform in both lakes is listed as urban runoff and industrial operations.

A DEC water quality assessment for these waterbodies considered four other pollutants of concern (petroleum, nitrates, lead, and ammonia), and the data indicated that there were no persistent violations of these parameters (ADEC, 2006). However, both lakes are still impaired and listed as Category 5 waterbodies for dissolved oxygen. A recovery plan is in place to address low dissolved oxygen levels by reducing inputs of deicing chemicals.

Aircraft and airport deicing operations for more than 50,000 flight operations per year affect ANC stormwater runoff. This results in 250,000 to 600,000 gallons of glycol-based aircraft deicing products, 200 to 500 tons of urea pavement deicer, and thousands of gallons of potassium acetate pavement deicer. These deicing products have high BOD and chemical oxygen demand (COD) concentrations, and oxygen demanding substances are the main concern in the stormwater runoff entering Lakes Hood and Spenard. Urea is a contributor of ammonia and total Kjeldahl nitrogen (TKN) in stormwater that flows to the lakes. Other constituents of stormwater runoff into the lakes include potassium, phosphorus, suspended solids, and occasionally, fecal coliform, oil, and grease (CH2M Hill, 2004a).

ANC created a deicing management program primarily to address the sources behind the 303(d) listings of Lakes Hood and Spenard. Since 1997, ANC has been implementing BMPs to reduce excess pavement deicer use and introduce potassium acetate to replace urea in areas draining to the lakes. Additionally, ANC has pilot-tested several techniques for intercepting deicing runoff containing glycols and redirecting the flows away from Lakes Hood and Spenard to either Cook Inlet outfalls or the AWWU sewer. The following pilot-tested techniques have been implemented:

- Diversion structures
- Glycol recovery vehicles
- Management of dirty snow
- Replacement of potassium acetate instead of urea when and where applicable (CH2M Hill, 2004a)

ANC has a Waterbody Recovery Plan (WBRP) for Lakes Hood and Spenard to satisfy the requirement of being a Category 5 303(d) listed waterbodies. There are two phases to implement the WBRP—near-term and long-term. The near-term phase consists of continued operation of the Basin C (adjacent to Lake Hood) diversion and implementing localized controls and BMPs to reduce BOD loading to the lakes. The longer-term phase consists of the construction of a diversion structure to divert flow to the Cook Inlet, if required. The average dissolved oxygen concentration throughout the lakes during ice-free periods is predicted to reach a steady-state recovery within 10 years. After pollutant loading from deicing chemicals is significantly reduced, recovery time of the lakes can be reevaluated based on further sampling data (CH2M Hill, 2004b).

To proactively identify issues that may arise as water quality in Lakes Hood and Spenard improve, ANC developed an Aquatic Vegetation Management Plan. As ANC implemented new BMPs to reduce pollutant loading to the lakes, lake clarity increased, resulting in increased macrophyte densities. Excessive aquatic vegetation has begun to be a nuisance; the main concern is the safety issue that vegetation poses to floatplanes. The Aquatic Vegetation Management Plan analyzed multiple alternatives to control the aquatic vegetation growth. Mechanical harvesting was the selected alternative because it reduces aquatic vegetation, while leaving shoreline vegetation intact to help protect against erosion (CH2M Hill, 2005).

1.3.15. Wetlands

Section 404 of the Clean Water Act, United States Code Title 33, Section 1344 (33 USC 1344), authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into the waters of the United States, including wetlands. Wetlands are defined by the US Army Corps of Engineers (USACE) as “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (USACE, 1987).”

A review of the MOA Anchorage Wetland Management Plan (AWMP) indicates that a number of AWMP mapped wetlands are located on ANC property. Refer to Figure 1-13 for general wetland locations. The actual areas and types of wetlands have not been accurately determined.

1.3.16. Wild and Scenic Rivers

The Wild and Scenic Rivers Act defines river areas eligible for protection under the legislation as those that are free flowing and have outstanding remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, and similar values. A review of the National Park Service website indicates that there are no designated wild and scenic rivers in the MOA.

1.3.17. Topography

The Airport lies on the eastern margin of the uplands area between Point Woronzof to the north and Point Campbell to the south. This area separates the Knik Arm (directly west and north of ANC) from the Turnagain Arm of Cook Inlet. The topography of this area of the Anchorage Bowl is a direct consequence of and mirrors the geological setting that produced the land forms of the area. The area directly west of Runway 14-32 is the high ground within the Airport boundary, with a maximum elevation of 160 feet MSL; it is generally undeveloped (except for the AWWU Treatment Plant and fuel farm at Point Woronzof) and is heavily wooded. Runway 14-32 slopes to the south at about three percent from a maximum elevation of 144 feet MSL to an elevation of 115 feet MSL. The area east of Runway 14-32 and south of Lockheed Avenue has very little relief and slopes gently to the east at about 0.5 percent; the average elevation is about 80 feet MSL. Runway 7-25 lies along and near the southern boundary of the Airport and rises at about four percent from an elevation of 81 feet MSL in the east to an elevation of 124 feet MSL at the west end of the runway. The area immediately south of Runway 7-25 is mainly undeveloped, heavily wooded land. The area is somewhat higher in elevation than the area north of Runway 7-25, but it follows the general trend of sloping from higher ground in the west (elevation 240 MSL) to the lower ground in the east (elevation 120 feet MSL).

1.3.18. Geology

Anchorage is located within the Lower Matanuska Lowland, a part of the Cook Inlet Lowland Physiographic Province that borders Cook Inlet. The present surficial geology of the Anchorage area is primarily the product of five major glacial advances that occupied the area. Still water (lake and marine) deposits and alluvial deposits were laid down consequent with or subsequent to the glacial advances.

The high ridge between Point Woronzof and Point Campbell that lies west of Runway 14-32 has been mapped by Miller and Dobrovolny as a delta deposit laid down adjacent to a retreating glacier. The soils in that deposit are principally layered sands and gravels interlayered with thin silt beds to a depth of about 100 feet or more.

The lowlands east of Runway 14-32 are principally bog deposits with peat depths in excess of 15 feet in certain areas. The groundwater table is very near the surface. Numerous lakes and ponds dot the area, with the most prominent being Lake Hood and Spenard Lake. The mineral soils below the peat are silts and clayey silts (Bootlegger Cove Formation) varying in stiffness from soft to stiff.

Shallow outwash deposits (sands and gravels) lie east of Runway 14-32 between Lakes Hood and Spenard and Runway 7L-25R. The area south of Taxiway V to Runway 14-32 and east of Point Woronzof Drive is underlain principally by a deposit of silt up to 100 feet thick and interbedded with thin lenses and layers of sand.

Dense proglacial outwash deposits (sand and gravel) underlie this area of Anchorage at depths between 100 and 200 feet below the ground surface. Dense, hard glacial tills underlie the outwash to a depth of several hundred feet where they contact bedrock.

1.3.19. Soils and Land Forms

The Airport site is a remnant of glacier and river activity in the late Pleistocene period, about 14,000 to 18,000 years ago. At that time, a glacier west of Point Woronzof deposited an extensive fan delta of intergrading gravels, sands, silts, and clays. Those sediments, known as the Bootlegger Cove Formation, lie at shallow depths beneath the Airport.

The Bootlegger Cove Formation contains a complex variety of sediment textures, reflecting the location’s dynamic interplay between the retreating glacial and advancing marine environments of the late Pleistocene period. The sediments may be divided into two main groups: cohesive and non-cohesive. The cohesive group contains a high percentage of fine-grained, silty clays, which are relatively impermeable to water and provide poor drainage; whereas, the non-cohesive types contain coarser-grained sands and gravels that are more permeable and allow better drainage. The cohesive component, with its high silt content, was primarily responsible for the ground failure and landslides that occurred at Turnagain Heights immediately north and northeast of the Airport during the March 27, 1964 earthquake.

The Airport is located over a transition zone between predominantly cohesive deposits to the east and predominantly non-cohesive deposits to the west. In central and western portions of Airport property, the cohesive deposits become closely interbedded with, and pinch out against, the non-cohesive sands and gravels. Runway 14-32 is sited directly over this transition zone and is oriented parallel to its face.

The east to west transition from cohesive to non-cohesive components of the underlying Bootlegger Cove Formation is reflected in the topography, surficial soils, and vegetation of Airport property. Land east of Runway 14-32 is of low relief, with poorly drained, peaty soils and wetland vegetation, reflecting the relatively impermeable underlying clays. West of Runway 14-32, there is a topographic rise to elevations exceeding 200 feet, with moderately hilly, forested uplands and well-drained, sandy and gravelly soils that are exposed in the high bluffs along Point Woronzof.

The presence of permafrost on Airport property has not been confirmed. A drilling program conducted in February 1987 documented approximately six inches to two feet of seasonally frozen ground underlying about 1 to 1.5 feet of snow. Permafrost was not found, and it was concluded that permafrost was not expected to occur on the site.

1.3.20. Airport Environs Land Uses and Zoning Regulations

The MOA Assembly adopted the Anchorage Bowl comprehensive plan, *Anchorage 2020*, on February 20, 2001. The plan recognizes the importance of the Airport as an economic resource, as well as a transportation resource. The plan also recognizes the potential for Airport expansion, primarily within the existing Airport boundaries, and commits the MOA to development of a West Anchorage District Plan to collaboratively address Airport activities and Airport impacts on the community, as well as impacts for adjacent land uses on the Airport. The Airport participated in the public process on the *Anchorage 2020* plan, and the MOA has participated in Airport planning efforts.

The most notable characteristic of the existing land use pattern is that the areas south and southwest of the Airport are composed of a simple pattern of public uses and residential development, while the areas east, southeast, and northeast of the Airport are composed of an intricate pattern of urban development. In addition, two greenbelts are reserved for recreation purposes—the Chester Creek Greenbelt to the northeast, and the Campbell Creek Greenbelt to the southeast of the Airport and parallel to Dimond Boulevard. The Alaska Railroad Corporation (ARRC) operates a rail line running north-south on the east side of the Airport. A spur connects the Airport to the rail system.

There are 32 zoning districts established by the regulations. Of these, 17 are located in the Airport environs. Excluding the flood hazard district, all but one of the districts have the potential to permit noise-sensitive land uses in noise-impacted areas.

ANC and LHD are bordered on the east primarily by single-family and multifamily residential areas, with a small amount of commercial and industrial lands adjacent to the east end of Lake Spenard and east of the Conners Bog area. Development beyond the adjacent areas to the east is increasingly urban with a mixture of residential, institutional, and commercial uses. ANC is bordered on the southeast by single and multifamily residential areas as well. Development is also increasingly urban to the east and southeast with a mixture of residential, commercial, institutional, and industrial uses.

1.4. Socioeconomic Background

This section identifies pertinent socioeconomic factors that are likely to affect air transportation demand. These factors include economic indicators, local and statewide growth patterns, and population characteristics, distribution, and numbers. Anchorage's economy closely parallels that of the state as a whole since Anchorage is the state's commercial hub and is home to nearly half of the state's population. Anchorage represents a large portion of the state economy and has the state's most diversified economic base.

Alaska's economy has historically relied on resource development—in the most recent decades, oil development—and on federal spending for many purposes, including military activities, services for Alaska Natives, and protection of federal conservation lands. However, in the past 5-10 years, the North Slope oil production that transformed Alaska's economy has seen significant reductions. Today, tourism, mining, and the air cargo industries are making up for some of that decline but fishing and timber industries have faltered due to changing world markets and other factors.

According to the Institute of Social and Economic Research's (ISER) report, *Economic Projections for Alaska and the Southern Railbelt 2005-2030,* the following trends are anticipated in the next 25 years.

- The state economy will continue to be dominated by commodity-producing industries, tourism, national defense, and the movement of international freight.
- Petroleum, mining, tourism, and international freight hold the greatest potential for employment growth.
- Cycles in commodity production and prices will continue to cause dips and spikes in the economy—the timing of these cannot be predicted.

ISER's descriptions of and projections for the major sectors of Anchorage's economy follow.

Petroleum – Anchorage is the headquarters for development and production on the North Slope and Cook Inlet. It is home to many North Slope workers. It is expected that oil prices will stabilize and production decline at a slower rate than in the past. A large workforce will continue to be required.

Mining – Mineral exploration and development are important to Alaska's economy; however, only the largest mineral deposits can be developed successfully because of lack of infrastructure, high construction and operating costs, and distance from markets. ISER projects that Kensington, Donlin Creek, and Pebble Mines will become producing mines by 2015.

Seafood – Employment in fish harvesting and processing is expected to remain constant.

Tourism – Approximately two thirds of the 1.2 million tourists who visit Alaska annually travel through Anchorage, many through ANC. The tourism industry is projected to continue to expand due to greater demand for tourism domestically and internationally, with an increasing market share for Alaska because of in-state infrastructure development.

International Air Cargo – ANC services air freight traffic between the US, Europe, and the Far East. International air cargo operations are expected to continue to expand in response to the rapidly-growing trans-Pacific market. It is projected that this expansion will continue through 2030, but at a declining rate.

Military – Elmendorf Air Force Base and Fort Richardson are part of the Anchorage community and are staffed by several thousand active duty personnel.

Federal Spending – The US Department of the Interior (DOI) manages the 60 percent of Alaska lands owned by the federal government and the DoD supports military operations. Federal civilian employment at agencies such as the Post Office will increase in response to population growth. Increased demands on federally owned and managed public resources will increase activity levels at the DOI and other such agencies.

After tapering off gradually, federal grant funding is expected to in proportion to population growth and capital costs. The current high level of federal procurement spending for military and civilian activities in Alaska is expected to continue through 2008 and taper off thereafter.

Commercial Center – Anchorage businesses account for 54 percent of statewide income from trade and 69 percent of income from services. Anchorage is the headquarters for most banks and many Native Corporations, and is the transportation, construction, and medical services center for much of the state. As trade, services, and finance support industries have grown, Anchorage has largely replaced Seattle as the supply center for bush Alaska.

State Government – Anchorage is home to the largest concentration of state employees.

1.4.1. Economic Base and Employment

Anchorage is the center of commerce for the state. Oil and gas industries, finance and real estate, transportation, communications, and government agencies are headquartered in Anchorage. Numerous visitor and tourist facilities and services are available. Over 8,500 military personnel are stationed at Fort Richardson and Elmendorf AFB. Seasonal factors contribute to a fluctuating, though low, unemployment rate. Most of the 912 residents who hold commercial fishing permits fish in Bristol Bay, Kodiak or Cordova. Table 1.17 summarizes the last five years of employment statistics for the MOA.

Table 1.17 Historic Employment Statistics

	2001	2002	2003	2004	2005	% Change
Industry						
Total Nonfarm	138,200	140,800	142,300	144,100	146,800	6.22%
Goods Producing	12,700	12,700	12,500	13,000	13,700	7.87%
Services Providing	125,500	128,100	129,800	131,100	133,100	6.05%
Natural Resources & Mining	3,400	2,800	2,100	2,000	2,100	-38.23%
Mining	3,300	2,700	2,100	2,000	2,100	-36.36%
Oil & Gas Extraction	3,200	2,600	2,000	1,900	2,000	-37.50%
Construction	7,500	8,100	8,600	9,200	9,700	29.33%
Manufacturing	1,800	1,800	1,800	1,800	1,900	5.55%
Trade/Transportation/Utilities	32,500	33,100	32,900	33,000	33,200	2.15%
Wholesale Trade	4,700	4,600	4,600	4,700	4,700	0.00%
Retail Trade	16,900	17,300	17,300	17,300	17,400	2.95%
Trans/Warehouse/Utilities	10,900	11,200	10,300	11,000	11,100	1.83%
Air Transport.	3,500	3,500	3,500	3,700	3,600	2.86%
Information	4,800	4,700	4,500	4,400	4,400	-8.33%
Financial Activities	8,500	8,400	8,800	9,000	9,100	7.05%
Professional & Business Svcs	16,100	16,100	15,900	16,000	16,400	1.86%
Educational & Health Services	14,800	16,100	17,600	18,400	19,100	29.05%
Health Care	13,600	14,900	12,900	13,700	14,300	5.15%

	2001	2002	2003	2004	2005	% Change
Industry						
Leisure & Hospitality	14,000	14,500	14,600	14,700	15,100	7.86%
Accommodation	2,800	3,000	3,000	3,100	3,200	14.29%
Food Svcs & Drinking Places	9,500	9,800	9,900	9,900	10,100	6.32%
Other Services	5,600	5,700	5,600	5,600	5,700	1.79%
Government	29,200	29,600	29,900	30,000	30,100	3.08%
Federal Government	9,700	9,600	9,700	9,700	9,500	-2.06%
State Government	9,100	9,500	9,600	9,600	9,700	6.59%
State Education	*	2,300	2,300	2,300	2,300	
Local Government	10,400	10,500	10,600	10,700	10,900	4.81%
Local Education	*	7,200	7,400	7,400	7,500	
Tribal Gov't.	200	200	200	300	300	50.00%

* Not reported for 2001

Source: Alaska Department of Labor and Workforce Development, Research and Analysis, Current Employment Statistics. http://almis.labor.state.ak.us.

1.4.2. Population

Table 1.18 shows historical and projected population for Anchorage compared to all of Alaska. The number of people in Anchorage grew at an average annual rate of 1.65 percent between 2000 and 2004, from 260,300 to 277,900. The Anchorage growth rate was slightly higher than in the rest of Alaska.

ISER projects 0.82 percent annual growth through 2020 and 0.87 percent annual growth in Anchorage population from 2020 through 2030. The Anchorage metro area population is projected to increase faster than in the rest of Alaska for a time, but growth in other areas of the state will cause this trend to reverse after about 2010. Future population in Anchorage and the nearby Matanuska-Susitna Valley will continue to increase as future employment opportunities are projected to arise in these urban areas.

Table 1.18 Historic and Projected Population

	Anchorage Metropolitan Area	Alaska	Anchorage Percent of Alaska
Historic			
2000	260,300	626,900	41.5%
2001	264,100	632,700	41.7%
2002	268,700	641,500	41.9%
2003	273,600	648,800	42.2%
Projected			
2005	285,700	669,300	42.7%
2007	290,900	678,700	42.9%
2012	295,100	703,800	41.9%
2017	299,100	735,100	40.7%
2022	311,900	787,000	39.6%
2027	326,600	844,500	38.7%

Source: Institute of Social and Economic Research (ISER), University of Alaska Anchorage, *Economic Projections for Alaska and the Southern Railbelt 2005-2030*.

1.4.3. Income

Alaska per capita income was about three percent above the US average in 2004.[7] Per capita income is considered a good measure of economic well-being because it includes income generated through work and investments, as well as transfer payments[8] (government). Anchorage residents have high per capita and household income levels. Average wages are high in the petroleum and construction industries and many professional and technical jobs are available. However, it is projected that growth in real per capita income, adjusted for inflation, will likely be under half a percent per year in the coming years. Table 1.19 shows the historic and projected per capita income for Anchorage and for Alaska as a whole.

Table 1.19 Historic and Projected Income for Anchorage and Alaska

Year	**Anchorage Per Capita Income** (2003 dollars)	**Alaska Per Capita Income** (2003 dollars)
Historic		
2000	$36,434	$32,327
2001	$38,182	$33,236
2002	$38,502	$33,471
Projected		
2003	$36,709	$33,185
2005	$36,919	$33,303
2007	$37,741	$34,120
2012	$38,177	$34,408
2017	$37,650	$33,678
2022	$37,379	$33,642
2027	$38,299	$33,929

Source: ISER, *Economic Projections for Alaska and the Southern Railbelt 2005-2030*.

1.5. Financial Data

The Alaska International Airport System (AIAS or System) rates and charges are calculated using a residual rate methodology. In a residual agreement, the signatory airlines accept the financial risk and guarantee the airport sufficient revenues to meet its operating and debt-service costs. Under this approach, after an airport deducts all non-airline revenue from its total annual expenses, the airlines are responsible for the remaining (residual) amount, and rates are set accordingly.

1.5.1. System Requirement

System cash uses originate from three main sources. The first of those is the operating budget for the two System airports and the AIAS component. Operating line items fall into five broad categories: personnel services, travel, commodities, supplies and equipment. Secondly, there is annual debt service on System revenue bonds. Finally, the System must collect fees for various "fund" deposits authorized by the passenger use and lease agreements with airlines. Those funds

---

[7] ISER, 2006. Understanding Alaska: People, Economy, and Resources

[8] Fried, 2005, Alaska: An Interesting Income Picture

provide for cash-funded capital projects, operating and maintenance reserve accounts and finally, an amount for System discretionary projects.

1.5.2. System Credits

Non-aeronautical revenue sources include vendor concessions from rental cars, food, news and gifts, and specialty item sales. Auto parking fees and land lease revenue are the other large contributors to this category. In addition to landing fees, the System generates airline revenues from terminal rent, aircraft parking and docking, the use of common space (such as baggage claim areas), a fuel flowage surcharge, and a charge for those airlines who require non-preferential space (airport administered charges).

Terminal rents are determined by calculating the total System requirement for that cost center. The requirement is offset with non-airline revenues from auto parking. The total requirement is divided by total usable terminal footage to arrive at a cost per square foot. This rate drives the calculation of other fees, such as common use space, federal inspection fees and airport administered use charges.

1.5.3. Residual Component (Landing Fee)

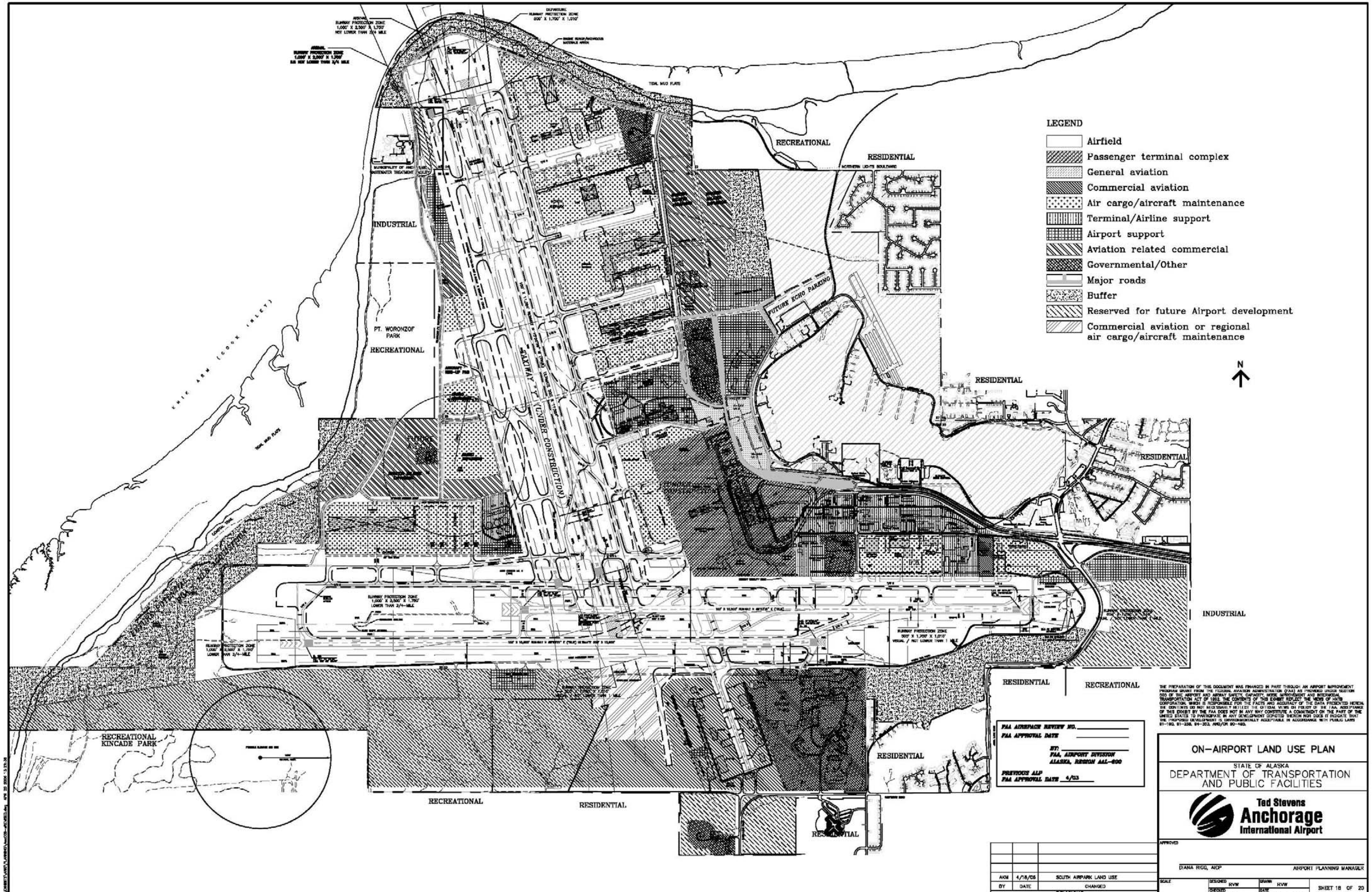
Non-aeronautical revenues are combined with airline income (except landing fees). The difference between those credits and the aggregate System requirement is calculated. Landing fees are then set at a level to cover this deficit and ensure break-even operation of the System. With minor exceptions, fees are the same for both ANC and Fairbanks International Airport (FIA).

1.5.4. CIP Summary

The current Capital Improvement Program (CIP) is a combination of FAA Airport Improvement Program (AIP), Passenger Facility Charge (PFC), Bond, and International Airport Revenue Fund funding. It contains both State Fiscal Year (SFY) and Federal Fiscal Year (FFY) projects. The goal of the CIP is to program projects appropriately, both for construction timing and funding. ANC maximizes the use of FAA funding by applying for multi-year grants. ANC further maximizes the use of FAA funding by using the PFC and Letters of Intent (LOI).

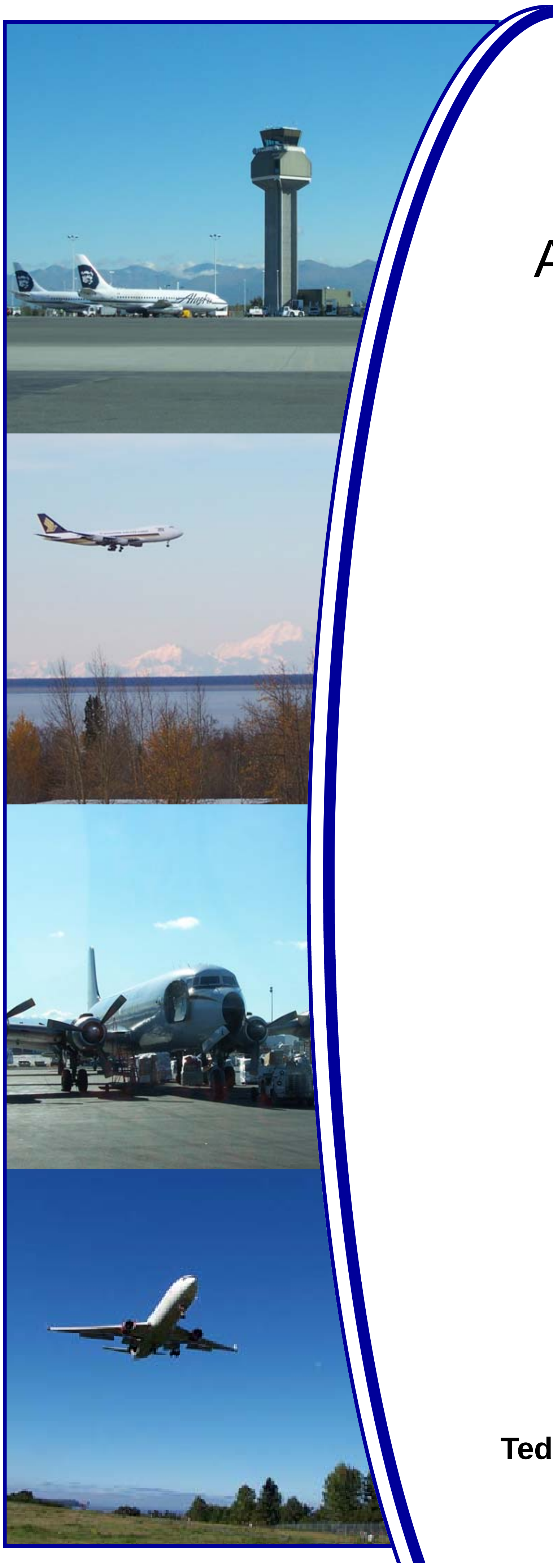
Cargo Entitlements (EC) are programmed primarily for airfield pavement projects. Passenger Entitlements (EP) are dedicated for the next few years to public parts of the A and B Concourse Seismic Retrofit project, as are the PFC funds.

ANC has an active Part 150 Noise Program that is rehabilitating private homes within the 65 DNL.



Ted Stevens Anchorage International Airport

ON-AIRPORT LAND USE PLAN
Figure 1-15



Chapter Two: Airport Activity Forecasts

Chapter Two: Airport Activity Forecasts

Ted Stevens Anchorage International Airport
2008 Master Plan Study Report
January 2009

Ted Stevens Anchorage International Airport
2008 Master Plan Study Report

Chapter Two – Airport Activity Forecast

January 23, 2009
Draft

AKSAS Project Number: 59585

Prepared for:
Ted Stevens Anchorage International Airport
Alaska Department of Transportation and Public Facilities

Prepared by:
WHPacific
with
HNTB Corporation and DOWL Engineers

Update on Effects of Recent World Economic Events

The Master Plan Forecast of Aviation Activity for the Ted Stevens Anchorage International Airport is based on economic and airline projections in 2006. It was found to be technically valid by the FAA in March, 2007 based on industry information available at the time. The rise in crude oil prices to as high as $140 per barrel and other major economic events in 2007 and 2008 have dramatically changed and continue to affect the aviation industry. Not only have costs risen, the demand for commercial passenger and general aviation passenger as well as air cargo services has decreased. The outlook as of late 2008 is unclear.

Future aviation demand levels presented in Draft Chapter 2, Aviation Activity Forecast, were used as the foundation for the Draft Chapter 3, Facility Requirements and the Draft Chapter 4, Concept Development and Alternatives Evaluation. However, due to the current uncertainty of business costs and the general economic activity levels, it is expected that future demand levels will not materialize as soon as originally projected.

Therefore, the Airport intends to monitor the economic outlook and, at an appropriate time, start a Master Plan Update with a new or updated forecast and development timetable. Accordingly, working with airline partners, the Airport is deferring further planning of a new runway until the economic outlook improves.

Chapter Two - Airport Activity Forecast

This chapter contains the activity forecasts for the Master Plan Update for Ted Stevens Anchorage International Airport (ANC). The forecasts are intended for use in subsequent facilities requirements analyses for the airside, terminal, landside and cargo areas. A credible and usable forecast is critical to ensure that the type and size of facilities that are planned are appropriate for future conditions and within the Airport's financial resources.

This chapter is organized into six major sections. The first section discusses the socioeconomic activity projected for the Anchorage area, Alaska, and the U.S. through 2020. The second section discusses historic aviation activity at ANC. The next section contains passenger carrier projections broken out by intra-Alaska, other United States, and international markets. It is followed by the air freight forecast section, which discusses intra-Alaska, U.S. and international cargo tonnage and aircraft operations organized by major market. This is followed by a section discussing air taxi, general aviation, and military activity. The chapter concludes with a summary of projected ANC aviation activity including landed weight projections and peak activity forecast. These forecasts will be the basis for planning and scheduling airport improvements through the planning period.

Except where noted, the demand forecasts contained herein are unconstrained. They assume terminal and airfield capacity will be available to accommodate the anticipated demand. Forecasts are presented for 2012, 2017, and 2027. The year 2005 was used as the base year since it is the most recent calendar for which a complete set of data are available. Where appropriate, the study draws upon previous forecast work performed for the State, specifically the Airfield/Air Cargo Master Plan Update for ANC completed in 2002 and the ongoing Lake Hood and ANC General Aviation Master Plan.

The assumptions inherent in the following calculations are based on input from regional economic, air carrier and Airport officials; previous ANC studies; relevant literature; and professional experience. Forecasting, however, is not an exact science. Departures from forecast levels in the local and global economy and in the airline business environment may have a significant effect on the projections presented herein. These uncertainties increase towards the end of the forecast period when new technologies, changes in business practices and priorities, and international political shifts may have an unpredictable impact on aviation activity. For these reasons, the forecasts should be periodically compared with actual ANC activity levels, and Airport plans and policies should be adjusted accordingly.

2.1. Socioeconomic Projections

The ultimate determinants of passenger travel are the strength of the economy and the cost and availability of the service. Consequently, a clear understanding of local economic forces and trends is important for developing an accurate aviation activity forecast. This is particularly true for Anchorage and Alaska. Due to the large size of the State, the remote location of many communities, and the limited road system, aviation assumes a role typically undertaken by highways and rail elsewhere in the country. Thus, a healthy aviation system is vital to the continued growth of the Anchorage and Alaska economies.

Historical data on population, employment, and income in the primary study area are presented in this section. The Anchorage Metropolitan Statistical Area (MSA) which contains the

Anchorage Municipality and the Matanuska-Susitna Borough, was selected as the primary service area for this study. It encompasses most of the regional economic activity surrounding the Airport. Consequently, in the remainder of this chapter, Anchorage refers to the Anchorage MSA unless otherwise noted.

The principal source of historical data for Anchorage, the State of Alaska, and the United States was the Bureau of Economic Analysis (BEA) in the U.S. Department of Commerce.

The principal source of economic projections for Anchorage and Alaska was Economic Projections for Alaska and the Southern Railbelt, published by the Institute of Social and Economic Research (ISER) at the University of Alaska Anchorage.[1] The ISER forecasts include a base case and multiple sensitivity cases. The ISER report contains forecasts of population, employment and income for Alaska and the Anchorage Municipality, and the Matanuska-Susitna and Kenai Peninsula Boroughs. Since ISER is more familiar with the Alaska economy than is any other socioeconomic forecast provider, their forecasts were selected for use in this study

The ISER income projections are based, in part, on assumptions that real national per capita income will grow at 0.5 percent per year and that real national earnings will grow at 1.5 percent per year. These assumptions are conservative when compared to Woods & Poole Economics (W&P) which project US per capita income growth of 1.1 percent per year and earnings growth of 2.1 percent per year over the same period. The W&P national forecasts, in turn, are more conservative than the economic forecasts used by the FAA in their projections. The earlier ISER per capita income forecast, used in the previous Master Plan, also proved conservative. ISER had projected Anchorage per capita income to grow at 0.3 percent per year from 1996 through 2003. The actual growth over that period was 1.4 percent per year. Based on the difference between the ISER and W&P national income projections, the ISER income projections were adjusted upwards by a growth rate of 0.6 percent per year for use in this study.

The base case ISER forecast incorporated the following key assumptions.

- A gradual decline in crude oil prices to about $30 per barrel.
- North Slope oil production will remain stable until 2015 and then decline at 3 percent per year.
- A large workforce will continue to be involved in oil production because of the additional labor required for marginal oil fields.
- There will be exploration but no production at the Arctic National Wildlife Refuge (ANWR).
- The ISER base case assumes that the proposed Alaska Gas Pipeline will not be constructed. ISER, however, has provided a sensitivity case that assumes the Gas Pipeline will be constructed, an assumption that was adopted by the Study Team for this forecast. Additional discussion is provided below.

---

[1] Institute of Social and Economic Research, University of Alaska Anchorage, Economic Projections for Alaska and the Southern Railbelt, September 30, 2005.

- The Kensington, Donlin Creek, and Pebble prospects will become producing mines and other mining activity will increase at 3 percent per year.
- Forest products will experience a modest growth rate of 1 percent per year, mostly in South Central Alaska.
- Seafood harvesting and production employment will be constant.
- Tourism expenditures will increase by five percent per year.
- Military employment will be constant.
- Non-military federal employment is assumed to grow .25 percent per year.
- Federal grants for infrastructure improvements are assumed to decline in the near term and then increase at the same rate as Alaska population.
- Civilian federal employment will increase 0.25 percent per year, consistent with long-term trends.
- Permanent Fund dividends are projected to gradually decline.

At this point the status of the proposed gas pipeline is uncertain. From a planning standpoint it is best to assume the most aggressive case (that the pipeline will be constructed resulting in additional economic and aviation activity). Given the environmental and political hurdles that would need to be overcome, it is assumed that construction will begin in 2015.[2] According to ISER, the pipeline will increase Anchorage employment by 4.8 percent and population by 4.9 percent during the construction peak. Post-construction, the pipeline will result in a net increase of 1.2 percent in employment and 1.1 percent in construction. The ISER forecasts were adjusted to incorporate the additional population and employment resulting from pipeline construction.

Forecast data for the remainder of the United States was obtained from Woods & Poole, Economics.[3] The W&P CEDDS forecasts, which contain projections by metropolitan area for the entire United States, were selected for use in developing forecasts from ANC to the remainder of the United States.

2.1.1. Population

Table 2.1.1 shows historical population for Anchorage, Alaska, and the United States. As shown in the table, the number of people in the Anchorage MSA grew at an average annual rate of 1.4 percent between 1985 and 2005, from 264,128 to 351,049. The Anchorage growth rate has been higher than in the rest of Alaska and in the remainder of the U.S. Prior to 1985, there was a rapid period of growth during the oil boom of the late 1970s and early 1980s.

The ISER population projections for the Anchorage MSA (adjusted for the gas pipeline) in **Table 2.1.2**, project a 1.5 percent annual growth rate through 2030. As shown, the Anchorage

---

[2] The ISER sensitivity case assumed construction on the natural gas pipeline would begin in 2006. Since the Study Team assumes a construction start that is later by nine years, the application of the ISER adjustment factors was also delayed by nine years.

[3] Woods and Poole Economic: <u>CEDDS 2005</u>.

metro area population is projected to increase faster than in Alaska or the United States. Future population in Anchorage is projected to grow more quickly than elsewhere in Alaska because more future employment opportunities are projected to arise in urban areas rather than rural areas (see Section 2.1.2 for more details).

2.1.2. Employment

Table 2.1.3 presents historical employment for Anchorage, Alaska, and the United States. Historically, employment has grown more rapidly than population, from 164,375 in 1985 to 222,516 in 2004. Over the 1985-2004 period, the average annual growth rate for Anchorage employment (1.6 percent) has been the same as for Alaska (1.6 percent) but slightly less rapid than the United States (1.7 percent).

The adjusted ISER forecast projects Anchorage employment to grow at a 1.4 percent annual rate through 2030. As shown in **Table 2.1.4**, Anchorage employment is projected to continue to grow faster than elsewhere in Alaska or the United States.

The ISER employment forecasts project that oil and gas production will continue to be a major driver of the Alaska economy but that its relative importance will decline over time. Tourism is projected to continue the rapid growth experienced in recent years as the tourist infrastructure, such as hotels, continues to be developed in Alaska. Mining has growth potential and timber and agricultural employment is expected to grow modestly. Since Alaska seafood harvesting is now constrained by the size of the fisheries, no increases in seafood related employment are anticipated.

Table 2.1.1

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Population

	Anchorage Municipality	Matanuska-Susitna Borough	Total Anchorage MSA (a)	Alaska	United States	Anchorage MSA Percentage of United States
1985	226,848	37,280	264,128	532,496	237,923,734	0.11%
1986	229,965	40,109	270,074	544,269	240,132,831	0.11%
1987	225,170	40,041	265,211	539,310	242,288,936	0.11%
1988	224,371	39,274	263,645	541,984	244,499,004	0.11%
1989	225,374	38,584	263,958	547,160	246,819,222	0.11%
1990	226,338	39,683	266,021	553,290	249,622,814	0.11%
1991	235,137	42,270	277,407	570,193	252,980,941	0.11%
1992	245,623	44,684	290,307	588,736	256,514,224	0.11%
1993	250,163	46,351	296,514	599,432	259,918,588	0.11%
1994	252,278	47,910	300,188	603,308	263,125,821	0.11%
1995	251,981	49,897	301,878	604,412	266,278,393	0.11%
1996	250,710	51,896	302,606	608,569	269,394,284	0.11%
1997	252,700	53,780	306,480	612,968	272,646,925	0.11%
1998	257,232	55,663	312,895	619,932	275,854,104	0.11%
1999	259,348	57,824	317,172	624,779	279,040,168	0.11%
2000	260,283	59,322	319,605	627,500	282,193,477	0.11%
2001	263,642	62,199	325,841	632,249	285,107,923	0.11%
2002	267,674	65,086	332,760	640,699	287,984,799	0.12%
2003	271,216	68,354	339,570	648,510	290,850,005	0.12%
2004	274,067	72,166	346,233	657,755	293,656,842	0.12%
2005	275,043	76,006	351,049	663,661	296,410,404	0.12%
Avg. Annual Growth 1985-2005	1.0%	3.6%	1.4%	1.1%	1.1%	

(a) Includes Anchorage Municipality and Matanuska-Susitna Borough

Sources: Bureau of Economic Analysis and HNTB analysis.

Table 2.1.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Population

	Anchorage Municipality (a)	Matanuska-Susitna Borough (a)	Total Anchorage MSA (b)	Alaska (a)	United States (c)	Anchorage MSA Percentage of United States
2005	275,043	76,006	351,049	663,661	296,410,404	0.12%
2010	281,600	94,700	376,300	684,100	310,973,900	0.12%
2012	284,100	102,900	387,000	704,400	317,155,500	0.12%
2015	285,200	113,500	398,700	712,400	326,427,800	0.12%
2017	289,200	121,800	411,000	731,800	332,847,600	0.12%
2020	297,600	135,700	433,300	765,200	342,477,300	0.13%
2025	317,600	162,300	479,900	811,300	359,313,300	0.13%
2027	319,200	171,200	490,400	848,500	366,550,000	0.13%
2030	325,000	186,500	511,500	877,800	377,405,000	0.14%
Avg. Annual Growth 2005-2030	0.7%	3.7%	1.5%	1.1%	1.0%	

(a) ISER growth rates applied to 2005 base year. Assumes construction of the Alaska Gas Pipeline.
(b) Municipality of Anchorage plus Matanuska-Susitna Borough.
(c) Woods & Poole growth rates applied to 2005 base year.

Sources: Table 2.1.1, Woods & Poole Economics, CEDDS 2005, ISER, Economic Projections for Alaska and the Southern Railbelt: 2005-2030, and HNTB analysis.

Table 2.1.3

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Employment

	Anchorage Municipality	Matanuska-Susitna Borough	Total Anchorage MSA (a)	Alaska	United States	Anchorage MSA Percentage of United States
1985	153,291	11,084	164,375	318,098	124,509,700	0.13%
1986	148,808	10,986	159,794	311,278	126,970,300	0.13%
1987	146,576	11,411	157,987	311,684	130,400,400	0.12%
1988	145,516	11,690	157,206	318,384	134,506,900	0.12%
1989	148,970	12,093	161,063	330,442	137,199,800	0.12%
1990	155,540	12,626	168,166	340,833	139,380,900	0.12%
1991	159,725	13,879	173,604	348,975	138,605,800	0.13%
1992	160,751	14,569	175,320	353,016	139,162,100	0.13%
1993	164,164	15,039	179,203	360,585	141,779,400	0.13%
1994	165,910	16,766	182,676	365,748	145,223,600	0.13%
1995	166,269	17,174	183,443	367,324	148,982,800	0.12%
1996	167,264	17,599	184,863	371,350	152,150,200	0.12%
1997	170,074	18,803	188,877	376,856	155,608,200	0.12%
1998	174,746	19,673	194,419	383,421	159,628,200	0.12%
1999	175,388	20,169	195,557	383,906	162,955,300	0.12%
2000	179,579	21,178	200,757	395,017	166,758,800	0.12%
2001	181,805	23,193	204,998	401,639	167,014,700	0.12%
2002	185,584	25,132	210,716	411,278	166,633,100	0.13%
2003	190,429	26,660	217,089	418,704	167,488,500	0.13%
2004	194,332	28,184	222,516	427,921	170,091,500	0.13%
2005						
Avg. Annual Growth 1985-2004	1.3%	5.0%	1.6%	1.6%	1.7%	

(a) Includes Anchorage Municipality and Matanuska-Susitna Borough

Sources: Bureau of Economic Analysis and HNTB analysis.

Table 2.1.4

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Employment

	Anchorage Municipality (a)	Matanuska-Susitna Borough (a)	Total Anchorage MSA (b)	Alaska (a)	United States (c)	Anchorage MSA Percentage of United States
2004	194,332	28,184	222,516	427,921	170,091,500	0.13%
2010	201,700	39,200	240,900	437,300	184,995,500	0.13%
2012	202,800	43,700	246,500	442,700	189,963,400	0.13%
2015	200,700	48,100	248,800	443,000	197,415,200	0.13%
2017	202,400	52,200	254,600	450,600	202,383,200	0.13%
2020	208,600	59,000	267,600	468,900	209,835,100	0.13%
2025	219,500	71,900	291,400	497,700	222,255,000	0.13%
2027	222,000	76,200	298,200	512,600	227,223,000	0.13%
2030	227,600	84,500	312,100	523,800	234,675,000	0.13%
Avg. Annual Growth 2005-2030	0.6%	4.5%	1.4%	0.8%	1.3%	

(a) ISER growth rates applied to 2005 base year. Assumes construction of the Alaska Gas Pipeline.
(b) Municipality of Anchorage plus Matanuska-Susitna Borough.
(c) Woods & Poole growth rates applied to 2005 base year.

Sources: Table 2.1.3, Woods & Poole Economics, CEDDS 2005, ISER, Economic Projections for Alaska and the Southern Railbelt: 2005-2030, and HNTB analysis.

Because of the strong role of the federal government in providing needed services and managing federal resources, it is expected to continue to be a major employer in Alaska. Employment in business and personal services, trade, and finance is expected to grow rapidly as local providers replace suppliers from elsewhere in the United States. Also, according to ISER, air freight handling is expected to become an increasingly important source of employment in the Anchorage area.

In contrast to the last 35 years in which basic (oil, timber, etc.) and infrastructure (pipeline construction, etc.) industries were the primary drivers of the economy, future employment growth is projected to occur mostly in support industries such as trade, finance, and services. Basic and infrastructure industries tend to be located in rural areas, and support industries are located in urban areas. Hence, future employment in Anchorage is projected to grow faster than in the remainder of the State.

2.1.3. Income

Table 2.1.5 shows historical annual real personal income (in 2005 dollars) for Anchorage, Alaska, and the United States. Total personal income in the Anchorage MSA grew at an average annual rate of 1.7 percent from 1985 to 2004. Over that period, Anchorage income grew at about the same rate as Alaska but significantly more slowly than the United States (3.0 percent) as historically higher per capita income levels converged more closely to the U.S. average when revenues from the oil and gas industry declined. Trends in historical income have been similar to those in employment. When employment has grown quickly, income has grown quickly. In slower periods, such as during the mid-1990s, real income has grown much more slowly.

Consistent with the population and employment projections, the adjusted ISER forecast projects Anchorage income to continue to grow, but not as quickly as in the past. As shown in **Table 2.1.6**, total Anchorage metropolitan income is projected to increase from $13.2 billion in 2004 to $24.1 billion in 2030, an average annual increase of 2.4 percent. On an average annual basis, real income in Anchorage is projected to grow more rapidly than in Alaska (1.4 percent) and slightly more rapidly than in the United States (2.2 percent).

Table 2.1.7 shows historical and projected real per capita income for Anchorage, Alaska, and the United States. Over the 1985-2004 period, real per capita income in the Anchorage metropolitan area alternately declined and rose, along with the fortunes of the oil industry. Although per capita income in Anchorage is still higher than the remainder of the United States, the difference has diminished over the past two decades.

Future per capita income in Anchorage is projected to remain relatively stable but still stay higher than the United States. Real per capita income (see **Table 2.1.8**) is not projected to increase as rapidly in Anchorage as in the U.S. The higher projected growth real income growth rate in Anchorage relative to the U.S. is attributable to the higher projected population growth (see Table 2.1.2).

Table 2.1.5

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Income
Thousands of 2005 Dollars

	Anchorage Municipality	Matanuska-Susitna Borough	Total Anchorage MSA (a)	Alaska	United States	Anchorage MSA Percentage of United States
1985	8,659,851	946,403	9,606,255	17,497,390	5,677,857,953	0.17%
1986	8,416,156	916,727	9,332,884	17,053,931	5,866,185,692	0.16%
1987	7,775,389	840,605	8,615,994	16,078,438	6,059,897,592	0.14%
1988	7,546,895	806,078	8,352,973	16,067,949	6,310,572,349	0.13%
1989	7,951,367	845,433	8,796,800	16,981,266	6,559,429,533	0.13%
1990	8,113,507	1,074,527	9,188,034	17,430,104	6,716,422,579	0.14%
1991	8,221,784	1,120,800	9,342,585	17,629,755	6,717,618,502	0.14%
1992	8,589,713	1,174,282	9,763,996	18,273,255	6,980,289,226	0.14%
1993	8,813,122	1,249,037	10,062,159	18,761,516	7,076,788,709	0.14%
1994	8,889,991	1,322,422	10,212,413	18,876,188	7,286,743,456	0.14%
1995	8,759,748	1,357,917	10,117,665	18,866,913	7,520,845,457	0.13%
1996	8,755,209	1,403,283	10,158,492	18,863,947	7,822,836,476	0.13%
1997	9,098,887	1,451,521	10,550,408	19,381,063	8,161,821,925	0.13%
1998	9,450,054	1,564,621	11,014,676	19,966,361	8,666,252,350	0.13%
1999	9,593,174	1,613,858	11,207,032	20,225,167	8,981,154,922	0.12%
2000	9,896,666	1,749,372	11,646,038	21,129,834	9,495,383,111	0.12%
2001	10,457,697	1,964,948	12,422,644	22,074,383	9,597,356,947	0.13%
2002	10,722,607	2,045,729	12,768,336	22,422,942	9,601,057,346	0.13%
2003	10,833,754	2,097,558	12,931,313	22,690,670	9,702,429,148	0.13%
2004	11,035,089	2,184,151	13,219,240	23,040,894	9,999,518,802	0.13%
2005						
Avg. Annual Growth 1985-2004	1.3%	4.5%	1.7%	1.5%	3.0%	

(a) Includes Anchorage Municipality and Matanuska-Susitna Borough

Sources: Bureau of Economic Analysis and HNTB analysis.

Table 2.1.6

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Income
Thousands of 2005 Dollars

	Anchorage Municipality (a)	Matanuska-Susitna Borough (a)	Total Anchorage MSA (b)	Alaska (a)	United States (c)	Anchorage MSA Percentage of United States
2004	11,035,089	2,184,151	13,219,240	23,040,894	9,999,518,802	0.13%
2010	12,440,294	3,152,339	15,592,633	24,406,369	11,290,811,200	0.14%
2012	12,763,324	3,552,822	16,316,145	25,004,445	11,774,154,300	0.14%
2015	12,892,661	3,982,050	16,874,711	25,440,590	12,499,169,000	0.14%
2017	13,204,365	4,346,737	17,551,101	26,198,417	13,037,576,100	0.13%
2020	13,876,222	4,991,305	18,867,527	27,589,014	13,845,186,800	0.14%
2025	15,438,146	6,287,588	21,725,734	30,562,445	15,347,964,700	0.14%
2027	15,739,905	6,760,974	22,500,879	31,680,668	16,020,679,100	0.14%
2030	16,532,154	7,607,810	24,139,965	32,887,883	17,029,750,700	0.14%
Avg. Annual Growth 2005-2030	1.6%	5.1%	2.4%	1.4%	2.2%	

(a) ISER growth rates applied to 2005 base year with adjustment of 0.6 percent per year (see text for details). Assumes construction of the Alaska Natural Gas Pipeline.

(b) Municipality of Anchorage plus Matanuska-Susitna Borough.

(c) Woods & Poole growth rates applied to 2005 base year.

Sources: Table 2.1.5, Woods & Poole Economics, CEDDS 2005, ISER, Economic Projections for Alaska and the Southern Railbelt: 2005-2030, and HNTB analysis.

Table 2.1.7

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Per Capita Income
(2005 Dollars)

	Anchorage Municipality	Matanuska-Susitna Borough	Total Anchorage MSA (a)	Alaska	United States	Anchorage MSA Percentage of United States
1985	38,175	25,386	36,370	32,859	23,864	152.40%
1986	36,598	22,856	34,557	31,334	24,429	141.46%
1987	34,531	20,994	32,487	29,813	25,011	129.89%
1988	33,636	20,524	31,683	29,647	25,810	122.75%
1989	35,281	21,911	33,327	31,035	26,576	125.40%
1990	35,847	27,078	34,539	31,503	26,906	128.37%
1991	34,966	26,515	33,678	30,919	26,554	126.83%
1992	34,971	26,280	33,633	31,038	27,212	123.60%
1993	35,230	26,947	33,935	31,299	27,227	124.64%
1994	35,239	27,602	34,020	31,288	27,693	122.85%
1995	34,764	27,214	33,516	31,215	28,244	118.66%
1996	34,922	27,040	33,570	30,997	29,039	115.60%
1997	36,007	26,990	34,424	31,618	29,935	115.00%
1998	36,737	28,109	35,202	32,207	31,416	112.05%
1999	36,990	27,910	35,334	32,372	32,186	109.78%
2000	38,023	29,489	36,439	33,673	33,648	108.29%
2001	39,666	31,591	38,125	34,914	33,662	113.26%
2002	40,058	31,431	38,371	34,998	33,339	115.09%
2003	39,945	30,687	38,081	34,989	33,359	114.16%
2004	40,264	30,266	38,180	35,030	34,052	112.12%
2005						
Avg. Annual Growth						
1985-2004	0.3%	0.9%	0.3%	0.3%	1.9%	

(a) Includes Anchorage Municipality and Matanuska-Susitna Borough

Sources: Bureau of Economic Analysis and HNTB analysis.

Table 2.1.8

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Per Capita Income
(2005 Dollars)

	Anchorage Municipality (a)	Matanuska-Susitna Borough (a)	Total Anchorage MSA (b)	Alaska (a)	United States (a)	Anchorage MSA Percentage of United States
2004	40,264	30,266	38,180	35,030	34,052	112.12%
2010	44,177	33,288	41,437	35,677	36,308	114.13%
2012	44,925	34,527	42,161	35,498	37,124	113.57%
2015	45,206	35,084	42,324	35,711	38,291	110.53%
2017	45,658	35,687	42,703	35,800	39,170	109.02%
2020	46,627	36,782	43,544	36,055	40,427	107.71%
2025	48,609	38,741	45,271	37,671	42,715	105.99%
2027	49,310	39,492	45,883	37,337	43,707	104.98%
2030	50,868	40,793	47,194	37,466	45,123	104.59%
Avg. Annual Growth 2005-2030	0.9%	1.2%	0.9%	0.3%	1.1%	

(a) Income projections in Table 2.1.6 divided by population projections in Table 2.1.2.
(b) Municipality of Anchorage plus Matanuska-Susitna Borough.

Sources: Tables 2.1.2 and 2.1.6, Woods & Poole Economics, CEDDS 2005, ISER, Economic Projections for Alaska and the Southern Railbelt: 2005-2030, and HNTB analysis.

2.1.4. International Economic Growth

Much of the cargo traffic at ANC depends primarily on world economic trends rather than local or national trends. Global Insight forecasts of Gross Domestic Product (GDP) by world region were used in the Boeing World Air Cargo Forecast: 2006-2007 and were also used by the FAA in their international forecasts. The forecasted 2005-2025 GDP average annual growth rates for key economies are as follows:

- World -- 3.1%
- US -- 3.0%
- Canada-- 2.2%
- Europe -- 2.1 %
- China -- 6.8%
- Japan -- 1.4%
- Southwest Asia -- 5.4%
- Middle East -- 4.0%
- Total Asia -- 3.4%
- South America -- 3.7%
- Central America -- 4.1%
- Caribbean -- 4.2%

Note that some of the most rapidly growing economies, specifically China, are located in Asia. ANC is well poised to continue to facilitate trade flows between the largest economy in the world (U.S.) and the most rapidly growing economy (China).

2.1.5. Summary

In general, the above information suggests that the Anchorage area will continue to grow into the future. However, this growth will not be as rapid as in the past as revenues from the oil industry decline and Alaska diversifies to other industries such as tourism. The economies of Asia and the remainder of North America, however, are projected to continue to grow at a healthy rate.

2.2. Historical Aviation Activity

This section discusses historical aviation activity at ANC including a discussion of the data sources. Aviation activity is comprised of the following subcategories:

- Commercial Passenger Service Activity - Including enplaned, deplaned and transit passengers for domestic air carriers, regional carriers, charter and other, and international carriers.
- Air Freight and Mail Activity - Including enplaned, deplaned, and transit tonnage operations for domestic and international carriers.
- General Aviation Activity

- Military Operations

In general, passenger and cargo activity is organized into three main categories, intra-state, other U.S. and international. These breakouts recognize the different forces driving activity in each region. Within Alaska, air transportation is a necessity. At many Alaska locations there are no other transportation modes such as highway and rail. Air travel is dictated by need; therefore compared to many other regions in the U.S. air transportation is relatively insensitive to cost. Travel to and from Alaska to the remainder of the U.S., is more discretionary, since there are alternative transportation modes available. Also, many of the lower-48 passengers to Anchorage are tourists, who have a range of options for travel destinations. Hence, air travel to the rest of the U.S. is much more price-sensitive. Most international air transportation of passengers and cargo is determined by economic factors completely outside of Alaska, and is therefore influenced by a third set of forces.

There are two main sources of information on historical and current aviation activity at ANC, the Airport and the U.S. Department of Transportation (US DOT). Each source has advantages and shortcomings.

Airport records have historically been more inclusive for passenger activity. Until 2003, the US DOT data missed many of the smaller intra-state carriers.[4] In addition, the US DOT data provides inbound and outbound passengers but has no breakout of enplaned, deplaned, and transit passengers. Unlike the US DOT data, the Airport data includes non-revenue passengers as well as revenue passengers. The US DOT data has the advantage of providing market-by-market breakouts of passengers, unlike the Airport data. In addition, some carriers fail to provide complete data to the Airport on a consistent basis. For example, in 2005, an international carrier did not file any enplaned or deplaned passenger data to the Airport, even though they had done so in previous years and continued to provide service in 2005. Likewise, a different international carrier filed no transit passenger information in 2005, despite having done so in previous years. Both carriers filed passenger data with the US DOT in 2005.

There are similar gaps in the cargo data. The international carriers, in particular, have not been consistent in the way they report cargo activity, specifically transit cargo. True transit cargo is cargo that remains on the aircraft without being off-loaded. Transit cargo is primarily carried by aircraft that use ANC as a technical stop to refuel or to relieve crew. Some airlines record transfer cargo (cargo that is off-loaded from one aircraft and loaded onto another aircraft) as enplaned and deplaned cargo, whereas others report it as transit cargo. Comparisons of historical transit cargo data with all-cargo aircraft landed weight statistics suggest that true transit cargo has been under-reported in the past, although the airlines have made progress in reducing this problem. There are similar gaps in the US DOT data. Until 2003, many of the carriers did not file cargo tonnage or aircraft operations data especially for domestic segments of their routes, including most of the U.S. flag all-cargo carriers.

As is the case with passengers, there are still some gaps in the cargo data provided by the airlines to the Airport. For example, some carriers do not report transit cargo, while others appear to

[4] US DOT, T100 data base.

report transit cargo twice, both on the inbound and outbound legs. Other carriers report significantly more cargo tonnage to the US DOT than to the Airport. Further confusion occurs when one carrier contracts the services of another carrier to carry cargo. In these instances, one carrier may report activity to the Airport while the other carrier reports activity to the US DOT.

Inconsistencies also occur in the reporting of landing statistics. The US DOT statistics show approximately 3,000 more landings by widebody cargo aircraft than the Airport statistics. An examination of the Airport's ANOMS data suggests that the number reported to the US DOT is more accurate.

In general, the Airport passenger and cargo data show more consistency over time, especially for domestic operations. Since 2003, the US DOT data appears to be more comprehensive and also provides breakouts on a market basis. Consequently, in the subsequent analyses the Airport data is used for forecast approaches such as trend or regression analyses that require a consistent data source for a lengthy period. The US DOT T100 data is used for the analyses that require market-by-market detail.

2.2.1. Passenger Activity

The recent history of passenger activity at ANC, including originating, enplaning, deplaning and transit passengers, is discussed in this section. Originating passengers are passengers that begin their air trip at ANC. Enplaning passengers include originating passengers plus those passengers that transfer from another aircraft. Transit passengers either remain on the aircraft or deplane and enplane the same aircraft as it makes a stop at ANC.

Table 2.2.1 shows domestic passenger originations at ANC from 1980 through 2005. Passenger growth was rapid in the 1980s, but grew more slowly in the 1990s until a dip in the late 1990s. There was a brief recovery around the turn of the century, followed by another dip associated with airline industry troubles in 2002 and 2003. Since then, there has been another period of recovery.

Table 2.2.1

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Passenger Originations at ANC

	Domestic Originating Passengers			
Year	**Intra-Alaska**	**Other - U.S.**	**Total**	
1980	n/a	n/a	324,690	(a)
1981	n/a	n/a	299,980	(a)
1982	n/a	n/a	416,110	(a)
1983	n/a	n/a	436,660	(a)
1984	n/a	n/a	436,880	(a)
1985	n/a	n/a	527,840	(a)
1986	n/a	n/a	714,860	(a)
1987	n/a	n/a	501,680	(a)
1988	n/a	n/a	732,150	(a)
1989	n/a	n/a	777,030	(a)
1990	485,010	621,770	1,106,780	
1991	506,960	671,260	1,178,220	
1992	538,350	757,950	1,296,300	
1993	518,380	771,270	1,289,650	
1994	516,440	843,140	1,359,580	
1995	575,880	875,020	1,450,900	
1996	598,480	925,660	1,524,140	
1997	589,290	924,910	1,514,200	
1998	553,700	902,630	1,456,330	
1999	539,380	923,490	1,462,870	
2000	526,510	957,230	1,483,740	
2001	532,240	971,480	1,503,720	
2002	435,390	1,003,350	1,438,740	
2003	509,020	958,620	1,467,640	
2004	521,580	1,057,760	1,579,340	
2005	513,230	1,102,280	1,615,510	
Average Annual Growth Rate				
1980-2005	n/a	n/a	4.8%	
1990-2005	0.4%	3.9%	2.6%	

(a) Prior to 1990, the originating passenger data has not been adjusted for non-reporting carriers.

Sources: USDOT Origin-Destination Survey as compiled by DataBase Products, and HNTB analysis.

It is notable that, since 1990, intra-Alaskan originations have grown very slowly (0.4 percent per year) while growth in originations to the remainder of the U.S. has been much stronger (3.9 percent per year). The overall growth rate during that period has been 2.6 percent per year.

Tables 2.2.2, 2.2.3, and 2.2.4 show historical enplaned, deplaned, and transit passengers compiled from Airport records. The data are organized by domestic commercial carrier, "for hire" air taxi, and international. This information was collected by airline. Some airlines, such as Northwest and Alaska, have provided both domestic and international service over the historical period; but since most of their service was domestic, their passengers were included in the domestic category. Tables A.1, A.2 and A.3 in the Technical Appendix provide an airline by airline breakout of the data.

The trends for domestic commercial enplaned and deplaned passengers are similar to the trend for originating passengers since 1990. The number of domestic transit passengers has declined significantly as airlines in Alaska, as in the rest of the United have sharply reduced their multi-stop and tag routes.

Domestic air taxi enplanements and deplanements have experienced year-to-year fluctuations with no discernable long-term trend since 1997. Air taxis serve mostly intra-state destinations and, not surprisingly, recent traffic trends have been similar to the trends for intra-state originations.

Although international enplanements and deplanements have experienced long-term growth since 1980, there have been three major disruptions to this trend. The first occurred in the early 1990s, as the introduction of the Boeing 747-400 and other long-range aircraft reduced the need for technical stops and therefore reduced available international service to ANC. There were additional interruptions during the 1998 Asian financial crisis and the 2001 terrorist attacks. The apparent drop in 2005 activity is explained mostly by the fact that Air Canada did not file passenger data with the Airport.

In contrast to international enplaned and deplaned passengers, international transit passengers have decreased substantially. The main reasons for the decline have been (1) the introduction of new-generation, long-range aircraft, especially the Boeing 747-400, which has enabled airlines to fly passengers directly from Asia to Europe and the remainder of the United States without an intermediate refueling stop and (2) the opening of Russian airspace to Asia-Europe flights.

Table 2.2.5 describes historical passenger aircraft landings. Since 1997, all categories of passenger aircraft landings have declined, albeit at varying rates. Domestic signator landings have declined slightly, even as passengers have increased. This is primarily due to increases in load factor. Among the intra-state carriers, the decrease has also been fueled by the substitution of small piston and turboprop aircraft by midsize turboprop aircraft. Data from the Official Airline Guide (OAG) indicates a marked decline in intra-state aircraft departures, while departures to non-Alaska domestic destinations have increased.

Table 2.2.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Passenger Enplanements

	Domestic				
Year	**Commercial Carrier**	**Air Taxi**	**Total Domestic**	**International**	**Total**
1980	n/a	n/a	1,006,869	25,971	1,032,840
1981 (a)	n/a	n/a	n/a	n/a	1,073,088
1982	n/a	n/a	1,232,079	27,430	1,259,509
1983	n/a	n/a	1,288,591	25,215	1,313,806
1984	n/a	n/a	1,399,899	27,078	1,426,977
1985	n/a	n/a	1,475,304	27,188	1,502,492
1986	n/a	n/a	1,406,358	29,195	1,435,553
1987	n/a	n/a	1,321,690	31,520	1,353,210
1988	n/a	n/a	1,367,204	35,681	1,402,885
1989	n/a	n/a	1,483,879	39,602	1,523,481
1990	n/a	n/a	1,692,059	52,119	1,744,178
1991	n/a	n/a	1,721,898	47,070	1,768,968
1992	n/a	n/a	1,778,105	32,055	1,810,160
1993	n/a	n/a	1,763,725	30,064	1,793,789
1994	n/a	n/a	1,908,632	25,862	1,934,494
1995	n/a	n/a	1,938,669	27,451	1,966,120
1996	n/a	n/a	2,081,148	38,139	2,119,287
1997	1,996,528	104,844	2,101,372	35,338	2,136,710
1998	1,998,934	112,116	2,111,050	35,895	2,146,945
1999	2,022,179	89,157	2,111,336	42,746	2,154,082
2000	2,051,217	100,523	2,151,740	46,074	2,197,814
2001	2,082,953	110,590	2,193,543	39,795	2,233,338
2002	2,107,609	101,010	2,208,619	37,247	2,245,866
2003	2,044,037	92,976	2,137,013	44,485	2,181,498
2004	2,216,883	95,507	2,312,390	46,931	2,359,321
2005	2,267,304	100,261	2,367,565	23,304	2,390,869
		Average Annual Growth Rate			
1980-2005	n/a	n/a	3.5%	-0.4%	3.4%
1997-2005	1.6%	-0.6%	1.5%	-5.1%	1.4%

(a) Fiscal year.

Sources: Airports Council International, Worldwide Airport Traffic Report for 1980-1089, TAMS Needs Assessment Report for 1990-1995, HNTB compilation of AIA data for 1996, and Table A.1 in Appendix A for 1997 to 2005.

Table 2.2.3

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Passenger Deplanements

	Domestic				
Year	**Commercial Carrier**	**Air Taxi**	**Total Domestic**	**International**	**Total**
1980	n/a	n/a	n/a	n/a	n/a
1981 (a)	n/a	n/a	n/a	n/a	n/a
1982	n/a	n/a	n/a	n/a	n/a
1983	n/a	n/a	n/a	n/a	n/a
1984	n/a	n/a	n/a	n/a	n/a
1985	n/a	n/a	n/a	n/a	n/a
1986	n/a	n/a	n/a	n/a	n/a
1987	n/a	n/a	n/a	n/a	n/a
1988	n/a	n/a	n/a	n/a	n/a
1989	n/a	n/a	n/a	n/a	n/a
1990	n/a	n/a	n/a	n/a	n/a
1991	n/a	n/a	n/a	n/a	n/a
1992	n/a	n/a	n/a	n/a	n/a
1993	n/a	n/a	n/a	n/a	n/a
1994	n/a	n/a	n/a	n/a	n/a
1995	n/a	n/a	n/a	n/a	n/a
1996	n/a	n/a	n/a	n/a	n/a
1997	2,001,973	103,358	2,105,331	37,532	2,142,863
1998	1,981,493	112,594	2,094,087	34,584	2,128,671
1999	2,012,787	90,507	2,103,294	41,938	2,145,232
2000	2,046,760	99,552	2,146,312	45,459	2,191,771
2001	2,066,482	110,818	2,177,300	38,278	2,215,578
2002	2,112,847	101,570	2,214,417	32,284	2,246,701
2003	2,044,728	96,078	2,140,806	45,727	2,186,533
2004	2,192,225	94,706	2,286,931	50,777	2,337,708
2005	2,255,822	99,801	2,355,623	33,946	2,389,569
Average Annual Growth Rate					
1980-2005	n/a	n/a	n/a	n/a	n/a
1997-2005	1.5%	-0.4%	1.4%	-1.2%	1.4%

(a) Fiscal year.

Sources: Airports Council International, Worldwide Airport Traffic Report for 1980-1089, TAMS Needs Assessment Report for 1990-1995, HNTB compilation of AIA data for 1996, and Table A.2 in Appendix A for 1997 to 2005.

Table 2.2.4

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Transit Passengers

	Domestic				
Year	**Commercial Carrier**	**Air Taxi**	**Total Domestic**	**International**	**Total**
1980	n/a	n/a	n/a	n/a	1,377,181
1981 (a)	n/a	n/a	n/a	n/a	1,456,894
1982	n/a	n/a	n/a	n/a	1,440,894
1983	n/a	n/a	n/a	n/a	1,394,756
1984	n/a	n/a	n/a	n/a	1,468,271
1985	n/a	n/a	n/a	n/a	1,624,399
1986	n/a	n/a	n/a	n/a	1,594,862
1987	n/a	n/a	n/a	n/a	1,659,699
1988	n/a	n/a	n/a	n/a	1,546,309
1989	n/a	n/a	n/a	n/a	1,535,365
1990	n/a	n/a	124,677	1,232,770	1,357,447
1991	n/a	n/a	142,655	641,475	784,130
1992	n/a	n/a	201,756	517,290	719,046
1993	n/a	n/a	183,415	346,017	529,432
1994	n/a	n/a	201,066	370,891	571,957
1995	n/a	n/a	182,497	454,502	636,999
1996	n/a	n/a	148,105	596,942	745,047
1997	179,625	9,672	189,297	602,526	791,823
1998	184,046	-	184,046	531,061	715,107
1999	166,357	17	166,374	517,040	683,414
2000	150,546	119	150,665	479,660	630,325
2001	139,069	-	139,069	392,321	531,390
2002	96,339	85	96,424	377,381	473,805
2003	91,782	-	91,782	251,186	342,968
2004	91,376	53	91,429	265,275	356,704
2005	75,099	202	75,301	221,164	296,465
			Average Annual Growth Rate		
1980-2005	n/a	n/a	n/a	n/a	-6.0%
1997-2005	-10.3%	-38.3%	-10.9%	-11.8%	-11.6%

(a) Fiscal year.

Sources: Airports Council International, Worldwide Airport Traffic Report for 1980-1089, TAMS Needs Assessment Report for 1990-1995, HNTB compilation of AIA data for 1996, and Table A.3 in Appendix A for 1997 to 2005.

Table 2.2.5

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Passenger Aircraft Landings

	Aircraft Landings (a)				Scheduled Departures (OAG) (b)			Scheduled Departures (T100) (c)			
Year	Domestic Signator	Domestic Non-Signator	International Signator	International Non-Signator	Intra-Alaska	Other U.S.	International	Intra-Alaska	Other U.S.	International	Charters (c)
1990	-	-	-	-	43,313	8,972	3,310	-	-	-	
1991	-	-	-	-	50,448	9,149	1,960	-	-	-	
1992	-	-	-	-	53,221	11,336	824	-	-	-	
1993	-	-	-	-	44,594	10,796	900	-	-	-	
1994	-	-	-	-	44,052	10,642	928	-	-	-	
1995	-	-	-	-	41,607	10,843	693	-	-	-	
1996	-	-	-	-	32,850	12,324	710	-	-	-	
1997	40,621	17,014	2,409	992	39,996	11,065	939	-	-	-	
1998	41,408	12,705	2,079	1,125	35,831	11,293	1,102	-	-	-	
1999	39,281	11,778	2,161	765	30,559	11,808	1,266	-	-	-	
2000	40,668	11,122	1,828	487	28,909	11,675	805	-	-	-	
2001	41,144	9,904	1,485	467	28,464	11,715	686	-	-	-	
2002	40,291	10,156	1,584	486	29,678	11,317	857	-	-	-	
2003	38,804	9,490	1,197	222	29,101	11,172	828	-	-	-	
2004	39,114	9,007	1,185	208	30,652	11,947	779	-	-	-	
2005	39,467	10,265	1,559	201	30,271	12,381	599	31,123	12,186	1,739	1,290
					Average Annual Growth Rate						
1997-2005	-0.4%	-6.1%	-5.3%	-18.1%	-3.4%	1.4%	-5.5%	-	-	-	
1990-2005	-	-	-	-	-2.4%	2.2%	-10.8%	-	-	-	

(a) Anchorage International Airport, Monthly Statistics by Carrier, converted to calendar year.
(b) Tables A.4, A.5, and A.6 in Appendix A.
(c) USDOT T100 data as compiled by DataBase Products, Inc.

Sources: As noted and HNTB analysis.

T-100 aircraft departure data for 2005 is also presented and it roughly matches the OAG data.[5]

Tables A.4 through A.7 in the Technical Appendix provide more detail from the OAG on the changes in passenger service, in terms of markets served, airlines, and equipment type, since 1990. Key factors have been the loss of major intra-Alaska airlines such as Markair and Reeve Aleutian, the gradual elimination of Stage 2 aircraft, and the loss of Asian and European service.

Table 2.2.6 presents the principle intra-state non-stop passenger markets in 2005. Fairbanks is the largest of the Alaska markets, accounting for almost one-third of intra-state traffic. It is followed by Juneau, Kenai, Kodiak, and Bethel. Inbound passengers roughly match outbound passengers to each market. There are some exceptions among the smaller markets but these exceptions are typically the result of airline routing decisions. Passengers who can travel non-stop on their outbound may have to make an intermediate stop on return and would therefore no longer be listed as non-stop passengers on their return.

Table 2.2.7 shows the major non-Alaska domestic non-stop markets in 2005. Seattle, which is the closest major U.S. city and the hub for Alaska Airlines, is the largest market, accounting for almost half of non-stop passengers in the category. It is followed by Minneapolis, Salt Lake City, Chicago O'Hare and Denver, all major airline hubs.

The major international non-stop markets in 2005 are presented in **Table 2.2.8**. U.S. airports that function as originating or terminating points for international transit passengers are classified as international in this table. Asia serves as the western focus of international transit passenger traffic and accounts for roughly half of all passengers. Canada and the United States account for almost one quarter of international passenger traffic apiece and serve as the eastern focus of international transit traffic. There is also a small amount of European traffic. New York, Hong Kong, Taipei and Toronto account for most of the international transit traffic traveling through ANC.

Table 2.2.9 presents domestic originations, average fares and average yields (airline revenue per passenger mile) for the top 50 domestic markets out of ANC. In general, nearby markets tend to have lower fares and higher yields than long distance markets.

2.2.2. Cargo Activity

This section discusses historical cargo activity at ANC. For the purpose of this analysis, air freight and air mail have been combined into air cargo. The Airport combines freight and mail into a single category for their reporting.

[5] The OAG shows much fewer scheduled international aircraft departures than the Airport or T-100 data. Airlines making technical stops that have no rights to enplane or deplane passengers at ANC typically do not publish scheduled stops at ANC.

Table 2.2.6

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Intra-Alaska Air Passenger Flows: 2005 (a)

Inbound			Outbound		
Market	**Passengers**	**Percent**	**Market**	**Passengers**	**Percent**
Fairbanks Intl Airport	259,357	32.3%	Fairbanks Intl Airport	266,073	33.2%
Juneau Intl Airport	92,772	11.6%	Juneau Intl Airport	92,637	11.6%
Kenai- Alaska- US	83,563	10.4%	Kenai- Alaska- US	78,022	9.7%
Kodiak Metro Area	67,824	8.5%	Kodiak Metro Area	65,939	8.2%
Bethel- Alaska- US	48,289	6.0%	Bethel- Alaska- US	51,166	6.4%
Nome- Alaska- US	30,947	3.9%	Nome- Alaska- US	18,117	2.3%
King Salmon- Alaska- US --	27,968	3.5%	King Salmon- Alaska- US --	35,761	4.5%
Mile 13 Field --	26,515	3.3%	Mile 13 Field --	25,127	3.1%
Dutch Harbor- Alaska- US	26,224	3.3%	Dutch Harbor- Alaska- US	14,131	1.8%
Homer- Alaska- US	23,737	3.0%	Homer- Alaska- US	22,956	2.9%
Dillingham- Alaska- US	23,127	2.9%	Dillingham- Alaska- US	28,100	3.5%
Kotzebue- Alaska- US	15,884	2.0%	Kotzebue- Alaska- US	28,741	3.6%
Valdez- Alaska- US	15,522	1.9%	Valdez- Alaska- US	15,657	2.0%
Aniak- Alaska- US	10,531	1.3%	Aniak- Alaska- US	9,864	1.2%
Deadhorse/Prudhoe Bay	9,089	1.1%	Deadhorse/Prudhoe Bay	9,265	1.2%
Cold Bay Airport- Alaska- US	5,519	0.7%	Cold Bay Airport- Alaska- US	6,982	0.9%
Red Dog- Alaska- US	5,345	0.7%	Red Dog- Alaska- US	5,290	0.7%
Iliamna- Alaska- US	4,257	0.5%	Iliamna- Alaska- US	3,877	0.5%
McGrath- Alaska- US	3,687	0.5%	McGrath- Alaska- US	3,366	0.4%
Sand Point- Alaska- US	3,571	0.4%	Sand Point- Alaska- US	3,721	0.5%
Unalakleet- Alaska- US	3,486	0.4%	Unalakleet- Alaska- US	3,610	0.5%
St Paul Island- Alaska- US --	3,124	0.4%	St Paul Island- Alaska- US --	674	0.1%
Emmonak- Alaska- US	2,266	0.3%	Emmonak- Alaska- US	2,319	0.3%
Galena- Alaska- US	2,094	0.3%	Galena- Alaska- US	2,427	0.3%
Beluga Lake- Alaska- US --	1,753	0.2%	Beluga Lake- Alaska- US --	1,668	0.2%
St Marys- Alaska- US	990	0.1%	St Marys- Alaska- US	1,755	0.2%
Sitka- Alaska- US	953	0.1%	Sitka- Alaska- US	1,355	0.2%
Other	4,187	0.5%	Other	3,094	0.4%
Total	802,581			801,694	

(a) Includes transit passengers.

Sources: USDOT T-100 data base as compiled by DataBase Products and HNTB analysis.

Table 2.2.7

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Domestic Non-Alaska Air Passenger Flows: 2005 (a)

Inbound			Outbound		
Market	**Passengers**	**Percent**	**Market**	**Passengers**	**Percent**
Seattle/Tacoma Intl Arpt --	672,790	47.7%	Seattle/Tacoma Intl Arpt --	675,564	47.8%
Minneapolis St Paul	171,460	12.2%	Minneapolis St Paul	166,692	11.8%
Salt Lake City Intl Arpt --	115,683	8.2%	Salt Lake City Intl Arpt --	109,258	7.7%
Chicago O'Hare Intl Airport	102,626	7.3%	Chicago O'Hare Intl Airport	104,662	7.4%
Denver Intl Airport	73,262	5.2%	Denver Intl Airport	77,396	5.5%
Portland- Oregon- US	56,192	4.0%	Portland- Oregon- US	64,596	4.6%
Honolulu- Oahu- Hawaii- US --	37,042	2.6%	Honolulu- Oahu- Hawaii- US --	26,977	2.6%
Phoenix Sky Harbor Intl -	34,018	2.4%	Phoenix Sky Harbor Intl -	37,155	1.9%
Houston Intercontinental --	25,831	1.8%	Houston Intercontinental --	23,077	1.9%
Las Vegas McCarran Intl Airport	25,385	1.8%	Las Vegas McCarran Intl Airport	26,352	1.6%
Los Angeles Intl Airport --	23,746	1.7%	Los Angeles Intl Airport --	22,107	1.6%
Atlanta Intl --	21,482	1.5%	Atlanta Intl --	23,187	1.6%
Detroit Wayne County Airport	18,667	1.3%	Detroit Wayne County Airport	15,815	1.1%
San Francisco Intl Arpt --	15,199	1.1%	San Francisco Intl Arpt --	15,063	1.1%
Dallas/Ft Worth Intl	15,035	1.1%	Dallas/Ft Worth Intl	15,648	1.1%
John F Kennedy Intl Arpt --	1,141	0.1%	John F Kennedy Intl Arpt --	364	0.6%
Kahului- Maui- Hawaii- US --	-	0.0%	Kahului- Maui- Hawaii- US --	8,785	0.0%
Other	314	0.0%	Other	1,329	0.1%
Total	1,409,873			1,414,027	

(a) Includes transit passengers.

Sources: USDOT T-100 data base as compiled by DataBase Products and HNTB analysis.

Table 2.2.8

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

International Passenger Flows: 2005 (a)

Inbound			Outbound		
Market	**Passengers**	**Percent**	**Market**	**Passengers**	**Percent**
Canada			Canada		
Toronto	85,259	21.0%	Toronto	95,010	22.4%
Vancouver	19,401	4.8%	Vancouver	22,688	5.3%
Whitehorse-	3,970	1.0%	Whitehorse-	44	0.0%
Other Canada	316	0.1%	Other Canada	129	0.0%
Total Canada	108,946	26.8%	Total Canada	117,871	27.8%
Asia			Asia		
Hong Kong	95,096	23.4%	Hong Kong	86,850	20.5%
Taipei	75,387	18.5%	Taipei	81,419	19.2%
Incheon Intl Apt- Seoul --	12,589	3.1%	Incheon Intl Apt- Seoul --	48,679	11.5%
Tokyo Narita Airport --	3,062	0.8%	Tokyo Narita Airport --	6,489	1.5%
Petropavlovsk-Kamchatsky- Russia	1,061	0.3%	Petropavlovsk-Kamchatsky- Russia	1,286	0.3%
Nagoya- Japan --	608	0.1%	Nagoya- Japan --	1,491	0.4%
Other Asia	1,498	0.4%	Other Asia	2,230	0.5%
Total Asia	189,301	46.5%	Total Asia	228,444	53.9%
Europe			Europe		
Frankfurt Intl Airport	4,924	1.2%	Frankfurt Intl Airport	9,058	2.1%
Other Europe	-	0.0%	Other Europe	-	0.0%
Total Europe	4,924	1.2%	Total Europe	9,058	2.1%
U.S. (International Transit)			U.S. (International Transit)		
New York JFK	103,620	25.5%	New York JFK	68,778	16.2%
Other U.S.	-	0.0%	Other U.S.	342	0.1%
Total U.S.	103,620	25.5%	Total U.S.	69,120	16.3%
Total	406,791	100.0%	Total	424,151	100.0%

(a) Includes transit passengers.

Sources: USDOT T-100 data base as compiled by DataBase Products and HNTB analysis.

Table 2.2.9

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Originations, Average Fares, and Yields by Market, 2005

Market	Code	Nonstop Miles	Originations	Average Fare (a)	Average Yield (b)
Seattle/Tacoma I	SEA	1,449	185,060	161.42	11.07
Fairbanks Intl	FAI	261	119,380	112.28	43.10
Kenai	ENA	60	64,300	41.30	68.83
Juneau Intl	JNU	571	48,600	145.77	25.55
Denver Intl	DEN	2,406	43,620	170.25	6.89
Portland	PDX	1,542	42,140	182.21	11.47
Kodiak Metro Are	ADQ	252	41,470	111.19	44.17
Los Angeles Intl	LAX	2,345	39,280	191.92	7.82
Bethel	BET	399	38,420	155.84	39.13
McCarran Intl	LAS	2,304	35,250	161.66	6.83
St Paul Intl	MSP	2,518	34,560	209.45	7.85
O'Hare Intl	ORD	2,846	33,430	196.34	6.54
Sky Harbor Intl	PHX	2,551	33,300	178.42	6.79
Salt Lake Intl	SLC	2,125	24,180	201.27	8.98
Wm B Hartsfield	ATL	3,417	22,920	224.06	6.13
Dallas/Ft Wor In	DFW	3,043	22,720	219.90	6.86
George Bush Intc	IAH	3,266	21,950	311.70	9.24
San Francisco In	SFO	2,018	21,520	199.50	9.33
Dillingham	DLG	329	18,420	122.93	37.37
Orlando Intl	MCO	3,817	18,120	201.12	5.01
Spokane Intl	GEG	1,584	17,720	158.40	9.43
Nome	OME	539	17,080	191.70	35.59
Homer	HOM	117	16,960	69.78	59.64
King Salmon	AKN	289	16,330	120.51	41.72
Sacramento Metro	SMF	1,973	16,190	200.97	9.39
Kotzebue	OTZ	549	16,030	200.21	36.45
Lindberg Field	SAN	2,452	15,480	204.26	7.91
Ronald Reagan Nt	DCA	3,375	15,390	275.84	7.67
Newark Intl	EWR	3,370	14,820	238.22	6.21
Logan Intl	BOS	3,383	14,060	223.63	5.70
Wiley Post	BRW	725	13,590	223.68	30.58
Valdez	VDZ	126	12,750	73.47	58.31
Wayne County	DTW	2,986	11,940	223.07	6.75
Boise	BOI	1,841	11,420	175.07	9.07
Dulles Intl	IAD	3,356	11,330	245.09	6.57
Mudhole Smith	CDV	160	11,280	99.52	62.20
Ketchikan Intl	KTN	775	11,100	214.35	26.97
Philadelphia Int	PHL	3,379	9,980	233.13	6.05
Kansas City Intl	MCI	2,762	9,250	223.32	7.26
Sitka	SIT	592	9,250	166.60	27.43
Tampa Intl	TPA	3,803	9,100	233.65	5.79
Reno	RNO	1,973	8,990	185.70	8.82
Metropol Oakland	OAK	2,016	8,930	211.80	9.79
Deadhorse/Prudho	SCC	626	8,580	303.97	48.48
Honolulu (Intl)	HNL	2,777	8,540	339.88	8.66
Lambert-St Louis	STL	2,936	8,210	240.76	7.43
John Wayne Intl	SNA	2,376	7,700	196.32	7.83
Dutch Harbor	DUT	792	7,500	149.48	18.87
Baltimore/Wash I	BWI	3,370	7,350	279.40	7.41
San Antonio Intl	SAT	3,192	7,220	250.31	7.25
Other			352,800		
Total			1,615,510	182.32	9.45

(a) Average one-way fare in 2005 dollars.
(b) Average revenue per passenger mile in 2005 cents.

Sources: USDOT Origin-Destination Survey and HNTB analysis.

In addition, FedEx which is the single largest mail contractor, reports mail as freight to the US DOT. Consequently, there no longer is an accurate way of distinguishing mail from freight. All tonnages in this analysis are presented in short tons (2000 pounds per ton). Air cargo activity is organized into two main categories, intra-state and other U.S./international. For the purpose of this analysis, non-Alaska U.S. cargo has been combined with international cargo because there is no practical way of separating out the two categories. Many U.S. flag carriers commingle international and domestic cargo on the North American leg of their flights. Also, although cargo that clears Customs in ANC and goes on to a U.S. destination is technically domestic, it is international in origin and more subject to the drivers that determine international cargo than domestic cargo.

Intra-Alaska cargo is typically loaded or unloaded at ANC, includes very little transit cargo, is carried on narrow body jets or turboprops, and has been stable or growing slowly. International cargo is mostly transit, with some transfer activity and very little origin-destination activity (in percentage terms) at ANC. Virtually all ANC international cargo is carried on large wide body aircraft over long distances and with tight schedule constraints. In addition, international cargo is growing more rapidly than any other aviation category at ANC.

Table 2.2.10 shows intra-state air cargo at ANC as compiled from Airport statistics. Since 1997, trends in intra-state cargo have been similar to intra-state passenger trends. There have been year-to-year fluctuations with no discernable long-term trends. Much of intra-state cargo consists of bypass mail. The bypass mail system allows shippers to transport pre-packaged, pre-approved mail in 1,000 pound units at a subsidized rate directly to an air carrier without going to a Post Office. In this respect, air mail becomes very similar to air freight and is often used as a substitute for air freight by shippers. The costs of the bypass mail system to the United States Postal Service (USPS) exceed revenues so there have been attempts to change the system to reduce costs. The Rural Service Improvement Act of 2002 had mandated that passenger air carriers must retain at least 20 percent of the passenger market to qualify and also required that they upgrade from FAR Part 135 requirements to more stringent Part 121 requirements. Amendments passed in December 2006, reduced the 20 percent requirement to 10 percent for Part 121 carriers.

Table 2.2.11 presents air cargo on carriers that ship primarily to and from non-Alaska domestic points. The table shows only a portion of ANC – U.S. flows since much of this traffic is carried by integrated carriers such as FedEx and UPS which commingle domestic and international cargo.

International air cargo reported to the Airport is presented in **Table 2.2.12**. Carriers such as FedEx, UPS, and Northwest, which carry mostly international air cargo, are included in this table. Therefore the numbers include some domestic cargo. The table shows some very rapid growth rates. Although much of this growth is real, some of it is apparent growth resulting from improved reporting by the carriers. Consequently the growth rates are somewhat overstated.

Table 2.2.10

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Estimated Intra-Alaska Air Cargo
(Freight and Mail)

Year	Enplaned Cargo (a)	Deplaned Cargo (b)	Transit Cargo (c)	Total Cargo (d)
1997	93,460	26,865	790	121,905
1998	96,188	33,090	1,890	133,059
1999	97,905	25,732	748	125,132
2000	100,389	25,286	1,054	127,784
2001	99,188	24,813	615	125,230
2002	100,080	22,456	3,278	129,091
2003	97,942	22,883	271	121,367
2004	96,572	26,125	269	123,234
2005	91,671	25,609	187	117,654
Average Annual Growth Rate				
1997-2005	-0.2%	-0.6%	-16.5%	-0.4%

(a) Table A.8 in appendix A.
(b) Table A.9 in appendix A.
(c) Table A.10 in appendix A.
(d) Enplaned plus deplaned plus transit cargo times 2 (inbound and outbound).

Souces: As noted and HNTB analysis.

Table 2.2.11

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Estimated Non-Alaska Domestic Air Cargo
(Freight and Mail)

Year	Enplaned Cargo (a)	Deplaned Cargo (b)	Transit Cargo (c)	Total Cargo (d)
1997	8,482	13,992	633	23,740
1998	8,120	11,181	1,084	21,469
1999	8,838	13,423	258	22,778
2000	12,253	17,047	224	29,749
2001	10,529	14,120	187	25,024
2002	9,877	11,455	510	22,353
2003	9,269	13,787	126	23,308
2004	9,992	12,212	125	22,454
2005	9,670	11,260	81	21,092
Average Annual Growth Rate				
1997-2005	1.7%	-2.7%	-22.7%	-1.5%

(a) Table A.8 in appendix A.
(b) Table A.9 in appendix A.
(c) Table A.10 in appendix A.
(d) Enplaned plus deplaned plus transit cargo times 2 (inbound and outbound).

Souces: As noted and HNTB analysis.

Table 2.2.12

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Estimated International Air Cargo
(Freight and Mail)

Year	Enplaned Cargo (a)	Deplaned Cargo (b)	Transit Cargo (c)	Total Cargo (d)
1997	23,317	45,652	1,210,617	2,490,202
1998	96,554	122,965	1,163,353	2,546,224
1999	194,314	221,323	1,442,635	3,300,905
2000	202,726	232,406	1,483,345	3,401,821
2001	213,714	242,687	1,307,666	3,071,732
2002	218,817	251,806	1,616,832	3,704,286
2003	208,579	258,286	1,701,485	3,869,835
2004	215,446	243,179	2,034,560	4,527,745
2005	293,611	329,447	2,187,176	4,997,409
Average Annual Growth Rate				
1997-2005	37.3%	28.0%	7.7%	9.1%

(a) Table A.8 in appendix A.
(b) Table A.9 in appendix A.
(c) Table A.10 in appendix A.
(d) Enplaned plus deplaned plus transit cargo times 2 (inbound and outbound).

Souces: As noted and HNTB analysis.

The rapid increase in international air cargo at ANC is attributable to several factors. First, air cargo has grown rapidly worldwide in recent decades. This growth has been especially rapid in the Asia-North America market, which has grown grew at a 9.0 percent annual rate since 1981, according to Boeing.[6] This growth has been achieved despite the disruptions of the Asian financial crisis in the late 1990s and the 9/11 terrorist attacks. Because of its strategic location along the great circle routes between Asia, Europe, and North America, ANC is particularly well-suited to take advantage of this growth. In addition, carriers such as FedEx and UPS, now joined by Northwest and its foreign-flag partners, are increasingly using ANC as a transfer hub so that they can better distribute aircraft payloads along the North American and Asian routes.

International air cargo at ANC has achieved an additional impetus in the late 1990s with the U.S. DOT Alaska Cargo Transfer Initiative, which grants the following rights to foreign-flag carriers:

- On-line cargo transfers among a foreign flag carrier's aircraft at ANC and Fairbanks;
- Change of gauge operations, provided the aircraft are continuing in the same direction;
- Commingling of U.S. and non-U.S. cargo on the same flight;
- Interline cargo transfers between U.S. and foreign-flag carriers; and
- Interline cargo transfers between different foreign-flag carriers.

The new cargo transfer initiative opened up ANC as a potential transfer hub to a number of new carriers.

Additional transfer authority was provided as part of the 2003 FAA Reauthorization Bill. Under the legislation, foreign-flag carriers now have the right to transfer cargo to other foreign-flag carriers at ANC provided the carriers have a code-share agreement, a blocked share agreement, or a term arrangement with a U.S. flag carrier operating to or from Alaska, or carry cargo on an air carrier waybill of a U.S. flag carrier operating to or from Alaska.

Despite the increases in cargo transfers, ANC's single greatest advantage to air cargo carriers has been its location, which allows carriers to maximize the efficiency of their operation by carrying full payloads. Otherwise they would have to sacrifice payload in exchange for additional fuel to safely cross the Pacific Ocean.

Table 2.2.13 summarizes the data in Tables 2.2.10 through 2.2.12. International cargo accounts for the bulk of air cargo activity at ANC resulting in high overall cargo growth rates. Again, some of the increase in the totals results from better reporting by the carriers so the growth rates are slightly overstated. Tables A.8, A.9, and A.10 in the Technical Appendix provide the same data broken out by air carrier.

[6] Boeing, World Air Cargo Forecast: 2006-2007.

Table 2.2.13

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Total Air Cargo
(Freight and Mail Tons)

Year	Enplaned Cargo	Deplaned Cargo	Transit Cargo	Total Cargo (a)
1980	77,943	51,795	n/a	n/a
1981	78,534	47,901	n/a	n/a
1982	93,240	59,672	n/a	n/a
1983	90,697	59,162	n/a	n/a
1984	95,893	65,070	n/a	n/a
1985	93,863	67,343	n/a	n/a
1986	99,046	70,411	n/a	n/a
1987	91,444	58,748	n/a	n/a
1988	89,189	53,263	171,454	485,359
1989	96,212	58,244	350,508	855,471
1990	104,952	67,718	395,883	964,435
1991	120,394	80,978	437,909	1,077,189
1992	126,375	83,354	460,476	1,130,681
1993	108,021	71,680	493,757	1,167,214
1994	103,996	76,852	619,202	1,419,252
1995	112,725	80,574	796,527	1,786,352
1996	116,858	85,275	1,078,601	2,359,333
1997	125,259	86,509	1,212,040	2,635,846
1998	200,862	167,236	1,166,327	2,700,752
1999	301,057	260,478	1,443,641	3,448,815
2000	315,369	274,739	1,484,623	3,559,354
2001	323,431	281,619	1,308,468	3,221,985
2002	328,773	285,717	1,620,620	3,855,730
2003	315,789	294,956	1,701,883	4,014,510
2004	322,010	281,516	2,034,954	4,673,433
2005	394,952	366,315	2,187,444	5,136,154
Average Annual Growth Rate				
1980-2005	6.7%	8.1%	n/a	n/a
1988-2005	9.1%	12.0%	16.2%	14.9%

(a) Enplaned plus deplaned plus transit cargo times 2 (inbound and outbound).

Sources: Tables 2.2.10, 2.2.11, and 2.2.12, Anchorage International Airport, Monthly Statistics by Carrier, and HNTB analysis.

Table 2.2.14 shows the top intra-Alaska markets in 2005. Passengers usually fly round trip and therefore outbound passengers generally match inbound passengers. Air cargo usually goes one way, resulting in imbalances between inbound and outbound cargo. This is especially true in the intra-Alaska market, where outbound air cargo is more than three times inbound air cargo ANC is a vital lifeline to many small Alaska communities that have no access to transportation other than by air. Hence, outbound air cargo flows are very large. These communities export relatively little to ANC and the outside world and therefore inbound cargo flows are much less.

Even though Fairbanks is the second largest metropolitan area in Alaska, after Anchorage, it ranks only fifth in terms of outbound cargo flows, behind Bethel, Nome, Kotzebue, and Dillingham. Unlike the other communities, Fairbanks has highway access to Anchorage. Therefore, many of the products that would go by air to the more inaccessible communities can go by truck to Fairbanks.

Table 2.2.15 describes eastbound air cargo traffic flows through ANC in 2005. This is traffic that originates in Asia, transits or transfers through ANC, and then goes on to its final destination, usually to North America but in some cases to Europe. A small amount of this cargo also originates in Asia and terminates in ANC or originates in ANC and terminates in North America or Europe. Outbound cargo flows exceed inbound flows by about 20,000 tons, indicating that cargo originating at ANC or elsewhere in Alaska exceeds Asian cargo terminating at ANC by at least 20,000 tons.

The Eastbound cargo flows passing through ANC are immense, accounting for almost two million tons in 2005. The chief points of origin (in terms of the non-stop air leg) are Seoul (28.8 percent), Taipei (22.9 percent), Hong Kong (11.3 percent), Shanghai (11.2 percent) and Tokyo (11.1 percent). The chief U.S. destinations are Los Angeles (23.5 percent), Chicago O'Hare (22.7 percent) and New York JFK (15.2 percent).

Table 2.2.16 shows Westbound air cargo traffic flows through ANC in 2005. Westbound flows are slightly less than half of eastbound flows. This results mostly because trade flows from Asia to North America are roughly double trade flows from North America to Asia. In addition, westbound flights are often not full and can therefore take on extra fuel and overfly ANC. Air cargo coming from North America to ANC exceeds air cargo going from ANC to Asia by about 76,000 tons. This indicates that air cargo originating in North America and terminating in ANC is much greater than air cargo originating at ANC and terminating elsewhere in North America. The chief points of origin are Chicago O'Hare (20.7 percent), New York JFK (16.4 percent), and San Francisco (9.5 percent). The chief destinations are Tokyo (31.2 percent), Seoul (23.4 percent), Taipei (18.3 percent), and Hong Kong (11.5 percent).

Table 2.2.17 shows the ANC share of total Eastbound Asia-North America traffic in 2005. As shown, 76 percent of total Eastbound Asia – North America air cargo flows through ANC, including 89.4 percent of all freighter cargo. Only 1.2 percent of belly cargo passes through ANC. There is a direct relationship between distance and ANC's share of the traffic flow.

Table 2.2.14

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Intra-Alaska Air Cargo Flows (in Tons): 2005 (a)

Inbound			Outbound		
Market	**Tonnage**	**Percent**	**Market**	**Tonnage**	**Percent**
Aniak- Alaska- US	276	1.07%	Aniak- Alaska- US	3,006	3.3%
Bethel- Alaska- US	1,677	6.49%	Bethel- Alaska- US	25,410	27.7%
Deadhorse/Prudhoe Bay	472	1.83%	Deadhorse/Prudhoe Bay	1,473	1.6%
Dillingham- Alaska- US	768	2.97%	Dillingham- Alaska- US	6,882	7.5%
Emmonak- Alaska- US	449	1.74%	Emmonak- Alaska- US	2,248	2.5%
Fairbanks Intl Airport	2,484	9.61%	Fairbanks Intl Airport	6,652	7.3%
Iliamna- Alaska- US	433	1.67%	Iliamna- Alaska- US	1,517	1.7%
Juneau Intl Airport	1,485	5.74%	Juneau Intl Airport	3,888	4.2%
King Salmon- Alaska- US --	2,240	8.67%	King Salmon- Alaska- US --	4,189	4.6%
Kodiak Metro Area	6,254	24.19%	Kodiak Metro Area	2,616	2.9%
Kotzebue- Alaska- US	1,026	3.97%	Kotzebue- Alaska- US	7,413	8.1%
McGrath- Alaska- US	203	0.79%	McGrath- Alaska- US	1,128	1.2%
Cordova (Mile 13 Field) --	1,043	4.03%	Cordova (Mile 13 Field) --	843	0.9%
Nome- Alaska- US	1,179	4.56%	Nome- Alaska- US	12,163	13.3%
Red Dog- Alaska- US	352	1.36%	Red Dog- Alaska- US	1,978	2.2%
St Marys- Alaska- US	223	0.86%	St Marys- Alaska- US	1,761	1.9%
Unalakleet- Alaska- US	550	2.13%	Unalakleet- Alaska- US	2,625	2.9%
Other	4,737	18.32%	Other	5,898	6.4%
Alaska Total	25,851	100.00%	Alaska Total	91,690	100.00%

(a) Includes air freight and air mail.

Sources: USDOT T-100 database and HNTB analysis.

Table 2.2.15

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Eastbound Air Cargo Flows through ANC: 2005 (a)

Inbound			Outbound		
Market	**Tonnage**	**Percent**	**Market**	**Tonnage**	**Percent**
People's Republic of China			**U.S. (Non-Alaska)**		
Capital Airport	16,515	0.8%	Huntsville, AL	10,084	0.5%
Guangzhou- China	12,509	0.6%	Los Angeles Intl Airport --	467,400	23.5%
Nanjing- China --	31,804	1.6%	Metropolitan Oakland Arpt --	14,228	0.7%
Shanghai- China	219,719	11.2%	Ontario Intl Airport	16,350	0.8%
Shenzhen- China	29,588	1.5%	San Francisco Intl Arpt --	18,272	0.9%
Other PRC	111	0.0%	Miami Intl Airport	27,703	1.4%
			William B Hartsfield Intl --	114,028	5.7%
Hong Kong Intl Airport	222,881	11.3%	O'Hare Intl Airport	450,552	22.7%
			Rockford- Illinois- US	11,619	0.6%
Macau- Macau --	15,031	0.8%	Indianapolis- Indiana- US --	46,897	2.4%
			Louisville- Kentucky- US --	130,781	6.6%
Japan			John F Kennedy Intl Arpt --	302,441	15.2%
Chitose Airport	41,276	2.1%	Newark Intl Airport	24,297	1.2%
Kansai Intl Airport	83,681	4.3%	Cincinnati/N Kentucky	17,967	0.9%
Nagoya- Japan --	22,250	1.1%	Rickenbacker Airport	27,515	1.4%
Narita Airport --	217,680	11.1%	Toledo- Ohio- US	6,377	0.3%
Other Japan	2,114	0.1%	Wilmington- Ohio- US	8,389	0.4%
			Portland- Oregon- US	9,673	0.5%
Russia			Memphis Intl Airport	65,319	3.3%
Khabarovsk- Russia	34,207	1.7%	Nashville- Tennessee- US --	31,844	1.6%
Other Russia	174	0.0%	Dallas/Ft Worth Intl	122,396	6.2%
			Seattle/Tacoma Intl Arpt --	5,682	0.3%
South Korea			Other U.S.	11,790	0.6%
Incheon Intl Apt- Seoul --	566,701	28.8%			
Other South Korea	-	0.0%	**Canada**		
			Pearson Airport	24,687	1.2%
Taiwan			Other Canada	374	0.0%
Chiang Kai Shek Intl Arpt --	449,789	22.9%			
Other Taiwan	74	0.0%	**Europe**		
			Heathrow Airport	6,917	0.3%
			Frankfurt Intl Airport	6,510	0.3%
			Amsterdam- Netherlands	6,270	0.3%
			Other Europe	508	0.0%
			Latin America	91	0.0%
Total	1,966,104	100.0%	**Total**	1,986,961	100.0%

(a) Includes air freight and air mail.

Sources: USDOT T-100 database and HNTB analysis.

Table 2.2.16

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Westbound Air Cargo Flows through ANC: 2005 (a)

Inbound			Outbound		
Market	**Tonnage**	**Percent**	**Market**	**Tonnage**	**Percent**
U.S. (Non-Alaska)			**People's Republic of China**		
Los Angeles Intl Airport --	73,626	7.9%	Beijing	33,115	3.9%
Metropolitan Oakland Arpt --	15,503	1.7%	Shanghai- China	33,123	3.9%
Ontario Intl Airport	13,013	1.4%	Other PRC	6,517	0.8%
San Francisco Intl Arpt --	88,614	9.5%			
William B Hartsfield Intl --	52,679	5.6%	Hong Kong Intl Airport	98,969	11.5%
O'Hare Intl Airport	193,930	20.7%			
Rockford- Illinois- US	9,195	1.0%	**Japan**		
Indianapolis- Indiana- US --	18,760	2.0%	Kansai Intl Airport	49,177	5.7%
Louisville- Kentucky- US --	58,972	6.3%	Narita Airport --	268,230	31.2%
John F Kennedy Intl Arpt --	153,188	16.4%	Other Japan	5,427	0.6%
Newark Intl Airport	26,398	2.8%			
Cincinnati/N Kentucky	14,471	1.5%	**South Korea**		
Wilmington- Ohio- US	6,269	0.7%	Incheon Intl Apt- Seoul --	201,343	23.4%
Memphis Intl Airport	45,793	4.9%	Other South Korea	2,260	0.3%
Dallas/Ft Worth Intl	61,118	6.5%			
Seattle/Tacoma Intl Arpt --	25,559	2.7%	**Taiwan**		
Other U.S.	21,074	2.3%	Chiang Kai Shek Intl Arpt --	156,875	18.3%
			Other Taiwan	3,615	0.4%
Canada					
Vancouver Intl Airport	14,127	1.5%	Other Asia	217	0.0%
Pearson Airport	15,760	1.7%			
Other Canada	3,778	0.4%			
Europe					
Frankfurt Intl Airport	12,974	1.4%			
Heathrow Airport	6,427	0.7%			
Other Europe	3,491	0.4%			
Latin America	170	0.0%			
Total	934,889	100.0%	**Total**	858,868	100.0%

(a) Includes air freight and air mail.

Sources: USDOT T-100 database and HNTB analysis.

Table 2.2.17

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Anchorage Share of Eastbound Asia - United States Cargo Flows (in Tons) in 2005

	United States			Anchorage			Anchorage Percent		
Market	**Freighter**	**Belly**	**Total**	**Freighter**	**Belly**	**Total**	**Freighter**	**Belly**	**Total**
People's Republic of China									
Capital Airport	34,498	14,023	48,521	16,508	7	16,515	47.9%	0.0%	34.0%
Guangzhou- China	12,648	1,790	14,438	12,509	-	12,509	98.9%	0.0%	86.6%
Nanjing- China --	31,804	-	31,804	31,804	-	31,804	100.0%	-	100.0%
Shanghai- China	227,611	12,945	240,556	219,719	-	219,719	96.5%	0.0%	91.3%
Shenzhen- China	29,588	-	29,588	29,588	-	29,588	100.0%	-	100.0%
Other PRC	111	-	111	111	-	111	100.0%	-	100.0%
Total PRC	336,260	28,758	365,018	310,239	7	310,246	92.3%	0.0%	85.0%
Hong Kong Intl Airport	232,198	24,314	256,512	220,281	2,600	222,881	94.9%	10.7%	86.9%
Macau- Macau --	15,031	-	15,031	15,031	-	15,031	100.0%	-	100.0%
Japan									
Chitose Airport	43,229	958	44,187	41,276	-	41,276	95.5%	0.0%	93.4%
Kansai Intl Airport	116,797	43,153	159,950	83,681	-	83,681	71.6%	0.0%	52.3%
Nagoya- Japan --	17,529	23,979	41,508	22,246	4	22,250	126.9%	0.0%	53.6%
Narita Airport --	301,625	186,613	488,238	217,604	76	217,680	72.1%	0.0%	44.6%
Other Japan	2,114	5,124	7,238	2,114	-	2,114	100.0%	0.0%	29.2%
Total Japan	481,294	259,827	741,121	366,921	80	367,001	76.2%	0.0%	49.5%
Russia									
Khabarovsk- Russia	36,217	-	36,217	34,207	-	34,207	94.5%	-	94.5%
Other Russia	174	1	175	173	1	174	99.4%	100.0%	99.4%
Total Russia - Far East	36,391	1	36,392	34,380	1	34,381	94.5%	100.0%	94.5%
South Korea									
Incheon Intl Apt- Seoul --	597,256	57,585	654,841	566,098	603	566,701	94.8%	1.0%	86.5%
Other South Korea	152	300	452	-		-	-	-	-
Total Korea	597,408	57,885	655,293	566,098	603	566,701	94.8%	1.0%	86.5%
Taiwan									
Chiang Kai Shek Intl Arpt --	475,957	43,269	519,226	448,076	1,713	449,789	94.1%	4.0%	86.6%
Other Taiwan	74	-	74	74	-	74	100.0%	-	100.0%
Total Taiwan	476,031	43,269	519,300	448,150	1,713	449,863	94.1%	4.0%	86.6%
Other Asia	19,733	544	20,277	-	-	-	-	-	-
Total	2,194,345	414,599	2,608,944	1,961,100	5,004	1,966,104	89.4%	1.2%	76.0%

(a) Includes air freight and air mail.

Sources: USDOT T-100 database and HNTB analysis.

ANC accounts for less of the share of air cargo to Japan, which is relatively accessible from the U.S. West Coast than to more distant countries such as China. **Table 2.2.18** presents the ANC share of Westbound North America – Asia traffic. Slightly over 70 percent of the air cargo traffic flows through ANC, including 81.8 percent of freighter traffic.

Figure 2.2.1 graphically depicts the air cargo flows through ANC. International Asia-North America flows account for the majority of air cargo traffic, and of this amount, Eastbound flows account for two-thirds. Compared to international air cargo, intra-state air cargo is relatively small, and the outbound share significantly exceeds the inbound share.

Historical freighter landings are presented in **Table 2.2.19**. Note that the data are broken by domestic and international signator airlines and the breakout of domestic and international airlines is not the same. For example, UPS switched from an international signator to domestic signator airline in 2003, even though there was no substantive change in its route structure. As a result, domestic freighter landings appear to be increasing faster than international freighter landings, when the opposite is in fact the case. The US DOT's T100 data provide a clearer indication of the distribution of aircraft operations, showing that international and other U.S. freighter operations are approximately three times greater than intra-Alaska freighter operations.

2.2.3. Aircraft Operations

Table 2.2.20 presents the recent history of aircraft operations at the Airport. Total annual aircraft operations at ANC have increased from 221,259 in 1990 to 246,019 in 2005. Over that time period, passenger aircraft operations decreased slightly, with a more rapid decrease among international carriers. Consistent with the increased cargo tonnage, air cargo operations have more than doubled over the period. Itinerant GA operations have fluctuated with no discernable long-term trend while local GA operations have declined significantly. Military operations have increased gradually but still account for a small percentage of the total. In 2005, passenger operations accounted for 42 percent of the total, all-cargo operations accounted for 38 percent of the total, air taxi and other operations accounted for 2 percent of the total, GA operations accounted for 16 percent of the total, and military operations accounted for 2 percent of the total.

Operations at the Lake Hood seaplane base, located adjacent to ANC, have also been included since the FAA tabulates ANC and Lake Hood operations together. In 2005, there were an estimated 69,502 aircraft operations at Lake Hood, consisting of air taxi and GA activity. ANC and Lake Hood accounted for a combined total of 315,521 aircraft operations in 2005.

2.3. Projected Passenger Activity

The forecasts of domestic and international passenger demand are discussed in this section. Included is a summary of the survey results, a discussion of key assumptions, the approach to forecasting domestic passenger originations on a market-by-market basis, and domestic enplanements. Also included is a discussion of the international forecast approach. The section concludes with a presentation of the forecast results including aircraft departures and fleet mix.

Table 2.2.18

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Anchorage Share of Westbound Asia - United States Cargo Flows in 2005

	United States			Anchorage			Anchorage Percent		
Market	**Freighter**	**Belly**	**Total**	**Freighter**	**Belly**	**Total**	**Freighter**	**Belly**	**Total**
People's Republic of China									
Beijing	47,939	8,480	56,419	33,113	2	33,115	69.1%	0.0%	58.7%
Shanghai- China	37,964	3,561	41,525	33,123	-	33,123	87.2%	0.0%	79.8%
Other PRC	6,616	871	7,487	6,517	-	6,517	98.5%	0.0%	87.0%
Total PRC	92,519	12,912	105,431	72,753	2	72,755	78.6%	0.0%	69.0%
Hong Kong Intl Airport	101,774	9,011	110,785	95,642	3,327	98,969	94.0%	36.9%	89.3%
Japan									
Kansai Intl Airport	59,345	13,369	72,714	49,177	-	49,177	82.9%	0.0%	67.6%
Narita Airport --	322,692	89,588	412,280	267,956	274	268,230	83.0%	0.3%	65.1%
Other Japan	6,938	6,727	13,665	5,427	-	5,427	78.2%	0.0%	39.7%
Total Japan	388,975	109,684	498,659	322,560	274	322,834	82.9%	0.2%	64.7%
South Korea									
Incheon Intl Apt- Seoul --	242,694	28,016	270,710	199,515	1,828	201,343	82.2%	6.5%	74.4%
Other South Korea	2,986	158	3,144	2,260	-	2,260	75.7%	0.0%	71.9%
Total Korea	245,680	28,174	273,854	201,775	1,828	203,603	82.1%	6.5%	74.3%
Taiwan									
Chiang Kai Shek Intl Arpt --	206,757	21,128	227,885	156,248	627	156,875	75.6%	3.0%	68.8%
Other Taiwan	3,615	-	3,615	3,615	-	3,615	100.0%	-	100.0%
Total Taiwan	210,372	21,128	231,500	159,863	627	160,490	76.0%	3.0%	69.3%
Other Asia	3,127	4,546	7,673	191	26	217	6.1%	0.6%	2.8%
Total	1,042,447	185,455	1,227,902	852,593	6,058	858,651	81.8%	3.3%	70.4%

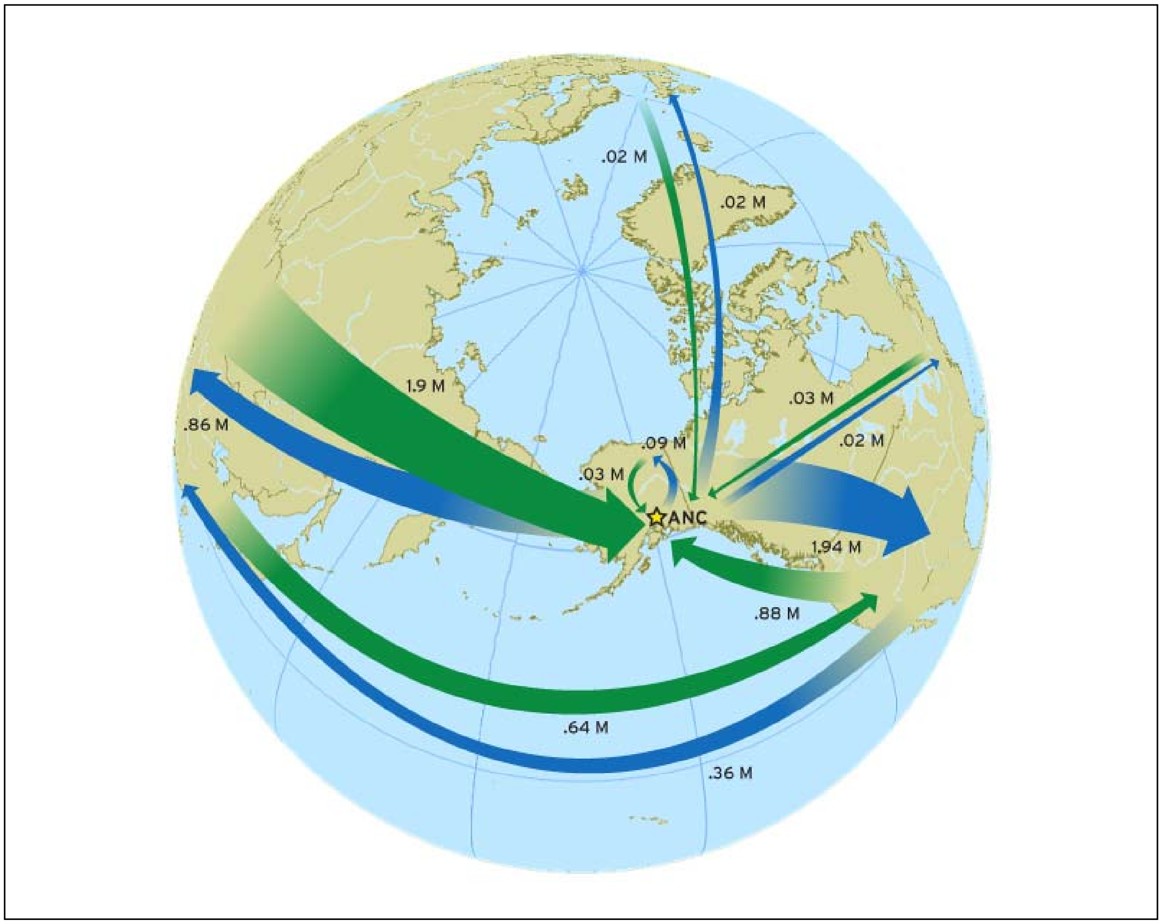
(a) Includes air freight and air mail.

Sources: USDOT T-100 database and HNTB analysis.

Figure 2.2.1

ANCHORAGE INTERNATIONAL AIRPORT

Distribution of North Pacific Air Cargo Flows
(millions of tons)



Source: HNTB analysis.

Table 2.2.19

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Freighter Operations at ANC

	Domestic (a)			International (a)			
Year	**Signator**	**Non-Signator**	**Total**	**Signator**	**Non-Signator**	**Total**	**Total**
1990	-	-	-	-	-	-	18,945
1991	-	-	-	-	-	-	19,912
1992	-	-	-	-	-	-	19,380
1993	-	-	-	-	-	-	20,314
1994	-	-	-	-	-	-	22,700
1995	-	-	-	-	-	-	24,811
1996	-	-	-	-	-	-	28,882
1997	6,232	6,716	12,948	18,728	1,819	20,547	33,495
1998	6,267	6,670	12,937	18,923	1,787	20,710	33,647
1999	5,704	7,452	13,156	20,411	2,693	23,104	36,260
2000	6,015	8,184	14,199	21,925	3,303	25,228	39,427
2001	5,638	9,148	14,786	20,906	2,896	23,802	38,588
2002	6,730	7,923	14,653	23,297	4,174	27,471	42,124
2003	9,408	5,753	15,161	21,546	3,552	25,098	40,259
2004	12,425	6,883	19,308	21,602	3,716	25,318	44,626
2005	13,322	7,404	20,726	21,582	4,512	26,094	46,820
Average Annual Growth Rate							
1990-2005	n/a	n/a	n/a	n/a	n/a	n/a	6.2%
1997-2005	10.0%	1.2%	6.1%	1.8%	12.0%	3.0%	4.3%

Aircraft Departures (USDOT T100 Data) (b)

	Intra-Alaska	**International and Other U.S.**	**Total**
2005	10,624	38,619	49,243

(a) Anchorage International Airport, Monthly Statistics by Carrier.
(b) US DOT T100 data as compiled by DataBase Products, Inc.

Sources: As noted and HNTB analysis.

Table 2.2.20

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Aircraft Operations

Calendar Year	Passenger (a) Domestic	Passenger (a) International	Passenger (a) Subtotal Passenger	Air Cargo (b)	Other (c)	Itinerant (d) GA	Itinerant (d) Military	Local (d) GA	Local (d) Military	Total (d)
				Anchorage International Airport Operations						
1990	92,328	13,064	105,392	37,890	17,490	44,469	2,670	13,109	239	221,259
1991	100,200	6,910	107,110	39,824	26,119	41,277	3,555	14,332	196	232,413
1992	120,022	5,818	125,840	38,760	13,786	37,226	3,483	12,944	179	232,218
1993	110,003	3,747	113,750	40,628	9,359	35,943	3,486	14,000	314	217,480
1994	110,849	3,676	114,525	45,400	8,503	34,793	3,633	9,995	302	217,151
1995	107,198	4,251	111,449	49,622	5,190	36,372	3,629	8,754	176	215,192
1996	101,924	6,238	108,162	57,764	2,008	32,899	3,323	696	123	204,975
1997	111,398	6,494	117,892	66,990	7,040	36,480	3,681	3,742	106	235,931
1998	108,226	6,408	114,634	67,294	n/a	n/a	4,184	503	241	n/a
1999	102,118	5,852	107,970	72,520	3,471	54,095	5,249	335	91	243,731
2000	103,580	4,630	108,210	78,854	5,213	51,941	5,154	249	56	249,677
2001	102,096	3,904	106,000	77,176	1,186	40,538	6,522	176	13	231,611
2002	100,894	4,140	105,034	84,248	3,336	43,720	5,640	216	29	242,223
2003	96,588	2,838	99,426	80,518	2,355	45,501	5,028	181	8	233,017
2004	96,242	2,786	99,028	89,252	8,455	40,594	5,939	208	8	243,484
2005	99,464	3,520	102,984	93,640	3,696	39,477	6,000	208	14	246,019
				Lake Hood Operations (d)						
1996	-	-	-	-	22,600	52,535	-	14,824	-	89,959
1997	-	-	-	-	22,043	47,167	-	12,998	-	82,208
1998	-	-	-	-	n/a	n/a	-	16,260	-	n/a
1999	-	-	-	-	13,508	42,428	-	10,844	-	66,780
2000	-	-	-	-	14,765	42,417	-	8,063	-	65,245
2001	-	-	-	-	15,272	46,711	-	5,700	-	67,683
2002	-	-	-	-	14,516	45,508	-	6,989	-	67,013
2003	-	-	-	-	13,218	39,278	-	5,858	-	58,354
2004	-	-	-	-	15,395	43,935	-	6,736	-	66,066
2005	-	-	-	-	19,921	42,852	-	6,729	-	69,502
				Anchorage International Airport and Lake Hood Operations						
1996	101,924	6,238	108,162	57,764	24,608	85,093	3,323	15,520	123	294,934
1997	111,398	6,494	117,892	66,990	29,083	88,016	3,681	16,740	106	318,139
1998	108,226	6,408	114,634	67,294	15,908	91,303	4,184	16,763	241	310,327
1999	102,118	5,852	107,970	72,520	16,979	96,523	5,249	11,179	91	310,511
2000	103,580	4,630	108,210	78,854	19,978	94,358	5,154	8,312	56	314,922
2001	102,096	3,904	106,000	77,176	16,458	87,249	6,522	5,884	13	299,294
2002	100,894	4,140	105,034	84,248	17,852	89,228	5,640	7,205	29	309,236
2003	96,588	2,838	99,426	80,518	15,573	84,779	5,028	6,039	8	291,371
2004	96,242	2,786	99,028	89,252	23,850	84,529	5,939	6,946	8	309,550
2005	99,464	3,520	102,984	93,640	23,617	82,329	6,000	6,895	14	315,521
				Operations Based on T100 Data - Anchorage International Airport (e)						
2005	86,618	3,478	92,676	98,486	9,158	39,477	6,000	208	14	246,019

(a) TAMS Needs Assessment Report for 1990-1995. HNTB compilation of AIA aircraft landings data for 1996-2005.
(b) HNTB compilation of AIA landings data for 1990-2005.
(c) Undetermined operations. Difference between FAA counts of Air Carrier and Air Taxi operations and AIA counts of commercial (passenger and freight) operations.
(d) Anchorage International Airport, Comparative Statistical Report and HNTB analysis.
(e) Commercial operations from US DOT T100 data base. General aviation and military operations from Anchorage International Airport, Comparative Statistical Report.

Sources: As noted and HNTB analysis.

2.3.1. Passenger Surveys

A combined interview and survey effort was undertaken in September 2006 to obtain a profile of representative passenger and cargo carriers serving the intrastate, mainline domestic and international markets. Key forecast findings included:

Intrastate Carriers:

- Many of the bush airports served are not Part 139 certified and thus limited to aircraft of less than 30 seats.
- Some carriers convert their aircraft from passenger to cargo or the reverse depending on the season or even the time of day.
- There is concern about the future fleet since most manufacturers have stopped building passenger turboprops and have switched to regional jets which do cannot operate on the short runways typical at many of Alaska's smaller airports.
- Most markets do not provide enough revenue to offset the cost of entry into a new market (pricing below market rates).
- Primary customer tends to be resident of destination city or relative visiting resident in destination city.
- Tourists comprise a small percentage of their market.
- The intrastate carriers are very cost sensitive.
- Intra-Alaska markets tend to be very price-inelastic – insensitive to fare levels.
- They are experiencing competition in nearby markets from automobiles.
- The intrastate passenger market is generally stable with slow growth of 1 to 2 percent per year.

Mainline Domestic Carriers:

- Demand is very seasonal, with summer demand much greater than winter demand
- ANC is considered to be a mature passenger market that will grow more slowly than the remainder of the United States.
- Traffic to the remainder of the U.S. will grow more quickly than intrastate traffic.
- Connecting passengers will grow slightly less quickly than originating passengers because of more direct flights from the lower 48 to other Alaska destinations such as Fairbanks.
- Load factors tend to be relatively low on average because of the small markets served and the high degree of seasonality. Load factors will probably remain the same in the future.
- Yields and fares tend to be high in Alaska. City pairs are expensive to serve because of seasonality, small market size and weather.
- Passenger growth estimates for mainline carriers were in the range of 2 to 3 percent per year.

International Carriers:

- Passenger enplanements and deplanements at ANC are extremely seasonal.

- Cabotage restricts the ability of foreign-flag carriers to serve the ANC market.
- Hourly peaks can be intense when two international passenger carriers are being served at the same time.

2.3.2. Assumptions

The passenger forecast is based on several key assumptions, which were developed from information collected from the interviews and surveys, discussions with Airport staff, and industry knowledge and publications. This section describes the general 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 major assumptions are described below.

Economic Assumptions

The forecasts assume no major economic downturn, such as occurred during the depression of the 1930s. 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 term, the high-growth and low-growth periods will offset each other so that the adjusted economic forecasts described in Section 2.1 will be realized.

Growth in Tourism and Cruise Industry

Visitors on cruise ships have grown rapidly over the recent past, at a 9.5 percent annual rate from 1993-2001, and then at 7.1 percent annually from 2002-2006. Discussions with industry representatives indicate that the $50 head tax, hotel and attraction capacity, and access constraints will reduce growth in the future. Therefore, the recommended assumption is that the growth in cruise passengers will decline to 4.5 percent per year through 2008 (projected growth in cruise capacity) and at U.S. GDP growth thereafter.

Fuel and Other Air Carrier Operating Costs

Long-term projections of fuel costs are based on the Energy Information Administration's (EIA) Annual Energy Outlook. Other operating costs as reflected in jet fuel costs and yields will be based on trends provided in the FAA Aerospace Forecasts: 2006-2017, and the Boeing World Air Cargo Forecast: 2006-2007.

Other Airports

It is assumed that destination airports will be developed sufficiently to accommodate demand from Anchorage. However, it is recognized that airfield capacity constraints at some airports, such as Los Angeles International Airport (LAX) and Tokyo Narita, may force an increase in aircraft gauge that would not occur in a truly unconstrained case.

National Airspace System

It is assumed that the FAA will successfully implement any required changes and improvements for the national airspace system to accommodate the unconstrained forecast of aviation demand.

International Political Environment

No major international conflicts that would disrupt aviation in the North America - Pacific area are assumed. Likewise, no major trade wars or embargoes that would restrict the international flow of commerce and travel are assumed.

Future Regulatory Environment

An evolutionary expansion of "Open Skies" agreements is assumed but with no passenger cabotage. Also, no nighttime curfews at ANC are assumed.

Environmental Factors

No major changes in the physical environment are assumed. It is assumed that global climate changes will not be sufficient enough to force restrictions on the burning of hydrocarbons or major fuel tax increases within the forecast period.

Future Security Environment

Security issues related to air travel have changed and will continue to change as new security procedures and technology are incorporated to improve airport security. Events that may affect traveler confidence in airport security or air travel security cannot be predicted. It is assumed that there will be no terrorist attacks during the forecast period that will affect confidence in the aviation system to the same extent as 9/11. It is also assumed that the Transportation Security Administration (TSA) and associated security costs and requirements will continue through the forecast period.

Airline Consolidation

It is assumed that factors such as government regulations and labor union resistance will prevent any major airline consolidation affecting the carriers serving Alaska. Although some minor airline consolidation could continue to occur, no attempt is made to predict the individual airlines that would be affected.

2.3.3. Domestic Passenger Forecast

This section describes the domestic passenger forecast for ANC, including data sources, the methodology for the passenger originations forecast, and the assumptions used to determine growth by market. This section also includes a discussion of the projections of enplanements and connections, load factor, and seat departures. The methodology and assumptions used to estimate the type of air service that would accommodate the projected passenger are also described.

Methodology, Assumptions, and Data Sources

Following is a summary of the methodology used in the domestic passenger forecasts for the for the intrastate and other U.S. markets:

- Project the drivers of passenger activity at ANC.
- Project future ANC domestic passenger originations using regression analysis.
- Allocate ANC originations by market.

- Estimate potential for future non-stop markets based on service thresholds at existing non-stop markets.
- Project outbound revenue passengers for each destination market as a ratio of originating traffic.
- Project load factor for each market.
- Project seat departures for each market using the outbound revenue passenger and load factor forecasts.
- Estimate the most probable manner in which airlines would accommodate the seat departure forecast in terms of aircraft type and frequency of service.
- Convert the outbound passenger forecast to enplanements using Airport enplanement data.
- Convert the scheduled aircraft departure forecast to actual departures using historical departure completion data.

The methodology will be described in greater detail in subsequent sections of this report.

The following data sources were used in the analysis:

- Historical and projected information on population, employment, and real income by market were obtained from Woods & Poole and ISER (see Section 2.1).
- The United States Department of Transportation (USDOT) OD1A domestic O&D data base was used to obtain yield (airline revenue per passenger mile) and distance and historical originating traffic on a market-by-market basis.
- The USDOT T-100 data base was used to obtain outbound passenger data on a market-by-market basis.
- Official Airline Guide (OAG) information on scheduled operations was used to determine existing scheduled service and historical non-stop service.
- The OAG, North American Airlines Handbook, and JP Fleet Airline-Fleets International were used to determine aircraft seat configurations for each airline.
- Airline interviews and surveys, The North American Airlines Handbook, JP Fleet Airline-Fleets International and other industry publications were used to identify information on airline fleet orders.

Socioeconomic and Fare Projections

Since passenger originations are local, they are sensitive to local economic factors such as population, employment, and income, and also to airline factors such as air carrier service and fares. Therefore, the critical assumptions for this analysis include the use of the ISER growth rates for socioeconomic data and the assumptions on future fare levels.

Table 2.3.1 presents fare projections for ANC intrastate and other U.S. markets. Air fares at ANC were assumed to increase at the same rate as U.S. domestic fares forecast by the FAA. This is a reasonable assumption since trends in ANC air fares have corresponded to trends in U.S. fares and because they are subject to the same forces, namely aircraft, maintenance, fuel, and labor costs. Projected real fares were calculated from the FAA's projections of real yield and average trip distance. Since the FAA projects average trip distance to increase, fares are not projected to decline as quickly as yields. The updated FAA forecasts only extend to 2017 but, for the purpose of this study, real yields and average trip distance were assumed to continue to decrease at the 2012-2017 average annual rate for the remainder of the forecast period.

Forecast of Domestic Originations

Passenger originations were projected using regression analysis. Regression analysis is a statistical method of generating an equation (or model) which best explains the historical relationship among selected variables, such as originating passengers and real income. If it is assumed that the model that best explains historical activity will continue to hold into the future, this equation can be used as a forecasting equation. Using historical (1990-2005) data, several passenger origination forecasting models were tested. The potential driving factors tested included socioeconomic variables, aviation industry variables, and instrument variables (also called dummy variables). The socioeconomic variables included population, employment, income, and per capita income for the Anchorage metropolitan area, the state of Alaska, and the United States. The aviation industry variables included ANC fares to intrastate and other U.S. markets. Instrument variables representing the Gulf War, the 1998 Asian financial crisis, the impact of 9/11, and USDOT data collection issues in 2002 were also tested in both linear and logarithmic model formulations. In addition, an attempt was made to calculate regression models for the major individual markets such as Seattle and Fairbanks.

Several of the equations that were calculated showed strong correlations with passenger originations. The model that produced the best results, from both a theoretical and statistical standpoint, for intrastate originations was a logarithmic formulation, which specified per capita originations (intrastate originations divided by non-Anchorage Alaska population) to other Alaska markets as a function of average real intra-state air fares, a dummy variable representing the availability of service by Reeve Aleutian Airlines, and a dummy variable representing the 2002 O&D data issues.

Table 2.3.1

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Forecast of Air Fares at ANC
(in 2005 prices)

	2005	2012	2017	2027
U.S Yield (2005 cents) (a)	11.31	10.76	10.28	9.32
U.S. Trip Distance (Miles) (a)	981.2	1012.6	1048.4	1120.0
U.S. Fare (b)	$ 110.97	$ 108.96	$ 107.78	$ 104.38
ANC Fare (c)				
to Other Alaska Markets	$ 124.86	$ 122.59	$ 121.26	$ 117.45
to Non-Alaska US Markets	$ 209.07	$ 205.27	$ 203.04	$ 196.66

(a) FAA Aerospace Forecasts: Fiscal Years 2006-2017.
(b) US Yield multiplied by US trip distance.
(c) Assumed to increase at same rate as US fare.

Sources: As noted and HNTB analysis.

The intrastate forecast equation is as follows:

AKORIG = OAKPOP x (10.751623 x AKFARE-.246623 x D2002 x REEVE)

where:

AKORIG = ANC intrastate originating passengers
OAKPOP = Alaska population outside of the Anchorage metropolitan area.
AKFARE = Average fare from ANC to intrastate markets in 2005 prices.
D2002 = 10-.067915 (.855) in 2002 and 1.0 in all other years
REEVE = 10.039564 (1.095) when Reeve offered service, and 1.0 in subsequent years.

R squared = .764
F-statistic = 11.89
Durbin-Watson = 1.52

T-statistics
Intercept = 2.94
AKFARE = -2.04
D2002 = -3.21
REEVE = 3.09

The population variable represents the size of the market, the fare variable represents the cost of the service, and the Reeve Aleutian variable represents the positive impact of the additional air service to Southwest Alaska when Reeve was in operation. Since the forecasting model has a logarithmic formulation, each of the exponents associated with the input variables is an elasticity. With small changes in the input variables, the forecasting model can be interpreted as indicating that every 1.0 percent increase in fares will decrease originations by approximately 0.25 percent.

The equation used to project other U.S. originations had a different formulation as follows:

USORIG = 101.446908 x ANCPOP1.103472 x FARE-.647804 x D911

where:

USORIG = originations to non-Alaska domestic markets
ANCPOP = Anchorage metropolitan population
FARE = Average fare to non-Alaska domestic markets
D911 = 10-.028257 (.937) in the post 9/11 recovery period (2002-2004)

R squared = .965
F-statistic = 100.86
Durbin-Watson = 1.75

T-statistics
Intercept = 0.547
ANCPOP = 2.72
FARE = -3.45
D911 = -2.14

Projections of the input variables are necessary to use the forecasting equation. Specifically, population projections were obtained from Table 2.1.2, and fare projections were obtained from Table 2.3.1.

Table 2.3.2 presents the forecasts of intrastate and other U.S. passenger originations. Total intrastate originations are projected to grow at 0.9 percent per year to 623,000 by 2027. Passenger originations to domestic points outside of Alaska are projected to grow at 2.1 percent per year to 1,739,400 by 2027. Total originations are projected to increase to almost 2.4 million by the end of the forecast period.

There are several assumptions implicit in the passenger origination forecasts:

- The historical relationship between originations, population and fares will continue throughout the forecast period. Forces that could disrupt this relationship, such as a return to regulation, severe congestion at destination airports, or the wide-scale use of teleconferencing as a travel alternative, could alter this relationship.
- New airline alliances, should they develop, will be restricted to code-sharing and joint frequent flyer programs, and will not reduce airline competition at the Airport.
- Population will grow at the rate projected in Table 2.1.2.
- As a percentage of income, taxes and medical expenses, which are the principal budget items over which households have little control, will not increase sufficiently to affect household or business budgets devoted to air travel.

Origination Projections by Market

Since one of the end products of this forecast is a detailed future schedule for use in airfield planning and simulation, originations were disaggregated by individual market. Historically, some markets have been increasing their market share of ANC originations at the expense of other markets. In some instances this has resulted from stronger economies, higher population growth or greater tourist interest. Within Alaska, larger communities such as Fairbanks are increasing their market share at the expense of smaller communities. Outside of Alaska, Seattle is losing market share to other cities as Alaska Airlines expands its network and new airlines provide additional service to ANC. The approach to the distribution of originations assumed that the historical trends in the distributions would continue into the future with proportionate adjustments to ensure that the sum of originations still matched the intrastate and other U.S. originations totals presented in **Table 2.3.2**. These projections are presented in **Tables 2.3.3** and **2.3.4**.

Domestic Outbound Passengers

This section discusses the forecast of outbound passengers for existing and new non-stop markets. Outbound passengers on a market-by-market basis were obtained from the USDOT's T-100 data base, which provides data on total revenue passengers (enplaned plus on-board) for each segment. This section first discusses assumptions regarding new non-stop markets, and then discusses the methodology for estimating future non-stop outbound passengers.

Candidate markets for non-stop air carrier service were determined by identifying the current thresholds of originating traffic that justified non-stop service to ANC. Thresholds are lower for nearby markets than more distant markets because service can be offered with smaller aircraft and because there is less competition from connecting hubs between the two markets. In addition, non-stop thresholds are lower for airports that serve as airline hubs because there is an additional increment of connecting passenger traffic that can sustain the service. Originating passengers are projected to grow at most markets during the forecast period. At some of the larger markets without nonstop service, it would be expected that this growth would eventually cause to exceed the threshold that would result in the introduction of non-stop service.

Because of the relatively slow growth in originations, no new markets were identified that would exceed the non-stop threshold by 2027. However, Orlando, Spokane, Sacramento and San Diego would be close to the threshold by that time and would therefore be candidates soon thereafter.[7] Should passenger growth be faster than anticipated, the nonstop thresholds could be achieved prior to the end of the forecast period.

Based on the results of the airline interviews and surveys it was assumed that connecting passengers would grow slightly less than originating passengers. Passengers connecting or transiting from one Alaska point to another Alaska point were assumed to increase at the same rate as intrastate originating passengers.

[7] Note that because of Orlando's distance from Anchorage most existing narrowbody aircraft could not provide the service.

Table 2.3.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Demand Forecast of Domestic Passenger Originations

	2005	2012	2017	2027
To Other Alaska Markets				
Alaska Population (a)	663,661	704,400	731,800	848,500
Anchorage Population (a)	351,049	387,000	411,000	490,400
Non-Anchorage Alaska Population (b)	312,612	317,400	320,800	358,100
ANC Fare to Other Alaska Markets (c)	$ 124.86	$ 122.59	$ 121.26	$ 117.45
Originations per Person (d)	1.64	1.72	1.73	1.74
Total Originations to Other Alaska Markets (e)	513,230	547,229	554,579	623,962
To Non-Alaska US Markets				
Anchorage Population (a)	351,049	387,000	411,000	490,400
ANC Fare to Non-Alaska US Markets (c)	$ 209.07	$ 205.27	$ 203.04	$ 196.66
Total Originations to Non-Alaska US Markets (f)	1,102,280	1,302,745	1,402,033	1,739,400
Total Domestic Originations (g)	1,615,510	1,849,974	1,956,611	2,363,362

(a) Table 2.1.2.
(b) Alaska population less metropolitan Anchorage population.
(c) Table 2.3.1.
(d) Calculated from ANC fare to other Alaska markets using forecasting equation. See text for details.
(e) Non-Anchorage population multiplied by originations per person.
(f) Calculated from ANC fare to non-Alaska markets using forecasting equation. See text for details.
(g) Total originations to other Alaska markets plus total originations to non-Alaska markets.

Sources: As noted and HNTB analysis.

Table 2.3.3

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Demand Forecast of Domestic Passenger Originations by Alaska Market (a)

Airport	Code	2005	2012	2017	2027
Fairbanks Intl	FAI	119,380	147,413	156,466	188,785
Kenai	ENA	64,300	50,979	43,273	33,746
Juneau Intl	JNU	48,600	56,756	60,337	73,303
Kodiak Metro Are	ADQ	41,470	35,541	33,233	31,451
Bethel	BET	38,420	45,558	49,319	61,250
Dillingham	DLG	18,420	22,550	24,091	29,296
Nome	OME	17,080	19,699	20,983	25,394
Homer	HOM	16,960	13,185	11,251	8,867
King Salmon	AKN	16,330	14,872	13,804	12,872
Kotzebue	OTZ	16,030	16,173	14,722	13,204
Wiley Post	BRW	13,590	16,321	17,199	20,451
Valdez	VDZ	12,750	10,285	8,464	6,204
Mudhole Smith	CDV	11,280	10,139	9,473	8,950
Ketchikan Intl	KTN	11,100	13,272	14,503	18,274
Sitka	SIT	9,250	10,688	11,508	14,172
Deadhorse/Prudho	SCC	8,580	8,840	9,145	11,046
Dutch Harbor	DUT	7,500	6,772	6,177	5,564
Aniak	ANI	6,740	11,088	12,912	17,794
Iliamna	ILI	4,360	2,998	2,657	2,259
Cold Bay	CDB	3,680	4,155	4,589	5,875
Unalakleet	UNK	3,280	4,189	4,471	5,429
McGrath	MCG	3,200	3,153	3,054	3,102
Sand Point	SDP	2,680	2,820	3,067	3,835
St Paul Island	SNP	2,370	1,811	1,634	1,439
Emmonak	EMK	2,310	2,380	2,920	4,293
Galena	GAL	2,270	2,669	3,036	4,053
Yakutat	YAK	2,210	2,422	2,502	2,877
Petersburg	PSG	1,950	2,077	2,262	2,835
St Marys	KSM	1,400	1,374	1,177	935
Wrangell SPB	WRG	1,260	1,548	1,735	2,270
Adak Island NS	ADK	620	622	529	415
Hooper Bay	HPB	620	463	482	560
Chevak	VAK	530	706	820	1,125
St George Island	STG	500	587	624	752
Toksook	OOK	260	322	369	497
Other		1,950	2,802	1,790	790
Total		513,230	547,229	554,579	623,962

(a) Originations in each market assumed to increase at 1990-2005 trend and adjusted to sum to intra-Alaska origination total from Table 2.3.2. Originations attributable to additional growth from proposed Alaska natural gas pipeline allocated to Juneau and markets to north and west of Anchorage.

Sources: As noted, Table 2.3.2 and HNTB analysis.

Table 2.3.4

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Demand Forecast of Domestic Passenger Originations by Non-Alaska Market (a)

Airport	Code	2005	2012	2017	2027
Seattle/Tacoma I	SEA	185,060	177,054	170,955	176,317
Denver Intl	DEN	43,620	48,433	54,571	72,164
Portland	PDX	42,140	62,432	66,533	81,337
Los Angeles Intl	LAX	39,280	48,889	50,585	59,046
McCarran Intl	LAS	35,250	50,466	58,317	79,656
St Paul Intl	MSP	34,560	40,112	44,394	57,311
O'Hare Intl	ORD	33,430	39,321	43,667	56,634
Sky Harbor Intl	PHX	33,300	43,382	48,476	63,400
Salt Lake Intl	SLC	24,180	28,958	32,148	41,676
Wm B Hartsfield	ATL	22,920	31,728	35,623	46,888
Dallas/Ft Wor In	DFW	22,720	25,838	28,146	35,534
George Bush Intc	IAH	21,950	25,668	28,374	36,568
San Francisco In	SFO	21,520	22,669	20,970	19,854
Orlando Intl	MCO	18,120	21,533	24,463	32,701
Spokane Intl	GEG	17,720	20,374	22,070	27,641
Sacramento Metro	SMF	16,190	20,132	22,472	29,348
Lindberg Field	SAN	15,480	21,360	23,176	29,096
Ronald Reagan Nt	DCA	15,390	16,814	18,836	24,718
Newark Intl	EWR	14,820	19,053	20,276	24,736
Logan Intl	BOS	14,060	17,259	18,960	24,223
Wayne County	DTW	11,940	15,912	16,903	20,565
Boise	BOI	11,420	13,752	15,661	21,001
Dulles Intl	IAD	11,330	12,834	13,828	17,182
Philadelphia Int	PHL	9,980	11,069	12,058	15,224
Kansas City Intl	MCI	9,250	11,090	12,128	15,398
Tampa Intl	TPA	9,100	10,929	12,249	16,084
Reno	RNO	8,990	14,140	15,801	20,666
Metropol Oakland	OAK	8,930	10,561	11,320	13,961
Honolulu (Intl)	HNL	8,540	8,604	10,146	14,204
Lambert-St Louis	STL	8,210	10,871	11,911	15,161
Kahului (Maui)	OGG	6,160	5,348	6,928	10,735
Cincinnati/N Ktk	CVG	5,030	7,691	8,429	10,733
John F Kennedy I	JFK	4,300	4,715	4,751	5,303
Kona (Hawaii)	KOA	990	1,241	1,565	2,360
Other		316,400	382,511	415,344	521,976
Total		1,102,280	1,302,745	1,402,033	1,739,400

(a) Originations in each market assumed to increase at 1990-2005 trend and adjusted to sum to non-Alaska domestic origination total from Table 2.3.2.

Sources: As noted, Table 2.3.2 and HNTB analysis.

The US DOT has a passenger trip category described as the domestic portion of international journey (DPIJ). In the case of ANC, this consists primarily of passengers beginning their trip at ANC and then going on to an international destination through another international gateway such as Chicago O'Hare or New York JFK. These were assumed to increase at the same rate as originations.

Table 2.3.5 presents the results of the forecast of total outbound passengers. Intrastate passengers are projected to increase at a 1.13 percent annual rate while other U.S. passengers are projected to increase at a 2.05 percent annual rate. Total outbound domestic passengers are projected to increase from 2.2 million in 2005 to 3.2 million in 2027, an average annual growth rate of 1.74 percent. Charter passengers, those passengers flying on commercial aircraft that do not file a schedule, were also assumed to increase at the same rate as originating passengers.

Outbound passengers in each market were estimated by assuming that the ratio of outbound passengers to originating passengers grows or declines at historical rates for that market. The results were adjusted, where necessary, so that the sum of the market-by-market projections of outbound passengers was equal to the total outbound passengers in Table 2.3.5. The details and results of the analysis are presented in Tables B.1, and B.2 in the Technical Appendix.

Average Load Factor

In existing non-stop markets, load factors were assumed to remain constant based on input from the airlines during the surveys and interviews. In some markets, the load factors appeared to be unsustainably low or high, and were assumed to gradually change to the average levels for similar markets.

Seat Departure Forecast

Annual scheduled seat departures in each market were estimated by dividing the projections of outbound passengers by the load factor projections. Table B.1 in the Technical Appendix also shows projected average weekday peak month (AWDPM) scheduled seat departures by market. AWDPM scheduled seat departures were derived from annual scheduled seat departures using the existing relationship between seat departures during a Thursday in August and annual scheduled seat departures. The annual seat departure projections are summarized in Table B.3 in the Technical Appendix.

2.3.4. International Passenger Forecast

This section discusses the international passenger forecasts, including assumptions, methodologies, and results.

Table 2.3.5

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Demand Forecast of Domestic Passengers

	2005	2012	2017	2027	Average Annual Growth
Intra-Alaska					
Total Outbound (a)	801,694	872,238	894,261	1,026,536	1.1%
Charter (b)	12,113	13,179	13,512	15,510	1.1%
Scheduled (c)	789,581	859,060	880,749	1,011,026	1.1%
Originating (d)	513,230	547,229	554,579	623,962	0.9%
DPIJ (e)	3,840	4,094	4,149	4,668	0.9%
Connecting and Transit (f)	272,511	307,736	322,021	382,396	1.6%
Other U.S.					
Total Outbound (a)	1,414,005	1,665,892	1,788,896	2,212,057	2.1%
Charter (b)	24,799	29,217	31,374	38,795	2.1%
Scheduled (c)	1,389,206	1,636,676	1,757,522	2,173,261	2.1%
Originating (d)	1,102,280	1,302,745	1,402,033	1,739,400	2.1%
DPIJ (e)	115,260	136,222	146,604	181,881	2.1%
Connecting and Transit (f)	171,666	197,709	208,886	251,981	1.8%
Total Domestic					
Outbound	2,215,699	2,538,131	2,683,157	3,238,593	1.7%
Charter	36,912	42,396	44,886	54,306	1.8%
Scheduled	2,178,787	2,495,735	2,638,272	3,184,287	1.7%
Originating	1,615,510	1,849,974	1,956,611	2,363,362	1.7%
DPIJ	119,100	140,316	150,753	186,549	2.1%
Connecting and Transit	444,177	505,445	530,907	634,377	1.6%
Enplaned (g)	2,257,141	2,612,254	2,774,080	3,373,042	1.8%
Deplaned (h)	2,247,060	2,612,254	2,774,080	3,373,042	1.9%
Transit (i)	75,099	59,377	50,206	35,894	-3.3%

(a) Table B.2 in Appendix B.
(b) Assumed to increase at same rate as total outbound passengers.
(c) Total outbound less charter.
(d) Table 2.3.2.
(e) Domestic portion of international journey. Consists mostly of international originating passengers connecting through other gateways. Assumed to increase at same rate as originations.
(f) Outbound passengers less originating and DPIJ passengers.
(g) Enplaned plus transit passengers assumed to increase at same rate as outbound passengers. Enplaned passengers equal enplaned plus transit passengers less transit passengers.
(h) Deplaned plus transit passengers assumed to increase at same rate as outbound passengers. Deplaned passengers equal deplaned plus transit passengers less transit passengers.
(i) Assumed to continue to decrease at same rate as domestic transit passengers over the past 15 years.

Sources: As noted and HNTB analysis.

Methodology, Assumptions, and Data Sources

The methodology used to develop the international passenger forecasts was essentially a top-down approach. The type of approach that was used to estimate domestic passenger traffic was not suitable for the international passenger forecast for several reasons. First, O&D data, for passengers flying their entire itinerary on foreign-flag carriers, is not available; therefore, the historical record is incomplete. Second, many of the international markets are still being developed, so insufficient historical data exists from which to establish trends. Finally, past international service has been constrained or enhanced by physical factors, such as distance and aircraft range, and political factors, such as bilateral agreements. These constraints tend to obscure the relationship between traditional drivers of demand, such as income and yield, and international passenger traffic.

A top-down approach provides an opportunity to exploit the research and analysis into international travel conducted by the FAA and major aircraft manufacturers, such as Boeing and Airbus. These organizations have much greater resources available to investigate the factors driving international demand, and are able to incorporate the findings into their forecasts. The selected top-down approach can be summarized as follows:

- Identify forecasts of U.S. international passenger traffic by major region.
- Identify existing international passenger traffic at ANC and determine whether it is enplaning, deplaning, or transit.
- Assess future of transit passenger activity based on past trends, distance from origin to destination in existing markets, and developments in aircraft technology.
- Estimate future international enplaning/deplaning passengers based on international passenger growth rates.
- Develop passenger forecasts by market.
- Estimate future load factor.
- Project future seat departures by market using the passenger and load factor forecasts.
- Estimate the most probable way that airlines would accommodate the seat departure forecast in terms of aircraft type and scheduled frequency.
- Convert the passenger forecast to enplanements using local airport enplanement data.
- Convert the scheduled aircraft departure forecast to actual departures using historical departure completion data.

The methodology will be described in greater detail in subsequent sections of this report.

The following data sources were used in the analysis:

- FAA, Boeing, and Airbus international projections.
- USDOT International Schedule T-100 data base.
- OAG information on scheduled operations which was used to identify existing scheduled service.

- The OAG, North American Airlines Handbook, and JP Airline-Fleets International guide which were used to determine aircraft seat configurations for each airline.
- The North American Airlines Handbook, JP Airline-Fleets International, and other industry publications, which were used to gather information on airline fleet orders.

Forecasts by International Region

Table 2.3.6 presents a comparison of international forecast growth rates developed by the FAA, Boeing, and Airbus. A consensus forecast growth rate was developed for each region using the average of the forecast indexes from the three organizations. Based on the consensus forecast, Asia – North America markets are expected to continue to grow rapidly.

Base Year Passenger Levels

As noted in Section 2.2, there are gaps in the existing Airport counts of international passengers. Table B.4 in the Technical Appendix shows an estimate of the Airport counts supplemented by US DOT T-100 data for Air Canada, Cathay Pacific and the international portion of Alaska Airlines.

International Transit Passenger Forecasts

Historically, international transit passengers through ANC have been declining as more and more international carriers acquire long-haul aircraft capable of flying from Asia to North America without a technical stop. In 2005, Korean Airlines and Asiana both ceased their passenger transit operations at ANC. As of this writing, only Cathay Pacific flying from Hong Kong to Toronto and China Airlines flying from Taipei to New York still conduct regular transit operations at ANC.

Over the forecast period, it is likely that the introduction of additional long-haul aircraft such as Boeing 787, coupled with competitive pressures from other Asian and U.S. carriers, will force both China Airlines and Cathay Pacific to fly direct. Therefore, the forecast assumes that one of the transit flights will cease by 2012 and both will have ceased by 2017.

It is anticipated that there will still be some residual international transit passenger activity, from charter carriers that tend to fly older aircraft with less range and from passengers flying on cargo carriers. **Table 2.3.7** shows the forecast of international transit passengers, which are projected to decline from 401,748 in 2005 to 75,800 in 2027, an average annual decrease of 7.3 percent.

Table 2.3.6

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

International Passenger Growth Rate Assumptions

	FAA (a)	Boeing (b)	Airbus (c)	Average (d) 2006-2025
World		4.9%	4.8%	4.9%
US Domestic	2.9%	3.6%	2.7%	3.1%
US International	5.0%			5.0%
US to Canada			3.8%	3.8%
Asia to North America	7.0%		6.2%	6.6%
Indian Subcontinent to North America		12.8%	7.6%	
Japan to North America		5.8%	4.5%	
Pacific to North America		4.1%	3.3%	
PRC to North America		6.5%	6.3%	
North America to Asia	7.0%		6.2%	6.6%
North America to Indian Subcontinent		12.8%	7.6%	
North America to Japan		5.8%	4.5%	
North America to Pacific		4.1%	3.3%	
North America to PRC		6.5%	6.3%	
Asia to Europe		5.4%	5.3%	5.4%
Europe to Asia		5.4%	5.3%	5.4%
Europe to North America	4.3%	4.5%	4.3%	4.4%
North America to Europe	4.3%	4.5%	4.3%	4.4%
CIS to North America			6.0%	6.0%
North America to CIS			6.0%	6.0%
Asia to South America			6.2%	3.1%
Japan to South America			0.1%	
Pacific to South America			2.9%	
South America to Asia			6.2%	3.1%
South America to Japan			0.1%	
South America to Pacific			2.9%	
Asia to Central America			-	2.3%
Japan to Central America			2.3%	
Central America to Asia			-	2.3%
Central America to Japan			2.3%	

(a) FAA Aerospace Forecasts, Fiscal Years 2006-2017.
(b) Boeing, 2006 Current Market Outlook.
(c) Airbus, Global Market Forecast: 2006-2025.
(d) Average of three sources.

Sources: As noted and HNTB analysis.

Table 2.3.7

ANCHORAGE INTERNATIONAL AIRPORT

Demand Forecast of International Passengers

		Forecast			
	2005 (a)	2012	2017	2027	Average Annual Growth Rate
Enplanements					
Canada (b)	22,715	24,300	26,900	33,000	2.1%
Asia (c)	14,354	25,500	29,600	39,800	4.7%
Europe (c)	8,650	11,000	12,800	17,200	3.2%
Total	45,719	60,800	69,300	90,000	3.1%
Deplanements					
Canada (b)	19,428	24,300	26,900	33,000	2.4%
Asia (c)	25,394	25,500	29,600	39,800	2.1%
Europe (c)	8,552	11,000	12,800	17,200	3.2%
Total	53,374	60,800	69,300	90,000	2.4%
Transit (d)					
Asia-North America	401,748	311,900	39,900	75,800	-7.3%
Asia-Europe	-	-	-	-	
Total	401,748	311,900	39,900	75,800	-7.3%
Total Passengers	902,589	745,400	218,400	331,600	-4.4%

(a) Table B.4 in Appendix B.

(b) Assumed to increase at non-Alaska domestic passenger growth rate from Table 2.3.5.

(c) Assumed to increase at same as projected growth in cruise passengers (4.5 percent annually through 2008, and 3.0 percent annually thereafter.

(d) Assumed to increase at average annual growth rate (Table 2.3.6) less adjustment for overflights.

Sources: As noted and HNTB analysis.

International Enplaned and Deplaned Passengers

In contrast to international transit passengers, international enplaned and deplaned passengers are projected to continue to increase. After consultation with Airport staff it was decided that the growth rates identified in Table 2.3.6 may be too aggressive for the Anchorage market. As a result, Canadian passengers were assumed to grow at the same rate as non-Alaska U.S. passengers. Asian and European enplaned and deplaned passengers are primarily tourists, and their activity was assumed to be closely tied to cruise ship activity. International enplanements are projected to increase from 45,719 in 2005 to 90,000 in 2027, an average annual increase of 3.1 percent. Table B.5 contains the detailed market-by-market forecasts of international passengers.

Load Factor and Seat Departure Forecast

Load factors in each existing non-stop market were assumed to remain constant, consistent with the responses in the airline surveys and interviews. Again, in cases where load factors appeared to be unusually low, it was assumed that airlines would restrict growth in seat capacity until load factors rose to sustainable levels.

Projected seat departures in each market were estimated by dividing the outbound passenger projections by the projected load factor. Future average weekday peak month seat departures were estimated by assuming that international enplaning and deplaning passengers would continue to exhibit pronounced summer peaks as detailed in Table B.5 in the Technical Appendix.

2.3.5. Passenger Aircraft Operations Projections

The domestic and international annual seat departure projections developed in Tables B.1 and B.5 were translated into projections of scheduled aircraft flights for each market using a set of assumptions regarding airline strategies and available equipment. Based on the interviews and surveys, published aircraft orders, industry publications, and professional experience, detailed air service assumptions were developed, as listed below:

- No radical changes in airline strategy for how to serve and compete in markets is assumed.
- The current pattern of airline dominance at other airport gateways, hubs and non-hubs is assumed to remain substantially in place.
- Alaska Airlines will gradually increase service to meet demand in intrastate and other U.S. markets.
- Other legacy carriers will increase service to their hubs as demand grows.
- Additional air service to Hawaii is assumed based on the increased range and ETOPS capabilities of the newer narrowbody aircraft.
- There will be no significant low-cost carrier penetration because of the small size, high operational cost and strong seasonality in Alaska markets.
- As projected by the FAA and Boeing, airlines will continue to emphasize frequency when adding service to meet demand. This means that domestic service will be provided principally by narrow-body air carrier aircraft.

- Because of their small size and low growth, little increase in the average size of aircraft serving the smaller intrastate markets is anticipated.
- Alaska Airlines is expected to continue to use the B-737 family of aircraft as the mainstay of its fleet. Consistent with their published fleet plans, MD-80s and 737-200 aircraft will be phased out, combi versions of the 737-400 will be phased in, and the Boeing 737-800 will be the principal growth aircraft in the near future.
- Smaller Alaska markets will continue to be served primarily by turboprop aircraft, because of the high cost, low cargo capacity and runway requirements of regional jet aircraft.
- Older aircraft are assumed to be gradually phased-out as their operational lives expire.
- Future fleet additions beyond those presently announced by the airlines are assumed to be consistent with current announced fleet expansion plans and existing acquisitions.
- Over the next 20 years, it is anticipated that successors to narrowbody aircraft such as the Boeing 737 and Airbus A320 will be introduced. These aircraft are still in the conceptual stage and therefore their technical characteristics are still undefined. It is anticipated, however, that they will incorporate many of the innovations developed for the Boeing 787 and Airbus 350XWB. For the purpose of this study, these aircraft are designated 79A (120 seats), 79B (150 seats) and 79C (180 seats).
- As the emphasis among international air carriers changes from transit to enplaned/deplaned traffic, it is anticipated that they will switch to the smaller widebody aircraft in their fleet, which are more suited to the anticipated demand for enplaned/deplaned traffic.
- No supersonic, hypersonic, or tilt-rotor aircraft are projected because of poor operating economies and potential noise impacts.

Using the above assumptions for guidance, air service scenarios were developed for each market in each forecast year. The scenarios were developed so that the selected aircraft types and frequencies in combination matched the AWDPM seat departure projections for that market. Factors considered in each market included historical service patterns, current dominant carriers, aircraft in place and on order, length of haul, and announced plans of current carriers and new entrants. Individual market scenarios are presented in Table B.6 in the Technical Appendix.[8]

The air service scenarios in Table B.6 were summarized to generate forecasts of annual aircraft departures and fleet mix.

Table 2.3.8 presents the forecast of annual domestic scheduled aircraft departures by aircraft type. The number of annual domestic scheduled aircraft departures is projected to increase from 43,309 in 2005 to 53,239 by 2027, an average annual increase of 0.9 percent. Future scheduled international passenger aircraft departures are projected to decline from 1,739 in 2005 to 542 in 2027, as a result of the projected decrease in transit traffic (see **Table 2.3.9**). Note that 747 sized aircraft disappear from the fleet mix along with the decrease in transit flights. This reflects the

[8] Since Table B.6 incorporates confidential airline survey information it will not be publicly distributed.

fact that carriers serving the summer international tourist market, such as Korean and Condor, use mid-sized wide-body aircraft such as Boeing 767 and A-330 aircraft for that market. **Table 2.3.10** shows the fleet mix forecast for charter aircraft. Tables B.8, B.9 and B.10 in the Technical Appendix show the Certificated Maximum Gross Takeoff Weight calculations based on the fleet mix projections for each category.

2.3.6. Passenger Forecast Summary

A summary of the passenger forecasts is presented in **Table 2.3.11**. Total passengers, including enplaned, deplaned and transit passengers, are projected to increase from 5.5 to 7.1 million over the forecast period, an average annual increase of 1.1 percent. Passenger aircraft operations are projected to increase from 92,728 in 2005 to 110,530 in 2027, an average annual increase of 0.8 percent.

2.4. Projected Cargo Activity

This section includes a discussion of the forecasts of air cargo demand. The survey results and principal assumptions guiding the forecasts are discussed first, followed by descriptions of the intrastate and international air cargo forecasts, and the market by market forecasts of cargo tonnage and aircraft operations.

Prior to discussing the details of the air freight forecasts, it is useful to examine the flow of worldwide air cargo, and the role that ANC performs in facilitating that flow. Earlier, Figure 2.2.1 graphically presented the flow of air cargo from Asia to North America. The flows described in this diagram also apply to Asia-Europe air cargo.

As shown in Figure 2.2.1, aircraft carrying air cargo from Asia to North America can take a variety of routings. They can go non-stop, although even the new Boeing 747-400 aircraft cannot carry enough fuel on most routes without sacrificing payload. Secondly, the aircraft can make technical stops for refueling at intermediate points, either at ANC or alternative airports. To save on fuel and time, aircraft that do not need to take on or off-load cargo will usually try to minimize the distance flown. Cargo that is not loaded or off-loaded is transit cargo.

Some cargo aircraft landing at ANC also transfer air cargo to other aircraft flying different routes, and take-on air cargo from other aircraft. This cargo is deplaned and then enplaned on another aircraft. These transfer capabilities allow carriers to ship air cargo between Asian and North American markets which generate insufficient traffic to justify a direct route. A transfer operation requires coordinated schedules among carriers and adequate on-airport facilities for the transfer operations.

Table 2.3.8

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Demand Forecast of Scheduled Domestic Passenger Aircraft Departures

Equipment Type	2005	2006	2012	2017	2027
Intra-Alaska					
PAG-PIPER (LIGHT AIRCRAFT) -PROP	210	-	-	-	-
CNA-CESSNA (LIGHT AIRCRAFT) -PROP	1,708	2,712	2,920	3,016	2,918
BES-BEECHCRAFT 1900C AIRLINER -TURBOPROP	3,121	3,398	7,939	9,188	10,968
BEH-BEECHCRAFT 1900D -TURBOPROP	625	441	362	-	-
SWM-FAIRCHILD SA26/SA226/SA227 MERLIN/METRO -TURBOPROP	1,838	1,222	852	304	52
SF3-SAAB 340 -TURBOPROP	4,111	4,618	5,182	5,786	6,543
DHT-DE HAVILLAND DHC-6 TWIN OTTER -TURBOPROP	3,387	3,377	-	-	-
DH8-DE HAVILLAND DHC8 DASH 8 -TURBOPROP	6,525	6,637	4,827	3,702	2,738
CVR-CONVAIR 240/440/580 -PROP	7	-	-	-	-
M80-BOEING (DOUGLAS) MD80 -NARROW BODY JET	98	440	-	-	-
73S-BOEING 737 ADVANCED -NARROW BODY JET	32	6	-	-	-
73M-BOEING 737 (MIXED CONFIG) -NARROW BODY JET	4,325	4,039	-	-	-
734-BOEING 737-400 -NARROW BODY JET	3,529	2,711	2,294	1,387	-
73Q-BOEING 737-400 (MIXED CONFIG) -NARROW BODY JET	-	357	4,280	4,998	6,413
73G-BOEING 737-700 -NARROW BODY JET	650	659	1,460	1,460	1,825
73H-BOEING 737-800 (WINGLETS) -NARROW BODY JET	-	64	774	1,596	2,350
739-BOEING 737-900 -NARROW BODY JET	105	274	365	365	365
79B NEXT GENERATION NARROW BODY - 150 SEATS	-	-	-	-	974
Subtotal	30,271	30,955	31,255	31,802	35,146
Other U.S.					
M80-BOEING (DOUGLAS) MD80 -NARROW BODY JET	1,313	1,278	-	-	-
319-AIRBUS INDUSTRIE A319 -NARROW BODY JET	1,050	1,367	1,036	719	128
320-AIRBUS INDUSTRIE A320 -NARROW BODY JET	361	60	448	872	1,738
73S-BOEING 737 ADVANCED -NARROW BODY JET	-	-	-	-	-
73M-BOEING 737 (MIXED CONFIG) -NARROW BODY JET	-	1	-	-	-
733-BOEING 737-300 -NARROW BODY JET	-	-	-	-	-
734-BOEING 737-400 -NARROW BODY JET	2,240	2,478	1,095	365	-
73G-BOEING 737-700 -NARROW BODY JET	2,413	2,082	2,703	3,305	2,090
738-BOEING 737-800 -NARROW BODY JET	374	517	617	652	416
73H-BOEING 737-800 (WINGLETS) -NARROW BODY JET	-	379	3,631	4,537	1,925
739-BOEING 737-900 -NARROW BODY JET	1,034	892	1,305	1,097	365
79A NEXT GENERATION NARROW BODY - 120 SEATS	-	-	-	-	1,654
79B NEXT GENERATION NARROW BODY - 150 SEATS	-	-	-	-	2,996
79C NEXT GENERATION NARROW BODY - 180 SEATS	-	-	-	365	3,341
757-BOEING 757 -NARROW BODY JET	2,660	1,865	2,196	1,615	-
753-BOEING 757-300 -NARROW BODY JET	393	493	672	768	1,240
767-BOEING 767 -WIDE BODY JET	126	-	109	118	126
763-BOEING 767-300 -WIDE BODY JET	272	115	-	104	811
764-BOEING 767-400 -WIDE BODY JET	-	-	91	237	277
Subtotal	12,236	11,527	13,903	14,754	17,107
Total Scheduled	42,507	42,482	45,158	46,556	52,253
Ratio of Departures Performed to Departures Scheduled (a)	1.019		1.019	1.019	1.019
Total Departures Performed (b)	43,309		46,010	47,434	53,239
Total Operations (c)	86,618		92,020	94,869	106,478

(a) Daprtures performed in 2005 divided by scheduled departures in 2005. Assumed to remain constant.
(b) Depatures performed in 2005 from USDOT T100 data in Table 2.2.5. Future departures performed estimated by multiplying scheduled departures by ratio of departures performed to departures scheduled.
(c) Departures performed multiplied by 2.

Sources: Table B.6 in Appendix B and HNTB analysis.

Table 2.3.9

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Demand Forecast of International Passenger Aircraft Departures

Equipment Type		2005	2006	2012	2017	2027
International						
319-AIRBUS INDUSTRIE A319	-NARROW BODY JET	133	121	145	143	73
320-AIRBUS INDUSTRIE A320	-NARROW BODY JET	-	-	-	24	109
321-AIRBUS INDUSTRIE A321	-NARROW BODY JET	-	3	-	2	7
734-BOEING 737-400	-NARROW BODY JET	98	-	-	-	-
73G-BOEING 737-700	-NARROW BODY JET	-	98	-	30	-
73H-BOEING 737-800 (WINGLETS)	-NARROW BODY JET	-	-	92	90	-
79B NEXT GENERATION NARROW BODY - 150 SEATS		-	-	-	-	155
TU5-TUPOLEV TU-154	-NARROW BODY JET	18	-	18	-	-
767-BOEING 767	-WIDE BODY JET	1	-	-	-	-
763-BOEING 767-300	-WIDE BODY JET	46	48	72	85	22
333-AIRBUS INDUSTRIE A330-300	-WIDE BODY JET	29	16	43	50	68
343-AIRBUS INDUSTRIE A340-300	-WIDE BODY JET	739	730	194	27	37
772-BOEING 777-200	-WIDE BODY JET	-	-	-	-	71
773-BOEING 777-300	-WIDE BODY JET	-	-	-	-	-
744-BOEING 747-400	-WIDE BODY JET	605	417	730	-	-
74C-BOEING 747-200 COMBI	-WIDE BODY JET	69	-	-	-	-
Total Scheduled		1,738	1,433	1,294	451	542
Ratio of Departures Performed to Departures Scheduled (a)		1.001		1.001	1.001	1.001
Total Departures Performed (b)		1,739		1,295	451	542
Total Operations (c)		3,478		2,589	903	1,085

(a) Daprtures performed in 2005 divided by scheduled departures in 2005. Assumed to remain constant.
(b) Depatures performed in 2005 from USDOT T100 data in Table 2.2.5. Future departures performed estimated by multiplying scheduled departures by ratio of departures performed to departures scheduled.
(c) Departures performed multiplied by 2.

Sources: Table B.6 in Appendix B and HNTB analysis.

Table 2.3.10

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Demand Forecast of Charter Passenger Aircraft Departures

Equipment Type	2005	2012	2017	2027
Charter				
C-172 Cessna Skyhawk	1	-	-	-
PA-32 Piper	13	15	15	15
C-402/A Cessna	5	5	5	-
B55 Baron Beech	5	5	5	-
C-206/207 Cessna	13	10	5	-
Piper PA-31T	35	35	30	15
PC-12 Pilatus Porter PF-12	76	100	150	250
PA-31 Piper PA-31 (Navaho)	62	55	40	20
C-208 Cessna	37	40	40	40
BCH-200 Beech SuperKing-Ai	139	150	150	150
PA-31/34/39 Piper	3	-	-	-
T-1040 Piper	1	-	-	-
SA-227 Fairchild	30	30	25	10
DHC-6 DeHavilland	411	400	350	250
Gulfstream V	1	1	1	1
737-700/LR >4-1-01 Boeing	3	4	5	6
BCH 1900 Beech	112	156	200	300
SF-340 Saab-Fairchild	8	8	8	8
DHC-8-100 DeHavilland	100	100	100	80
Brit. Aero BAE-748	2	-	-	-
737-200C Boeing	107	100	80	50
MD-80/DC-9-80 MD	2	3	4	4
737-900 >7-1-02 Boeing	1	2	3	4
757-200 Boeing	23	29	35	50
757-300 Boeing	1	-	-	-
767-300/ER Boeing	112	140	155	213
B-777 Boeing 777	1	1	2	3
A340-200 Airbus	1	2	2	2
DC-10-30 MD	6	6	5	3
Boeing 747-400	3	4	5	8
MD-11 MD	2	2	2	2
Total Departures	1,316	1,403	1,422	1,484
Total Operations (a)	2,632	2,806	2,844	2,968

(a) Departures performed multiplied by 2.

Sources: Table B.6 in Appendix B and HNTB analysis.

Table 2.3.11

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Annual Passenger Forecast Demand

		Forecast			
	2005 (a)	**2012**	**2017**	**2027**	**Average Annual Growth Rate (c)**
		Passengers			
Enplanements					
Domestic (a)	2,257,141	2,612,254	2,774,080	3,373,042	1.8%
International (b)	45,719	60,800	69,300	90,000	3.1%
Total	2,302,860	2,673,054	2,843,380	3,463,042	1.9%
Deplanements					
Domestic (a)	2,247,060	2,612,254	2,774,080	3,373,042	1.9%
International (b)	53,374	60,800	69,300	90,000	2.4%
Total	2,300,434	2,673,054	2,843,380	3,463,042	1.9%
Transit					
Domestic (a)	75,099	59,377	50,206	35,894	-3.3%
International (b)	401,748	311,900	39,900	75,800	-7.3%
Total	476,847	371,277	90,106	111,694	-6.4%
Total Passengers	5,511,269	6,027,862	5,797,671	7,059,472	1.1%
		Aircraft Operations			
Domestic (c)	86,618	92,020	94,869	106,478	0.9%
International (d)	3,478	2,589	903	1,085	-5.2%
Charter (e)	2,632	2,806	2,844	2,968	0.5%
Total	92,728	97,416	98,615	110,530	0.8%

(a) Table 2.3.5.
(b) Table 2.3.7.
(c) Table 2.3.8.
(d) Table 2.3.9.
(e) Table 2.3.10.

Sources: As noted and HNTB analysis.

A smaller amount of enplaned or deplaned air cargo actually begins or ends the air portion of its trip at ANC. This is considered either originating or terminating air cargo. Air cargo that is transferred to or from another mode, such as truck or ship, is also counted as originating or terminating air cargo. Some enplaned air cargo is shipped intrastate to outlying communities in Alaska, for whom air transportation is the only means of contact to the outside world.

ANC has little control over the amount of air cargo flying between Asia and North America. However, airline routing and operating decisions over the next 20 years, coupled with the facility investments made by ANC and competing airports, will determine the share of this air cargo flow that:

- goes non-stop;
- becomes transit cargo at ANC or a competing airport; or
- is transferred at ANC or a competing airport.

These factors will largely determine the amount and type of air cargo activity that occurs at ANC.

2.4.1. Air Cargo Surveys

Key forecast findings of the air cargo interviews and surveys included:

Intrastate Carriers

- Many intrastate carriers rely on large aging piston and turboprop aircraft that can use the short runways at many of Alaska's smaller airports. There appear to be no potential replacement aircraft of similar size at affordable prices and this is a source of uncertainty.
- Operators of larger aircraft in the intrastate market are closely tied to the North Slope economy.
- Military charters are a growing segment of the intrastate air cargo market.
- The oil industry support segment is diminishing.
- Major infrastructure projects like the proposed Alaska gas pipeline pose a challenge for the cargo carriers, since they are faced with the prospect of ramping up to achieve short-term gains and later facing excess capacity, or abandoning their existing customers to take advantage of the new opportunities.
- Intrastate cargo shipping is critical to the development of rural Alaska.

Long-Haul and International Carriers

- Cargo carriers are cost-sensitive and therefore landing fees and operational costs, such as deicing delays, are important.
- Load factors are much higher for eastbound traffic than westbound traffic.
- Some carriers are expressing interest in developing the Asia-Latin America market.
- Aircraft tend to reach their payload capacity before they use up the available volume in the aircraft.

- They expect to continue to need to make technical stops, not just for refueling but also to change crews.
- Cargo growth at the more developed Asian economies will slow down but the real growth will be in China and India.
- Some westbound flights overfly ANC in the summer because of lower payloads but still need to stop in winter because of headwinds.
- There is some potential of losing market to ships if the technology is developed to produce faster ships.
- Northwest, Korean Air and Transmile operate a crossloading operating at ANC.
- The Asia market is highly competitive.
- A growth rate of 6 to 7 percent in the Asia-North America markets is probably the minimum growth that can be expected.
- Guangzhou, in the Pearl River Delta region of China is one the most rapidly growing air cargo markets.
- Some carriers charter aircraft from other countries to get around bilateral restrictions.
- Most Asia-Europe traffic now stops at or overflies Russia.
- Eastbound cargo operations are extremely time-sensitive for express carriers, especially when Daylight Savings Time is in effect, which narrows the available window for the main sort operations.
- For express carriers, westbound flights tend to arrive early in the morning and depart between 9:30 and 11:00 am. Eastbound flights arrive between 11:00 am and 1:30 pm and then depart mid-afternoon.
- Expedited/express portion of air cargo is growing.
- International air cargo tends to spike in the fall, especially in September and December. January is a slow month.
- Asian airport slots tend to be fixed and therefore impose a constraint on air cargo.
- The requirement for technical stops is relatively insensitive to the cost of fuel.
- Carriers sometimes consolidate cargo on westbound flights to reduce load factor on other flights than can then fly non-stop.
- Consolidation will probably result in three main Mainland China air cargo carriers, China Southern, Air China, and Hainan Airlines Cargo.
- Taiwanese market will be very dependent on Southeast Asia, unless relations with Mainland China are normalized.
- Labor shortages in ANC are an issue regarding the potential for crossloading.

2.4.2. Critical Air Cargo Assumptions

The critical assumptions that were used to guide the air cargo forecasts were developed from information collected from the interviews and surveys, discussions with Airport staff, and industry knowledge and publications. They include assumptions on the socioeconomic environment, the political and trade environment, the air cargo industry, technological development, and airport development and operations.

Socioeconomic Assumptions

- The ISER demographic and economic projections, after adjustment for the assumed development of the Natural Gas Pipeline, were used for population, employment, and income projections for the Anchorage metropolitan area and Alaska (see Section 2.1).
- As noted in Section 2.1, the most recent Global Insight projections of world economic growth by region were used for the world economy.

Political/Trade Environment Assumptions

- Evolutionary expansion of "Open Skies" agreements.
- Continuation of Cargo Transfer rights at ANC but no extension of these rights to airports in the "lower 48."
- No cargo cabotage.
- Continuation of the Bypass Mail program in its current form as January 2007.[9]
- No carbon tax or new environmental regulations that would significantly constrain air transportation.
- A continuing reduction in trade barriers, fueling growth in air cargo.
- No wars or other political actions that would restrict airspace use.

Air Freight Industry Assumptions

- Air carrier cargo yield is assumed to continue to decline (in real dollars) consistent with the most recent Boeing cargo forecasts. These forecasts implicitly assume that cargo carriers, faced with continued competition, will continue to reduce their unit operating costs with improved efficiencies and that there will be no significant increases in fuel prices or fuel taxes.
- Cargo operators will continue to place a priority on payload over range, as has been their past practice.
- In the long run, the location of technical stops will be determined by minimizing distance flown and fuel burn.
- There will be increased efficiencies resulting from air carrier alliances and partnerships.
- New aircraft types over the forecast period will be based on the fleet acquisition plans of the cargo carriers serving ANC, North America, Asia, and Europe.

[9] As a result of the December 2006 Amendment to the Rural Service Improvement Act of 2002, air carriers operating under Part 121 rules only need to serve 10 percent of the market to qualify to carry Bypass Mail.

Technological Development

- There will be no new aircraft with capabilities beyond those currently in the planning or development stages.
- There will be no technological breakthroughs in other transportation modes, such as shipping, that would significantly change the relative costs between modes.

ANC Development and Operations

- Air cargo development will be unconstrained by facilities.
- There will be no nighttime restrictions on aircraft operations.
- There will be full interline transfer rights between carriers at ANC.
- Rates and charges, services, and fuel costs will continue to be competitive with other airports.
- Third party logistics facilities will gradually develop at ANC to capitalize on increasing transfer activity, Anchorage's strategic location, and extensive air service.

2.4.3. Intrastate Cargo

As noted in Section 2.2, intrastate air cargo has been growing relatively slowly in recent years and is subject to a different set of market forces than international air cargo. This section reviews the intrastate air cargo forecast for ANC, beginning with the assumptions, methods, and data used in the forecast and ending with a discussion of the forecast results.

Methodology and Data Sources

This section provides a brief overview of the air cargo forecasting methodology, including descriptions of the data sources.

A top-down approach was used to project air cargo activity, for many of the same reasons that this approach was used for the international passenger activity forecasts. A top-down approach provides an opportunity to apply findings on current and future trends researched by the FAA. The selected top-down approach can be briefly summarized as follows:

- Identify forecast of U.S. domestic air cargo flows.
- Adjust the cargo forecasts for local factors.
- Project future intrastate enplaning and deplaning domestic cargo tonnage for ANC.
- Determine the domestic passenger carrier cargo capacity.
- Allocate tonnage projections to passenger carriers and all-cargo carriers.
- Estimate required domestic all-cargo aircraft capacity.
- Derive projection of all-cargo aircraft departures and fleet mix that will accommodate required domestic all-cargo aircraft capacity.

Historical data and industry forecasts for the air cargo volume forecast were compiled from a variety of sources. Those sources include the Airport, the USDOT's Schedule T-100 statistics, the FAA, and other industry publications.

Industry Forecasts

FAA forecasts of domestic air cargo growth were selected over the Boeing and Airbus forecasts because they are consistent with the available historical data on U.S. cargo activity and because they provide year-by-year detail thereby allowing better definition of activity levels for the interim forecast years. Also, the FAA annual growth rates for the forecast period (3.2 percent) are similar to the consensus FAA, Boeing and Airbus growth rates (3.4 percent).

Air Cargo Tonnage Demand Forecasts

Table 2.4.1 presents projected intrastate air cargo tonnage for ANC. The historical trends in the share of domestic US Revenue Ton Miles (RTMs) accounted for by ANC were calculated and then extended into the future assuming the historical rate of change. Future intrastate air cargo outbound tonnage (enplaned plus transit) was projected to increase at the same rate as the U.S. domestic RTM's adjusted by the projected change in the ANC intrastate share of US domestic RTMs. The same method was used to estimate future inbound (deplaned plus transit) intrastate tonnage.

As shown in Table 2.4.1 outbound intrastate tonnage is projected to grow moderately at about 2.3 percent per year from 91,858 tons in 2005 to 148,747 tons in 2027. This would result from gradual population and income growth in the remainder of Alaska, leading to more demand for commodities which in many cases can only be transported by air. In addition, the construction of the gas pipeline will generate additional demand for air freight to the bush. Inbound intrastate tonnage is projected to decline gradually continuing the historical trend. Inbound cargo consists primarily of primary products such as fish that are unlikely to increase in tonnage. In addition, the natural gas pipeline is unlikely to generate any additional inbound air cargo. Total inbound intrastate cargo is projected to decline from 25,797 in 2005 to 23,257 in 2027.

Table 2.4.1

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Forecast of Intra-Alaska Air Cargo Tonnage Demand
(Tons)

		Outbound Tonnage		Inbound Tonnage		
Year	U.S. Domestic RTMs (a)	ANC Total (b)	ANC Share (c)	ANC Total (d)	ANC Share (c)	Total Tonnage
1997	14116.5	94,249	0.0067	27,655	0.0020	121,905
1998	14509.0	98,078	0.0068	34,980	0.0024	133,059
1999	14663.0	98,652	0.0067	26,479	0.0018	125,132
2000	15422.5	101,444	0.0066	26,340	0.0017	127,784
2001	14620.1	99,802	0.0068	25,428	0.0017	125,230
2002	13605.8	103,357	0.0076	25,734	0.0019	129,091
2003	14972.4	98,213	0.0066	23,154	0.0015	121,367
2004	16340.9	96,841	0.0059	26,394	0.0016	123,234
2005	16089.8	91,858	0.0057	25,796	0.0016	117,654
2012	20378.6	113,046	0.0055	24,365	0.0012	137,411
2017	24125.5	123,876	0.0051	23,990	0.0010	147,866
2027	33812.9	148,747	0.0044	23,257	0.0007	172,004
		Tonnage Based on T-100 Data (e)				
2005		91,690		25,851		117,541
2012		112,840		24,417		137,257
2017		123,650		24,041		147,691
2027		148,475		23,307		171,782

(a) FAA Aerospace Forecasts, Fiscal Years 2006-2017.
(b) Table 2.2.10 (enplaned plus transit) for historical. U.S. domestic RTMs multiplied by ANC share for future.
(c) Assumed to change at historical trend.
(d) Table 2.2.10 (deplaned plus transit) for historical. U.S. domestic RTMs multiplied by ANC share for future.
(e) Identical growth rates applied to T-100 data from Table 2.2.14.

Sources: As noted and HNTB analysis.

As noted earlier, Alaska's economy is especially dependent on air service 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 at the communities. In addition, the decline in the oil industry will limit increases in demand while, in the long term, the reduced availability of the older aircraft traditionally used in intrastate Alaska may constrain service. However, as long as the subsidy for bypass mail exists, this will help sustain demand for intrastate air freight.

Table 2.4.1 also presents a forecast in which the growth rates developed using Airport statistics are applied to 2005 base year numbers calculated using the USDOT T-100 data. As shown, the numbers are very similar. The T-100 data could not be used for the trend analysis because it much was much less comprehensive prior to 2003. However, since the T-100 data provides the detail for the market-by-market analysis, the T-100 forecasts are used for subsequent analyses.

Belly and Combi Cargo Tonnage Projections

The majority of intrastate air cargo at ANC is transported by air freight specialists such as Lynden Air Cargo, Northern Air Cargo, and Tatonduk Outfitters. Alaska Airlines is the only passenger carrier that accounts for more than 5 percent of the intrastate cargo market, and it also operates several freighters. The national trend has been for the belly cargo share of air freight to decline as the integrated carriers have gained market share and the passenger carriers have increasingly emphasized quick turnaround times and high passenger load factors, which reduce their ability to load air freight. The FAA does not publish a specific cargo load factor forecast but, since the FAA projects passenger Available Seat Miles (ASMs) to increase much faster than passenger carrier Revenue Ton Miles (RTMs), it can be inferred that the FAA anticipates passenger carrier cargo load factors to continue to decline. The relationship between FAA-projected RTMs and ASMs was applied to the forecast of domestic seat departures to prepare a forecast of intrastate belly and combi cargo for ANC. As shown in **Table 2.4.2** outbound intrastate belly and combi cargo is projected to decrease from 22,851 tons in 2005 to 20,178 tons in 2027. Inbound intrastate belly and combi cargo is projected to decrease from 9,785 tons in 2005 to 8,644 tons in 2027.

All Cargo Tonnage and Capacity

All-cargo (freighter) tonnage was estimated as the difference between total tonnage and passenger carrier tonnage. Intrastate outbound all-cargo tonnage is projected to increase from 66,848 tons in 2005 to 128,297 tons in 2027 and inbound all-cargo tonnage is projected to decrease from 16,066 tons in 2005 to 14,663 tons in 2027.

Table 2.4.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated Intra-Alaska Belly and Freighter Cargo Demand

	2005	2012	2017	2027
FAA Forecasts (a)				
US Dom. ASMs (bil)	755.9	935.0	1,128.1	1,514.3
US Dom. Passenger Carrier RTMs (mil)	3,082.3	3,487.5	3,743.2	4,254.6
Ratio	4.078	3.730	3.318	2.810
Intra-Alaska Seat Departures (b)				
Inbound	1,408,948	1,536,751	1,576,915	1,806,341
Outbound	1,408,948	1,536,751	1,576,915	1,806,341
Outbound Cargo				
Total (c)	91,690	112,840	123,650	148,475
Belly and Combi (d)	22,842	22,789	20,803	20,178
Freighter (e)	68,848	90,050	102,846	128,297
Inbound Cargo				
Total (c)	25,851	24,417	24,041	23,307
Belly and Combi (d)	9,785	9,763	8,912	8,644
Freighter (e)	16,066	14,654	15,129	14,663

(a) FAA Aerospace Forecasts: Fiscal Years 2006-2017. Forecasts for 2027 extrapolated at 2012-2017 growth rates.
(b) Table B.3 in Appendix B.
(c) Table 2.4.1.
(d) Assumed to increase at same rate as seat departures adjusted by change in ratio of U.S. Domestic Passenger Carrier RTMs to U.S. Domestic ASMs.
(e) Total less Belly and Combi cargo.

Sources: As noted and HNTB analysis.

Table 2.4.3 shows outbound freighter tonnage broken by major market. The data required to identify long-term trends in cargo activity by intrastate market is not available; therefore the growth in freighter cargo was allocated proportionately across all markets.

Future required all-cargo lift capacity was estimated by dividing outbound all-cargo tonnage by the estimated load factor. Cargo load factors were assumed to increase 0.5 percent per year. This assumption is based on the Boeing and Airbus world air cargo forecasts which assume "modest" increases in cargo load factor. Airbus projected that increased aircraft utilization and higher load factors, by themselves, would account for about a one percent per year increase in freight traffic.[10] If the increase is split equally among aircraft utilization and load factor, each would account for about 0.5 percent per year.

Projected load factor and required freighter capacity by market are presented in Tables C.1 and C.2 in the Technical Appendix. Historically, it has been very difficult to sustain cargo load factors significantly in excess of 90 percent on a year round basis. Therefore, no load factors were assumed to exceed 90 percent over the long term. Required freighter departure lift capacity is projected to increase from 90,963 in 2005 to 161,673 tons in 2027.

Capacity requirements were calculated using outbound cargo since outbound load factors are much higher. Inbound freighter load factors are much lower than outbound load factors and therefore do not materially affect capacity requirements. However, since outbound freighter aircraft ultimately have to return to ANC, inbound freighter capacity is equal to outbound capacity.

The capacity requirements are used to estimate intrastate freighter aircraft operations (see Section 2.4.7 for more detail).

The intrastate air cargo tonnage forecasts are dependent on the following assumptions:

- The historical relationship between intrastate air freight and U.S. domestic air freight will continue into the future.
- The bypass mail system will continue to be in place
- The base case ISER forecasts of Anchorage employment are valid.
- The natural gas pipeline will be built
- Fuel prices will not experience long-term spikes in prices.
- Freighter carriers will be able to acquire replacement aircraft as their existing aircraft exceed their useful economic life.

[10] *Airbus Global Market Forecast 2004-2023* and *Boeing World Air Cargo Forecast 2004/2005*.

Table 2.4.3

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated Intra-Alaska Outbound Freighter Freight Demand

Airport	Airport Code	2005 (a)	Forecast (b) 2012	2017	2027
Kodiak Metro Area	ADQ	1,635	2,040	2,330	2,906
King Salmon- Alaska- US --	AKN	2,079	2,594	2,962	3,695
Aniak- Alaska- US	ANI	2,588	3,229	3,687	4,600
Bethel- Alaska- US	BET	20,201	25,201	28,783	35,905
Barrow WBAS --	BRW	136	4,330	4,945	6,169
Beluga Lake- Alaska- US --	BVU	272	339	388	483
Cold Bay Airport- Alaska- US	CDB	224	279	319	398
Mile 13 Field --	CDV	314	392	447	558
Dillingham- Alaska- US	DLG	5,362	6,689	7,640	9,530
Dutch Harbor- Alaska- US	DUT	118	147	168	210
Emmonak- Alaska- US	EMK	2,148	2,680	3,060	3,818
Kenai- Alaska- US	ENA	434	541	618	771
Fairbanks Intl Airport	FAI	4,402	5,492	6,272	7,824
Galena- Alaska- US	GAL	137	171	195	244
Homer- Alaska- US	HOM	94	117	134	167
Iliamna- Alaska- US	ILI	1,439	1,795	2,050	2,558
Juneau Intl Airport	JNU	2,348	2,929	3,345	4,173
St Marys- Alaska- US	KSM	1,720	2,146	2,451	3,057
McGrath- Alaska- US	MCG	1,045	1,304	1,489	1,857
Nome- Alaska- US	OME	10,604	13,229	15,109	18,848
Kotzebue- Alaska- US	OTZ	4,919	6,136	7,008	8,743
Red Dog- Alaska- US	RDB	1,609	2,007	2,293	2,860
Deadhorse/Prudhoe Bay	SCC	205	256	292	364
Sand Point- Alaska- US	SDP	358	447	510	636
Unalakleet- Alaska- US	UNK	2,603	3,247	3,709	4,627
Yakutat- Alaska- US	YAK	144	180	205	256
Other Alaska		1,710	2,133	2,437	3,040
Total		68,848	90,050	102,846	128,297

(a) USDOT T100 data as compiled by DataBase Products, Inc. and HNTB analysis.
(b) Assumed to increase at same rate as freighter tonnage in Table 2.4.2.

Sources: As noted and HNTB analysis.

2.4.4. Non-Alaska Domestic Air Cargo

As noted earlier, domestic air cargo traveling between ANC and markets in the lower 48 is often commingled with international air cargo, especially on U.S. flag carriers. As noted in Section 2.2, the North American leg of both Eastbound and Westbound cargo flows show more tonnage than the Asian leg, and this excess in tonnage provides an estimate of the minimum level of domestic cargo flows between ANC and non-Alaskan U.S. points. Discussions with the cargo carriers serving ANC indicated that there was very little originating or terminating international air cargo at the Airport. Therefore, the additional cargo tonnage on the North American legs of Eastbound and Westbound cargo flows appear to be a reasonable albeit conservative estimate of domestic air cargo flows between ANC and the lower 48. This section provides a discussion of the forecast of non-Alaskan domestic air cargo.

Methodology and Data Sources

The approach used to project non-Alaska domestic air cargo is similar to the approach used to estimate intrastate air cargo and involved the following steps:

- Identify forecast of U.S. domestic air cargo flows.
- Adjust the cargo forecasts for local factors.
- Project future non-Alaska domestic outbound and inbound domestic cargo tonnage for ANC.
- Determine the domestic passenger carrier cargo capacity.
- Allocate tonnage projections to passenger carriers and all-cargo carriers.
- Estimate all-cargo aircraft capacity required to serve the domestic increment of Eastbound and Westbound air cargo flows.
- Derive projection of all-cargo aircraft departures and fleet mix that will accommodate required Eastbound and Westbound all-cargo aircraft capacity (domestic and international combined).

The data sources were similar to those used for the intra-state forecast and included the Airport, the USDOT's Schedule T-100 statistics, the FAA, and other industry publications.

Air Cargo Tonnage Forecasts

Table 2.4.4 provides the forecast of Non-Alaska domestic air cargo tonnage. The data required to provide a long-term historical breakout of non-Alaska domestic air cargo flows is not available since the Airport data don't show a breakout between domestic and international cargo among U.S. flag carriers and the U.S. DOT T-100 data did not become sufficiently comprehensive until 2003. Consequently, the historical ANC share of U.S. domestic cargo could not be calculated for the purpose of estimating future trends in share.

Table 2.4.4

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Forecast of Non-Alaska Domestic Air Cargo Tonnage Demand

			Outbound Tonnage		Inbound Tonnage		
Year	**U.S. Domestic RTMs (a)**	**Alaska Income Share (b)**	**ANC Total (c)**	**ANC Share (d)**	**ANC Total (e)**	**ANC Share (d)**	**Total Tonnage**
1997	14116.5						
1998	14509.0						
1999	14663.0						
2000	15422.5						
2001	14620.1						
2002	13605.8						
2003	14972.4						
2004	16340.9						
2005	16089.8	0.00228	20,857	0.0013	76,021	0.0047	96,878
2012	20378.6	0.00212	24,601	0.0012	89,666	0.0044	114,266
2017	24125.5	0.00201	27,557	0.0011	100,443	0.0042	128,001
2027	33812.9	0.00198	38,008	0.0011	138,535	0.0041	176,544

(a) FAA Aerospace Forecasts: Fiscal Years 2006-2017. Forecasts for 2027 extrapolated at 2012-2017 growth rates.
(b) Table 2.1.6.
(c) Net outbound eastbound tonnage from Table 2.2.15. Estimated by multiplying U.S. Domestic RTMs by ANC share.
(d) ANC share of U.S. Domestic RTMs assumed to decrease at same rate as income share.
(e) Net inbound westbound tonnage from Table 2.2.16. Estimated by multiplying U.S. Domestic RTMs by ANC share.

Sources: As noted and HNTB analysis.

As noted in the FAA, Boeing and Airbus forecasts, economic growth is the principal driver behind air cargo. Economic growth generates the demand to attract inbound cargo and fosters the production capacity to generate outbound cargo. Since ANC functions as the air cargo hub for cargo flowing between the rest of Alaska and the rest of the United States, income for the state of Alaska is a better indicator of domestic cargo activity than metropolitan Anchorage income. Therefore, it was assumed that the share of U.S. domestic air cargo accounted for by ANC non-Alaska domestic cargo would change at the same rate as the Alaska share of U.S. income.

As shown in Table 2.4.4, outbound non-Alaska domestic tonnage is projected to increase from an estimated 20,857 tons in 2005 to 38,008 tons in 2027, an average annual increase of 2.8 percent. Inbound non-Alaska domestic tonnage is projected to increase at the same rate from an estimated 76,021 tons to 138,535 tons. There is a large amount of inbound tonnage because many basic commodities are not produced in Alaska and must be imported from the lower 48. Most of Alaska's exports to the lower 48 have high weight to value ratios and are more suitable for waterborne shipping. Also, because of the imbalance between Eastbound and Westbound air cargo flows, there is a large amount of available inbound capacity on U.S. carriers which allows for lower air cargo shipping rates for inbound domestic cargo than for outbound domestic cargo.

Belly and Combi Cargo Tonnage Projections

Table 2.4.5 provides the breakout between all-cargo carrier freight and passenger and combi freight. The approach for developing the breakout is the same as that used for intrastate air cargo.

All Cargo Tonnage and Capacity

As shown in Table 2.4.5, the all-cargo carrier portion of domestic non-Alaska air cargo is projected to increase faster than belly and combi cargo. Since domestic non-Alaska air cargo and international air cargo is often commingled, the load factor and required capacity calculations have been combined and are discussed in the next section.

2.4.5. International Air Cargo

The forecast of international air cargo demand is discussed in this section. For the purposes of this analysis, international air cargo is defined as any shipment whose ultimate origin or destination is outside of U.S. soil. Therefore, an inbound shipment that arrives from Asia, clears Customs at ANC, and then goes on to the lower 48, is still defined as international air cargo. The reason for this definition is that, even though the shipment is technically domestic, it is still subject to the same forces and trends that govern international trade and air cargo.

Methodology and Data Sources

The approach used to project international air cargo is similar to the approach used to estimate intrastate air cargo and involved the following steps:

Table 2.4.5

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated Domestic Non-Alaska Belly and Freighter Cargo Demand

	2005	2012	2017	2027
FAA Forecasts (a)				
US Dom. ASMs (bil)	755.9	935.0	1,128.1	1,514.3
US Dom. Passenger Carrier RTMs (mil)	3,082.3	3,487.5	3,743.2	4,254.6
Ratio	4.078	3.730	3.318	2.810
Intra-Alaska Seat Departures (b)				
Inbound	1,901,968	2,189,373	2,347,411	2,899,266
Outbound	1,901,968	2,189,373	2,347,411	2,899,266
Outbound Cargo				
Total (c)	20,857	24,601	27,557	38,008
Belly and Combi (d)	10,382	10,932	10,427	10,904
Freighter (e)	10,475	13,669	17,131	27,104
Inbound Cargo				
Total (c)	76,021	89,666	100,443	138,535
Belly and Combi (d)	6,939	7,306	6,969	7,288
Freighter (e)	69,082	82,359	93,474	131,247

(a) FAA Aerospace Forecasts: Fiscal Years 2006-2017. Forecasts for 2027 extrapolated at 2012-2017 growth rates.
(b) Table B.3 in Appendix B.
(c) Table 2.4.4.
(d) Assumed to increase at same rate as seat departures adjusted by change in ratio of U.S. Domestic Passenger Carrier RTMs to U.S. Domestic ASMs.
(e) Total less Belly and Combi cargo.

Sources: As noted and HNTB analysis.

- Identify forecast of international air cargo flows.
- Identify and assess the factors that affect the share of international air cargo that will pass through ANC, including imbalances between Eastbound and Westbound trade flows, location and distance of markets, and existing and projected aircraft technical capabilities.
- Project future international Westbound and Eastbound Asia-North America air cargo tonnage for ANC.
- Project future international Asia-Europe air cargo tonnage for ANC.
- Allocate tonnage projections to passenger carriers and all-cargo carriers.
- Estimate all-cargo aircraft capacity required to serve the international and domestic increments of Eastbound and Westbound air cargo flows.
- Derive projection of all-cargo aircraft departures and fleet mix that will accommodate required Eastbound and Westbound all-cargo aircraft capacity (domestic and international combined).

The data sources were similar to those used for the intra-state forecast and included the Airport, the USDOT's Schedule T-100 statistics, the FAA, Boeing, Airbus, and other industry publications.

Global Air Cargo Tonnage Flows

Since most international cargo at ANC is on its way to and from Asia, Europe, and North America, it is heavily dependent on air cargo flows between these regions. **Table 2.4.6** presents the forecasts of the growth rates in these trade flows calculated as an average of the FAA, Boeing, Airbus, and MergeGlobal forecasts. As shown, most regions are projected to continue to experience rapid growth into the future. The most rapid growth rates are anticipated to be between Asia and the Americas, and the Peoples Republic of China is projected to show the most rapid growth within Asia.

The FAA projections of international air cargo are based on models that relate air cargo to world gross domestic product (GDP). The FAA forecasts international air cargo to continue to grow as a result of world economic growth, trade expansion, and more open skies agreements. The FAA also expects air cargo on all-cargo aircraft to increase faster than air cargo on passenger aircraft. The FAA also projects that large 4-engine wide body aircraft in the service of U.S. flag carriers will almost double from 67 in 2005 to 130 in 2017.[11]

The Boeing Commercial Airplane Group publishes its World Air Cargo Forecast every two years. The projections incorporate several forecasting methodologies, including econometric modeling (regression analysis), trend analysis, potential analysis, and judgment. The forecasts include an

[11] Federal Aviation Administration, FAA Aerospace Forecasts: Fiscal Years 2006-2017, March 2006.

Table 2.4.6

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Air Cargo Growth Rate Assumptions

	FAA (a)	Boeing (b)	Airbus (c)	MergeGlobal (d)	Average (e) 2006-2010	Average (e) 2006-2025	Average (e) 2010-2025
World		6.1%	6.0%	6.4%	6.2%	6.1%	6.0%
US Domestic	3.2%	3.8%	3.3%		3.4%	3.4%	3.4%
US International	6.3%				6.3%	6.3%	6.3%
US to Canada		6.0%			6.0%	6.0%	6.0%
Asia to North America		7.1%	5.7%	8.4%	7.1%	6.4%	6.2%
Indian Subcontinent to North America			5.0%				
Japan to North America			3.9%				
Pacific to North America			4.3%				
PRC to North America			9.8%				
Rest of Asia			5.5%				
North America to Asia		7.2%	5.5%	5.8%	6.2%	6.4%	6.4%
North America to Indian Subcontinent			7.2%				
North America to Japan			3.9%				
North America to Pacific			3.6%				
North America to PRC			8.1%				
Rest of Asia			4.8%				
Asia to Europe		6.8%	5.7%	7.7%	6.7%	6.3%	6.1%
Japan to Europe			5.0%				
Europe to Asia		7.0%	5.3%	5.9%	6.1%	6.2%	6.2%
Europe to Japan			3.7%				
Europe to North America		5.6%	3.7%	4.3%	4.5%	4.7%	4.7%
North America to Europe		5.1%	3.5%	3.2%	3.9%	4.3%	4.4%
CIS to North America			4.2%				
North America to CIS			6.6%				
Asia to South America			6.4%		6.8%	6.8%	6.8%
Indian Subcontinent to South America			7.2%				
Japan to South America			3.2%				
Pacific to South America			9.0%				
PRC to South America			8.0%				
South America to Asia			5.7%		6.6%	6.6%	6.6%
South America to Indian Subcontinent			7.8%				
South America to Japan			5.5%				
South America to Pacific			6.1%				
South America to China			7.7%				
Asia to Central America			7.2%		6.7%	6.7%	6.7%
Indian Subcontinent to Central America			8.5%				
Japan to Central America			4.7%				
Pacific to Central America			5.1%				
PRC to Central America			7.8%				
Central America to Asia			4.2%		5.6%	5.6%	5.6%
Central America to Indian Subcontinent			7.6%				
Central America to Japan			4.6%				
Central America to Pacific			5.9%				
Central America to China			5.9%				

(a) FAA Aerospace Forecasts, Fiscal Years 2006-2017.
(b) Boeing, World Air Cargo Forecast, 2006-2007.
(c) Airbus, Global Market Forecast: 2006-2025.
(d) MergeGlobal, published in American Shipper, August 2006. Through 2010 only.

Sources: As noted and HNTB analysis.

assessment of economic growth in importing regions, transportation costs for air and other modes, exchange rates, and relative prices, as well as changes in trade agreements and the development of new logistical strategies. Boeing notes that, historically, international air cargo has grown more than twice as fast as GDP, and Boeing projects this trend to continue.

Boeing expects that total air cargo between Asia and North America will grow more than 7 percent. They expect the imbalance between Eastbound and Westbound cargo but note that this is very sensitive to exchange rates. Therefore, if the Chinese yuan were to rise significantly against the U.S. dollar, trade flows would become more balanced.[12]

Airbus projects that overall international air cargo to grow much faster than domestic air cargo. They see high value exports, such as high tech, increasing more than lower value exports. High value exports are generally time-sensitive and this should additionally stimulate the market for air cargo. The China-U.S. market is expected to be the largest air cargo market, and among the fastest growing. Airbus expects the Yangzi region in Southeast China to account for three quarters of Chinese air exports by 2015. They note that high-tech equipment requires much bulky, albeit lightweight, packaging and see aircraft with high volumetric payloads, such as the A380, as ideal for this market.[13]

MergeGlobal is an independent consulting firm specializing in global transport and logistics issues and frequently called upon by the FAA and major air cargo carriers for their insights into the industry.[14] Their forecast is focused on the short range (to 2010) but echoes many of the themes in the FAA, Boeing and Airbus forecasts. They also note that continuing congestion and delay problems at seaports, including the U.S. West Coast, are causing shippers to increasingly use air cargo services. However, they also anticipate that average air freight rates will increase as a result of two factors 1) the higher marginal costs associated with air freight on freighters as compared to passenger carriers, and 2) increasing directional imbalances in many regions.

Tables 2.4.7 and 2.4.8 show total projected Eastbound and Westbound air cargo flows between Asia and the United States. Tonnage to or from each country was assumed to increase at the growth rate identified in Table 2.4.6. If there was no specific growth rate for an individual country, it was assumed to grow at the same rate as the rest of Asia. The forecasts for each country were adjusted proportionately upwards or downwards so that the totals would sum to the total Asia-North America forecast. Total Eastbound air cargo is projected to increase from 2.6 million tons in 2005 to 10.2 million tons in 2027. Westbound air cargo is projected to increase from 1.2 million tons to 4.8 million tons over the same period of time.

---

[12] The Boeing Company, World Air Cargo Forecast: 2006-2007, 2006.

[13] Airbus Industrie, Global Market Forecast: 2006-2025. November 2006.

[14] Brian Clancy and David Hoppin for MergeGlobal, Steady Climb, published in *American Shipper*, August 2006.

Table 2.4.7

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated Asia - United States Air Cargo Tonnage Demand - Eastbound

	2005	**2012**	**2017**	**2027**	**Average Annual Growth Rate**
Eastbound					
Total (a)	2,608,944	4,141,643	5,600,979	10,243,455	6.4%
China	365,018	759,316	1,226,383	3,108,281	10.2%
Japan	720,916	1,018,792	1,248,403	1,821,299	4.3%
Korea	655,293	1,030,611	1,363,166	2,317,097	5.9%
Taiwan	519,300	816,728	1,080,268	1,836,230	5.9%
Hong Kong	256,512	403,429	533,606	907,019	5.9%
Macao	15,031	23,640	31,268	53,149	5.9%
Russia	36,392	57,235	75,704	128,681	5.9%
Other Asia	20,277	31,891	42,181	71,699	5.9%
Belly Cargo (b)					
China	28,758	44,397	60,543	112,584	6.4%
Japan	259,827	369,275	474,675	784,312	5.2%
Korea	57,885	90,704	125,014	237,474	6.6%
Taiwan	43,269	67,801	93,447	177,510	6.6%
Hong Kong	24,314	38,100	52,511	99,750	6.6%
Macao	-	-	-	-	
Russia	1	2	2	4	6.6%
Other Asia	544	852	1,175	2,232	6.6%
	414,599	611,131	807,366	1,413,866	5.7%
Freighter Cargo (c)					
China	336,260	714,919	1,165,840	2,995,697	10.5%
Japan	461,089	649,517	773,728	1,036,987	3.8%
Korea	597,408	939,907	1,238,152	2,079,623	5.8%
Taiwan	476,031	748,927	986,821	1,658,719	5.8%
Hong Kong	232,198	365,329	481,095	807,269	5.8%
Macao	15,031	23,640	31,268	53,149	5.9%
Russia	36,391	57,234	75,702	128,677	5.9%
Other Asia	19,733	31,038	41,006	69,467	5.9%
	2,174,140	3,530,512	4,793,613	8,829,589	6.6%

(a) Total Asia to North America cargo in 2005 from Table 2.2.17. Excludes Asia-Europe cargo. Total assumed to increase at Asia North America growth rates from Table 2.4.6. Individual country totals assumed to increase at rates from Table 2.4.6 and then adjusted proportionately to sum to Asia North America total.

(b) Belly cargo assumed to growth at Asia-North America passenger growth rates from Table 2.3.6.

(c) Total cargo less belly cargo.

Sources: As noted and HNTB analysis.

Table 2.4.8

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated Asia - United States Air Cargo Tonnage Demand - Westbound

	2005	2012	2017	2027	Average Annual Growth Rate
Westbound					
Total (a)	1,227,902	1,875,878	2,559,253	4,763,552	6.4%
China	105,431	281,020	482,209	1,235,631	11.8%
Japan	475,767	621,875	752,976	1,103,917	3.9%
Korea	273,854	427,140	581,267	1,064,140	6.4%
Taiwan	231,500	361,079	491,369	899,561	6.4%
Hong Kong	110,785	172,795	235,146	430,488	6.4%
Other Asia	7,673	11,968	16,286	29,816	6.4%
Belly Cargo (b)					
China	12,912	19,934	27,183	50,550	6.4%
Japan	109,684	155,887	200,381	331,092	5.2%
Korea	28,174	44,147	60,846	115,582	6.6%
Taiwan	21,128	33,107	45,630	86,677	6.6%
Hong Kong	9,011	14,120	19,461	36,968	6.6%
Other Asia	4,546	7,123	9,818	18,650	6.6%
	185,455	274,318	363,319	639,519	5.8%
Freighter Cargo (c)					
China	92,519	261,087	455,025	1,185,082	12.3%
Japan	366,083	465,988	552,595	772,825	3.5%
Korea	245,680	382,993	520,422	948,558	6.3%
Taiwan	210,372	327,972	445,739	812,884	6.3%
Hong Kong	101,774	158,675	215,685	393,520	6.3%
Other Asia	3,127	4,844	6,468	11,166	6.0%
	1,019,555	1,601,559	2,195,935	4,124,033	6.6%

(a) Total Asia to North America cargo in 2005 from Table 2.2.18. Excludes Asia-Europe cargo. Total assumed to increase at Asia North America growth rates from Table 2.4.6. Individual country totals assumed to increase at rates from Table 2.4.6 and then adjusted proportionately to sum to Asia North America total.

(b) Belly cargo assumed to growth at Asia-North America passenger growth rates from Table 2.3.6.

(c) Total cargo less belly cargo.

Sources: As noted and HNTB analysis.

Total Asia-U.S. belly and combi air cargo were assumed to increase at the same rate as passenger growth identified in Table 2.3.6. Passenger carriers flying the Asia-North America routes fly wide-body aircraft, and foreign-flag passenger carriers are more aggressive in pursuing air cargo than U.S. flag carriers. Therefore, in contrast to domestic belly cargo, international belly cargo is assumed to keep pace with international traffic.

Freighter cargo tonnage is calculated as the difference between total cargo and belly cargo. Eastbound freighter tonnage is projected to increase slightly faster than total tonnage, from 2.2 million in 2005 to 8.8 million in 2027. Likewise, Westbound freighter tonnage is projected to increase from 1.0 million in 2005 to 4.1 million in 2027.

ANC Share of Global Air Cargo Flows

The amount of future international cargo that flows through ANC will depend on the need and desirability of ANC as a technical stop for the carriers engaged in this traffic. The desirability of ANC as a technical stop will depend on three principal factors: (1) potential competition from other technical stops (2) continued improvements in aircraft technology which will allow longer flights at full payloads, and (3) opportunities for transferring cargo at ANC that could not be obtained elsewhere.

The previous ANC Master Plan provided a detailed analysis of the advantages and disadvantages of ANC compared to other potential technical stops.[15] All potential market pairs among the Asian, European, and North American airports listed among the ACI's (Airport Council International's) top 100 air cargo airports were examined. This included 90 markets and 8,010 market pairs. The suitability of ANC as a technical stop for each market pair was evaluated based on 1) whether each segment to and from ANC could be flown non-stop by an aircraft with a full payload, 2) whether the two markets of the market pair were sufficiently far apart that they could not be served non-stop with a full payload, and 3) no other potential competing technical stop could serve better than ANC, based on minimizing total great circle distance several criteria. It was assumed that ANC would be the preferred technical stop provided the following criteria were met.

The analysis determined that ANC was clearly superior as a technical stop for Asia-North America traffic. Fairbanks was the only major airport with a circuity advantage, and this was offset by disadvantages in infrastructure, climate and available labor. In terms of minimizing great circle distance, Vancouver, Seattle, and Khabarovsk were superior technical stops for only a small number of Asia-North America market pairs.

ANC's relative advantage over other technical stops for Asia-North America traffic held true whether the assumed maximum range was 4,000, 5,000, or 6,000 nautical miles. As would be expected, however, the number of market pairs that could be flown non-stop increased as aircraft range increased.

The range of freighter aircraft has increased as newer models have become available. The Boeing 747-200, which until recently had been the mainstay of the long-haul freighter fleet, has a range of 3,800 statute miles with a full payload. The MD-11 and 747-400 can fly 4,100 and 5,100 statute miles with a full payload, respectively. The new Boeing 747-800 and 777

[15] Ted Stevens Anchorage International Airport Master Plan Update, 2002.

freighters will have the same maximum range as the Boeing 747-400 (5,100 statute miles). The FedEx version of the Boeing 777 freighter will reportedly have a range of 6,100 statute miles but with a lower maximum payload. The Airbus A380 will have a range of 6,400 miles with maximum payload, more than any freighter aircraft under operation or under development. Table C.3 in the Technical Appendix shows the range characteristics of long-haul freighter aircraft in operation or under development.

Table C.4 in the Technical Appendix illustrates how the type of aircraft used will affect whether a technical stop at ANC would be required. The table shows the non-stop distance between the major Asian markets and the nine key U.S. air cargo markets. For example, the table shows that MD-11 or 747-200 aircraft departing Tokyo Narita (NRT) with a full payload would not be able to fly to any of the U.S. markets without a technical stop. The Airbus 330 freighter would only be able to fly to Seattle without a technical stop. At the other extreme, only 44 percent of the U.S. markets (weighted by tonnage) would require a technical stop if the Airbus A380 were flying the route from NRT. As shown, even with the A380, long haul markets such as Hong Kong, Taipei, and most of the People's Republic of China would still require a technical stop to avoid a payload penalty. **Figure 2.4.1** graphically compares the range characteristics of aircraft in operation or under development with the distances between key market pairs in the Asia-North America market. As shown, even with new aircraft, a technical stop would be required for most of these market pairs at full payloads.

Table C.5 is similar to Table C.4 but assumes reduced payload to better represent more typical westbound load factors. It should be noted that, although westbound flights typically carry smaller loads, they also encounter headwinds which are especially strong at high latitudes in winter. This offsets some of the range advantage offered by a smaller load. With an 80 percent load factor, a Boeing 747-400 could fly to NRT from approximately half the U.S. markets without a technical stop at ANC. An A380 could fly from almost any point in the U.S. to NRT without a technical stop with an 80 percent load factor.

Existing patterns of aircraft use at ANC are illustrated in Table C.6 in the Technical Appendix. The number of westbound departures to Asia is similar to the number of eastbound arrivals from Asia for shorter range aircraft such as the Boeing 767, Boeing 747-200 and MD-11. The longer range 747-400 has only slightly more than half as many westbound stops at ANC as Eastbound stops. The Boeing 747-100 would appear to be an exception to the rule, but the results are skewed because its primary destination is Khabarovsk, which is much closer to the U.S. than other Asian markets.

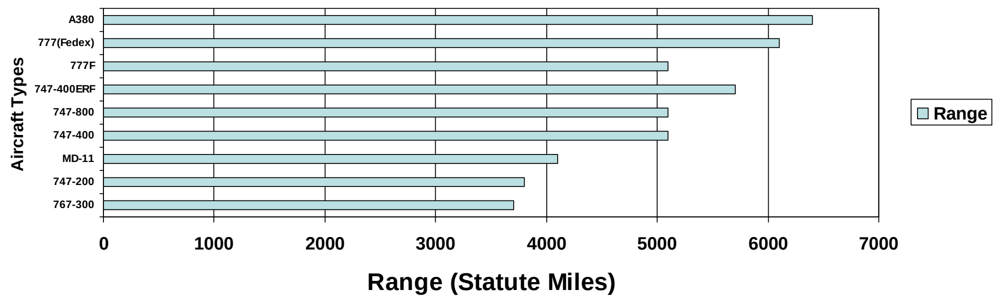
The analysis contained in Tables C.4 and C.5 was used to help assess the impact of new longer range aircraft on the use of ANC as a technical stop. **Table 2.4.9** shows the assumed reductions in the ANC share of Eastbound and Westbound Asia-North America air cargo flows resulting from the analysis.

Figure 2.4.1

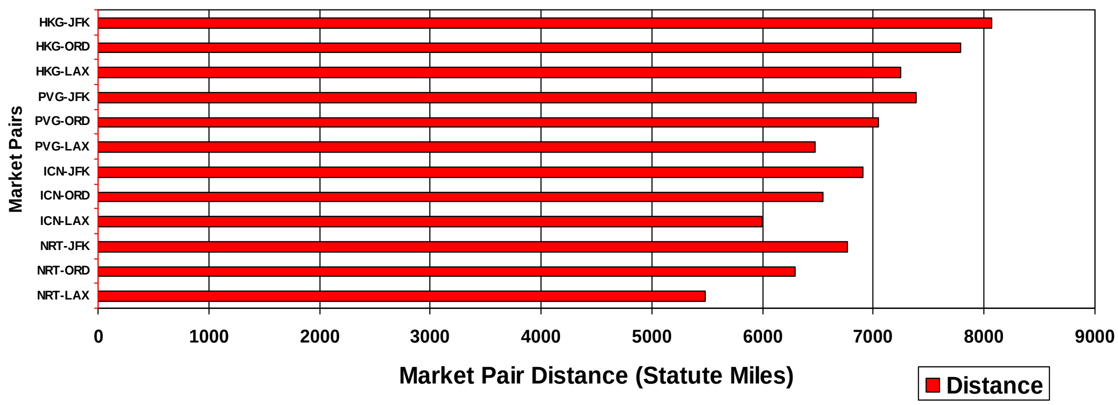
TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Comparison of Freighter Range Characteristics and Distances of Key Market Pairs

Range of Major Existing and Planned Freighter Aircraft (Assumes Full Payload)



Distance Between Key Market Pairs



Source: HNTB analysis.

Table 2.4.9

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated Change in ANC Share of Asia-North America Freighter Cargo Traffic

		Forecast (b)		
	2005 (a)	**2012**	**2017**	**2027**
China - Eastbound	92.3%	92.3%	92.3%	91.3%
China - Westbound	78.6%	73.9%	70.0%	66.1%
Hong Kong - Eastbound	94.9%	94.9%	94.9%	94.9%
Hong Kong - Westbound	94.0%	94.0%	94.0%	91.2%
Macao - Eastbound	100.0%	100.0%	100.0%	100.0%
Macao - Westbound	-	-	-	-
Japan - Eastbound	75.2%	74.4%	67.7%	56.4%
Japan - Westbound	81.9%	72.9%	66.3%	54.0%
Far East Russia - Eastbound	94.5%	94.5%	93.5%	93.5%
Far East Russia - Westbound	-	-	-	-
South Korea - Eastbound	94.8%	93.8%	92.9%	90.0%
South Korea - Westbound	82.1%	75.6%	71.5%	64.1%
Taiwan - Eastbound	94.1%	94.1%	94.1%	94.1%
Taiwan - Westbound	76.0%	73.7%	69.2%	64.6%
Other Asia - Eastbound	-	-	-	-
Other Asia - Westbound	6.1%	6.1%	6.1%	5.9%

(a) Tables 2.2.17 and 2.2.18
(b) Tables C.4 and C.5 in Appendix C and HNTB analysis. See text for details.

Sources: As noted and HNTB analysis.

Other elements of the analysis included an assessment of anticipated changes in the fleet mix of the carriers serving the market and interest in crossloading at ANC indicated by the carriers serving each region. In summary, the assumptions for each region were as follows:

China

2012 – average range halfway between MD-11 and 747-400

2017 – average range similar to 747-400

2027 – average range similar to 747-400 with a downward adjustment to allow for extended range 777 and A380s

Hong Kong

2012 – average range halfway between MD-11 and 747-400

2017 – average range similar to 747-400

2027 – average range halfway between 747-400 and 747-400ERF

Macao

2012 – average range halfway between MD-11 and 747-400

2017 – average range similar to 747-400

2027 – average range halfway between 747-400 and 747-400ERF

Japan

2012 – average range halfway between MD-11 and 747-400 with some upward adjustment for higher loads to Japan and crossloading

2017 – average range similar to 747-400, increased slightly to account for some 747-400 ERF aircraft. Also includes some upward adjustment for higher loads to Japan and crossloading.

2027 – average range assumes an equal mix of 747-400, 777F, 747-400ERF and A380 aircraft. Also includes some upward adjustment for higher loads to Japan and crossloading

Far East Russia

2012 – route assumed to be served by marginal carriers operating older aircraft such as the 747-200 and MD-11.

2017 – route assumed to be served by marginal carriers operating older aircraft such as the 747-200 and MD-11.

2027 – route assumed to be served by marginal carriers operating older aircraft such as the 747-200 and MD-11.

South Korea

2012 – average range similar to 747-400

2017 – average range similar to 747-400 with some extended range 777 aircraft

2027 – average range assumes a combination of 747-800 and extended range 777 aircraft.

Taiwan

2012 – average range similar to 747-400

2017 – average range halfway between 747-400 and extended range 777 aircraft

2027 – average range similar to extended range 777 aircraft

Other Asia

2012 – average range halfway between MD-11 and 747-400

2017 – average range similar to 747-400

2027 – average range halfway between 747-400 and 747-400ERF

There are several factors that could increase the number of flights between Asia and North America that overfly ANC, including the availability slots at destination airports, curfews, delivery deadlines, congestion or high costs at ANC. Factors that could decrease the number of flights between Asia and North America that overfly ANC include crew relief, sorting operations and crossloading operations.

The ANC share estimates in Table 2.4.9 were applied to the projections of total freighter flows in Tables 2.4.7 and 2.4.8 to generate projections of Eastbound and Westbound cargo flows between ANC and Asia.

Table 2.4.10 shows that eastbound inbound freight from Asia is projected to increase from 1.9 million tons in 2005 to 7.7 million tons in 2027, an average annual increase of 6.5 percent. **Table 2.4.11** shows the eastbound outbound freight to North America which also includes the additional increment of Eastbound domestic freight calculated in Section 2.4.4.

Table 2.4.12 shows that westbound outbound freight to Asia is projected to increase from 0.8 million tons in 2005 to 2.7 million tons in 2027, an average annual increase of 5.5 percent. Westbound inbound freight from North America includes domestic freight from the lower 48 to ANC and is presented in **Table 2.4.13**.

Table 2.4.14 presents the forecast of Asia-Europe cargo flows through ANC. Current traffic consists of approximately 20,000 tons each way flowing between Asia (Japan) and Western Europe. European cargo flows through ANC are unlikely to expand to other Asian countries as long as Russian airspace is accessible because, with the exception of Japan, the great circle distance through ANC is greater than the great circle distance through Russia. However, the non-stop distance between Japan and Western Europe is 6,000 miles or greater, so the route cannot flown without a payload penalty except with an A380. Hence it is likely that air cargo flowing between Europe and Asia will continue to make a stop at ANC. Eastbound Asia-Europe tonnage is projected to increase at a 5.0 annual rate to 59,105 tons by 2027 while westbound tonnage is projected to increase at a slower 3.7 percent rate to 50,912 tons.

Belly and Combi Cargo Tonnage Projections

The forecasts of international belly and combi cargo are presented in **Table 2.4.15**. The freighter cargo projections above were calculated as a share of overall freighter cargo flows between Asia and North America and therefore did not include cargo on passenger carriers.

Table 2.4.10

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated ANC Share of Asia - North America Air Cargo Tonnage Demand - Eastbound

	2005	2012	2017	2027	Average Annual Growth Rate
Eastbound					
Freighter Cargo (a)					
China	336,260	714,919	1,165,840	2,995,697	10.5%
Japan	461,089	649,517	773,728	1,036,987	3.8%
Korea	597,408	939,907	1,238,152	2,079,623	5.8%
Taiwan	476,031	748,927	986,821	1,658,719	5.8%
Hong Kong	232,198	365,329	481,095	807,269	5.8%
Macao	15,031	23,640	31,268	53,149	5.9%
Russia	36,391	57,234	75,702	128,677	5.9%
Other Asia	19,733	31,038	41,006	69,467	5.9%
	2,174,140	3,530,512	4,793,613	8,829,589	6.6%
ANC Share (b)					
China	92.3%	92.3%	92.3%	91.3%	-0.05%
Japan	75.2%	74.4%	67.7%	56.4%	-1.30%
Korea	94.8%	93.8%	92.9%	90.0%	-0.23%
Taiwan	94.1%	94.1%	94.1%	94.1%	0.00%
Hong Kong	94.9%	94.9%	94.9%	94.9%	0.00%
Macao	100.0%	100.0%	100.0%	100.0%	0.00%
Russia	94.5%	94.5%	93.5%	93.5%	-0.05%
Other Asia	0.0%	0.0%	0.0%	0.0%	
	89.3%	89.3%	88.4%	87.1%	-0.11%
ANC Freighter Cargo (c)					
China	310,239	659,597	1,075,624	2,736,242	10.4%
Japan (d)	346,716	483,521	523,625	584,822	2.4%
Korea	566,098	881,740	1,149,796	1,872,100	5.6%
Taiwan	448,150	705,063	929,023	1,561,568	5.8%
Hong Kong	220,281	346,580	456,405	765,839	5.8%
Macao	15,031	23,640	31,268	53,149	5.9%
Russia	34,380	54,071	70,803	120,350	5.9%
Other Asia	-	-	-	-	
	1,940,895	3,154,212	4,236,544	7,694,071	6.5%

(a) Table 2.4.7.
(b) Table 2.4.9.
(c) Data for 2005 from 2.2.17. Forecasts estimated by multiplying total Asia-U.S. cargo by ANC share.
(d) Excludes cargo going to Europe.

Sources: As noted and HNTB analysis.

Table 2.4.11

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated ANC - North America Air Cargo Freighter Tonnage Demand - Eastbound

	2005	2012	2017	2027	Average Annual Growth Rate
Eastbound Freighter Cargo					
From Asia to North America (a)	1,940,895	3,154,212	4,236,544	7,694,071	6.5%
From Alaska to North America (b)	10,475	13,669	17,131	27,104	4.4%
Total	1,951,370	3,167,881	4,253,674	7,721,175	6.5%
By Market (c)					
Alabama	11,354	18,255	24,512	44,493	6.4%
California	516,088	829,779	1,114,179	2,022,410	6.4%
Florida	27,703	44,542	59,808	108,561	6.4%
Georgia	113,950	183,212	246,006	446,539	6.4%
Illinois- US	461,910	742,670	997,215	1,810,101	6.4%
Indiana- US --	46,897	75,402	101,246	183,777	6.4%
Kentucky- US --	130,781	210,273	282,342	512,496	6.4%
New York	323,562	520,231	698,536	1,267,952	6.4%
Ohio- US	60,248	96,868	130,069	236,096	6.4%
Oregon- US	9,328	14,998	20,138	36,554	6.4%
Tennessee- US --	97,163	156,221	209,765	380,756	6.4%
Texas	126,988	204,174	274,154	497,632	6.4%
Washington	1,148	1,846	2,478	4,499	6.4%
Canada	22,545	36,639	49,211	89,373	6.5%
Other (d)	1,705	32,771	44,016	79,938	19.1%
Total	1,951,370	3,167,881	4,253,674	7,721,175	6.5%

(a) Table 2.4.10.

(b) Table 2.4.4.

(c) Forecast Eastbound freighter cargo to North American assumed to be distributed according to current percentage distributions.

(d) Increased to acknowledge potential for direct cargo flows to Latin America. See text for details.

Sources: As noted and HNTB analysis.

Table 2.4.12

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated ANC Share of Asia - North America Air Cargo Tonnage Demand - Westbound

	2005	2012	2017	2027	Average Annual Growth Rate
Westbound					
Freighter Cargo (a)					
China	92,519	261,087	455,025	1,185,082	12.3%
Japan	366,083	465,988	552,595	772,825	3.5%
Korea	245,680	382,993	520,422	948,558	6.3%
Taiwan	210,372	327,972	445,739	812,884	6.3%
Hong Kong	101,774	158,675	215,685	393,520	6.3%
Other Asia	3,127	4,844	6,468	11,166	6.0%
	1,019,555	1,601,559	2,195,935	4,124,033	6.6%
ANC Share (b)					
China	78.6%	73.9%	70.0%	66.1%	-0.79%
Japan	81.9%	72.9%	66.3%	54.0%	-1.87%
Korea	82.1%	75.6%	71.5%	64.1%	-1.12%
Taiwan	76.0%	73.7%	69.2%	64.6%	-0.74%
Hong Kong	94.0%	94.0%	94.0%	91.2%	-0.14%
Other Asia	6.1%	6.1%	6.1%	5.9%	-0.14%
	81.4%	75.7%	71.4%	65.3%	-1.00%
ANC Freighter Cargo (c)					
China	72,753	192,989	318,454	782,796	11.4%
Japan (d)	299,668	339,489	366,398	417,529	1.5%
Korea	201,775	289,384	371,853	607,652	5.1%
Taiwan	159,863	241,751	308,235	525,058	5.6%
Hong Kong	95,642	149,115	202,690	358,716	6.2%
Other Asia	191	296	395	662	5.8%
	829,892	1,213,025	1,568,026	2,692,412	5.5%

(a) Table 2.4.8.
(b) Table 2.4.9.
(c) Data for 2005 from 2.2.18. Forecasts estimated by multiplying total Asia-U.S. cargo by ANC share.
(d) Excludes cargo coming from Europe.

Sources: As noted and HNTB analysis.

Table 2.4.13

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated North America - ANC Freighter Air Cargo Tonnage Demand - Westbound

	2005	2012	2017	2027	Average Annual Growth Rate
Westbound Freighter Cargo					
From North America to Asia (a)	829,892	1,213,025	1,568,026	2,692,412	5.5%
From North America to Alaska (b)	69,082	82,359	93,474	131,247	3.0%
Total	898,974	1,295,385	1,661,500	2,823,659	5.3%
By Market (c)					
California	193,437	227,562	244,994	257,007	1.3%
Florida	2,829	4,542	6,068	10,906	6.3%
Georgia	52,507	84,301	112,623	202,428	6.3%
Illinois	202,996	299,485	401,223	741,811	6.1%
Indiana	18,760	27,677	37,079	68,555	6.1%
Kentucky	58,972	87,003	116,559	215,502	6.1%
New York	177,204	261,434	350,245	647,559	6.1%
Ohio	21,081	31,101	41,667	77,037	6.1%
Oregon	11,354	13,357	14,380	15,085	1.3%
Tennessee	46,250	68,234	91,413	169,012	6.1%
Texas	61,205	90,297	120,972	223,662	6.1%
Washington	21,625	25,440	27,389	28,732	1.3%
Canada	30,289	44,272	57,229	98,266	5.5%
Other (d)	465	30,680	39,658	68,096	25.4%
Total	898,974	1,295,385	1,661,500	2,823,659	5.3%

(a) Table 2.4.12.

(b) Table 2.4.4.

(c) Forecast Westbound freighter cargo from North American assumed to be distributed according to current percentage distributions. Growth in West Coast markets reduced to account for overflights.

(d) Increased to acknowledge potential for direct cargo flows from Latin America. See text for details.

Sources: As noted and HNTB analysis.

Table 2.4.14

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated Asia - Europe Air Cargo Tonnage Demand through Anchorage

	2005 (a)	2012	2017	2027	Average Annual Growth Rate
			Total		
Eastbound (b)	20,205	28,430	36,285	59,105	5.0%
Germany	6,509	9,159	11,689	19,041	5.0%
Netherlands	6,270	8,823	11,260	18,341	5.0%
United Kingdom	7,045	9,913	12,652	20,608	5.0%
Other Europe	381	536	684	1,115	5.0%
Westbound (c)	22,892	29,521	35,402	50,912	3.7%
Germany	12,974	16,731	20,064	28,854	3.7%
United Kingdom	6,427	8,288	9,939	14,294	3.7%
Other Europe	3,491	4,502	5,399	7,764	3.7%
			Belly		
Eastbound (d)	1	1	1	2	3.2%
Germany	1	1	1	2	3.2%
Netherlands	-	-	-	-	
United Kingdom	-	-	-	-	
Other Europe	-	-	-	-	
Westbound (d)	5	6	7	10	3.2%
Germany	5	6	7	10	3.2%
United Kingdom	-	-	-	-	
Other Europe	-	-	-	-	
			Freighter		
Eastbound (e)	20,204	28,429	36,284	59,103	5.0%
Germany	6,508	9,158	11,688	19,039	5.0%
Netherlands	6,270	8,823	11,260	18,341	5.0%
United Kingdom	7,045	9,913	12,652	20,608	5.0%
Other Europe	381	536	684	1,115	5.0%
Westbound (e)	22,887	29,515	35,395	50,902	3.7%
Germany	12,969	16,725	20,057	28,844	3.7%
United Kingdom	6,427	8,288	9,939	14,294	3.7%
Other Europe	3,491	4,502	5,399	7,764	3.7%

(a) Tables 2.2.15 and 2.2.16.
(b) Projected to grow in accordance with Japan-Europe growth rates in Table 2.4.6.
(c) Projected to grow in accordance with Europe-Japan growth rates in Table 2.4.6.
(d) Assumed to increase at same rate as passengers from Table 2.3.6.
(e) Total cargo less belly cargo.

Sources: As noted and HNTB analysis.

Table 2.4.15

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated International Belly Cargo at Anchorage

	2005	2012	2017	2027
Canada				
Total Passengers (a)	42,143	48,600	53,800	66,000
Inbound Belly Cargo (b)	35	40	45	55
Outbound Belly Cargo (b)	9	10	11	14
Asia - Enplaned/Deplaned				
Total Passengers (a)	39,748	51,000	59,200	79,600
Inbound Belly Cargo (b)	324	416	483	649
Outbound Belly Cargo (b)	26	33	39	52
Asia - Transit				
Total Passengers (a)	401,748	311,900	39,900	75,800
Inbound Belly Cargo (b)	4,680	3,633	465	883
Outbound Belly Cargo (b)	6,058	4,703	602	1,143
Europe				
Total Passengers (a)	17,202	22,000	25,600	34,400
Inbound Belly Cargo (b)	5	6	7	10
Outbound Belly Cargo (b)	1	1	1	2
Total				
Inbound	11,102	8,799	1,601	2,740
Outbound	10,774	8,382	1,118	2,094
Total	21,876	17,181	2,719	4,834

(a) Table 2.3.7.
(b) Assumed to increase at same rate as total passengers.

Sources: As noted and HNTB analysis.

Consistent with the belly cargo assumptions used to estimate the passenger carrier portion of total Asia-North America flows, it was assumed that international belly cargo tonnage would change at the same rate as international passengers. As illustrated in Table 2.4.15, total international belly cargo is projected to decrease substantially, as a result of the anticipated decrease in international transit passengers.

Projections of Air Cargo Capacity

Required international air cargo capacity was estimated using the same approach that was used for interstate cargo. The projections of freighter tonnage were divided by estimated load factor to arrive at estimates of required lift capacity. Based on the Airbus analysis (see Section 2.4.3) load factors were assumed to increase by .5 percent per year. It was assumed that, because of seasonal factors, load factors would not be able to consistently exceed 90 percent in any sector.

Table C.7 in the Technical Appendix shows the required lift capacity calculations for eastbound cargo from Asia to ANC. Estimates of the required capacity for the North American leg of Eastbound cargo flows are included in Tables C.8 and C.9. Tables C.10, C.11, and C.12 show similar calculations for the westbound legs. Note that Westbound North American load factors are projected to decrease slightly. This is a byproduct of the fact that the international cargo component (characterized by low load factors on the westbound leg) is growing much faster than the domestic component (which is characterized by high load factors). Table C.13 shows the required capacity for the Asia – Europe cargo flows through ANC.

Summary of International Air Cargo Tonnage Projections

The forecasts of international cargo tonnage are dependent on the following assumptions:

- The consensus FAA/Boeing/Airbus/MergeGlobal forecasts of global cargo flows are valid;
- There will be no political crises, either internal or external, that prevent the Asian economies from continuing to grow;
- Fuel prices will continue to be stable;
- Facilities at ANC will grow with demand and rates and charges to the airlines will not significantly exceed existing levels.
- There will be enough capacity at Asian airports to accommodate the projected demand;
- Fairbanks will not become a major competitor for technical stops beyond current levels; and
- Most cargo carriers will have aircraft with a general maximum range at full payload similar to a Boeing 747-400, and no cargo aircraft will be produced with a range at maximum payload that exceeds that of the Airbus A380.

A final critical assumption of the above analysis is that all-cargo carriers will not trade-off payload for range. Like passenger carriers, all-cargo carriers have the option of limiting payload and taking on more fuel to achieve greater non-stop ranges. The passenger version of the Boeing 747-400 can achieve non-stop ranges in excess of 8,000 statute miles by making these trade-offs.

The reason all-cargo carriers do not typically trade-off payload for range is that, as MergeGlobal puts it, “cargo doesn’t care about non-stops.” They go on to say:

> In the passenger market, carriers can gain significant competitive advantage by offering non-stop service when competitors offer one-stop routings. In particular, high-fare business passengers prefer shorter elapsed times, which increases average yields and thus helps offset the payload penalties on ultra-long-haul nonstop services. In the cargo market, however, there is little value associated with saving a few hours, particularly in view of the fact that cargo spends most of its door-to-door shipment time sitting on the ground, rather than in flight, so even dramatic flight-time reductions translate into relatively small changes in door-to-door time. For this reason, freighter operators typically accept tech stops and route their aircraft to maximize payloads, even if multiple-stop flights are necessary.[16]

Ted Weise, President and CEO of Federal Express, confirmed this viewpoint when he declared “We will not sacrifice payload for range” at the “Top of the World” Cargo Summit on September 16, 1998.

2.4.6. Air Cargo Tonnage Summary

Table 2.4.16 provides a summary of total projected domestic and international air cargo tonnage demand at ANC. Combined inbound and outbound cargo (counting transit cargo twice) is projected to increase at a 6.1 percent annual rate from 5.7 million tons in 2005 to over 21 million tons by 2027. International cargo accounts for the largest share currently, and will increase its share of ANC air cargo in the future.

Table 2.4.17 reorganizes the air cargo projections to correspond to the categories used by the Airport in its accounting: enplaning, deplaning and transit cargo. Intra-Alaska enplaned and deplaned air cargo was estimated by subtracting transit cargo from outbound and inbound intra-Alaska cargo respectively. Domestic transit cargo was assumed to continue its long-term decline. Most domestic transit cargo is carried by Alaska Airlines. Therefore, domestic transit cargo was assumed to follow domestic transit passenger trends.

Future enplaned and deplaned air cargo to international and other U.S. points will be sensitive to the amount of cross-loading that occurs at ANC. Since 1999, when the airlines began to file much more complete numbers to the airport, international enplaned, deplaned, and transit cargo have all grown at about 7 percent annually. This suggests that the amount of cross-loading is increasing in proportion to the total amount of international air cargo. Surveys and interviews conducted with the cargo carriers indicated that there was a substantial amount of cross-loading occurring, most of it Eastbound.

[16] Mergeglobal, Inc., “Are Winglets Worth It” in MGI Cargo Analyst, January/February 1995.

Table 2.4.16

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Cargo Tonnage Demand Forecast

	2005	2012	2017	2027	Average Annual Growth Rate
Inbound Total					
Intra-Alaska (a)	25,851	24,417	24,041	23,307	-0.5%
Other Domestic (b)	76,021	89,666	100,443	138,535	2.8%
Eastbound International (c)	1,945,899	3,158,261	4,237,491	7,695,603	6.4%
Westbound International (c)	835,990	1,217,775	1,568,679	2,693,620	5.5%
Total	2,883,761	4,490,119	5,930,655	10,551,065	6.1%
Outbound Total					
Intra-Alaska (a)	91,690	112,840	123,650	148,475	2.2%
Other Domestic (b)	20,857	24,601	27,557	38,008	2.8%
Eastbound International (c)	1,945,585	3,157,857	4,237,022	7,694,971	6.4%
Westbound International (c)	835,976	1,217,762	1,568,666	2,693,607	5.5%
Total	2,894,108	4,513,059	5,956,895	10,575,061	6.1%
Inbound Freighter					
Intra-Alaska (d)	16,066	14,654	15,129	14,663	-0.4%
Other Domestic (e)	69,082	82,359	93,474	131,247	3.0%
Eastbound International (f)	1,940,895	3,154,212	4,236,544	7,694,071	6.5%
Westbound International (g)	829,892	1,213,025	1,568,026	2,692,412	5.5%
Total	2,855,935	4,464,251	5,913,173	10,532,394	6.1%
Outbound Freighter					
Intra-Alaska (d)	68,848	90,050	102,846	128,297	2.9%
Other Domestic (e)	10,475	13,669	17,131	27,104	4.4%
Eastbound International (f)	1,940,895	3,154,212	4,236,544	7,694,071	6.5%
Westbound International (g)	829,892	1,213,025	1,568,026	2,692,412	5.5%
Total	2,850,110	4,470,956	5,924,546	10,541,885	6.1%
Inbound Belly and Combi					
Intra-Alaska (d)	9,785	9,763	8,912	8,644	-0.6%
Other Domestic (e)	6,939	7,306	6,969	7,288	0.2%
Eastbound International (h)	5,004	4,049	947	1,532	-5.2%
Westbound International (h)	6,098	4,750	654	1,208	-7.1%
Total	27,826	25,868	17,482	18,672	-1.8%
Outbound Belly and Combi					
Intra-Alaska (d)	22,842	22,789	20,803	20,178	-0.6%
Other Domestic (e)	10,382	10,932	10,427	10,904	0.2%
Eastbound International (h)	4,690	3,645	478	899	-7.2%
Westbound International (h)	6,084	4,737	640	1,195	-7.1%
Total	43,998	42,103	32,348	33,176	-1.3%

(a) Table 2.4.1.
(b) Table 2.4.4.
(c) Freighter plus belly cargo.
(d) Table 2.4.2.
(e) Table 2.4.5.
(f) Table 2.4.10.
(g) Table 2.4.12.
(h) Table 2.4.15.

Sources: As noted anf HNTB analysis.

Table 2.4.17

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Enplaned, Deplaned and Transit Cargo Tonnage Demand Forecasts

	2005	2012	2017	2027	Average Annual Growth Rate
Intra-Alaska					
Inbound (a)	25,851	24,417	24,041	23,307	-0.5%
Outbound (a)	91,690	112,840	123,650	148,475	2.2%
Subtotal	117,541	137,257	147,691	171,782	1.7%
Deplaned (b)	25,609	24,269	23,916	23,217	-0.4%
Enplaned (c)	91,671	112,692	123,524	148,385	2.2%
Transit	187	148	125	89	-3.3%
Subtotal	117,654	137,257	147,691	171,782	1.7%
Other U.S. and International					
Inbound (a)	2,857,910	4,465,702	5,906,614	10,527,759	6.1%
Outbound (a)	2,802,418	4,400,219	5,833,245	10,426,586	6.2%
Subtotal	5,660,328	8,865,921	11,739,859	20,954,345	6.1%
Deplaned (d)	340,706	552,978	741,939	1,347,417	6.4%
Enplaned (d)	303,281	492,236	660,441	1,199,411	6.4%
Transit (e)	2,187,256	3,910,354	5,168,739	9,203,758	6.1% (f)
Subtotal	5,018,500	8,865,921	11,739,859	20,954,345	6.1% (f)

(a) Table 2.4.16.
(b) 2005 numbers from Table 2.2.10. Future numbers estimated by subtracting transit tonnage from inbound tonnage.
(c) 2005 numbers from Table 2.2.10. Future numbers estimated by subtracting transit tonnage from outbound tonnage.
(d) 2005 numbers from Tables 2.2.11 and 2.2.12. Assumed to increase at same rate as Eastbound tonnage. See text for details
(e) Total inbound and outbound cargo less enplaned and deplaned cargo and divided by 2.
(f) Growth rates calculated using base year that incorporates T-100 data.

Sources: As noted and HNTB analysis.

These cross-loading operations are occurring within airlines (FedEx) and across airlines (Northwest, Korean, and Transmile). Many other carriers expressed an interest in cross-loading but cited obstacles such as the lack of ramp space and impact on schedules. Some carriers expressed surprise that cross-loading had not developed as rapidly as they had expected. One major carrier expected cross-loading to decrease because larger future cargo flows would make it easier to dedicate aircraft to a single market.

Balancing these various factors and incorporating historical trends, it was assumed that international enplaning and deplaning cargo would increase at the same rate as eastbound air cargo, which would be in excess of 6 percent annually. This growth rate, however, will be sensitive to individual air carrier operational decisions, availability of ramp facilities, and the level to which successful airline alliances can be developed. This activity will open opportunities for third party logistics providers which will, in turn, could further stimulate cargo transfer activity.

2.4.7. All-Cargo Aircraft Operations

The domestic and international annual cargo capacity projections developed in Tables C.2, C.7, C.9, C.10, C.12, and C.13 were translated into projections of all-cargo aircraft flights for each market using a set of assumptions regarding airline strategies and available equipment. Cargo traffic is much more directional than passenger traffic and therefore there is much less market symmetry between arriving flights and departing flights. Consequently, separate estimates were prepared for international aircraft arrivals and departures. Based on the interviews and surveys, published aircraft orders, industry publications, and professional experience, detailed air service assumptions were developed, as listed below:

General All-Cargo Assumptions

- Since the forecast is unconstrained, the fleet mix projections are not limited by the existing number or length of runways or airfield configuration.
- No attempt is made to forecast aircraft not currently in the planning or development stages.
- No supersonic, hypersonic, or tilt-rotor aircraft are projected because of poor operating economies.

Intra-state All-Cargo Aircraft Operations

- As they approach the end of their useful economic life, Stage 2 narrow-body aircraft are expected to be gradually phased out.
- Large piston and turboprop aircraft such as the Hercules C-130 and Douglas DC-6 that have no comparable replacement aircraft will be kept in service as long as possible. Nevertheless, operations by these aircraft are expected to decline significantly by the end of the forecast period.
- Increased numbers of large ATR-42 and ATR-72 turboprop aircraft will be introduced into the intra-state cargo market.
- Beech KingAir and QueenAir aircraft will see increased use in the smaller intra-state markets.

- Consistent with Boeing projections and findings from the airline interviews, more Boeing 737 freighters are projected to be introduced as replacement narrow-body air cargo aircraft.

International/Other U.S. All Cargo Aircraft Operations

- As the 747-100 and –200 aircraft age, they will gradually be replaced by the Boeing 747-400.
- Some narrow-body and small wide-body aircraft will be used to serve the Russian and Canadian markets.
- FedEx, UPS, Northwest, and Atlas/Polar will increase flights to Mainland China as a result of the additional frequencies they have been awarded.
- FedEx will add service to Guangzhou once their new sort center is operational between 2008 and 2012.
- FedEx, China Southern, and Korean will fly significant numbers of the 777 freighters they have on order through ANC.
- Korean, Nippon Cargo, and Atlas/Polar will fly significant numbers of 747-800 freighters they have on order through ANC.
- Atlas/Polar will increase flights to Hong Kong, to serve the DHL hub located there.
- ABX will fly some of the Boeing 767 aircraft it has on order through ANC.
- Some carriers will add service to Mexico City to help tap the Asian-Latin America market.
- Carriers with a history of buying Boeing aircraft will add 747-400ERFs and 747-800s to their fleets in the long term.
- By 2027, several carriers in addition to UPS will have purchased the A380 freighter.
- By 2027, non-stop routes to Southeast Asia will have been added to take advantage of the longer range of new aircraft and the lighter loads on Westbound routes.

Using the above assumptions for guidance, air service scenarios were developed for each market in each forecast year. The scenarios were developed so that the selected aircraft types and frequencies in combination matched the annual cargo capacity projections for that market. Factors considered in each market included historical service patterns, current dominant carriers, aircraft in place and on order, length of haul, and announced plans of current carriers and new entrants. Individual market scenarios for departures are presented in Table C.14 in the Technical Appendix. Individual market scenarios for arrivals are presented in Table C.15[17]

The air service scenarios in Tables C.14 and C.15 were summarized to generate forecasts of all-cargo aircraft departures, operations and fleet mix.

[17] Since Tables C.14 and C.15 incorporate confidential airline survey information they will not be publicly distributed.

Table 2.4.18 shows the all-cargo fleet mix forecast. By 2027, the mainstays of the intra-Alaska all-cargo fleet are expected to be Boeing 737-300s and 400s, ATR 42s and 72s, and Beech KingAirs and QueenAirs. The international all-cargo fleet is projected to consist almost entirely of large wide-body aircraft, and the Boeing 747-400 is expected to account for the plurality of operations. Design Group VI aircraft (Boeing 747-800 and Airbus A380) are forecast to account for almost one-third of the international all-cargo departures by 2027. The estimated future maximum certificated gross takeoff weights for all-cargo carriers were calculated from the fleet mix and are presented in Table C.16 in the Technical Appendix.

Table 2.4.19 summarizes all-cargo aircraft departures and operations. Intra-state operations are projected to increase from 21,248 to 31,646 in 2027, an average annual increase of 1.8 percent. International all-cargo aircraft operations are forecast to increase from 77,236 in 2005 to 234,754 in 2027, an average annual increase of 5.2 percent. Total all-cargo aircraft operations are projected to increase 4.6 percent per year on average.

2.5. Other Aviation Activity

This section includes a discussion of air taxi and other, GA and military activity at ANC.

2.5.1. Air Taxi and Other

For the purpose of this analysis, the air taxi and other category includes traditional "for hire" air taxi and also includes non-commercial charter activity such as the flights operated by BP Exploration and Phillips Alaska.

The number of air taxi and other enplaned and deplaned passengers has changed little over the past 10 years (see Tables 2.2.2 and 2.2.3). These operations serve mainly the intra-Alaska market and are subject to the same economic and demographic forces that govern scheduled intra-state passenger activity. These passengers were therefore assumed to increase at the same rate as intra-Alaska originations. Air taxi and other enplanements and deplanements are projected to increase at approximately 0.9 percent per year as shown in **Table 2.5.1**.

Table 2.5.2 provides the forecast of air taxi and other aircraft operations. There has been little change in the aircraft used by this segment in recent years, nor are there published plans for a major turnover in aircraft among the air taxi operators at ANC. Consequently, air taxi and other operations were projected to increase at the same rate as air taxi and other passengers.

2.5.2. General Aviation

The GA projections developed in the Lake Hood and General Aviation Airport Master Plan were adapted for use in this study. The forecasts were developed in 2004 and used 2003 as the base year.

Table 2.4.18

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Unconstrained Demand Forecast of Air Cargo Aircraft Departures by Aircraft Type

	2005	2012	2017	2027
Intra-Alaska Departures				
PA-31 Piper PA-31 (Navaho)	12	0	0	0
PA-32 Piper	9	0	0	0
PC-12 Pilatus Porter PF-12	9	0	0	0
Piper PA-31T	5	0	0	0
T-1040 Piper	2	0	0	0
C-206/207 Cessna	1	0	0	0
C-208 Cessna	659	556	550	503
C-212 Aviocar Casa	1	0	0	0
C-402/A Cessna	391	3	6	8
C-9O Beech King-Air	736	1396	1780	1982
BCH 18 Beech	763	780	260	0
BCH 1900 Beech	2164	2283	2324	2392
EMB-120 Brasilia	572	1494	1696	1022
330/SD3-30 Shorts	187	55	10	0
SA-227 Fairchild	28	0	0	0
SC-7 Short Harland	53	28	2	0
SF-340 Saab-Fairchild	1	213	245	299
DHC-6 DeHavilland	1	0	0	0
F27/27B Fairchild	11	0	0	0
ATR-42 Aerospatiale	956	301	444	582
ATR-72 Aerospatiale		226	1781	3664
C-46 Curtiss	118	34	0	0
DC-6A Douglas	1872	1192	139	5
L-100-30 (L-382G) Hercules	618	553	399	241
727-100C/QC Boeing	904	0	0	0
737-200C Boeing	530	2620	1104	509
737-300 Boeing			1896	2864
737-400 Boeing	20	836	1213	1723
737-900 Boeing	1			
757-200 Boeing		2	2	29
Subtotal	10624	12572	13851	15823
International and Other U.S. Departures				
L-100-30 (L-382G) Hercules	3	0	0	0
DC-9-30 MD	2	0	0	0
DC-9-40 MD	42	0	0	0
737-200C Boeing	104	0	0	0
737-400	0	104	156	156
757-200 Boeing	9	0	0	0
DC-8-71 MD	6	0	0	0
DC-8-73F MD	4	0	0	0
A300-B4 Airbus Industrie	3	0	0	0
A310-200 Airbus Industrie	3	0	0	0
767-200 Boeing	0	69	73	136
767-300/ER Boeing	1502	1252	1252	1252
DC-10-10 MD	234	172	0	0
DC-10-30 MD	323	304	304	0
MD-11 MD	11131	11828	12518	11735
777 Boeing	0	7147	10307	16111
747-100 Boeing	804	0	0	0
747-200/300 Boeing	12183	7702	5114	469
747-400 Boeing	12248	21490	29164	43680
747-400 ERF	0	1772	3543	6150
747-800 Boeing	0	3339	7420	22527
A380	0	1617	2451	14945
AN-124 Antonov	17	38	118	216
Subtotal	38618	56834	72420	117377
Total	49242	69406	86271	133200

Sources: Table C.14 in Appendix C and HNTB analysis.

Table 2.4.19

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Unconstrained Demand Forecast of Air Cargo Aircraft Operations

	2005	2012	2017	2027
Intra-Alaska				
Departures (a)	10,624	12,572	13,851	15,823
Operations (b)	21,248	25,144	27,702	31,646
International and Other U.S. Departures				
Departures (a)	38,618	56,834	72,420	117,377
Operations (b)	77,236	113,668	144,840	234,754
Total				
Departures	49,242	69,406	86,271	133,200
Operations	98,484	138,812	172,542	266,400

(a) Table 2.4.18.
(b) Departures multiplied by 2.

Sources: As noted and HNTB analysis.

Table 2.5.1

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Demand Forecast of Air Taxi Passengers

	2005	2012	2017	2027	Average Annual Growth Rate
Intra-Alaska Originations (a)	513,230	547,229	554,579	623,962	0.89%
Enplaned Passengers (b)	100,261	106,903	108,339	121,893	0.89%
Deplaned Passengers (b)	99,801	106,412	107,842	121,334	0.89%
Transit Passengers (c)	202	160	135	97	-3.30%

(a) Table 2.3.2.
(b) Assumed to increase at same rate as intra-Alaska originations.
(c) Assumed to continue to decrease at same rate as domestic transit passengers over the past fifteen years.

Sources: As noted and HNTB analysis.

Table 2.5.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Demand Forecast of Air Taxi and Other Operations

	2005	2012	2017	2027	Average Annual Growth Rate
Enplaned Passengers (a)	100,261	106,903	108,339	121,893	0.89%
Air Taxi and Other Operations (b)	9,158	9,765	9,896	11,134	0.89%

(a) Table 2.5.1
(b) Assumed to increase at same rate as air taxi enplaned passengers

Sources: As noted and HNTB analysis.

The ANC GA operations forecasts assumed a gradual increase in aircraft utilization, based on national trends, for both ANC and those Lake Hood based aircraft that use the ANC airfield. The unconstrained forecast of ANC based aircraft was based on projected FAA trends, adjusted for the mix of aircraft at ANC. The GA Master Plan forecasts were compared with actual activity levels in 2005 to determine whether they were sufficiently accurate to be used without change or whether some adjustments were required.

Table 2.5.3 presents the forecast of GA activity at ANC. As shown, actual itinerant GA operations in 2005 were substantially lower than had been projected in the GA Master Plan. Part of the reason is that the GA Master Plan also included air taxi operations in the GA counts. In contrast to itinerant operations, local operations were slightly higher. The updated ANC GA forecast used in this study applies the growth rates from the previous to the most recent base year numbers. As shown, total GA operations are projected to grow from 39,685 in 2005 to 66,543 in 2027, at an average annual growth rate of 2.4 percent. It should be noted that these forecasts are unconstrained, and that the airfield, ramp and hangar facilities to accommodate this activity will be available. If this is not the case, the GA activity will occur elsewhere.

2.5.3. Military Activity

Table 2.5.4 presents the recommended forecast of ANC military aircraft operations. The forecast assumes a significant reduction in military operations as a result of the planned relocation of the Kulis Air National Guard to Elmendorf Air Force Base. As shown, annual itinerant military operations are projected to decline from 6,000 annual operations to 1,000 annual operations through the forecast period. Local military operations are assumed to remain constant at 14.

2.6. Forecast Summary

This section summarizes the passenger, cargo, and aircraft operations forecasts for ANC. Comparisons with previous Master Plan Update forecasts and the FAA's Terminal Area Forecast (TAF) are also provided. These forecasts are unconstrained and assume that there will be adequate airfield, terminal, and cargo facilities to accommodate the projected traffic.

2.6.1. Passenger Summary

Table 2.6.1 summarizes the demand forecast of annual passenger activity at ANC. The summary includes domestic, international, and air taxi and other passengers. Total annual enplanements are projected to increase from 2.4 million in 2005 to almost 3.6 million by 2027, an average annual increase of 1.8 percent and total deplanements are projected to increase by a similar amount. Consistent with historical trends, total transit passengers are projected to decrease at a slower rate from 477,049 in 2005 to 111,790 in 2027. Total inbound and outbound passengers are projected to increase at a moderately, at a 1.21 percent annual rate from 5.6 million to 7.2 million.

Table 2.5.3

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Demand Forecast of General Aviation Operations

	Lake Hood Forecast (a)		Recommended Forecast (b)		
Year	**Itinerant Operations**	**Local Operations**	**Itinerant Operations**	**Local Operations**	**Total Operations**
2003	70,723	181			
2005	*74,131* (c)	*183* (c)	39,477	208	39,685
2008	79,242	186			
2012	*87,187* (c)	*186* (c)	46,430	211	46,641
2013	89,173	186			
2017	*99,281* (c)	*187* (c)	52,870	213	53,083
2023	114,442	189			
2027	*124,550* (d)	*190* (d)	66,327	216	66,543
Average Annual Growth Rate					
2005-2027			2.4%	0.2%	2.4%

(a) Lake Hood and ANC General Aviation Airport Master Plan, 2004 draft.
(b) Assumed to increase from 2005 levels at same rate as GA Master Plan growth rates.
(c) Interpolated.
(d) Extrapolated.

Sources: As noted and HNTB analysis.

Table 2.5.4

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Demand Forecast of Military Operations

	2005	2012	2017	2027	Average Annual Growth Rate
Itinerant (a)	6,000	5,000	1,000	1,000	-7.82%
Local (b)	14	14	14	14	0.00%
Total	6,014	5,014	1,014	1,014	-7.77%

(a) Assumes Kulis Air National Guard will relocate to Elmendorf Air Force Base and relocation will be complete by 2017.
(b) Assumed to remain constant at 2005 levels.

Sources: As noted and HNTB analysis.

Table 2.6.1

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Annual Passenger Demand Forecasts

		Forecast			
	2005	**2012**	**2017**	**2027**	**Average Annual Growth Rate (c)**
		Passengers			
Enplanements					
Domestic (a)	2,257,141	2,612,254	2,774,080	3,373,042	1.8%
International (a)	45,719	60,800	69,300	90,000	3.1%
Air Taxi (b)	100,261	106,903	108,339	121,893	0.9%
Total	2,403,121	2,779,957	2,951,719	3,584,935	1.8%
Deplanements					
Domestic (a)	2,247,060	2,612,254	2,774,080	3,373,042	1.9%
International (a)	53,374	60,800	69,300	90,000	2.4%
Air Taxi (b)	99,801	106,412	107,842	121,334	0.9%
Total	2,400,235	2,779,466	2,951,221	3,584,376	1.8%
Transit					
Domestic (a)	75,099	59,377	50,206	35,894	-3.3%
International (a)	401,748	311,900	39,900	75,800	-7.3%
Air Taxi (b)	202	160	135	97	-3.3%
Total	477,049	371,437	90,241	111,790	-6.4%
Total Passengers (c)	5,611,474	6,134,593	5,905,783	7,180,998	1.1%

(a) Table 2.3.11.
(b) Table 2.5.1.
(c) Transit passengers counted twice, inbound and outbound.

Sources: As noted and HNTB analysis.

Figure 2.6.1 is a graphic presentation of the passenger forecast, and also provides a comparison with the TAF. The growth rates of the current passenger forecast are very similar to those of the TAF. The base year passenger numbers for the TAF are slightly lower because the TAF excludes non-revenue passengers and also excludes passengers in the air taxi and other category, such as those carried by BP Exploration and Phillips Alaska. Also note that the TAF does not include transit passengers, therefore the basis for comparison should be enplaned passengers.

2.6.2. Cargo Summary

Table 2.6.2 summarizes the air cargo tonnage demand forecasts. Total intra-state air cargo is projected to grow from 117,541 tons to 171,782 tons by 2027, with outbound cargo growing faster than inbound cargo. Total inbound and outbound non-Alaska air cargo, which is mostly international, is projected to increase at a very rapid rate from 5.6 million tons to over 20 million tons over the same period, an average annual increase of 6.1 percent. The growth in international air cargo has been and will continue to be fueled by increases in trade between North America and Asia, especially China. Combined domestic and international freight is projected to increase fourfold over the forecast period, from 5.1 million tons to 21.1 million tons. Most air cargo will continue to be transit, but there will also substantial increases in enplaned and deplaned air cargo.

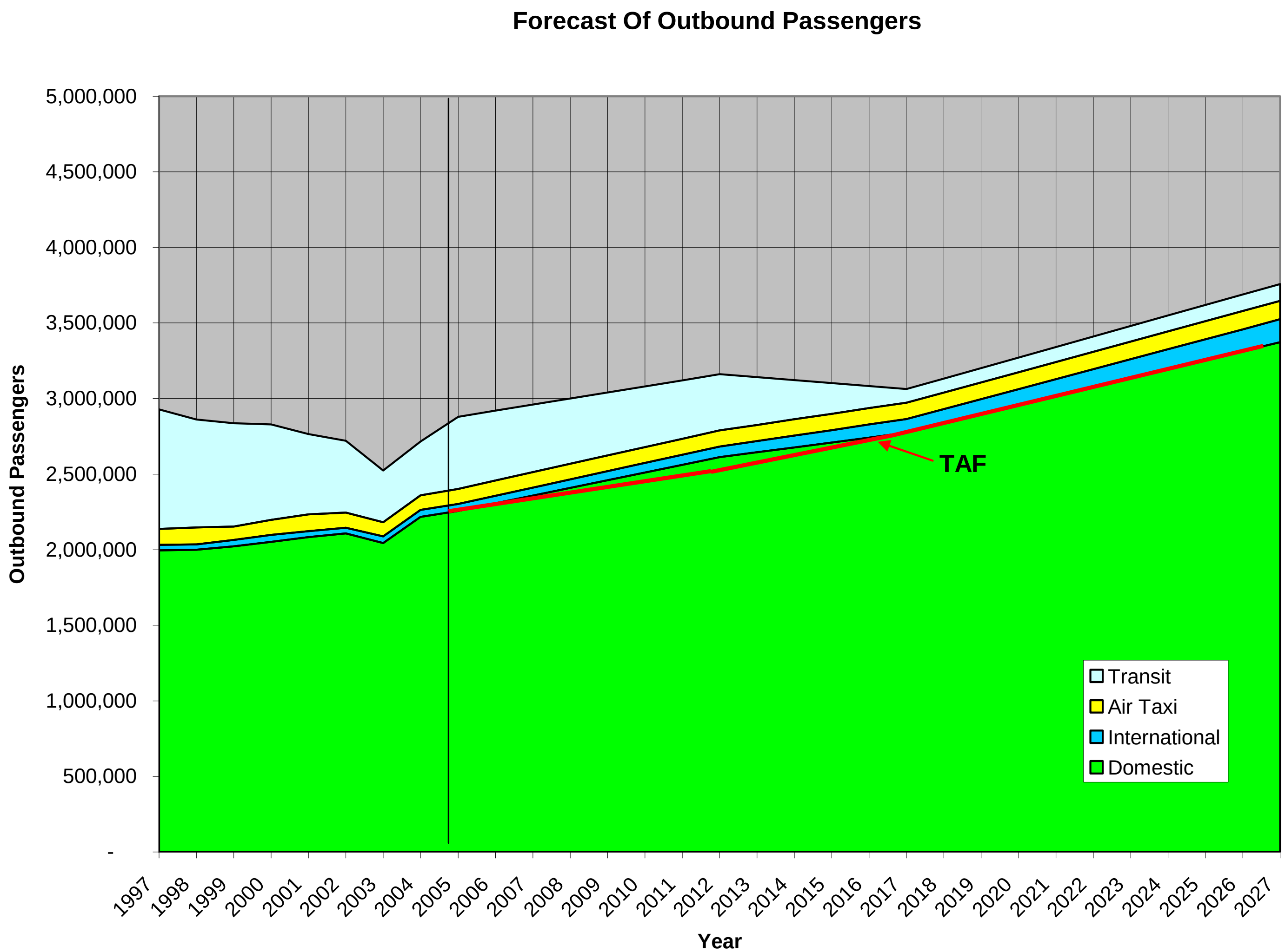
Figure 2.6.2 graphically presents the cargo tonnage demand forecast including intra-state and international enplaned, deplaned, and transit air cargo. The TAF does not provide a cargo tonnage forecast. Most of the increase in historical tonnage between 2004 and 2005 is attributable to the use the more comprehensive USDOT T100 data for 2005 tonnage numbers. The revised tonnage demand forecast is higher than earlier forecasts, but most of this increase is attributable to the higher base year level that reflects more comprehensive tonnage counts.

2.6.3. Aircraft Operations Summary

The demand forecasts of annual aircraft operations at ANC are summarized in **Table 2.6.3**. Passenger and air taxi operations are projected to increase at just under 1.0 percent per year. Assuming the Airport provides the required facilities, GA will increase at 2.4 percent per year. The greatest increase is projected among all-cargo operations, which are projected to increase from 40 percent of the total to 58 percent of the total by the end of the forecast period. The average annual growth rate in air cargo operations is projected to be 5.2 percent over the forecast period, moderating somewhat from the 6.3 percent average annual growth rate that occurred from 1990 to 2005. As shown in the tables, total annual ANC aircraft operations are projected to increase from 246,069 operations in 2005 to 461,37055,621 operations in 2027, an average annual increase of 2.98 percent.

Figure 2.6.1

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT



Source: HNTB analysis.

Table 2.6.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Enplaned, Deplaned and Transit Cargo Tonnage Demand Forecasts

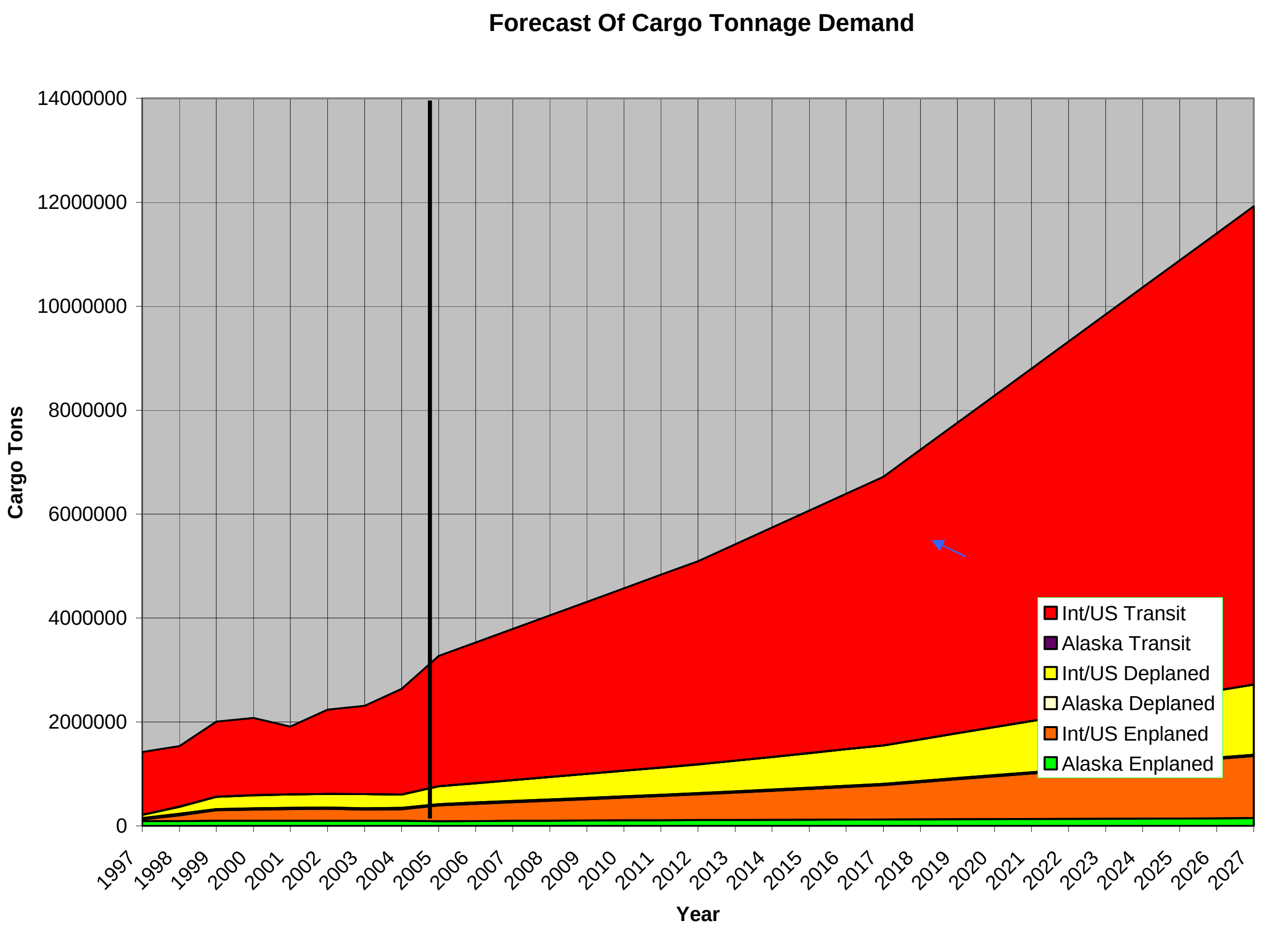
	2005	**2012**	**2017**	**2027**	**Average Annual Growth Rate**
Intra-Alaska					
Inbound	25,851	24,417	24,041	23,307	-0.5%
Outbound	91,690	112,840	123,650	148,475	2.2%
Subtotal	117,541	137,257	147,691	171,782	1.7%
Deplaned	25,609	24,269	23,916	23,217	-0.4%
Enplaned	91,671	112,692	123,524	148,385	2.2%
Transit	187	148	125	89	-3.3%
Subtotal (a)	117,467	137,109	147,565	171,692	1.7%
Subtotal (b)	117,654	137,257	147,691	171,782	1.7%
Other U.S. and International					
Inbound	2,857,910	4,465,702	5,906,614	10,527,759	6.1%
Outbound	2,802,418	4,400,219	5,833,245	10,426,586	6.2%
Subtotal	5,660,328	8,865,921	11,739,859	20,954,345	6.1%
Deplaned	340,706	552,978	741,939	1,347,417	6.4%
Enplaned	303,281	492,236	660,441	1,199,411	6.4%
Transit	2,187,256	3,910,354	5,168,739	9,203,758	6.1%
Subtotal (a)	2,831,244	4,955,567	6,571,120	11,750,587	6.2%
Subtotal (b)	5,018,500	8,865,921	11,739,859	20,954,345	6.1%
Total					
Inbound	2,883,761	4,490,119	5,930,655	10,551,065	6.1%
Outbound	2,894,108	4,513,059	5,956,895	10,575,061	6.1%
Subtotal	5,777,869	9,003,178	11,887,549	21,126,126	6.1%
Deplaned	366,315	577,246	765,855	1,370,635	6.2%
Enplaned	394,952	604,928	783,966	1,347,797	5.7%
Transit	2,187,444	3,910,502	5,168,864	9,203,847	6.1%
Subtotal (a)	2,948,711	5,092,676	6,718,685	11,922,279	6.1%
Subtotal (b)	5,136,154	9,003,178	11,887,549	21,126,126	6.1%

(a) Counts transit tonnage once.
(b) Counts transit tonnage twice.

Sources: Table 2.4.17.

Figure 2.6.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT



(a) This forecast represents the demand that would be realized at ANC without contraints, i.e. all runway, taxiway and other facilities would be constructed in time to avoid the level of delays that would cause air carriers to reduce operations at ANC.

Source: HNTB analysis.

Table 2.6.3

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Annual Aircraft Operations Demand Forecasts

		Forecast			Average Annual
	2005	2012	2017	2027	Growth Rate
Passenger Aircraft Operations (a)					
Domestic	86,618	92,020	94,869	106,478	0.9%
International	3,478	2,589	903	1,085	-5.2%
Charter	2,632	2,806	2,844	2,968	0.5%
Subtotal	92,728	97,416	98,615	110,530	0.8%
Cargo Aircraft Operations (b)					
Intra-Alaska	21,248	25,144	27,702	31,646	1.8%
Other U.S. and International	77,236	113,668	144,840	234,754	5.2%
Subtotal	98,484	138,812	172,542	266,400	4.6%
Other Operations					
Air Taxi and Other (c)	9,158	9,765	9,896	11,134	0.9%
General Aviation (d)	39,685	46,641	53,083	66,543	2.4%
Military (e)	6,014	5,014	1,014	1,014	-7.8%
Total Operations	246,069	297,647	335,150	455,621	2.8%

(a) Table 2.3.11.
(b) Table 2.4.19.
(c) Table 2.5.2.
(d) Table 2.5.3.
(e) Table 2.5.4.

Sources: As noted and HNTB analysis.

Figure 2.6.3 graphically depicts the aircraft operations demand forecast and compares the forecasts with the TAF. The current forecast of operations is higher than the TAF. If the forecast of international all-cargo operations were in line with the other operation categories, the current Master Plan operations forecast would be similar to the TAF. However, the current Master Plan forecasts international all-cargo aircraft operations to increase more than two and one-half times (see **Figure 2.6.4**) and this results in a major divergence from the TAF.

2.6.4. Certificated Maximum Gross Takeoff Weight

Table 2.6.4 shows estimated CMGTW for aircraft operations at ANC based on the fleet mix forecasts prepared for ANC. CMGTW is projected to grow much more rapidly than aircraft operations, principally because of the projected rapid growth in wide-body all-cargo aircraft. As shown, total CMTGW is projected to increase from 35.3 million in 2005 to 113.3 million in 2027, for an average annual growth rate of 5.2 percent.

2.6.5. Forecast Comparisons

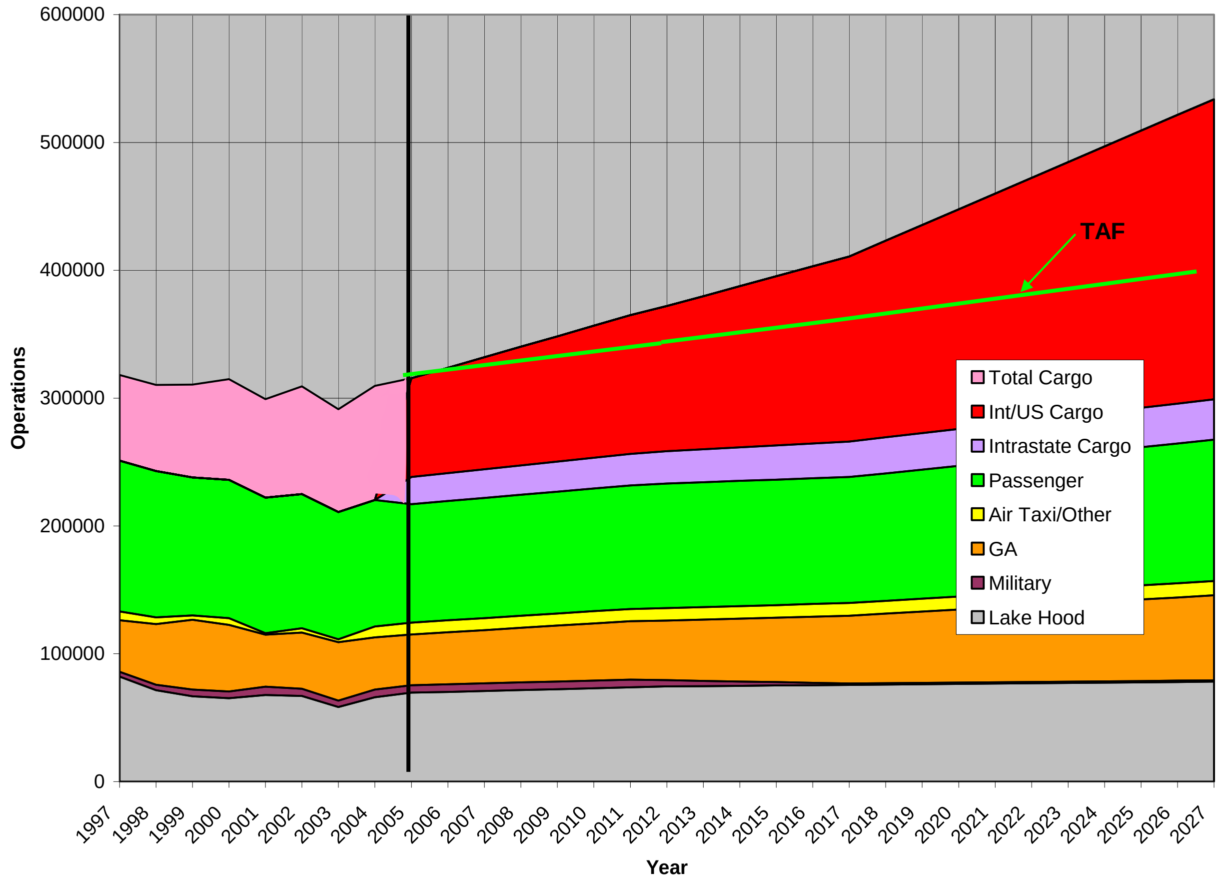
Table 2.6.5 provides a comparison of the current forecast with the previous Master Plan forecast. The revised passenger enplanement forecast is significantly lower than the earlier forecast, by 18 percent in 2005 and by almost 30 percent in 2020. The average growth rate is also lower (1.8 percent per year as compared to 3.4 percent per year previously.) The current Master Plan forecast is lower than the previous forecast in part because of the negative effects of the 9/11 terrorist attacks, the national economic recession in the first part of this decade, and because the cruise ship industry did not have as much of an impact on passenger enplanements as originally anticipated. The revised cargo tonnage forecast, in contrast, is higher than the previous forecast, because the cargo tonnage counts are now more comprehensive resulting in higher base year numbers. The revised average annual growth rate in cargo tonnage is slightly lower than the original growth rate (6.1 percent compared to 6.7 percent) mainly because industry forecasts of Asia-North America cargo are now slightly more conservative. The current forecast of aircraft operations is lower than the previous Master Plan forecast. Most of the difference is attributable to the passenger operations forecast. Actual passenger aircraft operations have trailed the original forecast because of lower than expected passenger enplanements and because of higher than projected load factors, which resulted in fewer aircraft operations per enplanement.

Table 2.6.6 compares the current Master Plan forecast with the TAF. As noted earlier, the passenger enplanement demand forecasts are very similar to the TAF. The main difference is attributable to the additional enplanement categories (non-revenue and air taxi and other passengers) that are not included in the TAF numbers. A separate comparison is provided that excludes air taxi and other passengers from the Master Plan forecast totals. Under this comparison, the two enplanement forecasts are within 10 percent of each other throughout the forecast period.

Figure 2.6.3

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Forecast Of Aircraft Operations Demand

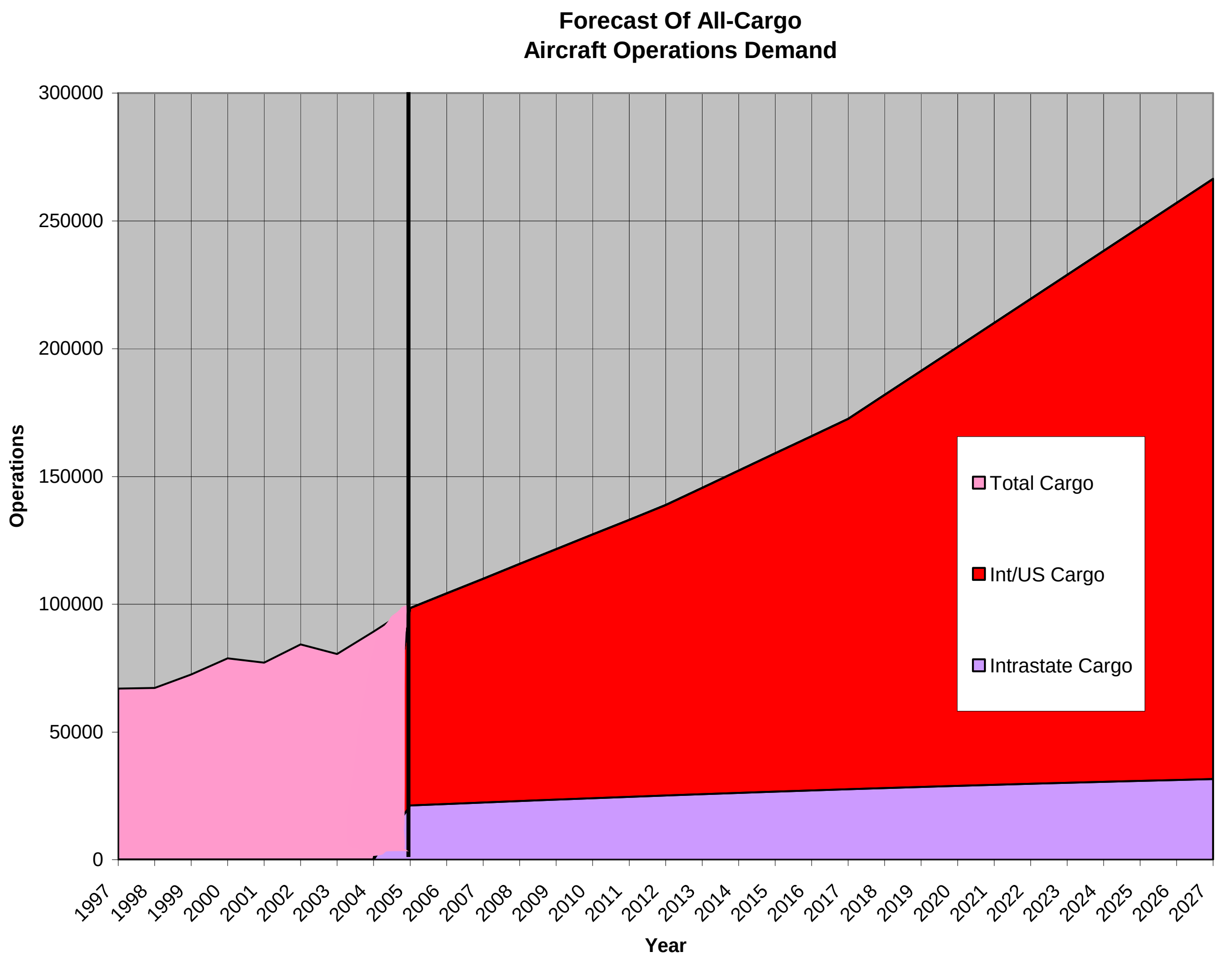


(a) This forecast represents the demand that would be realized at ANC without contraints, i.e. all runway, taxiway and other facilities would be constructed in time to avoid the level of delays that would cause air carriers to reduce operations at ANC.

Source: HNTB analysis.

Figure 2.6.4

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT



(a) This forecast represents the demand that would be realized at ANC without contraints, i.e. all runway, taxiway and other facilities would be constructed in time to avoid the level of delays that would cause air carriers to reduce operations at ANC.

Source: HNTB analysis.

Table 2.6.4

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Annual Certificated Maximum Gross Takeoff Weight Demand Forecasts

		Forecast			
	2005	**2012**	**2017**	**2027**	**Average Annual Growth Rate**
Passenger Aircraft Operations					
Domestic (a)	4,078,126	4,572,931	4,879,801	5,691,426	1.5%
International (b)	1,101,812	843,951	123,537	166,925	-8.2%
Charter (c)	89,080	103,757	110,855	137,580	2.0%
Subtotal	5,269,018	5,520,639	5,114,193	5,995,931	0.6%
Cargo Aircraft Operations (d)					
Intra-Alaska	635,609	789,900	869,192	1,049,823	2.3%
Other U.S. and International	29,240,999	45,834,159	59,947,075	106,016,320	6.0%
Subtotal	29,876,608	46,624,059	60,816,266	107,066,143	6.0%
Other Operations					
Air Taxi and Other (e)	174,858	186,442	188,946	212,585	0.9%
Total	35,320,484	52,331,140	66,119,405	113,274,659	5.4%

(a) Table B.8.
(b) Table B.9.
(c) Table B.10.
(d) Table C.16.
(e) Base year estimated by subtracting passenger CMGTW from total ANC count of passenger CMGTW. Assumed to increase at same rate as air taxi and other operations.

Sources: As noted and HNTB analysis.

Table 2.6.5

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Comparison with Previous Master Plan Update Forecast

Year	Current Forecast (a)	1998 Forecast (b)	Percent Difference (c)
Passenger Enplanements			
1997		2,119,692	
2003		2,740,000	
2005	2,403,121	*2,943,600* (d)	-18.4%
2008	*2,564,622* (d)	3,249,000	-21.1%
2012	2,779,957	*3,653,333* (d)	-23.9%
2017	2,951,719	*4,158,750* (d)	-29.0%
2020	*3,141,684* (d)	4,462,000	-29.6%
2027	3,584,935		
Average Annual Growth Rate	1.8%	3.4%	
Cargo Tonnage			
1997		1,822,444	
2003		2,399,700	
2005	3,269,437 (e)	*2,715,266* (d)	20.4%
2008	*3,953,315* (d)	3,268,100	21.0%
2012	5,092,676	*4,313,160* (d)	18.1%
2017	6,718,685	*6,101,279* (d)	10.1%
2020	*7,980,071* (d)	7,512,700	6.2%
2027	11,922,279		
Average Annual Growth Rate	6.1%	6.7%	
Aircraft Operations			
1997		231,562	
2003		263,200	
2005	246,069	*277,714* (d)	-11.4%
2008	*266,978* (d)	301,000	-11.3%
2012	297,647	*343,205* (d)	-13.3%
2017	335,150	*404,379* (d)	-17.1%
2020	*367,493* (d)	446,200	-17.6%
2027	455,621		
Average Annual Growth Rate	2.8%	3.0%	

(a) Tables 2.6.1, 2.6.2, and 2.6.3.
(b) Forecast prepared in 1998 and published in Ted Stevens Anchorage International Airport Master Plan Update, 2002.
(c) Current forecast less 2002 forecast divided by 2002 forecast.
(d) Interpolated.
(e) Based on T-100 data.

Sources: As noted and HNTB analysis.

Table 2.6.6

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Comparison With FAA Terminal Area Forecast

Year	Master Plan Forecast (a)	FAA TAF Forecast (b)	Percent Difference (c)
Passenger Enplanements (e)			
2005	2,403,121	2,208,119	8.8%
2012	2,779,957	2,468,138	12.6%
2017	2,951,719	2,737,212	7.8%
2027	3,584,935	*3,362,837* (d)	6.6%
Average Annual Growth Rate	1.8%	1.9%	
Passenger Enplanements (Not Including Air Taxi and Other Category) (f)			
2005	2,302,860	2,208,119	4.3%
2012	2,673,054	2,468,138	8.3%
2017	2,843,380	2,737,212	3.9%
2027	3,463,042	*3,362,837* (d)	3.0%
Average Annual Growth Rate	1.9%	1.9%	
Commercial Operations (g)			
2005	200,370	220,125	-9.0%
2012	245,992	237,200	3.7%
2017	281,053	254,568	10.4%
2027	388,064	*323,168* (d)	20.1%
Average Annual Growth Rate	3.1%	1.8%	
Total Aircraft Operations (h)			
2005	315,571	313,714	0.6%
2012	372,051	329,057	13.1%
2017	410,845	350,005	17.4%
2027	533,822	*429,718* (d)	24.2%
Average Annual Growth Rate	2.4%	1.4%	

(a) Tables 2.6.1, 2.6.2, and 2.6.3.
(b) FAA Terminal Area Forecast for ANC (Includes Lake Hood) February 2007.
(c) Master Plan forecast less TAF forecast divided by TAF forecast.
(d) Extrapolated.
(e) Master Plan base year enplanements differ because they include non-revenue passengers and air taxi and other passengers that are not included in T100 data.
(f) Master Plan Enplanements excluding air taxi and other category to facilitate comparison with TAF.
(g) Master Plan count of commercial operations does not include Lake Hood air taxi operations and therefore base year levels are less than TAF base year levels.
(h) Includes Lake Hood.

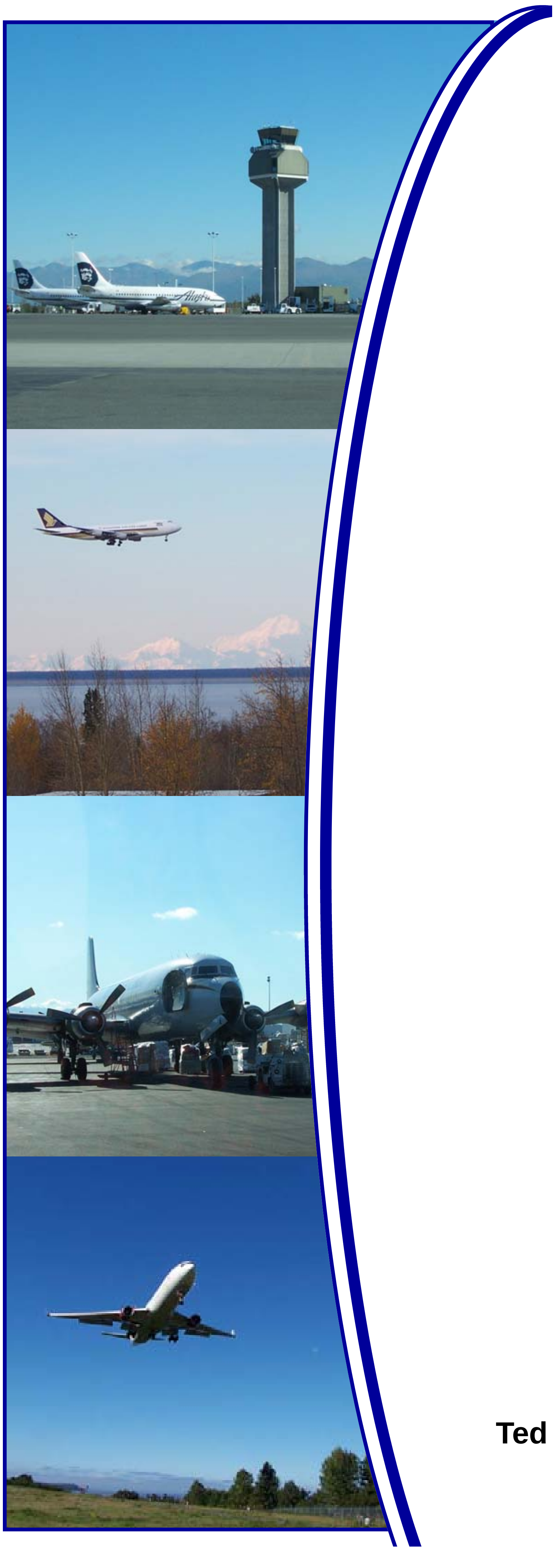
Sources: As noted and HNTB analysis.

Commercial operations for the revised Master Plan are not strictly comparable with the TAF because no separate forecast of air taxi operations at Lake Hood is available. Note that the FAA combines ANC and Lake Hood in their TAF projections. Consequently, base year commercial operations for the Master Plan are lower than for the TAF. Because of the rapid increase projected for international all-cargo operations, the Master Plan commercial operations forecast exceeds the TAF by 20 percent by the end of the forecast period. The TAF combines all-cargo operations with passenger operations in the air carrier and air taxi categories and therefore does not publish a separate forecast of cargo operations. The average growth rate in commercial operations is higher for the current Master Plan (3.1 percent) compared to the TAF (1.8 percent).

The differences in the forecasts of commercial operations carry over into the forecasts of total operations. As shown, total Master Plan operations exceed the TAF by 24 percent by the end of the forecast period, primarily because of all-cargo aircraft operations. Again, the current Master Plan growth rate in operations (2.4 percent) is significantly higher than the TAF growth rate (1.4 percent).

2.6.6. Summary

As noted earlier, the above demand forecasts are subject to political, economic and technological factors that are difficult to predict. Therefore, the forecasts should be monitored and compared to actual activity to identify any material deviations. Also, the implementation of new facilities should be tied to trigger levels to ensure that facilities are phased so that they come on line when needed and not too soon or too late. Finally, it should be reemphasized that these forecasts represent unconstrained demand. Therefore, if physical, financial, political, or environmental obstacles prevent the facilities required to accommodate this demand from being built, actual activity levels will be lower than shown in these forecasts.



Chapter Three: Facility Requirements

Chapter Three: Facility Requirements

Ted Stevens Anchorage International Airport
2008 Master Plan Study Report
January 2009

Ted Stevens Anchorage International Airport

2008 Master Plan Study Report

Chapter Three – Facility Requirements

January 23, 2009
Draft

AKSAS Project Number: 59585

Prepared for:
Alaska Department of Transportation and Public Facilities,
Ted Stevens Anchorage International Airport

Prepared by:
WHPacific
with
HNTB Corporation and DOWL Engineers

Update on Effects of Recent World Economic Events

The Master Plan Forecast of Aviation Activity for the Ted Stevens Anchorage International Airport is based on economic and airline projections in 2006. It was found to be technically valid by the FAA in March, 2007 based on industry information available at the time. The rise in crude oil prices to as high as $140 per barrel and other major economic events in 2007 and 2008 have dramatically changed and continue to affect the aviation industry. Not only have costs risen, the demand for commercial passenger and general aviation passenger as well as air cargo services has decreased. The outlook as of late 2008 is unclear.

Future aviation demand levels presented in Draft Chapter 2, Aviation Activity Forecast, were used as the foundation for the Draft Chapter 3, Facility Requirements and the Draft Chapter 4, Concept Development and Alternatives Evaluation. However, due to the current uncertainty of business costs and the general economic activity levels, it is expected that future demand levels will not materialize as soon as originally projected.

Therefore, the Airport intends to monitor the economic outlook and, at an appropriate time, start a Master Plan Update with a new or updated forecast and development timetable. Accordingly, working with airline partners, the Airport is deferring further planning of a new runway until the economic outlook improves.

Chapter Three - Facility Requirements

3.1. Summary and Introduction

This chapter describes the facilities required to accommodate the forecast demand at ANC over the course of the planning period—through 2027. Facility requirements were determined by comparing the aviation demand projections presented in Chapter Two with the capacity of the various functional airport areas, including:

- Airfield Facilities
- Terminal Facilities
- Air Cargo Facilities
- Roadway Access, Circulation, and Parking
- Support Facilities

Where appropriate, facility requirements are presented in phases corresponding to the horizon years 2012, 2017, and 2027 to ensure a logical future development sequence.

The facility requirements were developed at an airport master plan level of detail, not the level of detail suitable for an architectural or engineering design study. Specific facility needs are discussed in this chapter, while alternative methods of meeting these requirements are evaluated in subsequent chapters.

Key findings include:

- Substantial improvements to airfield facilities will be required to maintain acceptable delay levels at ANC.
    - A new north south runway is required to balance operations between the east-west and north-south runway complexes. This runway will be needed by 2012 to minimize peak hour delays. Additional runway capacity may be needed by 2017 to accommodate continued traffic growth.
    - Taxiway improvements will be required to help alleviate congestion on the airfield and provide improved access to and from the runways.

- As expected based on the airport activity forecast findings in Chapter 2, new facilities to accommodate the growth in air cargo at ANC have the greatest requirements.
    - Due to the continued growth in transit freight from Asia to North America, cargo apron area is the most demanding facility requirement other than airfield (runways/taxiway).
- Passenger growth through 2027 can be accommodated within the existing terminal facilities with improvements.
- International Airport Road and the terminal vehicle ramps will only need modest improvements to meet the 2027 requirement.
- Support Facilities: Additional sand/deicing chemical storage, maintenance vehicle storage, aviation fuel storage, and general aviation facilities will be needed within the planning period.

3.2. Limitations on Airport Growth

As noted in Chapter 2, Airport Activity Forecast, the demand forecasts for ANC are unconstrained. They assume that airport facilities will be in place to adequately accommodate the anticipated demand. This includes airfield facilities, terminal facilities, cargo facilities, and airport support facilities.

The boundaries of the airport, however, do present some limitations to physical growth. The ANC Master Plan Goals and Objectives identify the Airport's interest in planning improvements that generally remain within the existing boundary of the Airport and limit future land acquisition.

Lastly, the existing airspace was analyzed by FAA and document in the previous Master Plan and airspace constraints were identified, including the interaction between ANC and Elmendorf Air Force Base, the mountainous terrain, the local geography, and proximity of the Lake Hood sea plane base. These constraints have been accounted for in the updated capacity analysis.

3.3. Airfield Delay and Capacity

The purpose of this analysis is to determine the capacity of the existing airfield, and to identify potential need for improvements to meet long-term demand at Ted Stevens Anchorage

International Airport (ANC). The timing and need for additional improvements and alternatives for providing new capacity, where required, are evaluated in the alternatives analysis, the results of which are presented in Chapter 4.

Capacity is defined as the level of operations that yields an acceptable level of delay to the users of an airport. The acceptable level of delay varies by airport and is based on a number of factors including airline operations, the importance of the market served, and the overall ability of an airport to add capacity given financial, environmental, and political limitations that may exist. Acceptable delay can be defined on an annual or peak period basis, and both are discussed in this section.

3.3.1. Airfield Capacity Factors

The capacity of an airfield is influenced and determined by a number of factors, including aircraft separation, airspace limitations, weather, aircraft fleet mix, and runway and taxiway configuration and use.

Aircraft Separation

Separation between individual aircraft has a substantial impact on the capacity of both an airfield and the airspace serving the airfield. As a general rule, reduced separation will increase the capacity of an airfield; closer spacing means that more aircraft can use an airport during a specified time interval. Several factors determine the required minimum separation between aircraft, including prevailing weather conditions, flight rules, and the type of aircraft. These considerations help to ensure safe separation between aircraft.

Flight Rules and Weather Conditions

The flight rules that aircraft operate under have a direct impact on separation, and therefore on airfield and airspace capacity.

Aircraft operate under two distinct categories of operational flight rules: visual flight rules (VFR) and instrument flight rules (IFR). These flight rules are closely related to the two categories of weather conditions: visual meteorological conditions (VMC), and instrument meteorological conditions (IMC). VMC exists during generally fair to good weather, and IMC exists during times of rain, low clouds, or reduced visibility. IMC exists whenever visibility falls below 3 statue miles or the ceiling drops below 1,000 feet above ground level (AGL).

During VMC, aircraft may operate under VFR, and the pilot is primarily responsible for seeing other aircraft and maintaining safe separation. Aircraft operating under VFR typically navigate by reference to geographic and other visual references. Aircraft separation is reduced, and airspace and airfield capacity increases as a result.

During IMC, IFR is in effect for all aircraft - ATC is primarily responsible for separation of aircraft, and exercises positive control over aircraft. Aircraft operating under IFR must meet certain minimum equipment requirements. Pilots must also be specially certified and meet proficiency requirements. IFR aircraft fly assigned routes and altitudes, and use a combination of radio navigation aids and vectors from ATC to navigate. Aircraft separation is increased during IMC to a minimum of 3 nautical miles, since aircraft have a more difficult time seeing each other. As a result, airspace and airfield capacity is reduced.

Air carriers are typically required to operate under IFR at all times, regardless of weather. Many other aircraft also elect to operate under IFR. At a busy air carrier airport like ANC, the majority of air traffic operates under IFR. When weather permits, ATC will provide visual separation between IFR aircraft in order to increase airspace and airfield capacity. Visual approaches can be conducted at ANC whenever the cloud ceiling is at least 3,500 feet AGL and the visibility is 5 miles or greater.

Fleet Mix

Fleet mix affects aircraft separation requirements, and therefore has a substantial impact on airfield capacity. Separation between heavy, large, and small traffic is maintained to avoid wake turbulence from heavy jet traffic. Standard separation between two aircraft is 3 nautical miles, but this separation is increased in certain scenarios. As an example, small aircraft are separated from heavy aircraft, such as a B747, by six nautical miles. They are separated from B757 aircraft by five nautical miles.

It should also be noted that ANC experiences a high percentage of wide-body aircraft, specifically the Boeing 747, operating at the airport. Twenty percent of the aircraft operating at the airport in 2006 are heavy aircraft. This percentage increases through the forecast years to over 50 percent by 2027. Table 3.1 and Table 3.2 show standard VFR and IFR separation between aircraft. These separations were derived from ATC radar data and confirmed with FAA ATC personnel in 2006.

Table 3.1 VFR Separation (in statute miles)

	Trailing						
Leading	**SML**	**GA**	**MED**	**757**	**HVY**	**DC6**	**LRG**
SMALL	2.64	2.68	2.87	3.05	2.64	3.05	3.05
GA	2.64	2.68	2.87	3.05	3.27	3.05	3.05
MEDIUM	3.61	3.42	2.87	3.05	3.27	3.05	3.05
B757	3.61	3.42	3.82	4.21	4.1	4.06	4.06
HEAVY	4.96	5.09	4.55	4.84	4.1	4.84	4.84
DC-6	3.61	3.42	2.87	3.05	3.27	3.05	3.05
LARGE	3.61	3.42	2.87	3.05	3.27	3.05	3.05

Table 3.2 IFR Separation (in statute miles)

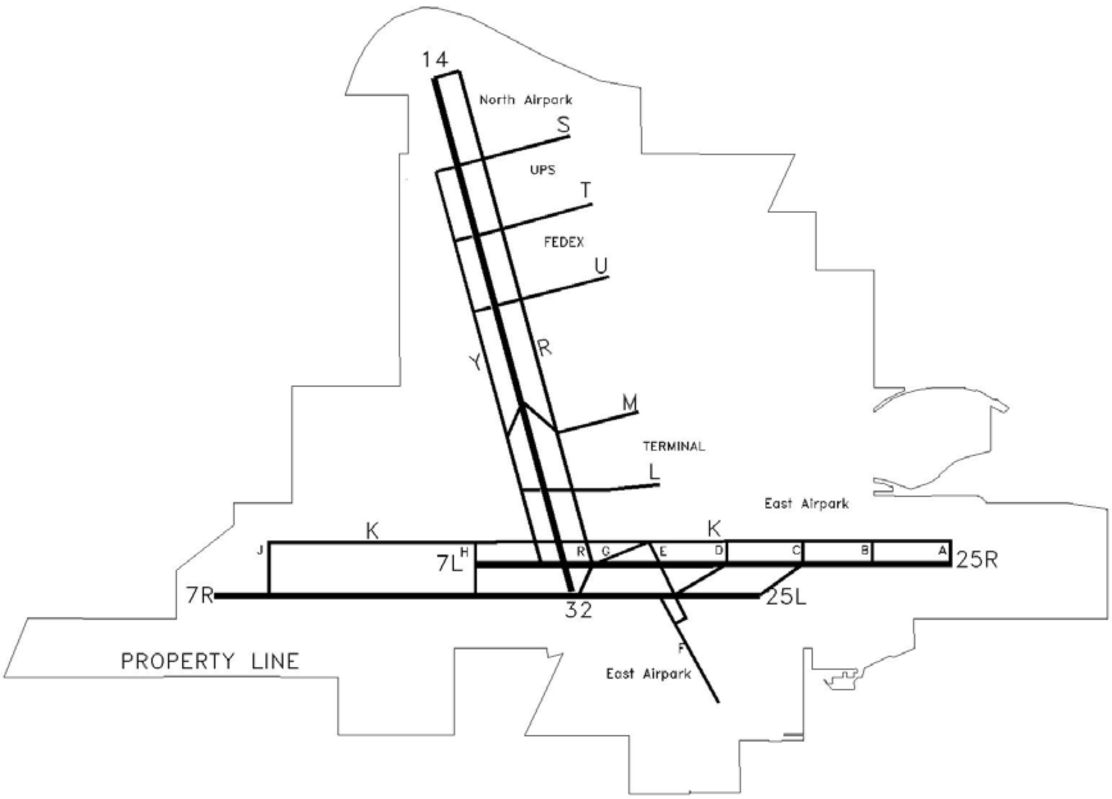
	Trailing						
	SML	**GA**	**MED**	**B757**	**HVY**	**DC6**	**LRG**
SMALL	3.86	3.82	3.94	4.2	4.43	4.2	4.2
GA	3.86	3.82	3.94	4.2	4.43	4.2	4.2
MEDIUM	4.82	4.82	3.94	4.2	4.43	4.2	4.2
B757	5.79	5.82	4.91	5.23	5.49	5.23	5.23
HEAVY	6.76	6.82	5.88	6.26	5.49	6.26	6.26
DC-6	4.82	4.82	3.94	4.2	4.43	4.2	4.2
LARGE	4.82	4.82	3.94	4.2	4.43	4.2	4.2

Faster aircraft must also be separated from slower aircraft in order to maintain the minimum separation standards. ATC will typically assign different arrival and departure routes and/or altitudes to segregate faster turbojet traffic from slower propeller-driven traffic.

Runway Layout

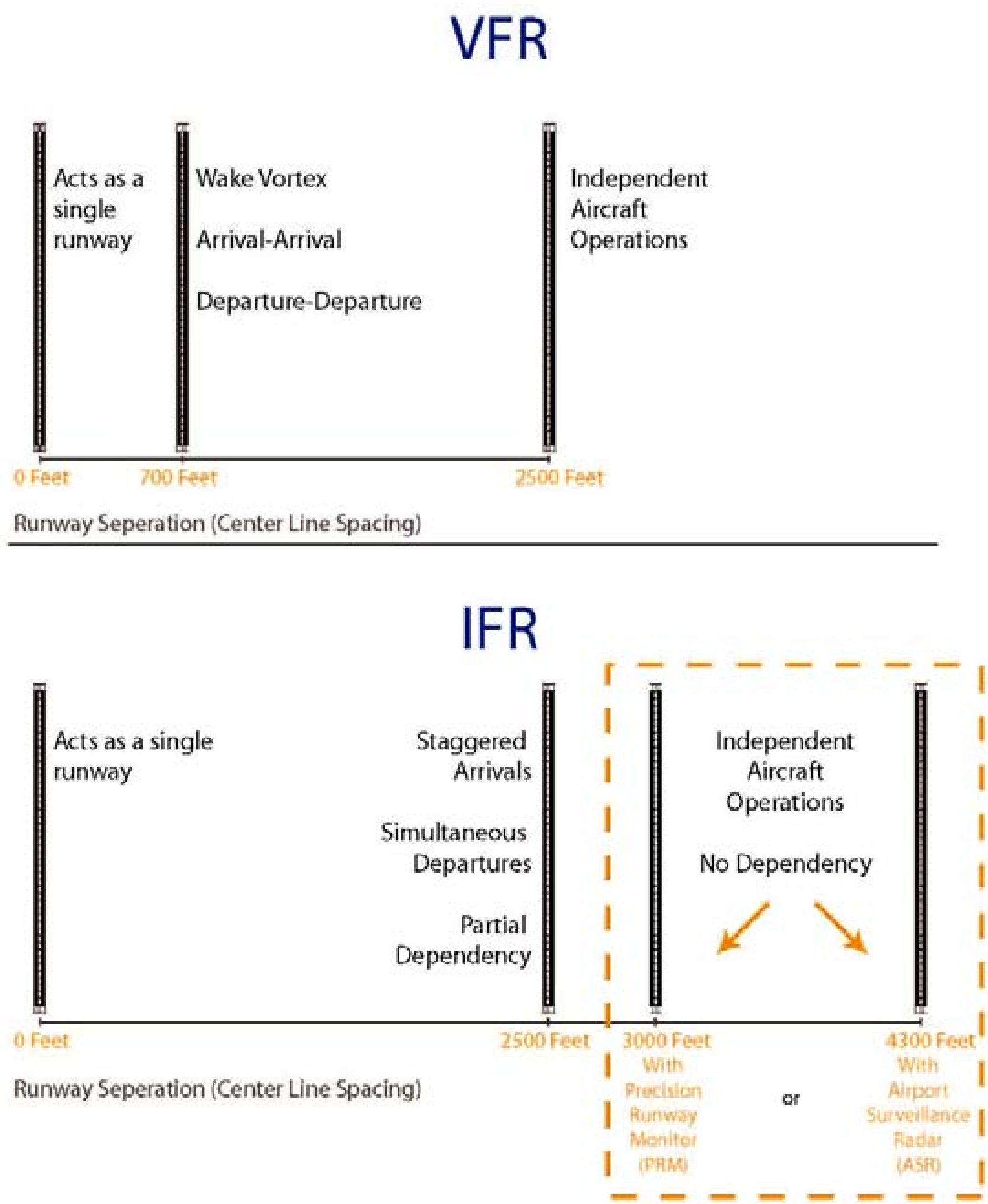
As shown in Figure 3-1, there are three active runways at ANC, as previously discussed. There is a single north-south runway (14-32), and two parallel east-west runways (7L-25R and 7R-25L) separated by 700 feet between their respective centerlines. Each of the three runways is capable of handling all types of aircraft that operate at ANC.

Figure 3-1 Existing Airfield



Separation distance between parallel runways impacts the capacity of runways. For aircraft operations to be totally independent on parallel runways, regardless of weather, they must be separated by 4,300 feet with an Airport Surveillance Radar (ASR) and 3,000 feet with a Precision Runway Monitor (PRM), under current FAA guidelines. As such, aircraft are dependent on the existing parallel runways at ANC, which, as mentioned above, are separated by 700 feet. In general, VFR operations on the parallel runways are independent unless one aircraft is heavy, in which case the operations become dependent. IFR operations are dependent regardless of aircraft size. An overview of the runway dependencies is depicted in Figure 3-2.

Figure 3-2 ATC Dependencies for Parallel Runways

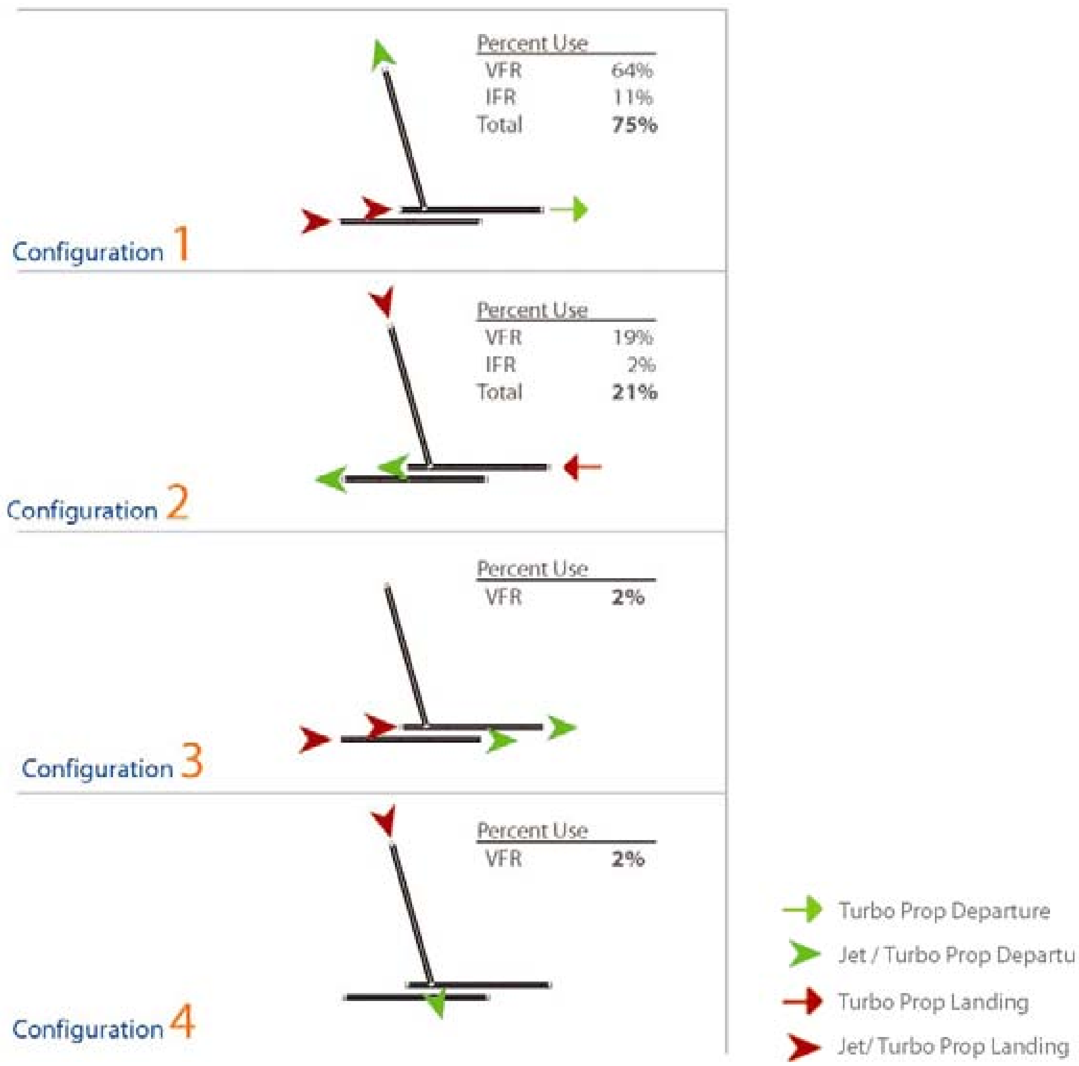


Runway Use

Runway use at ANC is determined by a number of factors, including prevailing winds and the preferential runway use plan. The preferential runway use plan is intended to reduce noise impacts on surrounding communities. Under the plan, aircraft take off and land over the water as much as possible in order to minimize over-flying residential areas. Therefore, departing aircraft use Runways 25L, 25R, and 32, while arriving aircraft use Runways 7L, 7R, and 14.

ATC will use the runway operating configuration that maximizes the capacity of the airfield and reduces noise impact when prevailing winds permit. As described in the inventory section ANC has three runways two east-west runways and a north-south runway. The airfield operates in numerous configurations based on situational or operational requirements. Based on FAA data it was determined that the airfield operated in fifteen different configurations between 2002 and 2006. For the purposes of simulation modeling typically only the most common configurations are analyzed. At ANC it was determined that four of the most commonly used configurations provided a good overall representation (~92 percent) of airport operations on an annualized basis. These configurations are depicted in Figure 3-3. The following briefly describes the typical operating parameter of each configuration.

Figure 3-3 Airfield Operating Configurations



Configuration 1 – Arrivals on Runway 7L and 7R and departures on Runway 32. Runway 7L is also used as a secondary departure runway as demand dictates. The 7L departures are typically intersection departures that are conducted by smaller propeller aircraft. This configuration was modeled in both VFR and IFR conditions. This configuration is used approximately 75 percent of the time (64% VFR, 11% IFR), on an annual basis.

Configuration 2 – Arrivals on Runway 32 and departures on Runways 25L and 25R. Arrivals are also conducted on Runway 25R as demand dictates in good weather conditions. This configuration was modeled in both VFR and IFR conditions. This configuration is used approximately 21 percent annually (19% VFR, 2% IFR).

Configuration 3 – Arrivals and departures on 7L and 7R. This configuration was modeled in VFR conditions only. This configuration is used approximately 2 percent annually.

Configuration 4 – Arrivals and departures on Runway 14. This configuration was modeled in VFR conditions only. This configuration is used 2 percent annually.

These configurations were reviewed for concurrence with the FAA in November 2006.

Airspace

The airspace structure developed for use during the previous Master Plan modeling effort was utilized for this update to the Master Plan. The link node network developed for the model was primarily derived from the Standard Terminal Arrival Routes (STARs), Departure Procedures (DPs), VFR arrival and departure routes and consultation with the FAA. Based on review with the FAA it was determined that the airspace generally remained the same. Minor modifications were incorporated into the model based on FAA input. One of the input requirements for the SIMMOD model (described below) is assignment of aircraft to arrival and departure airspace based on origin/destination. Data from the Airports ANOMS system was utilized to make these assignments.

Airspace interactions with Elmendorf are the greatest constraint at the present time. There are other airspace constraints in the area that have not become a major factor yet, but may become a factor in the future as traffic increases. These additional constraints include the mountainous terrain immediately east of the airport, and the VFR flyways, governed by FAR Part 93 (see Inventory Chapter) used by the high volume of general aviation traffic in the area. Options to change the VFR flyways are limited by the location of the existing airports and seaplane bases, the mountains, and the geography of Cook Inlet, which limits where single-engine aircraft are able to safely fly.

The above factors limit the number of options for multiple departure headings and multiple missed approach headings. Multiple departure headings and missed approach headings have not been a major issue at existing traffic levels. However, as the airport adds runways and/or additional NAVAIDs to improve airport capacity, the limitation of airspace options may become a factor.

3.3.2. Capacity and Delay Results

SIMMOD, the FAA's Airport and Airspace Simulation Model, was used to determine the existing and future delay levels for the existing airfield. Aircraft travel and delay times on the existing airfield facilities at ANC for current and future flight activity levels were evaluated. The existing conditions simulation will serve as the baseline model in which future improvements can be measured. For the purpose of analysis, the baseline model includes the proposed 1,540-foot westerly extension of Runway 7R.

SIMMOD is a useful tool for quantifying delay and capacity for an airport and airspace system given varying traffic levels, and for measuring the benefits of physical or procedural modifications. SIMMOD simulates the step-by-step movement of all aircraft, resolving conflicts and keeping track of the travel and delay time along each segment. SIMMOD then produces tabular results of aircraft travel and delay time, and displays an animation playback of the simulated activity.

The ANC simulation utilized the SIMMOD model that originated from the FAA Tech Center in 1999 and was updated for the 2002 Master Plan. The airfield and gates were updated based on the inventory of conditions in September 2006. ANOMS data from October 2005 to September 2006 were utilized to determine arrival and departure airspace gates. The overall airspace structure was reviewed with the FAA in September 2006. Other model inputs such as aircraft separations, runway exits used, and time distribution of variance from scheduled flight time were coordinated with the FAA.

Aircraft Schedule

A separate gated flight schedule for each forecast year was developed for the simulation model. These daily schedules shown below represent average day peak month (July) operations.

2006 – 841 daily operations

2012 – 922 daily operations

2017 – 1,042 daily operations

2027 – 1,408 daily operations

The gated flight schedule provides detailed information including arrival/departure time, aircraft type, origin/destination and gate.

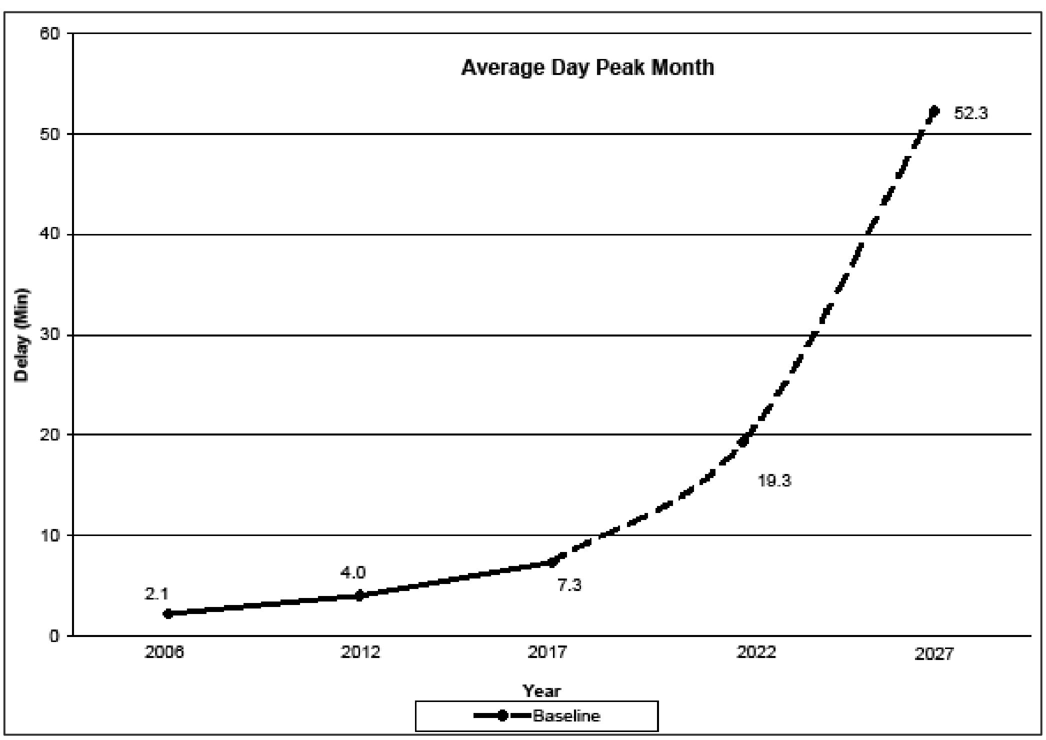
Annual Results

This section provides the average annual delay for the base year and each forecast year. These results are used to establish a baseline for annual delay for the existing airfield configuration with forecast levels of traffic in the three future years. Proposed capacity enhancements can then be evaluated for their ability to reduce delay, relative to the baseline for each of those future years.

The delays presented in Figure 3-4 for each configuration were based on modeling full daily schedule. To determine the average annual delay, the delays are multiplied by the percent time each configuration is operated, as shown in Figure 3-3. This delay value is more representative of how the airport typically operates throughout the year.

As depicted in Figure 3-4 the average annual delay is projected increases from 2.1 minute per operation in 2006 to 7.3 minutes per operation by 2017 without any airfield improvements. Since the existing airfield experiences gridlock at the 2027 demand level, the delay values for 2022 and 2027 were extrapolated. The extrapolated delay for 2027 is 52.3 minutes per operation. The airfield would be unable to sustain operations at this delay level.

Figure 3-4 Average Annual Delay



The FAA has not established a standard for acceptable delay levels at which an airport would be characterized as congested. However, the FAA report *Capacity Needs in the National Airspace System 2007-2025* considers an airport congested when average annual delays reach seven minutes per operation. At ANC, this is projected to occur between 2012 and 2017. Annual delay is one metric for measuring congestion while even without excessive annual delay, an airport may be congested during peak periods throughout the day.

Peak Hour Delays

Although annual average delay is a useful metric and will become an increasingly problematic delay issue at ANC, it is peak period delays that will drive the need for additional capacity in the immediate term. What is considered acceptable peak period delay varies by type of user. For example, domestic passenger carriers and GA traffic may have a relatively high tolerance for delay and have the flexibility to account for delays in their schedules. Conversely, the international cargo carriers have a lower tolerance for delay due to the schedule requirements to meet hub operations in the lower 48 states or landing and departure slots at Asian airports. Each cargo carrier has a different threshold of delay tolerance. Based on discussions with the cargo carriers at ANC, peak period delays of 30 minutes (arrivals or departures) on a regular basis would have a substantial impact on their operations. Likewise, peak period delays of 60 minutes or more would likely force carriers to consider shifting operations to a less congested airport.

Average and peak period delays for each configuration are provided in Table 3.3. To supplement this table are four graphics which provide demand, flow, and delay data for a 24-hour period. Demand, flow, and delay are described as follows:

Demand is the scheduled arrival and departure projections provided in the gated flight schedules.

Flow is the demand that is accommodated on the runway system. When the demand exceeds the flow (as shown in red), the flow represents the capacity of the airfield at that particular time for that fleet mix. As represented by the lower graph, delays begin to increase rapidly when demand exceeds the flow capability, or capacity, of the runway system.

Delay identifies how much additional time is required for every operation, on average, to absorb.

Table 3.3 Average Aircraft Delay (minutes per operation)

	Year	Arrival Delay	Arrival Peak Delay	Departure Delay	Departure Peak Delay	Average Delay
Configuration VFR – 1	2006	1.3	3.9	1.8	5.1	1.6
	2012	1.8	5.9	2.8	12.0	2.3
	2017	4.5	19.1	8.3	35.8	6.4
Configuration VFR – 2	2006	3.9	18.7	1.2	2.53	2.5
	2012	8.8	38.8	1.4	2.8	5.1
	2017	18.1	58.5	1.8	3.9	10.1
Configuration VFR – 3	2006	4.1	19.8	3.9	11.4	4.0
	2012	8.0	34.6	7.2	23.9	7.6
	2017	16.6	51.4	14.9	49.2	15.8
Configuration VFR – 4	2006	54.2	113.4	25.5	65.0	39.8
	2012	84	236.3	46.3	86.7	65.1
	2017	129.7	465.8	97.5	182.2	113.6
Configuration IFR – 1	2006	12.9	53.7	2.3	9.1	7.6
	2012	32.0	81.2	3.4	29.5	17.7
	2017	54.7	128.1	3.9	11.8	29.3
Configuration IFR – 2	2006	17.3	60.2	0.8	1.8	9.1
	2012	36.6	92.7	0.7	1.6	18.7
	2017	63.0	136.8	1.0	2.5	32.0

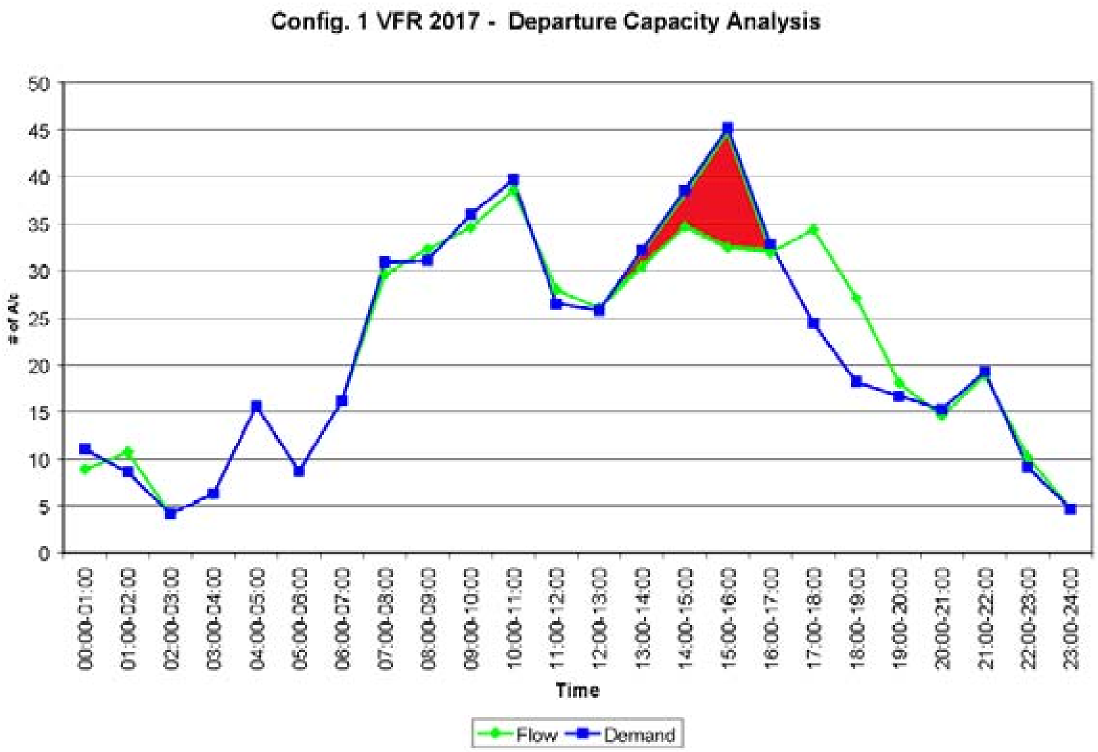
The imbalance of capacity in the north-south direction (one runway) with the capacity provided in the east-west direction (two runways) will have a substantial impact on delays.

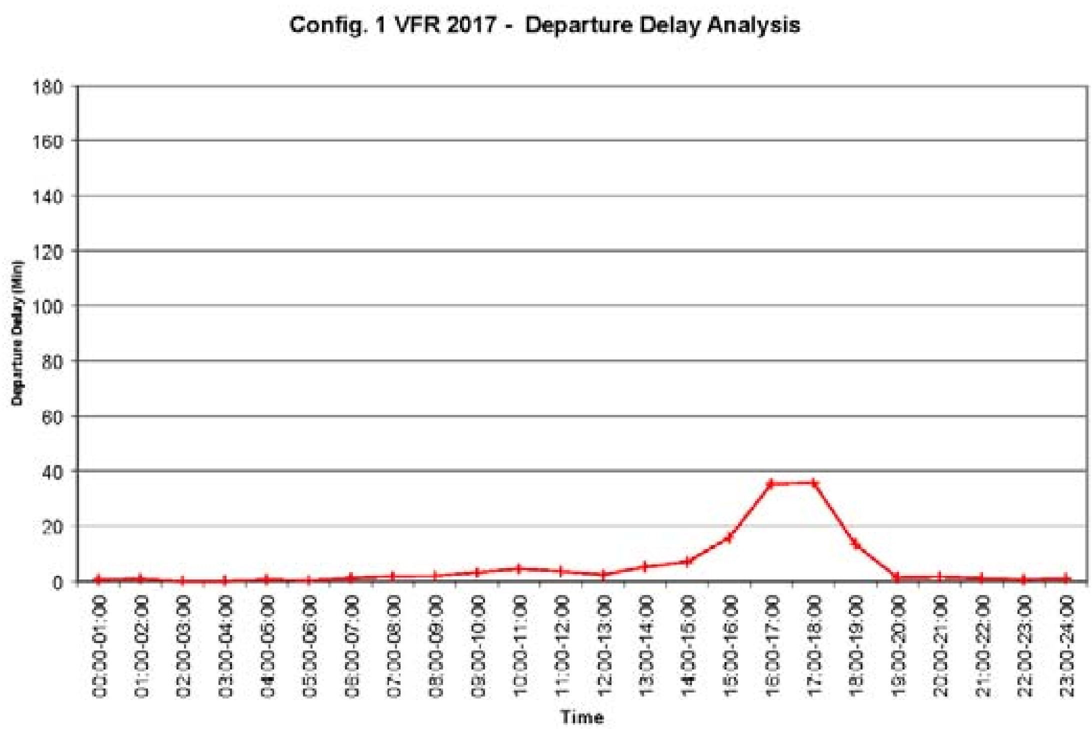
Based on the results, the following four key observations are made:

Configuration 1 and 2 provide the greatest capacity of the four configurations. As shown in the delay values, Configuration 1 provides greater arrival capacity and Configuration 2 provides greater departure capacity in VFR conditions. A review of peak hour arrivals and departures for these configurations confirm that the demand exceeds the airfield capacity by 2012.

Figure 3-5 depicts the departure demand verses the airfield flow for Configuration 1 for 2017. As shown, departure demand exceeds the capacity of the runway system starting at noon and will continue to do so for five hours. It will take approximately two hours to completely dissipate the queue. During peak periods, the departure delays will reach approximately 40 minutes. This type

Figure 3-5 Configuration 1 2017





of congestion will occur approximately 235 days per year by 2017. This reflects the airfield limitations of having only one primary departure runway in this configuration.

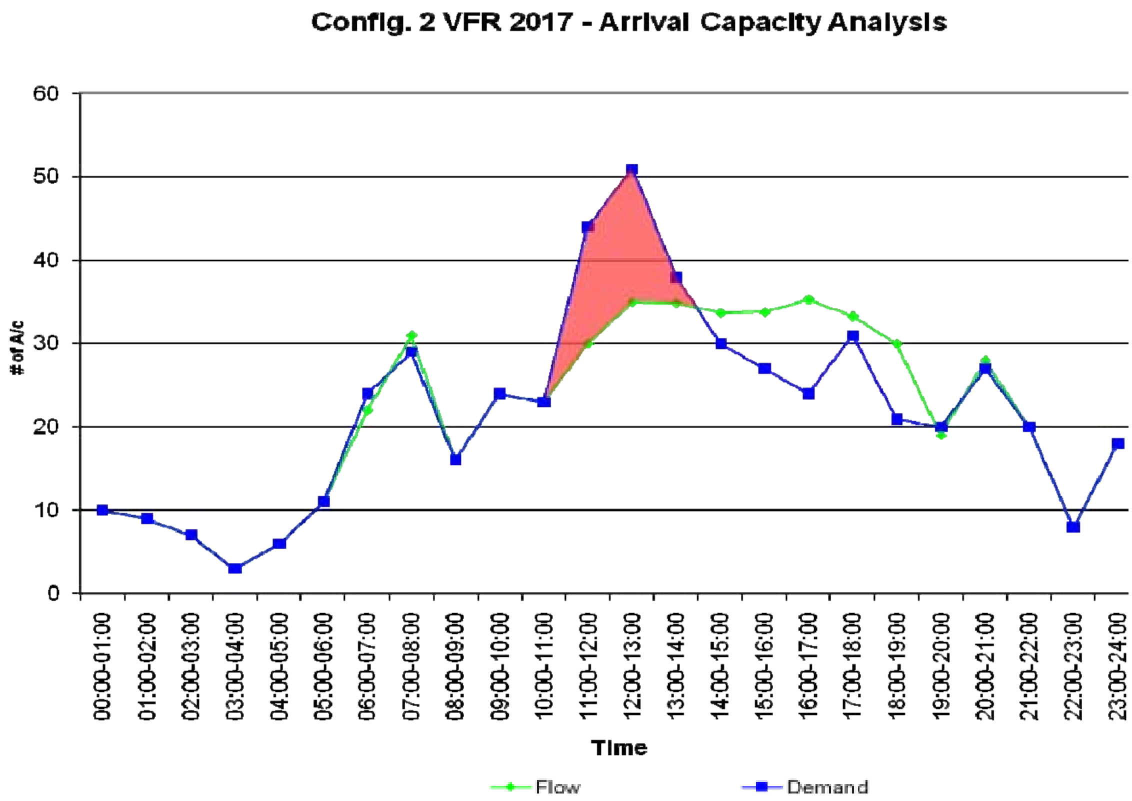
Likewise, Figure 3-6 depicts the arrival demand verses the airfield's flow for Configuration 2. Arrival demand will exceed the arrival capacity starting at approximately 10:00 am and will continue to do so until approximately 1:00 pm. However, even more critical than the departure capacity in Configuration 1, the arrival queues will not dissipate until almost 7:00 pm, and peak period delays will reach 60 minutes. This operating condition will occur approximately 76 days a year by 2017. This reflects the airfields limitation of having only one primary arrival runway in this configuration.

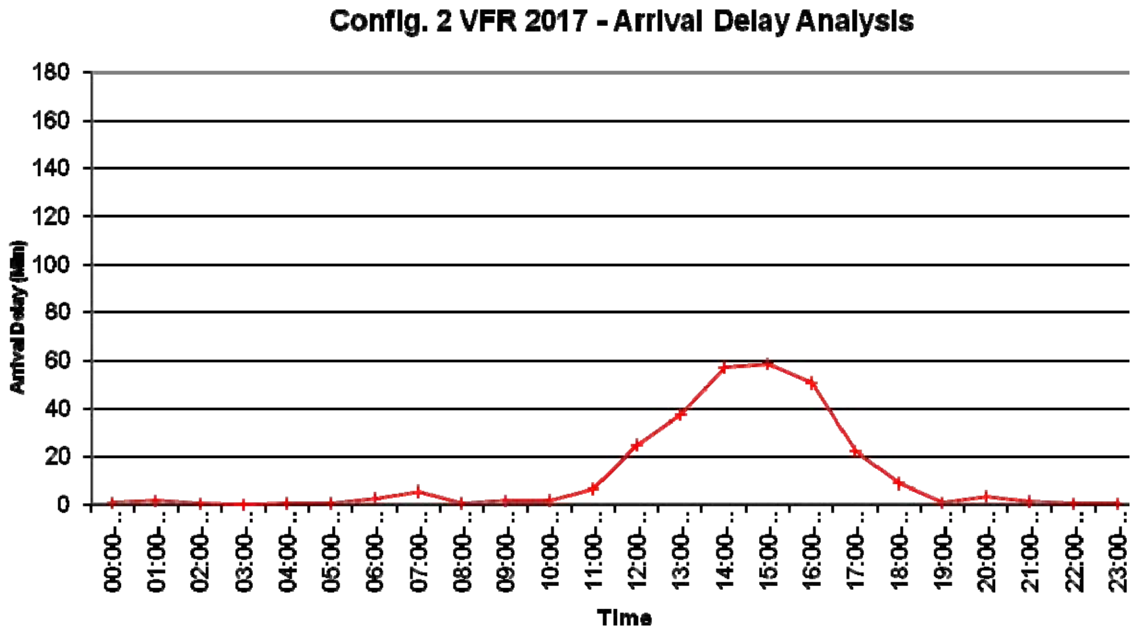
Looking at both Configurations 1 and 2, the airfield will be operating with peak period delays of approximately 32 minutes per arrival and 25 minutes per departure by 2017. This operating environment will occur approximately 311 days per year. On an average day, it will take between two and six hours to dissipate the arrival and departure queues.

By 2012, for a substantial portion of the year, demand will far exceed capacity and the resulting delays will force the carriers to cancel or reroute flights.

By 2012, the average peak period delays will be approximately 16 minutes for arrivals and 9 minutes for departures for a majority of the year (VFR Configurations 1 and 2). By all indications, both the passenger and cargo carriers will have the ability to adjust their schedule to operate within this environment. By 2012, the biggest challenge operationally for the carriers will be the approximate 50 days per year that the airport will be operating with substantial delays. This will occur when the airport is operating under IMC and IFR rules are in effect for all operations (approximately 12 percent annually) and when the winds dictate a north-south only operation (approximately 1 percent annually).

Figure 3-6 Configuration 2 2017





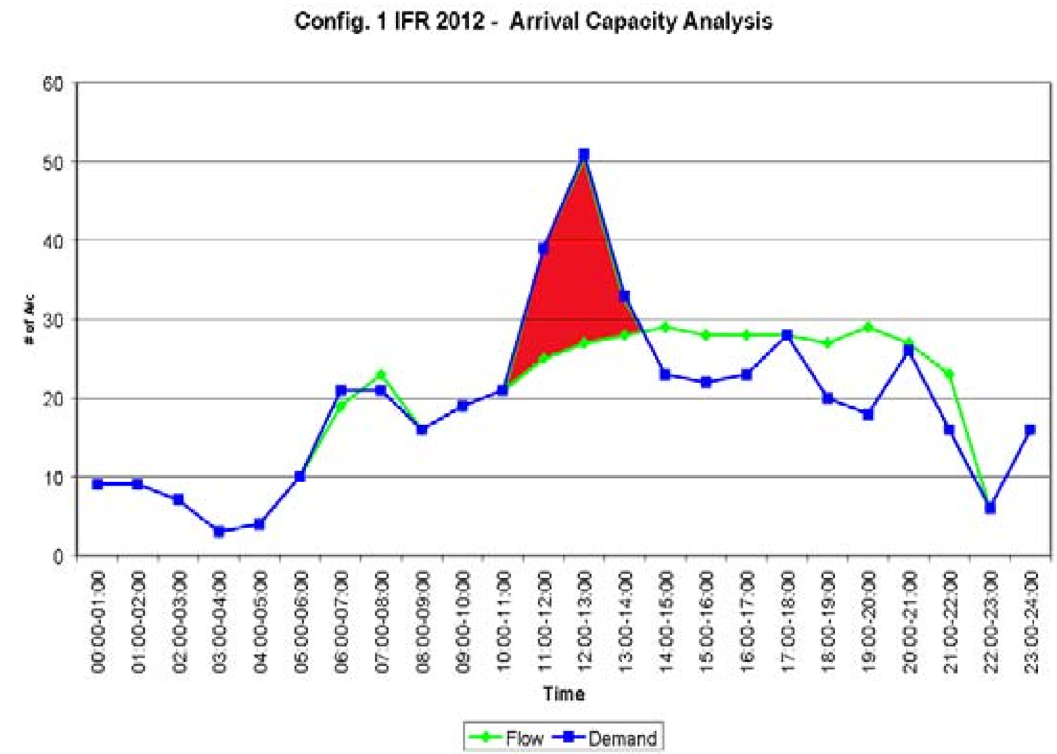
By 2012, IFR arrival delays will increase substantially over what are experienced today. As shown in Figure 3-7**,** due to the closely spaced parallel runways the capacity is greatly diminished during IFR conditions. Arrival demand will exceed the arrival capacity starting at approximately 10:00 am and will continue to do so until approximately 1:00 pm. The arrival queues will not dissipate until almost 10:00 pm, and peak period delays will reach 80 minutes. This operating condition will occur approximately 44 days a year by 2012.

The biggest capacity issue by 2012 will be when the airfield is operated on a single runway in the north-south only direction. This configuration will be required six to eight days per year. As shown in Figure 3-8, demand will exceed capacity for most of the day. Delays will start to increase early in the day and peak period delays will approach four hours for some arrivals. Arrival and departure queues will start early in the day and will not dissipate until early the next day. ATC would impose flow control into and out of ANC likely having the greatest impact on inbound flights. It is very likely that the carriers would be forced to cancel flights or over-fly ANC altogether.

In summary, the results indicate the following:

Without capacity improvements, the airfield will be operating at gridlock by 2017 and beyond. By 2012, the airfield will be operating in a congested environment and aircraft delays for some operating configurations will likely have a substantial impact on carrier operations.

Figure 3-7 Configuration 1 2012



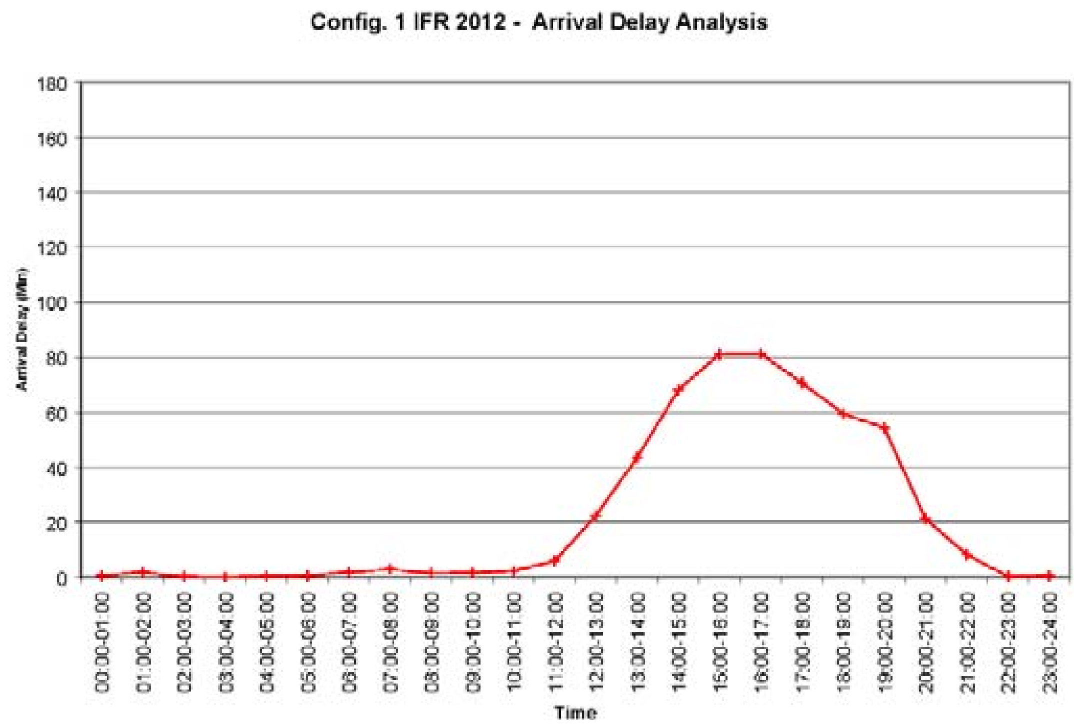
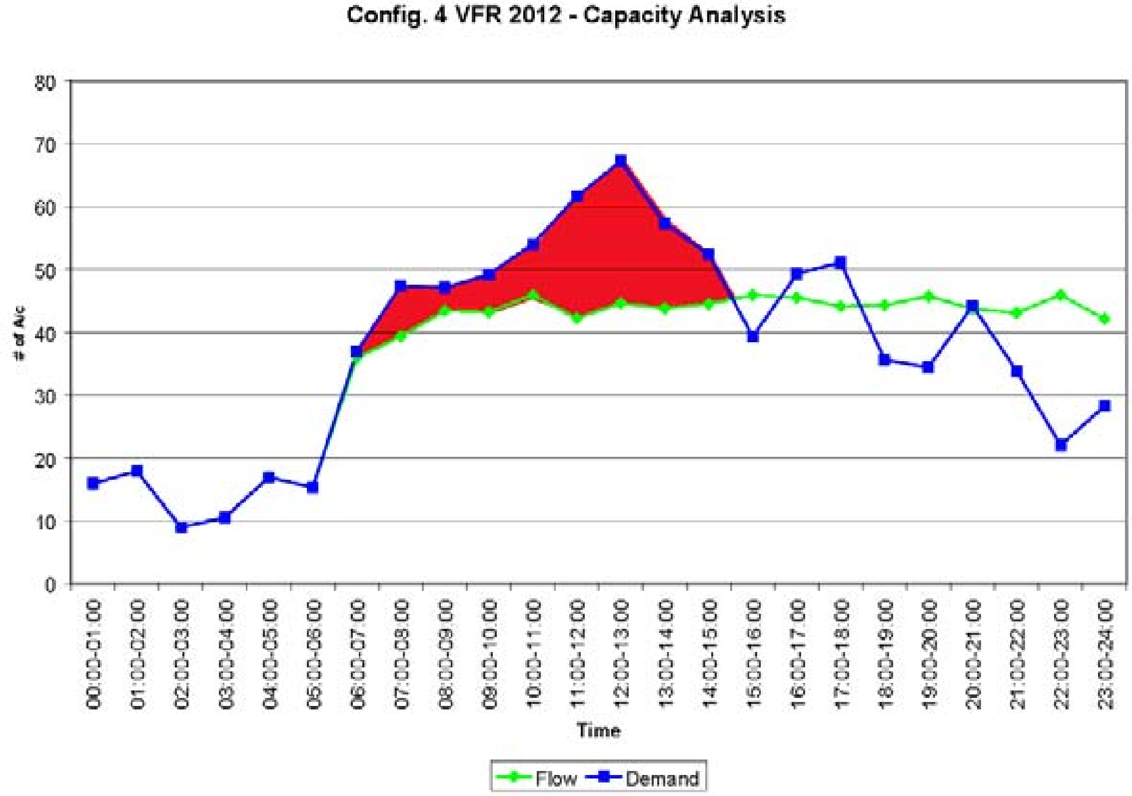
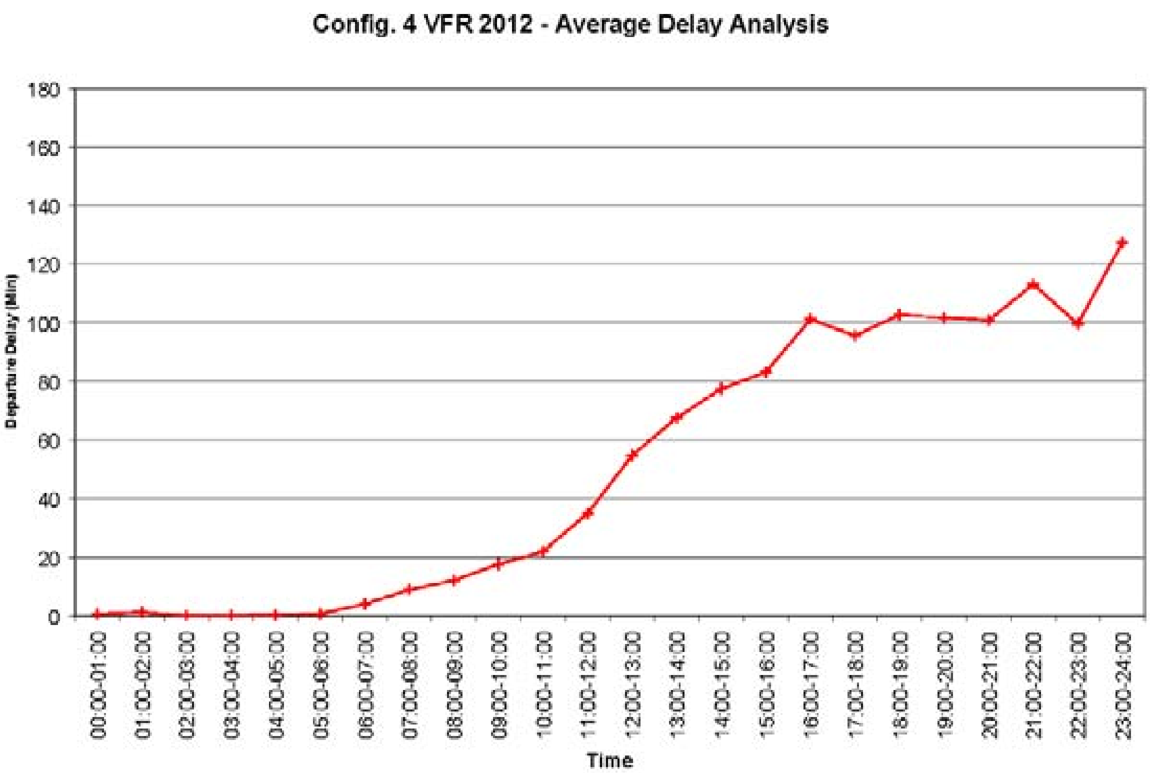


Figure 3-8 Configuration 4 2012





3.3.3. Annual Service Volume

Annual Service Volume (ASV) is an FAA capacity measure that provides a reasonable estimate of the capacity of an airport on an annual basis and is useful for long-range planning. FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, was used to estimate the ASV for ANC. The ASV can be exceeded, sometimes by substantial amounts, with corresponding increases in delay. ASV is calculated based on hourly capacity results and historical demand patterns. As total annual operations approach the ASV of an airfield, average annual delays increase rapidly with relatively small increases in aircraft operations.

The ASV for the existing airfield at ANC was calculated to be 390,300 operations. The ASV in 2027 is calculated to be 451,200 operations. Annual demand in 2025 is forecast to be 466,800 operations, indicating a possible need for additional long-range capacity consistent with the detailed airfield delay and capacity analysis provided above.

3.3.4. Conclusions

The results validate the recommendation in the 2002 Master Plan to add a second north-south parallel runway at ANC. This recommendation is on the currently approved ALP for the airport. A second north-south runway would balance capacity in the north-south direction with the east-west direction, and more importantly, add substantial capacity enhancement/delay reduction for three VFR operating configurations including Configurations 1, 2, and 4 and one IFR operating configuration, Configuration 1.

Chapter 4 – Alternatives will utilize a cost/benefit approach to determine the timing and need for the second north-south runway and evaluate alternative alignments. By 2012, the airfield will have substantial capacity/delay congestion for an ever increasing portion of the year. It remains to be seen whether or not the carriers can effectively operate in the 2012 capacity/delay environment. What is certain is that delays will begin to grow exponentially between 2012 and 2017. Considering the length of time required to plan, design, and construct a runway, the implementation process should begin immediately. Other non-quantifiable benefits to a new north-south runway that will need to be considered include the desire to maintain north-south capacity during snow removal operations and during periods when existing Runway 14-32 is closed for either routine or major maintenance.

The results also confirm from the 2002 Master Plan that IFR arrival capacity will be a major capacity constraint starting around 2012. Without improved flight procedures, technology, or new independent runways, IFR arrival capacity will be the factor that limits capacity and the ability to grow at ANC. There are technology improvements currently under study by the FAA that may increase IFR arrival capacity to close-spaced runways. The potential benefit of this new technology will be evaluated in the next chapter.

3.4. Airfield Requirements

3.4.1. Taxiway System Requirements

Taxiway requirements at ANC for runway-to-taxiway, taxiway-to-taxiway, and taxiway-to-fixed or movable object are based on Aircraft Design Group (ADG) V as defined in FAA AC 150/5300-13, *Airport Design*. Table 3.4 provides a summary of the separation standards for ADG V and ADG VI. As noted in Chapter 2, Airport Activity Forecast, ADG VI aircraft are forecast to use the Airport within the 20-year planning period. Therefore, ADG VI aircraft separation standards are recommended in those areas of the airfield accommodating ADG VI aircraft. There may be restrictions to the use of existing Taxiway K by ADG VI aircraft.

Table 3.4 Runway Dimensional Standards for Design Group V and VI Aircraft

	Design Group	
Category	**V**	**VI**
Runway Width	150 feet	200 feet
Runway Shoulders	35 feet	40 feet
Runway Blast Pad		
Length beyond runway end	400 feet	400 feet
Width	220 feet	280 feet
Aircraft Parking Limit Lines		
from runway centerline	500 feet	500 feet
Runway Safety Areas		
Length beyond runway end	1,000 feet	1,000 feet
Width	500 feet	500 feet
Runway Object Free Areas		
Length beyond runway end	1,000 feet	1,000 feet
Width	800 feet	800 feet

Source: AC 150/5300-13 with changes, HNTB analysis.

Existing runway-to-taxiway separation for Runway 14-32 and Taxiway R is 600 feet (50 feet greater than the standard for ADG VI). For Runway 7L-25R and parallel Taxiway K, the centerline-to-centerline separation ranges from 538 feet along most of its length, to 505 feet in the vicinity of the terminal.

The previous Master Plan and other studies recommended several taxiway improvements. Following are the previously recommended improvements and their current status.

Recommendation:

- A north-south taxiway (Taxiway Y) parallel to and west of Runway 14-32 was constructed to reduce head-to-head taxiing on existing Taxiway R.

Status

- Taxiway Y was completed in 2003 and is 506 feet west of Runway 14-32. Taxiway Y extends from Taxiway K to Taxiway S.

Recommendation:

- Convert Taxiway G, off 7R, to a true high speed exit to reduce runway occupancy time.

Status

- This project is designed and scheduled for construction.

Recommendation:

- Improve Taxiway E between 7R and 7L with better fillets and shoulders. Four-engine aircraft presently cannot use this taxiway because they blow too much gravel. These aircraft must use D instead, which requires a longer taxi if they are going to the international area, FedEx, or UPS facilities.

Status

- Fillet and shoulder improvements were completed on Taxiway E and this portion of the taxiway system can now accommodate four-engine aircraft. Further improvements to Taxiway E are planned.

Recommendation:

- Extend Taxiway F across the existing Runway 7-25 parallels. A significant volume of traffic taxis to and from the South Airpark, requiring head-to-head operations on Taxiway E. Extending Taxiway F would alleviate this operational constraint.

Status

- This project remains incomplete. The issue of congestion at this point of the taxiway system still exists and this project is still recommended for implementation. It is not currently budgeted with ANC's capital improvement program.

Recommendation:

- Improve high-speed taxiway exits for Runway 14 arrivals to reduce runway occupancy time. An angled taxiway is being constructed with the new north-south parallel taxiway. A second high-speed taxiway to the east is recommended.

Status

- This project is partially completed. A high-speed angled taxiway was constructed along with parallel Taxiway Y. A second high-speed exit taxiway is still recommended, and remains incomplete, for the west side. The angled taxiway is recommended to be located south of the existing angled taxiway providing a connection to Taxiway L for Runway 14 arrivals to reduce the number of turn for aircraft arriving at the terminal area or the R spots.

Recommendation:

- Re-open old Taxiway D, which was between current D and E along 7L. This taxiway could be used for 7L intersection departures by air taxis and other small commuters while keeping Taxiway D open for arrivals, and Taxiway E open for aircraft taxiing to the South Airpark.

Status

- This project was not completed is no longer recommended.

Though these previously recommended improvements will help alleviate some congestion at ANC, the SIMMOD model has highlighted areas of congestion on the airfield that are likely to develop or worsen during the planning period.

Taxiway K / Taxiway R Intersection and Terminal Area

During Configuration 1, when only one departure runway is available (Runway 32), aircraft awaiting departure must queue on either Taxiway K or Taxiway Y. Though aircraft departing from the cargo facilities at the north end of Taxiway R can cross Runway 14-32 and queue on Taxiway Y, aircraft departing from the terminal area, the facilities along Taxiway K, or from the South Airpark must queue on Taxiway K. These aircraft congest the taxiways and taxilanes in the vicinity of the terminal area and delay arriving aircraft from reaching their gate positions at the ramp areas along Taxiway R. Where feasible, traffic should be diverted from the areas near the intersection of Taxiways R and K. ANC is currently constructing a taxiway extension from the "R" spots to Taxiway K. This improvement may help alleviate some of the aforementioned congestion.

Development of West Airpark

ANC is currently making improvements to allow development of additional aircraft apron and parking areas for future international air cargo facilities at the west end of Taxiway K. This area, known as West Airpark, would be accessed from Taxiway K. The SIMMOD model shows that in future years, substantial delay would result without an additional access route to the proposed West Airpark, as aircraft arriving on Runway 7L or Runway 7R would be required to cross Runway 14-32 to reach West Airpark, based on existing airfield geometry. Improved access and circulation to these areas is recommended.

South Airpark

Continued development of South Airpark and the potential redevelopment of Kulis ANG base as a cargo, general aviation, or commercial facility will result in increased congestion at Taxiway E, the only existing access point to South Airpark. At the current time, there is no east-west taxiway system south of the east-west runways. Improved access and circulation to these areas is recommended.

Taxiway K and East Airpark

It is recommended that improvements to Taxiway K continue. Further evaluation of east-west taxi routes in the vicinity of East Airpark should be evaluated to provide additional east-west taxi capacity. These evaluations should be considered along with east-west taxi route development south of the parallel east-west runways.

Cargo Facility Development

The Airport's cargo facilities are heavily concentrated along Taxiway R. More than ten aprons for transit cargo exist in the terminal area at the south end of Taxiway R, while FedEx, UPS, and the North Airpark are all accessed via the northern half of Taxiway R. As noted above, congestion has been a problem at the intersection of Taxiways R and K, which is exacerbated by the concentration of cargo facilities accessed from Taxiway R. It is recommended that future cargo expansion be dispersed to other areas of the airport and that an analysis is conducted to determine potential taxi time and delay savings.

3.4.2. NAVAID Requirements

The Airport's existing and planned complement of navigational and visual landing aids, described in the Master Plan inventory, provides adequate air navigation capabilities to all aircraft. Following is a brief summary of existing NAVAIDs and recommendations for upgrades. The recommendations also incorporate input from ATC staff.

- Runways 7R and 14 are each equipped with ILS. Runway 7R has Category I, II, and III A/B ILS approaches. The Category III approach to Runway 7R permits landings down to 600 feet RVR. Runway 7R also has a VOR/GPS approach and an NDB approach.
- Runway 14 has a Category I ILS approach and a GPS approach.
- Runway 7L has a published GPS approach, an MLS approach, and a Category I ILS approach.
- Runways 7R, 7L, and 14 are equipped with PAPIs, while Runways 25L and 32 are equipped with 6-box Visual Approach Slope Indicators (VASIs). Runway 25R has 4-box VASIs.

Simultaneous independent landings cannot occur on the existing parallel runways during IMC due to the 700-foot separation of these runways.

Consideration should be given to establishing ILS capabilities on any new runways developed at ANC. Additional precision approach capability would be required at ANC throughout the planning period to accommodate forecast operations since airfield capacity is currently, and would be in the future, most constrained during IMC. It is recommended that ANC conduct an evaluation of additional instrument approach capability on existing and any proposed new runways. The exploration of existing NAVAID technology and next-generation technology should be considered. Existing technology to consider includes Simultaneous Offset Instrument Approaches (SOIA). Further, consideration should be given to implementation of newer technologies such as Required Navigation Performance (RNP) and Automatic Dependant Surveillance System-Broadcast (ADS-B).

3.5. Terminal Facility Requirements

The terminal building includes all the functions necessary for the normal processing of passengers and their baggage, plus typical passenger conveniences and airline and airport operational spaces. Terminal building functions include the following:

- Ticket counters, queuing, and circulation
- Airline ticket offices
- Baggage claim and circulation
- Baggage service offices
- Outbound baggage make-up
- Inbound baggage drop
- Airline operations areas
- Aircraft parking positions
- Departure lounges
- Passenger screening checkpoint(s)
- Explosive Detection System (EDS) for baggage screening
- Concourse circulation
- Concessions
- Federal Inspection Services (FIS) facilities
- Restrooms
- Loading dock

- Building maintenance and storage
- Mechanical and electrical spaces
- Miscellaneous, such as airport administration spaces, and non-public circulation

3.5.1. Facility Planning Factors

Forecasted passenger volumes can be used to estimate passenger terminal facility requirements through the use of "planning factors." Planning factors are "units of facility," such as square feet or linear feet, to adequately serve a "unit of demand," such as a particular type of passenger. Planning factors are typically used to appropriately size each of the terminal components listed above. For the purposes of this analysis, most detailed planning factors will only be qualitatively assessed and terminal facility requirements will be presented only for the following terminal area quantities:

- Total Number of Aircraft Gates
- Gross Square Footage of Public Areas
- Gross Square Footage of Non-Public Areas

Planning criteria are based on ANC's existing facility conditions at Concourse C. That is, the level of service at Concourse C is to be maintained for future terminal facilities at ANC. This is due to the modern nature (circa 2004) of the South Terminal addition and its associated concourse. Requirements are based on the aviation demand forecast for passenger traffic during an average weekday during the peak month as presented in Chapter 2 – Aviation Demand Forecasts.

Planning criteria also determine the estimated capacity of the existing terminal buildings and determine the approximate demand level at which they will no longer function at a high level of service. As passenger traffic continues to grow at ANC, it is recommended that more detailed analysis of the passenger terminal facility requirements be conducted to determine which specific passenger processing components, such as the security checkpoints, may fail to function at a high level of service during the planning horizon.

3.5.2. Terminal Facility Considerations

Airline functions include ticketing, baggage handling, airline operations, and departure lounges. The cumulative size of the spaces depends on individual airline requirements, but, on average, can be projected based on peak hour and annual passenger traffic.

Industry trends show an increased use of electronic check-in equipment or home check-in which may result in greater counter efficiency and thereby reduce the overall ticketing and check-in facility requirements in the future.

Explosive detection system (EDS) space typically assumes an in-line system conservatively estimated as equal to the area of the outbound baggage area. However, future technology may develop more space-efficient systems. ANC currently has a fully integrated in-line EDS in the South Terminal. North Terminal renovations are required to provide a fully integrated in-line EDS system matching the high level of service in the South Terminal.

The baggage claim area at the North Terminal is undersized for a higher peak hour utilization of the terminal for domestic arrivals. Reconfiguration of the existing space and potential expansion should be considered as the facility’s use as a domestic terminal increases in future years.

The Anchorage, Alaska market is unique in its remoteness and its appeal to adventure travelers. Thus, ANC terminal facilities should generally be planned to provide a greater volume of space per passenger to accommodate higher then average checked and carry-on baggage sizes, larger travel parties, and a high peak travel season tourist population that surges in summer.

Aircraft gate positions are based on the forecast aircraft gate mix and do not include remote parking positions, which, in the Anchorage climate, are not considered a viable option for domestic passenger boarding functions. Ground loading of turbo-prop aircraft used to service south-central Alaska regional markets is assumed to continue.

Departure lounges are factored into the gross square footage of the facility requirements. It is assumed that the passenger lounges within the North Terminal are large enough to accommodate domestic flights due to the terminal’s historic ability to accommodate wide-body international flights.

Typically, planning factors for food/beverage, news/gift/sundry, and other concessions would be based on annual enplanements. However, for the purpose of this analysis, concessions space is included within the public space of the airport terminal facilities.

Analysis of facility requirements for processing facilities for international arriving passengers is not specifically included in this analysis. However, it is assumed that ANC will continue to accommodate international arrivals for tourist charter flights and other international service. Federal Inspections Services (FIS) requirements are included within the public area facility requirements.

3.5.3. Secure Public Area

Secure public area includes the passenger security screening checkpoints, secure circulation (including concourse circulation), and secure side (concourse) public restrooms. Secure and non-secure public area areas are combined for the purposes of this analysis.

3.5.4. Non-Secure Public Area

This category includes circulation in the ticketing lobby and baggage claim lobby, as well as seating alcoves, vestibules, escalators, elevator lobbies, and non-secure public restrooms. Ticketing lobby circulation is the area in front of the ticket counter, excluding the passenger queuing space. General circulation in the ticketing lobby and baggage claim lobby includes areas for seating, hotel boards, ground transportation counters, information counters, and telephones. Secure and non-secure public area areas are combined for the purposes of this analysis.

3.5.5. Non-Public Area

Non-public areas include airport administration offices, loading dock areas, airport maintenance areas, and space for mechanical, electrical, and building systems.

3.5.6. Terminal Building Facility Requirements

Gross area terminal facility requirements are presented in Table 3.5 for the years 2012, 2017, and 2027. Requirements were determined by establishing a high level of service planning factor for public and non-public terminal space based on the existing passenger volumes within the South Terminal, an existing ANC facility that functions at a high level of service.

The required gross terminal areas are for master planning purposes only and should be refined in subsequent terminal planning and design studies. Actual building sizes will depend on specific airline, concessionaire, and airport requirements, geometric layout of the building, and degree of built-in capacity for additional traffic beyond the horizon year and flexibility to accommodate industry change. A review of the facility requirement projections indicates that the combined capacity of the two existing terminals is sufficient to handle forecast traffic through the planning horizon of 2027 at a reasonable level of service. However, based on qualitative analysis, the North Terminal facilities may need reconfiguration and modernization to accommodate the forecast passenger volumes. The assumption is made that ANC will continue the ongoing modernization program of the South Terminal including renovation of Concourse A, Concourse B, and the east portion of the terminal processor. Improvements to the North Terminal may require the displacement of facilities currently located in the North Terminal that do not directly support the passenger operations of the airport such as selected airline offices, and other facilities.

As demand continues to increase, it is recommended that ANC carefully manage the volume of service accommodated at each terminal. Improved inter-terminal access between the South Terminal and North Terminal will be required in future years enhancing access to the rental car facility, the train station, and long term parking lots from the North Terminal.

FAA Advisory Circular (AC) 150/5360-13 provides guidance on gross square footage of terminal facilities required. However, published terminal planning factors were developed nearly three decades ago and, in the experience of the consultant, underestimate the required terminal size for modern airport terminal facilities including security, circulation, and concessions. Planning factors can be based on several criteria such as the number of gates, the number of annual enplanements, the number of peak hour passengers, and the number of annual passengers. Other factors to consider include whether the facility is characterized as primarily origin and destination (O&D), hub, or whether it serves a high percentage of international passengers. Peak hour passengers were not calculated for the purposes of this analysis. For determination of gross terminal area, the FAA AC recommends a range of 0.08 to 0.12 ft^2 per annual enplanement for general airport planning and a range of 0.11 to 0.24 ft^2 per annual enplanement for O&D airports. Using the high end of the range to reflect the high level of service expected in ANC and the airport’s characteristic as, primarily, an O&D airport a planning factor of 0.24 ft^2 per annual enplanement is used to determine the required gross area of terminal space.

Table 3.5 Gross Terminal Area Requirements

Year	Passenger Enplanements	Existing Terminal Space (ft^2)	Required Terminal Space: 0.2 ft^2/Ann. Passenger	Required Gates	Required Terminal Space: 30,000 ft^2/gate
2005	2,403,121	1,037,294	576,749	34	1,020,000
2012	2,779,957	n/a	667,190	35	1,050,000
2017	2,951,719	n/a	708,413	36	1,080,000
2027	3,584,935	n/a	860,384	39	1,170,000

* Does not include Air Taxis
Source: HNTB analysis.

3.5.7. Gate Requirements

Total required square footage was also calculated based on the number of gates because peak hour passenger levels were not prepared for this analysis. For determination of gross terminal area, the FAA AC recommends a range of 21,000 ft^2 per gate to 31,000 ft^2 per gate based on the same variables mentioned above. Application of both methodologies for ANC will yield inconsistencies due to the fact that half of the Concourse A gates and the two "L" gates are used for ground loading of regional propeller aircraft. These gates do not require the same volume of space as domestic Jet-Aircraft gates. Further, three of the Concourse A gates are used for air-taxi service and do not utilize TSA security. Thus, the required space for these gates is less than the terminal planning factor would yield. However, for the purposes of calculating gross terminal area, a high planning factor of 30,000 ft^2 per gate was utilized. This high planning factor will also help identify the potential life span of the existing terminal facilities and yield the highest expected facility requirements for gross terminal area.

Gate requirements are presented in Table 3.6. At the current time ANC has a surplus of passenger boarding gates and a relatively low gate utilization rate partially due to the unique peaking characteristics of the Anchorage market. Most of the underutilized gates are located at the North Terminal which was historically used to accommodate transit passengers. As transit passengers have declined, the North Terminal has been reused for other purposes. However, the gate stands are still used for the two transit flights through ANC, charter flights, cargo transit flights, aircraft hardstands, and for all US Airways, Sun Country, and Delta Airlines flights. Only two gates at the eight gate facility, however, are currently utilized for scheduled domestic flights. As noted in Chapter 2 – Aviation Demand Forecast, transit flights are expected to dissolve from the ANC market by 2017. Further, it is expected that new apron areas will accommodate cargo transit flights that currently utilize the North Terminal ramp area. For the purposes of this analysis, it is assumed that ANC will fully utilize the North Terminal for scheduled domestic passenger and domestic and international charter flights prior to constructing new terminal facilities.

There is a requirement for one additional gate at ANC by 2027. Because the North Terminal is currently designed to accommodate eight wide-body aircraft it is assumed that the facility could be retrofitted to accommodate one additional narrow body aircraft boarding gate without physical expansion of the footprint. This is due to the forecast assumption that domestic air service will continue to be dominated by narrow body aircraft, more of which could be accommodated at the existing North Terminal. Therefore, a new passenger concourse is not expected to be required within the planning horizon based on gate requirements.

Table 3.6 Gate Requirements

Year	Passenger Operations*	Passenger Enplanements	Total Passengers	Existing Gates	Required Gates
2005	92,728	2,403,121	5,511,269	38	34
2012	97,416	2,779,957	6,027862	n/a	35
2017	98,615	2,951,719	5,797,761	n/a	36
2027	110,530	3,584,935	7,059,472	n/a	39

* Does not include Air Taxis

Note: Total numbers decrease from 2012 to 2017 due to the drop in transit passengers even though the total enplanements continue to climb.

Source: HNTB analysis.

3.5.8. Public & Non-Public Space Requirements

It is anticipated that the existing ratio of public and non-public space will be maintained at ANC. The existing ratio is approximately 70 percent public and 30 percent non-public. Public and non-public space requirements were determined based on the required terminal space calculated from the required number of aircraft gates. Table 3.7 shows the public and non-public space requirements for ANC.

Table 3.7 Gross Public and Non-Public Area Requirements

Year	Required Public Space (70%)	Required Non Public Space (30%)
2005	714,000	306,000
2012	735,000	315,000
2017	756,000	324,000
2017	819,000	351,000

Source: HNTB analysis.

3.6. Cargo Facility Requirements

3.6.1. Air Cargo Composition

This section presents the capacity of existing cargo facilities and projected requirements through 2027. Cargo activity at ANC differs substantially from the cargo activity encountered at most airports throughout the U.S. There are a number of cargo activities at ANC that need to be analyzed to properly determine overall facility requirements. Table 3.8 depicts a summary of the cargo tonnage demand forecast. As depicted, the cargo is divided into three primary categories:

1. Airline Cargo (belly/combi)
2. Freighter Cargo (all-cargo enplaned/deplaned)
3. Transit Cargo

These primary categories further subdivided into subcategories including intra-Alaska, other domestic and international. Each type of cargo activity is discussed below.

Airline (belly/combi) Cargo

This category includes cargo shipped via passenger carriers. Excluding transit cargo, Airline (belly/combi) cargo represents only 7 percent of the total cargo tonnage and declines to 2 percent of total activity by 2027.

Freighter (all cargo enplaned/deplaned)

This activity is conducted by non-passenger aircraft. This category includes both (a) O&D and (b) transfer cargo.

(a) O&D cargo either begins its initial air shipment at the Airport or is off-loaded from an aircraft at the Airport for subsequent distribution via an alternative mode of transit.

O&D cargo represented less than nine percent of the total cargo volume (tonnage) at ANC in 2005.

(b) Transfer cargo is cargo that is off-loaded from one aircraft and reloaded onto another aircraft and can include international or domestic cargo. There are three basic types of transfer cargo handled at ANC for which facility requirements have been prepared. The first type of transfer cargo requires a more complicated operation where cargo is removed from aircraft, sorted within a warehousing/sort facility, repacked on pallets or in cargo containers, and reloaded onto aircraft. In one of its largest facilities in the world, FedEx deplanes, breaks down, sorts, clears through customs, reloads contains and enplanes most of its Asia to North America inbound tonnage. UPS also has a sort and customs clearance operation at the Airport, however, to a lesser extent than FedEx. For the purposes of this section of the master plan document, we refer to the first type of transfer cargo as "integrated cargo." Secondly, Alaska Airlines transfers and sorts cargo for the Alaska and domestic U. S. markets. For the purposes of this section of the master plan document, we refer to this type of transfer cargo as "intra-Alaska and airline cargo." The final type of transfer cargo is moved from "tail to tail" (i.e. directly from one aircraft to another) and typically requires very little building space because the cargo pallets and/or containers are not broken down and the contents not sorted. Most of this type of transfer cargo is accommodated directly on the apron. For the purposes of this section of the Master Plan document, we refer to the final type of transfer cargo as "international air cargo." Japan Airlines, Northwest, Korean Air Cargo, Transmile, DHL/Airborne, and Nippon Cargo Airlines handle most international air cargo tonnage at ANC.

Transit Cargo

Transit cargo is cargo carried by aircraft arriving to or departing from ANC that remains on the aircraft without being off-loaded, i.e., the cargo doors do not open. These aircraft use ANC as a technical stop to refuel, perform minor maintenance and/or change crews. Transit cargo does not require as much ground handling equipment or landside buildings and support facilities as do transfer or full-sort operations. Thus, transit cargo has a diminished requirement for airport facilities. The principal facility requirement associated with transit cargo is for aircraft parking aprons. Transit cargo aircraft also require the services of support facilities which provide Ground Service Equipment (GSE), such as tugs, maintenance crews, deicing trucks, and fueling trucks. Additional facilities for aircraft fueling/hydrants and fuel storage capacity must be evaluated and provided as needed. Transit cargo represents a significant volume of the total cargo handled at the Airport. This activity comprised approximately 74 percent of 2005 total cargo tonnage.

Table 3.8 provides a summary of projected cargo growth over the planning period.

Table 3.8 Cargo Forecast Summary (tons)

	Year			
	2005	**2012**	**2017**	**2027**
Airline (belly/combi)				
Intra-Alaska	32,627	32,552	29,715	28,822
Other Domestic	17,321	18,238	17,396	18,193
International	400	507	586	782
Total Airline (belly and combi)	**50,348**	**51,298**	**47,697**	**47,796**
Freighter (all cargo)				
Intra-Alaska	84,653	104,409	117,725	142,781
Other Domestic and International	626,266	1,026,468	1,384,398	2,527,854
Total Freighter (all cargo enplaned/deplaned)	**710,919**	**1,130,877**	**1,502,124**	**2,670,635**
Transit	**2,187,444**	**3,910,502**	**5,168,864**	**9,203,847**
Total	**2,948,711**	**5,092,676**	**6,718,685**	**11,922,278**

Source: HNTB analysis.

3.6.2. Air Cargo Facilities

There are four primary types of cargo facilities at ANC; facilities that serve the integrated carriers, facilities that primarily serve the intra-Alaska O&D cargo activity, facilities that serve the passenger airlines for belly cargo and the international cargo carriers that have a mix of O&D and transfer activity. There is slightly over 1 million square feet of cargo facilities including 846,000 square feet of warehouse/processing space. This includes some facilities which are not currently utilized such as the former Northwest Air Cargo facility in the East Airpark. For master planning purposes, requirements for air cargo facilities are typically developed based on building utilization rates. Theses rates are used to measure the capacity of cargo facilities. Building utilization rates are expressed as square feet per annual ton of freight. Based on a survey of U.S. airports the average building utilization rate for cargo facilities is 1.75 square feet per ton of cargo. The survey also indicated the range of adequacy for these facilities, on average, is between 1.0 and 2.5 square feet per ton. A building utilization rate of 1.0 square foot per ton typically implies that the facilities are well-utilized and some near-term expansion is required. A 2.5 square foot per ton utilization rate implies either the existing tenants have ample space for their operations with some expansion capability, or a number of cargo-related tenants such as freight forwarders, truckers, or handling agents occupy space. A description of ANC cargo facilities and their requirements is provided below.

Integrated Cargo Building Requirements

These facilities specifically serve FedEx and UPS. This segment of activity represents 64 percent of total cargo (excluding transit) and 78 percent of international cargo. FedEx handles 90 percent of this activity. According to FedEx, 50 percent of their tonnage is cross loaded. Based on total tonnage the combined facilities have a utilization rate of approximately 1.2 square feet per ton based on total building area. The warehouse utilization rate is slightly less than one (.90) square foot per ton and the support building utilization rate is approximately 0.30 square foot per ton. For planning purposes a utilization rate of 1.0 was used for warehouse and a building utilization rate of .25 was used for support space. Table 3.9 depicts the building requirements for integrated air cargo. By 2027 over 2.5 million square feet of cargo building will be required.

Table 3.9 Integrated Carrier Cargo Building Requirements

Year	Freight (tons)	Warehouse (SF) @ 1.0	Support (SF) @ 0.25	Total Building (SF)
Existing*	488,488	457,282 (a)	145,552 (b)	602,834
2012	821,174	821,174	205,294	1,026,468
2017	1,107,519	1,107,519	276,880	1,384,399
2027	2,022,284	2,022,284	505,571	2,527,855

*2005 data (only includes active cargo facilities)
(a) @ .90 SF per ton
(b) @ .30 SF per ton
Source: HNTB analysis.

Intra-Alaska and Airline Cargo Building Requirements

These facilities serve the all-cargo carriers such as Northern Air Cargo, Lynden Air Cargo, or Everts Air, and the airline passenger carriers such as Alaska or Delta Airlines. The cargo processing requirements between these two activities are very similar; therefore, they have been combined for the purposes of determining cargo building requirements. The primary differences between the two activities are the airside requirements. The all-cargo carriers require aircraft apron area while the airlines utilize passenger gates. The building utilization rate is slightly over 1.5 square feet per ton. As stated above the average building utilization rate for these types of cargo facilities at U.S. airports is 1.75 square feet per ton of cargo implying that these facilities have slightly better utilization rates than the industry average. For planning purposes a utilization rate of 1.25 was used for warehouse and a building utilization rate of .25 was used for support space. Only a modest increase in building area will be required through the planning period. Table 3.10 depicts the building requirements for the Intra-Alaska and Airline cargo.

Table 3.10 Intra-Alaska and Airline Cargo Building Requirements

Year	Freight (tons)	Warehouse (SF) @ 1.25	Support Building (SF) @ 0.25	Total Building (SF)
Existing*	135,001	176,670 (a)	26,821 (b)	203,491
2012	155,706	194,633	38,927	233,559
2017	165,422	206,778	41,356	248,133
2027	190,577	238,221	47,644	285,866

*2005 data (only includes active cargo facilities)

(a) 1.30 SF per ton

(b) 0.25 SF per ton

Source: HNTB analysis.

International Air Cargo

These facilities serve the international carrier operations and include both O&D and transfer cargo. As discussed in the previous section, transfer cargo is often moved from 'tail to tail' which requires very little building space. The forecasts did not break out the percent of O&D versus transfer, therefore the building utilization rates were factored based on total tonnage. The existing ratio was approximately 1.2 square feet per ton. A greater building utilization would be expected recognizing that the transfer cargo moves from plane to plane without passing through any facilities. For planning purposes a utilization rate of 1.0 was used for warehouse and a building utilization rate of .25 was used for support space. Approximately half a million tons are forecasted by 2027. This will require a fourfold increase in total building space to slightly more than 631,000 square feet. Table 3.11 depicts the building requirements for the International Air Cargo.

Table 3.11 International Carrier Cargo Building Requirements

Year	Freight (tons)	Warehouse (SF) @ 1.0	Support Building (SF) @ 0.25	Total Building (SF)
Existing*	137,779	148,212 (a)	6,800 (b)	155,012
2012	205,294	205,294	51,324	256,618
2017	276,880	276,880	69,220	346,100
2027	505,571	505,571	126,393	631,964

*2005 data (only includes active cargo facilities)

(a) 1.10 SF per ton

(b) 0.10 SF per ton

Source: HNTB analysis.

Cargo Building Requirements Summary

Cargo tonnage will increase over three and half times existing volumes. The majority of this increase will be carried by integrated carriers. Total required building area will increase from 961,000 to nearly 3.5 million square feet. Table 3.12 depicts total building requirements summary.

Table 3.12 Total Cargo Building Requirements

Year	Freight	Warehouse (SF)	Support Building (SF)	Total Building
Existing*	761,268	782,164	179,173	961,337
2012	1,182,174	1,221,101	295,544	1,516,644
2017	1,549,821	1,591,177	387,455	1,978,632
2027	2,718,432	2,766,076	679,608	3,445,684

*2005 data (only includes active cargo facilities)

Source: HNTB analysis.

Cargo Land Use Requirements

Three components comprise the land use requirements for cargo operations: cargo buildings and support areas, aircraft/airside apron areas and circulation, and landside support. Cargo buildings and support facilities are responsible for the handling, sorting, and distribution of inbound and outbound cargo. Apron and circulation areas include aircraft parking positions, taxilanes, and service lanes, as well as limited aircraft circulation. The landside areas include truck and automobile parking stalls, truck and automobile circulation, truck loading areas, space between cargo buildings, and landscaping. By 2027, 520.7 acres will be required for cargo operations. The following section summarizes the methodology for determining cargo land use requirements and includes a summary table.

For planning purposes, cargo landside requirements—which include such elements as employee and visitor parking, vehicle circulation, truck loading and unloading areas, and landscaping—are equal to the cargo building and support area requirements. A tabulated summary is shown in Table 3.13.

Table 3.13 Air Cargo Land Use Requirements - 2007 Forecast Update

Forecast Air Cargo Tonnage					
2005	2,948,711				
2012	5,092,676				
2017	6,718,685				
2027	11,922,278				
Cargo Building Requirements (square feet)					
2012	1,516,645	ft^2	34.8	Acres	
2017	1,978,632	ft^2	45.4	Acres	
2027	3,445,685	ft^2	79.1	Acres	**15.2%**
Cargo Apron Requirements (square yards)					
2012	914,800	yd^2	189.0	Acres	
2017	1,108,400	yd^2	229.0	Acres	
2027	1,754,400	yd^2	362.5	Acres	**69.6%**
Cargo Landside Requirements (square feet) - for planning purposes landside is equal to building area.					
2012	1,516,645	ft^2	34.8	Acres	
2017	1,978,632	ft^2	45.4	Acres	
2027	3,445,685	ft^2	79.1	Acres	**15.2%**
Total On-Airport Cargo Requirement			**520.7**	Acres	**100.0%**

3.6.3. Cargo Aircraft Parking Positions

ANC has approximately 823,000 square yards (7,407,000 square feet) of existing cargo apron including 310,000 square yards (2,790,000 square feet) of transit apron. The transit apron includes the P-gates, the terminal area R-gates, and the K-gates. These apron areas include aircraft circulation. Areas of the North, East and South Airparks make up the remaining 513,000 square yards (4,617,000 square feet) of apron. These apron areas are associated with cargo processing facilities.

The principal cargo airlines located in the East Airpark are Alaska Airlines, Delta Air Lines, Northern Air Cargo, and Japan Airlines.

The principal cargo airlines located in the South Airpark is Lynden Air Cargo.

Principal cargo airlines located in the North Airpark include FedEx, UPS, Northwest Air Cargo, Korean Air, Transmile, Everts Air Cargo, and Alaska Central Express. Several cargo airlines located in North Airpark forecast their requirements for additional aircraft parking aprons to accommodate future peak demand cannot be met within current leaseholds. Two carriers have indicated interest in expanding in the only direction that is generally available, to the east of Postmark Drive. This could require realigning taxiway access and road right of ways.

Air cargo ramp size can vary considerably based on aircraft size and tenant requirements. Ramp size is also often a function of available land and airfield layout. Apron requirements for ANC are provided in Table 3.14. These apron requirements were based on the number of aircraft that are expected to be on the ground at one time during an average day peak month. These were developed from the gated flight schedules prepared for the forecast years. The forecast operations were then subdivided by aircraft operation type including: Intra Alaska (O&D and transfer), International and domestic transfer (with and without O&D), and transit (with and without transfer). Forecast apron requirements were developed for each of the horizon years by establishing the apron requirements for the typical aircraft in each category. These areas include the aircraft parking position as well as aircraft circulation. The transfer and O&D operations include a single taxiway arrangement similar to the FedEx or UPS layout. The transit operations include a dual circulation similar to the terminal area remote gates.

The apron requirements established for the cargo operators using this methodology would total approximately 914,800 square yards (8,233,200 square feet) by 2012, 1.1 million square yards (9,900,000 square feet) in 2017 and over 1.7 million square yards (15,300,000 square feet) in 2027.

Table 3.14 Cargo Apron Area Requirements

	Type of Operation	Apron (SY)	**2012**	**Apron Area (SY)**	**2017**	**Apron Area (SY)**	**2027**	**Apron Area (SY)**
Cargo Positions								
Intra-Alaska								
TP	O&D and transfer	3,400	26	88,400	27	91,800	27	91,800
NB	O&D and transfer	6,200	7	43,400	8	49,600	8	49,600
Subtotal			33		35		35	
International and Other US								
DG VI	transfer w/ some O&D	14,000	3	42,000	4	56,000	11	154,000
DG V	transfer w/ some O&D	12,000	13	156,000	18	216,000	27	324,000
DG IV	transfer w/ some O&D	10,000	6	60,000	5	50,000	4	40,000
NB	transfer w/ some O&D	6,200	0	-	0	-	0	-
DG VI	transfer	14,000	2	28,000	3	42,000	14	196,000
DG V	transfer	12,000	11	132,000	12	144,000	7	84,000
DG IV	transfer	10,000		-		-		-
DG VI	transit w/ some transfer	25,000	2	50,000	2	50,000	4	100,000
DG V	transit w/ some transfer	21,000	5	105,000	8	168,000	9	189,000
DG IV	transit w/ some transfer	19,000		-		-		-
DG VI	transit	25,000	1	25,000	3	75,000	16	400,000
DG V	transit	21,000	7	147,000	7	147,000	6	126,000
DG IV	transit	19,000	2	38,000	1	19,000		-
Subtotal			52		63		98	
Total Cargo			85	914,800	98	1,108,400	133	1,754,400

Note: Does not include spare gates or cargo positions

Source: HNTB analysis.

3.6.4. Air Mail Facility Requirements

United States Postal Service (USPS) air mail is transported from air cargo ramps and apron areas to a USPS Processing and Distribution Center / Air Mail Facility, a central mail facility where mail is sorted and distributed. The facility is comprised of a 291,000 square foot sort facility and 45,000 square foot air-mail facility. The 22.7-acre site is located on the east side of Postmark Drive between Lake Hood Drive on the north side and De Havilland Drive on the south side.

Currently, access to the airport apron areas from the facility requires trucks transporting air mail to cross Postmark Drive, the main road serving the North Terminal and North Airpark. As a result of increasing truck traffic on Postmark Drive, tugs carrying air-mail between the USPS facility and airport apron areas experience delays and a reduction in safety. This is exacerbated by the fact that much of the air mail is carried on apron tugs with multiple trailers not meant for public roadways. Access improvements to the apron areas from the USPS facility will be required as Postmark Drive traffic continues to increase.

Further contributing to congestion is the delay created by the long wait time created as trucks queue up to enter the secure facility via the entrance gate on Postmark Drive. Creating an additional entrance at Sikorsky Ave may help to alleviate this delay and plans for such an improvement have been under consideration by the USPS.

Finally, a warehouse expansion is under consideration. However, the size of the expansion and timetable for expansion has not been determined.

3.7. Landside Facility Requirements

3.7.1. Ground Access and Parking

This section presents the ground access and parking facility requirements prepared for ANC, including on-Airport surface transportation forecasts and public and employee parking requirements.

Access Roadways

Surface transportation forecasts were developed for on-Airport roadways including terminal and other access roadways and are described below.

On-Airport Terminal Roadways

The ADOT&PF collects and compiles average daily traffic volume on select State Roads on an annual basis. International Airport Road is part of the State roadway network and annual traffic counts are collected at three locations along the terminal entrance, exit and within the terminal area. Terminal area roadway forecasts were developed using the annual average daily traffic volumes (AADT) collected for 2005. The ADOT&PF AADT counts are representative of the vehicles traveling over a specific segment of road during one 24 hour period. According to the Central Region *Annual Traffic Volume Report 2003, 2004, 2005,* published by the ADOT&PF, the AADT is usually obtained from a sample adjusted for seasonality.

Table 3.15 depicts the 2005 AADT counts reported in the *2003, 2004, 2005 Annual Traffic Volume Report.* Average Daily Traffic Volumes are shown for each of the South Terminal area locations reported in the ADOT&PF counts, including each of the terminal curbside ramps and the return to terminal road. Traffic counts for the North Terminal were not reported in the Annual Report. The 2005 counts were extrapolated based on ANC O&D passenger forecasts for each of the future forecast years: 2012, 2017, and 2027. O&D passenger forecasts, shown in Table 3.16, are typically used to estimate surface transportation activity at airports as they represent passengers that arrive and depart the airport from the ANC roadways and utilize other landside facilities such as parking, rental car and ground transportation services. Connecting and transit passengers would not typically utilize these facilities except to connect between the North and South Terminals.

Table 3.15 South Terminal Roadway Forecasts (Annual Average Daily Traffic)

	2005	2012	2017	2027
South Terminal Entrance Road and Private Vehicle Arrival Ramp				
Entrance: South Aircraft Drive to Return Ramp	8,760	10,092	10,709	12,987
Entrance: Return Ramp to Rental Car Parking Entrance	13,040	15,022	15,941	19,333
Terminal Private Vehicle Arrivals Curbside	2,600	2,995	3,178	3,855
Exit: Terminal Departures Ramp to Return Ramp	15,030	17,315	18,374	22,283
Exit: Return Ramp to South Airport Drive	10,146	11,688	12,403	15,042
South Terminal Private Vehicle Departure Ramp				
Terminal Private Vehicle Departure Ramp	2,980	3,433	3,643	4,418
South Terminal Commercial Vehicle Ramp				
Terminal Commercial Vehicle Curbside	3,350	3,859	4,095	4,967
South Terminal Return to Terminal Ramp				
Return to Terminal Ramp	3,000	3,456	3,667	4,448

Source: HNTB Corporation based on DOT&PF data, 2007.

Table 3.16 presents the South Terminal Trip Generation Rate and estimate of peak hour traffic. The trip generation rate is based on the average daily traffic for the South Terminal divided by the average daily O&D passengers. The trip rate is based on the estimate of average daily traffic at the South Terminal roadway between the curbside and return to terminal road, 15,030 vehicles in 2005, and is calculated to be 1.51.

Table 3.16 South Terminal Trip Generation

	2005	2012	2017	2027
Airport Activity Level				
Annual passengers	5,005,042	5,658,008	5,726,660	7,001,884
Annual O&D passengers	3,634,482	4,186,972	4,443,100	5,388,434
Average Daily O&D passengers	9,957	11,471	12,173	14,763
South Terminal Trip Generation				
Average Daily Terminal Traffic (ADT)	15,030	17,315	18,374	22,283
Trip Rate (ADT/O&D passenger)	1.51	1.51	1.51	1.51
Peak Hour Ratio	10.0%	10.0%	10.0%	10.0%
Peak Hour Traffic	1,505	1,730	1,840	2,230

Source: HNTB Corporation, 2007.

Peak hour traffic volumes for the key terminal area roadway locations presented in Table 3.17 are estimated based on a peak hour ratio of 10 percent, shown in Table 3.16. The peak hour ratio was calculated based on traffic counts conducted at rental car entrances and parking exits in

September 2006. The p.m. peak traffic volumes represented approximately 10 percent of total traffic. The peak hour ratio was assumed to remain constant in future years.

Level of service (LOS) C is typically considered an appropriate design standard for peak hour roadway operations and was used in calculations for ANC. It represents moderate congestion levels during the busiest periods of the day with traffic operations during the remainder of the day operating at higher levels of service, typically A or B. Level of service is calculated based on the volume to capacity ratio (i.e. the existing or forecast volume of vehicles per hour [vph] divided by the maximum vehicles per hour that a specific roadway segment can accommodate). Terminal area entrance and exit roadways east of the return to terminal road were estimated to accommodate a maximum of 1,200 vph per lane, terminal area roads were estimated to accommodate 900 vph per lane, and the return to terminal road was estimated to accommodate 700 vph per lane. Each maximum lane capacity is multiplied by the number of lanes in a given segment to calculate the total roadway segment capacity. These volumes represent the maximum roadway capacity and correspond to a LOS F. The LOS C capacity represents between 71 percent and 80 percent of this maximum, as shown on Table 3.17. Peak hour traffic volumes for each of the key terminal roadway locations were calculated and compared to the LOS C capacity requirement calculated for each location. All locations are estimated to operate at LOS C or better through 2027. The South Terminal entrance roadway between the return to terminal road and curbsides is the only section estimated to operate at LOS C during 2027. This segment has a LOS C capacity requirement of 1,915 vehicles per hour and the peak hour traffic volume is estimated to be 1,935 in 2027. No roadway segments are estimated to operate at LOS C prior to 2027.

Table 3.17 South Terminal Ground Transportation Requirements

	2005	2012	2017	2027
South Terminal Entrance				
Daily Traffic	8,760	10,090	10,710	12,985
Peak Hour Traffic	875	1,010	1,070	1,300
LOS C Capacity Requirement	1,920	1,920	1,920	1,920
South Terminal Traffic Entrance to Terminal Curbside Ramps				
Daily Traffic	13,040	15,022	15,941	19,333
Peak Hour Traffic	1,305	1,500	1,595	1,935
LOS C Capacity Requirement	2,160	2,160	2,160	2,160
South Terminal Traffic Terminal Curbside Ramps to Exit				
Daily Traffic	15,030	17,315	18,374	22,283
Peak Hour Traffic	1,505	1,730	1,835	2,230
LOS C Capacity Requirement	2,880	2,880	2,880	2,880
Return to Terminal Ramp				
Daily Traffic	4,884	5,626	5,971	7,241
Peak Hour Traffic	300	345	365	445
LOS C Capacity Requirement	560	560	560	560
South Terminal Exit				
Daily Traffic	10,146	11,688	12,403	15,042
Peak Hour Traffic	1,015	1,170	1,240	1,505
LOS C Capacity Requirement	1,920	1,920	1,920	1,920

Source: HNTB Corporation based on DOT&PF data, 2007.

Other On-Airport Access Roadways

Roadways are needed to provide vehicular access to cargo, general aviation, and other areas of the Airport. The previous master plan update identified the following major roadway improvements, which should be reassessed:

- Construction of a new road, Logistics Drive (or reconfiguration of Postmark Dr), between Postmark Drive and Northern Lights Boulevard, to provide access to future aviation-related commercial areas. Logistics Drive would also remove public through-traffic from Postmark Drive, allowing safer tug crossings from property on the east side of Postmark Drive.

- Construction of a tunnel under the airfield to improve accessibility between the east and west sides of the Airport. The tunnel would contain separate public and secured airport lanes. The tunnel was proposed to reduce travel time compared with using Postmark

Drive or Northern Lights Boulevard to Point Woronzof Drive and to reduce cargo traffic impacts on neighborhoods along Northern Lights Boulevard.

Roadway needs and issues are discussed below under the following headings:

- Access to Future Development Areas
- Resolution of Traffic Conflicts and Congestion
- Access Control

Access to Future Development Areas

Facilities built on undeveloped parts of the Airport will need access to the public (for employees and customers) and service vehicle access, depending upon the land use. Service roads inside the airfield fence provide efficient access to aircraft operating areas and are needed for tugs and other vehicles that should not travel on public roads, such as refueling trucks and airport maintenance equipment.

West Airpark is the largest area of undeveloped property on the airport needing access. The previous master plan update recommended a vehicular tunnel under the airfield to supplement access via Point Woronzof Drive. The future use of West Airpark will affect how much public access is needed there, and the need for a tunnel under the airfield for purposes such as transferring cargo between carriers located in different airparks. The development of a north-south tug road parallel to Runway 14-32, along Point Woronzof Drive, should also be considered to facilitate West Airpark development.

At South Airpark, the current public access configuration at Kulis ANG Base is designed to enhance security and limit entry. After the ANG relocates from the Airport, the base will be available for redevelopment. If the ANG base is used for multiple commercial tenants, such as intra-state cargo carriers, then access improvements should be addressed. Acquisition of the FCC property to the west may allow additional facility development in South Airpark and an additional access point to improve South Airpark traffic circulation. To support the westward expansion of South Airpark, the extension of South Tug Road beyond Taxiway Z to West Perimeter Road should be considered.

Resolution of Traffic Conflicts and Congestion

International Airport Road is the primary access road to the Airport. This corridor acts as a funnel leading all traffic, cargo, and passengers to the same area. The other major access road at the Airport is Postmark Drive. Postmark Drive provides access to the North Terminal, the North Airpark, the Post Office, and Lake Hood. As growth at the Airport occurs, traffic on International Airport Road and Postmark Drive will increase, as will conflicts between different types of traffic, such as between passenger and cargo traffic.

Alternative improvements to separate cargo and terminal functions on-airport and to lessen congestion should be evaluated, such as grade separation at International Airport Road and Aircraft Drive.

Several traffic conflict and congestion issues relate to Postmark Drive and should be addressed in future roadway network planning. Construction of a new road located east of the Post Office has been proposed by the Airport as a replacement for Postmark Drive. This new road is referred to as Logistics Drive. Rerouting traffic to this new road would make additional land available for airside development. Airside development in North Airpark is currently limited by the location of Postmark Drive. The previous plan excludes the closure of Postmark Drive due to the need for public access to the Post Office and other facilities. This should be reassessed.

The tug road parallel to Postmark Drive may create visibility and turning movement conflicts between tugs and other vehicles. This tug road has seen limited use since the construction of a tug road adjacent to Taxiway R.

Potential conflict between taxiing aircraft and vehicles on Postmark Drive is discussed in the next paragraph.

Access Control

To maintain airport security, it is especially important to prevent general public vehicles from accessing the taxiways and runways of the airfield. One place where such access has been a concern is where Taxiway V provides aircraft access across Postmark Drive from Lake Hood to the ANC airfield. Access control around Lake Hood was a major issue addressed by the *General Aviation Master Plan for Lake Hood Seaplane Base and Anchorage International Airport*, completed in 2006. That plan does not eliminate or provide additional control (gating) of the access roads into Lake Hood, and it includes continued access by small aircraft to the ANC runways via Taxiway V. Pilot-controlled gates that stop traffic on Postmark Drive, similar to the type used at railroad crossings, are located where Taxiway V intersects Postmark Drive. Additional improvements to this intersection, such as grade separation, may be required in the future to prevent traffic congestion on Postmark Drive or to tighten access to ANC. The Transportation Security Administration (TSA) was consulted during the recent Lake Hood planning. At that time, the TSA did not indicate that more control of the access via Taxiway V would be required.

3.7.2. Parking

Public parking forecasts and facility requirements for public and employee parking in the terminal area are presented in this section.

Public Parking

Public parking transaction forecasts are presented in Table 3.18 for the South Terminal short-term, South Terminal long-term, and North Terminal facilities. Future transactions were estimated for hourly, 24 hours or less, and daily, over 24 hours for each facility. Parking transaction duration data for January 29 through September 26, 2006 were used to develop parking forecasts and requirements. According to this data, the average duration in the South Terminal short term lot was 1.63 hours for hourly parking and 2.84 days for daily parking. The average duration in the South Terminal long term lot was 4.33 hours and 4.25 days for hourly and daily parking, respectively; and the average duration in the North Terminal lot was 1.28 hours and 5.13 days for hourly and daily, respectively.

Traffic counts taken at the South Terminal parking exit between August 21 and September 7 were also used to determine peak hour percentages. During the pm peak hour, approximately 4:00 pm, between 10 percent and 15 percent of the total daily traffic exited the South Terminal parking lots. Daily transactions for 2005-2006 were assumed to grow at the same rate as O&D passengers and are presented in Table 3.18.

Table 3.18 Public Parking Daily Transaction Forecast

	Average Parking Duration	Daily Parking Transactions			
		Existing	2012	2017	2027
South Terminal Short Term					
Hourly (0-24hrs)	1.63 hrs	1,329	1,625	1,720	2,079
Daily (over 24 hrs)	2.84 days	100	122	129	156
Total Short Term		*1,429*	*1,747*	*1,849*	*2,235*
South Terminal Long Term					
Hourly (0-24hrs)	4.33 hrs	49	60	63	77
Daily (over 24 hours)	4.25 days	54	66	70	84
Total Long Term		*103*	*126*	*133*	*161*
North Terminal					
Hourly (0-24hrs)	1.28 hrs	241	295	312	377
Daily (over 24 hours)	5.13 days	6	7	8	9
Total North Terminal		*247*	*302*	*320*	*386*

Source: HNTB Corporation based on data provided by ANC staff, 2007.

Estimates of public parking space requirements were estimated for current and future years based on the hourly and daily transactions for each facility. The average parking duration period, presented in Table 3.18, and a surge factor to account for multiple vehicles arriving during the same period, was applied to the daily transaction data to determine short term and daily parking requirements. A surge factor of 10 percent was applied to the hourly and 5 percent to daily parking estimates to account for spaces that turn over as vehicles search for parking. Public parking requirements for South Terminal short term, South Terminal long term and North terminal are presented in Table 3.19.

Table 3.19 Public Parking Space Requirements

	Supply		Parking Space Requirements			
	Current	*After Completion of RAC Facility*	Existing	2012	2017	2027
Hourly (0-24hrs)			621	760	804	972
Daily (over 24 hrs)			629	769	814	983
Total Supply	*1,744*	*2,282*	*1,250*	*1,529*	*1,617*	*1,955*

Source: HNTB Corporation, 2007.

Employee Parking

Employee parking requirements were estimated for the main South Terminal employee parking facility and are presented in Table 3.20. The ANC staff estimated that the parking facility was approximately 2/3 or 67 percent full during peak periods, equaling approximately 600 occupied spaces. Employee parking space demand is typically linked to overall passenger activity levels because airport employees serve both connecting and O&D passengers. ANC employee parking was assumed to grow at the same rate as total passengers, less transit passengers (passengers who arrive and leave on the same flight). Employee parking demand for the main lot is expected to grow to approximately 840 spaces by 2027. This space demand could increase at a faster rate if spaces in smaller employee lots located throughout the terminal area become full or if there is an increase in vehicles left for extended periods. Currently, domiciled employees are allowed to leave a vehicle in long-term parking facilities for up to 15 days.

Table 3.20 Employee Parking Daily Transaction Forecast

	Supply	2005	2012	2017	2027
South Terminal Employee Lot					
Employee	*891*	600	678	686	839

Source: HNTB Corporation based on ANC staff input, 2006.

Passenger Terminal Complex

Total land use requirements for the terminal building complex, which includes the existing and required terminal structures (passenger processing terminals, passenger boarding concourses, structured parking facilities, and structured rental car facilities), passenger airline operations apron areas (aircraft parking positions, limited aircraft circulation, ground service equipment operations space and storage), landside facilities (access roads, circulation, non-structured parking and rental car facilities) are derived from evaluation of the existing terminal complex envelope and the facility requirements for additional passenger terminal complex facilities.

The existing passenger terminal complex is a 174 acre complex comprised by two airline terminals, landside circulation access and parking, and an aircraft apron area.

The existing passenger terminal complex envelop is sufficiently sized to accommodate the requirements for passenger terminal expansion through the horizon year of 2027. Passenger terminal complex requirements are shown in Table 3.21.

Table 3.21 Passenger Terminal Complex Requirements

Year	Required Gates	Required Terminal Space (sq. feet)	Terminal Land Use Requirements (acres)
2005	34	1,020,000	174
2012	35	1,050,000	174
2017	36	1,080,000	174
2027	39	1,170,000	174

3.8. Support Facilities

Support facilities at an airport provide a broad set of functions that ensure the smooth, efficient, and safe operation of the airport. This study included an update of the following facilities: Aircraft Rescue and Fire Fighting (ARFF), flight kitchen, aviation fuel storage, airport field maintenance, and general aviation facilities.

3.8.1. ARFF Facilities

Aircraft rescue and fire fighting (ARFF) requirements and recommendations are provided in 14 CFR Part 139. Airports certified under Part 139, the most recent update of which took effect June 9, 2004, must comply with specific ARFF requirements, including response time requirements and extinguishing agent requirements. ANC is a Class I airport based on the aircraft served which include scheduled large air carrier aircraft, small air carrier aircraft, and unscheduled large air carriers.

Airport Index

Part 139 is used to determine the aircraft rescue and firefighting Index (A through E) for airports serving certificated air carriers/commercial service based on the length of the longest aircraft operated by an air carrier performing an average of five scheduled departures per day (computed on an annual basis). Determination of the appropriate amount of ARFF equipment for an airport is based on the airport Index. The five ARFF Indexes are shown in Table 3.22 with details of specific requirements to meet each Index.

Table 3.22 ARFF Index Classifications

Airport Index	Required No. of Vehicles	Aircraft Length (feet)	Scheduled Daily Departures	Agent plus Water for Foam
A	1	< 90 ≥ 90, < 126	> 1 < 5	500# Sodium-based DC or Halon 1211 or Clean Agent; or 450# Potassium-based DC plus water to produce 100 gal of AFFF.
B	1 or 2	≥ 90, < 126 ≥ 126, <159	≥ 5 < 5	Index A plus 1,500 gal Water
C	2 or 3	≥ 126, < 159 ≥ 159, <200	≥ 5 < 5	Index A plus 3,000 gal Water
D	3	≥ 159, <200 ≥ 200	≥ 5 < 5	Index A plus 4,000 gal Water
E	3	≥ 200	≥ 5	Index A plus 6,000 gal Water

Source: 14 CFR Part 139

Table Notes:
DC = Dry Chemical
AFFF = Aqueous Film Forming Foam

ANC is currently classified as an Index E airport, serving an average of five or more daily departures of aircraft that are 200 feet long or longer. Index E requires an airport to have at least one lightweight, quick response vehicle carrying at least 500 pounds of sodium-based dry chemical, halon 1211, or clean agent, or 450 pounds of potassium-based dry chemical, and at least two additional firefighting vehicles carrying an amount of water and the commensurate quantity of aqueous film-forming foam (AFFF). The total quantity of water for foam production carried by all three vehicles must total at least 6,000 gallons.

ADG VI Aircraft

Several airlines are expected to operate ADG VI aircraft, such as the Boeing 747-8 freighter at ANC within five to ten years. ADG VI aircraft will not change the airport Index since the aircraft will be included in the group of aircraft longer than 200 feet. ADG VI passenger aircraft are not expected to use ANC during the planning period. No special requirements for ADG VI aircraft have been adopted at this time.

ARFF Equipment and Response Requirements

Existing Equipment

Table 3.23 shows existing ARFF equipment and new equipment being acquired between 2007 and 2009. The existing vehicles have a combined capacity of 28,747 gallons of water, 1,935 gallons of AFFF and 1,000 pounds of Halotron I. These quantities exceed the requirements for an Index E airport, which is currently the most demanding Index listed in Part 139.

Other equipment requiring storage include four wheeled all terrain vehicles (ATVs), two hovercraft and a first aid trailer.

New Equipment

The current ARFF vehicles are capable of carrying approximately 1,500, 3,000, or 6,000 gallons of water. ANC intends to replace all of these vehicles over time with a standard make and model of vehicle capable of carrying 4,500 gallons of water. Currently, the firemen and maintenance mechanics require separate training for each type of vehicle. The acquisition of a standard ARFF vehicle will simplify training and reduce the needed vehicle parts inventory.

At the time of this writing, the Capital Improvement Program showed a replacement ARFF vehicle to be acquired each year from FY2007 through FY2011. ARFF Rapid Intervention Vehicles were to be acquired in FY2007 and FY2009. A Mobile Aircraft Firefighting Training Device is scheduled to be acquired in FY2009.

Table 3.23 Existing and Projected Future ARFF Equipment

EXISTING ARFF EQUIPMENT

Vehicle Number	Type of Vehicle	Manufacturer	Model Year	Condition	Water Discharge Rate (gal/min)	Water Capacity (gallons)	Aqueous film-forming foam (AFFF) Capacity (gallons)	Agent Discharge Rate (lbs/sec)	Dry Chemical (DC) Capacity (pounds)	Halotron I Capacity (pounds)	Response Time (Midpoint of the Air Carrier Runway) (minutes)
1	Engine	Oshkosh	1991	Good	375/750	1,585	205	-	-	-	Three minutes
6	Engine	Oshkosh	1991	Good	375/750	1,585	205	-	-	-	Three minutes
3	Engine	Emergency 1	1986	Fair	780/1500	3,000	410	-	-	-	Three minutes
5	Engine	Emergency 1	1986	Fair	375/750	1,500	190	-	-	-	Three minutes
2	Engine	Oshkosh	1983	Poor	900/1800	6,077	515	-	-	-	Three minutes
New	Engine	Oshkosh	2007	New	600/1200	4,500	540	-	500	-	Three minutes
9	Tanker	Autocar	1989	Good	1,400	6,000	-	-	-	-	Four minutes
11	Tanker	Autocar	1989	Good	1,400	6,000	-	-	-	-	Four minutes
Ramp Capt	Primary RIV	Ford 350	2000	Good	-	-	-	7lbs/sec	-	500	Three minutes
Ramp Capt	Backup RIV	Chevrolet	1997	Poor	-	-	-	7lbs/sec	-	500	Three minutes

PROJECTED FUTURE ARFF EQUIPMENT

Vehicle Number	Type of Vehicle	Manufacturer	Model Year	Condition	Water Discharge Rate (gal/min)	Water Capacity (gallons)	Aqueous film-forming foam (AFFF) Capacity (gallons)	Agent Discharge Rate (lbs/sec)	Dry Chemical (DC) Capacity (pounds)	Halotron I Capacity (pounds)	Response Time (Midpoint of the Air Carrier Runway) (minutes)
2	Engine	Oshkosh	2008	New	600/1,200	4,500	540	-	500	-	Three minutes
3	Engine	Oshkosh	2009	New	600/1,200	4,500	540	-	500	-	Three minutes
5	Engine	Oshkosh	2010	New	600/1,200	4,500	540	-	500	-	Three minutes
1	Engine		2011	New	375/750	1,500	210	-	500	-	Three minutes
6	Engine		2012	New	375/750	1,500	210	-	500	-	Three minutes
Ramp Capt	Backup RIV		2009	New	-	-	150	5lbs/sec	500		Three minutes

ARFF Facility

The existing ARFF Facility is located at 6040 DeHavilland Avenue north of the intersection of Taxiways R and V and has direct access to Taxiway R to provide a reduced response time to all parts of the airfield. The facility has six vehicle bays with office, training and other support spaces. A two-bay addition and a mezzanine are under design with construction funding programmed for FY2009. The addition will house the two tankers currently stored in Field Maintenance.

The current ARFF Facility meets FAA response time requirements. When Kulis ANG Base is acquired, the Kulis Fire Station could be used as a satellite ARFF Facility to provide quicker access to the southern runways.

3.8.2. Flight Kitchen Facilities

Flight catering facilities are operated by LSG Sky Chefs and Airline Support, Inc. LSG Sky Chefs occupies approximately 35,000 square feet of space in the Northwest Airlines cargo building. They serve an average of 1.8 million passenger meals per year, with the highest volume during the summer tourist season. They have assessed their needs through 2017 and believe that their current facilities are adequate for their operations.

Airline Support, Inc. operates a 30,000 square foot facility located at 3551 Postmark Drive. They serve approximately 160,000 crew meals and fewer than 1,000 passenger meals per year, varying seasonally, with the highest volume in the summer. Airline Support, Inc. is designed to respond to changes in the local market and while it is their commitment to continue to expand in response to opportunities that arise, they have no definitive plans at this time as to the form that growth will take.

3.8.3. Fuel Storage Facilities

Commercial Carriers

The airport fuel storage facility, completed in 1996, is located north of Runway 7L-25R and west of Runway 14-32 on approximately 14.5 acres of land. This facility is operated by the Anchorage Fueling and Service Company (AFSC), a 19-member consortium of major airline companies.

The airport fuel storage facility also meters and filters all incoming fuel to the Airport and houses the control center that manages the incoming supply and distribution systems on the Airport.

The airport fuel storage facility has five 4.2 million-gallon above ground storage tanks (21 million-gallon total capacity of Jet-A fuel) for commercial carrier use. This facility provides an 8-day supply of fuel based on current usage of approximately 2,530,000 gallons per day.

Fuel is supplied to the fuel farm via a 12-inch supply pipeline from the AFSC Port Fuel Facility at the Port of Anchorage. The Port Fuel Facility has a storage capacity of 23,266,000 gallons in nine tanks. The 12-inch pipeline is required to accommodate the rapidly rising fuel demands at the Airport. An additional older pipeline branch from the Tesoro Nikiski refinery supplements the port supply pipeline.

Fuel is supplied to aircraft via a hydrant system. Underground pipelines distribute fuel from the storage facility to underground hydrants located at the aircraft parking positions. Hydrants are located at the North and South Terminal gates with additional hydrants serving the RON parking positions 1 through 14. In the North Airpark, additional hydrants are located on the UPS, FedEx and Alaska Cargo Port leaseholds and to RON parking positions P1 through P3. In the East Airpark, there are hydrants located at the old Northwest Airlines Building (lot 5A, blk 3) and the old FedEx facility (lot 3B, blk 4).

Table 3.24 presents the historical Jet-A fuel usage at the Airport from 2000 to 2006. Growth in fuel usage averaged 3.6 percent per year over this period. In 2005, fuel usage averaged 2,530,000 gallons per day yielding an average rate of 9,659 gallons of Jet-A fuel consumed per commercial aircraft departure.

Table 3.24 Historical Jet Fuel Demand

Year	Demand (gallons)
2000	744,914,317
2001	702,998,291
2002	800,117,264
2003	776,530,987
2004	861,103,288
2005	923,465,417
2006	923,898,294

Source: ANC Fuel Sales Data.

Anchorage handles a substantial volume of long-haul international aircraft operations. Aircraft departures include regional and domestic operators who do not have the fuel requirement of the international operators. Therefore, an attempt was made to differentiate between fuel consumed by aircraft performing international departures and the fuel consumption of regional and domestic departures.

The 2002 Master Plan determined the regional and domestic Jet-Aircraft used an average of 1,500 gallons per departure. Using 2005 as a base year, the average international Jet-Aircraft was calculated to use an average of 22,400 gallons per departure. Applying these gallon-per-departure factors to the average daily departures for domestic (including passenger, freight and charter) and international (including passenger and cargo) flights provide the results listed in Table 3.25.

To determine a monthly peaking factor, annual and monthly fuel sales data from 2000 through 2006 were provided by ANC. The data was categorized into international and domestic route fuel purchases. October was identified as the peak month for fuel sales at the Airport. There are anomalies in the data in October 2001 and 2002 so these years were eliminated; however, the average peak monthly fuel sales over the average monthly sales for the years 2003 through 2006 was 15 percent.

Table 3.25 Average Daily Fuel Consumption for Commercial Aircraft

	Average Day Departures		Average Day Consumption Jet-A		Storage Requirements *	
					5 day	7 day
Year	Domestic	International	Domestic	International	gallons	
2005	151	111	227,051	2,299,796	14,529,369	20,341,117
2012	164	159	246,514	3,312,528	20,464,491	28,650,287
2017	172	200	257,702	4,152,677	25,359,681	35,503,553
2027	193	323	289,915	6,719,796	40,305,840	56,428,175

* includes 15% increase to meet peak month requirement

With five 4.2 million-gallon tanks in the AFSC fuel facility located in West Airpark, total fuel storage capacity is 21 million gallons. This amount of fuel storage will meet the 5-day storage requirement until approximately 2012.

Further expansion of the existing fuel farm will be required after 2012 to meet the forecasted aviation demand. By 2027, a total of five additional tanks will be needed to meet the 5-day storage requirement and nine additional tanks will be needed to meet the 7-day storage requirement assuming similar 4.2 million-gallon tanks are constructed.

Each additional tank will require an estimated 1.3 acres of land; therefore, by 2027 the existing fuel farm will need to be expanded to between 6.5 and 11.7 acres to meet the 5-day or 7-day fuel storage requirement.

General Aviation Fuel

ERA Aviation (dba Million Air Anchorage), Signature Flight Support, International Aviation Services and ACE Hangars and Fuel provide GA fueling services at ANC and Lake Hood. ERA and Signature sell only Jet-A fuel, while International Aviation Services sells both Jet-A and AvGas. ACE sells only AvGas.

ERA Aviation includes a regional airline and operates flights from both the domestic terminal and from its South Airpark facility. Currently, they primarily serve their own aircraft, tenant aircraft based on their facility and transient aircraft. ERA Aviation has a combined total of approximately 173,000 gallons of underground fuel storage located at their leasehold in South Airpark. Fuel storage consists of three 29,200-gallon tanks, one 28,200-gallon tank, three 15,000-gallon tanks and one 12,000-gallon tank. All tanks contain Jet-A fuel. Currently ERA maintains a 3-day storage capacity. Fuel is trucked in by tanker from a local distributor located at the Port of Anchorage.

Aircraft fueling is handled by five mobile fuel trucks. One truck holds 7,000 gallons, two trucks hold 5,000 gallons each and two trucks hold 3,000 gallons each. ERA currently has near-term plans to add a 5,000-gallon or 7,000-gallon mobile tanker to their equipment fleet.

Signature Flight Support leases facilities in both East and South Airparks. They provide refueling service primarily to transient aircraft. They have two 30,000-gallon tanks containing Jet-A fuel located in South Airpark. Aircraft refueling is handled by four mobile fuel trucks. Three trucks each hold 5,000 gallons and one truck holds 3,000 gallons.

International Aviation Services facilities are located in the North Airpark adjacent to Postmark Drive and north of the FedEx maintenance hangar. Jet-A fuel is stored in four 20,000-gallon above ground tanks. Jet-A refueling is accomplished by ten 10,000-gallon Darts and four 5,000-gallon tanker trucks.

Also located at the North Airpark site, are two 12,000-gallon tanks holding AvGas. AvGas refueling is done by two 3,000-gallon tankers, one 1,500-gallon tanker and one 1,000-gallon tanker.

ACE Hangars and Fuel has two self-service refueling facilities located at Lake Hood. One facility is located at the gravel strip and one is located at the Public Floatplane ramp at the west edge of Lake Hood. Each location is equipped with a 5,500-gallon tank holding AvGas.

Global Rides is located in South Airpark (lot15, blk 18). They have two 10,000-gallon tanks holding Jet-A fuel. Refueling is dispensed through a hydrant system. Global Rides provides fuel only to aircraft using their facility as required under their lease agreement.

There are other aircraft refueling operations that have no on-airport storage capacity.

For planning purposes, the future aircraft fuel storage requirement for General Aviation aircraft is assumed to remain proportional to the number of aircraft operations over the planning period. Table 3.26 lists the fuel storage requirements.

Table 3.26 Fuel Storage Requirements for GA Aircraft

	Average Annual Operations			Storage Requirements Gallons	
Year	AirTaxi	GA	Total	Jet-A	AvGas
2005	9,158	39,685	48,843	333,000	35,000
2012	9,765	46,641	56,406	384,563	40,420
2017	9,896	53,083	62,979	429,376	45,130
2027	11,134	66,543	77,677	529,583	55,662

In round numbers, an additional 200,000 gallons of Jet-A and 20,000 gallons of AvGas fuel storage will be needed by 2027. The additional storage tanks can be placed underground or on unused aboveground areas on existing lease lots.

3.8.4. Airport Field Maintenance Facility

Field Maintenance occupies two main sites on the airport. The Field Maintenance Facility (FMF) containing the administration, equipment maintenance and vehicle storage is located on the north side of Taxiway V and west of Postmark Drive along De Havilland Avenue. This site is centrally located on the airport and provides excellent access within the AOA. The facility lies partially within the Security Identification Display Area (SIDA) and an Airport Identification Badge is required to access some portions of the facility. Located farther west along Taxiway V is the vehicle refueling pad and the sand/urea storage building. Two 80,000-gallon potassium acetate tanks are located adjacent to the north side of the sand/urea storage building. The combined facility occupies 12.5 acres of land.

A larger site is located west of Aircraft Drive and north of De Havilland Avenue. This site contains three large buildings used primarily for vehicle storage. Other uses contained in these buildings include road sand storage and material storage. Two other buildings not occupied by Field Maintenance are also located on the site. The entire site (block 300, lot 3) is 18 acres.

The old Fire Station 2 building located in West Airpark is used for equipment and material storage. Currently the lake weed mower and other equipment are stored there.

Table 3.27 Existing Field Maintenance Facilities (square feet)

Building	Admin & Shop	Vehicle Storage	Sand & Deice Storage	Other Storage
FMF 5740 De Haviland Ave	72,458	42,301		
Taxway V – Sand Storage Building			23,864	
4100 Aviation Ave – North Building		16,202	6,461	
4100 Aviation Ave – South Building		14,271		
4100 Aviation Ave – West Building	2,709	7,348		5,638
Old Fire Station 2		6,240		
Total	75,167	86,362	30,325	5,638

Future Requirements

The amount of maintenance equipment needed will increase as the airfield expands. The amount of equipment required to maintain the airfield is assumed to be proportional to the area of pavement maintained by the airport. Currently, the airport maintains roughly 670 acres of pavement within the AOA. This is expected to increase 30 percent over the 20-year planning period depending on the number and location of future runways, taxiways and aircraft parking positions. Based on this increase, an additional 25,900 square feet of vehicle storage and 10,000 square feet of sand and deicing material storage will be required.

Satellite maintenance facilities in West Airpark and South Airpark will be needed for operational efficiency. At a minimum, these satellite facilities will need employee break space and sand and deicing storage. This will allow distributor trucks operating in West or South Airpark to quickly reload with sand or deicing material. Existing maintenance facilities at Kulis could meet some of this need.

The existing FMF is divided from the fuel pumps by a tug road that ANC is planning to relocate to the east side of the site. This relocation will improve the safety and security of the FMF.

The *Airport Snow Disposal Master Plan* (see Section 3.10) identified the need for additional equipment and personnel to maintain areas on the AOA and Ground Operations Areas (GOAs) relative to snow removal and disposal. The additional equipment identified as required to maintain the new AOA and GOA areas in the *Snow Disposal Master Plan* is listed in Table 3.23.

3.8.5. Other Aviation-Related Facilities

The other aviation-related facilities at ANC consist of:

- General aviation
- Rental cars
- Military

General Aviation

The facility requirements for general aviation presented here have been adopted from the *General Aviation Master Plan for Lake Hood Seaplane Base and Anchorage International Airport* (GA Plan). The GA Plan was completed recently, in 2006; therefore, its analysis of facility requirements is still valid. The requirements presented in this section are for the higher performance, corporate turboprop and turbojet aircraft that use East and South Airparks. They are not for the lighter, mostly piston aircraft that primarily use Lake Hood’s water lanes and gravel runway, including the small number of aircraft based at tiedown aprons in North Airpark.

Two primary factors were used to derive future ANC general aviation facility requirements: based aircraft and transient operations. The GA Plan forecast provided based aircraft and total operations. Transient operations were determined based on an analysis of transient aircraft logs for Era Aviation (now doing business as Million Air) and Signature Flight Support. From this information it was determined that transient aircraft operations equaled approximately 20.5% of total annual operations. This percentage was assumed constant through the planning horizon. Table 3.28 depicts the forecast of based aircraft, annual operations, and transient operations that would operate out of the East and South Airparks for each planning horizon.

Table 3.28 ANC GA Transient Operations

Year	ANC Based Aircraft (a)	Operations per Based Aircraft (a)	Annual Itinerant Operations	Annual Transient Operations (b)
2003	41	647.7	26,556	5,452
2008	49	660.8	32,288	6,629
2013	58	647.1	37,532	7,705
2023	83	701.5	58,225	11,953

Notes: (a) General Aviation Master Plan for Lake Hood Seaplane Base and Anchorage International Airport, Table 2.8

(b) Assumed to be 20.5 percent of annual itinerant operations

Based on these assumptions, detailed GA facility requirements were developed using typical planning factors or ratios developed from existing facilities. Separate general aviation facility requirements were developed for each forecast year for the major general aviation components, including hangar, apron, and terminal. Based on these requirements, total acreage requirements were derived using existing facility ratios that account for ancillary facilities such as auto parking, fuel storage facilities, and buffer zones.

GA Aircraft Hangar

Demand for hangars exists for both based and transient aircraft. Typically, demand for hangar space is related to the local climate and the type of aircraft that operate at the airport. Areas with more severe weather conditions have a higher demand for hangar storage facilities. In addition, the large investments in Jet-And turboprop aircraft also increase the demand for hangar storage. For these reasons, ANC has a high demand for aircraft hangar storage. Facility requirements for based aircraft and transient aircraft are presented in detail below.

GA Based Aircraft Hangar

Based aircraft were projected to increase by approximately 70 percent through 2023. As shown in Table 3.29, the growth was primarily attributed to turboprop and Jet-Aircraft. Consistent with conversations with the FBOs, it was assumed 100 percent of the future based aircraft would be stored in hangars. Applying typical space requirements for each aircraft type resulted in the need for 242,100 square feet of hangar for based aircraft in 2023. Table 3.29 depicts based aircraft by type, average square foot requirement per aircraft and total hangar area required.

Table 3.29 ANC GA Based Hangar Requirements

Forecast Year	Based Aircraft Type	Number	Average Area (SF) Per Space	Area Required (SF)
2008	Single-Engine Piston	3	1,200	3,600
	Multi-Engine Piston	3	1,500	4,500
	Turboprop	16	1,900	30,400
	Jet	26	3,500	91,000
	Total	48		129,500
2013	Single-Engine Piston	3	1,200	3,600
	Multi-Engine Piston	3	1,500	4,500
	Turboprop	18	1,900	34,200
	Jet	34	3,500	119,000
	Total	58		161,300
2023	Single-Engine Piston	3	1,200	3,600
	Multi-Engine Piston	3	1,500	4,500
	Turboprop	20	1,900	38,000
	Jet	56	3,500	196,000
	Total	82		242,100

Source: HNTB Analysis

Hangar support space is typically associated with each hangar. These areas are generally comprised of office and storage areas. Projections of future hangar support space were based on the existing ratio of support area to hangar. The space requirements presented in Table 3.30 represent support space required for new hangars.

Table 3.30 ANC GA Based Hangar Support Space Requirements

Forecast Year	Hangar Support Space Requirements (SF)
2008	9,735
2013	20,229
2023	46,893

GA Transient Hangar

The demand for transient hangar space is typically greatest during the winter months, based on discussions with the FBOs. In addition, the average length of stay during this time is typically less than one day. The requirement for transient hangar space was estimated by multiplying the existing ratio of hangar space to average day, peak winter month arrivals. Peak month transient operations were determined to be 8.8 percent of annual transient activity based on an analysis of the FBO transient logs. The ratio of hangar to average day, peak winter month arrivals was found to be approximately 5,500 square feet. Transient aircraft need more hangar space per aircraft than based aircraft because of the frequent repositioning that occurs with transient aircraft. Table 3.31 depicts the transient hangar requirements. Transient hangar support space is included in terminal area calculations.

Table 3.31 ANC GA Transient Hangar Requirements

Forecast Year	Annual Transient Operations (a)	Peak Winter Month Transient Operations (b)	Average Day Peak Month Transient Arrivals (c)	Transient Hangar Space Requirements (SF)
2008	6,629	583	10	55,000
2013	7,705	678	11	60,500
2023	11,953	1,052	18	93,500

Notes: (a) Table 3.24

(b) Assumed to be 8.8 percent of annual transient operations

(c) Monthly transient operations divided by 31. Daily operations divided by 2.

GA Aircraft Apron

General aviation apron is typically comprised of based aircraft apron, transient aircraft apron and based aircraft hangar circulation apron.

GA Based Aircraft Apron

No future based apron area requirements will be required, since it was assumed that all future based aircraft would be stored in conventional hangars.

GA Transient Apron

The itinerant apron is used for loading and unloading passengers and for short-term aircraft parking. The demand for transient apron is greatest during the summer months, based on discussions with the FBOs. Transient aircraft also typically remain at the airport longer in the summer than in the winter. The length of stay can be as long as one week, with a typical length of stay of one to three days. Transient apron requirements were estimated by providing 1,200 square yards (10,800 square feet) to average day, peak summer month arrivals assuming an average duration of two days. This planning factor provides parking and circulation for larger turboprop and Jet-Aircraft. By 2013, additional transient apron will be required. Table 3.32 depicts transient apron requirements.

Table 3.32 ANC GA Transient Apron Requirements

Fore cast Year	Annual Transient Operations (a)	Peak Summer Month Transient Operations (b)	Average Day Peak Month Transient Arrivals (c)	2- Day Average Duration	Transient Apron Requirements (SF)
2008	6,629	762	13	26	280,800
2013	7,705	886	15	30	324,000
2023	11,953	1,375	23	46	496,800

Notes: (a) Table 3.24

(b) Assumed to be 11.5 percent of annual transient operations

(c) Monthly transient operations divided by 31. Daily operations divided by 2.

GA Hangar Circulation Apron

Hangar circulation provides access and staging for aircraft occupying the hangar. This area is typically calculated as a percentage of hangar area. Table 3.33 depicts the hangar apron requirements based on new based aircraft and transient aircraft hangar requirements.

Table 3.33 ANC GA Hangar Apron Circulation Requirements

Forecast Year	Total Hangar Circulation Apron (SF)
2008	36,450
2013	14,670
2023	37,890

General Aviation Terminal

A general aviation terminal building serves itinerant aircraft operations, which includes both based and transient aircraft. Services typically provided in the GA terminal include waiting area/pilot lounge, management/operations, public restrooms, concessions, circulation, and utilities. Additional services include VIP lounges and private conference rooms.

For planning purposes, it was assumed that future FBOs would provide a similar level of service as the two existing FBOs. The ratio of existing average day, peak month operations to terminal area was used to determine future facility requirements. Table 3.34 presents future General Aviation Terminal requirements.

Table 3.34 ANC GA Terminal Requirements

Forecast Year	Terminal Requirement (SF)
2008	23,170
2013	28,000
2023	41,500

ANC GA Facility Requirement Summary

Table 3.35 summarizes the facility requirements and deficiencies of each major GA component at ANC for each of the planning years. Total acres to accommodate these facilities were calculated so that land could be preserved to meet future requirements. A ratio of existing facilities to total area was determined and applied to the sum of the major components. This methodology accounts for ancillary components of the site including auto parking, fueling facilities, landscaping and zoning buffers. A total of 18 acres is required by 2023 to meet the additional requirements, as shown in Table 3.35. This area could increase depending on airside and landside access requirements.

Since the GA Plan requirements analysis was completed, Taxiway Z on the west side of South Airpark was constructed, making approximately 23 acres available for development. The GA Plan recommends this land be used to satisfy future GA facility expansion at ANC.

Table 3.35 ANC GA Facility Requirement Summary

		2008		2013		2023	
	Existing	Required	Deficiency	Required	Deficiency	Required	Deficiency
Hangar							
Based (SF)	100,000	129,500	(29,500)	161,300	(61,300)	242,100	(142,100)
Transient (SF)	44,000	55,000	(11,000)	60,500	(16,500)	93,500	(49,500)
Apron							
Transient (SF)	310,500	280,800	29,700	324,000	(13,500)	496,800	(186,300)
Circulation (SF)	(a)	36,450	(36,450)	70,020	(70,020)	172,440	(172,440)
Terminal (SF)	166,500	23,170	(4,670)	28,000	(9,500)	41,500	(23,000)
Total Gross Area Required (AC)	40	43	(3)	45	(5)	58	(18)

Notes: (a) Based on new hangar requirement
This table does not include future requirements for general aviation facilities at Lake Hood.

3.8.6. Miscellaneous Facilities

Miscellaneous facilities include facilities supporting FAA operations and commercial developments on the Airport.

Facilities required to support the FAA are determined at both the local and national levels and are subject to funding availability. No additional specific facility needs have been identified for the FAA at ANC; in fact, the FAA recently relocated from an office building in East Airpark. The previous master plan update proposed relocating the FAA's Air Traffic Control Tower (ATCT) to the west side of the airfield. In case the ATCT relocation ever occurs, recent planning for Lake Hood designated a site for a future supplemental Lake Hood control tower. This Master Plan will evaluate the viability of the existing ATCT site as part of the alternatives analysis process.

Airport commercial development is likewise difficult to quantify, given the impacts of local market conditions on the demand for these types of facilities. However, large airports are desirable locations for commercial development due to the high volume of traffic associated with them. The strong business and tourist components of the passenger market served by Anchorage would have a high propensity to use commercial facilities and services. Hotels, conference centers, restaurants, service stations, and light industrial/business parks all gravitate to locations on and immediately adjacent to major commercial airports. The Airport has identified a market for a hotel near the passenger terminal facilities to serve passengers arriving the night before their flight and leaving on an early flight the next day, late arrivals staying overnight, less than overnight stays for passengers waiting on flights and small business meetings.

3.9. Utility Requirements/Issues

Future development in the western and southern portions of the Airport to support an expansion of the airport will require improvements in utility infrastructure serving these areas of the airport. The utility companies have recognized that some expansion into these areas is likely and have been planning accordingly. Future improvements already being planned by the respective utilities are presented below and their capabilities for supporting additional development assessed.

3.9.1. Public Water, Domestic, and Fire Protection

Several water supply and upgrade projects were completed in the past several years at the airport to address low capacity and pressure concerns. The Anchorage Water & Wastewater Utility (AWWU) and the State of Alaska collaborated in strengthening the water supply and distribution system. A 5 million-gallon water storage tank was constructed south of the Airport on Kincaid Street, which feeds a 30-inch water main in Raspberry Road. From Raspberry Road, a 24-inch water main was constructed into the South Airpark and another 24-inch main was extended through Airguard Road, under the parallel runways, and into the main distribution system in the terminal area. Another 16-inch water line was constructed in west Northern Lights Boulevard which ties into the airport distribution system under Postmark Drive. Recent water line improvements include a 10-inch service pipe to the new terminal building, connecting between terminal Concourse B and the 16-inch central main at the north end of the new Concourse C. With these improvements in place, there is now sufficient pressure and capacity available in the mains to support existing airport development and some future expansion.

There is an existing 16-inch water main passing under Runway 14-32 near the ARFF facility. Presently, its sole purpose is to carry water to the sewage treatment plant at Point Woronzof and the fuel tank farm. The pressure in this line is on the order of 50 pounds per square inch (psi) and available fire flows are on the order of 1,500 to 2,000 gallons per minute (gpm).

Earlier planning studies identified a need for more water to fight fires when additional development occurs in the West Airpark. AWWU plans to install a new 16-inch water main from Raspberry Road crossing under both east-west runways and Taxiway K sometime after 2009. This water main will provide additional water capacity to the West Airpark.

Proposed development areas south of the parallel runways and west of the South Airpark could be served by the reservoir and large distribution mains described previously. Sufficient water is available for most types of construction in the South Airpark.

3.9.2. Sanitary Sewer

Several wastewater utility projects were completed in the past several years at the airport. Past improvements to the sanitary sewer system include a 12-inch ductile iron sewer line constructed to serve the Clitheroe Center on the west side of Runway 14-32. Due to the irregular topography, a portion of this sewer line is a force main. Sewage from the Clitheroe Center is pumped up to a manhole with an elevation of 95.8 feet. From there, the sewage flows through a 12-inch line under Runway 14-32 to a trunk line in DeHavilland Avenue.

According to the USKH design study report prepared for the Clitheroe Center Sewer Extension in 1996, the 12-inch sewer main was sized to accommodate flows from 400 acres of commercial development. It was assumed that this area would develop primarily into large expanses of aircraft parking and maneuvering areas, and industrial park. Therefore, unless a high volume of industrial development is contemplated, the existing sewer line should be adequately sized to serve the West Airpark area.

Potential development areas south of the Airport, west of the South Airpark, are not served well with sanitary sewer at this time. The existing South Airpark complex is served by an 8-inch ductile iron sewer system that drains eastward through Kulis. The line passing through Kulis is a 10-inch ductile iron main. This sewer system is not owned by AWWU and there is an ongoing question of how to convey these lines to AWWU.

A small residential subdivision south of Raspberry Road is served by a public sewer in Raspberry Road. It is a combination of 8-inch ductile iron gravity mains and a 4-inch force main. Any significant development in this area will require the construction of new sewer lines. The most likely route would be to upgrade the system currently serving the South Airpark and Kulis.

There is a 21-inch reinforced concrete trunk line in the subdivision immediately east of Kulis that would be a likely tie-in point.

The John M. Asplund Wastewater Treatment Facility is located adjacent to airport property on Point Woronzof Drive. The facility sits on a 45.6 acre site near the northwest end of Runway 32 and is owned by the AWWU. AWWU completed a facility plan in 1999 which identified adequate capacity with some modifications to the plant for expected flows through calendar year 2020. Modifications expected to occur in the short term will expand the facility to the south on existing property. MOA land adjacent to, and south of, the current site has been identified as potential area for long term expansion.

3.9.3. Storm Drainage

A large diameter storm drain, which extends westward through the West Airpark area, was constructed at the time the north-south runway was built. It crosses under Runway 14-32 at Taxiway M with a 54-inch corrugated metal pipe. The invert is approximately 15 feet below runway grade. From this point, the pipe extends southwestward, outfalling just north of the intersection of Taxiways K and J. The outfall is a 78-inch corrugated metal pipe. From the outfall, a drainage swale carries runoff directly westward to Cook Inlet. This piped storm drain system was sized to handle all runoff from the West Airpark area. The pipe may or may not be deep enough to accommodate required development in West Airpark.

Drainage in the area south of the Runway 7R-25L parallel is primarily surface drainage. A large swale extends west from the South Airpark to the end of the parallel runways. Due to rising terrain further west, a pair of 66-inch corrugated metal pipes have been constructed under the parallel runways and Taxiway K to carry this drainage northward. The outfall meets up with the previously described drainage swale where it runs westward to Cook Inlet.

A well-developed storm drain system serves the North Airpark area. It flows northward to a 72-inch diameter outfall crossing West Northern Lights Boulevard to outfall in Knik Arm. This storm drain system has been sized to handle runoff from the entire North Airpark area.

A project to construct a force main from the storm water pump station located in East Airpark to the Postmark Drive storm drain system is under design.

3.9.4. Natural Gas

The entire airport is served by Enstar Natural Gas Company (Enstar). Several gas supply and upgrade projects were completed in the past several years at the airport to address low capacity concerns and to provide service to the new terminal.

The recent improvements include a 6-inch high pressure gas main through the terminal area from the east. This gas main supplies high pressure gas to a reducing station adjacent to Taxiway V, just east of Postmark Drive and alleviates any potential gas shortages at the terminal area.

There is an existing 6-inch gas line passing under Runway 14-32 near the ARFF facility. This line brings gas from the reducing station mentioned previously to the West Airpark area. Enstar feels this will provide sufficient capacity to serve any commercial facilities anticipated in the West Airpark.

Existing service to the South Airpark area comes primarily from a main in Dimond Boulevard. When substantial development occurs in this area, Enstar will complete several critical links to allow them to bring large volumes of gas to this area.

Enstar will likely continue their current policy of paying for constructing gas mains to serve development, as required. The cost of the main extensions is recaptured through their rate base. Developers are not required to pay for gas main extensions. Enstar feels that there is adequate capacity to serve any reasonably anticipated developments in this area. Additional facilities will be installed with new growth in the area. There are no facility upgrades known or planned at this time.

3.9.5. Electric Service

Chugach Electric Association (CEA) provides services to the Airport. CEA feels there is adequate power available to meet any foreseeable needs. An existing underground distribution system skirts the shoreline from the Point Woronzof water treatment plant south to the west ends of the parallel runways, and then loops around the west and south end of the runway to a connection near the South Airpark. Also, a loop passes under Runway 14-32 near all the other utility crossings.

A new direct bury feeder line was installed along the alignment of a proposed new road through the West Airpark. The other feeder lines in the West Airpark will be upgraded or replaced as development takes place.

CEA constructed a new distribution substation adjacent to Point Woronzof Drive to serve growing demand for power at the airport. The new substation was completed in 2007.

3.10. Snow Disposal Sites

Snow storage facilities are divided into airfield and landside. The airfield snow is generally contaminated with various deicing fluids and is referred to as “dirty snow”. The landside snow is generally free of deicing contaminates and is referred to as “clean snow”.

Field Maintenance operates a large facility for clean snow north of Aircraft Drive northeast of Aircraft Parking Apron E. Smaller sites for clean snow are located east of the ADOT&PF Central Region building on Lake Hood and along Point Woronzof Drive south of the sewage treatment plant. These facilities are adequate for clean snow storage.

There are no permanent storage sites for dirty snow. Currently, most of the dirty snow is stored in the area beyond the west end of Runway 7L and between Runway 7R and Taxiway K. This area is gradually filling up with fuel contaminated soil and with waste soil from construction projects. Snow is also pushed from the terminal area to the area between the RON 7-11 parking positions and Taxiway R.

Field maintenance is able to push or blow much of the snow beyond the runway and taxiway safety areas. The rest must be hauled to the areas described above.

A new dirty snow storage facility will be constructed north of the Field Maintenance Facility in the corridor reserved for a future tunnel to West Airpark. The facility is currently under design. Current long term plans show a future snow storage site located at the west end of Taxiway K. A permanent facility is also needed in South Airpark.

UPS installed a snow melter in their recent construction. Field Maintenance is requesting a portable device to use in the terminal area. They believe this would be more effective than hauling and storing snow from the terminal area. They recently tested a device called the Dragon.

3.11. Sand and Deicing Materials

Field Maintenance currently uses four materials: urea, potassium acetate, runway sand and road sand. Urea is a relatively inexpensive deicer distributed in a pellet form. It is used in areas where its runoff will not enter into Lakes Hood and Spenard. It is not used on the aircraft parking aprons. Urea has a high nitrogen content and which can have a negative impact on the lakes. Potassium acetate is a liquid deicer that is used in the remaining areas. Runway sand has specific FAA grading requirements and is produced locally specifically for airfield use. Road sand has less stringent requirements. Runway sand is over 3 times the cost of road sand.

Field Maintenance will be reducing its use of urea as a deicing agent in the future because the fertilizer plant producing urea located in Nikiski is closing. The Nikiski plant produced the only urea that was certified by FAA for use on the Airfield. ANC is searching for an appropriate pellet deicer to replace urea. For this analysis, it is assumed the replacement deicer will have the same storage requirement.

In the Field Maintenance section, airfield pavement was expected to increase 30 percent over the 20-year planning period. Applying the same ratio to the material storage requirements provides the results in the following table.

Table 3.36 Sand and Deicing Materials Requirements

Material	Unit	Annual Requirement	Existing Storage	Future Requirement
Urea	ton	1,600	1,600	2,080
Potassium Acetate	gallon	120,000	90,000	156,000
Airfield Sand	ton	4,000	4,000	5200
Road Sand	ton	1,000	1,200	1,300

3.12. Summary of Facility and Land Requirements

A summary of key facility requirements findings is as follows:

- Airfield – Threefold increase in average delays in 10 years; almost twenty-fold in 20 years.
- Cargo – Fourfold increase in 20 years.
- Other – Average of 25 percent increase in 20 years.

Table 3.37 shows the existing land use categories and the projected number of acres required for each land use by 2027. The existing land uses and acreages are from Chapter One.

Table 3.37 Land Use Requirements (acres)

Land Use Category	Existing	Projected Need in 2027	Difference
Airfield	1,584	*	*
Passenger Terminal Complex	228	174	+54
General Aviation	9	9	0
Commercial Aviation	55	86	-31
Air Cargo/Aircraft Maintenance	253	559	-306
Terminal/Airline Support	93	116	-23
Airport Support	80	151	-71
Aviation Related Commercial	60	69	-9
Governmental/Other	163	33	130

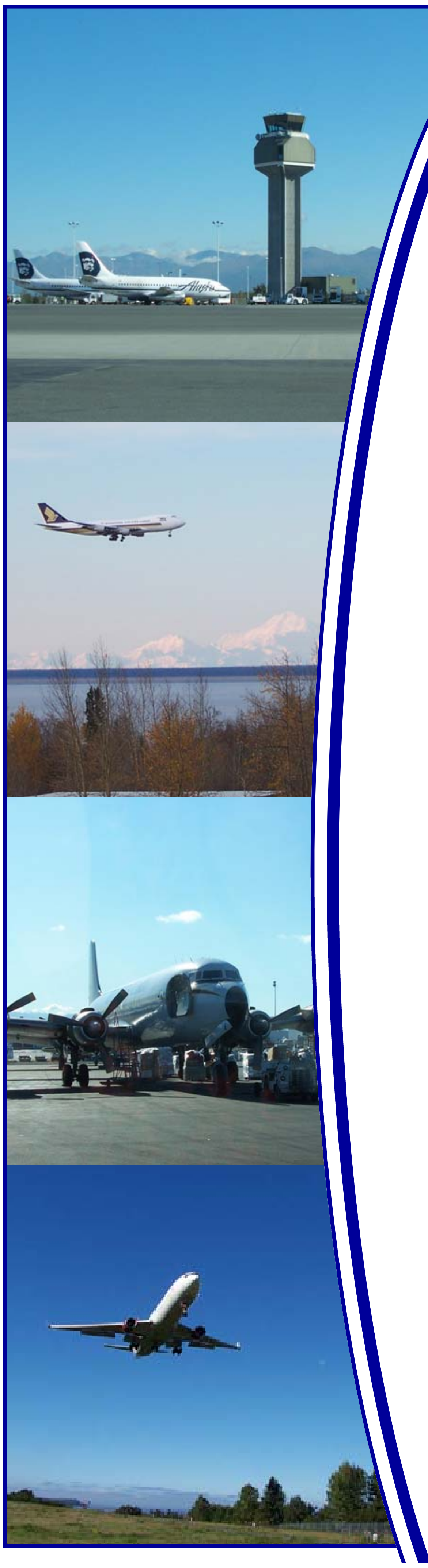
*Varies

Explanations of the future land use requirements follow:

- The amount of land required for the Airfield land use in the future depends upon the specific arrangement of runway and taxiway expansion considered in the alternatives.
- The Passenger Terminal Complex acreage is more than adequate to handle the needs through 2027, as was explained previously in this chapter.
- The General Aviation land use refers to a small area outside the Lake Hood Seaplane Base boundary that is used for smaller general aviation aircraft. No increase in this land use is projected because expansion for this type of aircraft is planned within the Lake Hood Seaplane Base boundary.
- Commercial Aviation is the land use now occurring in South Airpark, which is for higher performance business aircraft, the fastest growing segment of general aviation. The projected land area is based on analysis done for the *General Aviation Master Plan for Lake Hood Seaplane Base and Anchorage International Airport.*
- The Air Cargo/Aircraft Maintenance land use includes land primarily needed for air cargo. This land use shows the largest deficiency in land area for 2027 needs. Air Cargo alone needs 521 acres by 2027, most of it for additional aircraft parking apron.

- The Terminal/Airline Support land use includes facilities such as ground handling service facilities, flight kitchens, and bulk fuel storage. An increase of 25% is assumed for this land use.
- The large increase in land needed for Airport Support is due partly to the need to relocate one of the existing snow disposal areas that is now within the Airfield land use. In addition, future airfield pavement, roads, and parking lots will increase the area for snow removal and the area needed to store snow. The Airport Support land use increase also includes future ARFF and airport maintenance facilities that will be required in West Airpark to serve expanded airfield areas.
- Aviation-Related Commercial is highly dependent upon market demand. Future demand is assumed to require a 25% increase in land area for new and expanded commercial businesses that serve the needs of airport users, but do not require airfield access.
- The Governmental/Other land use reflects the largest decline in land area needed. This is due to the realignment of Kulis Air National Guard Base.

The total difference between existing and future needed land area in Table 3.37 is a deficiency of 364 acres. With approximately 1,400 acres of land in the Airport Reserve land use category, as shown on Figure 1-2, some land will be available to meet deficiencies identified in Table 3.37. However, to be useable, the available land must be located where appropriate for the specific land uses and their inter-relationships. Balancing the needs for facilities and airfield capacity will be a significant challenge in the next step of the planning process, which is to identify and evaluate alternatives for airport development. The alternatives chapter will address a range of options to meet future requirements. The evaluation will consider costs, noise, other environmental impacts, community values, and operational considerations.



Chapter Four: Concept Development and Alternatives Evaluation

Ted Stevens Anchorage International Airport
2008 Master Plan Study Report
January 2009

Ted Stevens Anchorage International Airport

2008 Master Plan Study Report

Chapter Four – Concept Development & Alternatives Evaluation

January 23, 2009
Draft

AKSAS Project Number: 59585

Prepared for:
Ted Stevens Anchorage International Airport
Alaska Department of Transportation and Public Facilities

Prepared by:
WHPacific
with
HNTB Corporation and DOWL Engineers

Appendices

Appendix A: 2002 Conditionally Approved ALP

Appendix B: Concept Development and Alternatives Evaluation

Appendix C: Emerging Technologies Analysis

Appendix D: FAA Traffic Management Unit (TMU)

Related Documents

Public Involvement Summary – Two Volumes

Technical Appendix

Update on Effects of Recent World Economic Events

The Master Plan Forecast of Aviation Activity for the Ted Stevens Anchorage International Airport is based on economic and airline projections in 2006. It was found to be technically valid by the FAA in March, 2007 based on industry information available at the time. The rise in crude oil prices to as high as $140 per barrel and other major economic events in 2007 and 2008 have dramatically changed and continue to affect the aviation industry. Not only have costs risen, the demand for commercial passenger and general aviation passenger as well as air cargo services has decreased. The outlook as of late 2008 is unclear.

Future aviation demand levels presented in Draft Chapter 2, Aviation Activity Forecast, were used as the foundation for the Draft Chapter 3, Facility Requirements and the Draft Chapter 4, Concept Development and Alternatives Evaluation. However, due to the current uncertainty of business costs and the general economic activity levels, it is expected that future demand levels will not materialize as soon as originally projected.

Therefore, the Airport intends to monitor the economic outlook and, at an appropriate time, start a Master Plan Update with a new or updated forecast and development timetable. Accordingly, working with airline partners, the Airport is deferring further planning of a new runway until the economic outlook improves.

Chapter Four - Concept Development & Alternatives Evaluation

4.1. Introduction and Executive Summary

The alternatives development and evaluation process is an organized approach to identifying and evaluating alternative development options. It typically results in the selection of a recommended alternative for airport improvements that best meets the forecast demand through the planning period. At ANC, through the public involvement process, a variety of facility improvement concepts were developed that met the identified goals, objectives and facility requirements. These concepts were later screened, refined as alternatives, and evaluated.

This chapter is written to reflect the work completed on the Master Plan to develop concepts and evaluate alternatives through May 2008. During the first half of 2008 the price of oil had nearly doubled from roughly $70 per barrel to over $140 per barrel (by July 3, 2008) and in the next three months fell substantially. This extreme volatility in the price of oil, and the rapid entry into a general recession, has led to an uncertain economic situation for airlines. Planning of major infrastructure improvements at Ted Stevens Anchorage International Airport has been deferred in consideration of the unknown outlook for aviation demand.

The uncertain economic situation has prompted ANC's signatory airlines to express their concerns about the development of an additional runway at ANC in the near future. Through May 2008, an airfield analysis was completed regarding potential options for constructing a runway prior to this economic downturn. That analysis is presented herein. Runway alternatives were developed based on this analysis and, for future years, based on the March 2007 FAA-approved aviation forecast. When planning activities resume at the Airport, the planning years from the March 2007 FAA-approved aviation forecast will need to be updated. With this in mind, operational demand levels for the runway alternatives presented will also be referenced.

Based on the March 2007 FAA-approved aviation forecast, the operational demands for the future planning development planning years are, respectively, 297,650 operations by

2012, 335,150 operations by 2017, and 455,600 operations by 2027. A total of 246,000 annual aircraft operations in the base year (2006) was used in the SIMMOD airfield simulation analysis. Finally, it should be noted that benefit-cost analyses presented in this document are based on the future planning development years. If the March 2007 FAA-approved aviation forecast is updated to reflect industry changes due to recent economic events, the results of the benefit-cost analysis will also change.

Through May 2008, the process to select a recommended alternative included concept development and a preliminary alternatives evaluation pertaining primarily to airfield requirements. An airfield alternative has not been recommended at this time. In addition to the airfield alternatives, a high-level summary of the concept development and alternatives analysis for air cargo and terminal facilities conducted to date is included. Excluded are the concepts and alternatives pertaining to support facilities, roadway access, circulation and parking.

This chapter summarizes the considerations, concept development, and alternatives evaluation and is organized as follows.

- Introduction and Executive Summary
- Master Plan Goals and Objectives
- Summary of Facility Requirements (Ch. 3)
- Alternatives Analysis Process
- Airfield Assessment
- Air Cargo Assessment
- Terminal Alternatives Analysis
- Regional Airfield Capacity Alternatives
- Conclusion

4.2. Master Plan Goals and Objectives

The following goals and their subordinate objectives were developed after a review of previous ANC Airport Master Plans, identification of current issues at the airport, interviews with Airport staff and discussions at Technical Committee, agency and public meetings. They are intended to guide the master plan formulation and provide the criteria for selecting the best concept for airport development.

Goal: Enhance airport safety

Objective: Comply with Federal Aviation Administration (FAA) design standards and other federal aviation regulations, such as those regarding airspace obstructions, airport certification, and security, in the development of airport facilities.

Objective: Reduce the potential for runway incursions and unsafe uses in and around the Runway Protection Zones.

Objective: Make safety a primary criterion for the layout of the airfield to provide adequate operational capability during snow removal, periodic airfield closures during maintenance and closures during construction.

Objective: Lay out roads and other facilities to maximize safety.

Objective: Acquire adjacent property to enhance safe aviation operations.

Goal: Limit and mitigate adverse environmental impacts as practicable.

Objective: Encourage over-water operations and employ other measures to reduce noise exposure in neighborhoods.

Objective: Work cooperatively with the Municipality of Anchorage (MOA), and within aviation related constraints, to allow Airport property that is not presently in demand for Airport functions, including revenue generation, to be used on an interim basis for recreational activities that do not limit or complicate prompt conversion to use for Airport purposes.

Objective: Develop the Airport in such a way as to achieve transportation goals while limiting and mitigating adverse impacts to the surrounding community.

Objective: Design storm drainage and storm drainage treatment systems and perform fueling, deicing, snow storage, and other airport activities to maintain or improve water quality.

Objective: Reduce airfield and road traffic congestion and delays to reduce air pollution and noise.

Goal: Maximize economic benefit to Southcentral Alaska, the State of Alaska, and the national air transportation system.

Objective: Facilitate the Airport's capacity to accommodate the fast-growing air cargo market to Asia, particularly China.

Objective: Increase other opportunities for revenue generation at the Airport, including future land development.

Objective: Plan Airport development that is timely, right sized, and financially feasible to implement.

Goal: Enhance effectiveness, efficiency, and customer service; meet the needs of Airport users; and balance air transportation needs with other ANC goals.

Objective: Balance the capacity provided with the projected demand.

Objective: Provide efficient circulation routes for aircraft, cargo, people (passengers, employees, visitors and pedestrians), baggage, vehicles, and support services.

Objective: Redevelop Kulis ANG Base so that it contributes to Airport goal fulfillment.

Objective: Develop the Airport in a way that maximizes flexibility in use and preserves options to accommodate anticipated future changes in aviation.

4.3. Summary of Facility Requirements

Chapter 3 of the ANC Airport Master Plan describes the facility requirements required to meet the unconstrained[1] March 2007 FAA-approved forecast demand through 2027. The facility requirements are organized according to five functional airport areas, categorized as primary and secondary elements, and developed for three development phases or horizons (2012, 2017, and 2027). The facility requirements and related considerations are summarized in the subsequent sections.

[1] Unconstrained growth assumes terminal and airfield capacity will be available to accommodate anticipated demand.

4.3.1. Primary and Secondary Elements

The facility requirements are organized into primary and secondary elements. Primary elements include airfield, air cargo, and terminal facilities. These elements are primary elements because they are required to meet substantial design criteria set forth by the Federal Aviation Administration (FAA) among other federal, state, and municipal regulations. They also comprise the largest, contiguous land areas on airport property, with potentially the greatest impact to Airport operations and Airport surroundings.

Secondary elements include support facilities and roadway access, circulation, and parking facility requirements. These secondary elements typically have greater planning flexibility, can often be subdivided, and filled-in around the primary elements. Through May 2008, concepts and alternatives for these secondary elements were not identified.

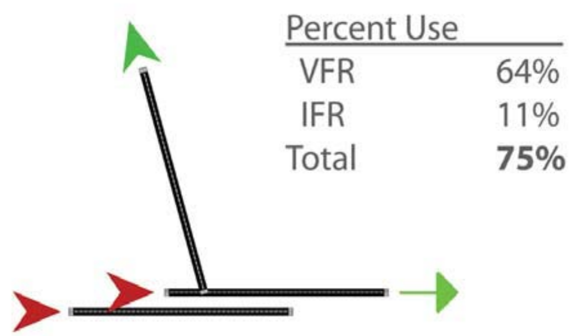
4.3.2. Airfield Facilities – Balance Runway Operations and Maintain Acceptable Delay Levels

Airfield facilities include the runway system, taxiway system, and common use aprons utilized for queuing, holding, sequencing, and deicing aircraft. Based on the March 2007 FAA-approved aviation forecast, and airfield capacity analysis completed through October 2007, peak hour delays at ANC will reach levels of 30 minutes or more per operation when demand exceeds capacity by roughly 10 operations during the peak hour. Airfield facility and operations improvements are required to balance operations and maintain acceptable delay levels based on the SIMMOD Model.

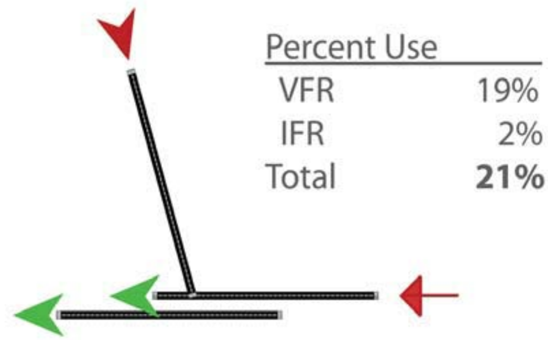
Balance Runway Operations

ANC currently operates three runways in tandem as permitted by Air Traffic Control (ATC) procedures and dependent on the combination of weather conditions (e.g. wind), fleet mix, and jet blast. The primary operating configuration is arrivals to Runways 7R and 7L and departures to Runway 32 (east-west configuration). This configuration produces the highest runway capacity. The second highest capacity configuration is arrivals to Runway 14 and departures to Runway 25R and 25L (north-south configuration). All runway configurations are illustrated on Figure 4.1 and further described in Chapter 3. The two east-west runways and one north-south runway currently create an imbalance in capacity between the east-west versus north-south operations.

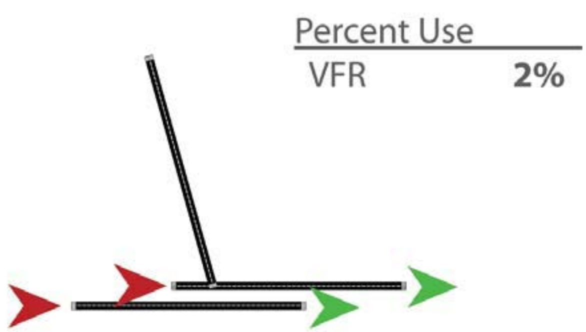
Configuration 1



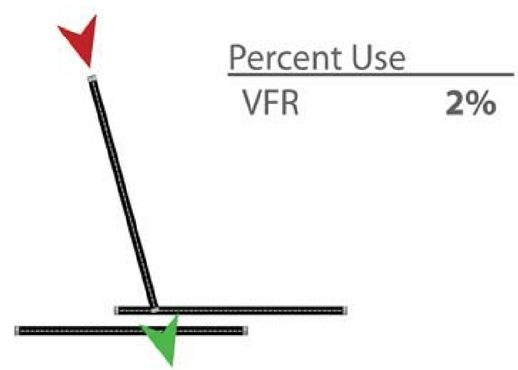
Configuration 2



Configuration 3



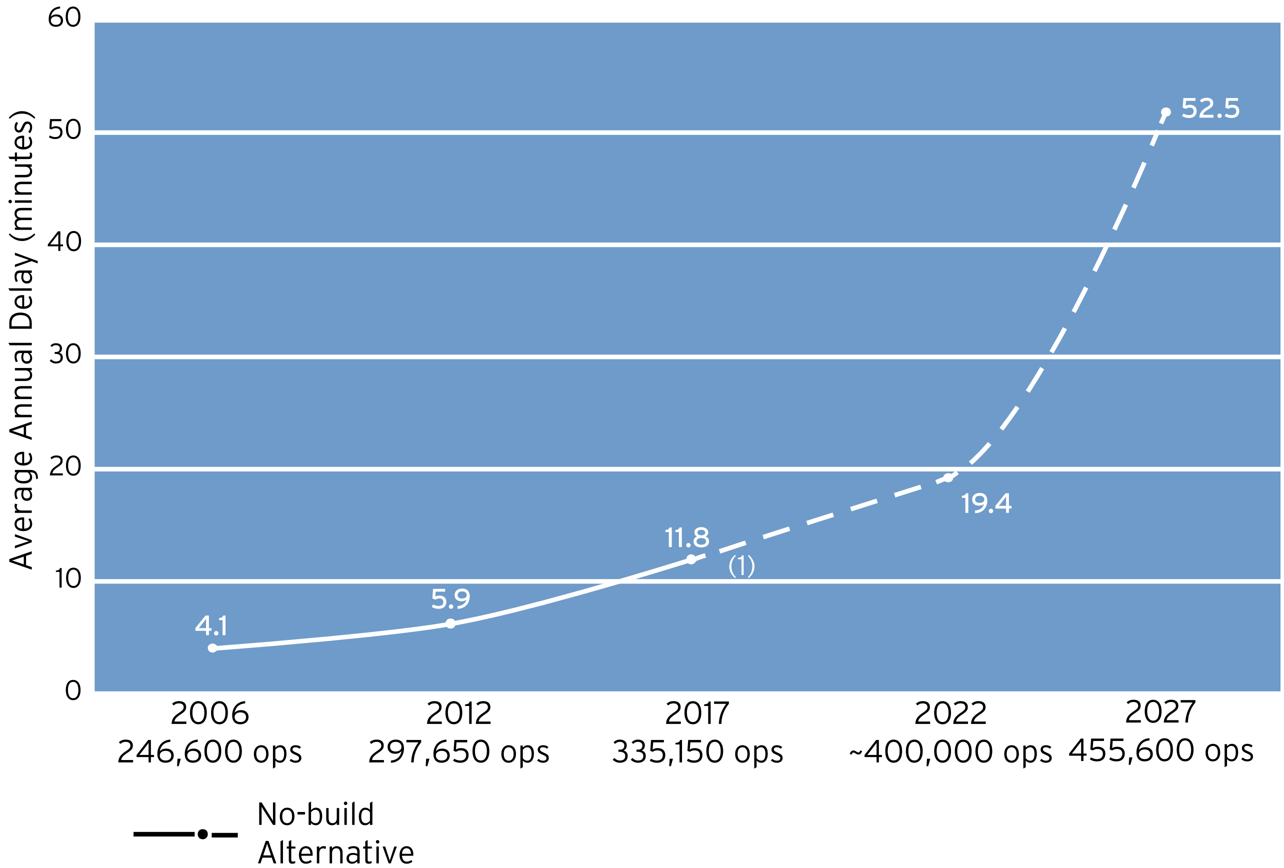
Configuration 4



Maintain Acceptable Delay Levels

As demand levels increase, the lack of a second north-south runway will result in significant airfield delays. These delays further increase when the north-south runway is taken out of service for snow removal, maintenance or operating under Instrument Flight Rule (IFR) conditions. Under IFR (poor weather) and without runway improvements, delays may exceed 30 minutes per operation during the peak hour when peak hour operations reach approximately 80.

It should be noted that the southern endpoint of Runway 14-32 lies roughly on the centerline of Runway 7L-25R. Thus, the two east-west runways are not entirely independent of Runway 14-32 operations in all operating configurations. Under several circumstances, when Runway 14-32 is utilized, Air Traffic Control (ATC) will restrict aircraft from arriving or departing on the two east-west runways, resulting in aircraft delays during periods of high demand. As an example, if a heavy jet is departing on Runway 32 from its southernmost point, ATC will close Runway 7L-25R while the aircraft is holding for departure. Additionally, due to the air movement generated by the run-up of the departing aircraft's engines, ATC will temporarily restrict arrival and departure operations on Runway 7R-25L to minimize turbulent air moving over the runway surface. An airfield capacity and delay analysis was conducted to determine the amount of existing and future delay resulting under the four runway use configurations as described in Chapter 3, Facility Requirements. The delay results from the analysis indicate that without capacity enhancements or operational changes, such as a new north-south runway, the airfield will be congested with only 9 percent growth in operations. Average annual delay results are shown in Figure 4.2.



(1) - When annual average delay levels exceed approximately 15 minutes per operation, the simulation model gridlocks. This occured beyond 2017 when demand exceeded 335,150 operations. Beyond 2017, the average annual delay values were extrapolated.

The delay-capacity results validate the recommendation in the 2002 Master Plan to add a second north-south parallel runway at ANC. A new runway was identified in the 2002 Master Plan and shown on the conditionally approved Airport Layout Plan (ALP) as revised in 2006 (see **Appendix A**). The 2002 Master Plan recommended a north-south runway to maintain adequate capacity at ANC and provide balance between the east-west and north-south runways at ANC. However, increased demand may necessitate additional or greater capacity enhancements at the airport. As a result, several runway alternatives are analyzed in this Master Plan Update.

A New North-South Runway

The existing north-south runway is expected to be reconstructed within the next ten years. The construction of an additional north-south runway is being considered in this alternatives analysis to resolve identified operational and delay issues.

A new north-south runway is expected to:

- Balance operations between east-west and north-south runways;
- Enhance airfield capacity to accommodate the March 2007 FAA-approved forecast demand;
- Reduce airfield delays for the primary runway operating configurations at ANC;
- Provide airport operational benefits, such as the continuation of commercial passenger and cargo operations, during snow removal operations and runway maintenance and rehabilitation;
- Produce system benefits that would accrue to the air carriers as a result of reduced delays;
- Reduce emissions by reducing ground delays for departing aircraft;
- Reduce noise from queued aircraft;
- Enhance airfield safety through reducing congestion and improving efficiency.
- Enhance safety during snow removal operations when north-south runway is required due to winds.

The north-south runway will be needed when activity levels approach the airfield capacity. Additional capacity will be needed to accommodate the March 2007 forecast demand levels and minimize delay.

Taxiway Improvements

Runway improvements will require associated taxiway improvements. These improvements are needed to help alleviate congestion on the airfield and provide improved access to and from the runways. Currently, airfield circulation problems exist at the junction of Taxiway R and Taxiway K. Taxiway R provides access to the North Airpark, UPS, FedEx, and Taxiway P cargo ramps. Taxiway K provides the only access to the West Airpark and serves as one of the main access routes for all runways.

4.3.3. Air Cargo Facilities

Air cargo, which includes air freight and air mail, at ANC is forecast to grow 6.1% annually through 2027 in tonnage according to the March 2007 FAA-approved forecast. It is forecast to grow 5.2% annually in operations, representing the greatest growth of all operations at ANC. Air cargo at ANC also makes up the largest share of operations. The share of total operations that are cargo will grow from 40% in 2005 to 58% in 2027. The majority of air cargo includes transit freight from Asia to North America, which will continue to grow through 2027.

Additional air cargo facilities are required to accommodate growth in air cargo at ANC. Air cargo facilities in greatest need include common use aprons utilized for queuing, holding, sequencing, and deicing aircraft. These aprons are open to all air carriers and are utilized at the discretion of air-traffic control and/or airport operations. The airport will need to increase the approximately 823,000 square yards of existing apron space to 1,754,400 square yards by 2027[2]. Parking positions are also required to accommodate growth. To meet growth projections from the 2007 forecast, approximately 134 cargo parking positions would be needed when annual operations reach 455,600. ANC currently has 75 cargo parking positions.

4.3.4. Terminal Facilities

In 2005, ANC accommodated approximately 5.6 million passengers. The March 2007 FAA-approved forecast anticipates approximately 7.2 million annual passengers by 2027 with an average annual growth rate of approximately 1.1%. Expansion of the South Terminal began in 1999 and is scheduled to be completed in 2009. Forecast passenger growth at ANC can be accommodated within the existing terminal facilities with

[2] ANC Community Council Presentation, October 2007

improvements to the North Terminal. Required North Terminal improvements include reconfiguration of existing gates to accommodate additional aircraft parking positions, improvements to ticketing and baggage claim facilities, and general improvements to improve its function for domestic air service. .

4.3.5. Support Facilities

Support facilities include airline maintenance, airfield maintenance, Air Rescue and Fire Fighting (ARFF), flight kitchens, fuel storage, snow storage/disposal, and deicing. Support facility improvements will be required to accommodate airport support needs. Additional facilities needed through 2027 include sand and deicing chemical storage, maintenance vehicle storage, and aviation fuel storage covered by referenced to General Aviation improvements.

4.3.6. Terminal Roadway Access, Circulation, and Parking Facilities

The existing terminal roadway access, circulation, and parking facilities are adequate for serving passenger growth at the North and South Terminals through 2027.

4.4. Alternatives Analysis Process

The alternatives analysis process refers to the process taken to develop concepts and alternatives, and the evaluation of alternatives towards the selection of a recommended alternative. The alternatives were analyzed separately for the three primary elements, airfield, air cargo, and terminal. This chapter is organized by the primary element alternatives, starting with the airfield. The secondary element alternatives support facilities and roadway access, circulation and parking facilities, were not analyzed due to this master planning process being stopped before completion.

4.4.1. Airfield

The alternatives analysis process for the airfield consisted of four steps, with each step providing a greater level of detail and evaluation than the previous step. The four step process is illustrated in Figure 4.3. Step One: Concept Development, involved a discussion of previous airfield concepts and the development of new airfield concepts based on the facility requirements (Chapter 3). These airfield concepts were subjectively screened and refined as alternatives in Step Two: Subjective Screening. Six evaluation criteria were utilized for the screening including safety and security, technical feasibility, economic soundness, environmental impacts, community impacts, and aeronautical utility. These evaluation criteria are defined in Section 4.5.

During the initial screening of airfield concepts in Step Two, a ranking system was utilized, placing a value on the concept to indicate that concept's benefit or ability to meet identified airfield requirements and evaluation criteria. Several airfield concepts were then selected as alternatives, refined, and evaluated in Step Three: Alternatives Evaluation. A new set of evaluation criteria was employed in Step Three, based on public and stakeholder comments, Master Plan goals and objectives, facility requirements, and criteria as suggested by Airport staff. The criteria included best planning tenets, environmental factors, fiscal factors, and operational performance for the airfield. Each criterion was further defined by a set of subcriteria. The evaluation was conducted based on technical analyses on airfield demand and capacity (SIMMOD), air quality, noise, and each alternative's benefit/cost.

A final review of criteria and recommendation of the alternatives was planned for in Step Four: Final Recommendation. However, due to recent economic events as stated previously, the final evaluation has not been completed.

Process Overview: Concept Development and Alternatives Analysis

	Step One	Step Two	Step Three	Step Four
	Concept Development	Subjective Screening	Alternatives Evalution	Final Recommendation
Meeting(s) :	Workshop I (Sept 11, 2007)	Workshop II (Nov 5, 2007) Public Meeting (Nov 6, 2007)	Workshop III (Apr 30, 2008) Public Meeting (May 21, 2008)	
Objective :	Develop concepts based on facility requirements	Subjectively screen concepts, conduct initial technical analyses, refine and determine alternatives	Present completed technical analyses, evaluate alternatives	Make a final recommendation
Number of Concepts / Alternatives:	Infinite	25	4	1
Evaluation Criteria:	MP Goals and Objectives Facility Requirements	6 Criteria Safety & Security Technical Feasibility Economic Soundness Environmental Impacts Community Impacts Aeronautical Utility	4 Criteria Best Planning Tenets Environmental Factors Fiscal Factors Operational Performance	Airport Strategic Vision Technical Committee Input Public Input
Supporting Documentation:	Workshop Presentation	Workshop Presentation	SIMMOD Analysis Noise Report Benefit / Cost Analysis Report	Ch. 4 Alternatives Analysis Air Quality Report

Ted Stevens
Anchorage
International Airport

NOT TO SCALE
September 2008

DRAFT

Figure 4-3
Alternatives Analysis Process

Concept Development & Alternatives Evaluation

4.4.2. Air Cargo

Air cargo facility concepts were developed. The concepts were developed to identify areas and layouts capable of accommodating the requirement for additional cargo facilities in future years 2012, 2017, and 2027 based on the March 2007 FAA-approved forecast. These concepts also considered the potential location of additional airfield facilities (e.g. a runway) because of the importance the airfield alternatives have on the operation of the airfield. Although the development of air cargo facility concepts considers the potential future airfield layout, the air cargo facility concepts would be refined upon selection of a final airfield concept.

4.4.3. Terminal

As previously mentioned, the existing North and South Terminals are able to accommodate demand for passenger traffic at ANC through the forecast horizon. However, it was noted that improvements to the terminal facilities would be required in order to maximize the functionality of the terminal facilities. The Terminal Area Concept Study, published in December 2005, provides an initial assessment of potential terminal development options at ANC. The terminal concepts from the Study, including a hotel connected to the Terminal, were used as the alternatives in this master planning process.

4.5. Airfield Assessment

4.5.1. Evaluation Criteria

Airfield concepts and alternatives were evaluated on two sets of criteria. The first set of criteria was applied in Step Two: Subjective Screening. The second set of criteria was applied in Step Three: Alternatives Evaluation.

Criteria for Step Two: Subjective Screening

In Step Two: Subjective Screening, the concepts identified in Step One: Concept Development were evaluated based on six evaluation criteria:

- <u>Safety & Security</u> - Develop the Airport in a manner that enhances safety and security best practices, provides for growth, and is flexible. Considerations include:

  - Complying with FAA design standards;
  - Complying with federal aviation regulations;
  - Minimizing airspace obstructions;
  - Maintaining airport certification;
  - Minimizing the number of runway incursions;
  - Minimizing the number of unsafe uses in and around the Runway Protection Zones;
  - Identifying roads and other facilities to maximize safety; and
  - Providing adequate operational capability during snow removal, periodic airfield closures during maintenance, and periodic airfield closures during construction.

- <u>Technical Feasibility</u> - Develop the Airport in a manner where improvements can be implemented on time and as efficiently as possible without major engineering or environmental problems. Considerations include:

  - Maintaining efficient circulation routes;
  - Providing maximum flexibility in use;
  - Preserving options to accommodate anticipated future changes in aviation;
  - Meeting short, mid, and long term needs and unforeseen changes in the future;
  - Meeting projected demand; and
  - Limiting site constraints.

- <u>Economic Soundness</u> - Develop the Airport in a way that maximizes economic benefit to South Central Alaska, the State of Alaska, and the national air transportation system. Considerations include:

  - Ensuring strategic development goals of the airport are met; and
  - Identifying development strategies that are financially feasible.

- <u>Environmental Impacts</u> - Develop the Airport in an environmentally responsible manner by minimizing or mitigating negative environmental consequences. Considerations include:

  - Maintaining Department of Transportation Act Section 4(f) lands such as Kincaid Park south of airport;
  - Minimizing operations over land;
  - Maintaining a viable coastal trail;
  - Maintaining the water quality;
  - Minimizing vehicular related air pollutant emissions;
  - Minimizing noise to the surrounding residential areas;
  - Conforming to air quality standards; and
  - Optimizing compatibility with surrounding land uses.

- <u>Community Impacts</u> - Develop the Airport in a way that minimizes adverse impacts to the community. Considerations include:
  - Minimizing the impact to Tony Knowles Coastal Trail;
  - Developing ANC in a way that is socially and politically feasible; and
  - Satisfying passengers', shippers' and other user needs.

- <u>Aeronautical Utility</u> - Develop the Airport in a way that maximizes aeronautical utility. Considerations include:
  - Accommodating larger aircraft;
  - Maintaining safe aircraft separation;
  - Providing maximum utilization of runways; and
  - Correcting airfield circulation problems.

Criteria for Step Three: Alternatives Evaluation

In step two, the six criteria listed above were expanded on for the evaluation of the alternatives in Step Three: Alternatives Evaluation. The evaluation was supported by technical analyses including a capacity-delay and benefit-cost analyses. The evaluation criteria for Step Three focus on best planning tenets, environmental factors, fiscal factors and operational performance. They are described below.

- <u>Best Planning Tenets</u> - Best planning practices measuring the feasibility and flexibility of the alternatives and conformance to relevant related policies, plans, standards (non-design related), and regulations.
  - **Timing/Phasing & Feasibility**: Can the alternative be implemented (planning/design/construction) within the designated planning timeframe and does the alternative present major engineering or environmental challenges that could adversely impact timing/phasing?
  - **Provides opportunity for future growth (flexibility)**: Is the alternative compatible with future development beyond the master plan horizon (e.g. the alternative sets aside enough land for a future runway or cargo facility improvements)? [Goals/Objectives: Also consider the possibility of future unforeseen changes (e.g. new large aircraft, increase in commercial passenger services, technological change).]

    - **Meets needs of airport users**: Does the alternative meet the identified needs of airport users? User needs include reasonable levels of service (e.g. minimal delays and good support services), low costs, efficiency, etc.
    - **Conforms to airport plans/land use guidelines**: Is the alternative compatible with local, regional, and federal land use guidelines (e.g. zoning, height restrictions, land use restrictions, and transportation goals) to meet the highest and best on- and off-airport land use.
    - **Political feasibility**: Is the alternative politically tenable and supported by local and state political leaders?
- <u>Environmental Factors</u> - The environmental impacts associated with airport improvements must be evaluated according to NEPA guidelines as presented in FAA Airport Environmental Handbook (Order 5050.4). The airport master plan provides an earlier opportunity to evaluate environmental factors. Environmental factors considered include air quality, coastal barriers, coastal zone, compatible land use, construction impacts, Department of Transportation Act Section 4(f), fish, wildlife and plants, floodplains, hazardous materials, historical, architectural, archaeological, and cultural, light emissions and visual effects, natural resources and energy supply, noise, socioeconomic, environmental justice, and children's health and safety risks, solid waste, water quality, wetlands, and wild and scenic rivers. While all the factors will be considered in detail during the NEPA, process the Master Plan provides an early opportunity to assess potential environmental impacts in the following sub-criteria:
    - **Impact to trail/recreational areas and parklands**: Does the alternative preserve, enhance, or effectively mitigate potential impacts to the Tony Knowles Coastal Trail, Department of Transportation Act Section 4(f) and other recreational areas, parklands, and cultural resources. Such areas include, but are not limited to the Point Woronzof area, Kincaid Park and known archeological sites. Considerations also include Section 6(f) analysis, required for the Coastal Trail because of the Land and Water Conservation Fund grant

- **Noise impacts**: Does the alternative reduce or mitigate noise impacts to the community residential and recreational areas? Is the alternative compatible with the Airport's noise abatement procedures and does it provide opportunities to prioritize over-water aircraft operations?
- **Tideland impacts**: Does the alternative minimize impacts to tidelands and coastal bluffs (e.g. Cook Inlet)? Will the runway placement affect the "mixing zone" around the sewage outfall of the Anchorage Water and Wastewater Utility (AWWU)?
- **Wildlife impacts**: Does the alternative minimize impacts to wildlife in areas such as the Coastal Wildlife Refuge, including beluga whales, the American bald eagle, and coastal fish migration activity? Does the alternative comply with the state statute to protect the Coastal Wildlife Refuge?

- Fiscal Factors - Alternatives should be financially feasible. This means the alternative should balance the cost of implementation with potential savings associated with delay reduction. Further, a favorable alternative will provide economic growth and revenue generating opportunities at ANC and within the Anchorage community.
  - **Benefit Cost Ratio**: Does the alternative provide a benefit-cost ratio exceeding 1.0?
  - **Socioeconomic Benefit**: Does the alternative provide socioeconomic benefits to the Anchorage community? This includes maintaining and creating new jobs and promoting the economy in Anchorage.

Operational Performance - Airfield - The alternatives are evaluated for their ability to provide capacity and meet the operational demands of the airfield. Airfield alternatives are evaluated for their ability to balance airfield operations and provide improved IFR arrival capacity.

- **SIMMOD Demand/Capacity analysis**: SIMMOD is an FAA-approved computer simulation tool used to model the delay and capacity within the ANC airspace and airfield. Does the alternative provide sufficient capacity to accommodate the March 2007 FAA-approved forecast demand levels throughout the planning period at reasonable delays levels? FAA has determined that nationally, 7 minutes of average annual delay triggers the need for capacity improvements.

- **Airfield balance**: Does the alternative balance the airfield between the north-south and east-west directions?
- **Provides operational capabilities during closures/repairs/construction**: Does the alternative minimize aircraft landing and departure delays during runway or taxiway closures (e.g. snow removal, maintenance, and repair)?
- **Airfield safety**: Does the alternative meet established FAA standards for safety? Considerations include runway and taxiway design standards, runway protection zones, runway safety areas.
- **Taxi time**: Does the alternative minimize aircraft taxi-time?
- **NAVAID technology**: Is the alternative compatible with existing NAVAID technology?

4.5.2. Step One: Concept Development

Development of airfield concepts took place during fall 2007. During this process, the need for a new runway was re-evaluated. This need was previously identified in the 2002 Master Plan and resulted in the selection of a recommended alternative involving the construction of a new parallel north-south runway. In consideration of industry changes, the March 2007 FAA-approved forecast growth, and operating priorities, a new runway is still identified as a priority requirement for this Master Plan. As a result, the alternatives for the current Master Plan focus on the high-priority airfield requirements, which recommend the construction of a new runway and where applicable, taxiways. Air cargo and terminal facility requirements were also considered in Step One and described in Sections 4.6 and 0, respectively, on air cargo and terminal alternatives analyses. Consideration of secondary elements, support facilities and roadway access, circulation and parking facilities were explored in Step One, but not in great depth.

Airfield concept development drove the following assumptions.

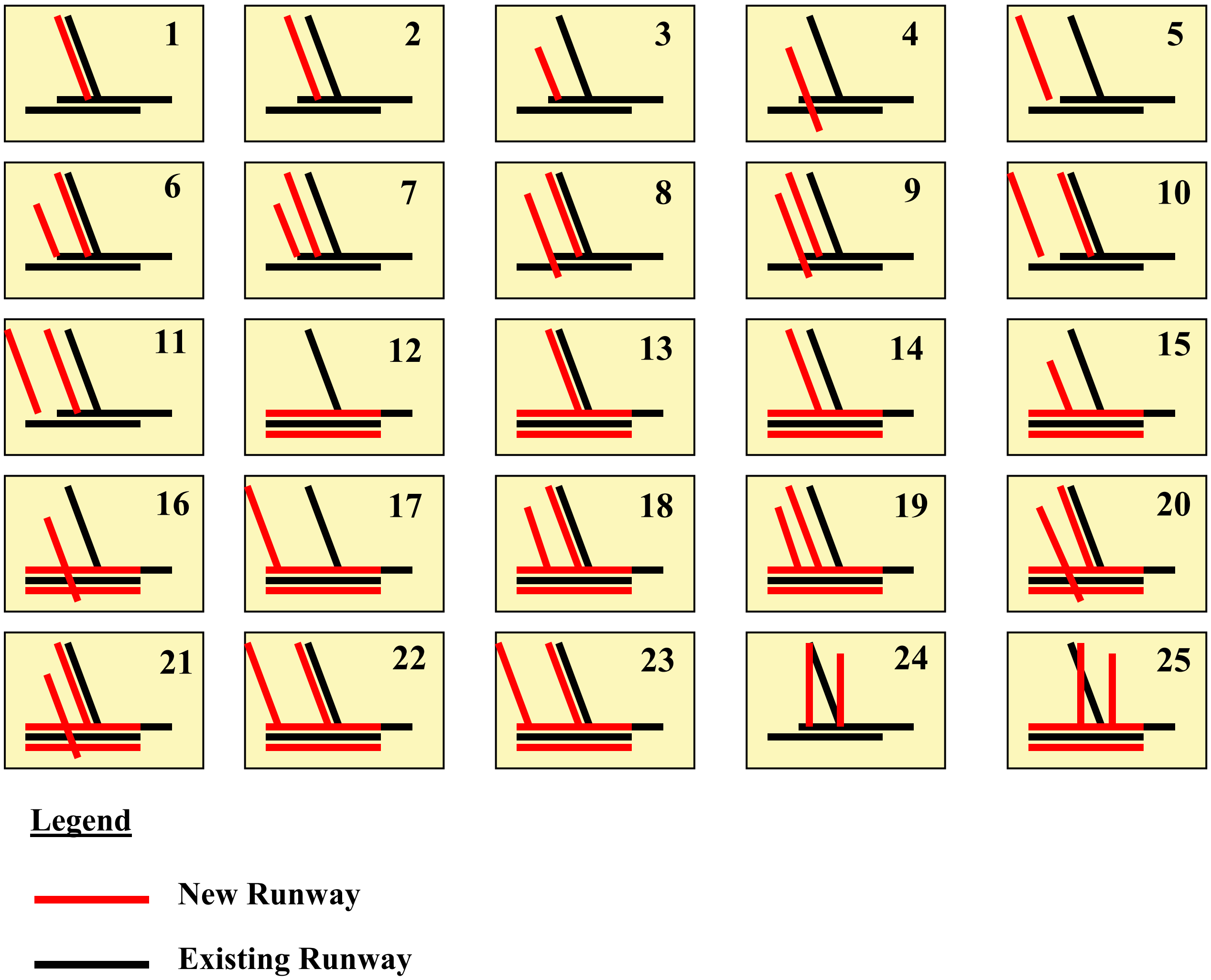
- The terminal and airfield capacity will be available to accommodate anticipated demand.
- Improvement concepts will remain generally within the existing boundary of the airport and reduce the need for land acquisition.

Through the public participation process conducted during the 2002 Master Plan Update, a primary criterion was added to focus on concepts not physically impacting Kincaid Park. The rationale was to "preserve the natural beauty" of Kincaid Park. Concepts were also developed to minimize impacts to the Anchorage Waste Water Utility (AWWU) facility and surrounding residential areas.

Finally, regional alternatives to adding capacity at ANC were assessed in the 2002 Master Plan and again in this Master Plan. Because regional alternatives were assessed in depth during the 2002 Master Plan Update, this Master Plan evaluated the conclusions of the previous assessment and determined whether any previous assumptions should be revised. It was determined that the results of the previous regional alternatives analysis were still valid and that, for the purposes of this analysis, the regional alternatives would not meet the goals and objectives set forth at the outset of this process. A regional alternative would likely require more infrastructure improvements than is feasible at other regional airports. More importantly, the regional alternative did not fall within the 20 year improvement timeline of this Master Plan. Regional Alternatives are discussed in Section 4.7.

Airfield Concepts

A total of twenty-five airfield concepts were developed to meet the airfield facility requirements and goals and objectives. Airfield concept development was initiated during staff workshops held September 11-13, 2007. The twenty-five airfield concepts are illustrated in Figure 4.4.

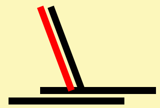
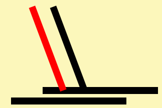
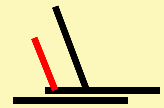
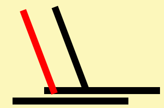
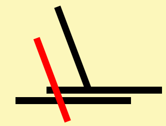
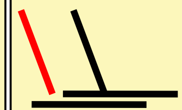


Note: Refer to **Appendix B** for screening results of airfield concepts.

4.5.3. Step Two: Subjective Screening

Following concept development, a subjective screening of the twenty-five concepts was conducted at the November 5, 2007 staff meeting (Workshop II). The screening utilized the six evaluation criteria previously described. The results for all twenty-five concepts are in **Appendix B**. Each concept called for the construction of a new runway offset from the centerline of the existing Runway 14L-32R. For instance, Concept 1 called for a new Runway 14R-32L built 700 feet west, centerline-to-centerline, of Runway 14L-32R.

To facilitate the subjective screening process, the impacts for each of the six north-south and two east-west concepts were ranked by criteria on a benefit scale from lowest (1) to highest (5). These ranking values were then totaled by concept. For the north-south runway, Concepts 1 through 5 of the twenty-five concepts with an additional modification of Concept 4 known as the “3,000 Long” (listed as 4 mod in Figure 4.5) were ranked. Concepts 12 through 25 included the two east-west runways. The screening results are summarized in Figure 4.5 and Figure 4.6.

	Concept 1 700’ 	Concept 2 906’ 	Concept 3 3,000’ Short 	Concept 4mod 3,000’ Long 	Concept 4 3,000’ Intersecting 	Concept 5 4,300’ 
Safety/Security	2	3	3	3	3	2
Tech. Feasibility	4	4	3	2	3	1
Economic Soundness	3	3	1	3	5	1
Environmental Impacts	3	3	3	3	3	2
Community Impacts	4	4	2	2	2	2
Aeronautical Utility	1	2	1	4	4	5
Total	17	19	13	17	20	13

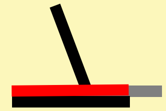
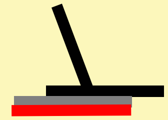
Ted Stevens
Anchorage
International Airport

NOT TO SCALE
September 2008

DRAFT

Figure 4-5
Subjective Screening Results - N/S Runway Concepts

Concept Development & Alternatives Evaluation

	Concept 1 7L Shift 	Concept 2 500’ Shift 
Safety/Security	3	4
Technical Feasibility	3	3
Economic Soundness	3	3
Environmental Impacts	2	2
Community Impacts	4	2
Aeronautical Utility	3	3
Total	18	17

Ted Stevens
Anchorage
International Airport

NOT TO SCALE
September 2008

DRAFT

Figure 4-6
Subjective Screening Results - E/W Runway Concepts

Concept Development & Alternatives Evaluation

In discussions held during and after the November 5, 2007 staff meeting (Workshop II), several concepts were removed from further consideration or refined based on initial simulation (SIMMOD) and benefit/cost analyses.

- The 4,300’ north-south runway concept (Concept 5 in Figure 4.5) was removed from further consideration due to the presence of other concepts that were able to reasonably meet the March 2007 FAA-approved forecast demand with a lower cost of implementation and less potential for significant environmental impacts.
- The 3,000’ intersecting concept (Concept 4 in Figure 4.5) was modified to the 3,000’ Long concept (Concept 4mod in Figure 4.5) to eliminate the runway intersection between the proposed runway, and the existing east-west runways.
- The 7L Shift east-west runway concept (Concept 1 in Figure 4.6) was removed from consideration because initial simulation (SIMMOD) results showed this concept would not meet capacity needs. With Runway 7L extended, it was assumed that all aircraft groups would be able to use Runway 7L as an arrival runway. However, increasing the number of arrivals to Runway 7L was found to increase the departure delay on Runway 32. This conflict occurs because of the impact of Runway 32 departure’s jet blast on the Runway 7L arrivals. This impact was magnified by full length runway departures on Runway 32 as this temporarily shuts down Runway 7L for arrivals. The interaction between arrivals on the east-west runway and departures on the north-south runway prevents this concept from providing increased capacity or reducing delay.

The subjective screening of the twenty-five concepts through the November 5, 2007 staff meeting (Workshop II), facilitated by the impacts evaluation of the six north-south and two east-west concepts, resulted in the development of eight preliminary alternatives to maintain the existing runway configuration. These preliminary alternatives are described below. The existing conditions scenario and eight preliminary alternatives include:

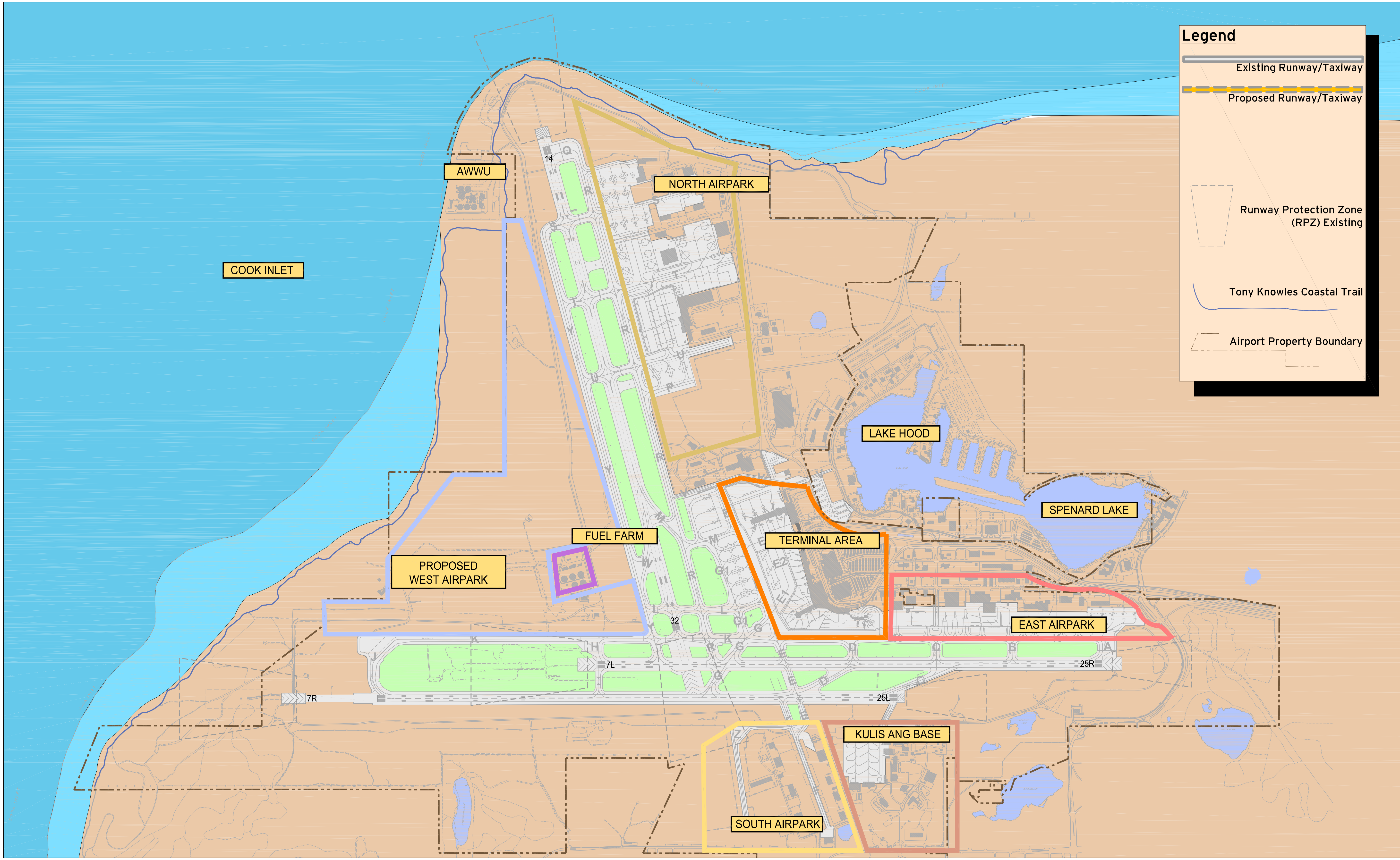
- *Existing Conditions**

Preliminary Alternatives	Abbreviated as:
• Closely spaced N/S runway 906 feet west*	906’
• Widely spaced N/S runway 3,000 feet west – Full length (10,000 feet long)*	Long 3000’
• Widely spaced N/S runway 3,000 feet west – Short length (8,000 feet long) + 7R-25L shift 500’ south	Short 3000’ + 500’ Shift
• Closely & widely spaced N/S runway 906 feet and 3,000 feet west and 7R-25L shift 500’ south	906’ + 3000’ + 500’ Shift
• Closely spaced N/S runway 700 feet west	700’
• Widely spaced N/S runway 3,000 feet west – Short length (8,000 feet long)*	Short 3000’
• Closely spaced N/S runway 906 feet west + 7R-25L shift 500 feet south*	906’ + 500’ Shift
• Widely spaced N/S runway 3,000 feet west – Full length (10,000 feet long) + 7R-25L shift 500 feet	Long 3000’ + 500’ Shift

* Note: Preliminary alternatives marked with an asterisk indicate they were selected as alternatives and evaluated in Step Three: Alternatives Evaluation.

Existing Conditions

Existing conditions, illustrated in Figure 4.7, include two east-west runways (7R-25L and 7L-25R) and one north-south runway (14-32). The proposed extension of Runway 7R is considered a part of the existing conditions. The parallel taxiways serving the runways are Taxiway K, Y, and R.



Ted Stevens Anchorage International Airport

Figure 4-7
Existing Conditions

Concept Development & Alternatives Evaluation

DRAFT

J:\43210-ANC\CADD\Exhibits\2009_0310_Alternatives\ Fig4-7_ExistingConditions.dwg Mar 10, 2009 - 4:20pm

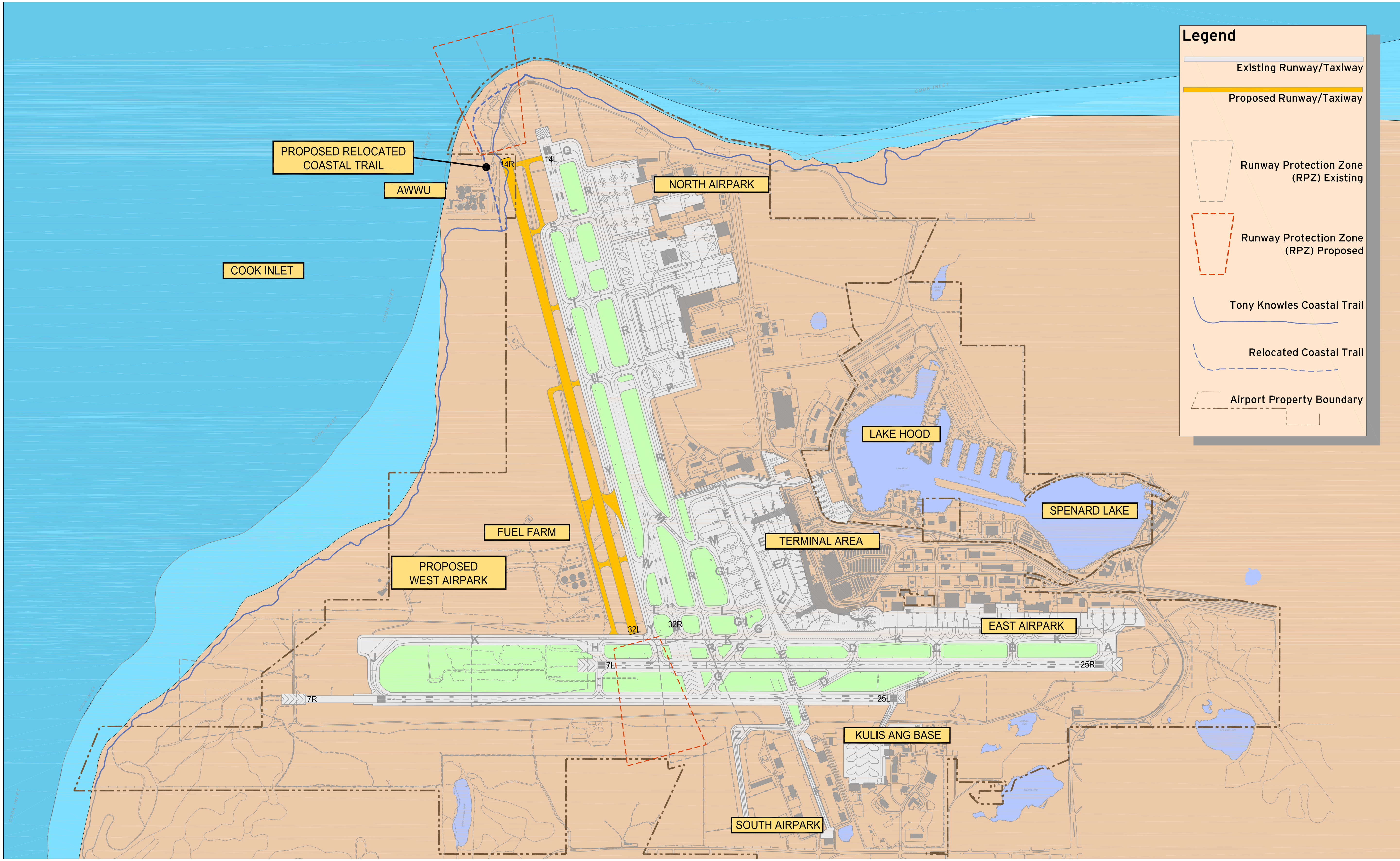
Closely Spaced N/S Runway 700 Feet West Preliminary Alternative (700')

The 700' preliminary alternative would construct a new parallel runway, 10,000 feet long x 150 feet wide, located 700 feet, centerline to centerline, west of the existing north-south Runway 14-32. A 1,000 foot long x 500 foot wide runway safety area would be constructed at the north end. The existing Taxiway Y would be removed and a new taxiway, 8,600 feet long by 75 feet wide, would be constructed approximately 400 feet to the west of the new runway between Taxiways K and S. Taxiways S, U, M, L and a new high speed exit would connect the new taxiway to the new and existing north-south runway. The existing Point Woronzof Drive would be relocated to accommodate the new runway and taxiway and a new tugroad would be constructed to connect the North and West Airparks. The proposed runway and taxiway would require approximately 5.5 million cubic yards of excavation and 1.6 million cubic yards of classified fill for construction[3].

[3] Draft Benefit Cost Analysis for Future Runway Projects and Associated Improvements at Ted Stevens Anchorage International Airport, January 2008

Closely Spaced N/S Runway 906 Feet West Preliminary Alternative (906')

The 906' preliminary alternative, illustrated in Figure 4.8, would construct a new parallel Runway 14R-32L, 10,000 feet long x 150 feet wide. The new runway would be located 906 feet west of the existing north-south Runway 14-32 and 400 feet west of the existing Taxiway Y, which would remain. It would also include construction of a new taxiway 400 feet west of the new north-south runway extending from Taxiway K to Taxiway U, making Taxiway Y the center parallel taxiway between the north-south runways. Taxiways L, S, U, and M would be extended and several new high speed exit connections constructed. This preliminary alternative was the recommended alternative from the 2002 Master Plan and is currently shown on the conditionally approved Airport Layout Plan.



Ted Stevens Anchorage International Airport

N
SCALE 1" = 1000'
January 2009

DRAFT

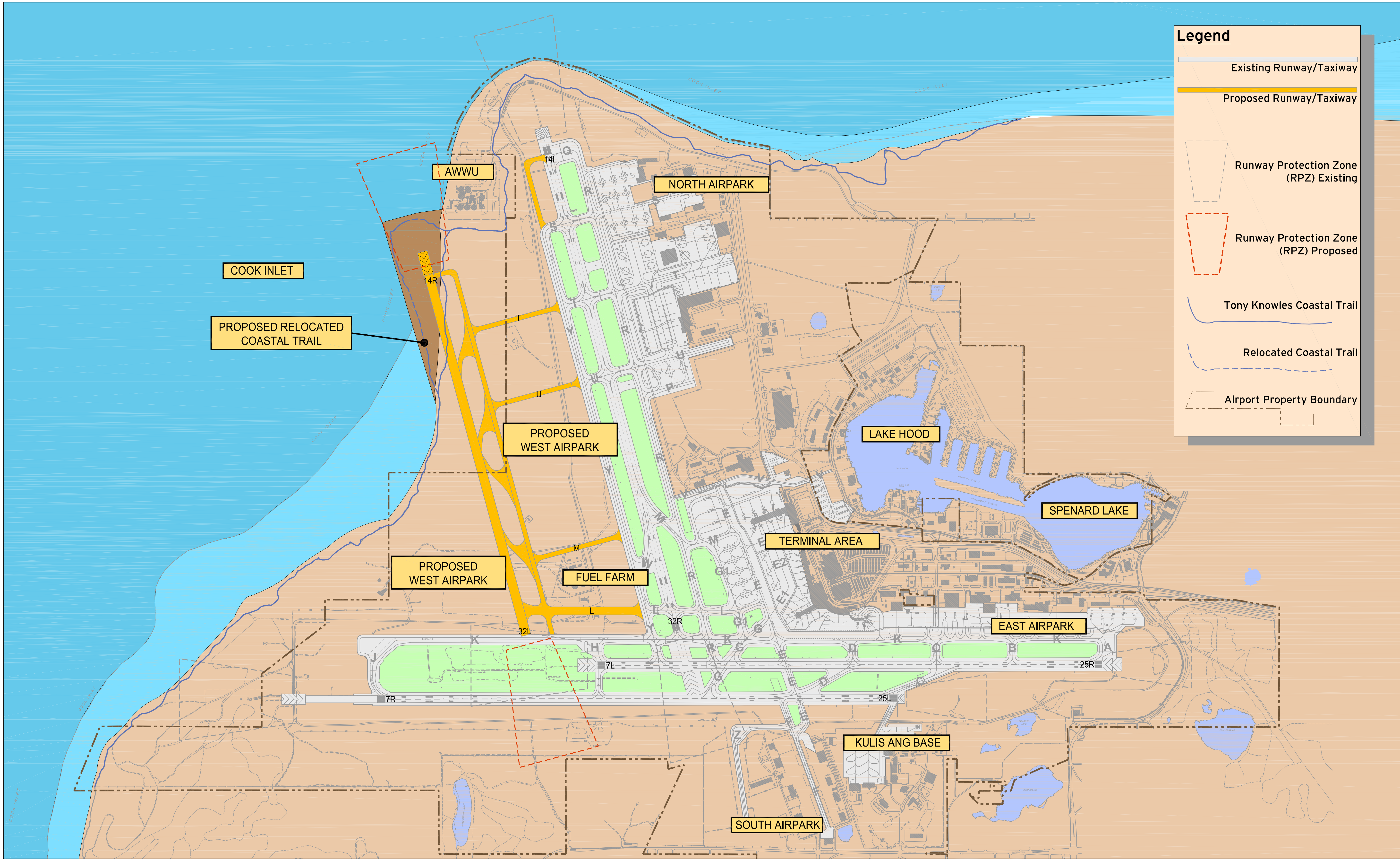
Figure 4-8
Closely Spaced N/S Runway 906 Feet West (906')

Concept Development & Alternatives Evaluation

J:\43210-ANC\CADD\Exhibits\2009_0310_Alternatives\ Fig4-8_906Alt.dwg Mar 10, 2009 - 4:24pm

Widely Spaced N/S Runway 3,000 Feet West – Short Length (8,000 feet long) Preliminary Alternative (Short 3000')

The Short 3000' preliminary alternative, illustrated in Figure 4.9, would construct a new parallel Runway14R-32L, 8,000 feet long by 150 feet wide, located approximately 3,000 feet (3,143 feet) west of the existing north-south Runway 14-32. It would be spaced to allow simultaneous independent instrument operations with a Precision Runway Monitor (PRM). The runway would be 8,000 feet long in order to keep as much of the runway on existing terrain while at the same time maintain a runway length that is usable a majority of the time. The runway would be oriented so as not to intersect with the existing east-west Runway 7R-25L. Finally, construction of this preliminary alternative would include a center taxiway with extensions from the existing Taxiway Y via Taxiways T, U, and L. Taxiways would also be connected from the new parallel Taxiway to new runway via Taxiway S, T, U, W, and L.



Ted Stevens Anchorage International Airport

N
SCALE 1" = 1000'
January 2009

Figure 4-9
Widely Spaced N/S Runway 3,143 Feet West - Short Length (Short 3000')

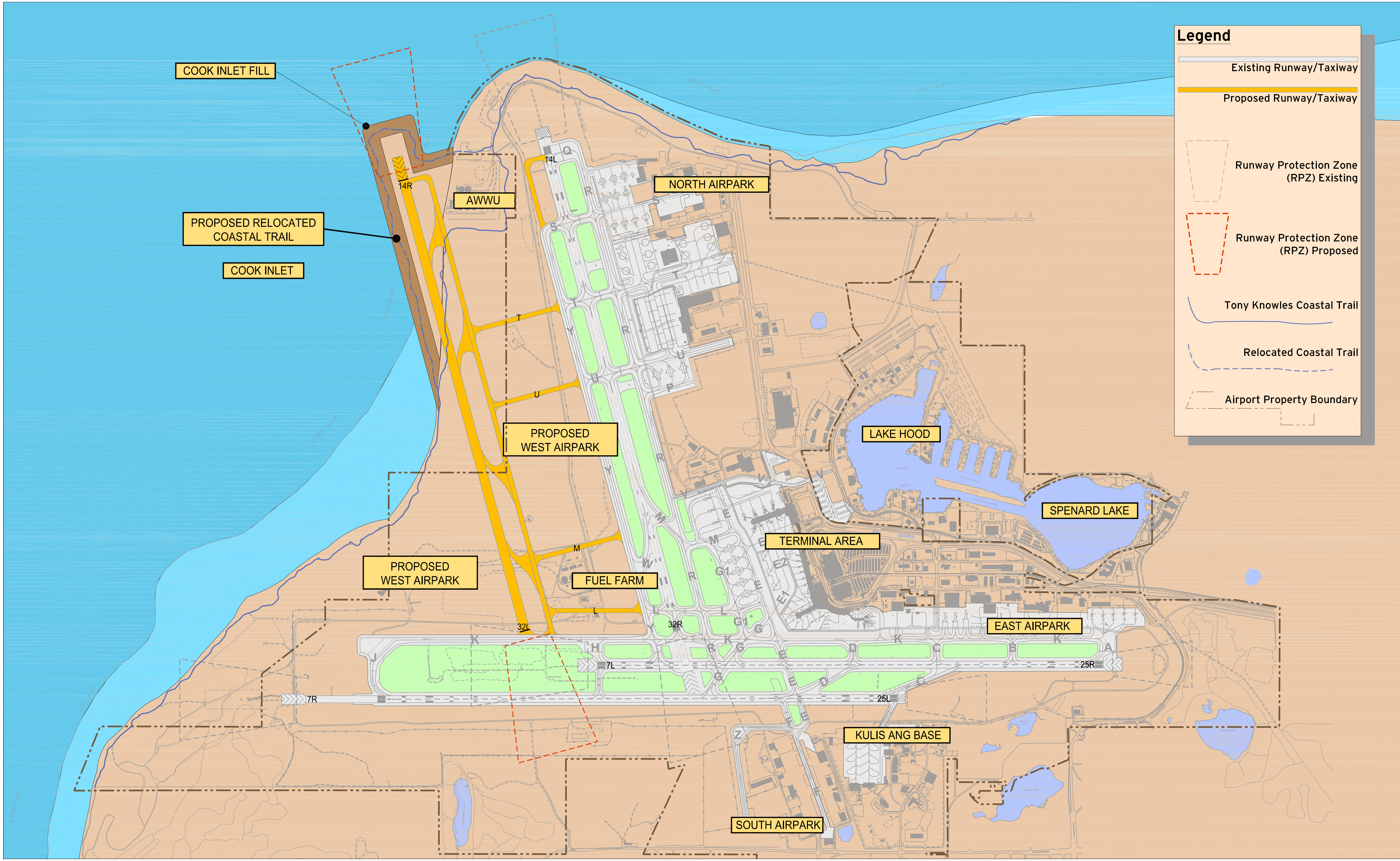
DRAFT

Concept Development & Alternatives Evaluation

J:\43210-ANC\CADD\Exhibits\2009_0310_Alternatives\ Fig4-9_Short3000Alt.dwg Mar 10, 2009 - 4:24pm

Widely Spaced N/S Runway 3,000 Feet West – Full Length (10,000 feet long) Preliminary Alternative (Long 3000')

The Long 3000' preliminary alternative, illustrated in Figure 4.10, would construct a new parallel Runway 14R-32L, 10,000 feet long by 150 feet wide, located approximately 3,000 feet (3,143 feet) west of the existing north-south Runway 14-32. It would be spaced to allow simultaneous independent instrument operations with a Precision Runway Monitor (PRM) as well as to physically avoid the Anchorage Waste Water Utility (AWWU) facility. The runway would be 10,000 feet in length and would extend onto fill in the Cook Inlet. The runway would be oriented so as not to intersect with the existing east-west Runway 7R-25L. Finally, construction of this preliminary alternative would include a center taxiway with extensions from existing Taxiway Y via Taxiways T, U, M and L. Taxiways would also be connected from the new parallel Taxiway to new runway via Taxiway T, M, and two new high speed taxiways.



Ted Stevens Anchorage International Airport

SCALE 1" = 1000'

January 2009

Figure 4-10

Widely Spaced N/S Runway 3,143 Feet West - Full Length (Long 3000')

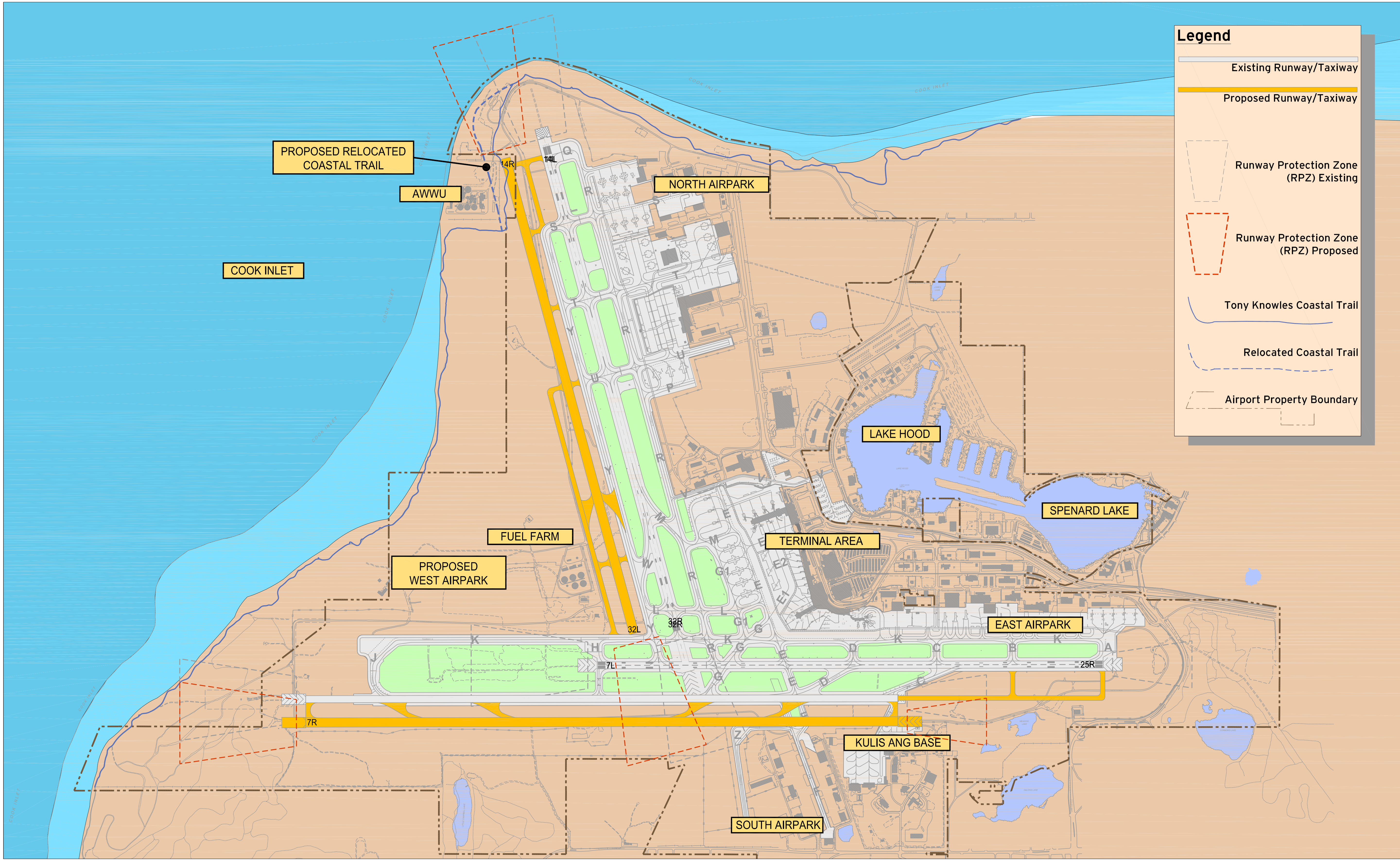
Concept Development & Alternatives Evaluation

DRAFT

J:\43210-ANC\CADD\Exhibits\2009_0310_Alternatives\ Fig4-10_Long3000Alt.dwg Mar 10, 2009 - 4:26pm

Closely Spaced N/S Runway 906 Feet West + 7R-25L Shift 500 Feet South Preliminary Alternative (906' + 500' Shift)

The 906' + 500' Shift preliminary alternative combines the 906' preliminary alternative with the relocation of the southern east-west runway (7R-25L) 500 feet to the south. The 500-foot shift would provide runway centerline-to-centerline separation of 1,200 feet. Existing Runway 7R-25L would be reused and converted to a taxiway. The 906' + 500' Shift preliminary alternative is illustrated in Figure 4.11.



Ted Stevens
Anchorage
International Airport

SCALE 1" = 1000'
January 2009

Figure 4-11

Closely Spaced N/S Runway 906 Feet West + 7R-25L Shift 500 Feet South (906 + 500' Shift)

DRAFT

Concept Development & Alternatives Evaluation

J:\43210–ANC\CADD\Exhibits\2009_0310_Alternatives\ Fig4–11_906+500ShiftAlt.dwg Mar 10, 2009 – 5:16pm

Widely Spaced N/S Runway 3,000 Feet West – Short Length (8,000 feet long) + 7R-25L Shift 500 Feet South Preliminary Alternative (Short 3000' & 500' Shift)

This preliminary alternative is a combination of the widely spaced N/S runway 3,000 feet west - short length and the southern runway shift shown in the 906' & 500' Shift preliminary alternative. Existing Runway 7R-25L would be would be reused and converted to a taxiway.

Widely Spaced N/S Runway 3,000 Feet West – Full Length (10,000 feet long) + 7R-25L Shift 500 Feet South Preliminary Alternative (Long 3000' & 500' Shift)

The Long 3000' & 500' Shift preliminary alternative combines the Long 3,000' preliminary alternative with the reconstruction of the southern east-west runway (7R-25L) 500 feet to the south. Both the Long 3000' and 500' Shift preliminary alternative were previously described. Existing Runway 7R-25L would be would be reused and converted to a taxiway.

Closely & Widely Spaced N/S Runway 906 Feet and 3,000 Feet West + 7R-25L Shift 500 Feet South Preliminary Alternative (906' & Long 3000' & 500' Shift)

The 906', Long 3000' & 500' Shift preliminary alternative combines the 906', Long 3000' preliminary alternative with the reconstruction of the southern east-west runway (7R-25L) 500 feet to the south. The 906', Long 3000' and 500' Shift preliminary alternatives were previously described. Existing Runway 7R-25L would be would be reused and converted to a taxiway.

Following the November 5, 2007 staff meeting (Workshop II), the eight preliminary alternatives were refined and evaluated. Four preliminary alternatives were removed from further consideration due to the following reasons:

- The 700’ Preliminary Alternative was excluded because it would require the demolition of Taxiway Y and would not provide a center taxiway. The lack of a center taxiway has been shown to have the potential to increase the risk for runway incursions for closely spaced parallel runways. Key studies regarding this issue were conducted by the Federal Aviation Administration to resolve issues with runway incursions at Los Angeles International Airport, where two parallel runways were separated by 700 feet without a center taxiway.
- The Short 3000’ + 500’ Shift Preliminary Alternative was excluded because compared to the other preliminary alternatives, it was not able to provide adequate capacity to meet the March 2007 FAA-approved forecast demand.
- The Long 3000’ + 500’ Shift Preliminary Alternative was excluded because compared to the other preliminary alternatives, it was not able to provide adequate capacity to meet the March 2007 FAA-approved forecast demand.
- The 906’ + 3000’ + 500’ Shift Preliminary Alternative was excluded because it was financially infeasible and implementation of the preliminary alternative would likely be beyond the 20 year planning horizon.

Public Meeting

The remaining four preliminary alternatives (906’, Short 3000; Long 3000’, 906’ and 500’ Shift) were selected and presented with existing conditions at the November 6, 2007 Public Meeting. Following the meeting, a technical analysis of the alternatives was completed.

4.5.4. Step Three: Alternatives Evaluation

The existing conditions and four alternatives were evaluated in detail in Step Three: Alternatives Evaluation. The alternatives include:

- Existing Conditions
- Closely spaced N/S runway 906 feet west
  (906')
- Widely spaced N/S runway 3,000 feet west – Short length (8,000 feet long)
  (Short 3000')
- Widely spaced N/S runway 3,000 feet west – Full length (10,000 feet long)
  (Long 3000')
- Closely spaced N/S runway 906 feet west + 7R-25L shift 500 feet south
  (906' & 500' Shift)

The alternatives, technical analyses, and alternatives evaluation methodology (see **Appendix B**) were presented and discussed at the April 30, 2008 staff meeting (Workshop III). During the meeting, the alternatives were subjectively screened by Airport staff. However, the evaluation results were not weighted or scored. These results and the technical analyses were then presented to the public on May 21, 2008.

Supporting Analyses

Four technical analyses were conducted to evaluate of the preliminary alternatives. The analyses are described below.

Airfield Demand Capacity and Delay Analysis

All preliminary alternatives were partially evaluated based on the FAA-approved SIMMOD airport and airspace simulation modeling software. SIMMOD simulates the step-by-step movement of all aircraft, resolving conflicts and keeping track of the taxi and delay time along each segment. SIMMOD is used to determine the capacity and future delay levels at ANC based on the March 2007 FAA-approved forecast volumes of demand for air cargo, air travel, and air operations through 2027. The capacity is the level of operations that yields an acceptable level of delay to users of an airport. Delay is the average annual delay for the base year and each forecast year. The airfield demand capacity analysis results are summarized below.

Benefit Cost Analysis

A benefit cost analysis was completed in January 2008[4] for the proposed construction of a 10,000 feet long x 150 feet wide north-south Runway 14R-32L located 700 feet west of the existing Runway 14-32, including a runway safety area and taxiway. The analysis was completed in accordance with the *FAA Airport Benefit-Cost Guidance*, published December 15, 1999. Results indicated construction of the proposed new north-south runway would generate a net present value of $876 million and a benefit-cost ratio of 6.18 during the 20-year period of time (2007 – 2027) of this ANC Airport Master Plan Update. The benefit cost analysis results are summarized below. All costs are in 2007 dollars and include demolition, relocation and construction, environmental impact statement, permitting, design, construction administration, and contingency. The benefit-cost analysis only applies to the associated planning years as identified in the March 2007 FAA-approved forecast.

Aviation Forecasts (see Update on Effects of World Economic Events)

The March 2007 FAA-approved forecasts are the basis for planning and scheduling airport improvements through 2027. The highlights[5] of the forecast include:

- International and US cargo tonnage is forecasted to increase 6.1% annually
- International and US cargo operations are projected to increase at 5.2% annually
- Domestic passenger enplanements are forecasted to increase 1.9% annually
- Passenger and air taxi operations are projected to increase at just under 1% per year
- Total ANC aircraft operations are forecasted to increase 2.8% annually (the volume of aircraft operations at ANC is forecast to grow from roughly 300,000 to 550,000).

[4] Source: Draft Benefit Cost Analysis for Future Runway Projects and Associated Improvements at Ted Stevens Anchorage International Airport, January 2008.

[5] Source: Get Involved in Planning Your Airport handout, *Anchorage Airport Master Plan News Newsletter*, Oct 2007

Emerging Technologies Analysis

The emerging technologies analysis results are summarized in **Appendix C**.

Airfield Capacity and Delay Analysis/Benefit Cost Analysis

Note: Due to United States Economic Recession that began in 2008, the 2007 FAA-approved forecast no longer reflects the economic condition and activity levels of the aviation industry. ANC will update the aviation forecast at a later date, when economic conditions stabilize. The capacity and delay analysis may need to be revised upon completion of an updated forecast. However, the level of delay, as related with growth in operations, still serves as a useful metric, and is shown on Figure 4-12.

Airfield capacity/delay and benefit/cost analyses were conducted to evaluate the four preliminary alternatives. SIMMOD, the FAA's Airport and Airspace Simulation Model, was used to determine the existing airfield capacity and future average annual delay levels. Benefit/cost analysis was conducted for the future years presented in the FAA-approved March 2007 forecast to determine the net present values and benefit-cost ratio of the four preliminary alternatives described in the preceding section.

For ANC, the data used in the SIMMOD model included airfield and gate inventories collected in September 2006 and ANOMS data collected between October 2005 and September 2006. A gated flight schedule for each forecast year (2006 (base year), 2012, 2017, and 2027) was developed based on the average daily operations during the peak month (July 2006). When multiplied by the percent of time each runway configuration operates, an average annual delay was calculated from this gated flight schedule for four preliminary alternatives and a no-build alternative (baseline model of existing conditions). The no-build alternative includes the proposed Runway 7R extension.

In the no-build alternative, the airfield average annual delay based on peak month, average day gated flight schedules, increases from 4.1 minutes per operation in 2006 to 11.8 minutes per operation by the time operations reach approximately 335,150 in 2017. Because the airfield simulation model gridlocks beyond demand levels of 335,150 operations, delay values for higher operations levels (400,000 and 455,600) were extrapolated. The extrapolated delay when operations reach approximately 455,600

(Forecast for 2027) is 52.5 minutes per operation. The average annual delay for the existing airfield is shown in **Figure 4-2**.

906' Alternative

The 906' Alternative is illustrated in Figure 4.8. The capacity/delay and benefit/cost analyses results are summarized below. Because of IFR separation rules and the impact of wake turbulence generated by heavy aircraft, a new north-south runway separated by 906 feet from existing Runway 14-32 will not double departure capacity in Configuration 1 or arrival capacity in Configuration 2. However, the incremental increase in capacity would result in a decrease in aircraft delays, especially during peak periods. The result of the benefit-cost analysis indicates that the runway would be justified when operations levels are forecast to reach approximately 297,650 operations in the 2012-2013 time frame. Average annual delay and benefit/cost analysis results are displayed in Table 4.1 and Table 4.2, respectively.

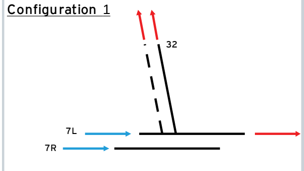
Average Annual Delay - Minutes Per Operaton

Delay	2006	2012	2017	2027
Operations	246,000	297,650	335,150	455,600
No-build Alternative	4.1	5.9	11.8	(1)
906' Alternative	2.3	4.1	6.9	(1)

Delay plus Taxi Time	2006	2012	2017	2027
Operations	246,000	297,650	335,150	455,600
No-build Alternative	9.5	12.7	18.7	(1)
906' Alternative	8.7	10.9	13.8	(1)

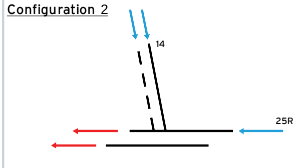
(1) - When annual average delay levels exceed approximately 15 minutes per operation, the simulation model gridlocks. This occured beyond 2017 when demand exceeded 335,150 operations.

Configuration 1



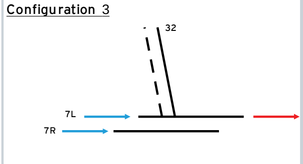
- By 2017 (335,150 ops), the new runway would increase the departure capacity from about 35 departures per hour (Base Case) to 41 departures per hour in the peak departure period. Peak period departure delays would be reduced from approximately 36 minutes (Base Case) per operation to 15 minutes in the peak arrival period.
- Reduced runway crossings and the ability to feed both departure runways from the center taxiway reduces ground delay by seven minutes.
- The parallel north-south runways are separated by less than 2,500 feet and are subject to wake turbulence penalties when heavy aircraft are operating on one of the runways.
- Because of the separation, the new runway would not add departure capacity in IFR.

Configuration 2



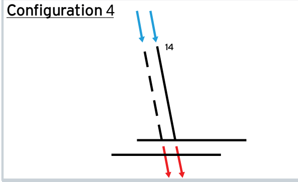
- The new runway would increase arrival capacity from approximately 35 arrivals (Base Case) per hour to 47 arrivals per hour. Peak period arrival delays would be reduced from 59 minutes (Base Case) to 18 minutes.
- The parallel north-south runways are separated by less than 2,500 feet and are subject to wake turbulence penalties when heavy aircraft are operating on one of the runways.
- Because of the separation of less the 2,500 feet, the new runway would not add arrival capacity in IFR.

Configuration 3



- The new north-south runway would not add capacity in this configuration.

Configuration 4



- The ability to store several arrival aircraft on the center taxiway before having to cross existing Runway 14-32 (14L-32R) slightly increases the capacity of the two runway system by four operations per hour.
- Although only used two percent of the time, total capacity is increased substantially with a second north-south runway. The new runway would increase total capacity from 49 operations per hour (Base Case) to 64 operations per hour. Peak period delays would be reduced from 180 minutes to 60 minutes.

	Undiscounted	Discounted
Total Benefits (a)		
Aircraft Delay Benefits	$2,974,927,090	$713,460,332
Passenger Delay Benefits	$393,861,905	$95,301,888
Cargo Delay Benefits	$1,649,134,447	$383,873,895
Runway Reconstruction	$19,053,817	$9,685,995
Salvage Value	$70,239,523	$9,873,065
Subtotal	$5,107,216,783	$1,212,195,175
Total Costs (a)		
Capital Costs	$210,718,570	$129,267,356
O&M Costs	$11,466,103	$3,303,638
Subtotal	$222,184,673	$132,570,993
Net Present Value (b)		$1,079,624,181
Benefit Cost Ratio (c)		9.14

(a) Table M.1 in Appendix M.
(b) Discounted benefits less discounted costs.
(c) Discounted benefits divided by discounted costs.

Sources: As noted and HNTB analysis.

Short 3000' Alternative

The Short 3000' Alternative is illustrated in Figure 4.9. The capacity/delay and benefit/cost analyses results are summarized below. Like the Long 3000' alternative, the benefit of the Short 3000' alternative is that it addresses the north-south capacity imbalance and IFR arrival capacity issues with the development of a single runway. The segregation of traffic between the two north-south runways does not substantially impact capacity. Combined with a reduction in construction costs relative to the Long 3000' alternative, this alternative yields an improved benefit-cost ratio. To obtain maximum potential capacity of this alternative, the primary operating configuration was changed from Configuration 1 to Configuration 2 for both VFR and IFR. Average annual delay and benefit/cost analysis results are displayed in Table 4.3and Table 4.4, respectively.

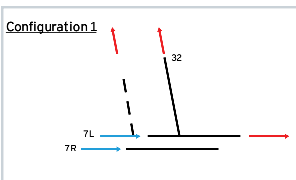
Average Annual Delay - Minutes Per Operaton

Delay	2006	2012	2017	2027
Operations	246,000	297,650	335,150	455,600
No-build Alternative	4.1	5.9	11.8	(1)
Short 3000' Alternative	1.4	2.0	3.2	18.2 (2)

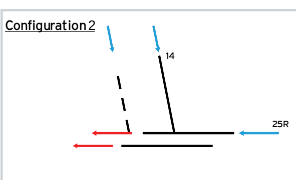
Delay plus Taxi Time	2006	2012	2017	2027
Operations	246,000	297,650	335,150	455,600
No-build Alternative	9.5	12.7	18.7	(1)
Short 3000' Alternative	9	10.1	12.5	26.9 (2)

(1) - When annual average delay levels exceed approximately 15 minutes per operation, the simulation model gridlocks. This occured beyond 2017 when demand exceeded 335,150 operations.

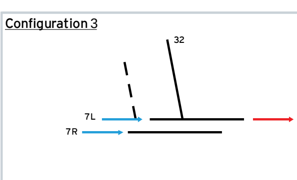
(2) The simulation model ran in all configurations except for Configuration 3



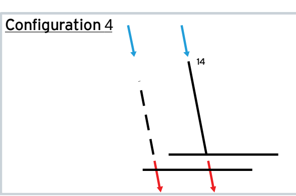
- The alternative provides roughly the same departure benefits as Alternative 3 with only a slight decrease in capacity due to the segregation of traf c between the two runways.
- This configuration runs at 2027 (455,600 ops) demand levels with acceptable delays, although IFR arrival delays would still be substantial.
- At lower traffic levels the advantage of the runway is offset by the longer taxi travel times to the new runway. The longer taxi distance would mostly impact the passenger carriers.
- The interaction between arrivals on 7L and departures on 32L would have to be managed by ATC so as to not adversely impact capacity.



- The alternative provides roughly the same VFR and IFR arrival benefits as Alternative 3 with only a slight decrease in capacity due to the segregation of traffic between the two runways.



- The new north-south runway would not have any benefit in this configuration.



- The alternative provides roughly the same departure benefits as Alternative 3 with only a slight decrease in capacity due to the segregation of traffic between the two runways.
- This configuration runs at 2027(455,600 ops) demand levels albeit still with substantial delays.

	Undiscounted	Discounted
Total Benefits (a)		
Aircraft Delay Benefits	$6,252,104,789	$1,374,105,886
Passenger Delay Benefits	$692,430,823	$151,741,752
Cargo Delay Benefits	$2,116,923,414	$462,420,629
Runway Reconstruction	$35,470,255	$15,749,217
Salvage Value	$180,025,833	$22,102,313
Subtotal	$9,276,955,114	$2,026,119,797
Total Costs (a)		
Capital Costs	$540,077,500	$310,835,471
O&M Costs	$22,904,739	$5,764,138
Subtotal	$562,982,239	$316,599,609
Net Present Value (b)		$1,709,520,188
Benefit Cost Ratio (c)		6.40

(a) Table M.1 in Appendix M.
(b) Discounted benefits less discounted costs.
(c) Discounted benefits divided by discounted costs.

Sources: As noted and HNTB analysis.

Long 3000' Alternative

The Long 3000' Alternative is illustrated in Figure 4.10. The capacity/delay and benefit/cost analyses results are summarized below. The benefit of this alternative is that it addresses both the north-south capacity imbalance and IFR arrival capacity issues with the development of a single runway. To obtain full benefit of this alternative, the primary operating configuration was changed from Configuration 1 to Configuration 2 for both VFR and IFR. Average annual delay and benefit/cost analysis results are displayed in Table 4.5 and Table 4.6, respectively.

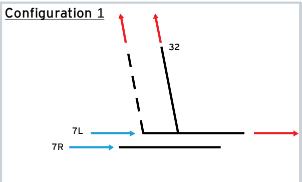
Average Annual Delay - Minutes Per Operaton

Delay	2006	2012	2017	2027
Operations	246,000	297,650	335,150	455,600
No-build Alternative	4.1	5.9	11.8	(1)
Long 3000' Alternative	1.3	1.9	2.9	13.6 (2)

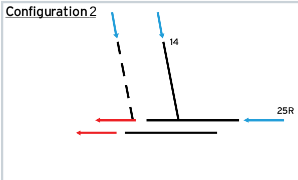
Delay plus Taxi Time	2006	2012	2017	2027
Operations	246,000	297,650	335,150	455,600
No-build Alternative	9.5	12.7	18.7	(1)
Long 3000' Alternative	9	10.2	12.0	22.1 (2)

(1) - When annual average delay levels exceed approximately 15 minutes per operation, the simulation model gridlocks. This occured beyond 2017 when demand exceeded 335,150 operations.

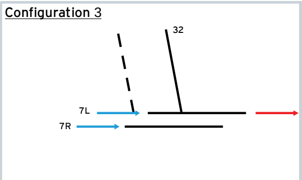
(2) The simulation model ran in all configurations except for Configuration 3



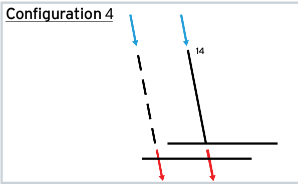
- A new runway at this separation would double the departure capacity to approximately 70 per hour.
- This configuration runs at 2027 (455,600 ops) demand levels.
- At lower traffic levels the advantage of the runway is offset by the longer taxi travel times to the new runway.
- The interaction between arrivals on 7L and departures on 32L would have to be managed by ATC so as to not adversely impact capacity.



- A new runway at this separation would double both the VFR and IFR arrival capacity, substantially reducing delays.
- Departure capacity would remain the same as the existing airfield.



- The new north-south runway would not have any benefit in this configuration.



- A new parallel north-south runway with this proposed separation would double the capacity and substantially reduce delays is what is the highest delay configuration.
- This configuration runs at 2027 (455,600 ops) demand levels albeit still with substantial delays.

	Undiscounted	Discounted
Total Benefits (a)		
Aircraft Delay Benefits	$6,629,542,612	$1,457,010,827
Passenger Delay Benefits	$732,410,465	$160,506,142
Cargo Delay Benefits	$2,117,746,500	$462,628,960
Runway Reconstruction	$35,470,255	$15,749,217
Salvage Value	$229,011,250	$28,116,400
Subtotal	$9,744,181,083	$2,124,011,546
Total Costs (a)		
Capital Costs	$687,033,750	$394,073,375
O&M Costs	$30,385,805	$7,646,800
Subtotal	$717,419,555	$401,720,175
Net Present Value (b)		$1,722,291,370
Benefit Cost Ratio (c)		5.29

(a) Table M.1 in Appendix M.
(b) Discounted benefits less discounted costs.
(c) Discounted benefits divided by discounted costs.

Sources: As noted and HNTB analysis.

906' & 500' Shift Alternative

The 906' & 500' Shift Alternative is illustrated in Figure 4.11. The capacity/delay and benefit/cost analyses results are summarized below. SIMMOD results underscore the importance of adding IFR arrival capacity to meet long-term demand. However, current estimates by the FAA indicated that the technology needed to implement this alternative may not be widely available until after 2020 which is beyond when additional IFR capacity is forecast (according to the FAA-approved 2007 forecast) to be needed.

The Federal Aviation Administration (FAA) is currently exploring future capacity enhancements for runways down to these separations. These enhancements include the elimination of wake turbulence penalties for arrivals and the capability to run dependent IFR approaches to parallel runways separated by less than 2,500 feet. The proposed separation does not affect departures. The wake turbulence rules for departures are still applicable and modeled. Average annual delay and benefit/cost analysis results are displayed in Table 4.7 and Table 4.8, respectively.

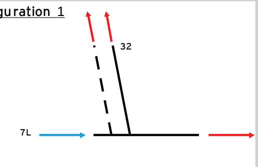
Average Annual Delay - Minutes Per Operaton

Delay plus Taxi Time	2006	2012	2017	2027
Operations	246,000	297,650	335,150	455,600
No-build Alternative	4.1	5.9	11.8	(1)
906′ & 500′ Shift Alternative	1.5	2.4	4.2	(1)

Delay	2006	2012	2017	2027
Operations	246,000	297,650	335,150	455,600
No-build Alternative	9.5	12.7	18.7	(1)
906′ & 500′ Shift Alternative	7.9	9.3	11.3	(1)

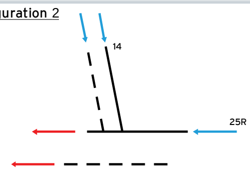
(1) - When annual average delay levels exceed approximately 15 minutes per operation, the simulation model gridlocks. This occured beyond 2017 when demand exceeded 335,150 operations.

Configuration 1



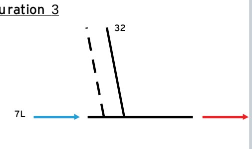
- The 500-foot shift reduces the jet blast potential between Runway 32 and Runway 7R resulting in a slight increase in departure capacity over Alternative 1.
- With the shift, IFR arrival rates would increase from 28 arrivals per hour to 39 arrivals per hour. If the technology were actually to be in place by 2012 (297,650 ops), peak period arrival delays would be reduced from 92 minutes per arrival to 32 minutes per arrival.

Configuration 2



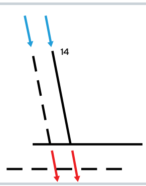
- Although there is current research underway to reduce the impact of wake turbulence generated by heavy aircraft, the analysis did not factor that into account.
- VFR arrival capacity and delay is comparable to Alternative 1.

Configuration 3



- Since this is a VFR configuration, then the 500-foot shift would not provide any bene t in this con guration.

Configuration 4



- The benefits of the new north-south runway are the same as Alternative 1.

	Undiscounted	Discounted
Total Benefits (a)		
Aircraft Delay Benefits	$5,530,365,176	$1,229,307,541
Passenger Delay Benefits	$686,637,661	$153,836,719
Cargo Delay Benefits	$2,026,825,121	$444,619,906
Runway Reconstruction	$19,053,817	$9,685,995
Salvage Value	$175,069,244	$21,493,777
Subtotal	$8,437,951,019	$1,858,943,938
Total Costs (a)		
Capital Costs	$507,912,632	$267,715,814
O&M Costs	$33,583,970	$8,312,529
Subtotal	$541,496,602	$276,028,344
Net Present Value (b)		$1,582,915,594
Benefit Cost Ratio (c)		6.73

(a) Table M.1 in Appendix M.
(b) Discounted benefits less discounted costs.
(c) Discounted benefits divided by discounted costs.

Sources: As noted and HNTB analysis.

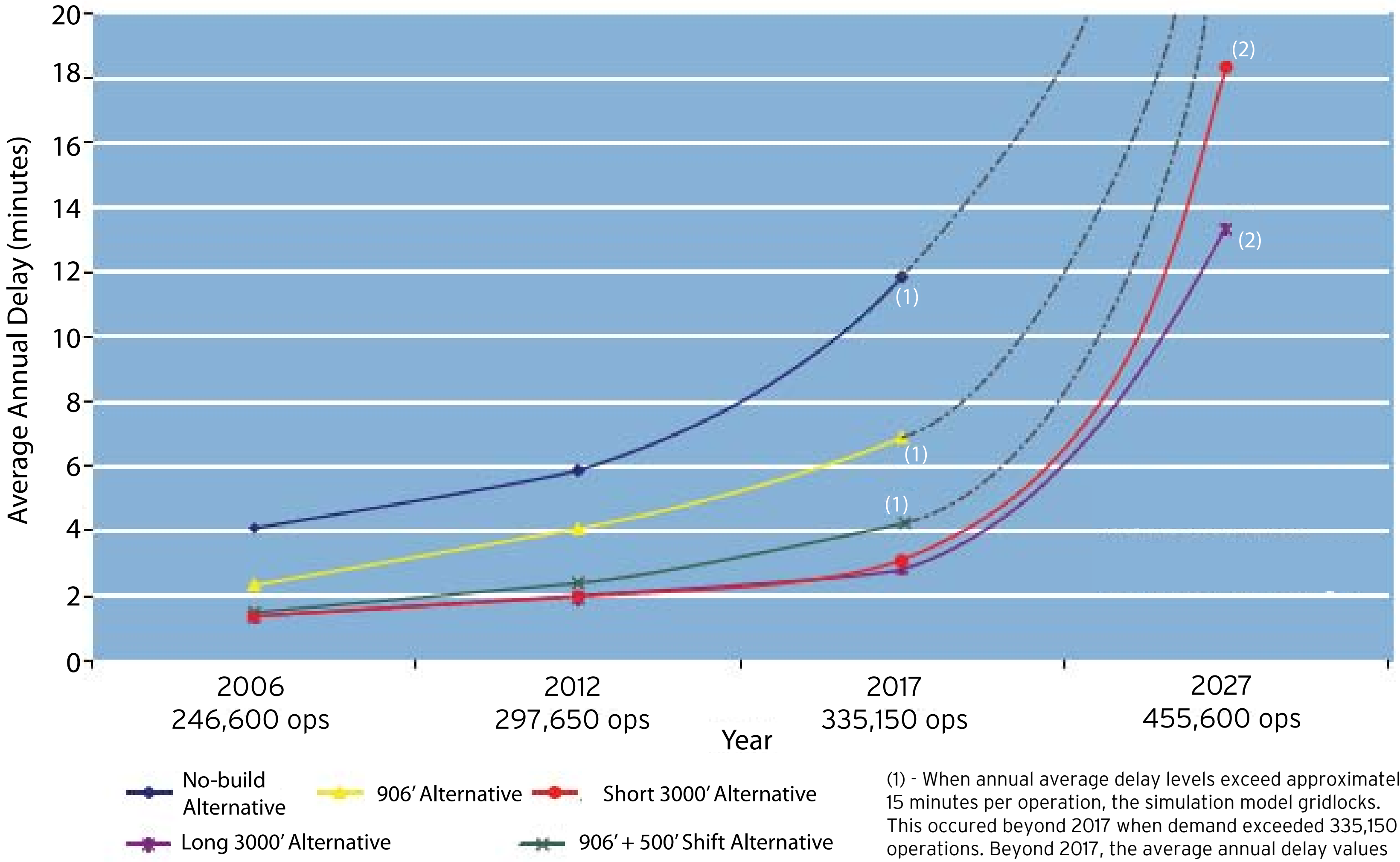
Capacity/Delay and Benefit/Cost Analyses Summary

Based on the SIMMOD capacity/delay and benefit/cost analyses, the following preliminary conclusions were made and presented in public meetings. However, a final recommendation would need to consider other factors including constructability, facility development potential, airspace considerations, environmental factors, and public review and acceptance.

- Although a new close-spaced parallel north-south runway provided in the 906' Alternative would address the east-west versus north-south capacity imbalance, it would not provide additional IFR arrival capacity. Long-term demand, as presented in the 2007 FAA-approved forecast, could not be met with the 906'Alternative as IFR arrival delays would be substantial beyond approximately 297,650 annual operations (reached in 2012 according to the 2007 FAA-approved forecast).
- The 906' + 500' Shift Alternative would add IFR arrival capacity, but only sufficient capacity to accommodate approximately 355,150 annual operations (reached in 2017 according to the 2007 FAA-approved forecast). Even with the south runway shift and new technology, forecast long-term demand could not be met with this alternative as arrival delays would again be substantial beyond approximately 355,150 annual operations. This alternative would require the development of two runways which increases the costs and lowers the net present value compared to the other alternatives.
- A widely-spaced new parallel north-south runway provided with the Short 3000' and Long 3000' Alternatives would address the east-west versus north-south capacity imbalance and the IFR arrival capacity needs. Except for approximately two percent of the time annually, these are the only alternatives that would accommodate demand levels of approximately 455,600 operations (reached in 2027 according to the 2007 FAA-approved forecast).
- Although the shorter runway requires segregation of heavy and non-heavy aircraft between the runways, the impact to delays at operations levels up to approximately 355,150 (reached in 2017 according to the 2007 FAA-approved

forecast) are minimal. Longer term, segregation in traffic will have a greater impact on delays as the difference in average annual delay between the Short 3000' and Long 3000' Alternatives increases to over four minutes per operation.

For comparative purposes, average annual delay, benefit-cost ratio, and net present value results are provided in Figure 4.12, Figure 4.13, and Figure 4.14, respectively and Table 4.9.



(1) - When annual average delay levels exceed approximately 15 minutes per operation, the simulation model gridlocks. This occured beyond 2017 when demand exceeded 335,150 operations. Beyond 2017, the average annual delay values were extrapolated.

(2) - The simulation model gridlocks at 2027 demand levels for configuration 3.

Ted Stevens
Anchorage
International Airport

NOT TO SCALE

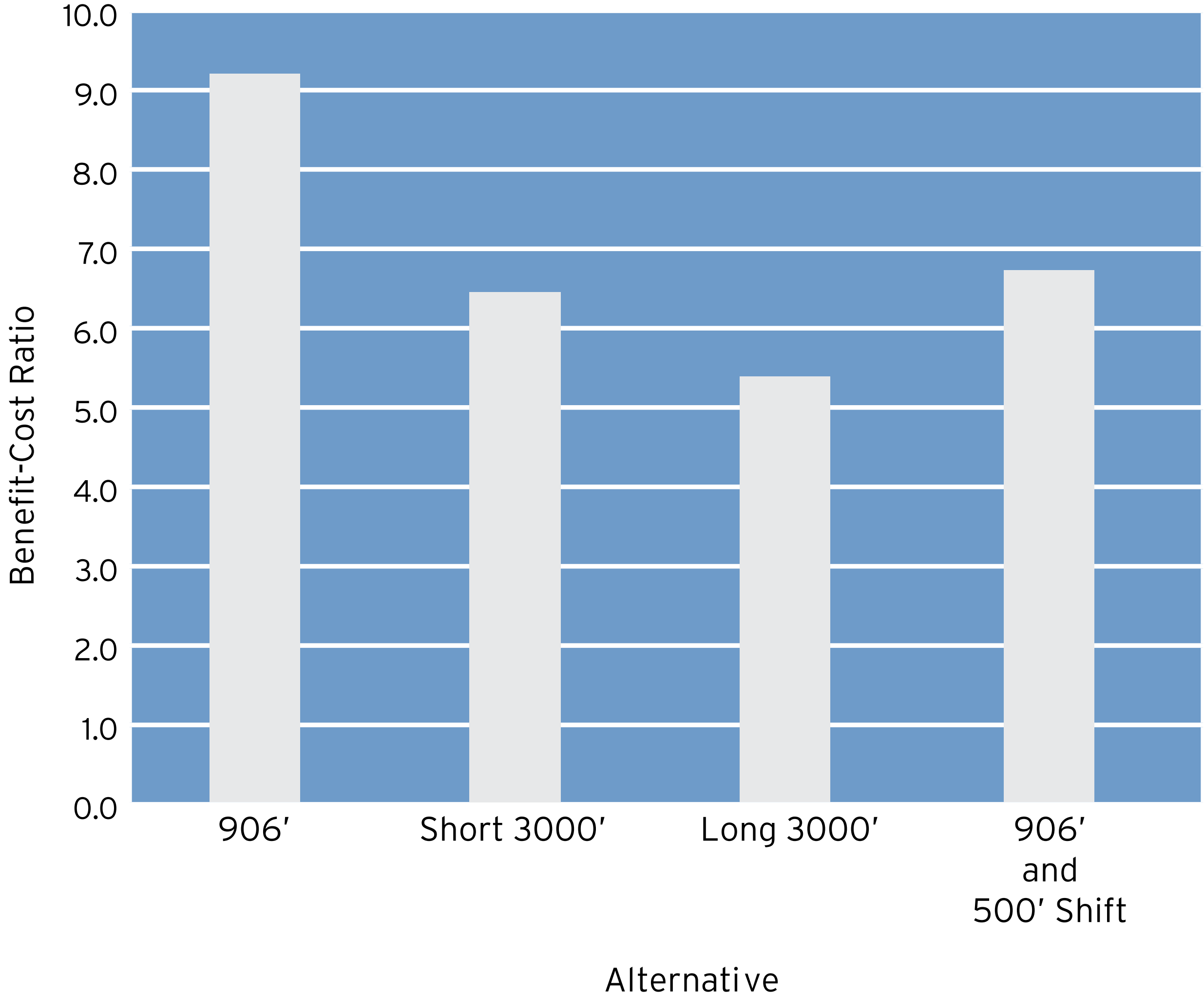
September 2008

DRAFT

Figure 4-12

Summary of Alternatives

Concept Development & Alternatives Evaluation



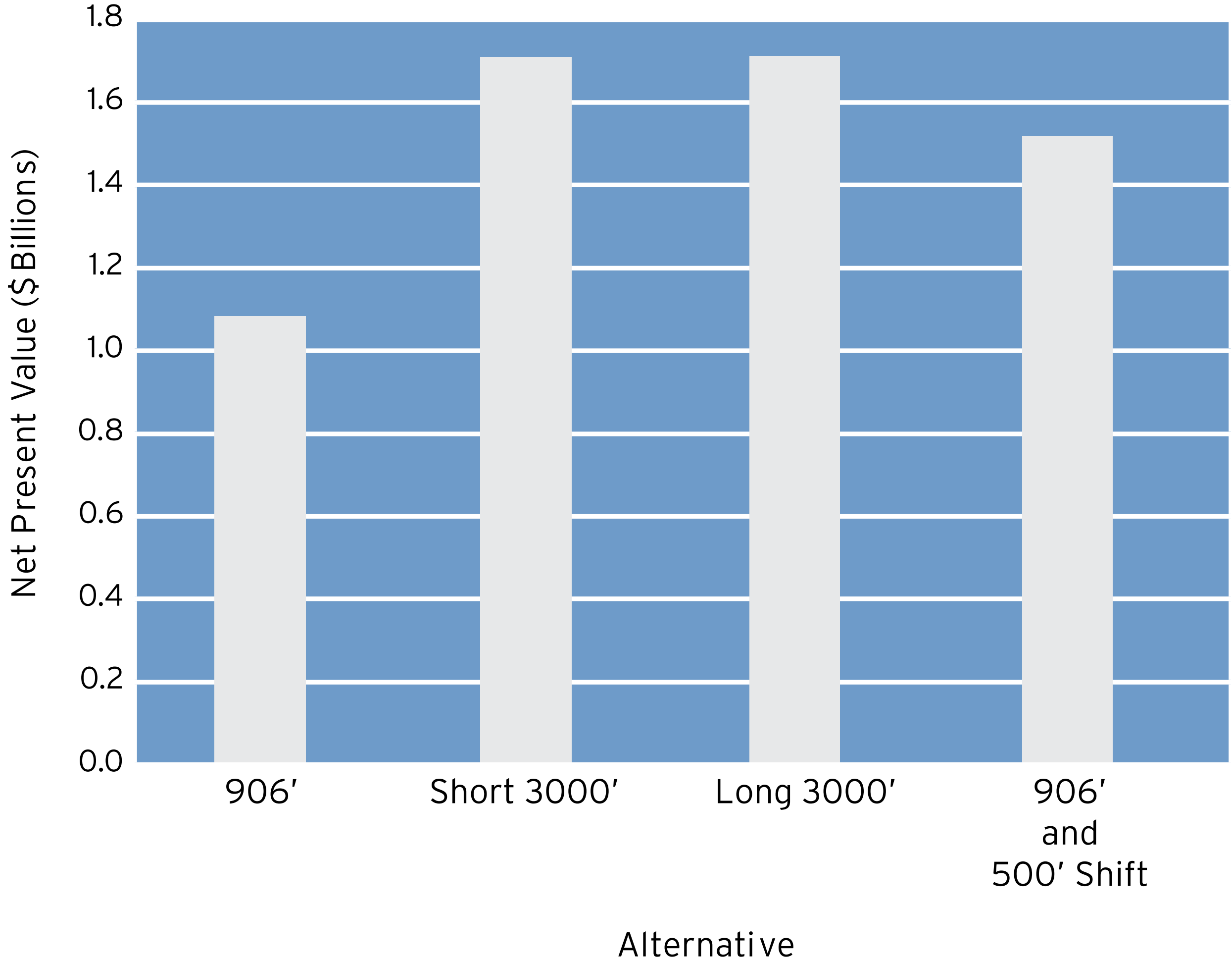
Ted Stevens
Anchorage
International Airport

NOT TO SCALE
September 2008

DRAFT

Figure 4-13
Alternatives Benefit-Cost Ratio Comparison

Concept Development & Alternatives Evaluation



Note: The Benefit-Cost analysis presented only applies to the associated planning years as identified in the March 2007 FAA approved forecast

Ted Stevens Anchorage International Airport

NOT TO SCALE
September 2008

DRAFT

Figure 4-14
Alternatives Net Present Value Comparison

Concept Development & Alternatives Evaluation

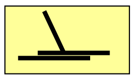
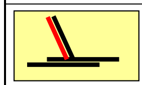
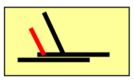
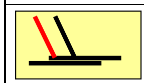
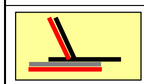
Table 4.9 Benefit-Cost Comparison of Airfield Alternatives

Alternative	Discounted Benefits	Discounted Costs	Net Present Value (Discounted Benefits minus Discounted Costs)	Benefit-Cost Ratio (Discounted Benefits divided by Discounted Costs)
906'	**$1,212,195,175**	**$132,570,993**	**$1,079,624,181**	**9.14**
Short 3000'	**$2,026,119,797**	**$316,599,609**	**$1,709,520,188**	**6.40**
Long 3000'	**$2,124,011,546**	**$401,720,175**	**$1,722,291,370**	**5.29**
906' and 500' Shift	**$1,858,943,938**	**$276,028,344**	**$1,582,915,594**	**6.73**

Note: The benefit-cost analysis presented only applies to the associated planning years as identified in the March 2007 FAA-approved forecast.

4.5.5. Draft Results of Evaluation of Airfield Alternatives

The results of Step Three: Alternatives Evaluation, resulted in a subjective evaluation of the airfield alternatives. The results of the subjective evaluation are presented below. Although the alternatives evaluation was never completed with a final weighting and scoring of alternatives, the evaluation matrix shown in Figure 4.15was presented at the April 30th, 2008 staff meeting (Workshop III) and May 21st, 2008 public meeting. .

		BEST PLANNING TENETS						ENVIRONMENTAL FACTORS					FISCAL FACTORS			OPERATIONAL PERFORMANCE - AIRFIELD							ANC	GRAND TOTAL
		Timing / phasing feasibility	Provides opportunity for future growth (flexibility)	Satisfies airport user needs	Conforms to appropriate plans	Political feasibility	SUBTOTAL	Impact to Trail / Recreational Areas and Parks	Noise Impacts	Tideland Impacts	Wildlife Impacts	SUBTOTAL	Benefit-Cost Ratio/ Net Present Value	Socioeconomic Benefit	SUBTOTAL	Demand Capacity Analysis	Airfield Balance	Provides operational capabilities during closures / repairs / construction	Airfield Safety	Taxi Time	NAVAID Technology	SUBTOTAL	Conforms to the ANC Strategic Vision	
	Maximum Points Available																							
	Existing Conditions																							
	906'																							
	Short 3000'																							
	Long 3000'																							
	906' and Shift																							

Ted Stevens
Anchorage
International Airport

NOT TO SCALE

September 2008

DRAFT

Figure 4-15

Alternatives Evaluation Matrix

Concept Development & Alternatives Evaluation

Alternative Evaluation Rankings (to be completed)

Criteria: Best Planning Tenets:

Subcriteria

- Timing/Phasing & Feasibility
- Provides opportunity for future growth (flexibility)
- Satisfies Airport user needs
- Conforms to airport plans/land use guidelines
- Political feasibility

Criteria: Environmental Factors

Subcriteria:

- Impacts to Tony Knowles Coastal Trail/Recreational Areas and Parklands/ Cultural Resources
- Noise Impacts
- Tideland Impacts
- Wildlife Impacts

Criteria: Fiscal Factors

Subcriteria:

- Benefit-Cost Ratio
- Socioeconomic Benefit

Criteria: Operational Performance – Airfield

Subcriteria:

- Demand Capacity Analysis
- Airfield Balance
- Provides operational capabilities during closures/repairs/construction
- Airfield Safety
- Taxi Time
- NAVAID Technology

4.5.6. Airfield Alternatives - Next Steps/Recommendations

Recommended analyses include the following.

- Update Aviation Activity Forecast
- Evaluate Fairbanks International Airport as a reliever airport
- Completion of alternatives evaluation and selection`

- Determine whether or not additional operating configurations of the airport layout would conflict with current noise abatement procedures
- Conduct a sensitivity analysis of the oil price and the economy in Aviation Activity Forecast and BCA analyses.
- Analyze capacity enhancement instrument approaches
- Determine, if capacity increases, the need to address the environmental impact in more detail, such as the air quality
- Evaluate Airfield Capacity with Implementation of FAA Traffic Management Unit (TMU). (see Appendix D)

4.6. Air Cargo Assessment

As of May 2008, when work on this Master Plan was discontinued, no air cargo concepts were developed. This section on air cargo summarizes the air cargo facility requirements and presents a description of the existing and currently planned cargo positions.

4.6.1. Air Cargo Facility Requirements

Alternatives to meet air cargo facility requirements consisted of layout and parcel options in areas designated for future cargo development. Up to three alternatives per area would be considered and a recommended alternative selected in consultation with Airport staff.

Alternative development parcels would be evaluated relative to the following factors[6]:

- Flexibility to adapt to changing service levels and fleet mix;
- East of airfield access;
- Ease of surface access;
- Truck maneuverability;
- Flexibility to adapt to changing aircraft parking requirements (i.e. push-back versus power-out);
- Engineering factors;
- Location of utilities;
- Environmental considerations;
- Community impact considerations
- Order-of-magnitude costs/revenue impacts;
- Flexibility to adapt to changing markets in airline operations,
- Operations factors, and
- Deicing facilities, services, and glycol disposal / reuse.

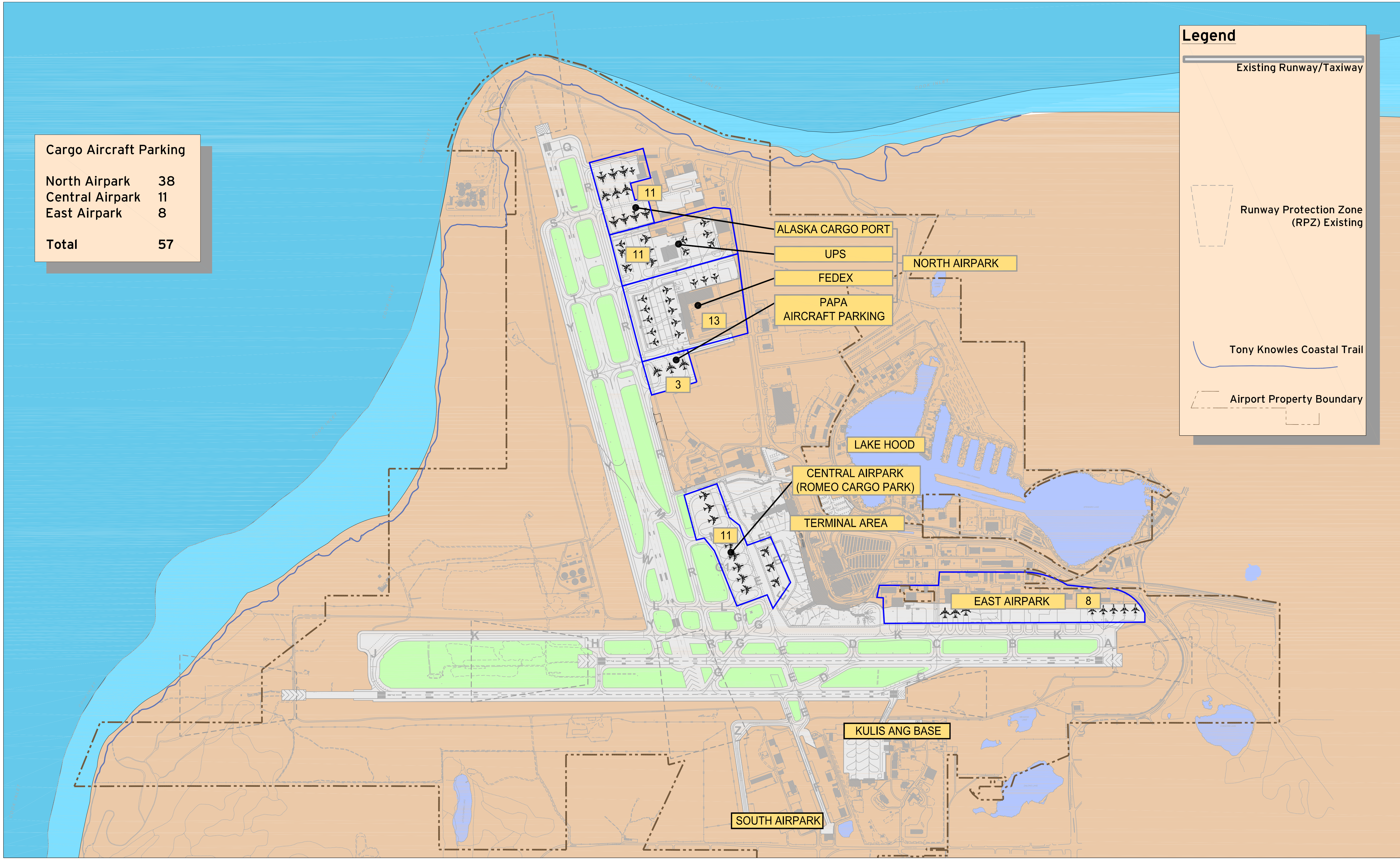
4.6.2. Existing Cargo Positions

Existing Conditions

There is a total of 57 Cargo aircraft parking positions spread across the airport in three areas: North Airpark with 38 positions, Central Airpark (Romeo Cargo Parking) with 11 positions and the East Airpark with 8 positions. Existing cargo conditions are shown in Figure 4.16.

4.6.3. Planned Cargo Positions

Currently planned cargo facilities are depicted in Figure 4.17. Modifications include up to 12 positions in North Airpark and the subtraction of one position in East Airpark due to re-striping for larger widebody aircraft.



Ted Stevens Anchorage International Airport

SCALE 1" = 1000'

January 2009

DRAFT

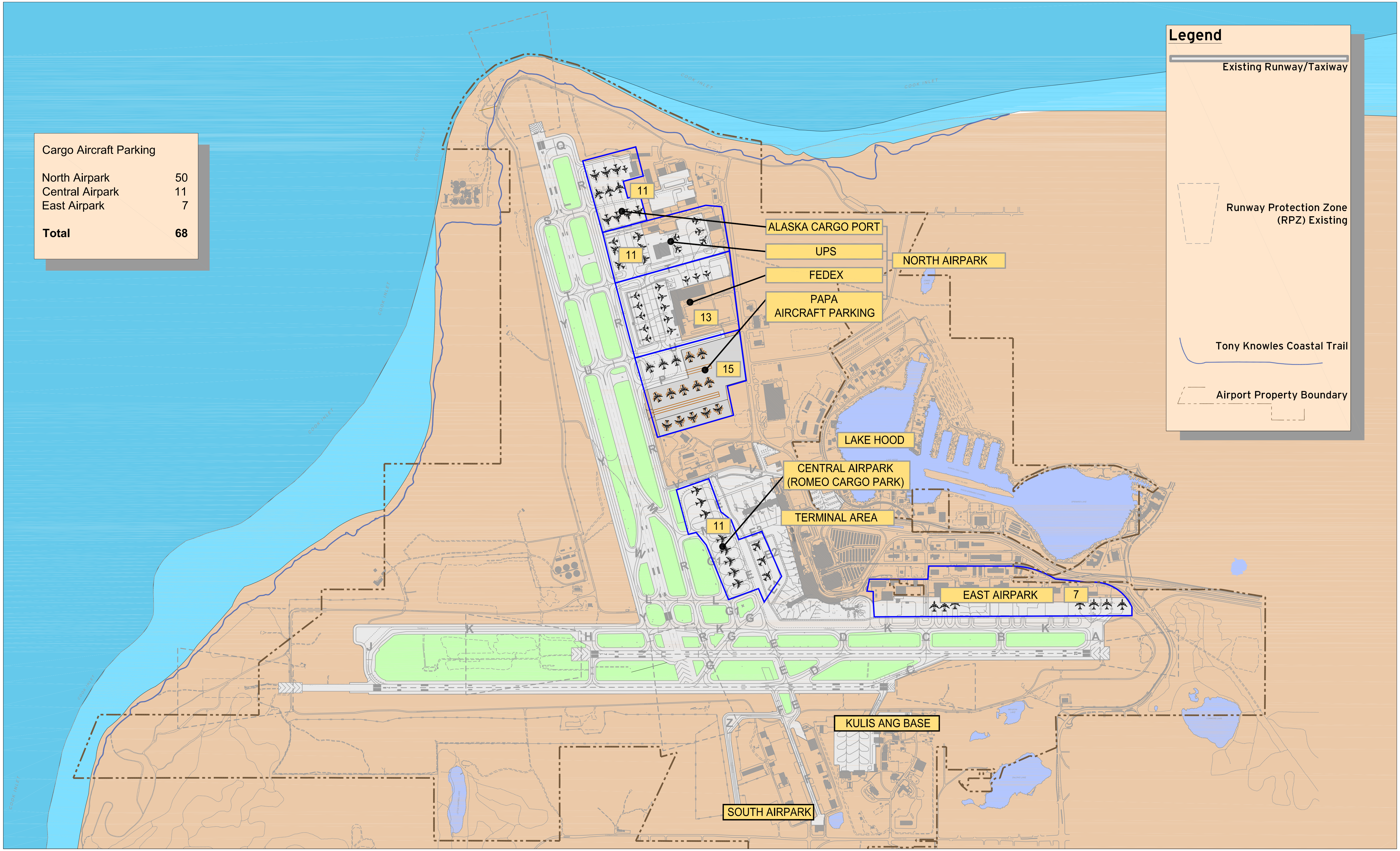
Figure 4-16

Existing Cargo Positions

Concept Development & Alternatives Evaluation

J:\43210-ANC\CADD\Exhibits\2009_0310_Alternatives\ Fig4-16_Cargo_ExistingCargoPositions.dwg Mar 10, 2009 - 5:21pm

note: this exhibit may be reduced from its original layout



Ted Stevens Anchorage International Airport

DRAFT

Figure 4-17
Currently Planned Cargo Positions

Concept Development & Alternatives Evaluation

Terminal Alternatives Analysis

Terminal concepts for the ANC Master Plan were developed in the December 2005 Terminal Area Concept Study. Specific areas of focus included the terminal area, co-generation capabilities, a Centralized Facilities Complex, hotel, and control tower. The Airport has prepared a feasibility study for a hotel and plans to issue an RFP. The process involved reviewing relevant documents, including the existing master plan, reports, space programs, site plans, and terminal floor plans. Growth rates and future expansion options were identified for the terminal building and terminal support facilities. Three terminal concepts were recommended.

The first concept involves an expansion in the construction of a mid-field Concourse "D" located mid-way between existing Concourse B and the North Terminal and perpendicular to Concourse C. The ticket and baggage claim lobbies would utilize a portion of the two-level curbside road that is now unoccupied, but was designed to accommodate this future expansion. Six jet gates that can accommodate the Boeing 757-300 with winglets (wingspan of 135 feet) would be added for a total of 15 jet gates on Concourses C & D.

The second recommended concept involves an expansion of the existing ticket and baggage claim lobbies and two-level curbside road in the area west of South Aircraft Drive and south of the new elevated Alaska Railroad line. The expansion may potentially increase the number of jet gates to 17. This area should be preserved for future terminal area expansion, potentially for new services, security and updated retail core.

The third recommended concept involves dedicating all or a portion of the North Terminal for domestic use in the event international passenger traffic decline or are relocated. If this happens, six domestic jet gates can use the area of the four landside international gates. If the entire terminal complex is used for domestic use, the terminal complex could potentially provide for 14 domestic jet gates.

In this Master Plan process, the concepts recommended from the Terminal Area Concept Study were evaluated as alternatives. The evaluation included modifying the layout of the concepts to accommodate the requirements indicated by the Master Plan. Terminal alternatives identified which area of the terminal complex and/or adjacent areas should be preserved for future terminal development.

4.7. *Regional Airfield Capacity Alternatives*

4.7.1. Background

The 2002 master plan update[7] evaluated a range of alternatives to accommodate the projected aviation demand in the Anchorage region. The evaluation concluded that the most appropriate alternative for meeting long term aviation demand was expanding facilities within the Ted Stevens Anchorage International Airport (ANC) border. In this chapter, the alternatives that included supplemental and replacement airports are examined again to see if the conclusion from the 2002 master plan update is still valid. This validation process is qualitative in nature and not intended to provide the level of detail needed for any future Environmental Assessment or Environmental Impact Statement.

The planning assumptions for the previous alternatives are reviewed to determine if there have been significant changes that might change the 2002 master plan conclusion. The planning assumptions and other relevant topics reviewed are:

- Demand/Capacity Analysis
- FAA Operating Procedures/Airspace in the Anchorage Bowl
- Facility Requirements
- Aviation Industry Changes
- Ground Access
- Environmental Impacts
- Community Impacts
- Development Costs
- Financial Feasibility
- Consistency with Other Plans

[7] Ted Stevens Anchorage International Airport Master Plan Update Technical Report, HNTB Corporation, November 2002.

Public comment indicated a need to evaluate Fairbanks International Airport (see Next Steps).

4.7.2. Description of Alternatives

The 2002 Master Plan Update considered six alternatives. Three alternatives did not include regional supplemental or replacement airports:

- Alternative 1: No Airfield Expansion at ANC
- Alternative 2: Limited Airfield Expansion of ANC within Existing Borders
- Alternative 5: Full Development of ANC including Development beyond Existing Borders

Alternative 2 was recommended, based upon the results of the evaluation matrix in Table 4.10. Alternative 2 included a new parallel north-south runway west of existing Runway 14-32.

The 2002 Master Plan Update also considered regional alternatives that would either supplement the existing ANC airport or would replace it. These are the subject of this chapter:

- Alternative 3: Supplemental Airport at Fire Island
- Alternative 4: Supplemental Airport at Point MacKenzie
- Alternative 6: Replacement Airport at Point MacKenzie

Alternatives 3 and 4 included limited expansion of ANC within its existing borders. Figure 4.18 locates the Fire Island and Point MacKenzie sites. Fire Island could not be considered a site for a replacement airport due to its limited size.

Fire Island’s close proximity to ANC and lack of development were reasons for considering it as an airport site, along with the fact that its use for supplementing the Airport had been discussed with the community previously. In fact, the principal owner of the site, Cook Inlet Regional, Inc., had completed some feasibility studies for airport use. The 4,240-acre island is 5.3 miles long by 2.2 miles wide. It is located in Cook Inlet approximately 3 miles west of the Airport, within the Municipality of Anchorage. It is uninhabited and accessible only by small boat or aircraft.

The Point MacKenzie alternatives focused on an area known as the former Knik Aviation Reserve, 15 miles northwest of ANC in the Matanuska-Susitna Borough. The 9,345-acre reserve was created in the early 1970s for a potential future airport and chosen because it was one of the few, relatively flat areas in the region large enough to support the development of a new airport. The aviation reserve request was closed in 1980 and the land was included in an agricultural sale. Another reason for proposing it as an airport site was that there was little evidence of any major environmental concerns that could not be mitigated.

Figure 4.18 Regional Airport Sites Considered

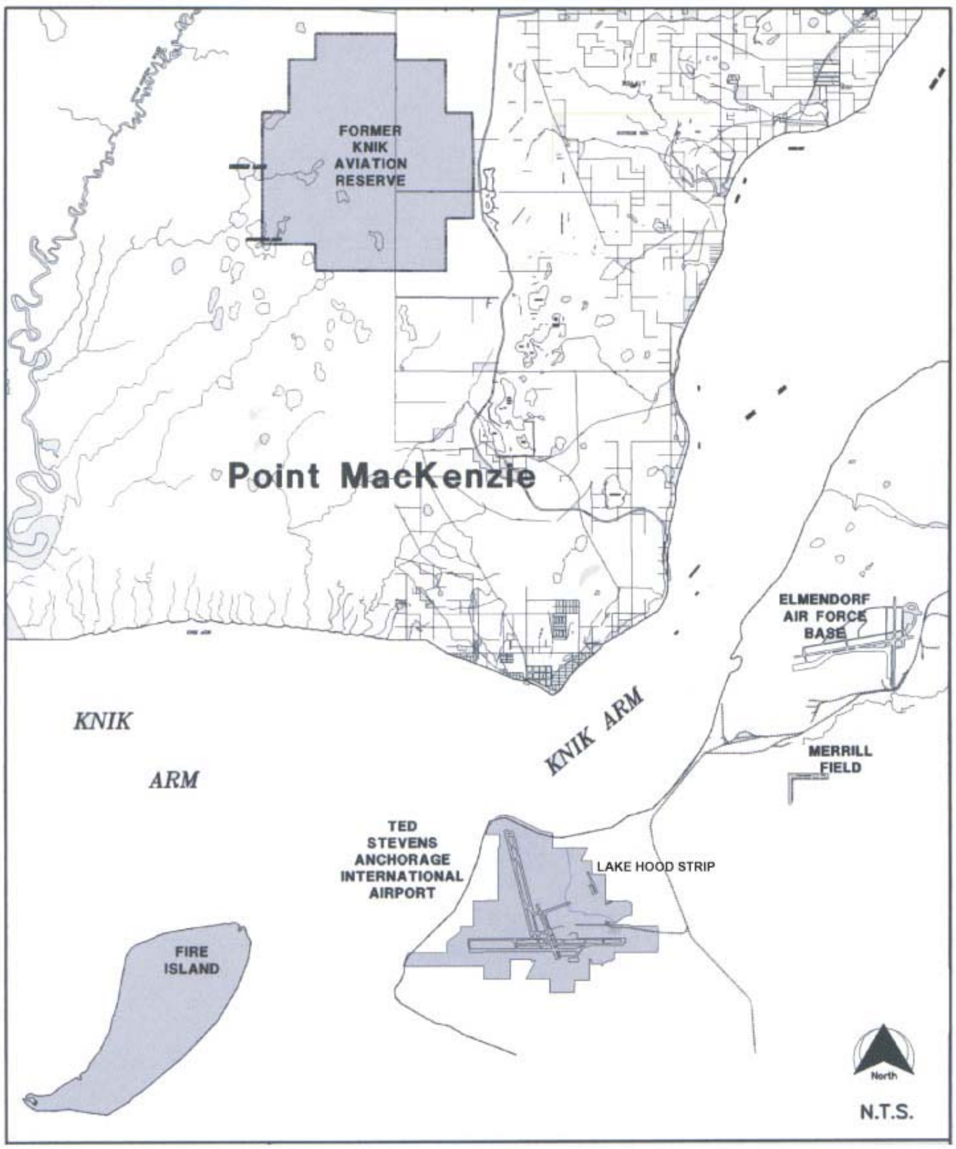


Figure 4.19, Figure 4.20 and Figure 4.21 illustrate the airport development concepts for Alternatives 3, 4, and 6.

Figure 4.19 Alternative 3 – Fire Island Supplemental Airport

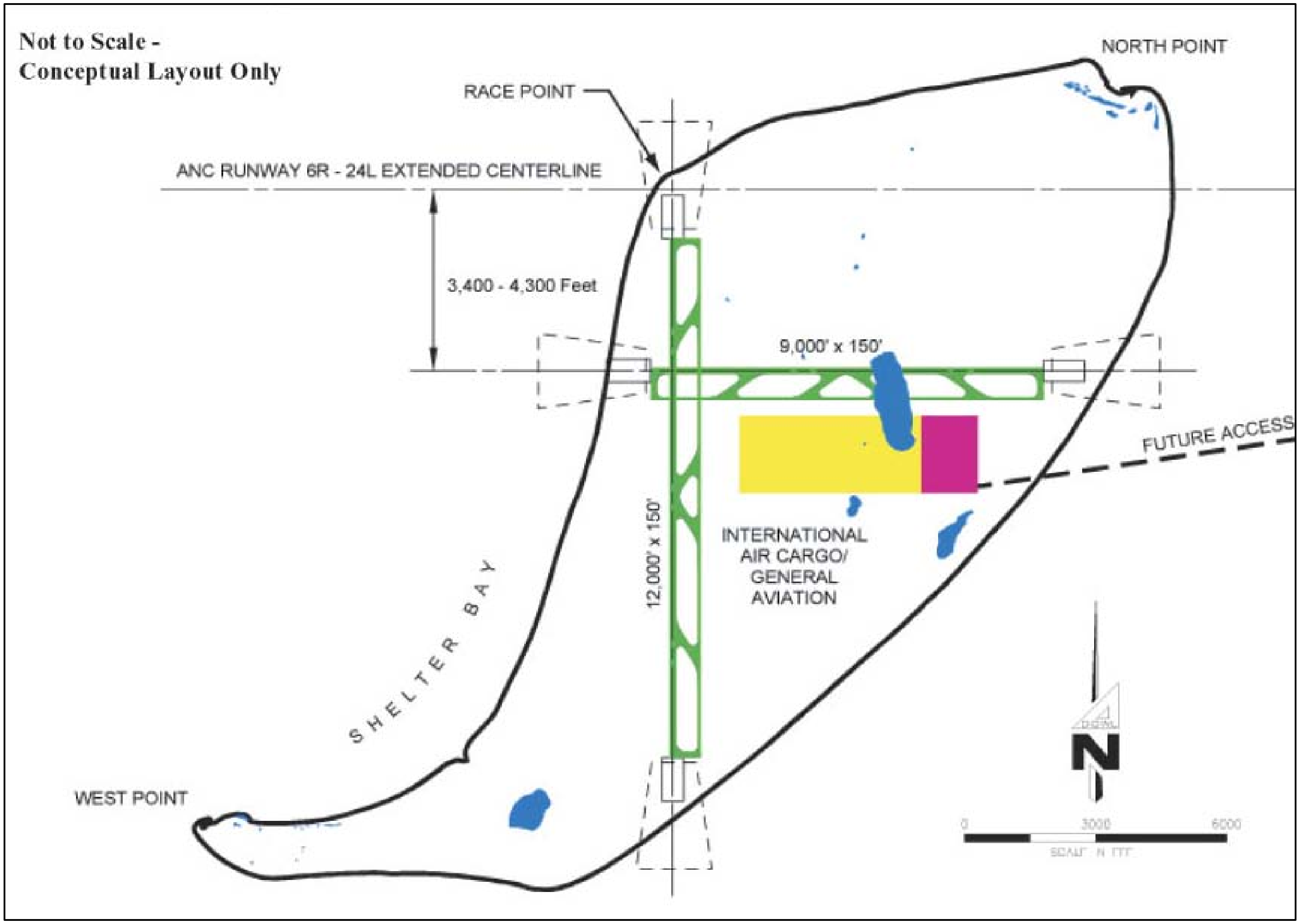


Figure 4.20 Alternative 4 – Point MacKenzie Supplemental Airport

Not to Scale -
Conceptual Layout Only

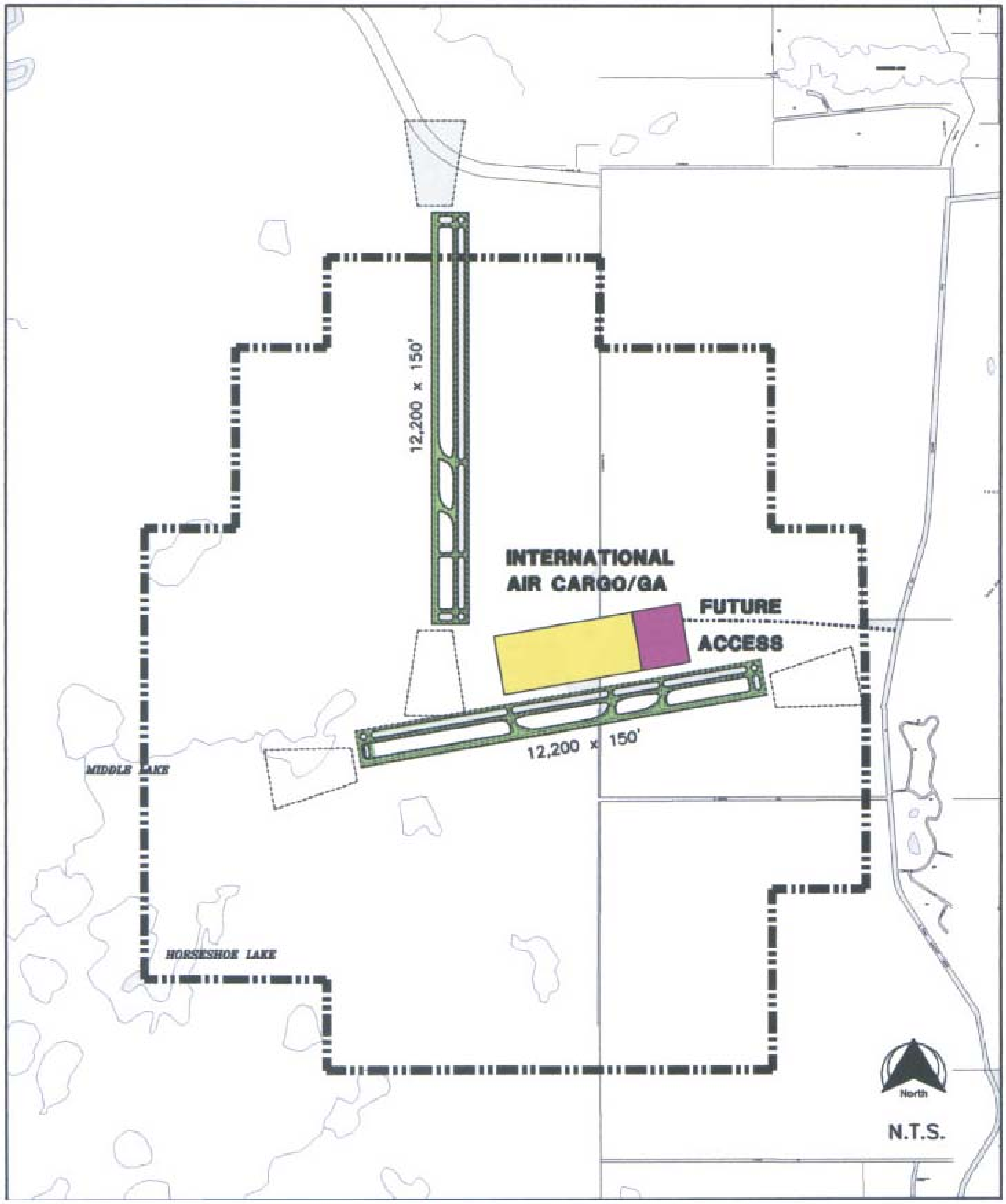
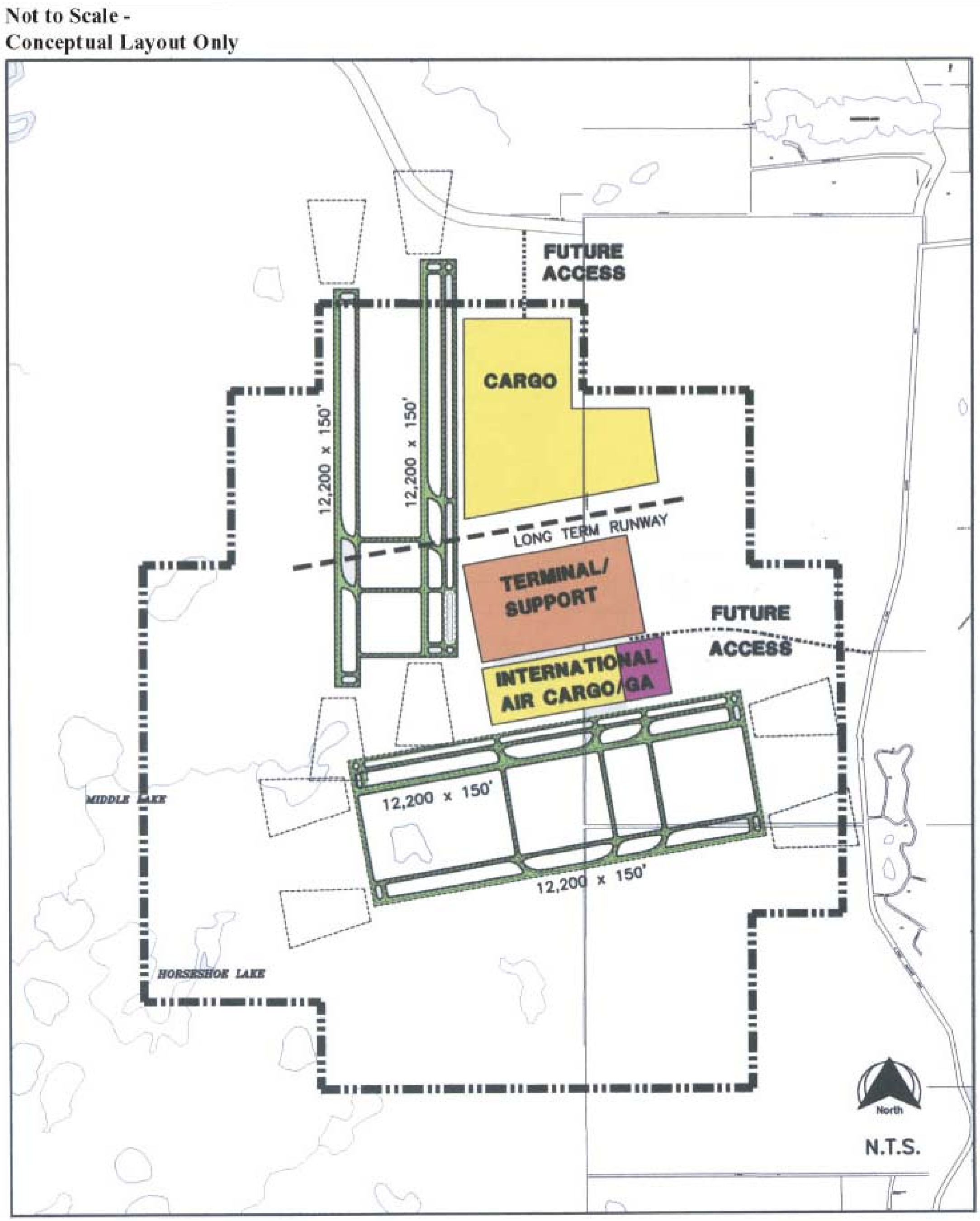


Figure 4.21 Alternative 6 – Point MacKenzie Replacement Airport



A summary of the alternatives evaluated in matrix form is provided in the following Table.

Table 4.10 Alternatives Evaluation Matrix from 2002 Master Plan Update

	Airside/ Landside Considerations	Airspace/Safety (Table 4.9)	Access/Surface Transportation (Travel and Time Costs)	Noise (Residential Units within 2020 65 DNL)	Other Environmental Factors of Concern (see Table 4 .12)	Economic Impacts	Development Costs (Billions)	Financial Feasibility (Signatory Landing Fee in $2001)	Compatibility with MOA Comprehensive Plan
Alternative 1 – No Airfield Expansion at ANC	Use of technology and/or demand management techniques needed to meet long-term regional aviation demand	Good Interactions – 4 Terrain impact 2 airport system	$90M	200- 300 120 acres	Minimal impacts	Airport-related Jobs Anchorage = 11,700 Mat-Su = 0 Payroll Anchorage = $471M Mat-Su = 0 Tax Revenue Anchorage = $5.0M Mat-Su = 0	**$1.2B**	**$0.99**	Compatible with Comprehensive Plan assumptions and recommendations
Alternative 2 – Limited Airfield Expansion of ANC within Existing Borders	Use of technology and/or demand management techniques needed to meet long-term regional aviation demand	Good Interactions – 8 Terrain impact 2 airport system	$109M	200-300 120 acres	Air quality Point Woronzof Park Bald eagle impact	Airport-related Jobs Anchorage = 13,200 Mat-Su = 0 Payroll Anchorage = $533M Mat-Su = 0 Tax Revenue Anchorage = $5.7M Mat-Su = 0	**$1.5B**	**$1.17**	Compatible with Comprehensive Plan assumptions and recommendations
Alternative 3 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island	New ATC procedures/ technology needed to meet long-term aviation facility requirements in the region (see Airspace Safety)	Poor Interactions – 29 Impacts EDF Training Wind shear Terrain impact 3 airport system	$311M	200-300 120 acres	Air quality Point Woronzof Park Bald eagle impact Wetlands Coastal zone	Airport-related Jobs Anchorage = 17,700 Mat-Su = 0 Payroll Anchorage = $714M Mat-Su = 0 Tax Revenue Anchorage = $7.6 Mat-Su = 0	**$3.1B**	**$1.44**	Conflicts with Comprehensive Plan assumptions
Alternative 4 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport in Point MacKenzie	Access/landside/ airside layout works well Meets long-term aviation facility requirements in region	Good Interactions – 14 Impacts EDF Training Terrain impact Further restricts GA corridor 3 airport system	With bridge = $290M Without bridge = $492M	200-350 12 0 acres (ANC) 4,700 (Pt. MacKenzie)	Air quality Point Woronzof Park Bald eagle impact Coastal Zone Wildlife Secondary and Cumulative	Airport-related Jobs Anchorage = 13,200 Mat-Su = 4,500 Payroll Anchorage = $533M Mat-Su =$181M Tax Revenue Anchorage = $5.7M Mat-Su = $1.9	**$4.1B**	**$1.70**	Conflicts with Comprehensive Plan assumptions
Alternative 5 – Full Development of ANC Including Development beyond Existing Borders	Requires facility development on south side Meets long-term aviation facility requirements in region	Good Interactions – N/A Terrain impact 2 airport system	$170M	650-750 350 acres	Air quality Point Woronzof Park Bald eagle impact Wetlands Kincaid Park Little Campbell Lake	Airport-related Jobs Anchorage = 17,700 Mat-Su = 0 Payroll Anchorage = $714M Mat-Su = 0 Tax Revenue Anchorage = $7.6 Mat-Su = 0	**$2.3B**	**$1.29**	Conflicts with Comprehensive Plan assumptions and recommendations
Alternative 6 – Closure of ANC and Development of a New Airport in Point MacKenzie	Best opportunity for efficient access landside/airside development Meets long-term aviation facility requirements in region	Very good Interactions – 0 Impacts EDF Training Further restricts GA corridor 2 airport system	With bridge = $527M Without bridge = $1,132M	0-50 12,750 Acres (1)	Wetlands Wildlife Coastal zone Secondary and Cumulative	Airport-related Jobs Anchorage = 0 Mat-Su = 17,700 Payroll Anchorage = 0 Mat-Su = $714M Tax Revenue Anchorage = 0 Mat-Su = $7.6M	**$6.3B**	**$2.68**	Conflicts with Comprehensive Plan assumptions and recommendations

Source: HNTB, DOWL Engineers, Northern Economics analyses.
Note: (1) This area is not zoned, therefore, it could be used for residential use.

4.7.3. Review of Planning Assumptions

Demand/Capacity Analysis

Table 4.11 shows how the 2002 Master Plan Update

allocated the aircraft operations forecast demand in 2020 among the regional alternatives.

Table 4.11 Aircraft Operations Forecast for 2020 from 2002 Master Plan Update

	Alternative 3		Alternative 4		Alternative 6
	ANC	Fire Island	ANC	Point MacKenzie	Point MacKenzie
Passenger Carriers	192,800		192,800		192,800
Domestic Cargo	18,400		18,400		18,400
Air Mail	10,800		10,800		10,800
Military	4,000		4,000		4,000
International Cargo	53,400	15,200	54,880	13,720	68,600
Int'l Tech-Stop		108,400	33,620	74,780	108,400
Air Taxi	850	850	850	850	1,700
General Aviation	20,750	20,750	20,750	20,750	41,500
Total Operations	301,000	145,200	336,100	110,100	446,200

Source: Table 4.2, Ted Stevens Anchorage International Airport Master Plan Update Technical Report, HNTB Corporation, November 2002

The forecasts in Table 4.11 were compared with the forecasts prepared for the current master plan update (Table 4.12). Aircraft operations for 2020 were interpolated, based upon the operations projected for the milestone years 2017 and 2027. The interpolation was done so that forecasts for the same year could be compared.

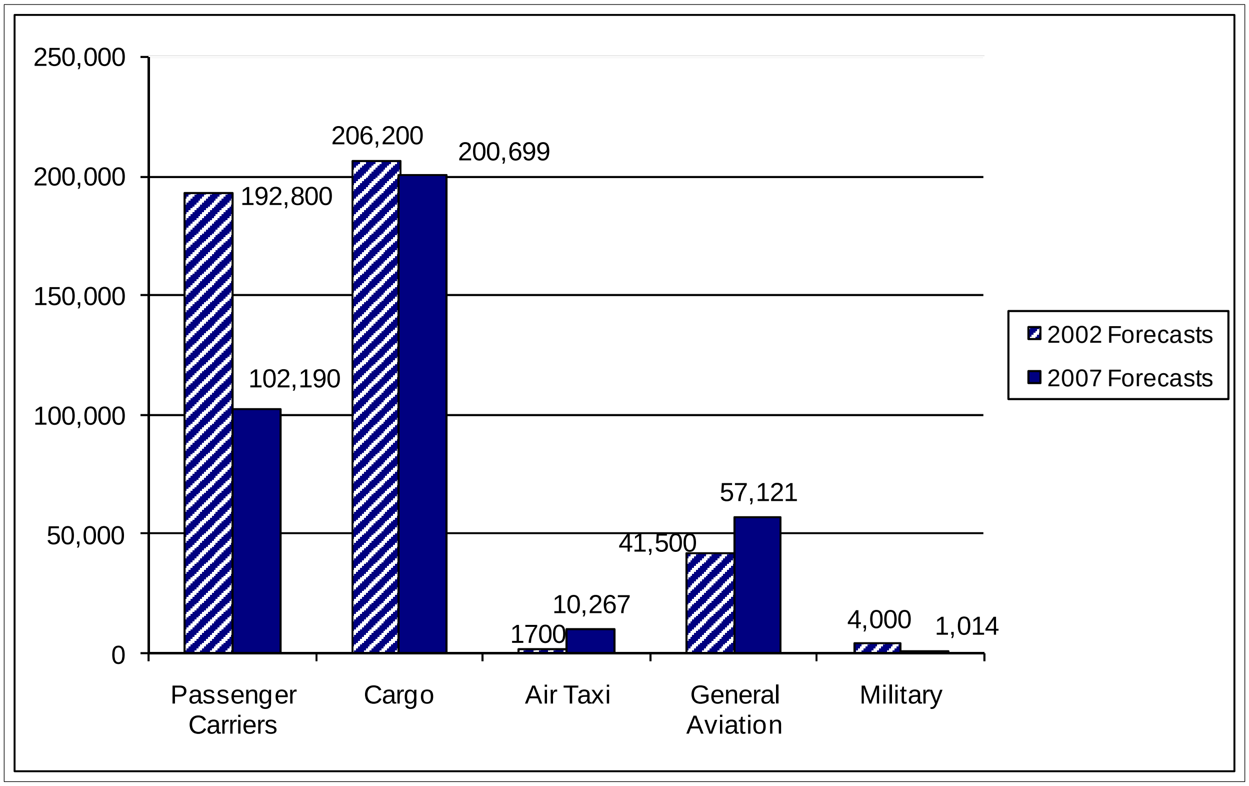
Table 4.12 Current Forecast for Aircraft Operations

	2017	2020 (Interpolated)	2027
Passenger Aircraft			
Domestic	94,869	98,352	106,478
International	903	958	1,085
Charter	2,844	2,881	2,968
Subtotal	98,615	102,190	110,530
Cargo Aircraft			
Intra-Alaska	27,702	28,885	31,646
International and Other US	144,840	171,814	234,754
Subtotal	172,542	200,699	266,400
Other Aircraft			
Air Taxi and Other	9,896	10,267	11,134
General Aviation	53,083	57,121	66,543
Military	1,014	1,014	1,014
Subtotal	63,993	68,402	78,691
Total Operations	335,150	371,291	455,621

Source: Table 2.6.3

The current master plan update forecast for 2020 operations is 83% of the forecast from the 2002 Master Plan Update (371,291 compared to 446,200). The forecast for the largest category of aircraft, cargo, is very close to the previous forecast, 200,699 versus 206,200 (the sum of domestic cargo, air mail, international cargo, and international tech-stop). The latest forecast for the next largest category of aircraft operations, passenger carrier aircraft, is about half what was forecast previously, which is a significant reason for the total operations forecast to be lower than the previous forecast. There are substantial differences in the forecasts for military, air taxi, and general aviation aircraft operations, but these categories represent a small percentage of the total number of operations. See Figure 4.22 below.

Figure 4.22 2002 and 2007 Forecast Comparison for 2020*



*Note: The 2007 forecast for 2020 was extrapolated using 2017 and 2027 forecasts.

While the overall current forecasts for 2020 are lower than the previous forecasts for 2020, it would not delay the time when the ANC airfield reaches its capacity for aircraft operations. The reason for this apparent contradiction is due to a refinement in the modeling of the delay. The 2002 Master Plan Update utilized the FAA Airfield Delay Model, and the 2007 Master Plan Update uses the SIMMOD Model. The Airfield Delay Model uses theoretical capacities which were subsequently determined to be higher than can actually be achieved. With SIMMOD, it was determined that the hourly capacity of the airfield is about 40 arrivals, 36 departures, and 60 total operations. The model was calibrated to FAA Aviation System Performance Metrics (ASPM) data which indicates the capacity to be 40 arrivals, 35 departures, and 60 total operations. For comparative purposes, in the prior master plan a theoretical capacity of 145 operations per hour was used. The result is that the 2007 model shows severe congestion at ANC by 2017.

Conclusion about Demand/Capacity Analysis

Current master plan update forecasts, using the updated modeling, show demand growing quicker than the 2002 Master Plan Update's forecasts. Differences in demand projections and capacity analyses have not made regional alternatives more attractive.

FAA Operating Procedures/Airspace in the Anchorage Bowl

The base year for airfield capacity analysis in the 2002 Master Plan Update was 1997. Since then, the Anchorage Terminal Area Airspace and Procedures Redesign study was completed by the FAA in 2002, resulting in redesign of the Anchorage Bowl airspace and procedures, particularly for VFR traffic. The project was part of a national FAA initiative that recognized how difficult it is to build new runways at congested airports and sought to increase capacity through more efficient use of the airspace. Enhancement of the Anchorage Bowl's airspace capacity continues. A May 13, 2005 memorandum to the FAA from the Assistant Inspector General for Aviation and Special Program Audits noted that the Anchorage Terminal Area Airspace Redesign Project needs additional navigation equipment to create new arrival and departure routes for the Anchorage area. In the spring of 2007 improvements were announced that increase the capacity of flights over the ocean.

Conclusion about FAA Operating Procedures/Airspace in the Anchorage Bowl

Airspace redesign and air traffic improvements have helped lengthen the time until ANC will reach its airfield capacity. Airspace and arrival/departure procedures have been designed around the existing airports in the Anchorage Bowl, so an increase in airports might not result in an increase in operations capacity, as was concluded about Alternative 3 in the previous master plan. The 2002 Master Plan Update's conclusion that Alternative 6 would be the best alternative for airspace and safety appears to be valid still. Changes in FAA operating procedures and airspace redesign have not made regional alternatives more attractive.

Facility Requirements

Table 4.13 contains a summary of the existing and projected requirements for ANC.

Table 4.13 Summary of Facility Requirements

Component	Unit	Existing Facilities	2027 Master Plan Requirement
Terminal			
Building	sf	1,037,000	1,037,000
Gates	ea	38	39
Parking			
Public	ea	2,350	1,955
Employee	ea	1,241	839
Rental Car	ea	1,080	1,080
Air Cargo Building			
Domestic	sf	203,491	285,866
International	sf	155,012	631,964
Air Cargo Parking Positions	ea	57	99
Flight Kitchen	sf	65,000	65,000
Fuel Storage (7 day supply)			
Jet A	ga	21,000,000	56,400,000
GA-Jet A	ga	333,000	530,000
GA-AvGas	ga	35,000	56,000
General Aviation			
Hangar	sf	144,000	335,600
Apron	sy	310,500	496,800
Terminal	sf	166,500	41,500

Aviation Industry Changes

Note: Recent oil prices and other economic events since 2007 resulted in aviation industry structural changes (see Update on Effects of Recent World Economic Events, page 4-1). A closer examination of changes in the aviation industry should be included in the next master plan update.

As Table 4.10 shows, the supplementary airport alternatives, 3 and 4, assumed that all passenger, domestic cargo, air mail, and military aircraft operations would continue to be served from ANC. Most (78% – 80%) of the international cargo aircraft operations, half of the air taxi operations, and half of the general aviation operations would continue to use ANC. All the international technical stops were assigned to the supplemental airport because they were less dependent on other segments of airport activity and required the fewest ancillary facilities, such as warehousing and cargo handling facilities.

Major changes in the aviation industry since the 2002 Master Plan Update could change the assumed split of type of operations between ANC and the supplementary airport. Two major changes are discussed below.

September 11

The terrorist attacks of September 11, 2001 and ensuing security requirements have affected the aviation industry. One effect is strong growth in corporate general aviation, fueled by people seeking to avoid the longer time required for security screening before a commercial airline flight. ANC has experienced growth in corporate jet traffic, but it is still a small portion of airfield use. Another trend, only partly due to September 11, is that the proportion of air cargo carried in the lower hold of passenger aircraft has been declining, while the proportion carried on all-cargo aircraft has grown. Air cargo activity at ANC is more influenced by Alaska-unique factors than by September 11-caused trends.

International Air Cargo

The path to ANC's consistent international cargo growth over time was paved by USDOT Order 96-9-19, which allowed authorized foreign air cargo carriers expanded authority for the following:

- on-line cargo transfers from one of their own aircraft to any other aircraft
- all forms of change of gauge for cargo operations, including "starburst" change of gauge
- commingling of air cargo traffic moving in foreign air transportation
- interline cargo transfers to and from US carriers
- interline cargo transfers to and from foreign carriers to and from foreign destinations

The 2002 Master Plan Update accounted for this 1996 cargo liberalization. Since then, the Vision 100 – A Century of Aviation Act of 2003 further liberalized international cargo. Foreign carriers may now carry international origin and destination cargo between Alaska and other points in the United States in the course of continuing international transportation, even if a different carrier moves the cargo between the foreign point and Alaska. The foreign carriers using this transfer authority must have a code share agreement, a blocked space agreement, or a term arrangement with a U.S. airline operating to Alaska, or carry the cargo on the way bill of a U.S. carrier between Alaska and the other U.S. point.

Northwest Airlines and Korean Air Cargo provide an example of how the 2003 liberalization is affecting the cargo industry. In February 2005 Korean Air Cargo and Northwest Air Cargo initiated a code-sharing agreement that enables both airlines to carry international cargo on each other's scheduled freighter flights between Asia and the United States, providing new destinations, faster service and more frequencies for their cargo customers. Under the code-sharing agreement, Northwest places the "NW" code on cargo flights operated by Korean Air from Seoul to Anchorage, Atlanta, Chicago, Dallas/Ft.Worth and San Francisco, complementing Northwest's Boeing 747 freighter flights to Los Angeles, Chicago, New York and Cincinnati via its cargo hub at Anchorage. Korean Air uses its "KE" airline code on Northwest-operated freighters from Anchorage to Chicago and Cincinnati as well as between Seoul and Anchorage. Both airlines are members of the SkyTeam alliance.

Advantages of cargo liberalization include the following:

- Foreign cargo carriers can now transfer cargo between carriers without it being considered a break in journey. These rules do not override any restriction in the bilateral agreement between the U.S. and the airline's country of registry.
- Transferring cargo at Anchorage would make them more efficient, provide more destinations, and provide more frequent service to their customers.

Conclusion about Aviation Industry Changes

The 2003 cargo liberalization could lessen the amount of international tech-stop traffic that could be handled at a supplemental airport. The expected trend is that more international cargo carriers will not just stop in Anchorage for refueling, but will transload cargo to other international carriers and to domestic carriers. For efficient transloading, both carriers would need to be located at the same airport. As of 2007, aviation industry changes have not made regional airport alternatives more attractive.

Ground Access

The most significant ground access development since the 2002 Master Plan Update is the Knik Arm Crossing, a bridge proposed to span the Cook Inlet between Anchorage and Point MacKenzie. The Alaska Legislature established the Knik Arm Bridge and Toll Authority (KABATA) in 2003. Planning, geotechnical studies, and a draft Environmental Impact Statement have been completed; however, a Record of Decision has not been issued.

In 2002, the Matanuska-Susitna Borough developed a plan to build a ferry landing at Port MacKenzie for crossings to and from Anchorage. That plan is an interim solution to the Knik Arm crossing.

The Anchorage Bowl 2025 Long-Range Transportation Plan (LRTP)[8] includes projects for continued access improvement to ANC, including grade-separated interchanges at International Airport Road's intersections with Jewel Lake/Spenard, passenger terminal and parking drives, and Seward Highway. The LRTP does not identify any projects for improved Fire Island access.

Environmental Impacts

The affected environment for regional airport alternatives, as well as for ANC alternatives, is similar now to what it was when the alternatives were proposed, except for the following:

- Continued rapid growth in the Point McKenzie/Wasilla area increases the level of impacts from any major airport project there. The Matanuska Susitna Borough Airport Study did not recommend preserving or acquiring land for a major new airport in the area.
- On July 23, 2004 the Municipality of Anchorage went from a non-attainment area to a maintenance area for CO emissions.
- The beluga whale may be placed on the Endangered Species list
- The Environmental Protection Agency is in the process of revising its regulations regarding the discharge of de-icing fluids.
- The change from a non-attainment area to a maintenance area means that efforts to reduce CO emissions within the Anchorage area have been successful. It also means that there would be less benefit to disperse CO emissions by moving some or all of the Anchorage Airport operations to another location.
- The Knik Arm Bridge Draft Environmental Impact Statement has brought to public attention declining numbers of beluga whales in the Cook Inlet. The

[8] Alaska Department of Transportation and Public Facilities and Municipality of Anchorage, Anchorage Metropolitan Area Transportation Solutions, December 2005.

National Marine Fisheries Service has proposed naming the beluga an endangered species. Adverse impact on the whale habitat might result from trips generated by a new airport at Point MacKenzie via bridge or ferry. Because it would increase surface traffic from ANC to Fire Island during construction and afterwards and it would result in additional outfall for de-icing fluid, Alternative 3 might also adversely affect the beluga habitat.

Conclusion about Environmental Impacts

No new information about environmental impacts has made regional airport alternatives more attractive.

Development Costs

The 2002 Master Plan Update estimated development costs for the six alternatives as follows:

Alternative 1 - $1.2 billion

Alternative 2 – $1.5 billion

Alternative 3 - $3.1 billion

Alternative 4 – $4.1 billion (including Knik Arm Bridge)

Alternative 5 - $2.3 billion

Alternative 6 – $6.3 billion (including Knik Arm Bridge)

If a bridge across the Knik Arm is built with non-airport funding, the costs of Alternatives 4 and 6 would decrease by approximately $0.6 billion. They would still be the most expensive alternatives, however.

Since the 2002 Master Plan Update, the Matanuska-Susitna Borough has been developing Port MacKenzie. Infrastructure improvements made for the port would lower airport development costs at the Port MacKenzie site (Alternatives 4 and 6). A barge dock was built in 2000 and a deep draft dock was added in 2004, facilities that could be used during airport construction to lower the costs of mobilization and transporting some materials and equipment. The Port now has 3-phase electric power, phone, fax, and internet. A natural gas line extension to the Port is planned, along with paving of the road north from the Port and the extension of a rail spur south to the Port from Willow or Houston.

Conclusion about Development Costs

Alternatives 4 and 6 would benefit from recently built and possible future infrastructure at Point MacKenzie. Depending upon the amount of additional road and utility infrastructure built in the future, Alternative 4's cost might decrease to be comparable to Alternative 3. Neither Alternative 4 nor 6 are likely to have lower development costs than the recommended Alternative 2, however.

Financial Feasibility

The 2002 Master Plan Update used landing fees to evaluate financial feasibility. The alternatives rank in the same order for landing fees as they do for development costs. Consequently, the reasons for lower development costs for Alternatives 4 and 6 would be reasons for lower landing fees for those same alternatives.

Conclusion about Financial Feasibility

None of the comments above about the financial climate for airport improvement in Alaska support a conclusion that any of the regional airport alternatives would be attractive.

Consistency with Other Plans

The Alaska Aviation System Plan is underway but will not have recommendations for some time. *The Matanuska-Susitna Borough (MSB) Aviation Plan* is in draft form. Essentially it says that a full or partial move of ANC to the MSB is not practical according to the 2002 Master Plan Update. However, there is demand for floatplane and wheeled GA activity in Anchorage that could partly be met by a new floatplane/wheeled airport in the MSB, particularly if the Knik Arm Crossing is built. The plan identified three finalist sites: Goose Bay with addition of floatplane facility, Big Lake Airport with addition of floatplane facility, and Seven-Mile Lake (about mid-way between the two airports) which is a lake off the road system that would need roads, utilities, and a gravel runway.

Cook Inlet Regional Inc. and Chugach Electric have been making plans to build a power-generating wind turbine farm on Fire Island. While the scope of the development and the probability that it will happen are uncertain at this time, a supplemental airport

(Alternative 3) and a wind turbine farm could probably not coexist. Approximately 30 windmills were originally planned to be as tall as 400 feet. Potential interference with the FAA's VOR navigational aid on the island has caused the windmill size to be scaled back.

The Matanuska-Susitna Borough has been developing Port MacKenzie in the vicinity of Alternatives 4 and 6. Dock facilities, utility service, and road paving have occurred or are planned. The Port now has two industrial businesses and more may come, enticed by the Port's offer of free sand and gravel for development. Port literature reports that Point MacKenzie is the preferred site for relocation of the Ted Stevens International Airport, according to the "*2020 Master Plan*." Development plans for the 8,940 acres of Port Special Land Use District appear to avoid the former Knik Aviation Reserve, with the possible exception of a future railroad spur. A 1992 feasibility study for a railroad spur from the Parks Highway to Port MacKenzie shows a route through the former Knik Aviation Reserve. A 2002 rail spur proposal shows a route located farther to the east, extending straight south from Big Lake. The existing road running north to link with the Parks Highway, which the Port plans to pave, runs along the east side of the airport site. This road would provide access to the airport from the north (intersecting the Parks Highway in Houston and running past Big Lake) and from the south, via a Knik Arm bridge or ferry between Anchorage and Point MacKenzie. The Mat-Su Borough Regional Aviation System Plan, currently underway, is searching for a site for a public floatplane facility, and Port MacKenzie is a candidate site. Other recent proposals for Point MacKenzie include a $303 million, 2,200-inmate medium security prison and a $38 million, 20-megawatt tide-generated power plant. All these land uses would be compatible with an airport, provided they do not obstruct airspace needed for air navigation; cause smoke, glare, or electro-magnetic interference; or encroach on land needed for airport development. In fact, the addition of an airport to the Port's multi-modal transportation infrastructure would enhance industrial development at that location, with regional economic benefits resulting. It appears there is ample land available for both airport and industrial development.

The regional airport alternatives are not consistent with the *Anchorage 2020 Anchorage Bowl Comprehensive Plan.*[9] The plan recognizes that Fire Island, Point MacKenzie, and military land could open up for Anchorage expansion. It concludes that these expansion possibilities are speculative and largely outside municipal control. Consequently, the Comprehensive Plan does not assume one of these expansion possibilities will become available. If such an opportunity for expansion arises, the Comprehensive Plan will be revised accordingly.

The Anchorage 2020 Anchorage Bowl Comprehensive Plan states the following about ANC:

> "How Anchorage 2020 Addresses Ted Stevens Anchorage International Airport:
> Future growth of airport and runway-depended land uses is managed primarily within the present airport boundaries.
>
> The Municipality will develop a West Anchorage District Plan through a collaborative planning process involving the State, the Municipality, and the community…
>
> Except for protection of safety zones near runways, noise abatement, and a future taxiway and snow storage area identified in current airport plans, future expansion of airport-related land uses outside current boundaries is restricted to existing commercial and industrial zoning districts. Existing residentially zoned areas are preserved for residential use to accommodate projected population growth in a way that is compatible with the airport noise environment and safety standards.
>
> Some parts of the Tony Knowles Coastal Trail and Kincaid Park are within airport boundaries. These areas have a high value to the public and should be protected. If any airport lands currently used for recreational purposes under an agreement with the Municipality are considered for use by the airport for non-recreational purposes, the airport and the Municipality will conduct a collaborative public process. All other

[9] Adopted February 20, 2001 by the Municipality of Anchorage.

options will be eliminated before making any final decisions that result in the loss of recreation/open space areas."

Conclusion about Consistency with Other Plans:

Alternative 3 will probably not be feasible if the wind farm is established on Fire Island. Alternatives 4 and 6, which include a new airport at Point MacKenzie, are consistent with plans for adjacent land uses, provided a future railroad spur does not encroach on the airport, airspace is kept clear of obstructions, and other hazards to aviation from industrial development (smoke, glare, and electro-magnetic interference) are avoided or mitigated. However, recommended Alternative 2 is the one that is included in the *Anchorage 2020 Anchorage Bowl Comprehensive Plan*. Changes in development and potential development plans at the regional alternative sites make Alternative 3 a less attractive development alternative and Alternatives 4 and 6 more attractive development alternatives.

4.7.4. Summary of Analysis

Development and potential development at Point MacKenzie, particularly the proposed Knik Arm Crossing, make Alternatives 4 and 5 more attractive than they were in the 2002 Master Plan Update. Nevertheless, even if the Knik Arm Crossing is built, improving travel time/costs, development costs, and financial feasibility, ANC alternatives will score better for these evaluation factors than the Point MacKenzie alternatives. Therefore, the conclusion from the 2002 Master Plan Update, that the most appropriate alternative for meeting long term aviation demand is expanding facilities within the ANC border, is still valid.

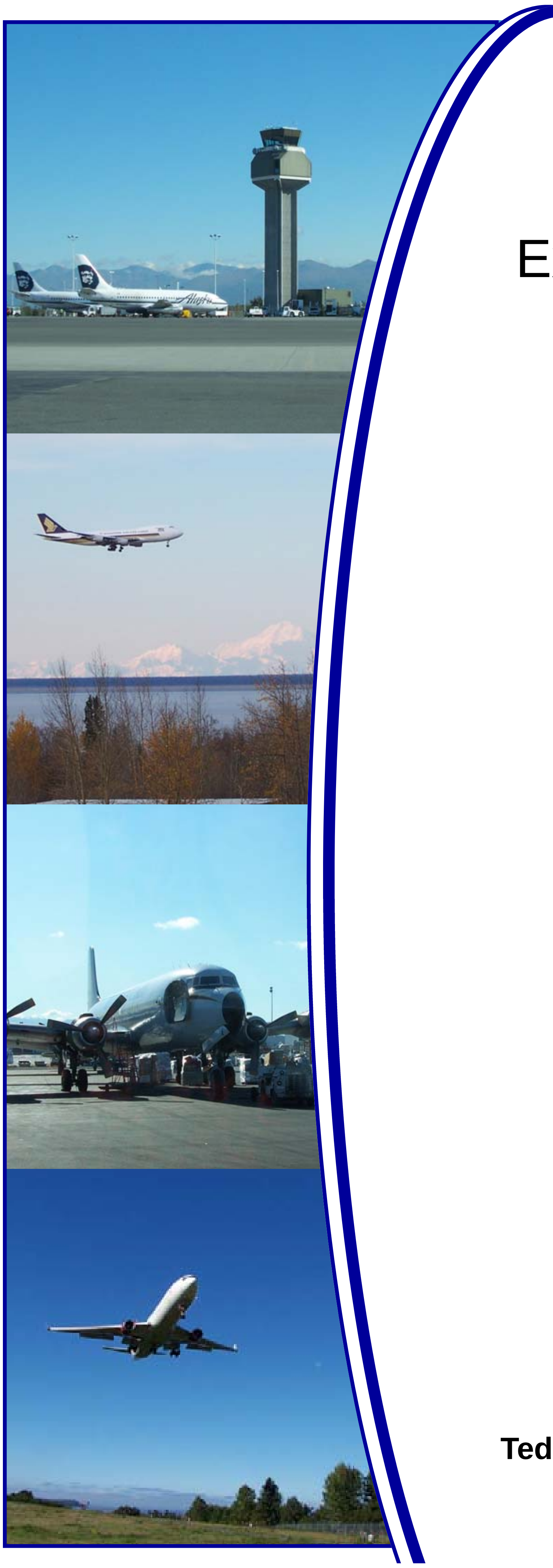
4.7.5. Other Airport Alternatives

During the Public Meetings held in November 2007 and May 2008, members of the public and the Airlines asked that Fairbanks International Airport and the City of Kenai airport also be analyzed as alternative airports to ANC. These would be non-regional alternatives. This capacity analysis is anticipated when a Master Plan update is initiated.

4.8. Conclusion

Ted Stevens Anchorage International Airport remains confident that airport operations will continue to grow in the future. However, the recent rise in oil prices has adversely affected air traffic at the airport and led to uncertainty regarding when this growth will occur. Given this uncertainty, the airport has decided to not change the recommendations from the *2002 Master Plan Update*.

The next Master Plan Update should revise the forecast taking account the recent rise in oil prices. Both the airlines and public requested that alternative, non-regional airports be considered as an alternative to further growth at ANC. At a minimum, this analysis should include Fairbanks and Kenai as alternative airports. Finally, the airport should consider further study of a Simultaneous Offset Instrument Approach (SOIA) for runways 7R and 7L.



Chapter Five: Executive Summary of the Public Process

Chapter Five: Executive Summary of the Public Process

Ted Stevens Anchorage International Airport
2008 Master Plan Study Report
January 2009

Ted Stevens Anchorage International Airport

2008 Master Plan Study Report

Chapter Five – Executive Summary of the Public Process

January 23, 2009
Draft

AKSAS Project Number: 59585

Prepared for:
Ted Stevens Anchorage International Airport
Alaska Department of Transportation and Public Facilities

Prepared by:
WHPacific
with
HNTB Corporation and DOWL Engineers

Appendices

Appendix A: 2002 Conditionally Approved ALP

Appendix B: Concept Development and Alternatives Evaluation

Appendix C: Emerging Technologies Analysis

Appendix D: FAA Traffic Management Unit (TMU)

Related Documents

Public Involvement Summary – Two Volumes

Technical Appendix

Update on Effects of Recent World Economic Events

The Master Plan Forecast of Aviation Activity for the Ted Stevens Anchorage International Airport is based on economic and airline projections in 2006. It was found to be technically valid by the FAA in March, 2007 based on industry information available at the time. The rise in crude oil prices to as high as $140 per barrel and other major economic events in 2007 and 2008 have dramatically changed and continue to affect the aviation industry. Not only have costs risen, the demand for commercial passenger and general aviation passenger as well as air cargo services has decreased. The outlook as of late 2008 is unclear.

Future aviation demand levels presented in Draft Chapter 2, Aviation Activity Forecast, were used as the foundation for the Draft Chapter 3, Facility Requirements and the Draft Chapter 4, Concept Development and Alternatives Evaluation. However, due to the current uncertainty of business costs and the general economic activity levels, it is expected that future demand levels will not materialize as soon as originally projected.

Therefore, the Airport intends to monitor the economic outlook and, at an appropriate time, start a Master Plan Update with a new or updated forecast and development timetable. Accordingly, working with airline partners, the Airport is deferring further planning of a new runway until the economic outlook improves.

Chapter Five - Executive Summary of the Public Process

5.1. Introduction

The FAA guidelines contained in Chapter 4 of the Advisory Circular (AC) 150/5070-6B (pages 17-21), outline the public involvement process that an Airport should undertake in support of an Airport Master Plan. The AC provides guidelines for Timing, Tools and Techniques, Identification of Stakeholders, Identification of Key Issues and Documentation Guidelines. This summary outlines how these guidelines were implemented.

On August 21, 2006 a Notice-To-Proceed for the Anchorage Airport Master Plan was issued. Discussions began immediately on how best to involve the public in the planning process as recommended in the Advisory Circular.

> "The first task in a master plan, after the consultant receives a notice-to-proceed, is the creation of a public involvement program."[1]

An initial Public Involvement Plan (PIP) was completed on August 30, 2006. The purpose of the PIP was to outline how the Airport should effectively gather relevant information from stakeholders to help shape future project development and funding. The PIP was also intended to ensure that the public, state and federal agencies, pilots, passenger and cargo carriers, commuter/regional charter companies, general aviation users, military, airlines and other airport users at ANC were informed about the project as it progressed. The goals in the PIP were as follows:

- Pinpoint project concerns
- Provide forum for local airport user and other impacted party involvement
- Involve community representatives from diverse interests
- Respect and listen to community values
- Address public concerns and resolve differences

---

[1] U.S. Department of Transportation, FAA, AC/5070-6B, page 17.

- Support public decision-making
- Avoid project delays
- Develop public acceptance and project support
- Collect and disseminate technical information

5.2. Timing

FAA recognizes that public involvement has its greatest impact during the early stages of the planning process, before irreversible decisions have been made and while many alternatives can be considered.[2] Toward that end, the Airport distributed its first newsletter October 2006, shortly after the project began. Public meetings were held in mid-November 2006 in three locations to inform the public about the plan start up and invite participants to list any relevant issues that should be considered. The Technical Committee was also formed in the fall of 2006 and met for the first time just prior to the round of public meetings. The purpose of the initial meetings was to collect information about Issues, Goals, and Objectives and to discuss the Facility Inventory.

5.3. Tools and Techniques

Tools and Techniques, as described in the AC 150/5070-6B were used as a guideline during the public process. The techniques included formation of the Technical Committee, Public Information Meetings, Small Group Meetings and Briefings, Webpages and Newsletters. These are described in more detail below.

5.3.1. Technical Committee

A Technical Committee (TC) was formed and was responsible for reviewing and commenting on the Master Plan/Chapters. The committee had approximately 24 members who represented airlines, agencies, tenants and the Turnagain Community Council. Airport and FAA staff also attended the meetings. A total of six TC meetings were conducted as the project developed.

[2] U.S. Department of Transportation , FAA, AC/5070-6B, page 17.

5.3.2. Public Meetings

Five public meetings were conducted; each was advertised twice with a minimum of two weeks advance notice. Meetings were held in an open house format with a formal presentation and question and answer period. Comment forms were distributed. Within one week following each public meeting a public meeting summary was completed and presentations were posted on the website.

5.3.3. Agency Meetings

Three agency meetings were conducted. Invitations were sent to approximately 30 agency staff from 15 agencies.

5.3.4. Chief Pilots and Airline Meetings

Three group meetings, separate from the TC meetings, were held with Chief Pilots and Airline Representatives. Airlines attending all or some of these meetings included Alaska Airlines, Atlas Air, China Airlines, Everts Air Cargo, Federal Express, Japan Airlines, Korean Airlines, Nippon Air Cargo, Northern Air Cargo, Northwest Airlines, PenAir and UPS. The Airline Technical Representative also attended some these meetings. Airlines receiving additional one on one meeting(s) included: FedEx (teleconference), Korean Airlines, Northwest Airlines, UPS and the Airline Technical Representative.

5.3.5. Small Group Meetings

A vital part of the master plan was small group meetings to collect additional information and to inform stakeholders of the progress of the Airport Master Plan. Small group meetings included twelve meetings with the Sand Lake, Spenard and Turnagain Community Councils, meetings with the Alaska Center for the Environment, Anchorage Unleashed, the Municipality of Anchorage, and three meetings with a stakeholder group that represented local businesses.

FAA Airports Division and the Air Traffic Control staff were kept well informed throughout the process. Bi-weekly meetings with the FAA Airports planner were held throughout the process and ATC was often present at these and at internal airport workshops.

In addition to the meetings stated above, the Airport also participated in phone calls and email requests from the public on an on-going basis, 13 FAA briefings and three staff workshops.

5.3.6. Newsletters

Four newsletters were distributed to provide brief discussions of project issues identified through public and agency involvement. Approximately 1,000 copies or each were distributed via email or mail. They also were distributed at the Technical Committee, public and agency meetings and as requested.

5.3.7. Website

A website was developed specifically for the Anchorage Airport Master Plan. It was updated continuously during the planning process and contained the following pages; Project Overview, Frequently Asked Questions, Project Schedule, Technical Committee, Documents, Comments and Contacts. The documents included meeting summaries, draft chapters and presentations. Readers could leave comments or questions on the comment page and request a response.

5.4. Stakeholder Identification

The FAA recommends that planners should make every effort to identify and communicate with all appropriate stakeholders. A stakeholder list was developed which included all known potentially affected interests. The list included over 50 stakeholders or stakeholder groups. Stakeholders included users and tenants, FAA personnel, resources agencies, local governments, community councils, environmental groups, recreational users, citizens groups and Native entities. The addresses were added to the mailing list and, in many instances, these groups were contacted directly to inform them of the planning process.

5.5. Identification of Key Issues

According to FAA, identification of key issues is an early product of a well-designed public involvement program.[3] The Airport initiated the identification of issues that impact airport operations early in the planning process. Issues were a topic of the first public, agency and technical committee meetings held in the winter of 2006/2007. The issues were used to develop goals and objectives which centered on safety, environment, economy, and customer service. This information was used in presentation boards and comments were solicited. The goals and objectives were also a topic at Community Council meetings, airport workshops and individual meetings with air carriers.

5.6. Documentation Guidelines

Documentation of key issues and documenting the public involvement program is also an important part of the public process. The key issues identified early in the process and were documented in the resulting goals and objectives as stated above. Public involvement was well documented throughout the process and a summary of the meetings, newsletters, etc. was updated on a regular basis.

5.7. Conclusion

Over 140 individuals attended the public meeting held in May 2008. At this meeting, numerous people made comments, as summarized in the public information report, which indicated that they did not support the construction of a new north-south runway at this time or in the proposed location. These people included representatives of the airlines, users of the Tony Knowles Coastal Trail, Alaska Natives, and others. Because of this, the Airport decided to defer further analysis of runway alternatives and selection of a preferred alternative to a later date.

On May 22, 2008 the Airport released the following statement:

> "Due to the uncertainty and current instability in the aviation industry, the Ted Steven's Anchorage International Airport has decided to defer a decision on a master plan preferred alternative to meet forecast capacity requirements.

[3] U.S. Department of Transportation, FAA, AC/5070-6B, page 20.

> The airport will continue its dialogue with the public and other stakeholders through public meetings and other forms of community outreach including public comments.
>
> Information on the Airport Master Plan is available on the airport's website at www.anchorageairport.com"

In addition to inclusion in the Anchorage Daily News, the press release was emailed to all those on the project mailing list and mailed to those without email addresses.

Comments are being compiled as they are received, responded to, and organized and archived until the resumption of the Master Plan process.

Ted Stevens
Anchorage International Airport
2008 Master Plan Study Report
Draft

January 2009

Technical Appendix

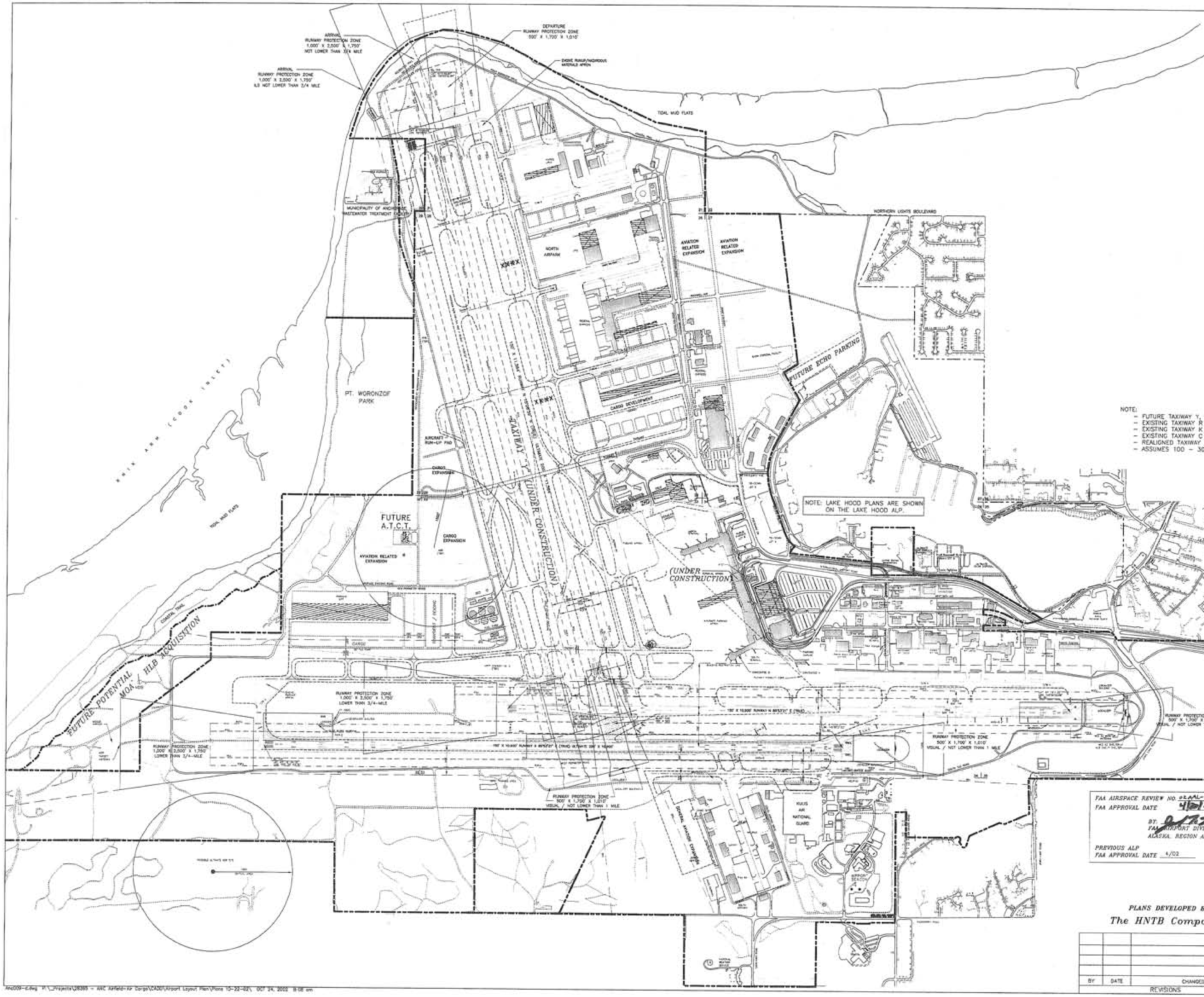
Ted Stevens
Anchorage
International Airport

Produced by:

with
HNTB Corporation
and
DOWL Engineers

Appendix A

2002 Conditionally Approved ALP



LEGEND		
EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT BOUNDARY
		ROAD
		BUILDING
		AIRFIELD/APRON PAVEMENT
BRL	BRL	BUILDING RESTRICTION LINE
		PARCEL/R.O.W.
		TO BE REMOVED
		GROUND CONTOUR
		FENCE
		AIRPORT REFERENCE POINT (ARP)
		LS CRITICAL AREAS
21|22 28|27	21|22 28|27	SECTION CORNER

EXISTING TOPOGRAPHIC INFORMATION SCREENED FOR CLARITY.
"NO THRESHOLD SITING SURFACE OBJECT PENETRATIONS"
"NO OFZ OBJECT PENETRATIONS"

RUNWAY COORDINATES NAD 83				
	EXISTING		ULTIMATE	
RUNWAY	LATITUDE	LONGITUDE	LATITUDE	LONGITUDE
6R	61°10'04.153"	150°02'03.753"	SAME	SAME
24L	61°10'04.369"	149°58'21.527"	SAME	SAME
6L	61°10'11.151"	150°00'30.999"	SAME	SAME
24R	61°10'11.317"	149°58'53.880"	SAME	SAME
14L	61°11'59.974"	150°00'52.844"	SAME	SAME
14L Displaced	61°11'58.075"	150°00'51.774"	SAME	SAME
32R	61°10'18.339"	149°59'55.938"	SAME	SAME
32R Displaced	61°10'09.651"	149°59'51.313"	SAME	SAME
14R			61°13'47.794"	150°01'09.186"
32L			61°10'31.360"	150°00'13.716"

NOTE:
- FUTURE TAXIWAY Y, NEW ANGLE TAXIWAY M, AND NEW TAXIWAYS U,T,S CONNECTORS ARE 100' IN WIDTH.
- EXISTING TAXIWAY R TO BE WIDENED TO 100' & SHOULDERS TO TAXIWAY SAFETY AREA.
- EXISTING TAXIWAY K TO BE WIDENED TO 100' & SHOULDERS TO TAXIWAY SAFETY AREA.
- EXISTING TAXIWAY C TO BE WIDENED TO 100' & SHOULDERS TO TAXIWAY SAFETY AREA.
- REALIGNED TAXIWAY G TO BE WIDENED TO 100'
- ASSUMES 100 – 300 FT. BUFFER FROM COASTAL TRAIL.

THE PREPARATION OF THIS DOCUMENT WAS FINANCED IN PART THROUGH AN AIRPORT IMPROVEMENT PROGRAM GRANT FROM THE FEDERAL AVIATION ADMINISTRATION (FAA) AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY SAFETY, CAPACITY, NOISE IMPROVEMENT AND INTERMODAL TRANSPORTATION ACT OF 1992. THE CONTENTS OF THIS EXHIBIT REFLECT THE VIEWS OF HNTB CORPORATION, WHICH IS RESPONSIBLE FOR THE FACTS AND ACCURACY OF THE DATA PRESENTED HEREIN. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS EXHIBIT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH PUBLIC LAWS 91-190, 91-258, 94-353, AND/OR 90-495.

FAA AIRSPACE REVIEW NO. 02-AAL-117NRA
FAA APPROVAL DATE 4/20/03
BY: [signature]
FAA AIRPORT DIVISION
ALASKA REGION AAL-600

PREVIOUS ALP
FAA APPROVAL DATE 4/02

PLANS DEVELOPED BY:
The HNTB Companies

BY	DATE	CHANGED
REVISIONS		

AIRPORT LAYOUT PLAN

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

Ted Stevens Anchorage International Airport

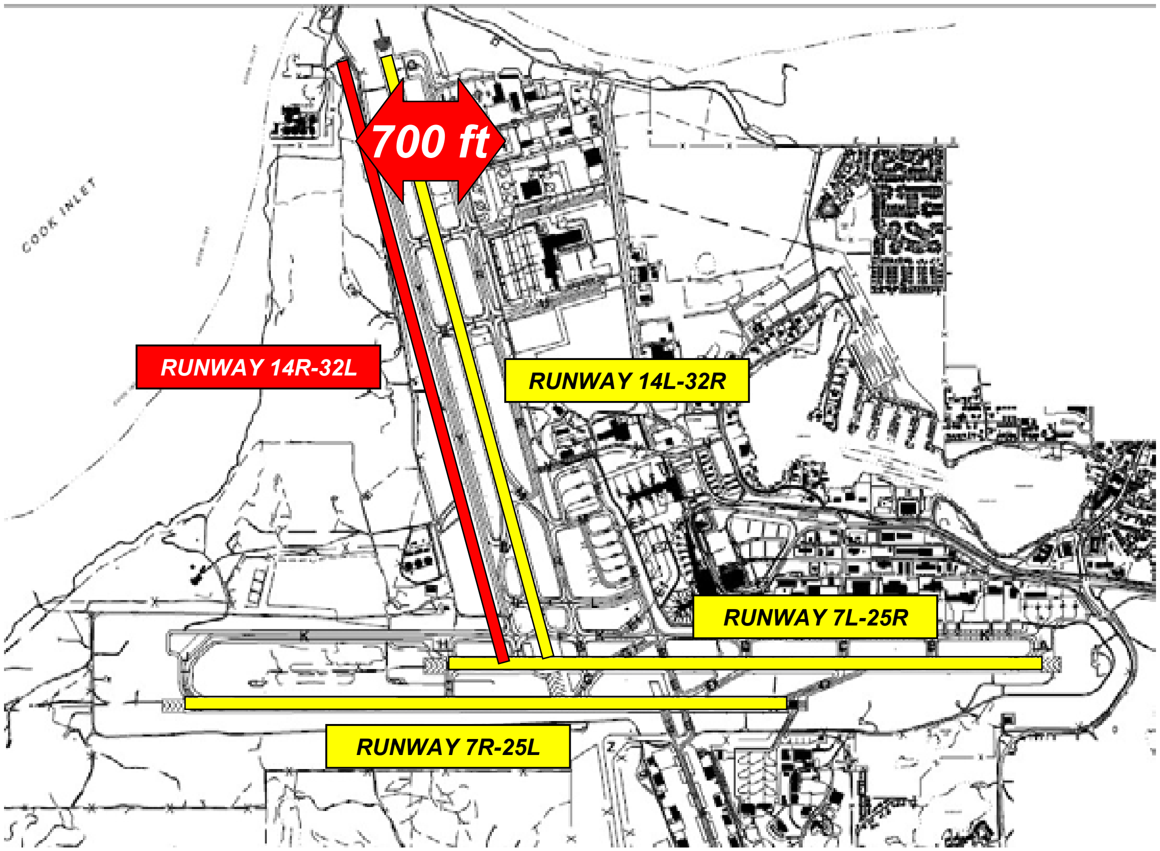
APPROVED [signature]
For MARYELLEN TUTTELL, AICP — AIRPORT PLANNING MANAGER

SCALE	DESIGNED RVW	DRAWN RVW	SHEET 3 OF 20
	CHECKED JSM	DATE Nov. 1, 2002	

Anc009-c.dwg P:_Projects\28365 - ANC Airfield-Air Cargo\CADD\Airport Layout Plan\Plans 10-22-02\ OCT 24, 2002 8:08 am

Appendix B

Concept Development and Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

NOT TO SCALE

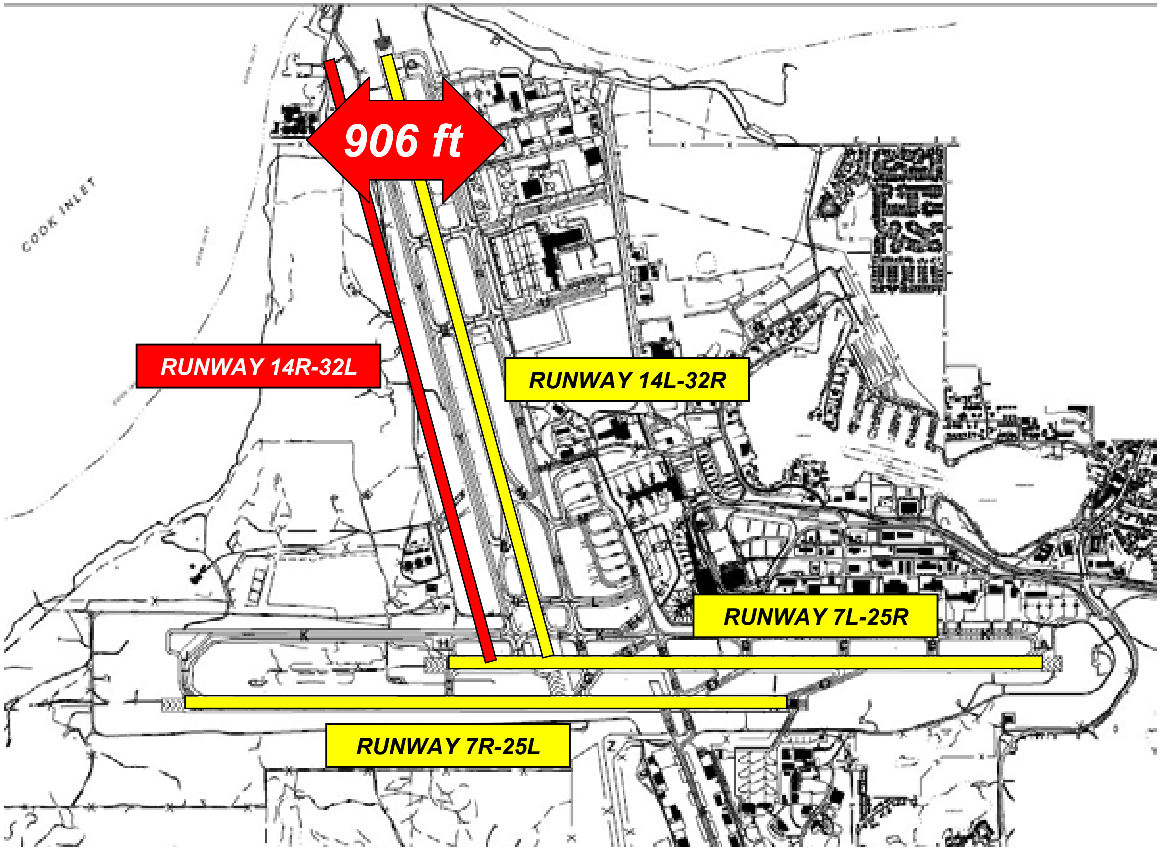
September 2008

DRAFT

Appendix B

Concept 1 - Runway 14R-32L Shifted 700' West

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

NOT TO SCALE

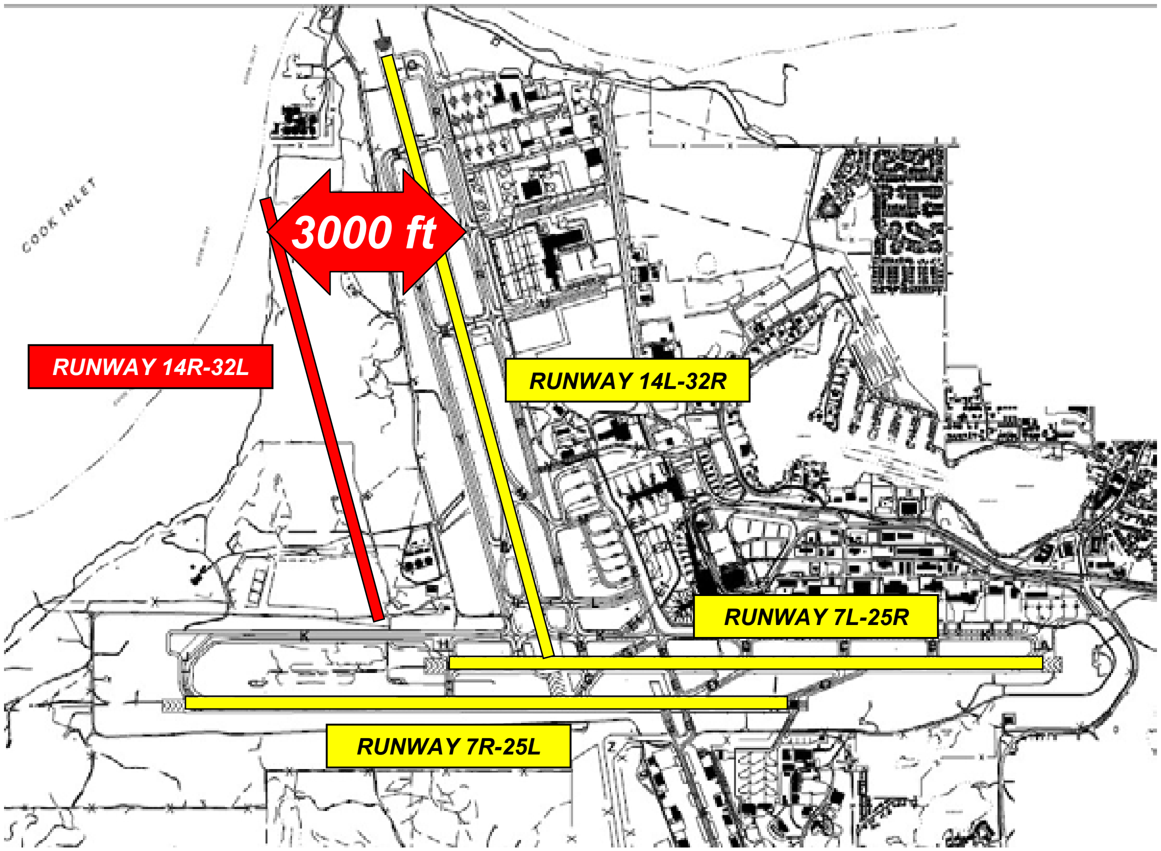
September 2008

DRAFT

Appendix B

Concept 2 - Runway 14R-32L Shifted 906' West

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

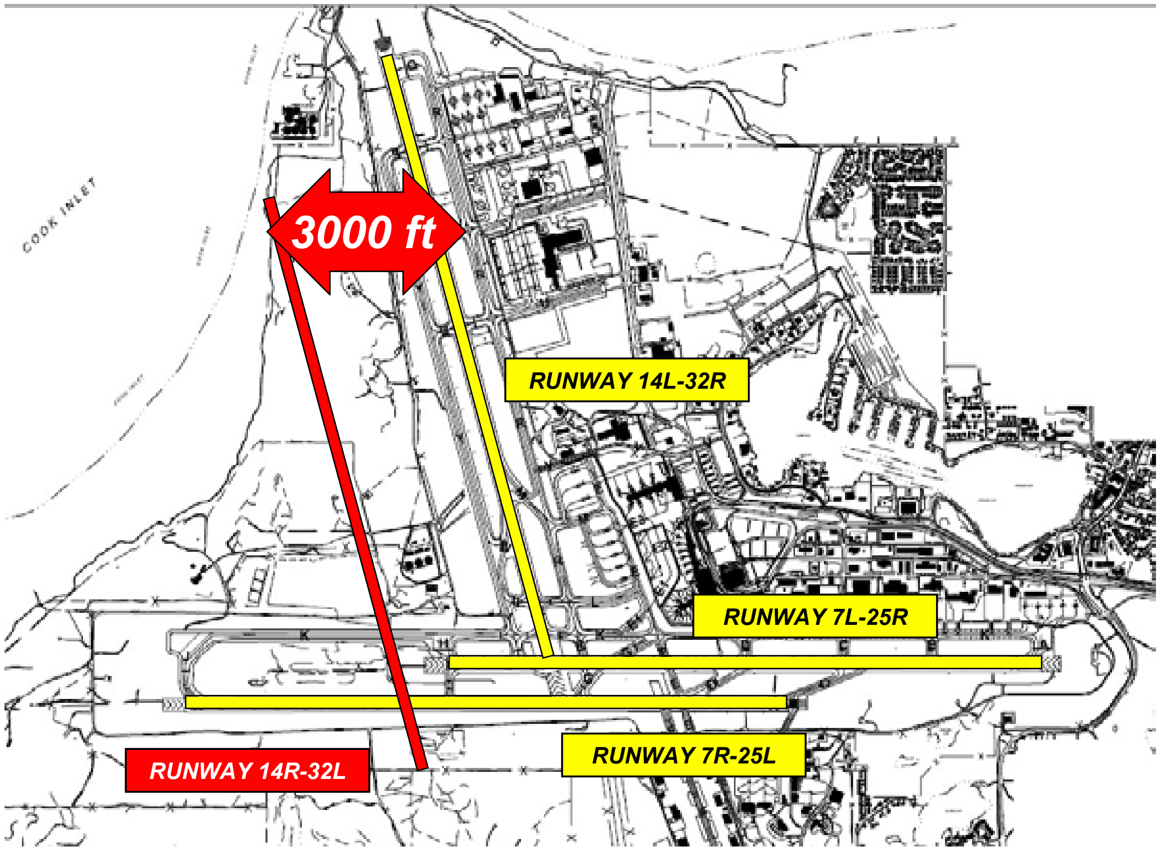
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 3 - Runway 14R-32L Shifted 3,143' West

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

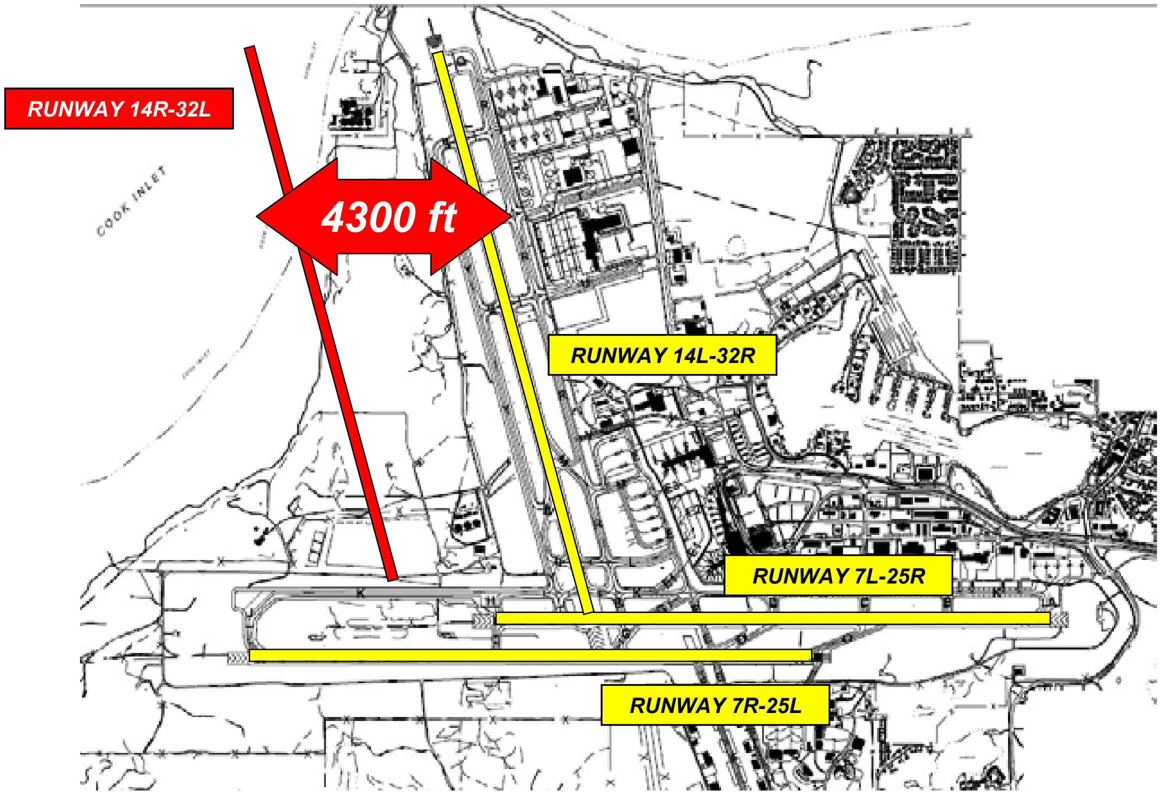
N
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 4 - Extended Runway 14R-32L Shifted 3,143' West

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

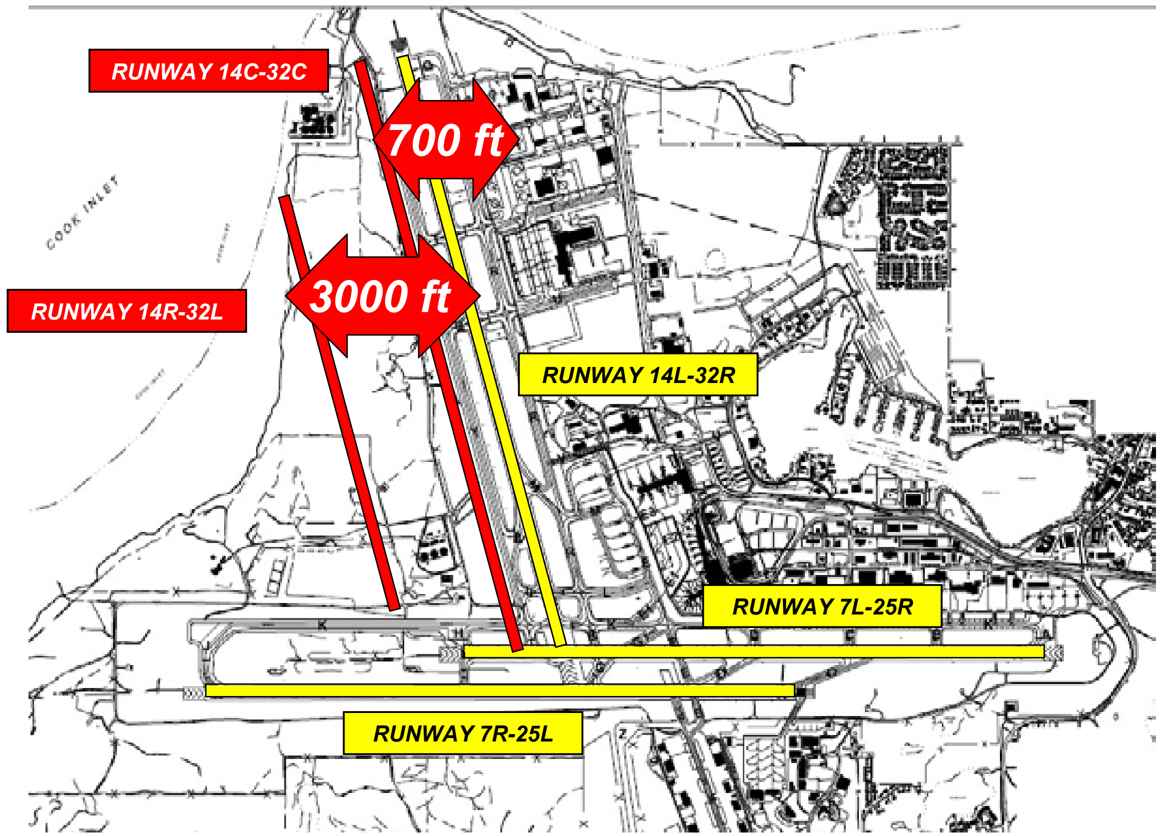
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 5 - Runway 14R-32L Shifted 4,300' West

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

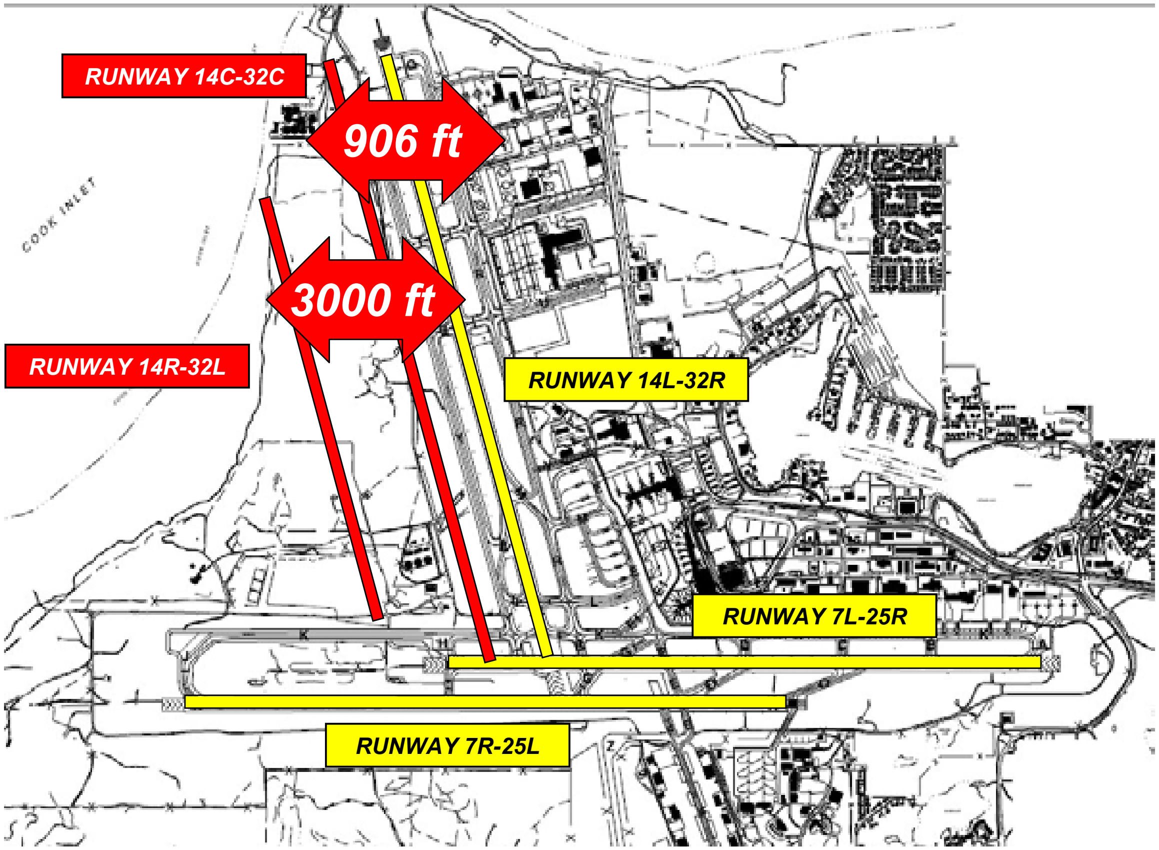
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 6 - Runway 14C-32C Shifted 700' West
Runway 14R-32L Shifted 3,000' West

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

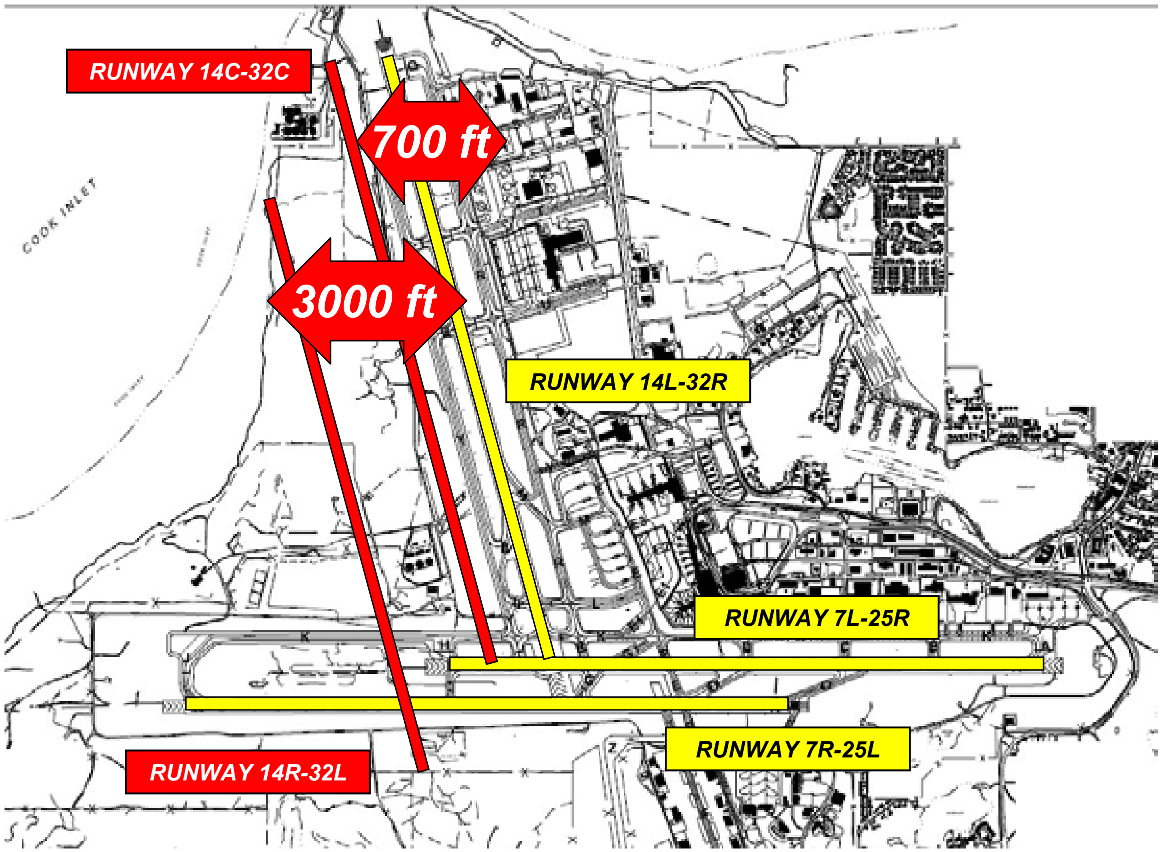
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 7 - Runway 14C-32C Shifted 906' West
Runway 14R-32L Shifted 3,000' West

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

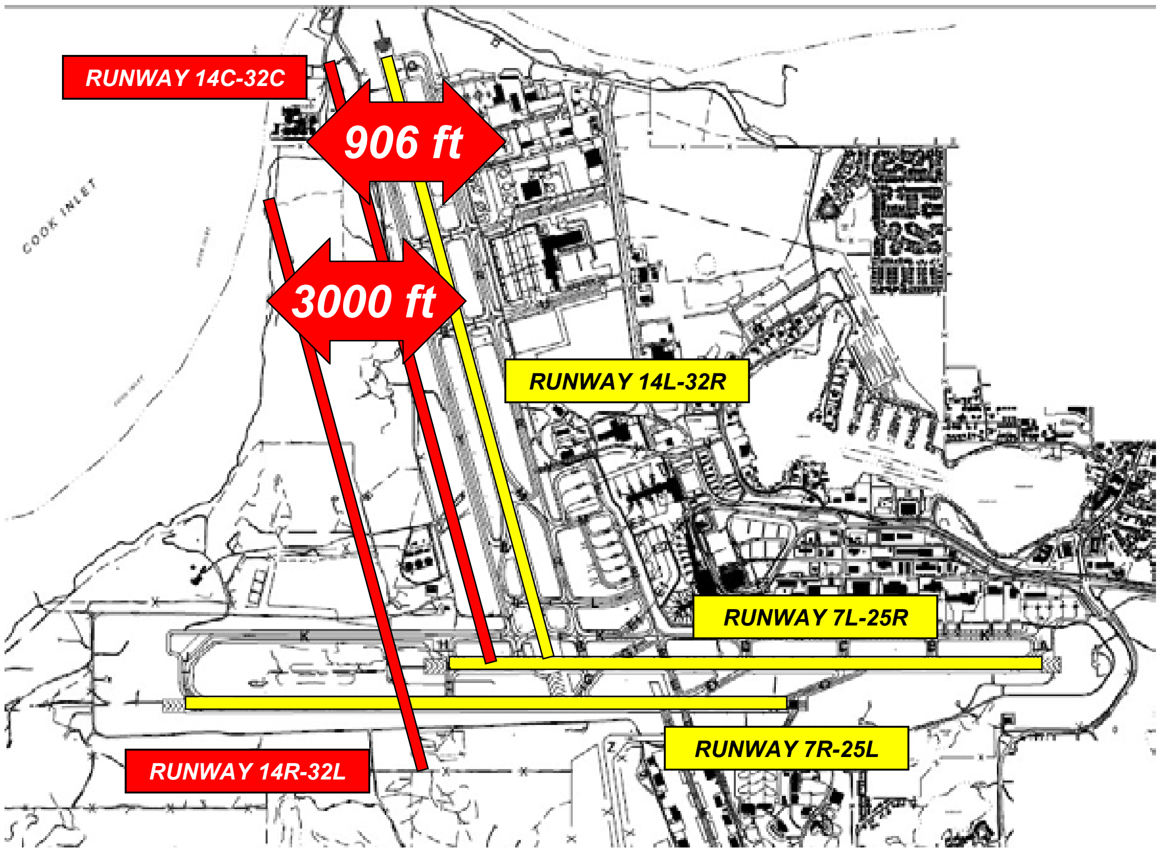
N
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 8 - Runway 14C-32C Shifted 700' West
Extended Runway 14R-32L Shifted 3,000' West

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

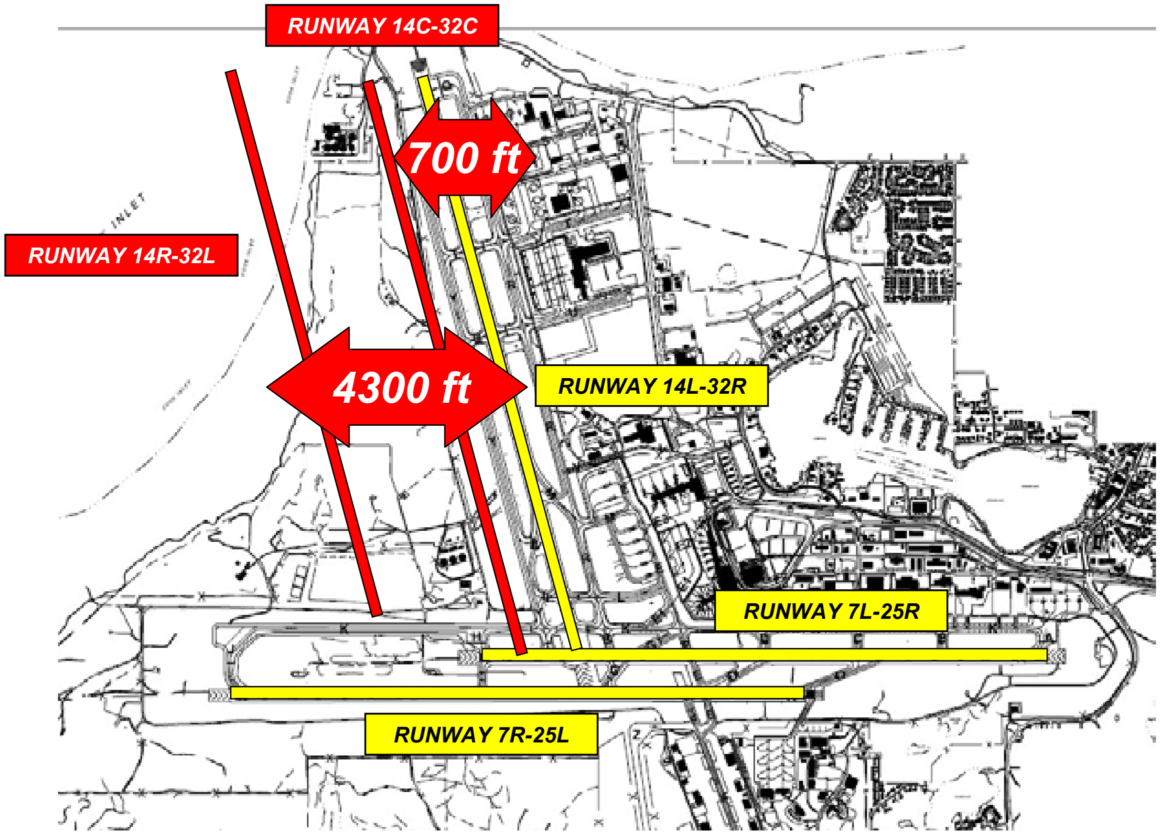
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 9 - Runway 14C-32C Shifted 906' West
Extended Runway 14R-32L Shifted 3,000' West

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

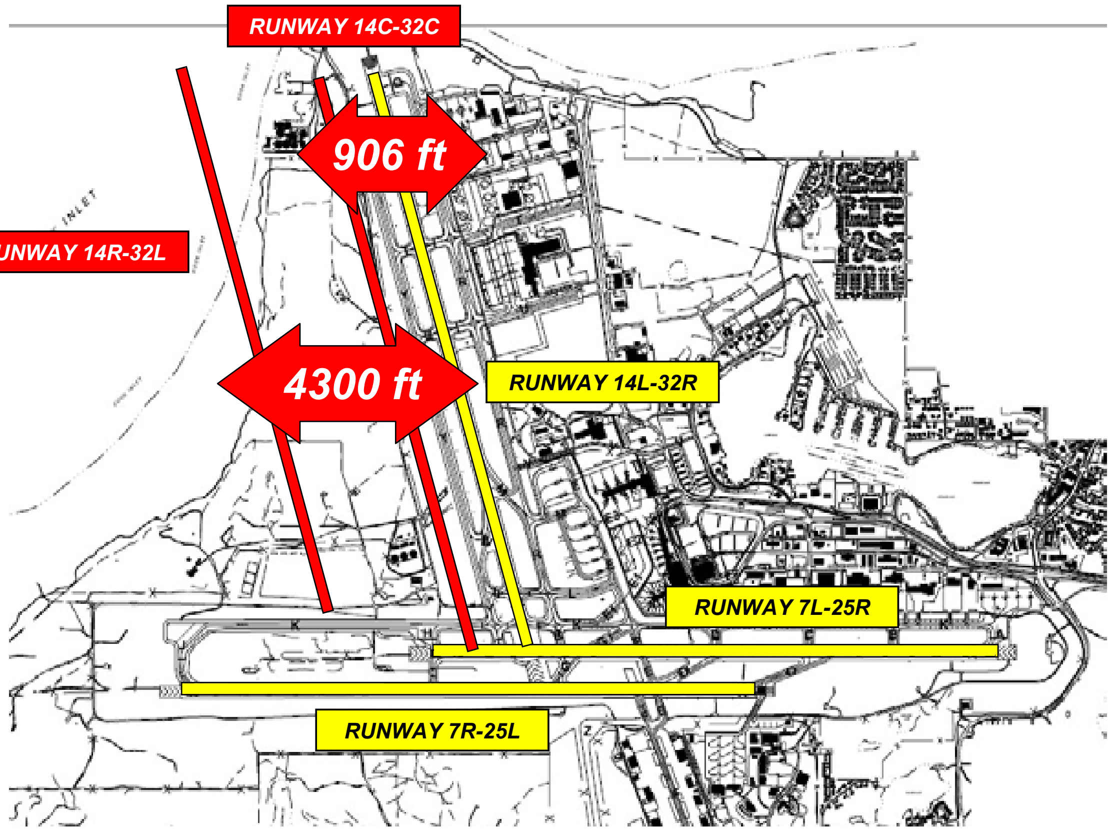
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 10 - Runway 14C-32C Shifted 700' West
Runway 14R-32L Shifted 4,300' West

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

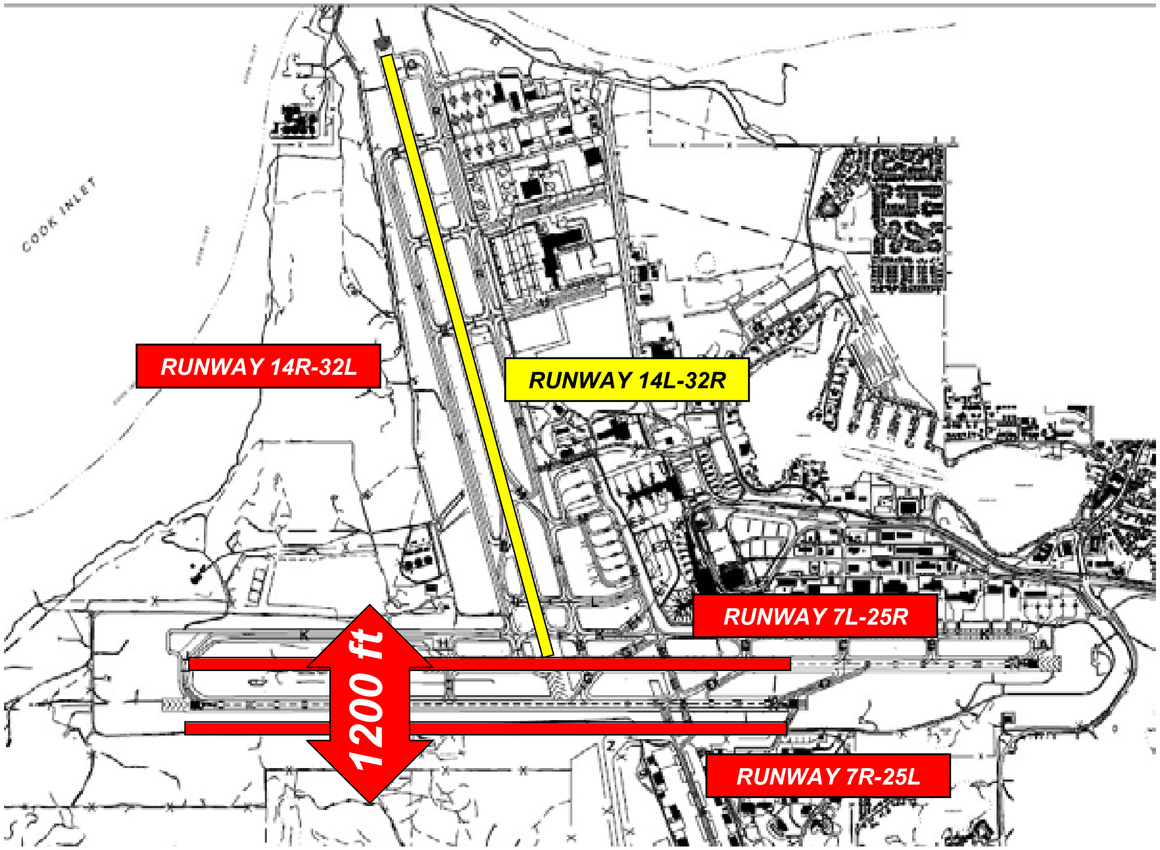
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 11 - Runway 14C-32C Shifted 906' West
Runway 14R-32L Shifted 4,300' West

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

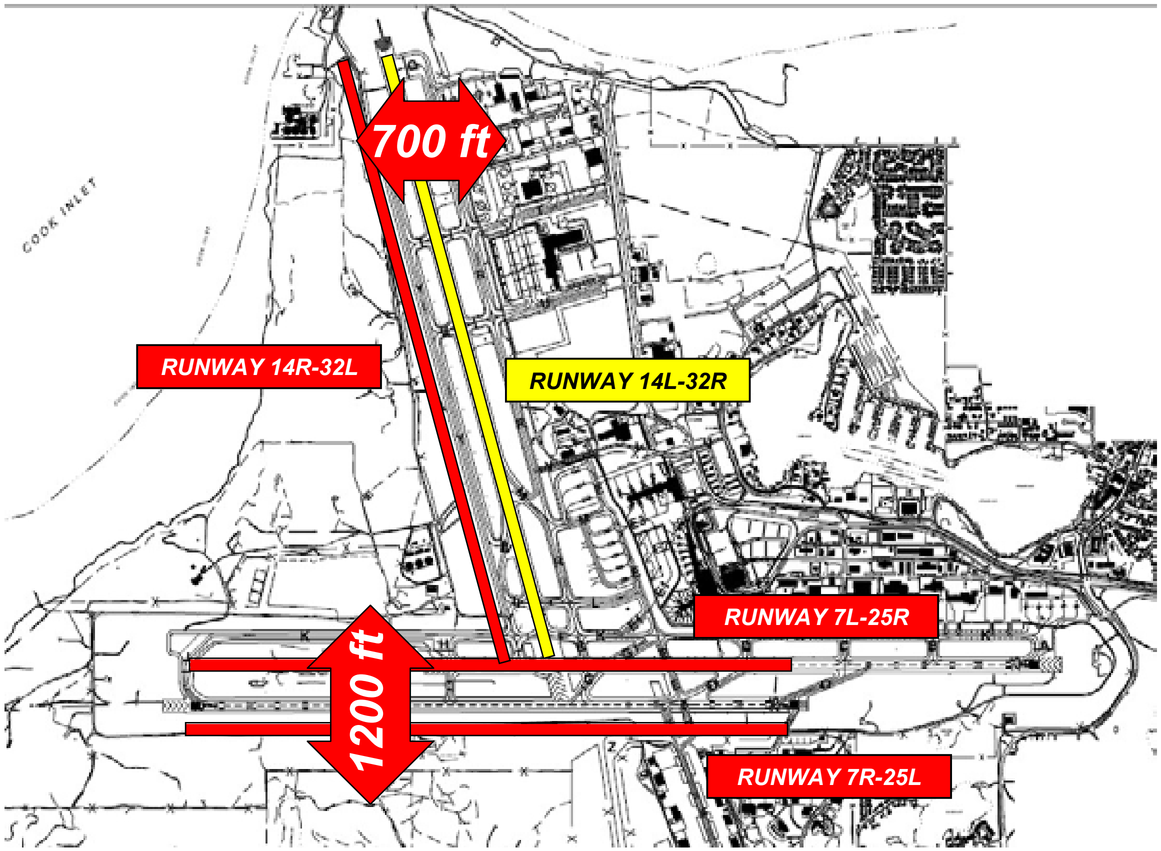
N
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 12 - Runway 7L-25R w/ Extension and Threshold Relocation
Runway 7R-25L Constructed 1,200' from Runway 7L-25R

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

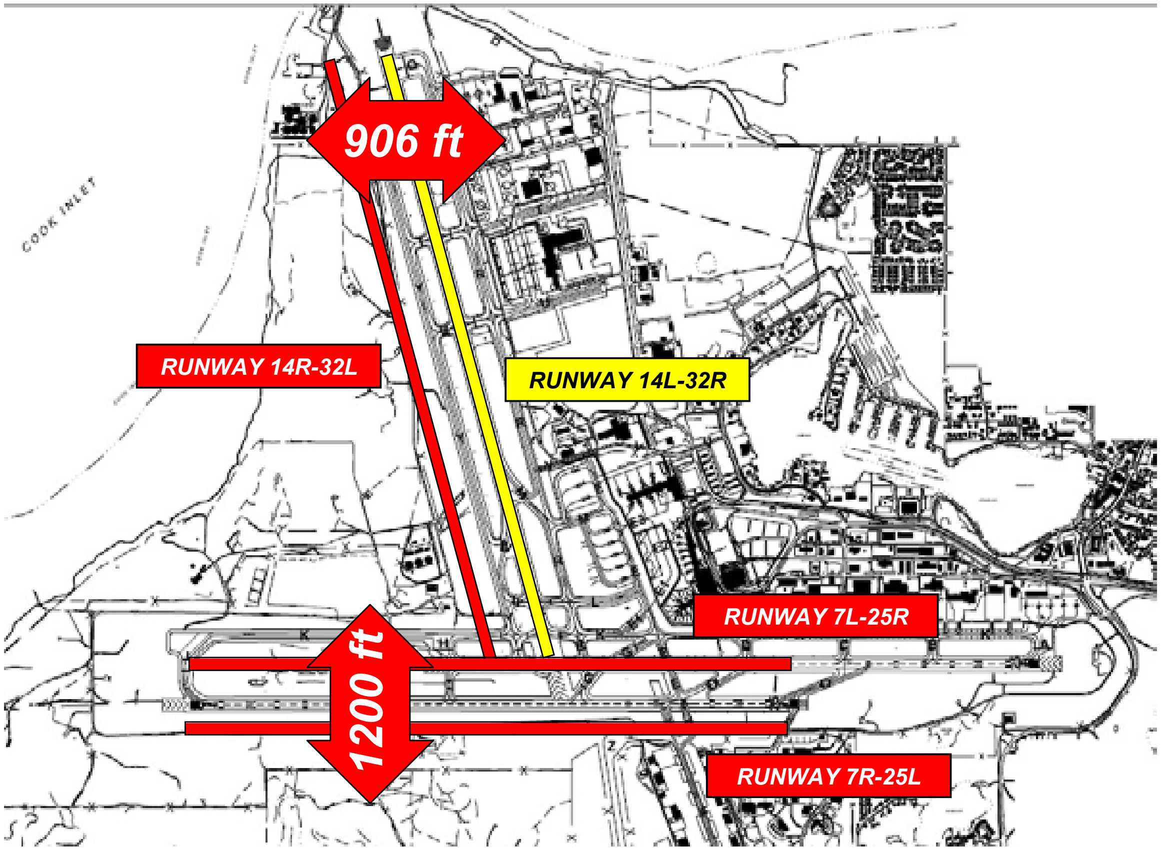
NOT TO SCALE

September 2008

DRAFT

Appendix B

Concept 13 - Runway 14R-32L Shifted 700' West / Runway 7L-25R w/ Extension and Threshold Relocation / Runway 7R-25L Constructed 1,200' from Runway 7L-25R



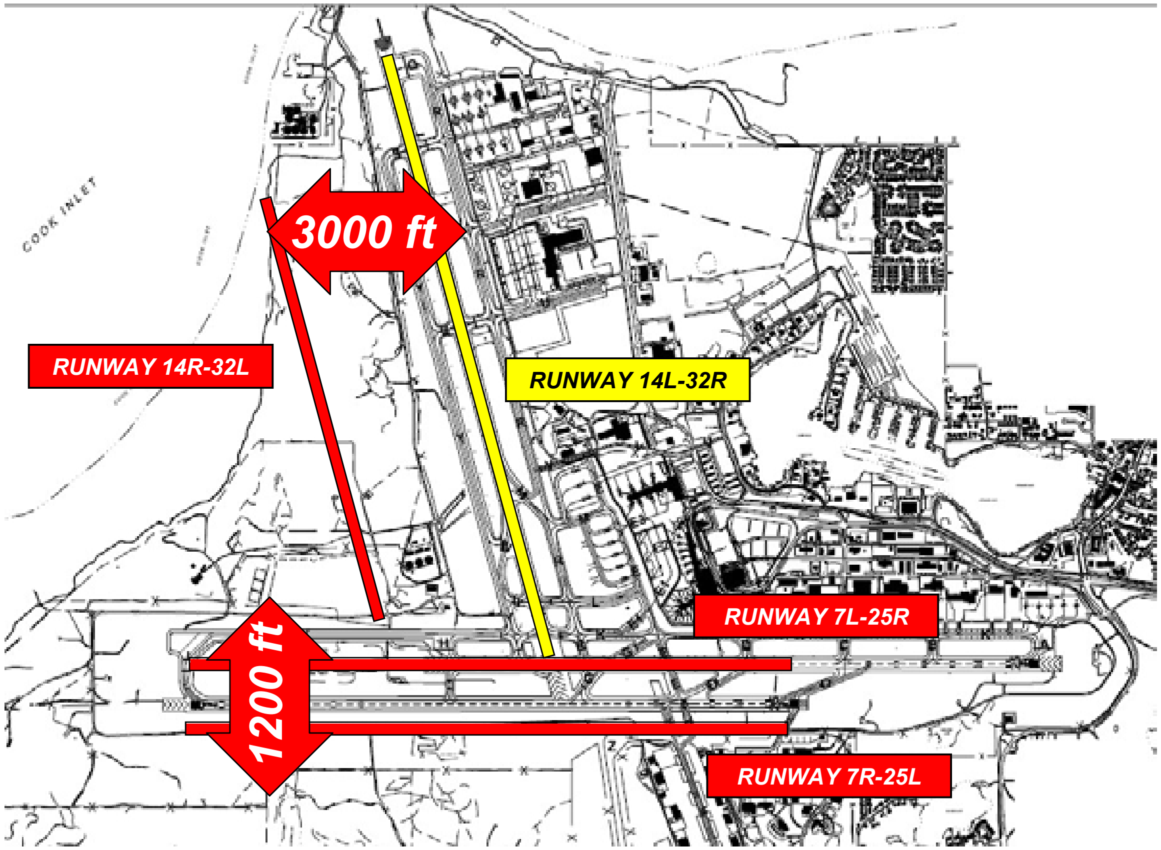
Ted Stevens
Anchorage
International Airport

NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 14 - Runway 14R-32L Shifted 906' West / Runway 7L-25R w/ Extension and Threshold Relocation / Runway 7R-25L Constructed 1,200' from Runway 7L-25R



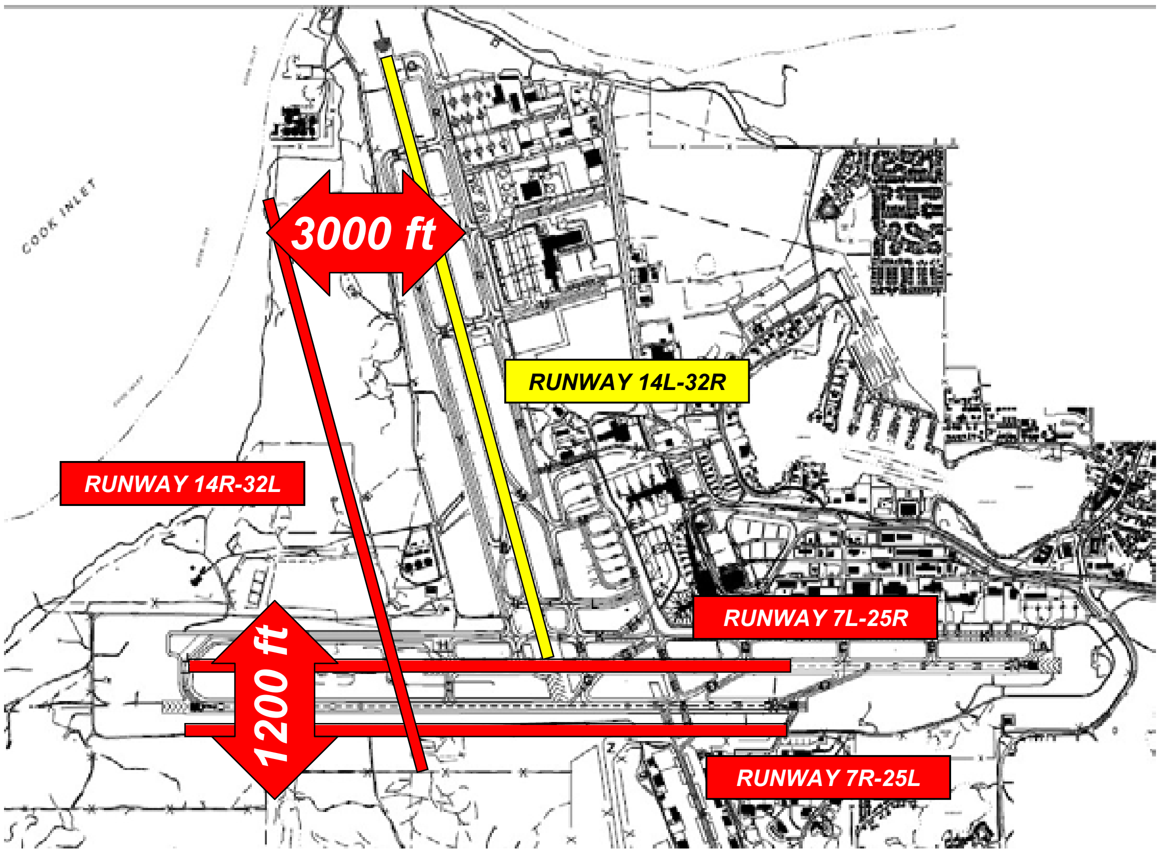
Ted Stevens
Anchorage
International Airport

N
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 15 - Runway 14R-32L Shifted 3,000' West / Runway 7L-25R w/ Extension and Threshold Relocation / Runway 7R-25L Constructed 1,200' from Runway 7L-25R



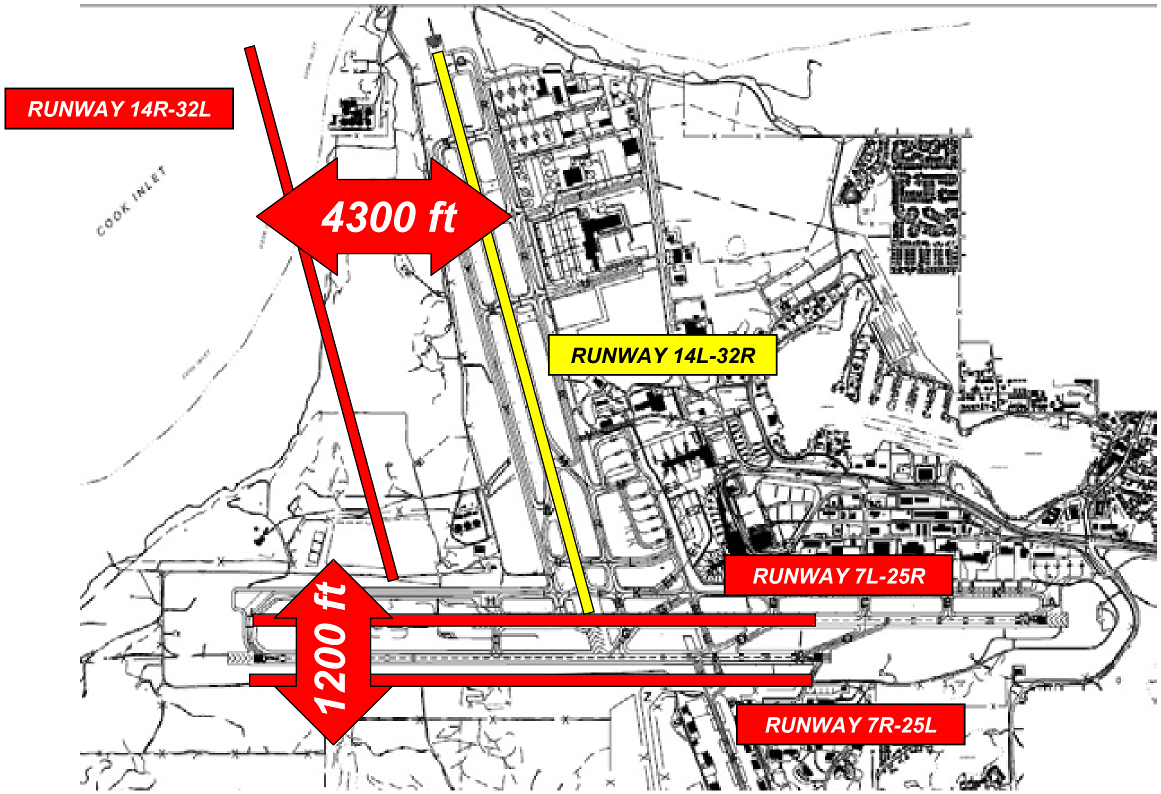
Ted Stevens
Anchorage
International Airport

NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 16 - Extended R/W 14R-32L Shifted 3,000' West / R/W 7L-25R w/ Extension and Threshold Relocation / R/W 7R-25L Constructed 1,200' from R/W 7L-25R



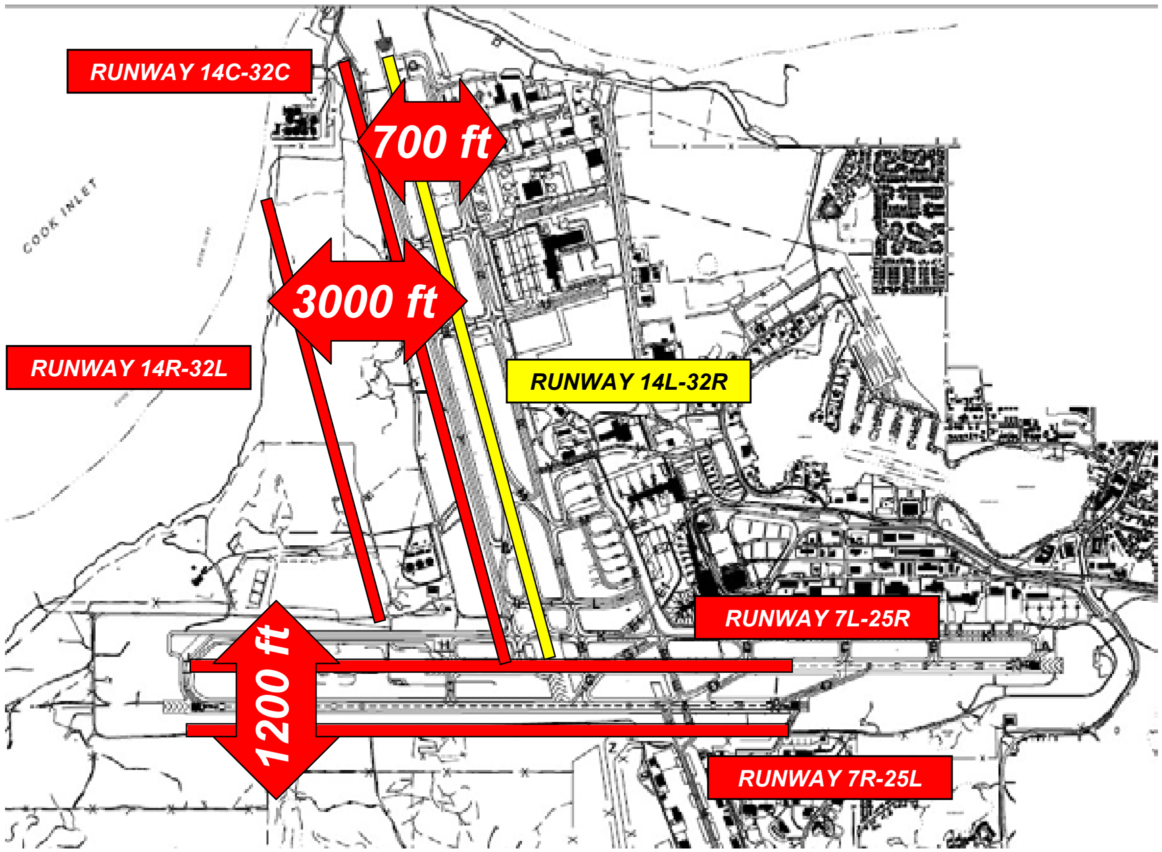
Ted Stevens
Anchorage
International Airport

NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 17 - R/W 14R-32L Shifted 4,300' West / R/W 7L-25R w/ Extension and Threshold Relocation / R/W 7R-25L Constructed 1,200' from R/W 7L-25R



Ted Stevens
Anchorage
International Airport

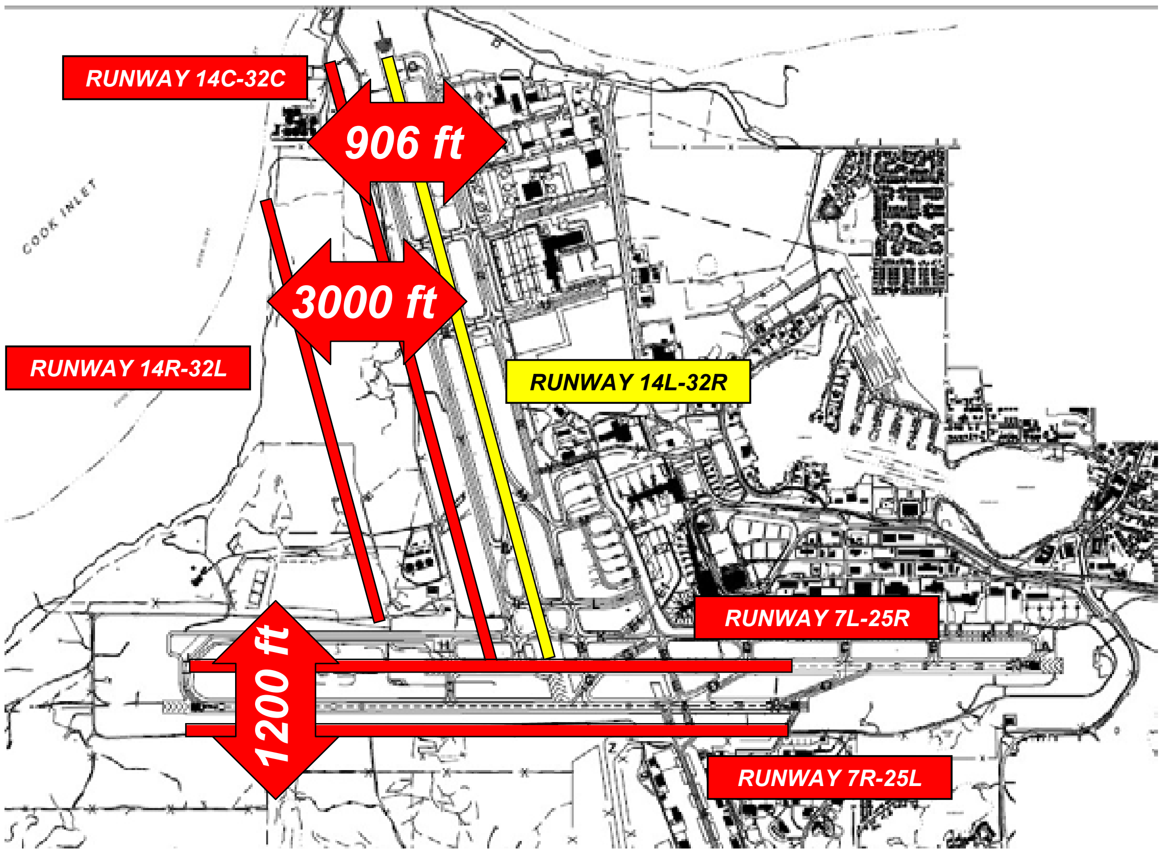
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 18 - R/W 14C-32C Shifted 700' West / R/W 14R-32L Shifted 3,000' West /
R/W 7L-25R w/ Extension and Threshold Relocation /
R/W 7R-25L Constructed 1,200' from R/W 7L-25R

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

NOT TO SCALE

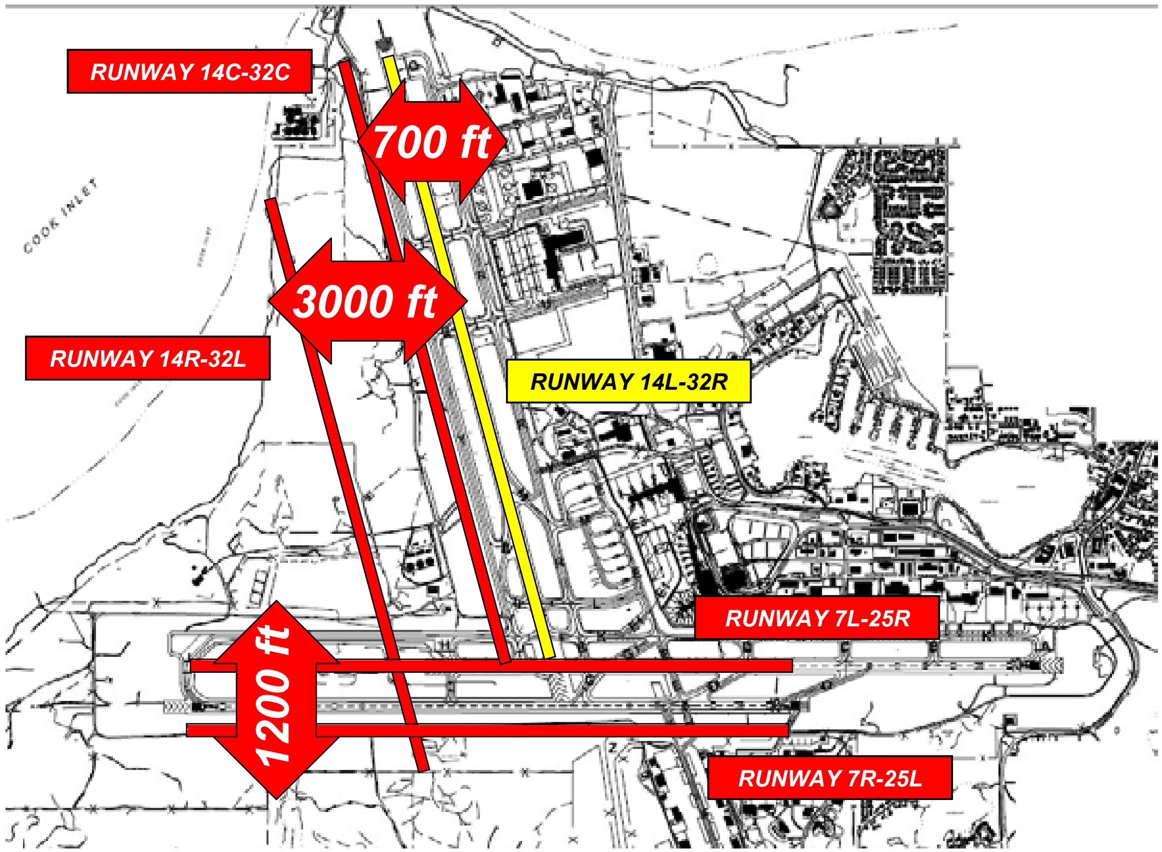
September 2008

DRAFT

Appendix B

Concept 19 - R/W 14C-32C Shifted 906' West / R/W 14R-32L Shifted 3,000' West / R/W 7L-25R w/ Extension and Threshold Relocation / R/W 7R-25L Constructed 1,200' from R/W 7L-25R

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

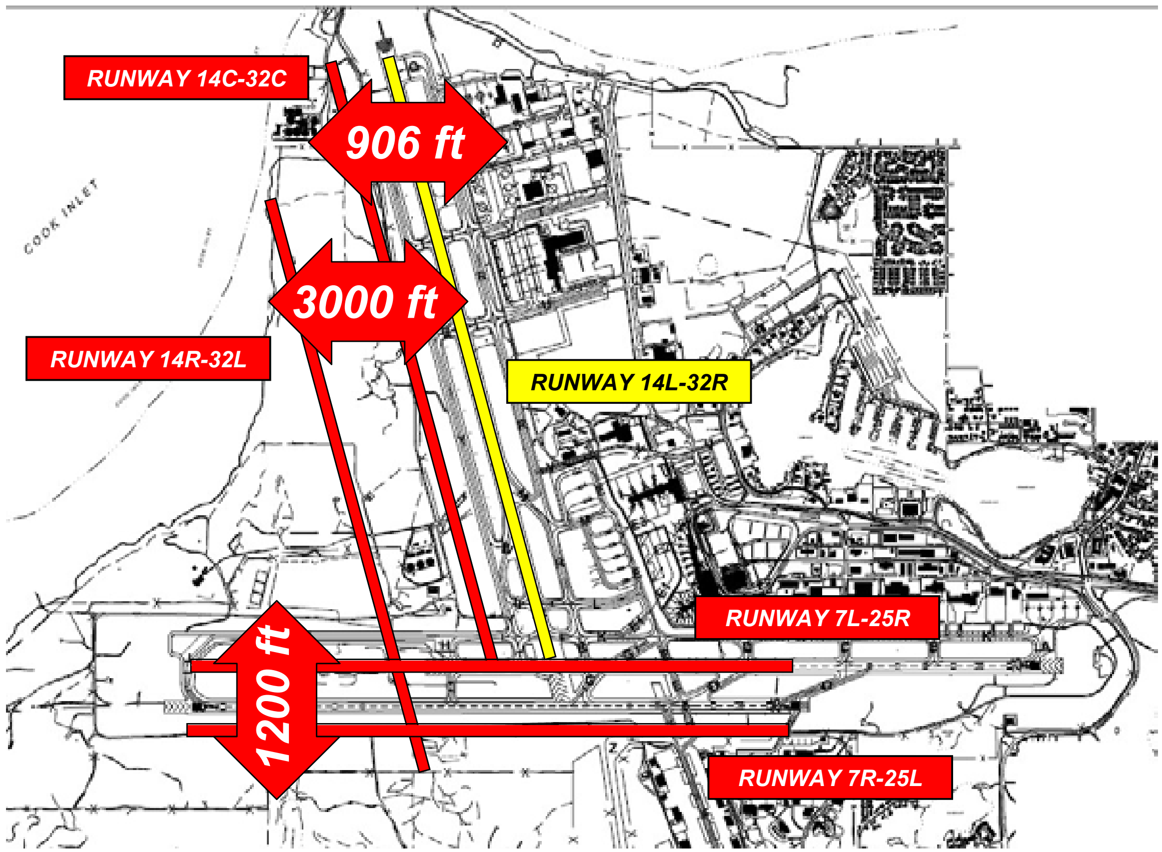
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 20 - R/W 14C-32C Shifted 700' West / Extended R/W 14R-32L Shifted 3,000' West / R/W 7L-25R w/ Extension and Threshold Relocation / R/W 7R-25L Constructed 1,200' from R/W 7L-25R

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

NOT TO SCALE

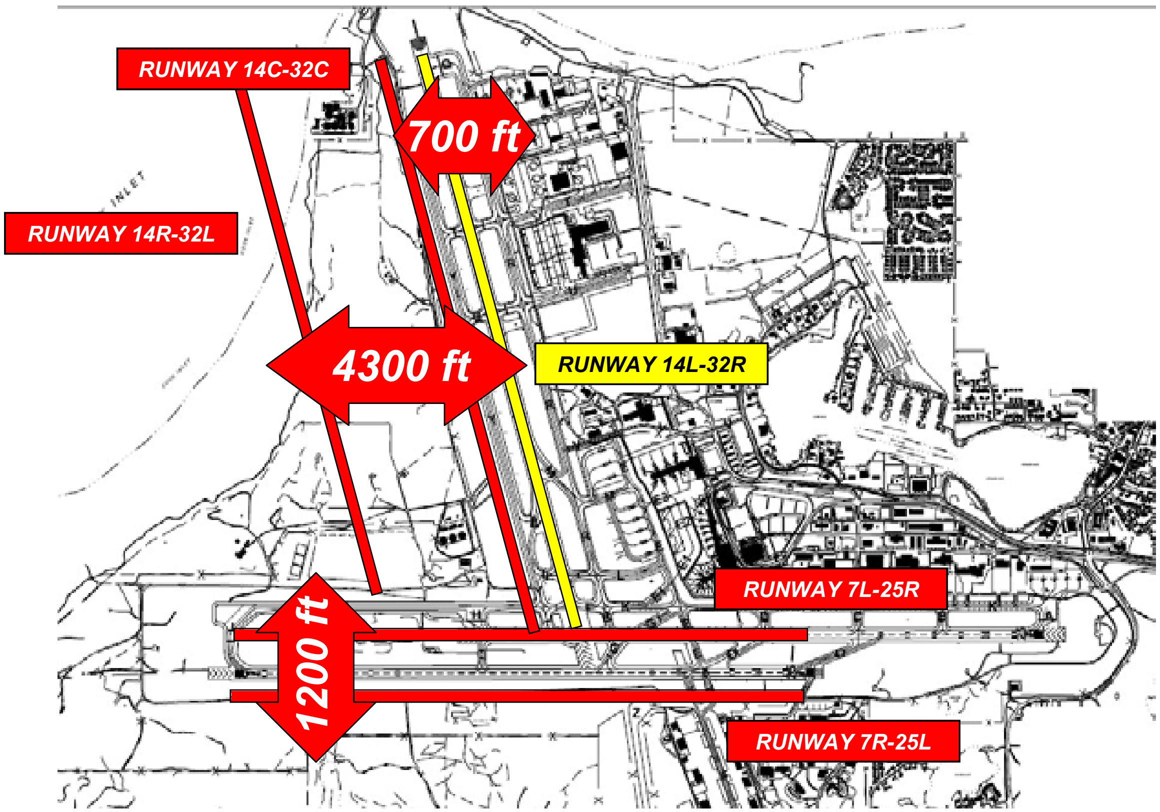
September 2008

DRAFT

Appendix B

Concept 21 - R/W 14C-32C Shifted 906' West / Extended R/W 14R-32L Shifted 3,000' West / R/W 7L-25R w/ Extension and Threshold Relocation / R/W 7R-25L Constructed 1,200' from R/W 7L-25R

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

NOT TO SCALE

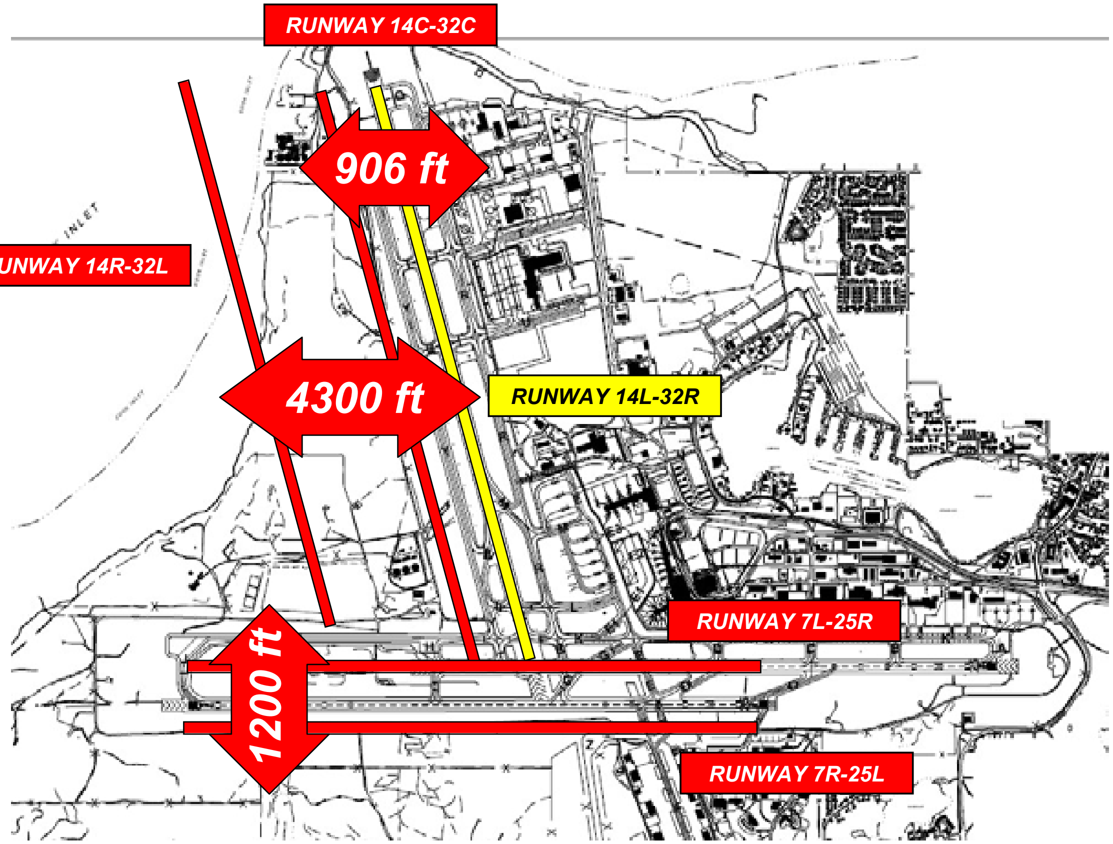
September 2008

DRAFT

Appendix B

Concept 22 - R/W 14C-32C Shifted 700' West / R/W 14R-32L Shifted 4,300' West / R/W 7L-25R w/ Extension and Threshold Relocation / R/W 7R-25L Constructed 1,200' from R/W 7L-25R

Concept Development & Alternatives Evaluation



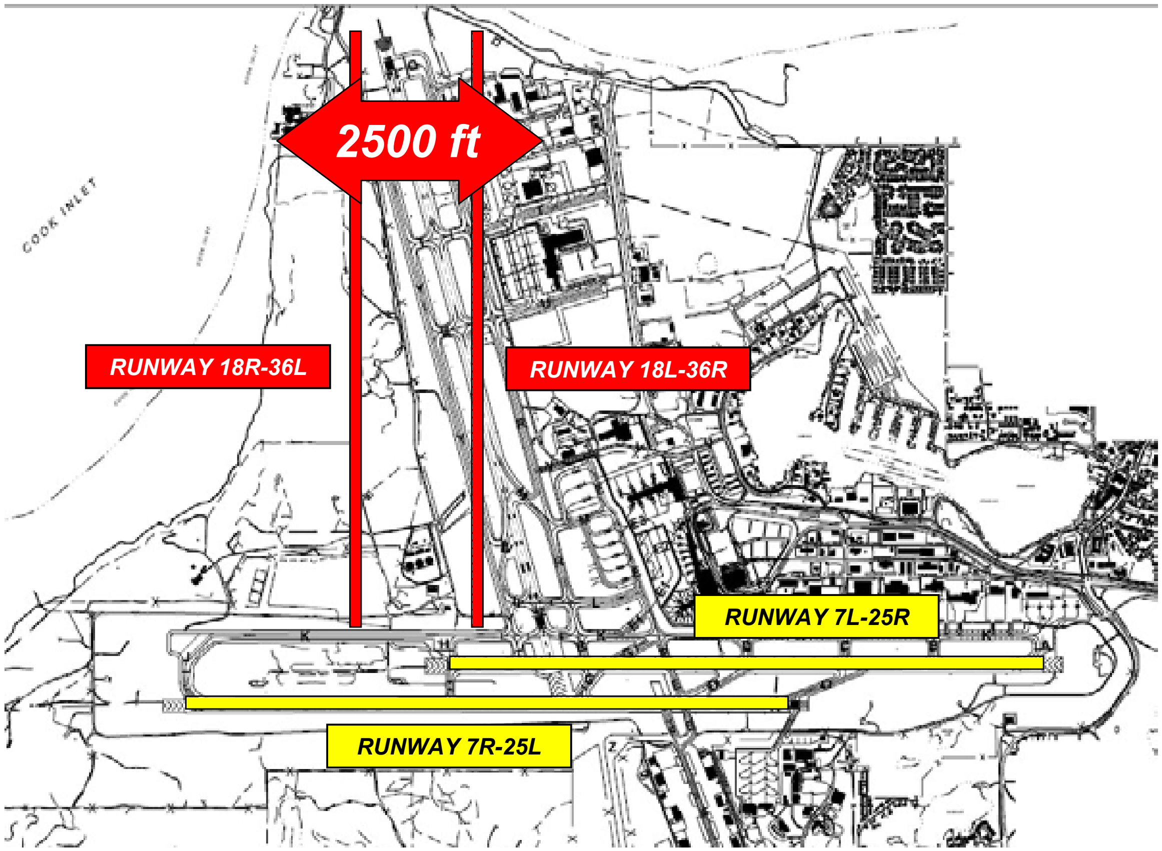
Ted Stevens
Anchorage
International Airport

N
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 23 - R/W 14C-32C Shifted 906' West / R/W 14R-32L Shifted 4,300' West / R/W 7L-25R w/ Extension and Threshold Relocation / R/W 7R-25L Constructed 1,200' from R/W 7L-25R



Ted Stevens
Anchorage
International Airport

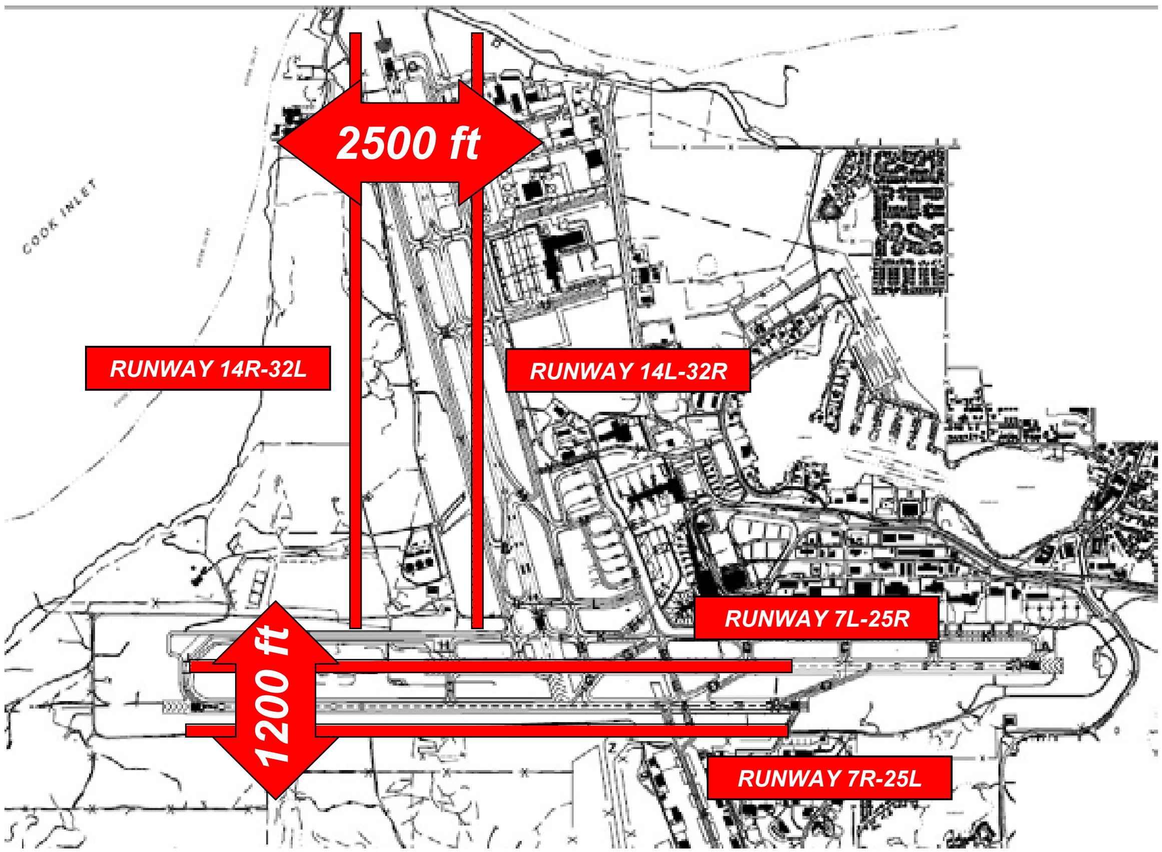
NOT TO SCALE
September 2008

DRAFT

Appendix B

Concept 24 - Runway 18R-36 / Runway 18L-36R / Dependent IFR Runways

Concept Development & Alternatives Evaluation



Ted Stevens
Anchorage
International Airport

NOT TO SCALE

September 2008

DRAFT

Appendix B

Concept 25 - R/W 18R-36 / R/W 18L-36R / Dependent IFR Runways / R/W 7L-25R w/ Extension and Threshold Relocation / R/W 7R-25L Constructed 1,200' from R/W 7L-25R

Concept Development & Alternatives Evaluation

Appendix C

Emerging Technologies Analysis

Introduction

The purpose of the emerging technologies analysis is to provide an assessment of the current status of future aviation technology and procedures. It focuses on those technologies and procedures that might be able to provide greater airport capacity, especially at airports with closely spaced parallel runways, separated runway centerline to centerline by 750 to 3,000 feet apart).

Most of the new technologies and procedures are in the early stages of development. It is therefore necessary to provide a prediction of the likelihood of the procedure actually being implemented, and the timing of that implementation. Most predictions are difficult. This one is especially so, since politics and world and airline economics would play a large role regarding whether or not these new procedures would ever come to fruition, and when that would happen.

The following are the primary sources for this paper:

- **2007 to 2011 FAA Flight Plan** *Charting the Path for the Next Generation*
- **Road map for Performance Based Navigation** *Evolution for Area Navigation (RNAV) and Required Navigation Performance (RNP) Capabilities 2006 to 2025 (July 2006 version 2.0)*
- Discussions and Proceedings from ATC 2008 (Amsterdam March 11 to 13, 2008).

General Overview of Air Traffic Management Change

Air traffic management is undergoing significant change throughout the world. The two leaders in this endeavor are the United States and Europe. In the US, the Federal Aviation Administration (FAA) is starting to implement the NextGen system (Next Generation Air Transportation System). The system in Europe is called SESAR (Single European Sky Air Traffic Management Research). Other countries are also involved, but NextGen and SESAR are the primary systems. This paper would focus on the NextGen system.

One of the big issues the aviation industry faces is standardization of systems. Even though NextGen and SESAR are similar, they also have differences. One of the common themes of the 2008 air traffic control conference was that a true world-wide system should be adopted. A very strong entity or leader is needed to make that happen. The developers of NextGen and SESAR are coordinating with each other, but no entity has emerged as a world leader. The International Civil Aviation Organization (ICAO) could play that role, but that was not the consensus of those speaking at the ATC 2008 convention. Some indicated there would need to be another major world aviation agreement, similar to the Chicago Convention, in order to provide the discipline and focus to move the system forward. With this background in mind, the NextGen system is discussed.

FAA NextGen System

Two of the key initiatives of NextGen are Required Navigation Performance (RNP) and Automatic Dependant Surveillance System-Broadcast (ADS-B).

RNP

In simple terms, **RNP** is a new way of providing on-board air navigation systems for aircraft. The system primarily uses the Global Positioning Satellite (GPS) System for deriving the navigation signal, though it can also take advantage of other systems. RNP allows for more flexible air navigation routes in all phases of flight, and more precision in the en-route phase, than can be provided by land-based navigation systems. It also offers curved routes that cannot be supplied by land-based systems. This is one key initiative that would provide more airspace capacity through tighter and more precise routings through the airspace.

ADS-B

ADS-B provides a new means for aircraft surveillance, which is one of the primary means ATC uses to separate and sequence aircraft. The current method of aircraft surveillance has been RADAR. This technology scans a geographic area and determines aircraft position by reflected signals and transponder responses. These are pulsed radio signals that equipment on the aircraft provide when scanned by RADAR.

In ADS-B, aircraft send position information to ATC sensors, which collect the information and display it on an air traffic controller's display screen. The ADS-B equipment on the aircraft sends information on location, speed, altitude, and aircraft identification and equipment. With ADS-B, the position information is much more precise than with RADAR, and the information is updated much quicker. This is expected to allow reduced separation standards between aircraft in the future. ADS-B has two primary components: ADS-B IN and ADS-B OUT. These components are discussed later.

The NextGen plan includes many other initiatives. Among those are the following:

- Required Communication Performance (RCP) involving improved ATC /aircraft communication using systems such as data links
- Required Surveillance Performance (RSP)
- Required Total System Performance (RTSP)
- Automated 4-D trajectory systems that would allow ATC to provide better aircraft sequencing and routings, especially in the en-route environment
- Improved dissemination of weather information to aircraft crews
- Improved dissemination of aircraft traffic information to crews
- Research into wake turbulence monitoring

However, RNP and ADS-B are the primary building block components for NextGen.

How NextGen is Expected to Increase Airport Capacity

By providing precise navigation and surveillance capabilities, NextGen is expected to make much more efficient use of airspace. This would be accomplished by precise routings and reduced separation standards. Some of these improvements can be completed in the near term, while others would take more time. These kinds of improvements can help airports that are in dense airspace areas, and/or are affected by airspace capacity issues. For airports where the issue is closely spaced parallel runways, more advanced and future technologies than are currently envisioned by NextGen are the only solutions that are generally regarded as feasible.

Issues with Implementing Future Technology

In order to understand the issues and problems with getting advanced and future technologies on line, a discussion follows of three key areas: technology, procedures and regulations, and aircraft equipage.

One logical question is whether or not there are any current technologies outside of NextGen that might offer promise for reduced capacity. These are discussed later in this report.

Technology

The technology most likely to provide greater capacity for closely spaced parallel runways will allow pilots to simulate visual flight conditions while flying under Instrument Flight Rules (IFR) conditions. If this technology can be accomplished, aircraft can presumably achieve the same capacity to closely spaced parallel runways as they can today during visual conditions, while on a visual approach. The only significant capacity constraint to visual approaches is wake turbulence, which is discussed later.

The most promising technology for "Synthetic Visual Approaches" involves ADS-B, possibly combined with Enhanced Flight Visibility Systems (EFVS). As mentioned previously, ADS-B has two components: ADS-B IN and ADS-B OUT.

ADS-B OUT involves aircraft equipment that sends a signal to land-based ADS-B receivers regarding the aircraft's position, altitude and other data. ATC can use this for more precise surveillance and control of air traffic. While this will allow better use of airspace in general, it will not allow the precision required for simultaneous independent IFR approaches in instrument meteorological conditions (IMC) to closely spaced parallel runways.

ADS-B IN equipment receives ADS-B and other data into the aircraft. This involves ADS-B transmissions from other aircraft in close proximity, and uplink of air traffic data from ATC that provides information on all traffic in the vicinity, both derived from ADS-B and other sources such as RADAR. The ADS-B IN equipment can also provide weather information and other data. Since ADS-B provides the pilot with essentially instantaneous information on the relative position, speed and altitude of nearby aircraft, a pilot could use the ADS-B IN display to provide information as good as or better than what is obtained with the naked eye. Presumably a visual approach could be conducted during IMC. While some believe this might be enough, others believe some sort of synthetic vision through a heads-up display might also be required.

This technology is already being used in a test phase by UPS. UPS has equipped a number of aircraft in its fleet with both ADS-B IN and OUT equipment. In one application, they have received approval to use ADS-B for assistance in flying visual approaches. The current approval requires that the procedure still be flown under visual conditions. The benefit is that if an aircraft on visual approach loses sight of the aircraft it is following, due to haze or excess lights on the ground at night, for example, that aircraft can still continue the visual approach using ADS-B IN information. The normal requirement is that a pilot needs to notify ATC immediately when they lose sight of the aircraft they are following. ATC must then re-apply IFR separation, which often involves breaking the aircraft out of the approach.

This procedure is far from allowing "Synthetic Visual Approaches" during IMC, but it is an impressive first step.

Procedures and Regulations

The procedure described above is part of the NextGen system. As indicated earlier, NextGen is a system for the US. Especially for an airport like Anchorage, that has a very high percentage of international traffic. It is very important that all aircraft flying to Anchorage be equipped and trained to use the equipment and procedure. Europe and its SESAR system might be able to participate and develop procedures, but ICAO will ultimately need to adopt the framework and set the umbrella standards. Also, all carriers flying into Anchorage must have their pilots trained, and their airline approved to fly the procedure. The timetable for something like this has not been established yet, but it is expected to be a long process.

Aircraft Equipage

This is probably the second-most difficult item to accomplish following establishing rules and procedures. The only way for the "Synthetic Visual Approaches" to work properly is to have all aircraft equipped.

A lesson can be learned from the implementation of the Precision Runway Monitor (PRM) at Minneapolis/St. Paul International Airport (MSP). The PRM was installed at MSP to allow simultaneous independent approaches during IMC to MSP's parallel runways 12R/30L and 12L/30R, which are separated by 3,380 feet. PRM did not require any significant equipment in the airplane, but it did require pilots to be trained. The major carriers at MSP went through the training, but other large airlines, who only had a few flights a day at MSP did not feel training all their crews on the procedure was economically justified.

This became a very high workload item for ATC. They had to hold aircraft that had not been trained in use of PRM, and then eventually suspend PRM procedures while they worked non-trained aircraft into the airport. At Anchorage, aircraft not equipped with ADS-B IN and OUT would not be able to fly the procedure. It is possible that an aircraft with ADS-B IN and OUT and with a trained crew could closely follow an aircraft that had only ADS-B OUT, but they would not be able to catch or pass the other (ADS-B OUT only) aircraft, as that aircraft would not have adequate information on the plane coming up beside them. Hence, for all practical purposes, a large majority of aircraft will need to be equipped with ADS-B IN and OUT for this to work. Anything less will create an unacceptably high level of workload for air traffic controllers.

At the ATC 2008 conference, an estimate for avionics required to meet NextGen was quoted at 14-20 billion euros ($22 to $31 billion at current exchange rates). The cost to aircraft in Europe to meet SESAR is estimated at 12 billion euros.

An additional issue called the Avionics Conundrum was cited by Neil Planzer, Vice President of ATM Strategy for Boeing. The Avionics Conundrum refers to the lack of a single set of absolute standards and requirements. The issue is similar to the 1980s competition between Beta and VHS standards for video cassette recorders

(VCRs). It is also similar to the more recent competition for high definition DVD standards, whether Blue Ray or HD DVD technology.

Mr. Planzer indicated that most new planes being delivered today are not being supplied with many of the avionics required for NextGen, since Boeing and Airbus cannot tell their customers which system will ultimately be adopted. It is very expensive to buy multiple systems, with the hope that one of them will be the correct one. The Conundrum is further exacerbated by the fact that retrofitting aircraft with new avionics is much more difficult than building the avionics into the aircraft initially. It was indicated at the conference several times that new avionics and technologies will have to make business sense to the airlines or they will never be implemented. Airlines will not buy equipment that can only be used at a few airports.

At Anchorage, if the “Synthetic Visual Approaches” can be ultimately approved by agreeing on the procedures, rules and regulations, the airlines and other stakeholders all need to buy and install the equipment and train their flight crews. The systems for air carrier and large business jet aircraft are expected to be an electronic flight bag system, which will be part of the flight management system. As mentioned earlier, a synthetic vision system using a HUD display may also be required. For smaller business aviation and general aviation, the ADS-B IN equipment will likely consist of a display similar to, or perhaps the same as, the display being used for Capstone. It is not clear if a simple display like that will be adequate for the “Synthetic Visual Approaches”, even if the synthetic vision system is not required.

The current proposed rulemaking which FAA has out, for transition to the NextGen system, calls for aircraft that will be operating in specified airspace to have ADS-B OUT equipment by 2020. No requirements are set yet for installation of ADS-B IN equipment. It is hard to envision ADS-B IN being mandated before 2025.

Avoidance of Wake Turbulence

Wake turbulence rules need to be applied any time a “heavy” or a Boeing 757 is involved, and runways or flight paths are less than 2,500 feet apart. During a visual approach, pilots accept responsibility for wake turbulence separation and are allowed to use their own judgment regarding how closely they want to follow another aircraft. It is not uncommon for an aircraft on a visual approach to a closely spaced parallel runway, to fly fairly close to a “heavy” aircraft on the adjoining runway, when the pilot feels confident that wind and other conditions are such that he can avoid the wake from the other aircraft. That is not likely to be the case for a “Synthetic Visual Approach.” Additional procedures and rules will be needed if wake turbulence can be mitigated most of the time, in the same manner it is for true visual approaches.

A technical memo on research associated with wake turbulence avoidance is attached. As indicated in that report, there are no near term solutions to the type of “Synthetic Visual Approach,” described above. However, solutions could come on line about the same time as the other technologies and procedures necessary for “Synthetic Visual Approaches.” One technology being used to conduct wake turbulence analysis is a system developed by Lockheed Martin, called Wind Tracer. It uses a Doppler Lidar to detect and measure wake turbulence and wind shear. In the near term, this technology could be used to help controllers decide when wake turbulence avoidance needs to be applied to closely spaced parallel runways. It has not been mentioned anywhere in the literature, but perhaps in the future this technology could be uploaded into the ADS-B IN display. This information could then be used so that pilots could fly “Synthetic Visual Approaches” with confidence that they are avoiding wake turbulence.

Current Technologies to Increase Airport Capacity

There are some current technologies, that do not fully solve the issue of instrument approaches to closely spaced parallel runways, but that can increase airport capacity at ANC, by allowing the airport to operate in “visual conditions” for a greater percentage of time. These are briefly discussed below.

Simultaneous Offset Instrument Approaches

Simultaneous Offset Instrument Approaches (SOIA) uses existing technology to gain greater capacity to closely spaced parallel runways. It employs an offset localizer (LDA) with glideslope to keep aircraft separated by 3,000 feet laterally (current minimum separation for parallel runways during IMC) for as long as possible. This means the plane on the LDA approach is coming in to the runway at an angle, and slowly getting closer to the final approach course for the other runway.

The procedure also uses PRM, which is monitored by air traffic controllers who can instruct aircraft to break off the approach if they stray off course and have the potential of getting too close to another aircraft. The procedure requires an aircraft execute a missed approach when it meets the point of 3,000-foot separation between the approach courses, if it does not have visual sight of the other aircraft and the runway. Aircraft must have 30 seconds to see the aircraft on the adjacent runway prior to the missed approach point, and aircraft must also be established on the landing runway centerline at least 500 feet above ground level. Due to all these requirements, the minimums for flying the procedure, while a distinct benefit, are not as low as would normally be desired. The minimums for the procedure at San Francisco International Airport (SFO) are 1,127 feet above ground level (AGL), and 4 miles visibility. However, there is a note that the procedure is not authorized below 2,100 mean sea level (MSL) and 4 miles visibility. This is presumably due to the requirement to see the other aircraft for 30 seconds prior to the missed approach point.

Minimums at Anchorage might be better, as obstructions might not be as bad as at SFO. One potential solution at Anchorage is to implement the PRM approach. As ADS-B IN and OUT comes on line, a logical first step might be that aircraft equipped with ADS-B IN could use that as the means for “acquiring visually” the aircraft they will be following on the adjacent runway. That would eliminate the 30-second requirement, and perhaps provide lower minimums. A second logical step might be to reduce the separation standards for the distance between approach courses to something less than 3,000 feet, which would again lower the minimums further.

Simultaneous Offset Instrument Approaches with High Approach Landing System/ Dual Threshold Operations (HALS/DTOP)

HALS/DTOP is discussed in the attached technical memo on wake turbulence. This procedure helps avoid wake turbulence issues on closely spaced parallel runways. One technique used by the procedure is to stagger runway thresholds. This keeps one aircraft higher than the adjacent aircraft on the adjoining runway, which normally avoids wake turbulence issues. Since the runways 7R and 7L at ANC already have a significant stagger, and since the airport has a high percentage of “heavy” aircraft, the

SOIA procedure may work well by adopting the HALS/DTOP procedure. SOIA may also be a good interim solution to use for the proposed parallel to Runway 14/32. To employ SOIA with HALS/DTOP on 14/32 would require some degree of staggered or displaced threshold. It is not certain at this time if the amount of required stagger could be applied to those runways.

Use of RNP for Closely Spaced Parallel Runways

RNP has been proposed as one means for conducting IMC to closely spaced parallel runways. However, it is unlikely those proposals are for runways with the existing and anticipated spacing at ANC. A typical minimum value for RNP, as used by air carriers with special certification is in the range of 0.09 to 0.1 nautical miles. That means the aircraft will stay (for RNP 0.1 for example) within 0.1 miles of course 95% of the time, and within 0.2 miles 99 percent of the time. The plane could stray off course as much as 676 feet 5% of the time. That would obviously put the plane too close to an aircraft approaching a parallel runway that is only separated by 750 feet. Presumably, the RNP would have to meet standards such that the plane would never stray more than 300 feet from centerline, for a runway pair with 750 foot separation. This would require an RNP value of 0.025. This level of accuracy for RNP does not appear to be viable for the near future. Even if it could be achieved technically, many other difficult procedures would need to be worked out and agreed upon, and all participating aircraft would have to have this level of RNP equipment. One promising use of RNP for the near term is RNP Parallel Approach Transition (RPAT). This essentially performs the same function as SOIA, except the procedure is done without the need for ground based NAVAIDS. The negative is that the minimums will likely not be lower than SOIA, and all aircraft need to be equipped to do the procedure.

Conclusion/Summary

There are promising technologies being developed, that may allow near simultaneous instrument approaches to closely spaced parallel runways in the future. However, there are many hurdles to overcome before this can happen. These involve developing standards for the equipment that will provide the technology, developing the rules and procedures to be used, and finding the funding and making a strong enough business case for the aircraft operators to spend the considerable funds that will be required to equip aircraft.

Achieving a system by 2025 is possible, but very unlikely. That date was offered by some of the expert speakers at ATC 2008, as the earliest a system is envisioned. A more likely date is 2030 to 2035.

Appendix D

FAA Traffic Management Unit (TMU)

FAA initiated a TMU at ANC in 2007 to help meter arrival traffic during peak operating periods. The TMU supported an additional air traffic controller at the Anchorage TRACON to meter arriving flights into two arrival streams. One arrival stream utilizes Runway 7R, while the other utilizes Runway 14. In order to accept arrivals on these two runways, all departures, including heavy jet aircraft, utilize Runway 7L while the TMU is in operation. Though this operation provides additional arrival capacity during peak periods (typically weekdays between 11 AM and 1 PM), it requires that all ANC departures during the period utilize Runway 7L and depart over the Municipality instead of over water. Further studies of this operation would determine whether it is viable for use during longer periods of the operating day and what potential noise impacts may be associated with this operation and whether it is a viable long term capacity enhancing alternative.