Ted Stevens
Anchorage
International Airport

MASTER PLAN UPDATE

TECHNICAL REPORT

HNTB Corporation

Ted Stevens Anchorage International Airport Master Plan Update

November 2002

Prepared by:

HNTB Corporation

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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 1996, was based on operations data from the early 1990s and responded to significant changes in international passenger activity that occurred in the 1980s and early 1990s. By the late 1990s, it was apparent that operations at ANC had again changed significantly, with international cargo operations increasing at a very high rate. Thus, ANC began this Master Plan Update in 1998, primarily to address the increasing demands of cargo operations.

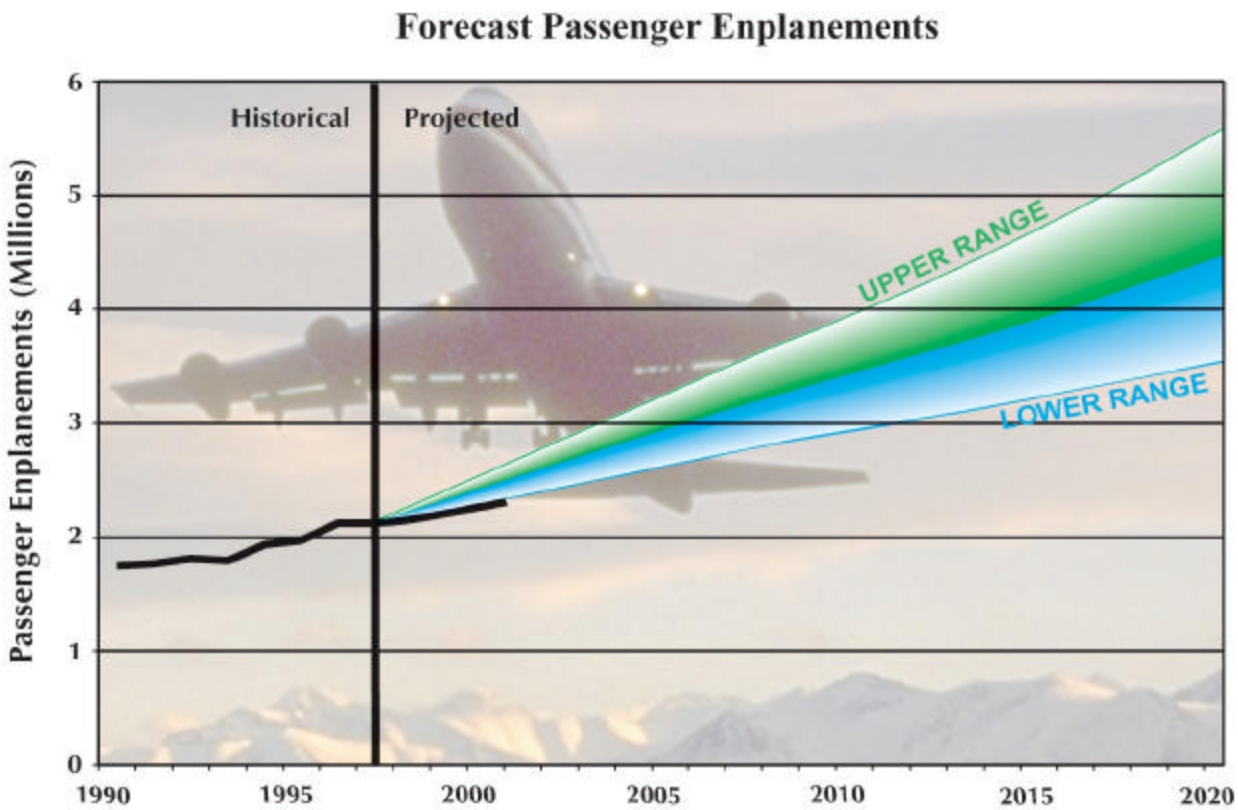
MASTER PLAN CONTENTS

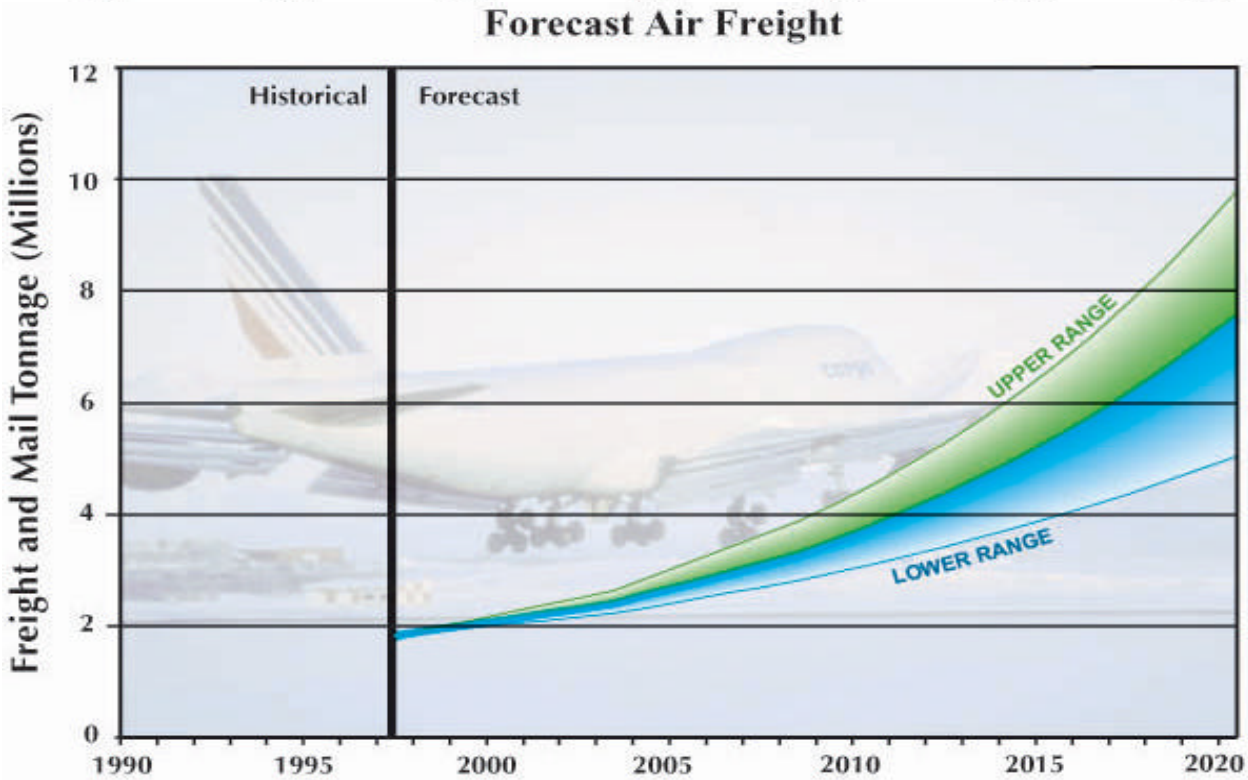
This Master Plan Update contains an inventory of existing Airport facilities, forecasts for the various types of aviation activity at ANC, facility requirements for both airfield and support facilities needed to accommodate forecast activity levels, an analysis of regional airport development alternatives to meet forecast activity levels, and Airport plans for future development over the 20-year time period to 2020.

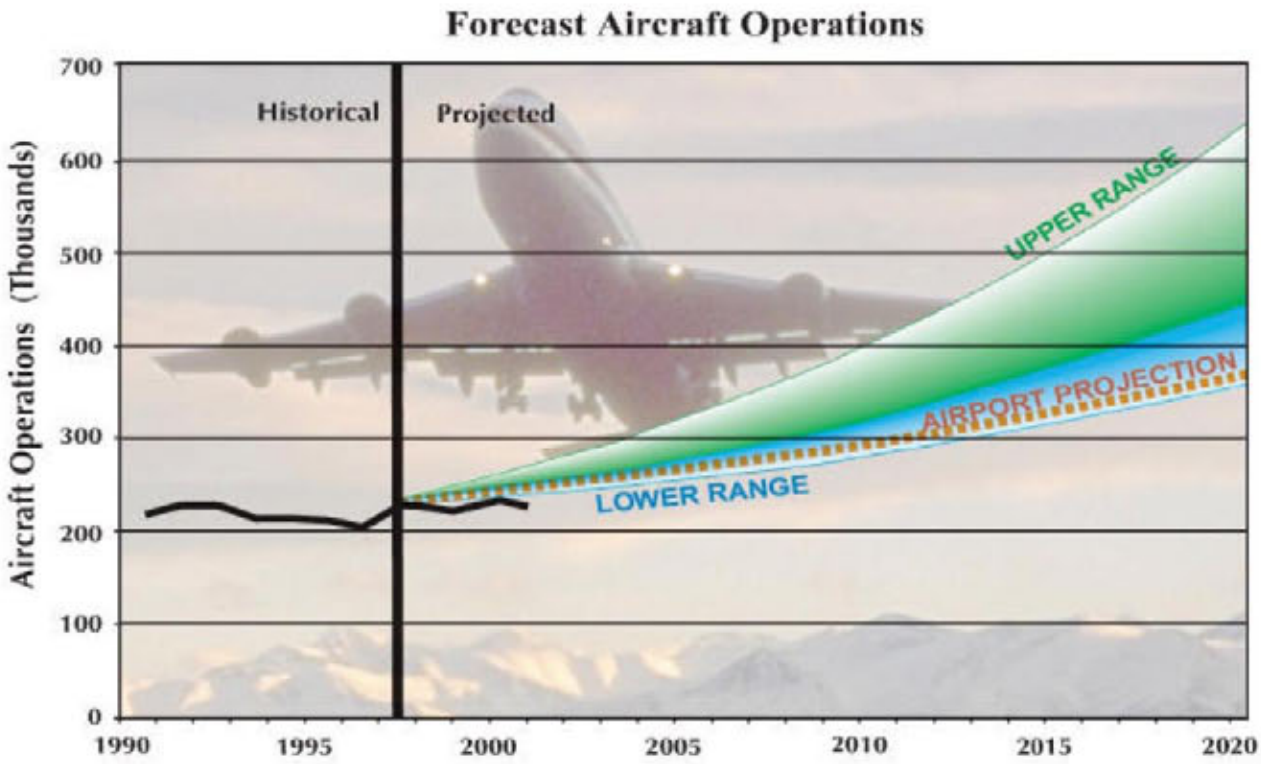
AVIATION ACTIVITY FORECASTS

The aviation activity forecasts for the Master Plan Update were prepared in 1998, using 1997 as the base year. The Federal Aviation Administration (FAA) approved the forecasts in 1999. To ensure the Airport is using the most current data, a forecast review was undertaken in the spring of 2001, using 2000 as the base year. The forecast review determined that, in the short term, activity was increasing at a lower rate than forecast, but that the original activity forecasts were tracking close enough to actual levels to be valid for long-range Airport planning purposes. The lower actual growth rate is currently anticipated to result in delaying the date when certain improvements may be required; however, it is unlikely to change the need for the facilities proposed. In addition, in late 2001, Airport staff prepared an updated aircraft operations forecast based on trends seen since the late 1990s at ANC. This forecast assumes an annual growth rate of 4.5 percent for cargo operations, a 1.25 annual percent growth rate in passenger operations, and no growth in other activity categories.

The activity forecasts used for the Master Plan Update are shown in the following figures. Total aircraft operations are expected to increase from 231,562 operations in 1997 to 446,200 operations in 2020. This reflects an average annual forecast growth rate of 2.9 percent overall for airport operations. Various components of aviation activity, such as passenger operations or international cargo operations, are projected to increase at different rates, with international air cargo activity projected to increase at a higher rate than other activity components.


Forecast Passenger Enplanements
Historical
Projected
UPPER RANGE
LOWER RANGE
Passenger Enplanements (Millions)
0
1
2
3
4
5
6
1990
1995
2000
2005
2010
2015
2020


Forecast Air Freight
Historical
Forecast
UPPER RANGE
LOWER RANGE
Freight and Mail Tonnage (Millions)
0
2
4
6
8
10
12
1990
1995
2000
2005
2010
2015
2020



FACILITY REQUIREMENTS

Future facility requirements were based on the forecast activity levels for various types of aviation operations. The facility requirements analysis examined airspace capacity, airfield capacity and delay, airfield improvements, landside and airside buildings, cargo surface transportation, and support facilities.

The airfield capacity analysis indicated that, without additional airfield development, delays were expected to increase significantly by 2020. Airfield improvements to address these potential future delays, as well as other identified airport facility needs, are evaluated in the Alternatives section below.

REGIONAL AIRPORT DEVELOPMENT ALTERNATIVE EVALUATION

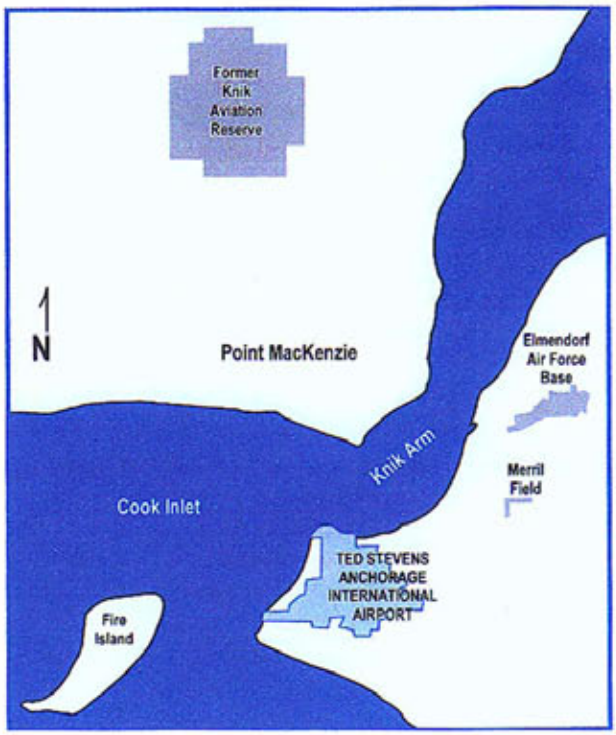
The ANC Master Plan Update evaluated a range of potential alternatives in the Anchorage region to accommodate the aviation activity demands forecast for ANC. In addition to looking at airfield development on ANC, the analysis evaluated a supplemental airport located at either Fire Island or Point MacKenzie, or a replacement airport at Point MacKenzie. This analysis was not a detailed site selection and environmental impact study, but a screening analysis used to compare the relative benefits and drawbacks of the various alternatives.

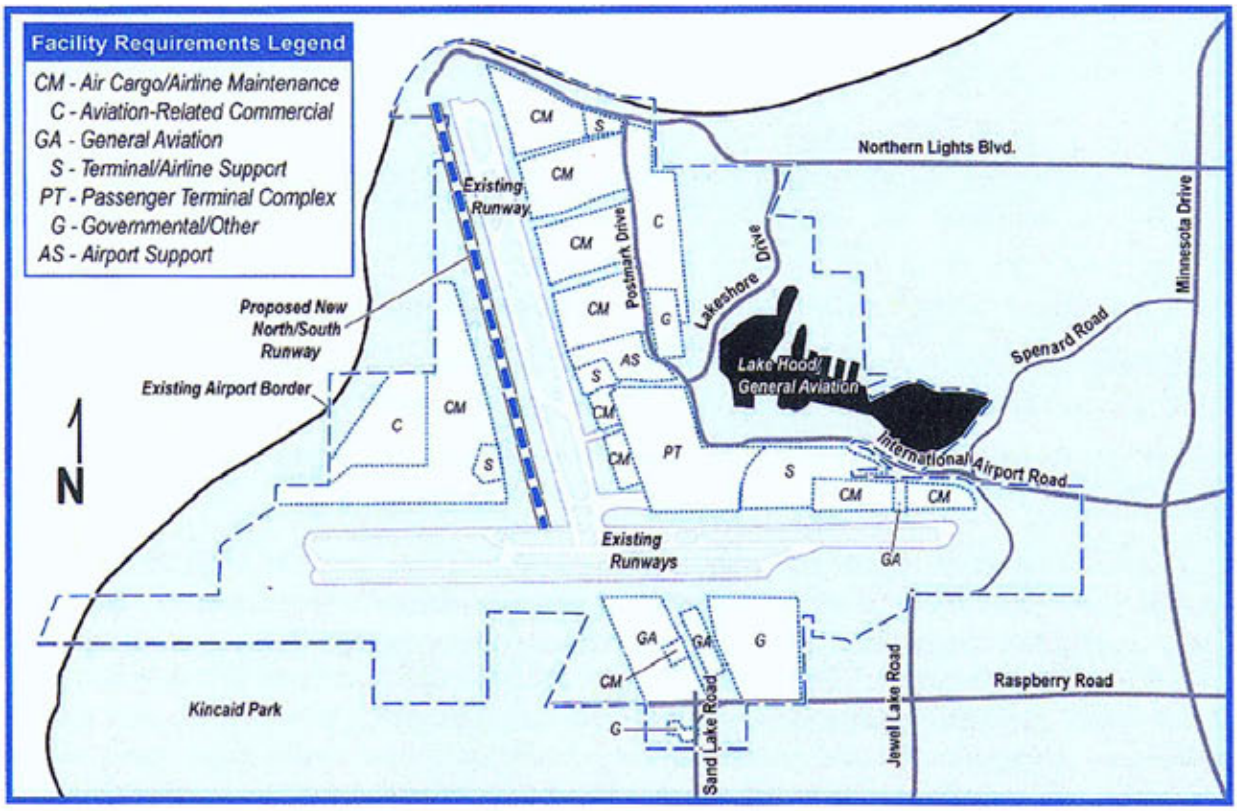
Each alternative was evaluated using a series of quantitative and qualitative analyses, as appropriate, and considered airside/landside considerations, airspace/safety, surface transportation, noise impacts, other environmental impacts, economic impacts, development

costs, financial feasibility, and Municipality of Anchorage (MOA) comprehensive plan compatibility.

With the benefit of Master Plan workshops and other opportunities for public involvement, the Regional Airport Development Evaluation recommended continued development of airfield capacity primarily within ANC's existing boundaries. Cost (and financial feasibility), passenger and business convenience in terms of travel time and cost, business risk, and secondary environmental impacts were voiced by the public and recommended by the consultant as the primary drivers of this conclusion.

ANC held over 40 public and advisory committee meetings on the Master Plan Update during the past 5 years.





Recommended Alternative: Limited Airfield Expansion Primarily Within Existing Borders.
Note: LHD is now a separate airport and LHD land uses are shown in the LHD Airport Layout Plan.

SUMMARY OF ALTERNATIVES EVALUATION

Alternatives	Strengths	Weaknesses
1. No expansion with minimum improvements	*Least costly.*	*Lowest accommodation of needs, with delays and delay costs increasing significantly in planning horizon.*
2. Limited airfield expansion primarily within the existing border	*Maximizes existing resources with lowest economic and environmental impacts to community.*	*Could still result in significant delays toward the 20-year horizon if growth picks up again.*
3. Limited airfield expansion with a supplemental airport at Fire Island	*Higher number of Anchorage jobs.*	*Overlapping airspace with ANC and resulting complicated airspace patterns would limit total airfield capacity gains.*
4. Limited airfield expansion with a supplemental airport at Pt. Mackenzie	*Higher demand accommodation.*	*High costs in surface transportation and bridge construction, and high environmental impacts in rural recreation area.*
5. Full ANC development beyond existing border	*Accommodates high growth demands and creates the highest number of Anchorage jobs.*	*Greater impacts to Anchorage environment, requiring acquisition of residential and recreational lands.*
6. Close existing ANC, relocate airport to Pt. MacKenzie	*Fully accommodates demands and eliminates overlapping airspace with Elmendorf Air Force Base.*	*High costs in surface transportation and bridge construction, loss of most of Anchorage's airport-related jobs, and high environmental impacts in rural recreation area.*

AIRPORT DEVELOPMENT PLANS

The overall development strategy for preparing the Airport Development Plan had the following four objectives:

1. Ensure facilities are developed in an orderly and cost-effective manner, recognizing limited resources. This ensures ANC optimizes its assets to benefit the maximum number of Alaskans.
2. Recognize the best use of limited Airport lands.
3. Allow for flexibility and ensure that ANC is ready to continue orderly growth within the 20-year planning horizon and beyond.
4. Consider the unique environmental issues associated with current and long-term development at ANC.

With these objectives in mind, the Development Plan programs major projects around key decision points, at which time ANC can re-evaluate the appropriateness of the Plan in light of the latest national and local trends before committing additional resources. An important consideration was that lowered aviation trends at ANC since 1998 have suggested the Airport should not rely on the rates reflected in the long-term aviation activity forecasts to schedule runway or other major infrastructure improvements. Economic factors and other events have significantly impacted the aviation industry and could change the long-term outlook for growth in operations. Similarly, continuing improvements in navigation and air traffic control technologies may result in capacity gains for any given Airport runway configuration.

The proposed airfield alternative includes constructing a new parallel north-south runway to the west of existing Runway 14-32, which could require a small amount of land acquisition from the MOA adjacent to the Anchorage Water and Wastewater Utility (AWWU). In addition to the airfield improvements, the alternative includes a tunnel connecting the terminal area to the West Airpark, and expansion of other aviation facilities within existing Airport boundaries. The Airport will maximize the use of aviation technology advances, demand management techniques, and other regional and State assets to achieve the greatest utility of the resulting four-runway system at ANC, thereby delaying as long as possible the need for additional capacity enhancements.

A summary of major improvements is shown in the 20-Year Development Plan. The Development Plan will be phased based on reaching actual operations levels. Phase I reflects needs anticipated as operations increase up to 286,000 operations per year. Phase II reflects needs anticipated as operations increase to 332,000 operations, and Phase III reflects needs anticipated as operations increase to 446,000.

Key development projects include:

- ***New north-south runway.***
- ***New taxiways.***
- ***Airfield upgrades to accommodate new large aircraft.***
- ***Terminal expansion.***
- ***Expansion of air cargo, airline, airport support, and general aviation facilities.***
- ***Land acquisition to address noise, runway protection standards, future development needs, operational issues, and security.***

The total cost estimate to implement the recommended program is approximately $2.2 billion through 2020, including tenant investments. A summary of short-term (Phase I), intermediate (Phase II), and long-term (Phase III) development cost estimates for the planning periods are provided in the 20-Year Development Plan Summary below. While planning ahead for long lead time infrastructure improvements is essential, it should be noted that the scheduling of design and construction will be updated periodically as market trends change.

20-YEAR DEVELOPMENT PLAN SUMMARY
(IN MILLIONS OF 2002 DOLLARS)

Project	Phase I	Phase II	Phase III	Total
Airfield	170.4	331.2	96.8	598.4
Air Cargo	126.2	193.9	178.6	498.6
West Side Development	0.0	34.6	30.1	64.7
Terminal	44.8	132.4	119.6	296.7
Infrastructure	14.6	18.0	25.0	57.6
Airport Support	57.4	80.0	23.0	160.4
Airline Support	0.0	26.4	26.4	52.9
Rental Cars	0.0	43.0	0.0	43.0
General Aviation	15.0	40.0	15.0	70.0
Environmental	46.2	52.5	85.5	184.2
Safety	47.0	6.5	11.7	65.2
Other	28.3	30.0	35.0	93.3
Total	**549.8**	**988.5**	**646.7**	**2,184.9**

Includes tenant development costs.

Successful implementation of this development plan will depend on actual activity growth over time, available funding, and successful completion of detailed design and environmental documentation. This Master Plan Update provides a planning tool for airport management to meet expected future aviation demands and ensure the most efficient use of this important State asset.

PUBLIC INVOLVEMENT

ANC implemented an extensive public involvement program throughout the Master Plan Update. Seven Master Plan Update public meetings were held at key points during the update process. In addition, ANC held two stakeholder roundtable discussions, where a diverse group of 50-60 Anchorage residents discussed various issues in great detail. Public surveys were also conducted to convey information and to obtain input from the general public, including those that often will not attend public meetings. Over 40 presentations on the Master Plan Update were also provided to the following groups:

- ✓ ANC Airport Advisory Committee.
- ✓ Master Plan Update Technical Advisory Committee.
- ✓ Master Plan Update Policy Committee.
- ✓ Airline Airport Affairs Committee.
- ✓ Various Nearby Community Councils.
- ✓ Community Organizations, ranging from the Chambers of Commerce to Public Service Clubs, such as Rotary, to recreation interest groups.

MASTER PLAN IMPLEMENTATION

This Master Plan Update is intended to be a blueprint for future development at ANC. The main function of this plan and the associated Airport Layout Plan is to ensure that Airport lands and resources are used in their most efficient manner and that development is not approved that would limit essential future infrastructure improvements. The Investment Plan laid out earlier reflects the best estimates of the investment needs to meet future aviation demands based on FAA-approved Base Case Forecasts. No Federally funded airport improvements can be constructed, however, without justified need and compliance with all Federal approval procedures.

Actual implementation of projects listed in the Development Plan will be proposed as levels of operations justify them. As each project is proposed for implementation, more detailed planning and design efforts will be undertaken and environmental reviews under the National Environmental Policy Act, cost-benefit analyses, and other reviews will be required.

Chapter One
INVENTORY OF EXISTING CONDITIONS

Note: This inventory of existing conditions is primarily based on information obtained from the previous master plan (published in 1996). Where possible, limited updates to this information are provided.

1.1 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. ANC's last master plan was completed in 1996 based on operations data from the early 1990s. The 1996 Master Plan responded to changes that occurred in the 1980s and early 1990s that resulted in significant changes in international passenger activity at ANC. By the late 1990s, it as apparent that operations at ANC had changed significantly, with international cargo operations increasing at a very high rate. ANC thus began this Update in 1998 to address the increasing demands from cargo operations.

The Master Plan Update process was guided by four goals:

1. Ensure facilities are developed in an orderly cost-effective manner, recognizing limited resources. This ensures that ANC optimizes its assets to benefit the maximum number of Alaskans and enhance their quality of life.
2. Recognize the best use of limited Airport lands.
3. Allow for flexibility and ensure that ANC is ready to continue orderly growth with the 20-year planning horizon and beyond.
4. Consider the unique environmental issues associated with current and future long-term development of ANC.

The Master Plan Update process comprised five steps:

1. Inventory of existing facilities,
2. Forecasts of future demand,
3. Determination of future facility requirements,
4. Develop and assess regional airport development alternatives, and
5. Prepare a recommended development plan.

Each of these steps is discussed in the technical report.

1.2 EXISTING AIRPORT FACILITIES

ANC occupies about 4,112 acres three miles southwest of the Anchorage central business district. The Airport property and the adjacent Lake Hood Seaplane Base (LHD) are owned by the State of Alaska and are

administered and operated by the DOT&PF. Airport property extends east from Point Woronzof to Aircraft Drive and extends approximately 3,500 feet past the east end of Runway 6L-24R. The southern boundary of the Airport follows Jewel Lake Road and passes south of Meadow Lake, the Kulis Air National Guard (ANG) Base, the South Airpark, and Little Campbell Lake. Along its western boundary, the Airport property extends to the coastline of the Knik Arm of Cook Inlet, except for the Municipality of Anchorage (MOA) land west of Runway 14-32 (a portion of this land is used for a city water treatment facility). The Airport reference elevation is 144 feet MSL. The mean daily maximum temperature during the hottest month is 65°F.

Existing Airport facilities are shown in **Figure 1-1**.

The Airport comprises seven principal land uses plus a sizeable acreage that is undeveloped and currently used as a buffer. These land uses are shown in **Figure 1-2**, and the acreage of each land use area is listed in **Table 1.1**. The following sections present details of the existing facilities in the respective land use areas.

1.2.1 Airfield and Air Traffic Control

Airfield

As shown in Figure 1-1, ANC maintains two parallel east-west runways (6L-24R and 6R-24L) separated by 700 feet, and north-south Runway 14-32 located to the north of the parallel east-west runways. General data related to these runways are summarized in **Table 1.2**.

General data on the instrumentation and lighting associated with the Airport are summarized in **Table 1.3**.

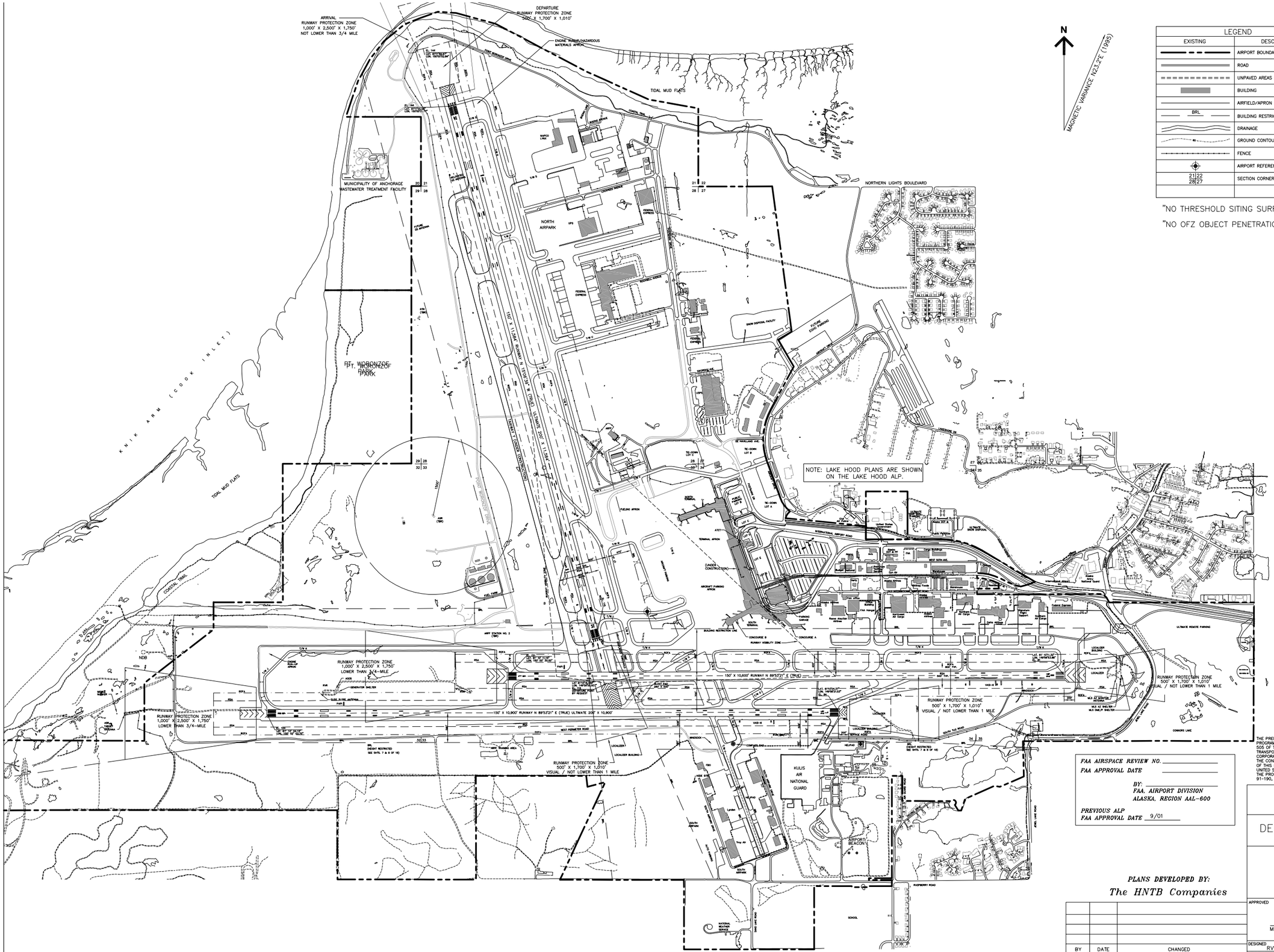
Taxiway V, located between the passenger complex and the North Airpark, is restricted to aircraft weighing 12,500 pounds or less. Taxiway B, near Runway 24R, is closed to aircraft weighing 300,000 pounds or more.

Navigational Aids and Published Approaches

Terminal area and on-airport electronic navigational aids (NAVAIDs) include the following:

- Airport surveillance radar (ASR)
- Very high frequency omnidirectional range (VOR)—Runway 6R
- Non-directional beacon (NDB)—Runway 6R
- Tactical air navigation (TACAN) equipment
- Airport traffic control tower (ATCT)
- Distance measuring equipment (DME)
- Instrument landing system (ILS)—Runways 6L, 6R, and 14
- Localizer—Runway 6L
- Rotating beacon
- Microwave Landing System (MLS)—Runway 6L
- Area Navigation (RNAV) (Global Positioning Satellite (GPS))—Runways 6L, 6R, and 14

Published instrument approach procedures and associated weather minimums are summarized in **Table 1.4** by aircraft approach category.



LEGEND	
EXISTING	DESCRIPTION
	AIRPORT BOUNDARY
	ROAD
	UNPAVED AREAS (ROADS, PARKING)
	BUILDING
	AIRFIELD/APRON PAVEMENT
BRL	BUILDING RESTRICTION LINE
	DRAINAGE
	GROUND CONTOUR
	FENCE
	AIRPORT REFERENCE POINT (ARP)
21 22 / 28 27	SECTION CORNER

"NO THRESHOLD SITING SURFACE OBJECT PENETRATIONS"

"NO OFZ OBJECT PENETRATIONS"

FAA AIRSPACE REVIEW NO. _____

FAA APPROVAL DATE _____

BY: _____
FAA, AIRPORT DIVISION
ALASKA, REGION AAL-600

PREVIOUS ALP
FAA APPROVAL DATE 9/01

PLANS DEVELOPED BY:
The HNTB Companies

BY	DATE	CHANGED

REVISIONS

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.

EXISTING CONDITIONS

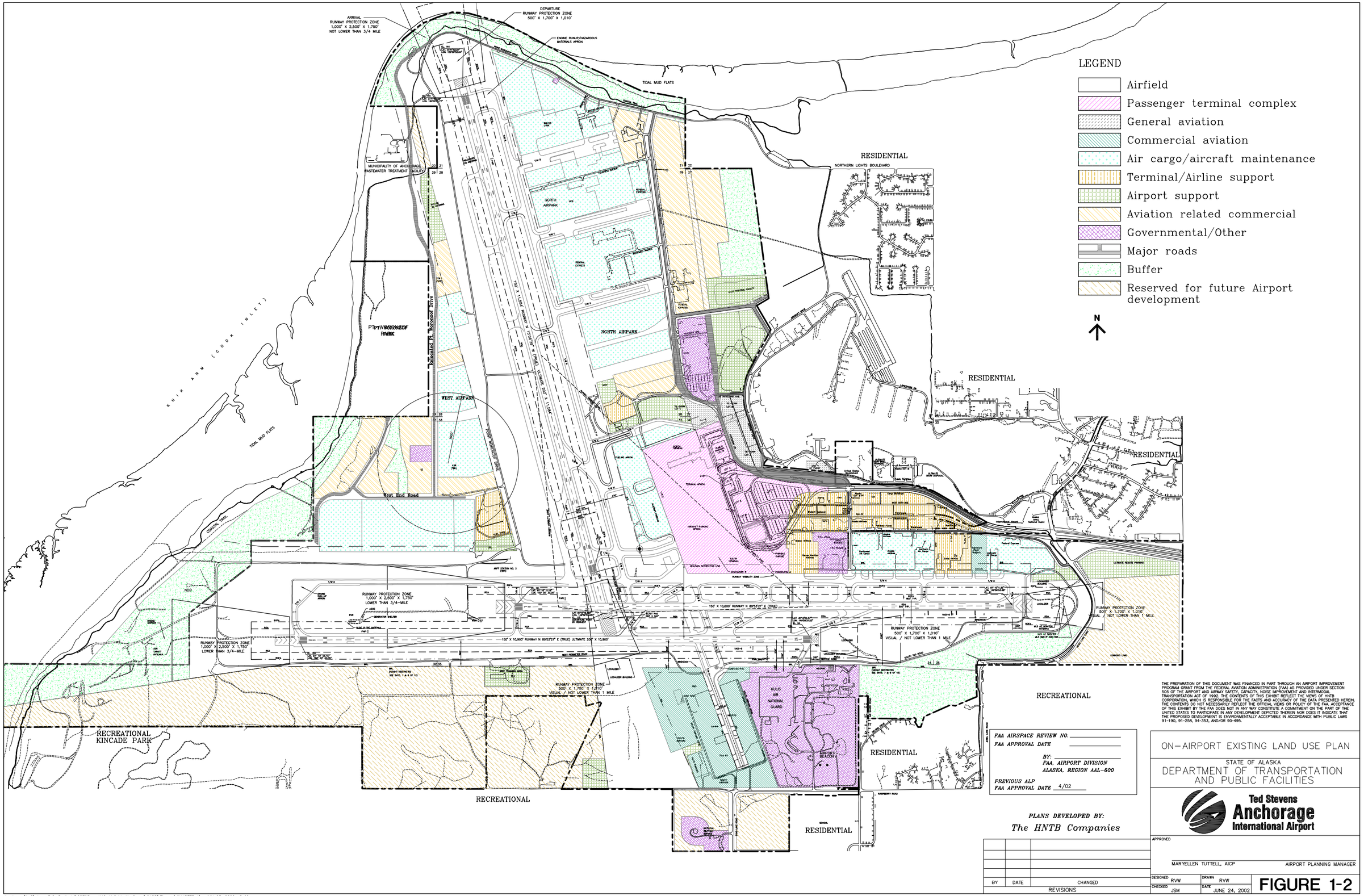
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

Ted Stevens Anchorage International Airport

APPROVED

MARYELLEN TUTTELL, AICP — AIRPORT PLANNING MANAGER

DESIGNED	DRAWN	
RVW	RVW	FIGURE 1-1
CHECKED JSM	DATE JUNE 24, 2002	



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FAA AIRSPACE REVIEW NO. _____

FAA APPROVAL DATE _____

BY: _____

FAA, AIRPORT DIVISION
ALASKA, REGION AAL-600

PREVIOUS ALP
FAA APPROVAL DATE 4/02

PLANS DEVELOPED BY:
The HNTB Companies

BY	DATE	CHANGED

REVISIONS

ON-AIRPORT EXISTING LAND USE PLAN

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

Ted Stevens Anchorage International Airport

APPROVED

MARYELLEN TUTTELL, AICP — AIRPORT PLANNING MANAGER

DESIGNED	RVW	DRAWN	RVW	FIGURE 1-2
CHECKED	JSM	DATE	JUNE 24, 2002	

land-use(1-2).dwg P:_Projects\28395 - ANC Airfield-Air Cargo\CADD\Figures\CHAPTER 1\ JUN 25, 2002 8:42 am

Table 1.1

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Existing Land Use

Land Use Category	Acres (a)
Airfield	2,007
Passenger terminal complex	160
General Aviation	17
Commercial Aviation	91
Air cargo/aircraft maintenance	483
Terminal/airline support	124
Airport support	169
Aviation related commercial	191
Governmental/other	176
Major roads	45
Subtotal developed land	3,463
Undeveloped land	457
Wetlands/buffer	192
Total	**4,112**

(a) Area available for use in the particular occupancy; not all land is necessarily leased or used. Does not include 553 acres now designated as LHD.

Source: DOT&PF.

Table 1.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Air Carrier Runway Data

	Runway		
	6L-24R	**6R-24L**	**14-32**
Category	Transport	Transport	Transport
Length (feet)	10,600	10,897	14 - 10,496 32 - 11,584
Width (feet)	150	150	150
True bearing	N89°53'21"E	N89°53'21"E	N15°06'39"W
Marking	Precision	Precision	Precision
Surface material	Asphalt	Asphalt	Asphalt
Pavement strength (thousands of pounds)			
Single-wheel (e.g., DC-3)	75	75	75
Dual-wheel (e.g., B-737)	175	175	175
Dual tandem (e.g., B-757)	400	400	400
Double-dual tandem (e.g., B-747)	900	885	900
Aircraft design group/approach speed category	V/D	V/D (winter only)	V/D
Effective gradient (%)	0.3883	0.2753	0.2504

Source: Airport Layout Plan and Federal Aviation Administration.

Table 1.3

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Instrumentation and Lighting Data

	Runway					
	6R	**24L**	**6L**	**24R**	**14**	**32**
Instrumentation						
Precision	X		X		X	
Non-precision	X	X	X	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				X
Approach Lighting						
ALSF-II	X					
MALSR			X			
ODALS					X	
PAPI	X		X		X	
VASI		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

Source: FAA 5010 and U.S. Terminal Procedures, 2002.

Table 1.4

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Published Approach Procedures

Name of Procedure	RWY	Weather Minimums by Aircraft Approach Category (a)			
		A (b)	B (c)	C (d)	D (e)
ILS (Category I)	6R	324' and RVR 1,800' or ½-mile visibility	(Same as A)	(Same as A)	(Same as A)
ILS (Category II and III)	6R				
Category II		224' and RVR 1,200' (depending on aircraft equipment and pilot certification) (a) (f) 274' and RVR 1,600' (depending on aircraft equipment and pilot certification) (b)	–	–	–
Category III A		Zero ceiling, RVR 700' (f)	–	–	–
Category III B		Zero ceiling, RVR 600' (f)	–	–	–
ILS (Category I)	6L	321' and RVR 2,400' or ½-mile visibility	(Same as A)	(Same as A)	460' and RVR 4,000' or ¾-mile visibility
VOR	6R	640' 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
NDB	6R	660' and RVR 4,000' or ¾-mile visibility	(Same as A)	660' and RVR 5,000' or 1-mile visibility	660' and 1½-mile visibility
ILS	14	344' and ¾-mile visibility	(Same as A)	(Same as A)	(Same as A)
MLS	6L	321' and RVR 2,400' or ½-mile visibility	(Same as A)	(Same as A)	(Same as A)
GPS	6R	600' and RVR 2,400' or ½-visibility	(Same as A)	(Same as A)	(Same as A)
GPS	6L	600' and RVR 2,400' or ½-mile visibility	(Same as A)	600' and RVR 4,000' or ¾-mile visibility	600' and RVR 5,000' or 1-mile visibility
GPS	14	420' and RVR 5,000' or 1 mile visibility	(Same as A)	(Same as A)	420' and RVR 5,000' or 1-mile visibility

ILS = Instrument landing system
RVR = Runway visual range
VOR = Very high frequency omnidirectional range
NDB = Non-directional beacon
ASR = Airport surveillance system

a) Weather minimums for precision approach procedures (e.g., ILS) are stated in terms of a decision height in feet 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 non-precision approaches (no electronic glide path information provided) are stated in terms of a minimum descent altitude (in feet above MSL) 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).
f) Weather minimums applicable to aircraft of all approach categories.

Source: U.S. Terminal Procedures, December 1998.

A charted visual approach procedure (the "Sustina River Visual") is published for Runway 14.

Approach Surfaces

In accordance with Federal Aviation Regulations (FAR) Part 77, approach surfaces established for the Airport are shown in **Table 1.5**.

Table 1.5

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

ANC Approach Surfaces

Runway	Approach Slope Ratio
14	50:1
32	20:1
6L	50:1
24R	20:1
6R	50:1
24L	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. No Air Traffic Control (ATC) procedures were developed, nor were evaluations made of obstructions during this portion of the study.

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, 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 Federal Aviation Administration (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 U.S. 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

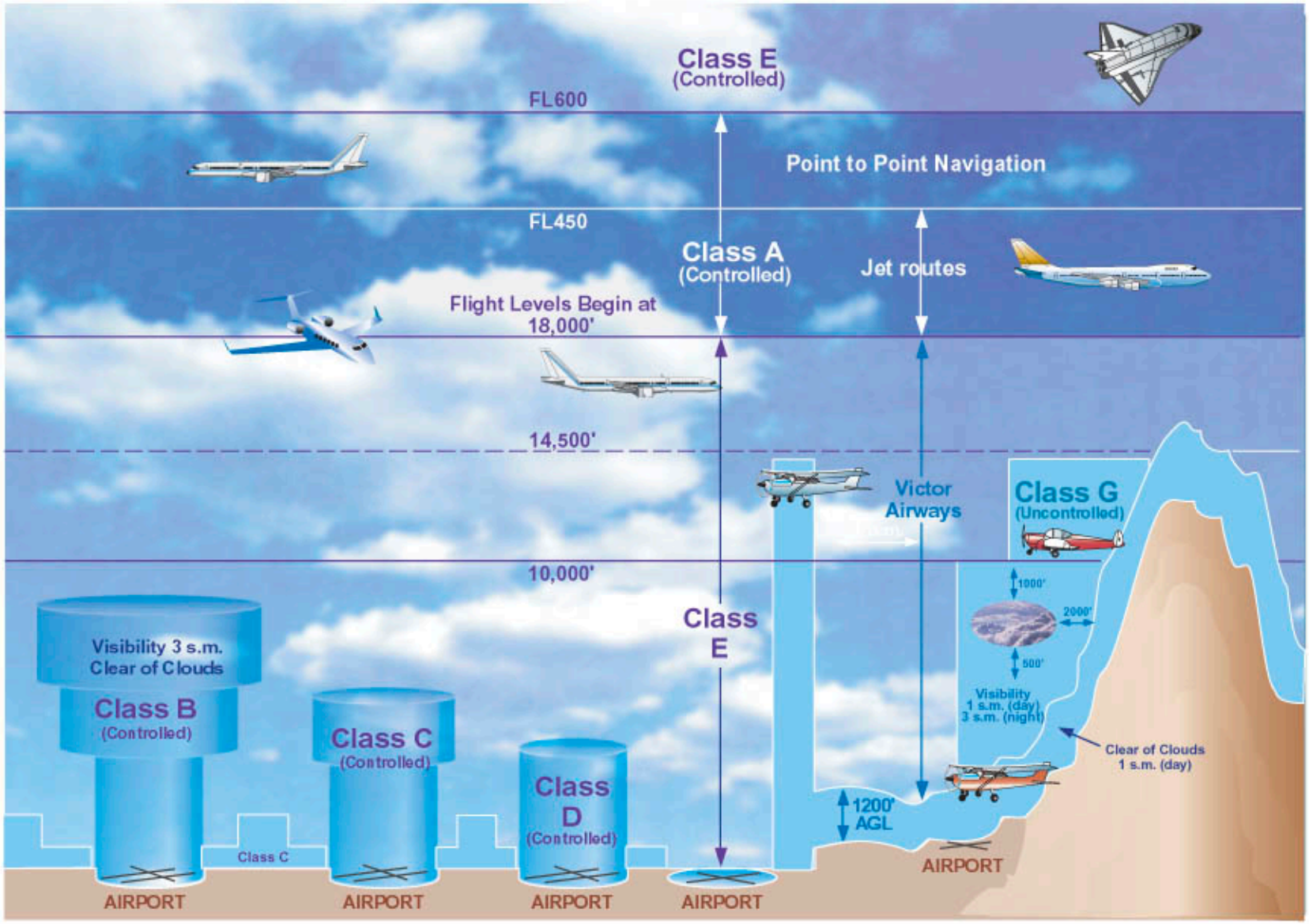
Airspace is currently classified as either controlled or uncontrolled. Controlled airspace is supported by ground-to-air communications, navigation aids (NAVAIDs), and air traffic services. In September 1993, the FAA completed an 11-month-long project to reclassify/redefine segments of the NAS. The new classifications and terminology, along with their relationship to the old classification system, are depicted in **Figure 1-3**.

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

FAA Airspace Classification

Figure 1-3



nautical miles of the coast of the 48 contiguous States).

- Class C airspace (formerly referred to as the Airport Radar Service Area (ARSA)) generally includes all airspace from the 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 core surface area that extends from the 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 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 the 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 the 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.

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 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 144 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 1,900 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 elevations of each facility's Class D airspace is 2,500 feet MSL, 2,500 feet MSL, and 3,000 feet MSL.

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 location of all airports with Class D airspace and their relationship to other airports' airspace areas are depicted in **Figure 1-4**. The Class D airspace for these facilities is active only during the operational hours of the three ATCTs identified earlier. 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 and is 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.

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.

Ted Stevens Anchorage International Airport

Anchorage Area Class D Airspace

Figure 1-4

0 — 50,000
SCALE IN FEET

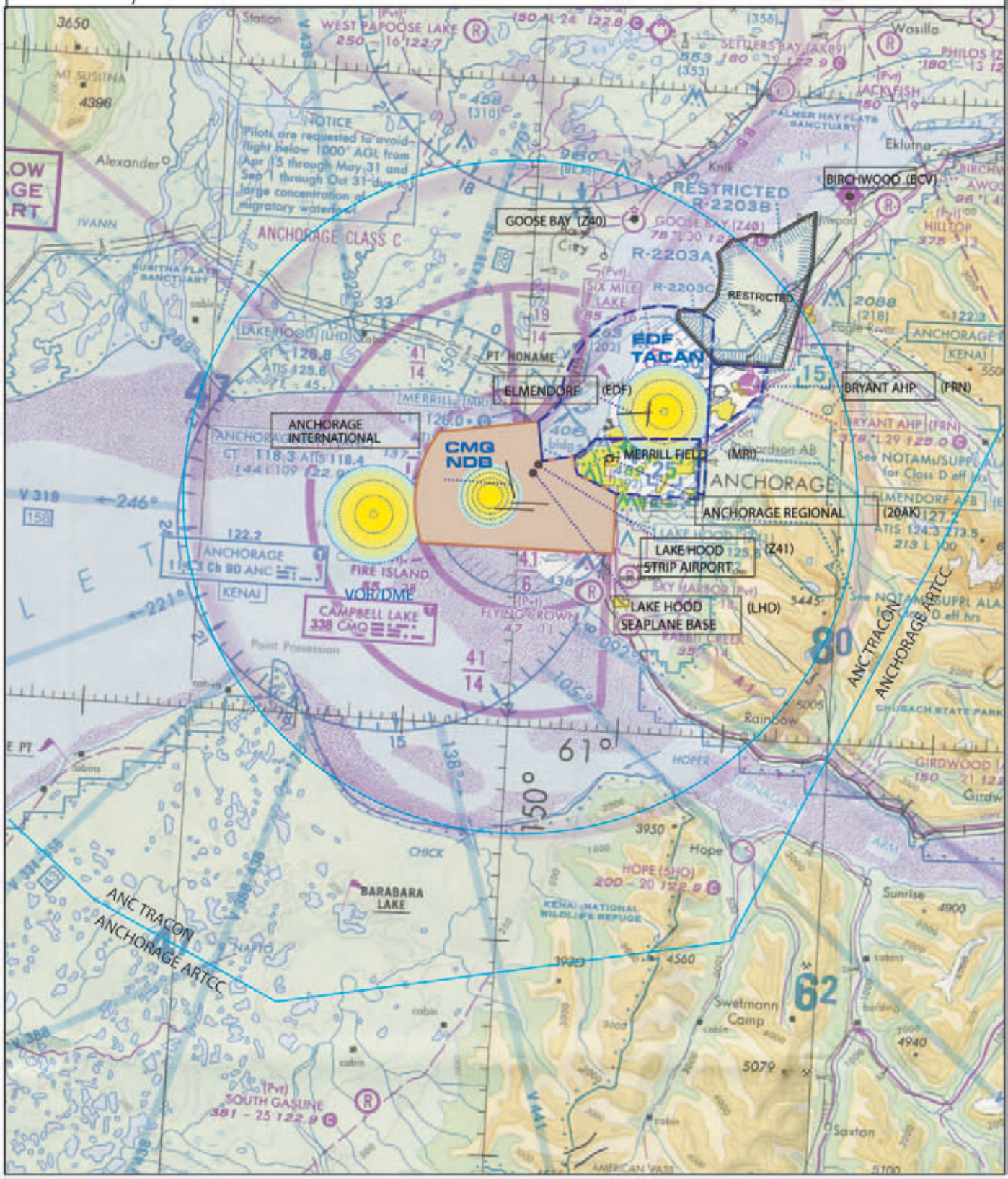
TRUE NORTH
MAGNETIC

BIRCHWOOD (BCV) — Airport without Precision Approach

ELMENDORF (EFD) — Airport with Precision Approach

ANC ATCT

BGQ VORTAC — VOR



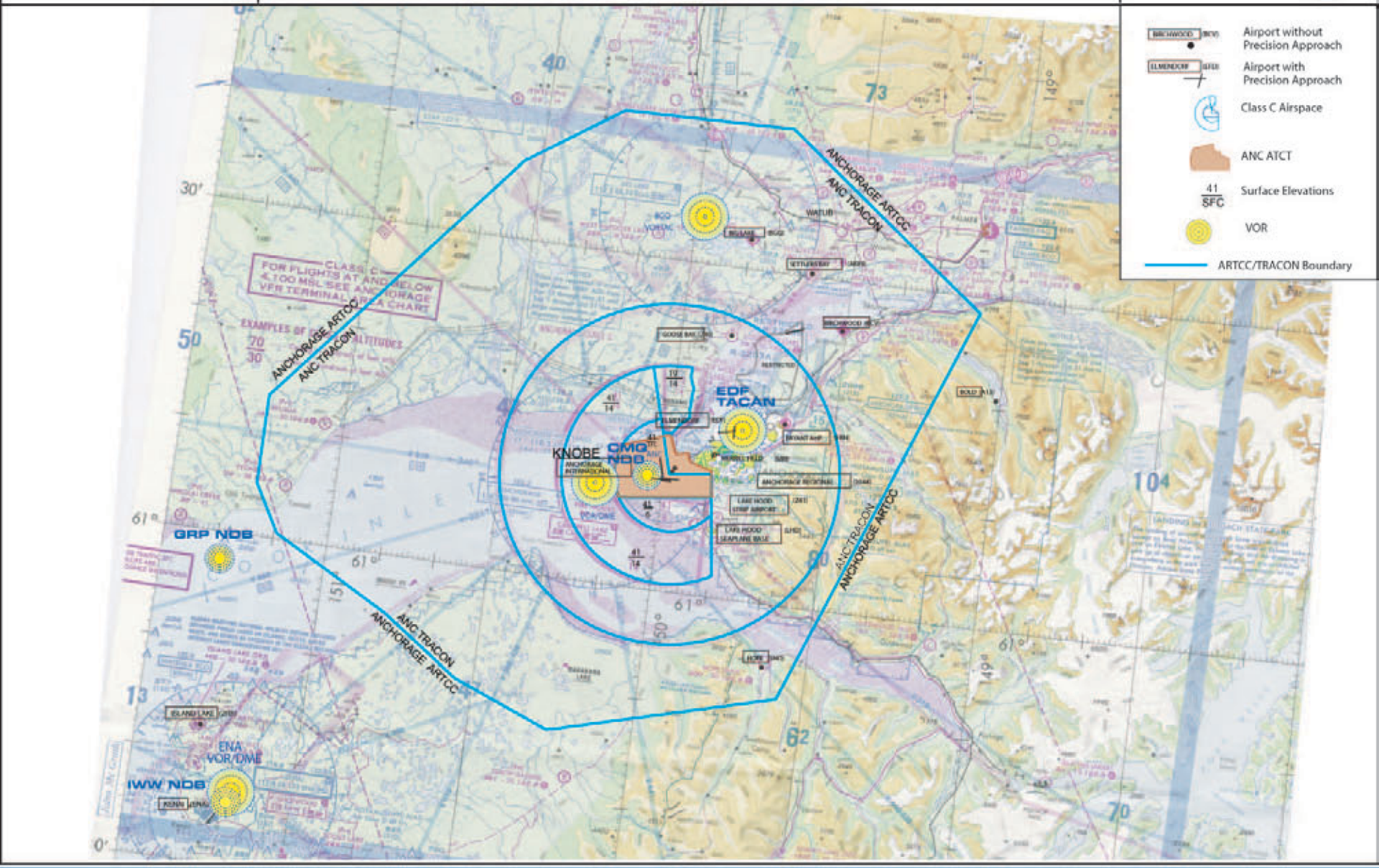
Ted Stevens Anchorage International Airport

Anchorage ARTCC/TRACON Airspace

Figure 1-5

0 — 50,000
SCALE IN FEET

TRUE NORTH — MAGNETIC



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 6L 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: Anchorage (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. All existing NDBs, VORTACs (VOR/Tactical Air Navigation), and low altitude Victor airways associated with ANC airspace are shown in **Figure 1-6**.

Neighboring Airports

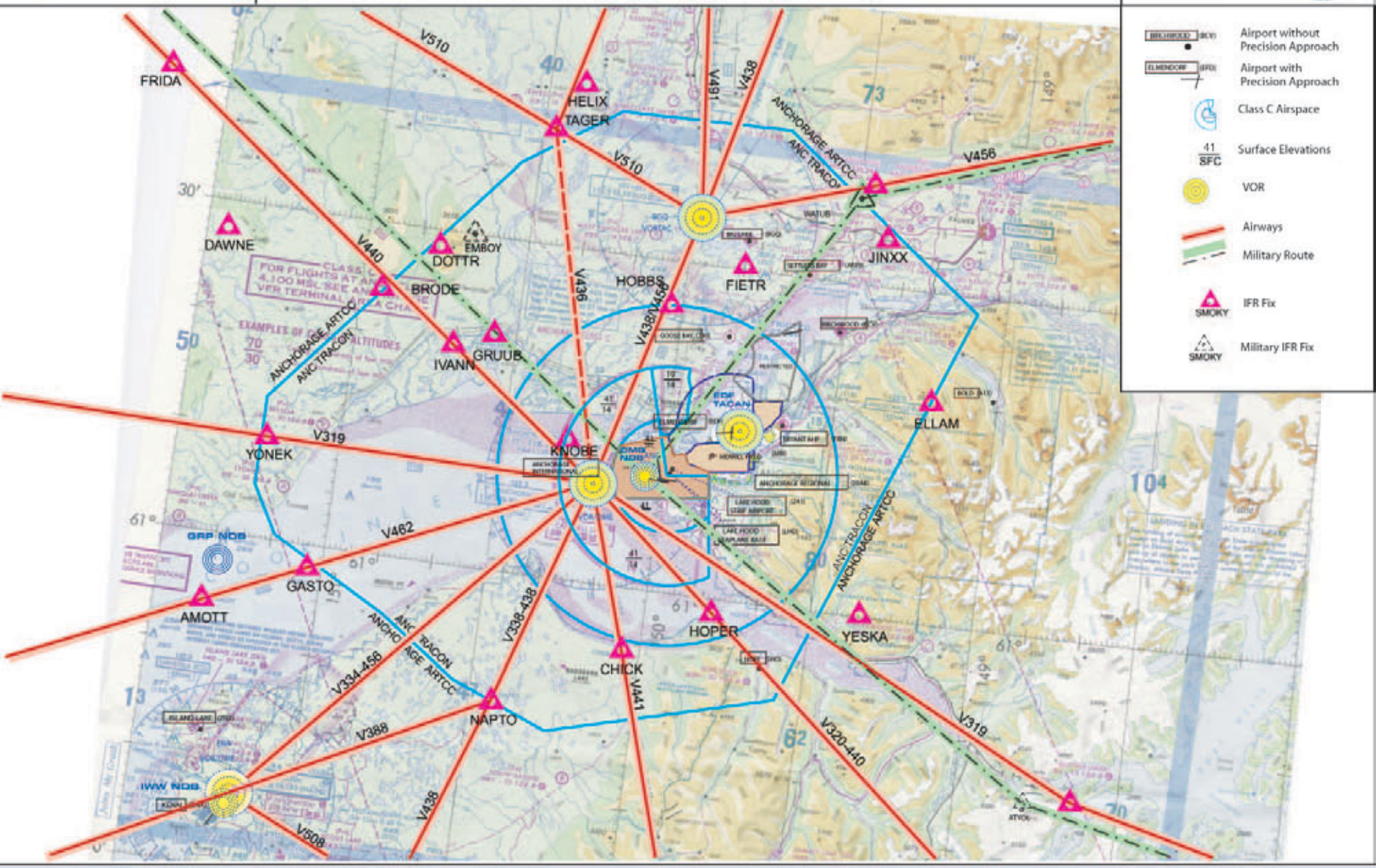
Figure 1-7 shows the 13 aviation facilities within 50 nautical miles of ANC. (One facility outside of this 50-mile arc is included because of the extent of airspace interactions.) **Table 1.6** lists these neighboring airports.

Table 1.7 lists the type of published precision and/or non-precision instrument approaches, if any, at each airport identified in Table 1.6. The far right-hand column of Table 1.7 identifies any known airspace conflicts/interactions associated with these approaches, relative to operations into ANC.

Existing NAVAIDS/Victor Airways

Figure 1-6

0 50,000
SCALE IN FEET



Ted Stevens Anchorage International Airport

Surrounding Public Airports

Figure 1-7

0 — 50,000
SCALE IN FEET

TRUE NORTH
MAGNETIC

BIRCHWOOD (BCV) — Airport without Precision Approach

ELMENDORF (EFD) — Airport with Precision Approach

Class C Airspace

41 SFC — Surface Elevations

BGQ VORTAC — VOR

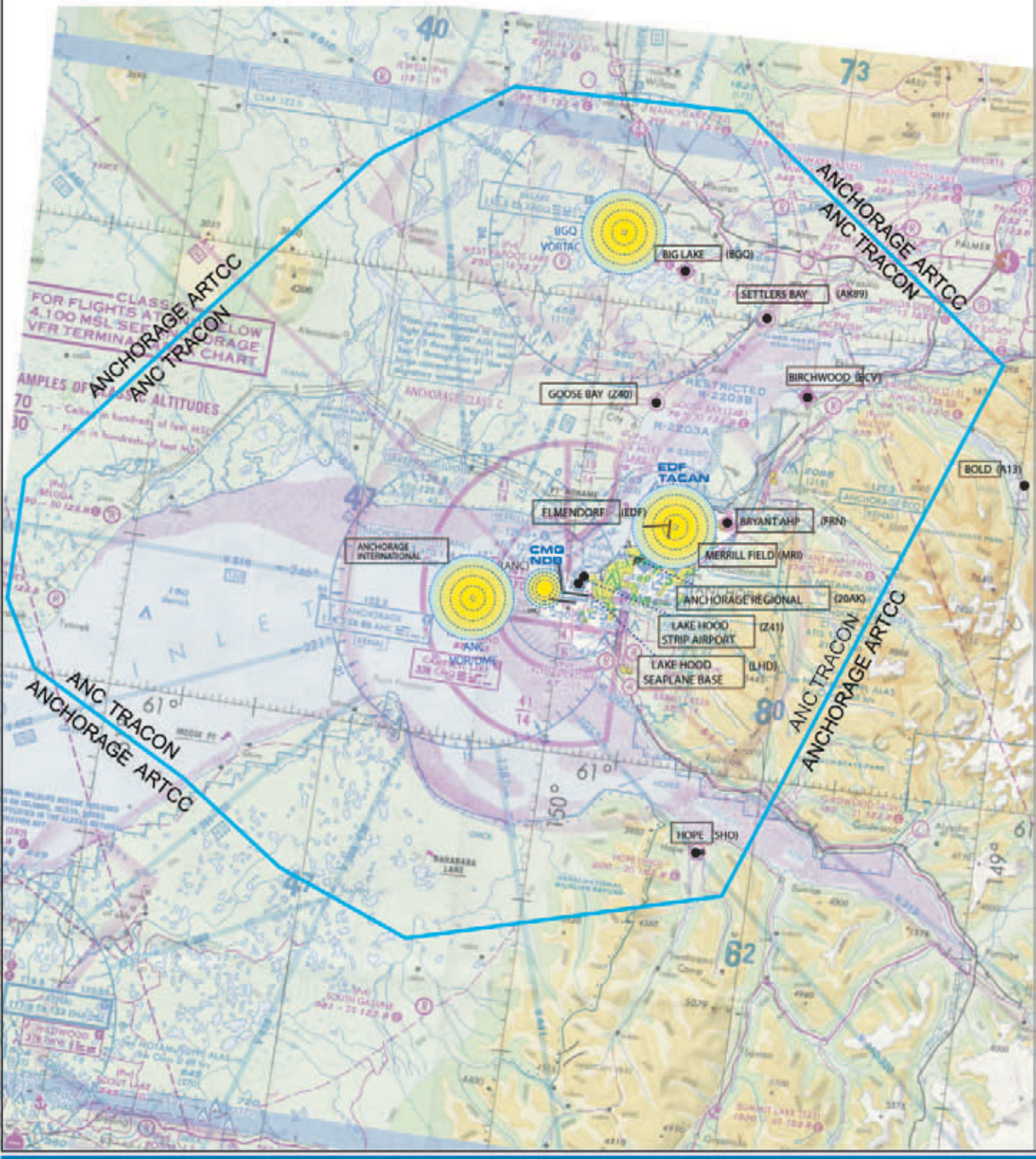


Table 1.6

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Neighboring Airports

Civil	Military
Lake Hood Seaplane Base (LHD)	Elmendorf Air Force Base (EDF)
Lake Hood Strip Airport (Z41)	Bryant Army Heliport and Airstrip (FRN)
Settlers Bay Strip Airport (AK49)	
Hope Airport (5HO)	
Kenai Municipal Airport (ENA)	
Alaska Regional Hospital Airport (20AK)	
Bold Airport (A13)	
Goose Bay Airport (Z40)	
Birchwood Airport (BCV)	
Big Lake Airport (BGQ)	
Merrill Field (MRI)	

Table 1.7

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Instrument Approaches at Neighboring Airports

Airport	Instrument Approach	Airspace Conflict
Civil		
Big Lake Airport	VOR or GPS Runway 6	
Birchwood Airport	Non-Precision	
Kenai Municipal Airport	ILS Runway 19 VOR/DME Runway 1 RNAV (GPS) Runway 1-19 HI-VOR/DME Runway 19 VOR Runway 19 NDB A	
Merrill Field	Precision Instrument Runway 6-24	
Military		
Elmendorf Air Force Base	HI-ILS Runway or TACAN 1 Runway 6 ILS 1 Runway 6 ILS 2 or TACAN Runway 6	

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 ACTC 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 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 five segments—Lake Hood, Anchorage International, Merrill, Campbell Lake and Six Mile Lake, and EDF—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 two basic rules outlined by FAR Part 93 for the Anchorage area:

1. Crossing Altitudes Across Knik Arm - Pilots are required to cross Knik Arm at certain altitudes, depending on the airport traffic segment in which they will be operating. These altitudes are mandatory to keep General Aviation (GA) traffic separated from traffic on the EDF Runway 6 final approach course.

2. Radio Contact with the Appropriate Control Tower - Pilots operating in an airport traffic segment below 3,000 feet are required to be in radio contact with the appropriate control tower for authorization to operate in that airport traffic segment. Radio contact with one tower does not constitute permission to fly in another control tower's segment.

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

ANC VFR 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).

MRL VFR Procedures:

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

- POTTER ARRIVAL—issued to aircraft arriving MRL from the south.

A graphical depiction of some of the requirements of FAR Part 93 for ANC is shown in **Figure 1-8**.

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.

Five 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 five 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.
- 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 north and west.
- MATSU FOUR ARRIVAL—for aircraft arriving from the northeast.

Other aircraft are brought into the Airport's airspace using one of seven Arrival Transition Areas (ATAs). Both the STARs and the ATAs are depicted in **Figure 1-9**. The STAR or ATA that an aircraft is directed through depends on which runway has been designated as the arrivals runway at ANC.

Table 1.8 lists clearance/instructions for arriving aircraft, as outlined in the LOA between the ANC ARTCC and the ANC TRACON.

For departing IFR turbojet aircraft, the FAA issues standard instrument departures (SIDs). There are three SIDs available for ANC departures—ANCHORAGE THREE, KNIK SIX, and TURNAGAIN TWO—and one SID for EDF departures—EAGEL ONE. In addition to these SIDs (usually utilized only by heavier and faster turbojet aircraft), 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. The four SIDs and seven DTAs (BIG LAKE, ELLAM, YESKA, SEWARD, KENAI, SPARREHVOHN, and NAPTO) are depicted in **Figure 1-10**.

Table 1.9 lists clearance/instructions for departing aircraft, as outlined in the LOA between the ANC ARTCC and the ANC TRACON.

Ted Stevens Anchorage International Airport

FAR Part 93 Segments

Figure 1-8

0 40,000
SCALE IN FEET

TRUE NORTH
MAGNETIC

BIRCHWOOD (BCV) Airport without Precision Approach
ELMENDORF (EFD) Airport with Precision Approach
41 SFC Surface Elevations
VOR
Class C Airspace
Visual Check Point

BIRCHWOOD
GOOSE BAY
GOOSE BAY (Z40)
KINK ARM
BIRCHWOOD (BCV)
RESTRICTED
BRIDGE
TWIN ISLAND LAKE
FIGURE EIGHT LAKE
MOUTH OF LITTLE SUSTINA RIVER
PT NONAME
SUBSTATION
ELMENDORF (EDF)
BRYANT SEGMENT
ELMENDORF SEGMENT
CLARK HI
BRYANT AHP
(FRN)
PT MACKENZIE
MOUTH OF SHIP CREEK
MULDOON ROAD
WEST HI
MERRILL FIELD (MRI)
PT WORONZOF
GOOSE LAKE
MERRILL SEGMENT
ANCHORAGE INTERNATIONAL
(ANC)
LAKE HOOD SEGMENT
PT CAMPBELL
ANCHORAGE REGIONAL (20AK)
ALASKA SEGMENT
POLAR TWINS
TUDOR BUS BARN
FIRE ISLAND
LAKE HOOD STRIP AIRPORT
(Z41)
CAMPBELL LAKE
LAKE HOOD SEAPLANE BASE
(LHD)
ANC VOR/DME
RABBITT CREEK
POTTER
PT POSSESSION

Ted Stevens Anchorage International Airport

Existing Standard Terminal Arrival Routes (STARs) and Arrival Transition Areas (ATAs) for ANC, EDF

Figure 1-9

0 50,000
SCALE IN FEET

TRUE NORTH
MAGNETIC

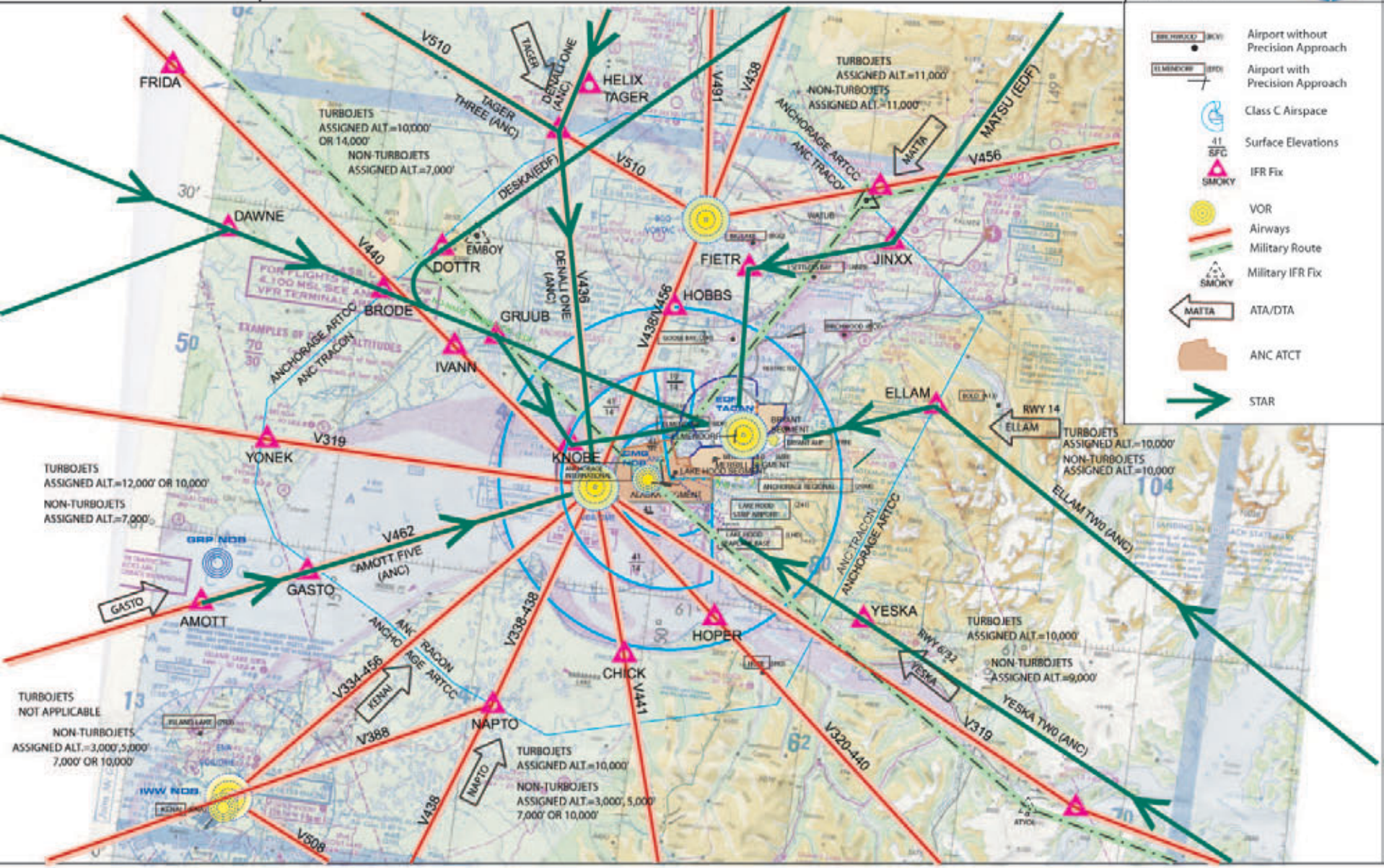


Table 1.8

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

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:
1. When A11 is utilizing 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.
2. At KTA, aircraft may use two of the noted altitudes without sequencing.
3. Headings shall be assigned that will keep the aircraft within the confines of the ATA. The individual headings need not be coordinated.
4. On top (OTP) is an acceptable altitude at any ATA.
5. Turbojets and non-turbojets shall be a minimum of 5 miles in trail.

Ted Stevens Anchorage International Airport

Existing Standard Instrument Departures (SIDs) and Departure Transition Areas (DTAs) for ANC, EDF

Figure 1-10

0 50,000
SCALE IN FEET

Table 1.9

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

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.

1. 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.
2. 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.
3. Aircraft filed westbound on V440, A1, or J111 may be cleared via the airway unless DESKA Letdown is active.
4. 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.
5. Aircraft filed northwest-bound on J133 may be cleared via the airway at all times.
6. All aircraft filed V319 eastbound at or below 13,000 feet shall be vectored via the SEWARD DTA.

Local Air Traffic Control Procedures

Runway Usage

Anchorage Runway Operating Restrictions. As summarized in **Table 1.10**, a preferential runway use system is in effect at the Airport as part of ANC's aggressive noise abatement program, which applies to all turbojet aircraft and aircraft with more than two 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.

For Runway 32, all turbojet departures not on a SID (see Figure 1-10) 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 SID. 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 PM and 7:00 AM. 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).

Table 1.10

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Preferential Runway Use Program (In Priority Order)

Operation	Daytime (0700-2200)	Nighttime (2200-0700)
Departures	1. Runway 32	1. Runway 32
	2. Runway 6R	2. Runway 24L
	3. Runway 6L	3. Runway 24R
	4. Runway 24L	4. Runway 6R
	5. Runway 24R	5. Runway 6L
	6. Runway 14	6. Runway 14
Arrivals	1. Runways 6R/6L/14	1. Runways 6R/6L/14
	2. Runway 32	2. Runway 32
	3. Runways 24L/24R	3. Runway 24L/24R

Source: Airport Bulletin 2000-16 (August 1, 2000).

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 6R-24L. This restriction also applies when Runway 32 departures are leaving the approach end (Taxiway K). When Runway 6L-24R 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 6L-24R. When a heavy jet 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 6R-24L or Runway 6L-24R.

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 1.11**.

Table 1.11

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Departure Headings

Rwy	Turn Restrictions
24R/24L	RT (RH to 025)
	LT (RH to 120)
6R/6L	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 6R, 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 spacing to allow for simultaneous precision instrument approaches in all weather conditions. They are also too close to allow IFR departures on one runway, which is independent of IFR arrivals on the other parallel runway. 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 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. Point McKenzie is shown in **Figure 1-11**. 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 and timing are summarized below. This summary is presented for information purposes only, as firm commitments have not been made for the improvements.

Planned Improvements

- Runway 32
  - PAPI
- Runway 24R
  - PAPI
- Airport (timing uncertain for some systems)
  - Upgrade ASDE with AMASS
  - Replacement ASR 8 with ASR 11
  - LLWAS
  - ASOS
  - AWIS

PAPI = Precision Approach Path Indicator
AWOS = Automated Weather Observing System
ASDE = Airport Surface Detection Equipment
AMASS = Airport Movement Area Safety System
ASR = Airport Surveillance Radar
LLWAS = Low Level Wind Shear Alert System
ASOS = Automated Surface Observation System
AWIS = Automated Weather Information System

1.2.2 Passenger Terminal Complex

The 152-acre passenger terminal complex supports two passenger terminals and their associated aircraft parking aprons, curbsides, public and employee parking areas, and car rental and return facilities of the on-airport car rental companies. The passenger terminal complex is illustrated in **Figure 1-12**. An additional area of about 12 acres in the adjacent East Airpark accommodates the maintenance and storage functions of the car rental companies, plus a privately operated public parking facility.

Table 1.12 lists the scheduled air carriers providing passenger service at ANC.

Table 1.13 lists all-cargo operations conducted or serviced (primarily fueling) at the terminal complex.

Aircraft Parking Apron

There are 41 designated gates at the two airline passenger terminals, including 30 air carrier gates and 6 commuter gates; 8 of the air carrier gates are at the North Terminal, and some of the commuter gates provide access for more than one aircraft parking position. The existing gate assignments, gate types, and maximum aircraft sizes that can be independently accommodated at each gate are identified in **Table 1.14**.

Ted Stevens Anchorage International Airport

Areas of Potential Airspace Conflicts

Figure 1-11

NOT TO SCALE

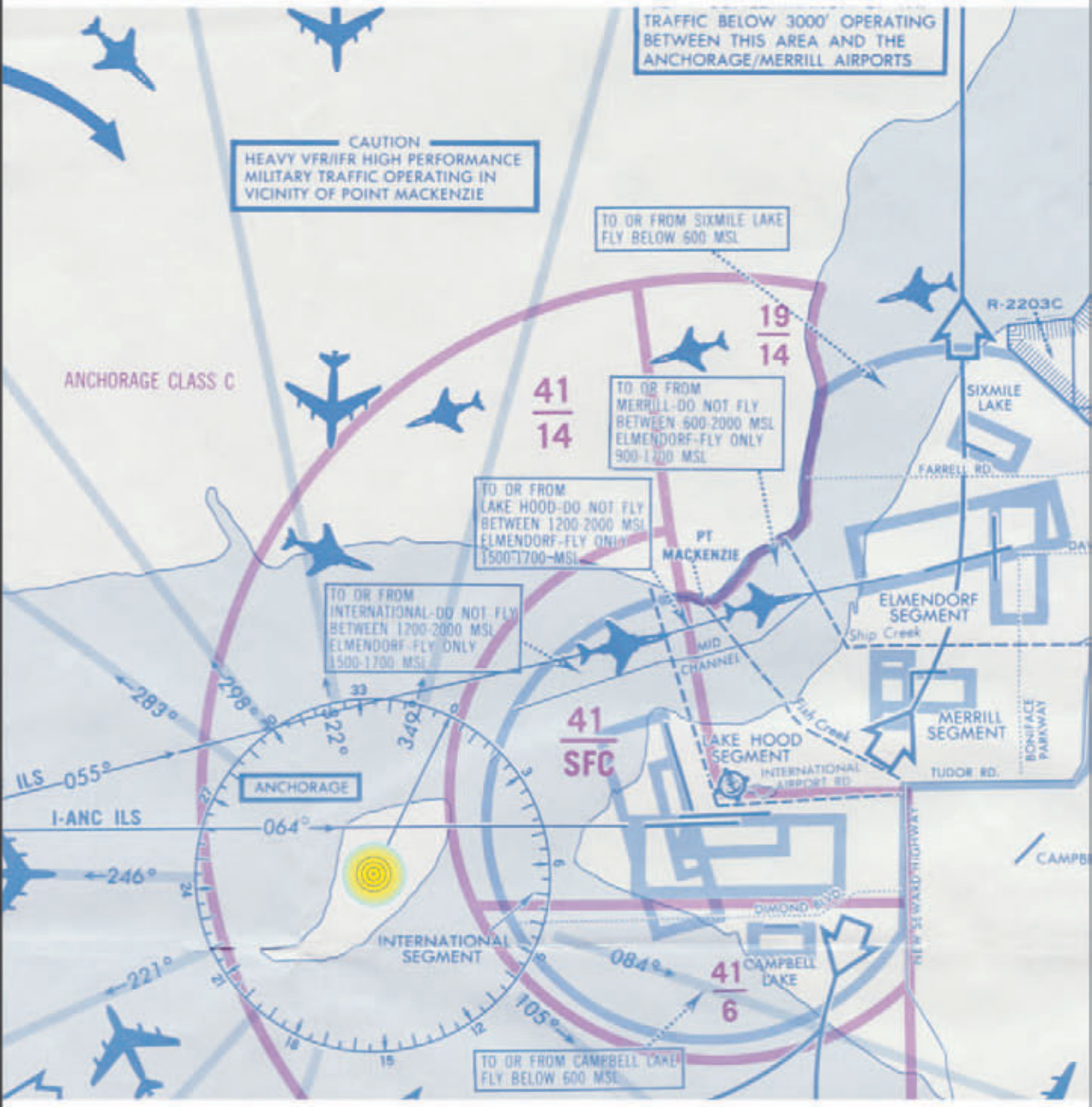
BIRCHWOOD (BCV) — Airport without Precision Approach

ELMENDORF (EFD) — Airport with Precision Approach

Class C Airspace

41 SFC — Surface Elevations

BGQ VORTAC — VOR



NOTE: LAKE HOOD PLANS ARE SHOWN ON THE LAKE HOOD ALP.

(UE) ULTIMATE 200' X 11,584'
TAXIWAY Y (UNDER CONSTRUCTION)
POINT WORONZOF DRIVE
RUNWAY VISIBILITY ZONE
ARFF
FUEL FARM
ARFF STATION NO. 2 (TBR)
FUELING APRON
NORTH TERMINAL
TERMINAL APRON
AIRCRAFT PARKING
AIRCRAFT PARKING APRON
ATCT
(UNDER CONSTRUCTION)
SOUTH TERMINAL
BUILDING RESTRICTION LINE
CONCOURSE B
CONCOURSE A
RUNWAY VISIBILITY ZONE
PARKING GARAGE
TIE-DOWN LOT C
TIE-DOWN LOT B
TIE-DOWN LOT A
DE HAVILLAND AVE.
POSTMARK DR
AIRCRAFT DRIVE
PUBLIC PARKING LOT B
LOT C
LOT D
LOT E
LOT F
LOT G
LOT H
INTERNATIONAL AIRPORT ROAD
LAKESHORE DR
Civil Air Patrol
United States Government
ULTIMATE TOUR BUS PARKING
Alaska DOT & Public Facilities
ULTIMATE SNOW DISPOSAL
Alamo
Avis
Alaska DOT & PF
FAA
Cargo Buildings
WEST 50TH AVE.
Budget
National
Petrolium Testing Service
Dyn Air
Warehouse
Offices
Hertz
Alaska Airlines
Whitney Foods
Warehouses
Warehouse
Restaurant
OLD INTERNATIONAL AIRPORT ROAD
FAA office
Office Building
FAA Hangar
Reeve Aleutian Airlines
SOUTH AIRCRAFT DRIVE
Northwest Air Cargo
Alaska Airlines
Northern Air Cargo
Delta Airline
T/W R
T/W V
T/W M
T/W E
T/W L
T/W Y
T/W K
T/W H
T/W G
T/W D
T/W C
T/W B
T/W F
470'
600'
500' TYP.
800' TYP.
RSA
ROFA
BRL
PAPI
REIL
EL. 115
DISPLACED THRESHOLD
888'
EL. 121
LAT. 61° 10' 11.15"
LON. 150° 00' 30.00"
LAT 61°10'18.339"
LON. 149°59'55.937"
EL. 115
DEPARTURE POINT BY REQUEST
BLAST PAD 280' X 500'
LAT. 61°10'04.37"
LON. 149°58'21.53"
EL. 94
150' X 10,600' RUNWAY N 89°53'21" E (TRUE)
150' X 10,900' RUNWAY N 89°53'21" E (TRUE) ULTIMATE 200' X 10,900'
RVR
VASI-6
RVR(TBR)
COMPASS RAD
WINDSOCK
LOCALIZER
LOCALIZER BUILDING
WEST PERIMETER ROAD
ARFF TRAINING AREA
HEL
606'
700'
400'
537.5'
508'
705'
60'
200'
800' TYP.

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FAA, AIRPORT DIVISION
ALASKA, REGION AAL-600
PREVIOUS ALP
FAA APPROVAL DATE 9/01

0' 300' 600'
Scale in Feet

PLANS DEVELOPED BY:
The HNTB Companies

BY	DATE	CHANGED

REVISIONS

EXISTING TERMINAL COMPLEX

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

Ted Stevens Anchorage International Airport

APPROVED

MARYELLEN TUTTELL, AICP — AIRPORT PLANNING MANAGER

DESIGNED	DRAWN
RVW	RVW
CHECKED	DATE
JSM	JUNE 24, 2002

FIGURE 1-12

Table 1.12

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Scheduled Air Carriers Providing Passenger Service

DOMESTIC	INTERNATIONAL
Passenger Operations	**Passenger Operations**
Alaska Airlines	Asiana Airlines*
America West	Cathay Pacific Airways*
American Airlines	China Airlines
Continental Airlines	Eva Air*
Delta Air Lines	Korean Air
Era Aviation	* indicates transit only
Frontier Flying Service	
Grant Aviation	**Passenger Charters**
Northwest Airlines	Aeroflot
Peninsula Airways	Balair
United Airlines	Condor
	Japan Air Charter
Passenger Charters	
Hawaiian Airlines	
Sun Country	

Source: ANC web site, April 2002.

Table 1.13

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

All-Cargo Operations Conducted or Serviced at the Terminal Complex

Domestic	International	Charter
Air Cargo Express	Air China	American International Airlines
Alaska Central Express	Air Hong Kong	Emery Worldwide Airlines
Alaska Airlines	American Transair	Gemini
Empire Airlines	Asiana Airlines	Malaysia Airlines
Era Aviation	Atlas Air	Martinair
Lynden Air Cargo	Cathay Pacific Airways	
Northern Air Cargo	China Airlines	
	Eva Air	
	Evergreen International Airlines	
	FedEx	
	Japan Airlines	
	KLM Royal Dutch Airlines	
	Korean Air	
	Nippon Cargo Airlines	
	Northwest Air Cargo	
	Polar Air Cargo	
	Singapore Airlines	
	United Parcel Service	

Source: ANC web site, April 2002.

Table 1.14

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Existing Airline Gate Inventory

Position No.	Designation	Design Aircraft	Gate Use
A5	Airport administered	737-300	Passenger
A6	Preferential-Alaska	737-300	Passenger
A7	Preferential-Northwest	DC-10-30/40	Passenger
A8	Preferential-Alaska	DC-10-30/40	Passenger
A14	Airport administered	-	Passenger
A15	Preferential-Frontier	-	Passenger
B1	Preferential-Alaska	737-900	Passenger
B2	Preferential-Alaska	737-900	Passenger
B3	Preferential-Alaska	737-900	Passenger
B4	Preferential-Alaska	757-200	Passenger
B5	Preferential-Alaska	757-200	Passenger
B6	Preferential-Alaska	767-300	Passenger
B7	Preferential-Alaska	767-300	Passenger
B8	Preferential-United	747-400	Passenger
B9	Preferential-Northwest	757-200	Passenger
B10	Preferential-United	747-400	Passenger
L1	Preferential-Pen Air	-	Passenger
L2	Preferential-ERA	-	Passenger
N1	Preferential-Delta	747-300	PAX, Cargo
N2	Airport administered	747-300	PAX, Cargo
N3	Preferential-Delta	747-300	PAX, Cargo
N4	Airport administered	747-300	PAX, Cargo
N5	Airport administered	747-300	PAX, Cargo
N6	Airport administered	747-300	PAX, Cargo
N7	Airport administered	747-300	PAX, Cargo
N8	Airport administered	747-300	PAX, Cargo
R1A	Airport administered	757	Cargo, Fuel
R2	Airport administered	747-400	Cargo, Fuel
R2A	Airport administered	757	Cargo, Fuel
R3	Airport administered	747-400	Cargo, Fuel
R4	Airport administered	747-400	Cargo, Fuel
R4A	Airport administered	757	Cargo, Fuel
R5A	Airport administered	757	Cargo, Fuel
R6A	Airport administered	757	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	Group VI	Cargo, Fuel
R13	Airport administered	Group VI	Cargo, Fuel
R14	Airport administered	747-400	Cargo, Fuel

Source: Ted Stevens Anchorage International Airport

In addition, there are 11 remote hardstands (aircraft parking positions) located between the North and South Terminals for fueling or overnight aircraft parking. Currently, three more hardstands are under construction. Each of the air carrier hardstands are equipped with aircraft fueling pits served by a fuel hydrant system extending through the fuel farm. There are six additional Airport-owned hardstands in the North Airport near the UPS leasehold. UPS has preferential use of four of these hardstands.

Passenger Terminal Buildings

The main passenger-processing facilities are located in the North and South Terminals, which are separated by approximately 1,300 feet along the west side of Satellite Drive. The South Terminal accommodates domestic scheduled air carrier, commuter, and charter operations, while the North Terminal accommodates international scheduled air carrier and charter operations. During the construction of the Terminal Redevelopment Program, Delta will operate from the North Terminal.

The South Terminal is a 2-story structure with a mezzanine floor. The South Terminal serves three passenger-boarding concourses. The ground level of the terminal building contains baggage handling, baggage claim, and public lobbies. The second level contains airline ticketing functions, passenger security screening, primary concession facilities, and passenger holdrooms. The mezzanine level contains offices for Airport staff, airlines, and other Airport tenants.

The three passenger concourses in the South Terminal are designated as Concourses A, B, and C. Concourse A is a 2-story structure, opened in 1985, which serves six narrow-body and eight commuter gates. The ramp level contains airline operations space and commuter passenger holdrooms for Gates A10through A15. The second level contains passenger holdrooms for air carrier Gates A1 through A8 and airline office space.

Concourse B is a 2-story structure that serves a total of 11 narrow-body and wide-body gates. The ramp level contains airline operations, concession support, and baggage handling space. The second level contains passenger holdrooms and secondary concession areas.

Concourse C is currently under construction. When completed, it will have 9 airline gates.

The rental car counter area in the South Terminal is located below the main access roadway and is accessible from corridors under the roadway connecting the main terminal lobbies to the parking garage.

Table 1.15 shows the approximate current allocation of floor space in the South Terminal.

Table 1.15

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

South Terminal Space Allocation

	Area (square feet)	Percentage
Public space	120,187	36%
Airline space	128,210	38%
Concessions	34,057	10%
Other space(a)	54,843	16%
Total	**337,297**	**100%**

(a) Includes Airport and State of Alaska office space, mechanical and building-support spaces, baggage tug drives, and non-public circulation.

Source: DOT & PF.

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 and a Federal Inspections Facility (FIS) at the end closest to the terminal building for the clearance of arriving international passengers entering the U.S. 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. The uppermost level accommodates 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 1.16 shows the approximate current allocation of floor space in the North Terminal.

Table 1.16

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

North Terminal Space Allocation

	Area (square feet)	Percentage
Public space	43,950	16%
Airline space	87,700	32%
Concessions	39,750	15%
Other space (a)	100,100	37%
Total	**271,500**	**100%**

(a) Includes Airport and State of Alaska office space, mechanical and building-support spaces, baggage tug drives, non-public circulation, and Federal areas for Customs and INS.

Source: Leigh Fisher Associates, Master Plan Update Ted Stevens Anchorage International Airport, June 1996.

Planned Facilities

In 1997, the Governor of the State of Alaska announced a capital development program known as "Gateway Alaska." The initiative recognized the increasing growth in domestic and international passengers and the State's importance in the global cargo market. Expansion of the terminal and other facilities is expected to displace certain cargo fueling areas, gates, and overnight parking positions, thereby adding urgency to the need for cargo facility and apron area improvements. The Terminal Redevelopment Program is described below.

The Gateway Alaska program will fund a portion of the renovation and expansion of the Airport's domestic terminal and other airside and landside improvements. A primary objective of Gateway Alaska is to improve highway access to the Airport through a series of programmed and planned improvements along International Airport Road.

The preliminary design indicates the overall size of the South Terminal will increase from the existing 337,297 square feet to 759,909 square feet. This addition of space will increase efficiency within the terminal and reduce delays. The terminal will be reconfigured to place most of the additional usable space in the areas that are currently most deficient. The preliminary design calls for widening the ticket lobby and baggage claim areas to the west and extending them northward about 300 feet.

The design also provides new aircraft gates and gate lounges, which will provide a net gain over the total number of gate lounges that exist today in the core terminal and in Concourses A, B, and C. Jets park at the terminal (each jet is generally associated with one gate lounge on the second level) for

boarding through a jetway. The smaller regional aircraft park near the terminal, and passengers walk from ground-level gates to board the aircraft. One gate lounge can serve approximately three regional aircraft parking positions. The project proposes five new jet gates and five accompanying gate lounges, as well as new gate lounges to serve seven new parking areas for regional aircraft. This would bring the total number of gates and gate lounges associated with jets to 24, up from 19 today. The total gate lounge space for regional aircraft would be an amount adequate to serve 20 aircraft parking positions (approximately seven gate lounges).

There are several interrelated airside elements that may be grouped as follows:

- Repaving the apron adjacent to the terminal.
- Replacing cargo aircraft fueling areas.
- Demolishing two old fire stations no longer used for emergency response.

Immediately adjacent to the reconfigured terminal will be a continuous concrete apron extending approximately 250 feet into the airfield and running the full length of the South Terminal. Some concrete already exists in this area. Under the proposed project, concrete will replace asphalt in this area to provide adequate support for parking heavy jet aircraft. Subsurface fuel lines and surface hydrants will be installed for fueling passenger aircraft as part of this paving element.

An area just west of Concourse C, currently a refueling apron for Boeing 747-type cargo aircraft, consists of three concrete "hardstands" on which jets park for refueling from hydrants. This area is being reconstructed to provide overnight parking for up to five Boeing 757-type passenger jets. Because the hydrants and fuel lines already exist in this area, they will be maintained if possible. Retaining the hydrants will allow this apron to be used to refuel cargo aircraft when not in use by passenger jets.

The entire area north of Concourse B and west of Concourse C, approximately 33 acres, will be repaved with new asphalt, except for the areas noted previously, which will be paved with concrete. The asphalt area will be used primarily for aircraft maneuvering, as it is today. This area includes routes on which to operate tractors, tugs, and trucks that support aircraft and airport operations. An additional area off the south end of Concourse A will be repaved and re-striped, which will provide regional aircraft a second taxilane for simultaneous two-way traffic.

Because the entire area is currently paved and drainage systems are in place, none of the repaving elements is anticipated to involve new drainage work.

The project includes a new asphalt apron, approximately 875 feet by 1,750 feet with five concrete hardstands on which to park aircraft. The apron, which includes 10 fueling hydrants, will be constructed near the Airport fuel storage tanks to accommodate five Boeing 747-type aircraft. This area is just west of the north-south runway off the western end of Taxiway L. The new apron will include underground fuel lines that will supply fuel to the surface hydrants. In addition, the new apron will likely include subsurface storm drains and perimeter ditch drainage that will direct runoff to an established subsurface storm drain that discharges to an open channel, which in turn discharges to Cook Inlet on the western edge of the Airport.

Fire Stations

Fire Stations No. 1 and No. 2 (no longer used as fire stations) will be demolished. Fire Station No. 1, a concrete block building that sits off the south end of Concourse A, will be demolished to allow FAA-standard wingtip clearance for the second taxilane that will be added in this area. Fire Station No. 2 is a similar building that lies between Taxiway K and the fuel tank facility west of the north-south runway. Fire Station No. 2 will be demolished—along with a hill, approximately 40 feet high, on which it sits—to make room for the new fueling apron and to improve the line-of-sight from the ATCT to Taxiway K. Previous ANC projects have lowered and leveled the land around the "hill," creating the single knob on which Fire Station No. 2 sits.

North Terminal

Most improvements are minor code upgrades and cosmetic in nature. A current study is underway that will address the realignment of gates for 747-400s, which could include new jetways and modifications to holdrooms.

1.2.3 Ground Access and Parking

This section describes the roadway and parking facilities serving ANC.

Terminal Curbside Roadways

The South Terminal is served by ground-level and second-level curbside roadways. The second-level (enplaning) curbside roadway consists of four travel lanes and approximately 540 feet of curbside frontage for passenger dropoff by private and commercial vehicles. The ground-level (deplaning) curbside roadway consists of three travel lanes and approximately 540 feet of curbside frontage for passenger pickup by private vehicles. An additional 4-lane, ground-level commercial roadway is located between the terminal building and the parking garage, providing loading spaces for commercial vehicles, including courtesy vehicles, taxicabs, tour buses, limousines, and public transit. A passenger waiting shelter is provided on a pedestrian island adjacent to the commercial roadway. Pedestrian access to the waiting shelter is by escalator and elevator from the underground Transportation Lobby, which connects the South Terminal lobbies to the parking garage.

The North Terminal is served by a ground-level curbside roadway consisting of three travel lanes and approximately 300 feet of curbside frontage for both dropoff of enplaning passengers and pickup of deplaning passengers. Commercial and private vehicles share this curbside roadway.

Both the upper- and lower-level curbside areas experience congestion and are generally less than adequate with regard to passenger convenience and level of service. The upper-level curbside, in particular, is prone to congestion, mostly at the initial section of the terminal frontage. This congestion causes considerable passenger and baggage activity on active traffic lanes and impairs vehicular access to the subsequent sections of the frontage. Congestion at the lower level is less problematic. However, congestion does occur, mostly due to the relatively few building exits available and drivers' preferences to park close to these exits.

Parking Facilities

Several public, employee, and rental car parking facilities are provided in the terminal area. An inventory summary of parking spaces is provided in **Table 1.17**.

Table 1.17

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Inventory of Existing Parking Spaces

	Number of Spaces by Parking Category			
Parking Location	**Public**	**Employee**	**Rental car**	**Total**
Parking garage	1,135	--	65	1,200
Surface Lots				
A	--	155	--	155
B	200	--	--	200
C	--	182	--	182
D	--	336	--	336
E	--	189	--	189
F	200	--	--	200
G	275	--	73	348
H	500	--	--	500
I	--	229	--	229
Total	**2,310**	**1,091**	**138(a)**	**3,539**

(a) Approximately 50 spaces in Lot G are made available for public use by conversion of car rental spaces during the peak summer months.

Source: Leigh Fisher Associates, December 1992, based on information supplied by ANC staff.

Public Parking

Approximately 2,260 public parking spaces are available in the terminal complex. The parking garage adjacent to the South Terminal provides 1,135 spaces for the public. A surface lot located east of the parking garage (Lot H) provides 500 spaces. Approximately 299 spaces are provided next to and east of the North Terminal (Lot B). The remaining 424 spaces are in Lots F and G. Shuttle buses transport passengers between the North and South Terminals and parking lots.

Several privately operated Airport parking facilities are also available. These operators include Park & Fly (625 spaces), Thrifty (500 spaces), Super 8 Motel (150 spaces), and Alamo Rental Car (115 spaces).

Employee Parking

Employee parking is provided in four surface lots, with a total of 902 parking spaces. The largest employee parking area (Lot D), which contains 336 spaces, is located near the FAA Control Tower.

Rental Car

Rental car ready-and-return spaces are adjacent to the parking garage in Lot G (73 spaces) and on the first level of the parking garage (65 spaces). The rental car quick turnaround service areas and overflow parking areas are located along West 50th Avenue in the East Airpark.

Staging Areas

Tour bus staging is provided in four parallel parking spaces along an auxiliary lane of the approach roadway to the South Terminal.

Additional tour bus staging is provided adjacent to Parking Lot E.

In addition to the seven taxicab pickup locations along the commercial vehicle roadway, staging for four taxicabs is available along a turnout located 75 feet ahead of the terminal curbside frontage. Additional taxicab staging for 18 vehicles is located adjacent to Parking Lot E.

Planned Improvements

The following are four primary landside elements of the Gateway Alaska Program are all interrelated:

- The one-way terminal approach and departure roads and the return-to-terminal loop have been realigned.
- Postmark Drive has been realigned creating a new intersection. There are plans for an eventual interchange at Postmark Drive and International Airport Road.
- Terminal parking has been consolidated inside the roadway loop.
- Pedestrian and bicycle routes have been provided.

The elevated road that serves as a curbside passenger drop-off area was retained and extended more than 500 feet northward. This extension required removing the ramp that leads to the elevated road section and replacing it with a new ramp. Moving the ramp required entirely reconfiguring the approach road. ANC also improved the road departing the terminal and the cut-off that allows drivers to return to the terminal. The lower-level baggage-loading curbside area has been extended northward.

Postmark Drive traffic (including North Terminal traffic) is now routed off International Airport Road before International Airport Road splits into separate one-way roads for terminal approach and departure. This created a new four-way intersection, with Postmark Drive connecting to South Aircraft Drive. It allows traffic bound for the terminal to flow freely except when a car pulls up and needs to cross. The intersection will include a free-flowing right turn for westbound traffic turning onto Postmark Drive. Phase 2, which is anticipated to be implemented within the 20-year life of the road system, will be a grade-separated interchange with free-flow conditions in both directions for both International Airport Road and Postmark Drive traffic.

South Terminal employee and public parking has been consolidated inside the terminal loop roads. Rental car parking is also accommodated inside the terminal loop. The existing facilities for generating metered-parking ticket stubs and paying for parking was retained. Pavement inside the loop is re-used for internal circulation and parking to the maximum extent possible.

The existing bicycle and pedestrian trail along International Airport Road was replaced with a trail along the new segment of Postmark Drive. The trail continues to the western side of Postmark Drive. A trail leads to the South Terminal, while the main route continues to the North Terminal and beyond to connect with broad shoulders along the northern end of Postmark Drive. Sidewalks and pedestrian circulation routes inside the terminal approach and departure roads are clearly marked and supplemented with shuttle buses.

Public transit is proposed to begin servicing the Airport passenger terminals in 2003. Currently, transit is available to the edge of

the Airport on Jewel Lake and Spenard Roads.

The Alaska Railroad Corporation (ARRC) is currently constructing a passenger terminal at ANC near the South Terminal. The facility is expected to facilitate transfer of cruise ship passengers from the Port of Seward and will provide another transportation alternative fore residents and visitors traveling to the Airport. The passenger terminal is expected to be operational in early 2003.

Regional Access Roadways

International Airport Road is a 4-lane controlled access highway providing primary access to the Airport from the east. At the Airport, the road transitions to the loop roadways serving the curbsides and parking areas at the North and South Terminals and provides access to roads in the LHD area.

Access from the north is provided via West Northern Lights Boulevard, which is a 2-lane minor arterial running east-west and parallel to the shore of Cook Inlet. However, east of Wisconsin Street, the roadway becomes a 4-lane facility with center turn lanes at some locations. Heavy truck traffic is prohibited on the roadway through an MOA posted weight limit.

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 and connecting with Jewel Lake Road, which becomes Spenard Road north of the intersection with International Airport Road. Jewel Lake Road provides a north-south link between the main Airport entrance roadway (International Airport Road), the South Airpark, and LHD. Jewel Lake Road and Spenard Road are classified as major arterials.

On-Airport Roadways—Existing Facilities

Postmark Drive and Aircraft Drive intersect West Northern Lights Boulevard to provide access to the Airport from the north. Postmark Drive is a 3-lane minor arterial and is in good condition. Aircraft Drive, a 2-lane commercial/collector roadway, is in fair condition. Aircraft Drive provides direct access from West Northern Lights Boulevard to the LHD GA facilities. Within the GA area, sections of the roadway are used as taxiways by GA aircraft. However, guardrails have been installed along the west end of Lake Hood, parallel to Aircraft Drive in the GA area, to reduce conflicts between vehicles and GA aircraft.

Lakeshore Drive is a 2-lane neighborhood collector roadway that provides access between Aircraft Drive and the GA facilities along the north shore of Lake Hood and Lake Spenard. Lakeshore Drive provides an alternative access to the GA area (and the Airport) via a gate at the western terminus of Lakeshore Drive near Wisconsin Street.

Tower Road intersects Postmark Drive south of the North Terminal and provides access between Satellite Drive and the LHD GA area.

Old International Airport Road is a 2-lane roadway providing limited Airport access from the east via Jewel Lake Road. West 50th Avenue is a 2-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 the many land uses in the East Airpark. Old International Airport Road also serves as a

service road for many airfield and aircraft-related, unlicensed vehicles that operate in the Airpark.

South Aircraft Drive is a 2-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 controlled access gate at the south terminus of South Aircraft Drive provides airfield access for the various service vehicles traveling between the Old International Airport Road area and the airfield.

On-Airport Roadways—Planned Improvements

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

Aircraft Drive

The portion of Aircraft Drive from West Northern Lights Boulevard to the Lake Hood area is proposed to be relocated with construction of the new Echo parking area. Aircraft Drive will be routed to the west along the northern edge of the new parking area and will then tie into existing roads to the south and west. South Aircraft Drive will continue to provide access to the facilities located around Lake Hood.

Old International Airport Road

In October 1990, ANC completed a draft study design report for improving Old International Airport Road. The primary purpose of the improvement is to provide a safe and functional roadway, with separation of pedestrians, licensed vehicles, and unlicensed (aircraft service) vehicles (e.g., fueling carts, cargo tugs, maindeck loaders, and other support vehicles). The study recommended that Old International Airport be upgraded to a 3-lane facility with a continuous left-turn median lane. A pedestrian pathway would be located on the south side of the roadway.

1.2.4 General Aviation

ANC is located adjacent to LHD, as shown in **Figure 1-13**. The two airports are jointly managed and GA operations at the two are closely related. Although the established boundaries of LHD contain the lakes, seaplane floatslips, a gravel strip, and tie-down areas near the lake (Delta), other tie-down areas associated with operations at LHD are located within the boundaries of ANC. Augmenting the State-owned areas, various private tie-down facilities are available within the commercially leased parcels around the lakes. In addition to the facilities at LHD, there are both private and corporate GA facilities associated with operations on ANC.

ANC currently has tie-down areas for small wheeled GA aircraft in tie-down lots Alpha, Bravo, and Charlie. ANC is currently in the process of relocating a portion of the tie-downs in Charlie to a new tie-down area (Echo) closer to the LHD gravel strip to reduce taxi time and road crossings for aircraft using the gravel strip. The three existing tie-down areas on ANC border on Taxiway V and permit direct access to either the ANC or LHD airfields. These areas currently have a combined capacity of approximately 225 aircraft. There is also a private tenant development adjacent to Charlie parking that provides additional aircraft tie-downs near ANC's runways.

NOTE: LAKE HOOD PLANS ARE SHOWN ON THE LAKE HOOD ALP.

SNOW DISPOSAL FACILITY
FUTURE ECHO PARKING
AIRCRAFT DRIVE
SKY AVE.
DE HAVILLAND AVE.
TIE-DOWN LOT B
AIRCRAFT DRIVE
POSTMARK DR
PUBLIC PARKING LOT B
TIE-DOWN LOT A
LOT C
LOT D
LOT E
LOT D
LAKESHORE DR
27 26
34 35
ULTIMATE TOUR BUS PARKING
Civil Air Patrol
United States Government
Alaska DOT & Public Facilities
ULTIMATE SNOW DISPOSAL
AVIATION AVENUE
INTERNATIONAL AIRPORT ROAD
ATCT
MINAL APRON
(UNDER CONSTRUCTION)
RCRAFT PARKING APRON
Alamo
Avis
Alaska DOT & PF
FAA
Cargo Buildings
WEST 50TH AVE.
Budget
National
Petroleum Testing Service
Dyn Air
Warehouse
Offices
Hertz
Alaska Airlines
Whitney Foods
Warehouses
Warehouse
Restaurant
International Airport Inn
Alaska Army National Guard
OLD INTERNATIONAL AIRPORT ROAD
FAA office
Alaska Airlines
Office Building
FAA Hangar
SOUTH AIRCRAFT DRIVE
Alaska Airlines
Northwest Air Cargo
Alaska Airlines
Northern Air Cargo
Signature Flight Support
Northern Air Cargo
Federal Express
Delta Airlines
Reeve Aleutian Airlines
PARKING GARAGE
SOUTH TERMINAL
RUNWAY VISIBILITY ZONE
BUILDING RESTRICTION LINE
CONCOURSE B
CONCOURSE A
RUNWAY VISIBILITY ZONE
BRL
BRL
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FAA, AIRPORT DIVISION
ALASKA, REGION AAL-600

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0' 300' 600'
Scale in Feet

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The HNTB Companies

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LAKE HOOD

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

Ted Stevens Anchorage International Airport

APPROVED

MARYELLEN TUTTELL, AICP — AIRPORT PLANNING MANAGER

DESIGNED	DRAWN	
RVW	RVW	FIGURE 1-13
CHECKED JSM	DATE JUNE 24, 2002	

A principal concern of the State and the GA aircraft operators relates to the aircraft-vehicle conflicts at Taxiway V and Postmark Drive. Recently, crossing guards were installed at this intersection to reduce these conflicts. The relocation of a portion of the aircraft tie-downs from Charlie to the new Echo parking area is also expected to reduce these conflicts and allow GA aircraft to be parked in proximity to the runway they typically use.

Corporate GA services are provided by private tenants located in East Air Park and South Air Park.

1.2.5 Aviation-Related Facilities

The three principal locations for aviation-related facilities at the Airport are the North, East, and South Airparks, which are described below.

North Airpark—Existing Facilities

The North Airpark, which is between Taxiway R and the wetlands area east of Postmark Drive, encompasses approximately 359 acres, as shown in **Figure 1-14**. The principal occupants of the North Airpark are FedEx, UPS, Northwest, Japan Air Lines, Peninsula Air, Air Cargo Express, and North Park Fuels. Existing facilities east of Postmark Drive include the U.S. Postal Service (USPS), the FedEx Flight Simulator and Training Facility, Duty-Free Shoppers, DHL Worldwide Express, and Evergreen.

North Airpark—Planned Facilities

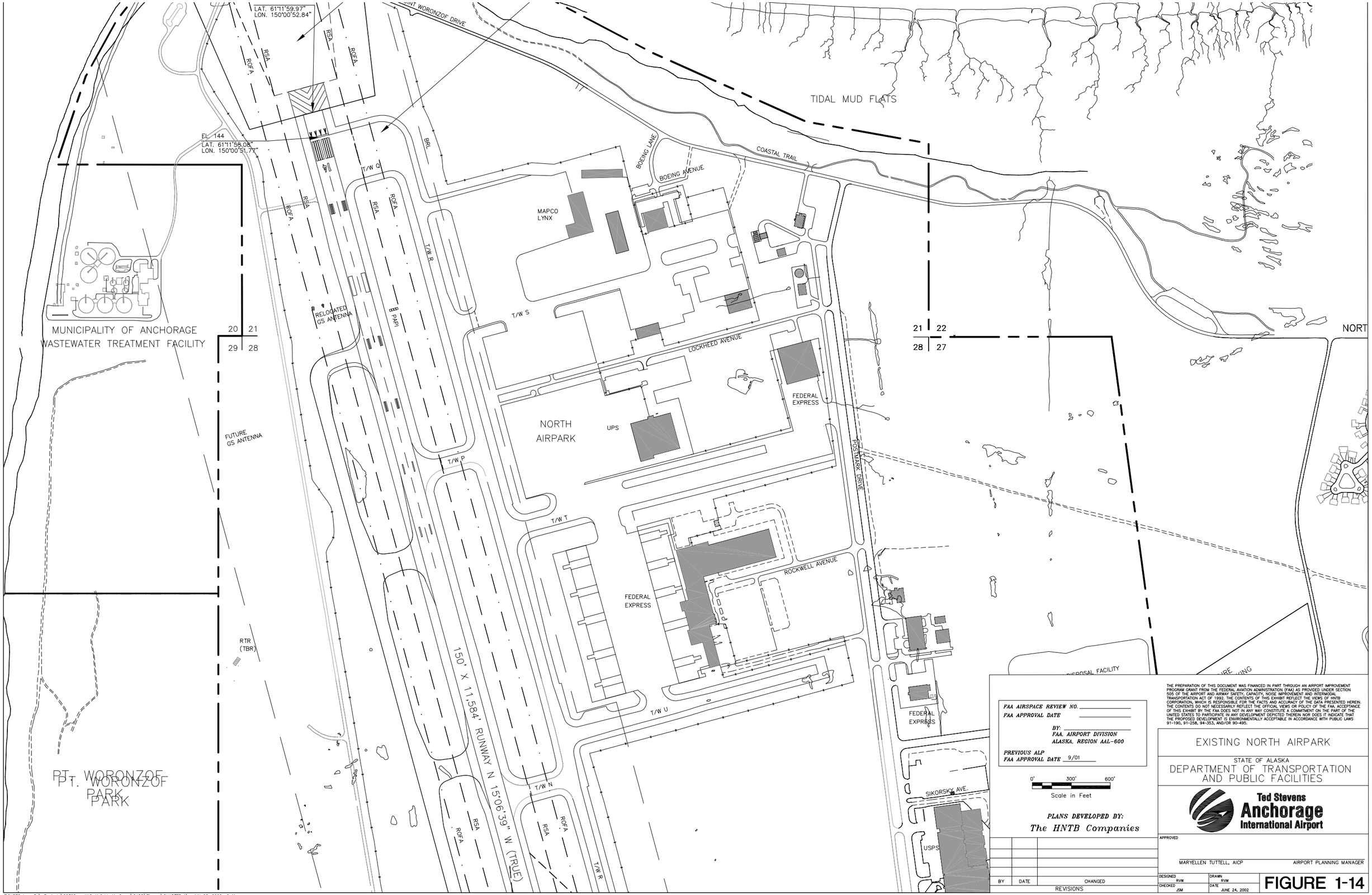
FedEx and UPS Master Plans allow for continued expansion of cargo and maintenance facilities. FedEx can add a second bay to its hangar and aircraft parking and warehouse space. UPS can expand its building and small aircraft parking facilities. The multi-tenant facility (MAPCO/Lynx) can be expanded to a 100,000-square foot cargo transfer facility; each will include nine aircraft parking positions and support space for offices and air freight forwarding. The remaining airfield accessible land in the North Airpark is the Postmark area, located north of the North Terminal and south of FedEx. This area is planned for cargo development, including cargo transfer and fueling facilities.

There are areas east of Postmark Drive that are available for aviation-related uses such as freight forwarding and logistics support. These areas are subject to special conditions in the long-term permit for wetland development on the Airport.

East Airpark—Existing Facilities

As shown in **Figure 1-15**, the East Airpark encompasses an area of approximately 176 acres east of the passenger terminal complex between Taxiway K and International Airport Road. A listing of property occupants in the East Airpark is provided on the second page of Figure 1-15. The principal occupants of the East Airpark are air cargo facilities, airline maintenance facilities, and warehouses. Many of the tenants, including Alaska Airlines, Northern Air Cargo, Delta Air Lines, Northwest Airlines, and Signature Flight Support, have aircraft parking aprons adjacent to Taxiway K. Northwest Airlines subleases a portion of a cargo building to LSG/Sky Chefs (a flight kitchen). The buildings are connected by security fences to form the limit of the Airport Operations Area (AOA) in this portion of the Airport.

The ARRC rail line crosses through the East Airpark and rises to an elevated crossing into



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EXISTING NORTH AIRPARK

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

Ted Stevens Anchorage International Airport

APPROVED

MARYELLEN TUTTELL, AICP — AIRPORT PLANNING MANAGER

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CHECKED	DATE
JSM	JUNE 24, 2002

FIGURE 1-14

NOTE: LAKE HOOD PLANS ARE SHOWN ON THE LAKE HOOD ALP.

LAKESHORE DR
DE HAVILLAND AVE.
TIE-DOWN LOT C
TIE-DOWN LOT B
AIRCRAFT DRIVE
POSTMARK DR
TIE-DOWN LOT A
NORTH TERMINAL
PUBLIC PARKING LOT B
LOT C
LOT D
LOT E
LOT F
LOT G
ATCT
TERMINAL APRON
(UNDER CONSTRUCTION)
AIRCRAFT PARKING APRON
Civil Air Patrol
United States Government
ULTIMATE TOUR BUS PARKING
Alaska DOT & Public Facilities
ULTIMATE SNOW DISPOSAL
INTERNATIONAL AIRPORT ROAD
AVIATION AVENUE
SPENARD ROAD
Alamo
Avis
Budget
National
Alaska DOT & PF
FAA
Cargo Buildings
WEST 50TH AVE.
Petroleum Testing Service
Dyn Air
Warehouse
Offices
Hertz
Alaska Airlines
Whitney Foods
Warehouses
Restaurant
International Airport Inn
Alaska Army National Guard
OLD INTERNATIONAL AIRPORT ROAD
FAA office
Office Building
FAA Hangar
SOUTH AIRCRAFT DRIVE
Reeve Aleutian Airlines
Northwest Air Cargo
Northern Air Cargo
Delta Airlines
Signature Flight Support
Federal Express
PARKING GARAGE
RUNWAY VISIBILITY ZONE
SOUTH TERMINAL
BUILDING RESTRICTION LINE
CONCOURSE B
CONCOURSE A
BRL
T/W K
T/W G
T/W E
T/W D
T/W C
T/W B
T/W A
ROFA
RSA
ROFA 800' TYP.
RSA 500' TYP.
150' X 10,600' RUNWAY N 89°53'21" E (TRUE)
LAT. 61°10'11.32" LON. 149°56'53.88" EL. 81
LAT. 61°10'04.37" LON. 149°58'21.53" EL. 94
LOCALIZER BUILDING
LOCALIZER
ULTIMATE REMOTE PARKING
RUNWAY PROTECTION ZONE
500' X 1,700' X 1,010'
VISUAL / NOT LOWER THAN 1 MILE
VASI-6
WINDSOCK
MLS AZ MONITOR
REIL
RVR(TBR)
COMPASS RAD
HELIPAD
SERVICE ROAD
SOUTH TUG ROAD
BRL (HEIGHT RESTRICTED SEE SHTS. 7 & 8 OF 18)
FBO
ASDE SITE
SOUTH AIRPARK ROAD
KULIS AIR NATIONAL
900'
400'
537.5'
1260'
700'
508'
705'
160'
200'

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REVISIONS

EXISTING EAST AIRPARK

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

Ted Stevens Anchorage International Airport

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MARYELLEN TUTTELL, AICP — AIRPORT PLANNING MANAGER

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FIGURE 1-15

the terminal area ending at the new ARRC passenger terminal. Many of the tenants on parcels north of Old International Airport Road require the use of ramp vehicles (e.g., tugs and cargo dollies). Consequently, operational problems exist due to the conflicting demands of railcars, ramp vehicles, and public vehicles. Other facilities located on the East Airpark (such as the rental car lots and FAA facilities) further complicate the vehicular access and circulation patterns in this area.

There have been recent upgrades to the Alaska Airlines cargo complex, which was acquired from MarkAir; however, upgrades are planned for the maintenance hangar. Also, the Northern Air Cargo facility underwent a recent expansion/remodel.

East Airpark—Planned Facilities

Since this area has already been fully developed or leased, less major new development is planned. Most of the projects under consideration in this area consist of incremental upgrades to existing facilities (mostly by individual tenants), State upgrading of Old International Airport Road, and clarification of vehicular circulation patterns.

South Airpark—Existing Facilities

The South Airpark encompasses approximately 22 acres along Taxiway F, as shown in **Figure 1-16**, and is located south of Runway 6R-24L and west of the Kulis ANG site. The principal occupancies in this area are GA commercial aviation operations, Fixed Base Operators (FBOs), airline support, and helicopter operations, including Alaska Airlines, UPS, Lynden, Signature Flight Support, ERA Aviation, and FS Air Service.

South Airpark—Planned Facilities

The master plan recommends westward expansion of the South Airpark for GA commercial aviation and/or FBO operations.

1.2.6 Airport Support

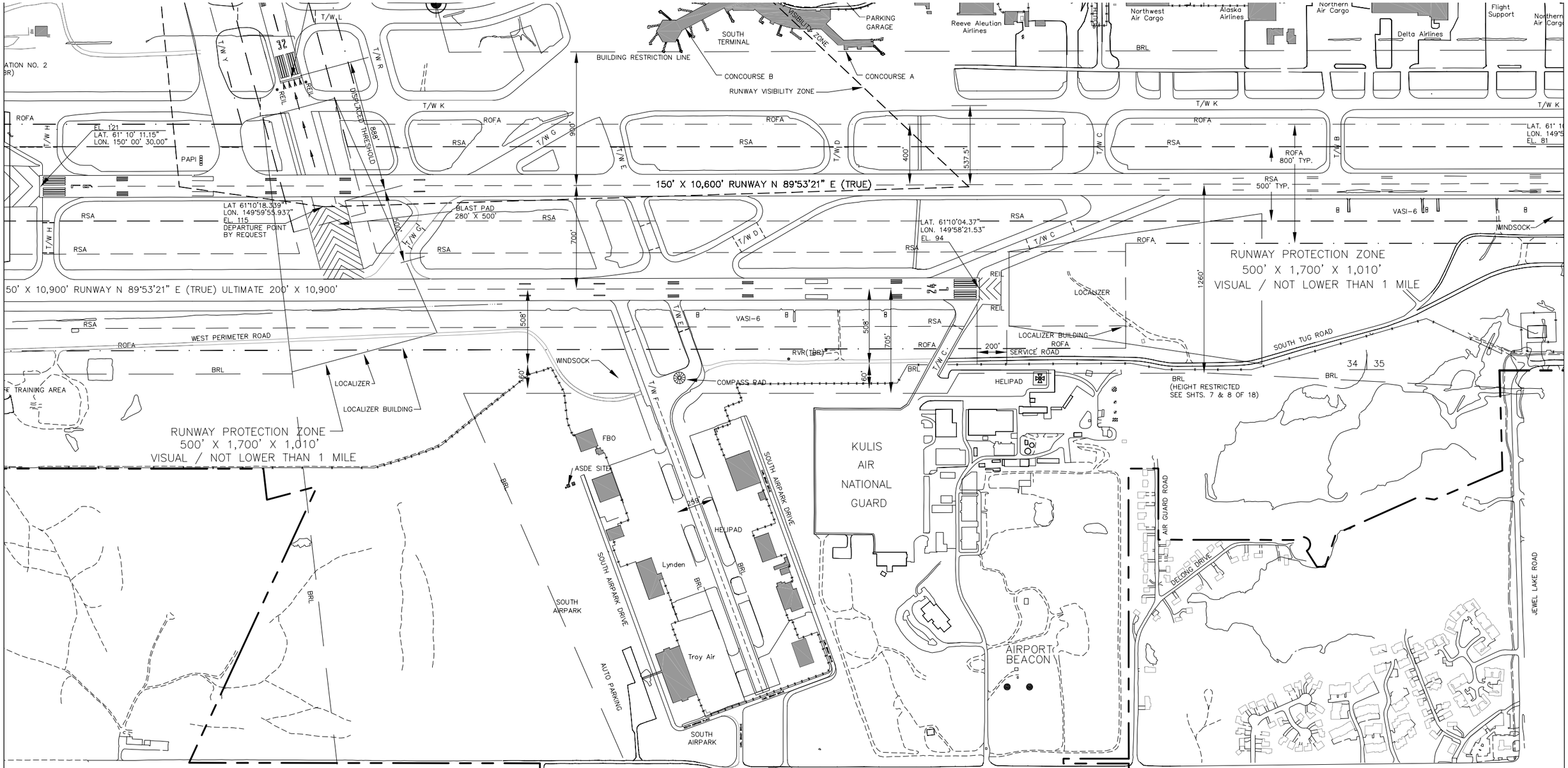
Existing Airport Support Facilities

Airport support facilities are at various locations on the Airport and include the ANC Field Maintenance Complex (FMC), the aircraft rescue and firefighting (ARFF) facility, the National Weather Service facilities, and the aviation fuel farm facility.

The FMC occupies a 10-acre site along Aircraft Drive north of DeHavilland Avenue. Facilities include five buildings for offices and storage of material and equipment. A paved court between the buildings is available for outdoor equipment parking as well as employee and visitor parking.

The ANC ARFF facility is located at the southwest corner of the North Airpark, near the intersection of Taxiways V and R. This facility is a consolidation of the two former ARFF facilities. Former ARFF Station No. 1 (near Concourse A of the South Terminal) is currently vacant but will be removed shortly to allow for Terminal Redevelopment Program improvements. Former ARFF Station No. 2 (south of the new fuel farm) is being used primarily for storage. The ANC ARFF facility has direct access to Taxiways V and R to provide reduced response time to all parts of the airfield.

The FAA ATCT is located on the south side of Tower Road, about equidistant from the North and South passenger terminals. A 1-story building accommodating FAA offices is at the base of the tower. Tower levels



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EXISTING SOUTH AIRPARK

STATE OF ALASKA
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DESIGNED	DRAWN	
RVW	RVW	FIGURE 1-16
CHECKED	DATE	
JSM	JUNE 24, 2002	

contain the ATC equipment and additional FAA offices.

A National Weather Service facility is located south of Raspberry Road.

The fuel farm holds 12 million gallons, and is capable of adding storage. A fuel line connecting to the Port of Anchorage, where there is additional major storage, was recently completed.

Planned Airport Support Facilities

ANC is currently expanding the FMC facilities. A Quick Turn Facility (QTF) for runway and apron deicing is under construction. An FMC is planned near the existing ARFF building.

The Airport is looking at options to expand the ARFF facility to replace storage and support facilities at the former ARFF Station No. 2.

1.2.7 Other Airport Facilities

There are other Federal facilities at various sites around the Airport, including the Kulis ANG base, FAA offices and hangars, the USPS facility, and a U.S. Fish and Wildlife Service facility.

- ***Kulis Air National Guard Base.*** The Kulis ANG Base is directly east of the South Airpark. Facilities along the northern boundary of the Base have aircraft aprons with stub taxiway connections to the east end of Runway 6R-24L. Vehicular access to the site is from Raspberry Road, however, the base is patrolled and access is limited.
- ***FAA Offices.*** The FAA maintains several facilities on the Airport, including offices and a hangar facility in the East Airpark.
- ***U.S. 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.

  There are no firm commitments on the part of the USPS to make significant improvements or to expand the postal facility, although interest in expanded warehouse space (about 20,000 square feet) has been expressed.
- ***U.S. Fish and Wildlife Facility.*** The U.S. Fish and Wildlife Service maintains a storage facility near the NWS office south of Raspberry Road

1.2.8 Utility Services

Water System

Existing Facilities

The water distribution system is owned and operated by the Anchorage Water and Wastewater Utility (AWWU). Main lines serving the Airport include a 16-inch pipe in Old International Airport Road that extends west to the passenger terminal buildings, then extends north along Postmark Drive. Another 16-inch line extends west from the City system near Earthquake Park and ties into the line in Postmark Drive. A 12-inch line begins east of the LHD gravel strip, runs along Aircraft Drive, and extends to the passenger terminal.

Several on-site mains connect to these main lines to serve other areas on the Airport. A

major extension is a 16-inch line, which branches from the line in Postmark Drive, extends west across Runway 14-32, turns north, and extends along Point Woronzof Drive to serve the AWWU wastewater treatment facility. A 12-inch line runs under West 50th Avenue and serves facilities in that area.

A 24-inch line across Runways 6L-24R and 6R-24L, constructed in 1990, connects the line in Old International Airport Road to the recently constructed line in Raspberry Road. This connection and the Kincaid Reservoir (completed in 1993) greatly increase the water delivery capacity for firefighting functions at the Airport.

Planned Improvements

Future waterline extensions to the West Airpark and undeveloped areas of the North Airpark will occur as these areas are developed. One major improvement to increase water pressure to the West Airpark would be a water main from the South Airpark beneath Runway 6R and Taxiway K to the West Airpark.

Sewer System

Existing Facilities

AWWU also owns and operates the public sewer system on ANC. The major collection line runs north along Satellite Drive. Branches from this line serve the passenger terminal buildings and the East Airpark. The line extends north, parallel to, and east of Postmark Drive and connects into the AWWU 96-inch main trunk line. The trunk line runs west across the north side of the Airport and ends at the wastewater treatment facility west of Point Woronzof Drive.

Planned Facilities

Future sewer line 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. The three drainage basins are 1) Turnagain Arm drainage basin, which drains to Turnagain Arm, 2) Knik Arm drainage basin, which drains to Knik Arm, and 3) Lake Hood/Lake Spenard drainage basin which drains to the lakes. The Turnagain Arm basin is the largest in land area, covering Runway 14-32 and the western ends of the east-west runways. 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. The Lake Hood-Lake Spenard drainage basin presents the most challenging issues, due to water quality and water level concerns in the lakes, low 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 in the storm drain system. Various storm drain improvements have been constructed to improve drainage or 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 drainage basin to reduce pollutant flows to the lakes.

Planned Facilities

The 6-year Capital Improvement Program (CIP) includes a phased construction of drainage improvements, emphasizing drainage through the terminal area and East Airpark in the first phases. In addition, the Terminal Redevelopment Program will construct drainage improvements in portions of the terminal and East Airpark areas. A segment of the drainage system connecting the terminal apron drainage with the Postmark Drive storm drain was constructed in 1998. This allows for the seasonal diversion of deicing and ice drainage into Cook Inlet, diverting it away from the environmentally sensitive Lakes Hood and Spenard. During the summer and fall, the terminal area continues to drain into the Lakes. ANC continues to work with the airlines and regulatory agencies on water quality and deicing issues, and additional structural improvements may be proposed as a result of on-going watershed management studies.

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-Airport, and accommodate GA fuel requirements as well as those of the scheduled passenger and cargo airlines.

Nearly 80 percent of the turbine-engine fuel delivered to the Airport is purchased by a 16-member airline fuel consortium. Consortium fuel is delivered by pipeline and rail to storage tanks at the Port of Anchorage. There are three 4.2 million gallon tanks for a total of 12.6 million gallons of storage capacity. From these tanks, the fuel is transported through an underground pipeline to storage 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. A private company that operates under a service contract with the consortium 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 means. In addition to the underground pipeline serving most of the air carrier aircraft 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 also located at the international cargo apron. This area 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 dealers.

Planned Facilities

The existing fuel pipeline is designed to satisfy fuel storage requirements for the foreseeable future and the fuel tank farm has room to expand storage capacity.

Electric Power, Natural Gas, and Telephone Service

Electric Power

Electric service is provided to all developed areas on the Airport by Chugach Electric Association (CEA). The Airport is served by a single distribution substation just west of Spenard Road on the north side 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 just north of the AWWU wastewater plant and straddles AWWU and Airport property. The Woronzof transmission substation connects CEA's major power supply from the Beluga powerplant on the west side of Cook Inlet to Anchorage. This station connects the submarine cables that come under the inlet to the Anchorage electrical 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 substation. The Airport East substation is located in the North Airpark south of West Northern Lights Boulevard and west of Postmark Drive. This substation serves as a cable terminal station, allowing the transition from the underground cables to overhead lines.

CEA has indicated that an additional distribution substation is likely to be needed to support long-term development at the Airport. CEA has also expressed interest in development of a co-generation facility on the Airport to provide additional electric and heating needs in the future.

Natural Gas

Enstar Natural Gas Company supplies natural gas service through an extensive distribution system serving nearly all developed areas on the Airport.

Telephone Service

Private and public telephone service is available to all developed areas at the Airport. This service is installed and maintained by the Anchorage Telephone Utility. Public telephones are located throughout the international and domestic terminals.

1.3 ENVIRONMENTAL CONDITIONS

1.3.1 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 Anchorage Water Treatment Facility and new 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 6-24 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 6-24 is mainly undeveloped, heavily wooded land. The area is somewhat higher in elevation than the area north of Runway 6-24, 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).

1.3.2 Geology

Anchorage is situated 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 Lake Spenard. 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 6-24. 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.

1.3.3 Wetlands

Major wetlands at ANC were identified by the MOA in the *Anchorage Wetlands Management Plan* dated April 1996. This plan identified two major areas of wetlands and some smaller areas. The largest wetland area on the Airport is Turnagain Bog, located east of Postmark Drive, west of developed Turnagain residential area, and primarily north of LHD. The wetlands within Turnagain Bog consist of primarily convex patterned peat bog surrounded by forested wetlands and uplands of spruce/birch forest and developed areas. Diversity of vegetation communities is similar to other patterned bogs in the Anchorage area. Most of the area included within the ANC boundary consists of non-patterned shrub bog, dominated by sweet gale and sedges. Forested black spruce wetlands are also abundant. Flooded and

seasonal or drained flarks comprise the remainder of the habitat. Turnagain Bog is surrounded by roadways and has aviation development along its southern and western margins; in addition, an Anchorage water and wastewater pipeline runs through Turnagain Bog on a diagonal.

Postmark Bog is a remnant of Turnagain Bog. The wetland areas at Postmark are primarily flooded flarks and non-patterned shrub bog habitat with small portions of seasonal/drained flarks, non-patterned forested wetlands acres, and a small area of upland. This wetland area is surrounded by aviation-related development on all four sides.

Other bog wetland areas at the Airport include Conners Bog, wetlands north of Delong Lake, and isolated wetlands located in West Airpark. Wetlands on Airport land at Conners Bog are concentrated south of the utility corridor in the vicinity of Conners Lake. There is a 4.8-acre wetland located adjacent to the MOA snow storage site at Conners Bog, north of the utility corridor. South of the utility corridor are approximately 40 acres of bog wetlands in the vicinity of Conners Lake. The wetlands north of Delong Lake include approximately 32 acres of bog wetlands including Meadow Lake.

ANC recently received a wetland permit to develop approximately 218 acres of wetlands in Postmark and Turnagain Bog for airport-related development of areas identified for development in the 1996 ANC Master Plan Update. The wetland permit allows development of these areas for specific aviation-related uses consistent with the special conditions outlined in the permit. Wetland losses at ANC are being mitigated through a comprehensive preservation and restoration program at Klatt Bog in south Anchorage.

1.3.4 Soils and Land Forms

The Airport is 100 to 200 feet above MSL on a mostly flat peninsular bluff between Points Woronzof and Campbell, at the junction of Knik and Turnagain Arms on the east side of upper Cook Inlet. The 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, 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.

1.3.5 Drainage and Water Quality

The relatively impermeable clay fraction of the Bootlegger Cove Formation significantly influences drainage and water quality in the vicinity of the Airport. On most Airport property and throughout much of the surrounding region, a shallow, unconfined aquifer is perched above the extensive cohesive deposits of the Bootlegger Cove Formation. The silty clay has low permeability and traps runoff at the surface, producing the wetlands that typify the area east of Runway 14-32. Beneath the Bootlegger Cove deposits is a confined aquifer kept under pressure by the impervious clay cap; this is part of the deep artesian system underlying much of the Anchorage area. This situation exists throughout most portions of Airport property except at the upland west of Runway 14-32, where Bootlegger Cove clay intergrades with and pinches out against more permeable non-cohesive deposits; here, water may be encountered at many levels in the porous strata formed by glacial outwash action.

Water quality in most of the waterbodies on ANC is good, other than low dissolved oxygen, which is typical of northern bog lakes. The water quality in Lake Hood and Lake Spenard has been impacted by a variety of factors. These lakes have limited inflow other than drainage from developed Airport areas, such as East Airpark. Water quality concerns at the lake are primarily due to high fecal coliform, low dissolved oxygen, and the potential for fuel spills from aviation operations. Due to Anchorage's winter climate, drainage from the airfield includes deicing agents (urea, potassium acetate, propylene and ethylene glycols) as well as typical stormwater pollutants like oil and grease. ANC has an extensive Watershed Program that includes a National Pollutant Discharge Elimination System general permit for stormwater discharges and a Stormwater Pollution Prevention Plan.

ANC has worked hard to improve water quality in Lakes Hood and Spenard by constructing watershed stations on the outfalls into the lakes, diverting winter stormwater runoff from the cargo apron areas from the lakes, reducing urea use in areas that drain to the lakes, and adding groundwater to maintain water levels during the summer. ANC continues to work with the airlines, airline service companies, the

Alaska Department of Environmental Conservation (ADEC), and the U.S. Environmental Protection Agency (EPA) to develop and implement programs to address deicing and stormwater issues for the future. ANC is also in the process of developing a Waterbody Recovery Plan for Lakes Hood and Spenard which could propose additional structural or operational measures to improve water quality.

1.3.6 Vegetation

Wooded uplands are situated immediately northeast, north, and west of Runway 14-32, where the northern end of the runway and its clear zone abut West Northern Lights Boulevard at Point Woronzof. The uplands west of Runway 14-32 support a mixed forest, consisting primarily of paper birch and black and white spruce, both of which are abundant in south central Alaska. Other upland mixed forest areas are located south of Runway 6R-24L and west of the South Airpark, and in the Conners Bog area north or the utility line.

Wetland areas located on Airport property are described in Section 1.2.3. Vegetation within these wetland areas include buckbean (*Menyanthes trifoliata*), marsh cinquefoil (*Potentilla palustris*), water sedge (*Carex aquatilis*), livid sedge (*C. livida*), and sweet gale (*Myrica gale*) in the wetter areas with higher areas containing a mixture of shrubs, such as shrubby cinquefoil (*Potentilla fruticosa*), shrub birch (*Betula nana*), and ericaceous shrubs (*Ledum decumbens, Empetrum nigrum, Vaccinium uliginosum*), and non-patterned wetland forests of black spruce.

Turnagain Bog, east of Runway 14-32, is a patterned open-complex wetland, or bog formation, with some areas showing wet-meadow characteristics.

1.3.7 Fish and Wildlife

The bog wetlands, waterbodies, and upland areas at ANC provide habitat for a variety of wildlife. Birds commonly seen on the Airport include passerines, such as Savannah sparrow, and White-crowned sparrow; waterfowl, such as Canada goose, Mallard, Northern pintail, American widgeon, Green-winged teal, and Greater scaup; shorebirds, such as Lesser yellowlegs, Short-billed dowitcher, Least sandpiper, and Common snipe; and Bald eagles. Other wildlife sighted at the Airport include moose, River otter, muskrat, coyote, ermine, weasel, mink, and Snowshoe hare.

Birds and other wildlife on and around airports can pose serious safety risks for aviation operations. Aircraft/wildlife collisions have become an increasing concern for the aviation industry, with over 22,000 bird strikes reported between 1900 and 1999; over 80 percent of these strikes involved commercial aircraft. Although any species of wildlife can pose a risk to aircraft operations, migratory waterfowl are one of the most hazardous species.

Federal Aviation Regulation (FAR) 139 provides certification requirements for commercial public use airports. Section 139.337 covers requirements associated with wildlife hazard management. Airports where any air carrier aircraft have experienced a wildlife strike on or near the airport or where wildlife capable of causing damage to an aircraft have access to airport flight patterns or movement areas must evaluate the need for an airport wildlife hazard management plan. The plan must provide measures to alleviate or eliminate wildlife hazards to air

carrier operations. ANC had over 49 bird strikes and 33 bird ingestions through 1994. FAA records indicate that there were 300 aircraft/wildlife strikes between 1990 and 1999 in Alaska, an average of 22 per year (FAA, 1999). Due to the high number of incidents and the high wildlife populations in the Airport vicinity, it was determined that ANC needed a wildlife hazard management plan.

The Airport adopted a Wildlife Hazard Management Plan and received FAA approval in 1997. The Plan provides a comprehensive approach to reducing wildlife hazards on the Airport, including measures to reduce the wildlife populations on the Airport, and to haze wildlife from active operations areas. The Plan includes measures to reduce habitat, including management of vegetation, open water, structures, and food or prey. In addition to managing habitat on the Airport to reduce the attractiveness to wildlife, the Plan also includes wildlife control measures, such as hazing and population control. Although ANC attempts to haze wildlife when possible, ANC does have permits from the U.S. Fish and Wildlife Service and the Alaska Department of Fish and Game to destroy wildlife when needed.

The Airport actively hazes wildlife from areas located near aircraft activity areas, including Lakes Hood and Spenard and the gravel runway. Although the focus of hazing activities are aimed at the more hazardous wildlife, particularly waterfowl and moose, wildlife harassment and dispersal activities are not selective and can disturb and disrupt use of habitat by all species, not just those targeted. Since any bird species can be considered a potential hazard to aviation, disruption of species other than those targeted specifically is not inconsistent with the Wildlife Hazard Management Plan.

1.3.8 Air Quality

The Airport is required to comply with the Federal Clean Air Act and State air quality regulations for operating permits (Title V) and for demonstrating air quality compliance for proposed construction projects. ANC operates under a Title V Owner Requested Limit. This permit requires ANC to monitor fuel use by State operations and to ensure that operations stay within those limits identified in the permit.

Air quality conformity analysis is required for major construction projects proposed at the Airport. Projects are first reviewed to determine if the proposed activities are likely to emit more than de minimus levels of criteria pollutants as identified by the EPA. If these de minimus levels are exceeded, further analysis must be conducted to ensure that emissions from the proposed project are in compliance with the State Implementation Plan for air quality. Although planning documents are typically exempt from air quality conformity analysis, ANC is preparing an air quality conformity assessment for the first five years of this Master Plan Update. Most of the projects proposed in the first five years have already been reviewed for air quality conformity under the environmental review process required for Federally funded projects.

ANC is partially located within the Anchorage non-attainment area for carbon monoxide, and ANC coordinates with the MOA and the State Department of Environmental Conservation (ADEC) regarding carbon monoxide and other air quality issues. The MOA has recently submitted a Carbon Monoxide Attainment Plan and is currently drafting a Carbon Monoxide Maintenance Plan. Although motor vehicles contribute the majority of the carbon monoxide emissions in Anchorage,

the MOA has implemented measures that are resulting in a decrease in motor vehicle emissions over time. As Airport operations are projected to increase, carbon monoxide emissions from aircraft operations are also expected to rise. Current projections show Airport carbon monoxide emissions increasing from 11 percent of total Anchorage emissions in 1996 to 18 percent of emissions in 2013. ANC is currently implementing various measures to address carbon monoxide emissions at the Airport, including plug-ins for State vehicle parking areas, a Transportation Demand Management Plan to reduce single occupancy vehicle trips to the Airport, and requesting less use of auxiliary power units on aircraft ramps. ANC has no authority to control air emissions from aircraft engines, which must meet Federal criteria for air emissions.

Over the last few years, ANC has received an increasing number of complaints regarding odors in areas on or near the Airport. There are no Federal standards on odors or methodologies for measuring and assessing odors. Odors are very difficult to deal with because they are subjective and therefore, difficult to measure, analyze, and address. Some members of the public have questioned whether there are specific health hazards associated with jet fuel emissions. The Washington State Department of Health undertook a review of jet fuel emissions in 1999. This study indicates that jet fuel emissions and jet engine exhaust contains the same types of air pollutants as fuel emissions related to fuel use by cars, trucks, and buses. No pollutants unique to aircraft emissions were identified. The MOA completed a Hazardous Air Pollutant (HAP) air sampling program in the Airport area last winter to address odor concerns and to identify any potential concerns regarding HAP emissions. Although the final report has not been completed, a preliminary review of the data did not reveal any unusual concentrations of HAPs.

ANC will continue to work with the MOA and ADEC on air quality issues in Anchorage; however, it must be recognized that Airport operations are likely to produce some level of odors associated with fueling operations, and these are particularly likely to be noticed by people using recreation facilities on Airport lands.

1.3.9 Airport Noise Studies

The Airport has an active and comprehensive Noise Abatement Program designed to address Airport noise and land use compatibility in the Airport area. The Airport completed an FAR Part 150 Noise Compatibility Program (NCP) in 1999 and received FAA approval for implementation of the Program in 2000. The Airport's Noise Exposure Map (NEP), published in 1998, identifies those areas in the Airport vicinity considered to be adversely impacted by Airport noise using Federally accepted noise criteria. The area within the Airport's Day Night Average Sound Level (DNL) 60 contour and above in 1997 was estimated at 11.25 square miles, of which 5.66 square miles are off-Airport. The population within the DNL 60 contours in 1997 was estimated at 8,246.

ANC is fortunate to be located adjacent to water bodies that allow for departures to typically occur over water and for arrivals to also approach over water. ANC's Preferential Runway Use Program is likely the most important noise abatement tool available to the Airport. In addition, the Airport is pursuing acquisition of vacant residentially zoned lands within high noise

areas and is implementing a residential sound insulation program for occupied houses within these high noise areas. ANC also works with the MOA and the real estate community to ensure that development in the vicinity of the Airport takes Airport noise levels into consideration, through plat notes, building design, and real estate disclosure.

A wide assortment of individual noise sources and types of operations contribute to the overall ground noise environment at ANC. The Airport recently completed a Ground Noise Study to look at noise sources not typically addressed in Part 150 noise studies. The study recommends a variety of measures to address ground noise, including improvements to operational procedures (intersection departures, revisions to operations bulletins, and changes in how run-ups are reported), structural abatement measures (construction of high-speed taxiways, an engine run-up pad located west of Runway 14-32), and other mitigation measures (such as aircraft orientation).

In addition, the Airport is currently installing a Flight Track and Noise Management System. Ten noise monitors will be placed in the community to allow the Airport to monitor the flight path, altitude, and speed of aircraft that arrive, depart, or transfer through the airspace over Anchorage and match them to decibel (dB) levels. The system will be used by the Airport to monitor the effectiveness of the Airport's NCP and evaluate possible improvements.

1.3.10 Airport Environs Land Uses and Zoning Regulations

The MOA recently completed an updated Comprehensive Plan titled *Anchorage 2020*. The Plan recognizes the importance of the Airport both as a transportation and an economic 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, including the NCP and this Airport Master Plan Update.

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. The eastern land uses include single and multi-family residential, schools, churches, and commercial 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 ARRC operates a rail line running north-south on the east side of the Airport. A spur connects the Airport to the rail system.

Land use adjacent to the Airport is controlled primarily through the implementation of the MOA zoning regulations under Chapters 21.35 through 21.55 of the Anchorage Municipal Code.

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 multi-family 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 multi-family residential areas as well. Development is also increasingly urban to the east and southeast with a mixture of residential, commercial, institutional, and industrial uses.

Public and recreation lands are adjacent to the Airport from the northeast boundary, along the western boundary, and the southwestern boundary. MOA parklands are located along the Airport's northeast boundary (Earthquake Park), along the western boundary (Woronzof Park), the southeastern boundary (Conners Park), and the southwestern boundary (Kincaid Park). In addition, the MOA leases adjacent Airport lands for recreational uses near Kincaid and Conners; these are often mistakenly identified as part of the adjacent MOA parklands.

Chapter Two
ACTIVITY FORECASTS

Note: The forecasts presented herein were prepared in 1998 using 1997 as a base year. The forecasts were approved by the FAA in 1999. A forecast review, using 2000 as a base year, was undertaken in the spring of 2001. Since the actual growth rates since 1997 have been lower than forecast, it is likely that the Base Case Forecast used for analysis is high. However, the forecast review determined that the original forecasts were tracking close enough to actual levels to be valid for airport planning, particularly for airfield and cargo needs. Since the Base Case Forecast is likely high, the "trigger points" at which new or expanded facilities would be needed may be delayed for some components. This is addressed further in Section 2.8.4 Airport Estimates. A copy of the Forecast Review is provided in ***Appendix A.***

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

The purpose of this chapter is to prepare new long-term forecasts of air cargo activity at ANC. The long-term forecasts will then be consolidated with previous passenger, GA, and military activity forecasts to generate an overall airport activity forecast. The passenger forecasts are drawn from the TAMS Needs Assessment Report developed for the terminal building and published in July 1997.[1] The GA and military forecasts are obtained from the KPMG Peat Marwick, (now Leigh Fisher Associates (LFA)) Master Plan forecasts developed in 1993. Both the TAMS and LFA forecasts were updated to reflect the most recent base year and current trends. The Anchorage International Airport Preliminary Air Cargo Forecast, prepared by Keiser & Associates (K&A) in March 1998 and revised in October 1998, was used for insight into historical activity and ongoing cargo trends, as well as for short-term future trends.

This chapter is organized into eight 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 Base Case Forecast for passenger carrier projections, followed by the air freight forecast section, which discusses domestic, international, and transit cargo tonnage and aircraft operations forecasts. The next two sections discuss air mail, GA, and military activity. The chapter concludes with a summary of projected ANC aviation activity, including a sensitivity analysis with alternative forecast scenarios. These forecasts will be the basis for planning and scheduling airport improvements through the planning period.

The Base Case Forecast will be used to determine future facility requirements, but

[1] Leif Selkregg Associates Program Management Team, TAMS Consultants, Inc., Final Needs Assessment Report, Enplanement and Passenger Aircraft Forecasts, July 1, 1997.

the planning program presented in subsequent tasks of this Master Plan will be developed to accommodate the range of the alternative scenarios that may occur over the next 21 years. The program will have the flexibility to accelerate or be modified to meet changes in air travel demand. These scenarios and their implications for traffic growth are discussed in more detail later in this chapter.

Except where noted, the Base Case Forecasts contained herein are unconstrained; they assume terminal and airfield capacity will be available to accommodate the anticipated demand. Forecasts are presented for 2003, 2008, and 2020.

The assumptions inherent in the following calculations are based on input from regional economic, cargo developer, airline and Airport officials; previous ANC studies; relevant literature; and professional experience. Furthermore, the assumptions incorporate recent trends such as the positive impact of low oil prices on the aviation industry and their negative impact on the Alaska economy. Forecasting, however, is not an exact science. Departures from forecast levels in the local and global economy and in the airline business environment may significantly impact the projections presented herein. These uncertainties increase toward the end of the forecast period, when new technologies, changes in business practices and priorities, and international political shifts may unpredictably impact aviation activity. Therefore, the forecasts should be periodically compared with actual ANC activity levels, and Airport plans and policies should be adjusted accordingly.

2.1 SOCIOECONOMIC BACKGROUND

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 Borough of Anchorage, which is also the official metropolitan statistical area (MSA) for the area, 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 and projected data for Anchorage and the State of Alaska were the Statewide and Regional Economic and Demographic Projections developed by the Institute of Social and Economic Research (ISER) at the University of Alaska Anchorage.[2] The ISER forecasts include base case, high case, and low case scenarios for population, employment, and income. Historical and forecast data for the United States from the Bureau of Economic

[2] Institute of Social and Economic Research, University of Alaska Anchorage, Alaska's Economy and Population, 1959-2020, March 1997.

Analysis (BEA) in the U.S. Department of Commerce were used for comparison purposes.[3]

The base case ISER forecast incorporated the following assumptions, many of which are based on Alaska Department of Revenue projections:

- In the long-term, oil prices will remain constant at 1996 levels.
- Alaska oil production will decline at a 5 percent annual rate.
- Petroleum production employment will remain constant because of the additional labor required for marginal oil fields.
- After 2005, an additional 1,000 employees will be associated with North Slope natural gas production.
- There will be exploration but no production at the Arctic National Wildlife Refuge (ANWR).
- The opening of new mines and reopening of current mines will cause mining employment to increase from 1,300 in 1996 to 2,600 by 2000 and 3,000 by 2015.
- Military employment will be constant after the completion of the 1995-1996 base closures, including Fort Greely.
- Civilian Federal employment will increase 0.25 percent per year, consistent with long-term trends.
- Seafood harvesting and production employment will be constant.
- Tourism expenditures will increase by 5 percent per year through 2000, 4 percent per year through 2010, and 3 percent per year thereafter.
- The real rate of return on the Permanent Fund will be 5 percent.
- Dividends on the Permanent Fund will be cut from 50 percent of earnings to 25 percent of earnings.

2.1.1 Population

Table 2.1 shows historical and projected population for Anchorage, Alaska, and the United States. As shown in the table, the number of people in Anchorage grew at an average annual rate of 2 percent between 1979 and 1996, from 180,200 to 254,180. The Anchorage growth rate was lower than in the rest of Alaska but significantly higher than the U.S. Most of the growth in population occurred during the oil boom of the late 1970s and early 1980s.

The base case ISER population projections for Anchorage forecast a 1.3 percent annual growth rate through 2020. As shown under the base case, the Anchorage 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 future employment opportunities are projected to arise in urban areas rather than rural areas (see Section 2.1.2 for details).

2.1.2 Employment

Table 2.2 presents historical and projected employment for Anchorage, Alaska, and the United States. Historically, employment has grown even more rapidly than population, from 77,500 in 1979 to 119,950 in 1996. Over the 1979-1996 period, the average annual growth rate for Anchorage employment (2.6 percent) has been less rapid than for Alaska (2.8 percent) but more rapid than for the United States (1.8 percent).

[3] U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System (REIS), May 1998.

Table 2 1

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historic and Projected Population

Year	Anchorage Metropolitan Area (a) (b)	Alaska (b)	Anchorage Percent of Alaska	United States (c)	Anchorage Percent of United States
		Historic			
1979	180,200	413,700	43.6%	224,564,100	0.08%
1980	182,500	419,800	43.5%	227,224,700	0.08%
1981	188,500	433,800	43.5%	229,465,700	0.08%
1982	201,300	463,400	43.4%	231,664,400	0.09%
1983	216,200	495,600	43.6%	233,792,000	0.09%
1984	226,200	522,000	43.3%	235,824,900	0.10%
1985	233,900	541,300	43.2%	237,923,700	0.10%
1986	235,100	547,600	42.9%	240,132,800	0.10%
1987	228,000	537,800	42.4%	242,288,900	0.09%
1988	222,900	531,000	42.0%	244,499,000	0.09%
1989	221,900	534,400	41.5%	246,819,200	0.09%
1990	226,300	550,000	41.1%	249,439,500	0.09%
1991	235,900	569,600	41.4%	252,124,400	0.09%
1992	245,100	587,600	41.7%	255,001,800	0.10%
1993	251,800	598,300	42.1%	257,752,700	0.10%
1994	255,400	602,900	42.4%	260,292,400	0.10%
1995	253,600	603,500	42.0%	262,760,600	0.10%
1996	254,180	604,966	42.0% (d)	265,179,400	0.10%
		Projections (- Base Case) (e)			
2000	265,800	635,200	41.8%	276,242,000	0.10%
2003	274,050	658,700	41.6%	283,469,000	0.10%
2005	279,430	672,800	41.5%	288,287,000	0.10%
2008	292,280	702,500	41.6%	295,573,000	0.10%
2010	303,290	727,500	41.7%	300,430,000	0.10%
2015	334,460	796,700	42.0%	313,117,000	0.11%
2020	365,730	865,600	42.3%	325,727,500	0.11%
2025	399,320	938,600	42.5%	338,338,000	0.12%
		Projections (- High Case) (f)			
2000	273,330	651,200	42.0%		
2003	297,640	707,300	42.1%		
2005	311,690	737,500	42.3%		
2008	354,490	839,400	42.2%		
2010	382,890	902,600	42.4%		
2015	432,250	1,010,600	42.8%		
2020	499,140	1,149,700	43.4%		
2025	579,290	1,310,600	44.2%		
		Projections (- Low Case) (g)			
2000	250,890	608,700	41.2%		
2003	257,350	627,100	41.0%		
2005	260,730	636,500	41.0%		
2008	268,290	654,000	41.0%		
2010	274,200	667,400	41.1%		
2015	290,250	702,300	41.3%		
2020	307,080	738,500	41.6%		
2025	318,660	761,900	41.8%		

(a) Anchorage Borough.
(b) Anchorage and State data and projections from Institute of Social and Economic Research (ISER), University of Alaska Anchorage, Alaska's Economy and Population: 1959-2020, 1997 and Population, Employment and Income Projections for Alaska Census Areas, 1998.
(c) U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System (REIS)
(d) 1996 State data from REIS.
(e) ISER, DOT Base Projection.
(f) ISER, DOT High Projection.
(g) ISER, DOT Low Projection.

Sources: As noted and HNTB analysis.

Table 2.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historic and Projected Employment

Year	Anchorage Metropolitan Area (a) (b)	Alaska (b)	Anchorage Percent of Alaska	United States (c)
		Historic		
1979	77,500	166,400	46.6%	113,288,100 (d)
1980	78,200	168,900	46.3%	114,231,200 (d)
1981	86,200	184,100	46.8%	115,304,000 (d)
1982	95,100	198,300	48.0%	114,521,300 (d)
1983	102,700	211,300	48.6%	116,019,700 (d)
1984	108,400	220,800	49.1%	121,051,100 (d)
1985	110,900	226,100	49.0%	124,472,700 (d)
1986	105,600	216,900	48.7%	126,941,200 (d)
1987	99,600	206,000	48.3%	130,371,400 (d)
1988	100,000	210,800	47.4%	134,675,900 (d)
1989	103,400	223,000	46.4%	137,317,700 (d)
1990	110,000	233,900	47.0%	139,184,600 (d)
1991	113,000	238,700	47.3%	138,785,800 (d)
1992	114,100	242,400	47.1%	139,410,800 (d)
1993	116,600	248,800	46.9%	142,005,500 (d)
1994	119,100	254,900	46.7%	145,650,300 (d)
1995	119,600	257,900	46.4%	149,444,500 (d)
1996	119,950	n/a	n/a	152,313,900 (d)
		Projections (- Base Case) (e)		
2000	124,740	270,400	46.1%	157,656,000 (d)
2003	126,210	274,100	46.0%	163,753,000
2005	127,730	277,400	46.0%	167,817,000 (d)
2008	133,180	288,500	46.2%	172,825,000
2010	137,640	297,600	46.3%	176,164,000 (d)
2015	150,520	322,700	46.6%	182,191,000 (d)
2020	164,000	348,300	47.1%	185,260,000 (d)
2025	178,940	376,600	47.5%	188,329,000 (d)
		Projections (- High Case) (f)		
2000	128,730	280,400	45.9%	
2003	137,390	297,800	46.1%	
2005	142,600	311,000	45.9%	
2008	164,240	362,800	45.3%	
2010	174,900	379,900	46.0%	
2015	196,660	419,500	46.9%	
2020	228,820	480,000	47.7%	
2025	266,500	548,500	48.6%	
		Projections (- Low Case) (g)		
2000	118,150	257,300	45.9%	
2003	120,460	262,600	45.9%	
2005	120,840	263,700	45.8%	
2008	123,100	267,900	45.9%	
2010	125,010	271,400	46.1%	
2015	130,630	281,500	46.4%	
2020	137,310	293,800	46.7%	
2025	139,740	295,800	47.2%	

(a) Anchorage Borough.
(b) Anchorage and State data and projections from Institute of Social and Economic Research (ISER), University of Alaska Anchorage, Alaska's Economy and Population: 1959-2020. 1997 and Population, Employment and Income Projections for Alaska Census Areas, 1998.
(c) U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System (REIS).
(d) BEA and ISER count employment differently so numbers are not directly comparable.
(e) ISER, DOT Base Projection.
(f) ISER, DOT High Projection.
(g) ISER, DOT Low Projection.

Sources: As noted and HNTB analysis.

The ISER base case forecast projects Anchorage employment to grow at a 1.2 percent annual rate through 2020. In the long run, employment growth is expected to taper off as the population grows less quickly and as a greater number of people retire. As shown in Table 2.2, 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. Although Alaska seafood harvesting is now constrained by the size of the fisheries, further increases in employment are possible by increasing seafood processing in Alaska. Timber and mining also have growth potential. 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. 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, to the extent that air freight trans-shipment develops at ANC, it will become an increasingly important employer in the Anchorage area.

In contrast to the last 30 years, in which basic (e.g., oil and timber) and infrastructure (e.g., pipeline construction) industries were the primary drivers of the economy, future employment growth is projected to occur 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, in contrast to the past when employment in Anchorage grew less quickly than in the remainder of Alaska, future employment in Anchorage is projected to grow faster than in the remainder of the State.

2.1.3 Income

Table 2.3 shows historical and projected annual real personal income (in 1997 dollars) for Anchorage, Alaska, and the United States. Total Anchorage personal income grew at an average annual rate of 2.2 percent from 1979 to 1996. Over that period, Anchorage income grew at about the same rate as Alaska but slightly slower than the United States (2.5 percent) as historically higher per capita income levels converged more closely to the U.S. average as 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 base case ISER forecast projects Anchorage income to continue to grow, but not as quickly as in the past. As shown in Table 2.3, total Anchorage metropolitan income is projected to increase from $7.3 billion in 1996 to $11.3 billion in 2020, an average annual increase of 1.8 percent. On an average annual basis, real income in Anchorage through 2020 (1.8 percent) is projected to grow at the same rate as Alaska and more rapidly than in the United States (1.6 percent). Real per capita income (see **Table 2.4**) 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).

Table 2.3

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical and Projected Income (thousands of 1997 Dollars)

Year	Anchorage Metropolitan Area (a) (b)	Alaska (b)	Anchorage Percent of Alaska	United States (c)	Anchorage Percent of United States
		Historic			
1979	5,060,600	10,569,300	47.9%	4,374,755,900	0.12%
1980	5,077,500	10,679,400	47.5%	4,406,193,800	0.12%
1981	5,503,700	11,374,600	48.4%	4,522,841,800	0.12%
1982	6,364,500	12,883,500	49.4%	4,544,127,900	0.14%
1983	6,971,200	13,998,300	49.8%	4,631,740,900	0.15%
1984	7,076,800	13,962,100	50.7%	4,938,523,000	0.14%
1985	7,278,000	14,573,200	49.9%	5,108,979,000	0.14%
1986	6,938,300	14,010,100	49.5%	5,269,437,500	0.13%
1987	6,260,900	12,946,800	48.4%	5,393,874,800	0.12%
1988	6,130,000	12,993,100	47.2%	5,576,712,400	0.11%
1989	6,433,900	13,689,900	47.0%	5,716,539,200	0.11%
1990	6,659,200	14,012,400	47.5%	5,806,812,500	0.11%
1991	6,815,200	14,298,700	47.7%	5,778,669,600	0.12%
1992	6,985,900	14,578,300	47.9%	5,930,111,300	0.12%
1993	7,243,900	15,029,300	48.2%	6,047,370,900	0.12%
1994	7,348,600	15,208,000	48.3%	6,190,622,100	0.12%
1995	7,372,500	15,220,700	48.4% (d)	6,412,657,400	0.11%
1996	7,329,000	15,183,300	48.3% (e)	6,612,013,200	0.11%
		Projections (- Base Case) (f)			
2000	7,975,000	17,035,000	46.8%	6,814,548,000	0.12%
2003	8,096,000	17,214,000	47.0%	7,241,779,000	0.11%
2005	8,222,000	17,481,000	47.0%	7,526,600,000	0.11%
2008	8,688,000	18,410,000	47.2%	7,953,741,000	0.11%
2010	9,048,000	19,105,000	47.4%	8,238,502,000	0.11%
2015	10,122,000	21,152,000	47.9%	8,944,406,000	0.11%
2020	11,310,000	23,406,000	48.3%	9,654,670,500	0.12%
2025	12,664,000	25,953,000	48.8%	10,364,935,000	0.12%
		Projections (- High Case) (g)			
2000	8,324,000	17,750,000	46.9%		
2003	9,108,000	19,229,000	47.4%		
2005	9,561,000	20,123,000	47.5%		
2008	10,989,000	23,307,000	47.1%		
2010	11,889,000	24,963,000	47.6%		
2015	13,898,000	28,711,000	48.4%		
2020	16,814,000	34,136,000	49.3%		
2025	20,504,000	40,757,000	50.3%		
		Projections (- Low Case) (h)			
2000	7,485,000	16,146,000	46.4%		
2003	7,575,000	16,312,000	46.4%		
2005	7,597,000	16,380,000	46.4%		
2008	7,778,000	16,710,000	46.5%		
2010	7,942,000	17,007,000	46.7%		
2015	8,425,000	17,890,000	47.1%		
2020	8,982,000	18,914,000	47.5%		
2025	9,351,000	19,485,000	48.0%		

(a) Anchorage Borough.
(b) Anchorage and State data and projections from Institute of Social and Economic Research (ISER), University of Alaska Anchorage, Alaska's Economy and Population: 1959-2020, 1997 and Population, Employment and Income Projections for Alaska Census Areas, 1998. Converted to 1997 dollars.
(c) U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System (REIS).
(d) 1995 Anchorage and State income numbers from BEA.
(e) 1995 State income numbers from BEA.
(f) ISER, DOT Base Projection.
(g) ISER, DOT High Projection.
(h) ISER, DOT Low Projection.

Sources: As noted and HNTB analysis.

Table 2.4

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical and Projected Per Capita Income (1997 Dollars)

Year	Anchorage Metropolitan Area (a) (b)	Alaska (b)	Anchorage Percent of Alaska	United States (c)	Anchorage Percent of United States
		Historic			
1979	28,083	25,548	109.9%	19,481	144.2%
1980	27,822	25,439	109.4%	19,391	143.5%
1981	29,197	26,221	111.4%	19,710	148.1%
1982	31,617	27,802	113.7%	19,615	161.2%
1983	32,244	28,245	114.2%	19,811	162.8%
1984	31,286	26,747	117.0%	20,941	149.4%
1985	31,116	26,923	115.6%	21,473	144.9%
1986	29,512	25,585	115.4%	21,944	134.5%
1987	27,460	24,074	114.1%	22,262	123.3%
1988	27,501	24,469	112.4%	22,809	120.6%
1989	28,995	25,617	113.2%	23,161	125.2%
1990	29,426	25,477	115.5%	23,279	126.4%
1991	28,890	25,103	115.1%	22,920	126.0%
1992	28,502	24,810	114.9%	23,255	122.6%
1993	28,768	25,120	114.5%	23,462	122.6%
1994	28,773	25,225	114.1%	23,783	121.0%
1995	29,071	25,221	115.3%	24,405	119.1%
1996	28,834	25,098	114.9%	24,934	115.6%
		Projections (- Base Case) (d)			
2000	30,004	26,818	111.9%	24,669	121.6%
2003	29,542	26,133	113.0%	25,547	115.6%
2005	29,424	25,982	113.2%	26,108	112.7%
2008	29,725	26,206	113.4%	26,910	110.5%
2010	29,833	26,261	113.6%	27,422	108.8%
2015	30,264	26,550	114.0%	28,566	105.9%
2020	30,924	27,040	114.4%	29,640	104.3%
2025	31,714	27,651	114.7%	30,635	103.5%
		Projections (- High Case) (e)			
2000	30,454	27,257	111.7%		
2003	30,601	27,186	112.6%		
2005	30,675	27,285	112.4%		
2008	30,999	27,766	111.6%		
2010	31,051	27,657	112.3%		
2015	32,153	28,410	113.2%		
2020	33,686	29,691	113.5%		
2025	35,395	31,098	113.8%		
		Projections (- Low Case) (f)			
2000	29,834	26,525	112.5%		
2003	29,435	26,012	113.2%		
2005	29,137	25,734	113.2%		
2008	28,991	25,550	113.5%		
2010	28,964	25,482	113.7%		
2015	29,027	25,473	113.9%		
2020	29,250	25,611	114.2%		
2025	29,345	25,574	114.7%		

(a) Anchorage Borough.

(b) Anchorage and State data and projections from Institute of Social and Economic Research (ISER), University of Alaska Anchorage, Alaska's Economy and Population: 1959-2020, 1997 and Population, Employment and Income Projections for Alaska Census Areas, 1998. Converted to 1997 dollars.

(c) U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System (REIS).

(d) ISER, DOT Base Projection

(e) ISER, DOT High Projection

(f) ISER, DOT Low Projection

Sources: As noted and HNTB analysis.

Table 2.4 presents historical and projected real per capita income for Anchorage, Alaska, and the United States. Over the 1979-1996 period, real per capita income in the Anchorage metropolitan area rose and then declined, 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 to remain higher than the U.S.

2.1.4 Summary

In general, the information in this section 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. Recent declines in the price of oil and reductions in the oil industry workforce are part of this trend.

2.2 HISTORICAL AIRPORT ACTIVITY

This section discusses historical aviation activity at ANC. Aviation activity is comprised of the following subcategories:

- Commercial Passenger Service Activity - Including enplaned and transit activity for domestic air carriers, regional carriers, charter and other, and international carriers.
- Air Freight and Mail Activity - Including enplaned, deplaned, and transit tonnage for domestic and international carriers.
- GA Activity.
- Military Operations.

2.2.1 Passenger Activity

Table 2.5 presents the history of passenger activity at ANC from calendar year 1980 through 1997. Three major categories of passengers are included: originating, enplaning, and transit. Originating passengers 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.

Total enplanements have more than doubled from 1980 to 1997, increasing from 1.0 million to 2.1 million, an average annual increase of 4.3 percent. Except for a brief decline during the late 1980s when the oil industry suffered a setback, passenger enplanements have increased steadily through the period. Regional carrier enplanements have grown most rapidly, while charter and international enplanements have declined in recent years as the number of passenger aircraft making technical stops has declined.

Total transit passengers increased from 1.4 million in 1980 to almost 1.7 million in 1987, then declined to about 0.5 million in 1993 before recovering somewhat to 0.8 million in 1997. 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 2.5

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Passenger Originations and Enplanements

		Passenger Enplanements (b)					Transit Passengers (c)		
Calendar Year	Domestic Originations (a)	Domestic Air Carrier	Domestic Regional Carrier	Domestic Charter	International	Total	Domestic	International	Total
1980	324,690	1,006,869	n/a	n/a	25,971	1,032,840	n/a	n/a	1,377,181
1981 (d)	299,980	n/a	n/a	n/a	n/a	1,073,088	n/a	n/a	1,456,894
1982	416,110	1,232,079	n/a	n/a	27,430	1,259,509	n/a	n/a	1,440,894
1983	436,660	1,288,591	n/a	n/a	25,215	1,313,806	n/a	n/a	1,394,756
1984	436,880	1,399,899	n/a	n/a	27,078	1,426,977	n/a	n/a	1,468,271
1985	527,840	1,475,304	n/a	n/a	27,188	1,502,492	n/a	n/a	1,624,399
1986	714,860	1,407,358	n/a	n/a	28,195	1,435,553	n/a	n/a	1,594,862
1987	501,680	1,321,690	n/a	n/a	31,520	1,353,210	n/a	n/a	1,659,699
1988	732,150	1,229,145	138,059	n/a	35,681	1,402,885	n/a	n/a	1,546,309
1989	777,030	1,318,405	165,474	n/a	39,602	1,523,481	n/a	n/a	1,535,365
1990	901,060	1,379,682	160,054	152,323	52,119	1,744,178	124,677	1,232,770	1,357,447
1991	978,360	1,364,991	201,876	155,031	47,070	1,768,968	142,655	641,475	784,130
1992	1,019,300	1,380,619	260,597	136,889	32,055	1,810,160	201,756	517,290	719,046
1993	982,650	1,382,875	257,186	123,664	30,064	1,793,789	183,415	346,017	529,432
1994	1,001,650	1,510,800	301,327	96,505	25,862	1,934,494	201,066	370,891	571,957
1995	951,470	1,516,345	309,043	113,281	27,451	1,966,120	182,497	454,502	636,999
1996	1,168,450	1,675,938	270,501	134,709	38,139	2,119,287	148,105	596,942	745,047
1997	1,159,210 (e)	1,694,389	276,864	117,156	31,283	2,119,692	161,504	630,319	791,823

(a) CAB/DOT, Domestic Origin Destination Survey, Table 1.
(b) Airports Council International, Worldwide Airport Traffic Report for 1980-1989, TAMS Needs Assessment Report for 1990-1995 and HNTB compilation of ANC data for 1996-1997.
(c) TAMS Needs Assessment Report for 1990-1995 and HNTB compilation of ANC data for 1996-1997.
(d) Fiscal year.
(e) Twelve months ending September 1997.

Sources: As noted and HNTB analysis.

2.2.2 Air Freight and Mail Activity

Tables 2.6 and 2.7 present two sets of historical air freight data, which differ as to their sources and the way in which they were compiled.

Table 2.6 presents historical airport statistics on air cargo. These statistics are compiled on a fiscal year basis and include both freight and mail. The data are provided by the airlines, which are not consistent in the way they report cargo activity, specifically transit cargo. True transit cargo 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. Thus, some of the growth in transit air cargo shown in Table 2.6 may be attributable to improved reporting procedures. Some carriers, notably FedEx and Japan Air Lines (JAL), still do not report transit cargo, so true transit air cargo remains under-reported. An estimate of true transit cargo is discussed in Section 2.2.4.

Table 2.7 presents an alternative compilation of historical cargo data for ANC on a calendar year basis. Prior to 1990, the series shows that domestic air cargo, as reported by the airlines to the U.S. Department of Transportation (DOT), increased substantially in the early 1980s and then continued to grow at a more moderate pace. The data between 1990 and 1997 were compiled by K&A based on interviews with the individual carriers and carrier submittals to the U.S. DOT. These data include a separate breakout of intrastate air freight at ANC, and show that domestic cargo decreased between 1990 and 1993, then gradually increased. Some of the perceived slow growth in domestic freight is attributable to the diversion to bypass mail—in which pallets of air freight can be sent as mail—without being processed through a post office. International enplaned and deplaned air freight have increased substantially over the period, both as a result of the global growth in air freight, and the increased use of ANC as a transfer hub for cargo carriers, especially FedEx and UPS.

The rapid increase in international air cargo at ANC is attributable to several factors. First, air cargo has grown rapidly worldwide during the 1990s. This growth has been especially rapid in the Asia-North America market, which grew at a 10.7 percent annual rate between 1990 and 1997, according to Boeing. 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, United, and Polar Air, are increasingly using ANC as a transfer hub so that they can better distribute aircraft payloads along the North American and Asian routes. In 1997, these five carriers accounted for 95.5 percent of enplaned international air freight and 96.7 percent of deplaned international air freight at ANC.

International air cargo at ANC has recently achieved an additional impetus 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.

Table 2.6

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historic Air Freight and Mail (thousands of pounds)
Airport Statistics

Fiscal	Domestic Air Freight and Mail				International Air Freight and Mail				Total Air Freight and Mail			
Year	Enplaned	Deplaned	Transit	Total	Enplaned	Deplaned	Transit	Total	Enplaned	Deplaned	Transit	Total
1979	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	155,886	103,590	n/a	259,476
1980	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	157,068	95,801	n/a	252,869
1981	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	186,480	119,343	n/a	305,823
1982	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	181,394	118,324	n/a	299,718
1983	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	191,785	130,139	n/a	321,923
1984	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	187,725	134,685	n/a	322,410
1985	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	198,091	140,821	n/a	338,913
1986	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	182,888	117,496	n/a	300,384
1987	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	178,378	106,525	n/a	284,903
1988	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	192,423	116,488	342,907	651,818
1989	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	209,903	135,436	701,015	1,046,354
1990	222,179	114,071	3,335	339,586	18,608	47,884	788,430	854,922	240,787	161,956	791,765	1,194,507
1991	216,882	100,236	2,908	320,026	35,867	66,472	872,909	975,248	252,749	166,708	875,817	1,295,273
1992	195,877	102,247	4,210	302,333	20,165	41,112	916,742	978,019	216,042	143,359	920,952	1,280,352
1993	190,655	101,763	4,866	297,284	17,267	51,940	982,647	1,051,854	207,922	153,703	987,513	1,349,138
1994	200,973	98,501	3,089	302,563	23,492	62,646	1,235,315	1,321,452	224,465	161,147	1,238,404	1,624,016
1995	195,268	88,790	12,768	296,826	30,181	81,759	1,580,286	1,692,226	225,449	170,549	1,593,054	1,989,052
1996	200,964	89,356	89,191	379,511	32,751	85,092	2,068,010	2,185,853	233,715	174,448	2,157,201	2,565,364
1997	204,858	88,200	328,560	621,618	34,889	78,150	2,043,262	2,156,301	239,747	166,350	2,371,822	2,777,919
1998	214,087	99,757	385,847	699,691	44,435	91,236	2,007,469	2,143,140	258,522	190,993	2,393,316	2,842,831

Sources: Ted Stevens Anchorage International Airport, Monthly Statistics by Carrier.

Table 2.7

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historic Air Freight (tons)
FAA and K&A Statistics

Calendar Year	Domestic Air Freight (a)			Estimated Domestic Intrastate Freight (b)			International Air Freight			Total Air Freight		
	Enplaned	Deplaned	Total	Enplaned	Deplaned	Total	Enplaned	Deplaned	Total	Enplaned	Deplaned	Total
						FAA Airport Activity Statistics (c)						
1979	74,308	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1980	92,644	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1981	106,410	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1982	122,364	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1983	176,242	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1984	216,233	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1985	194,866	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1986	203,039	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1987	239,616	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1988	257,598	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1989	262,192	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
						Keiser Associates, Inc, Statistics (d)						
1990	184,338	43,231	227,569	31,432	19,340	50,772	61,505	56,037	117,542	245,843	99,268	345,111
1991	170,185	47,614	217,799	30,746	19,713	50,459	75,226	74,665	149,891	245,411	122,279	367,690
1992	146,846	42,200	189,046	29,487	21,307	50,794	76,373	112,020	188,393	223,219	154,220	377,439
1993	140,633	46,163	186,796	30,055	21,609	51,664	46,720	93,416	140,136	187,353	139,579	326,932
1994	151,826	49,015	200,841	33,700	26,359	60,059	55,264	123,682	178,946	207,090	172,697	379,787
1995	149,843	56,064	205,907	36,877	29,740	66,617	77,170	144,456	221,626	227,013	200,520	427,533
1996	158,025	48,532	206,557	43,509	25,950	69,459	102,249	144,193	246,442	260,274	192,725	452,999
1997	176,764	46,198	222,962	46,632	23,234	69,866	104,457	166,023	270,480	281,221	212,221	493,442

(a) Includes intrastate air freight.
(b) Estimated intrastate air freight provided by Keiser Associates, Inc.
(c) FAA/CAB, Airport Activity Statistics of Certificated Route Air Carriers, 1979-1989.
(d) Keiser Associates, Inc., Anchorage International Airport Preliminary Air Cargo Forecast updated for 1997.

Sources: As noted and HNTB analysis.

- 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.
- Interline cargo transfers between different foreign-flag carriers.

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

Table 2.8 presents historical air mail statistics at ANC, as compiled by the U.S. DOT prior to 1990 and by K&A from 1990 through 1997. As shown, the vast majority of mail is domestic. Air mail at ANC has grown gradually through the years. In recent years, air mail growth at ANC has been stimulated by the increased popularity 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. Combined domestic air freight and mail declined between 1990 and 1993 but have since increased at a 5.8 percent annual rate.

2.2.3 Estimate of Origin-Destination Freight

Some cargo facility requirements, such as roadways leading to the cargo buildings, are dependent on true origin-destination (O&D) air freight. A true originating air freight ton is an enplaned ton that comes from outside the Airport, either as a result of processing or manufacturing at Anchorage or transfer from another mode, such as ship or truck. Likewise, a true terminating ton is a deplaned ton that is transported outside the Airport, either for final use at Anchorage or for transfer to another transportation mode. A transfer ton is a deplaned cargo ton that is eventually enplaned onto another aircraft at ANC.

No accurate information on the distribution of enplaned and deplaned cargo tonnage between O&D and transfer freight is available. The carriers are not required to provide this breakdown to either the Airport or the U.S. DOT. Consequently, estimates of base year domestic and international O&D cargo were developed for use in the facilities planning analysis. Because these estimates are based on assumptions, it should be noted that they are necessarily more speculative than the estimates of total enplaned and deplaned domestic freight.

Table 2.9 shows the methodology used to estimate domestic and international O&D air freight. According to K&A and Anchorage Economic Development Corporation (AEDC) staff, most intrastate enplaned and deplaned air freight is O&D. Of the airlines offering intrastate service, only Alaska Airlines has the air route network necessary to transfer air cargo from the lower 48 states to outlying Alaska communities. According to AEDC staff familiar with Alaska Airline operations, approximately 12 to 15 percent of Alaska air freight is transferred to other Alaska Airlines aircraft, with another 1 or 2 percent transferred to other domestic air carriers. In addition, some freight is delivered to freight forwarders, who may later reship it with another carrier. Based on this information, it was assumed that approximately 15 percent of Alaska Airlines enplaned freight is domestic-to-domestic transfer and that the remainder of intrastate enplaned air freight is O&D. As shown in Table 2.9, the methodology generates an estimated 44,882 originating tons of domestic air freight and an estimated 21,484 terminating tons of domestic air freight for calendar year 1997.

Table 2.8

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historic Mail (tons)
FAA and K&A Statistics

Calendar Year	Domestic Air Mail			International Air Mail			Total Air Mail			Total Domestic Freight and Mail
	Enplaned	Deplaned	Total	Enplaned	Deplaned	Total	Enplaned	Deplaned	Total	
				FAA Airport Activity Statistics (a)						
1979	22,197	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1980	25,440	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1981	29,821	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1982	34,390	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1983	38,496	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1984	44,146	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1985	44,315	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1986	51,027	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1987	53,829	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1988	57,658	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1989	59,051	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
				Keiser Associates, Inc, Statistics (b)						
1990	n/a	n/a	57,534	n/a	n/a	2,227	n/a	n/a	59,761	285,103
1991	n/a	n/a	54,288	n/a	n/a	1,947	n/a	n/a	56,235	272,087
1992	n/a	n/a	58,786	n/a	n/a	3,610	n/a	n/a	62,396	247,832
1993	n/a	n/a	59,237	n/a	n/a	2,858	n/a	n/a	62,095	246,033
1994	n/a	n/a	65,322	n/a	n/a	2,318	n/a	n/a	67,640	266,163
1995	n/a	n/a	68,168	n/a	n/a	2,644	n/a	n/a	70,812	274,075
1996	n/a	n/a	82,688	n/a	n/a	2,942	n/a	n/a	85,630	289,245
1997	n/a	n/a	84,912	n/a	n/a	4,146	n/a	n/a	89,058	307,874

(a) FAA/CAB. Airport Activity Statistics of Certificated Route Air Carriers, 1979-1989.
(b) Keiser Associates, Inc , Anchorage International Airport Preliminary Air Cargo Forecast updated for 1997.

Sources: As noted and HNTB analysis.

Table 2.9

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated Distribution of ANC Air Freight in 1997

Category	Tonnage Estimate	Source
Domestic Deplaned Air Freight		
(a) Total	46,198	Table 2.7.
(b) Domestic to Domestic Transfer	1,750	Approximately 15 percent of Alaska Airlines enplaned freight based on information provided by AEDC.
(c) Domestic to International Transfer	22,964	Total less domestic-to-domestic transfer and terminating domestic.
(d) Terminating Domestic	21,484	Domestic intrastate deplaned air freight from Table 2.7 less domestic-to-domestic transfer.
Domestic Enplaned Air Freight		
(a) Total	176,764	Table 2.7.
(b) Domestic to Domestic Transfer	1,750	Approximately 15 percent of Alaska Airlines enplaned freight based on information provided by AEDC.
(c) International to Domestic Transfer	130,132	Total less domestic-to-domestic transfer and originating domestic.
(d) Originating Domestic	44,882	Domestic intrastate enplaned air freight from Table 2.7 less domestic-to-domestic transfer.
International Deplaned Air Freight		
(a) Total	166,023	Table 2.7.
(b) International to International Transfer	30,421	Total less international-to-domestic transfer and terminating international.
(c) International to Domestic Transfer	130,132	From domestic enplaned air freight, (c) international-to-domestic transfer.
(d) Terminating International	5,470	Total deplaned international freight from carriers not engaged in routine transfer operations (All carriers except FedEx, UPS, Northwest, United, and Polar) from Keiser Associates data.
International Enplaned Air Freight		
(a) Total	104,457	Table 2.7.
(b) International to International Transfer	30,421	From international deplaned air freight, (b) international-to-international transfer.
(c) Domestic to International Transfer	22,964	From domestic deplaned air freight, (c) domestic-to-international transfer.
(d) Originating International	51,072	Total less international-to-international transfer and domestic-to-international transfer.

Sources: As noted and HNTB analysis.

As a result of the domestic O&D calculation, it is also possible to estimate domestic-to-international and international-to-domestic transfer air freight. As shown in Table 2.9, 1997 domestic-to-international transfer freight is estimated at 22,964 tons and international-to-domestic freight is estimated at 130,132 tons.

As noted earlier, the five carriers engaged in international transfer operations at ANC account for 96.7 percent of deplaned international air freight. Most of the remaining carriers have minimal transfer operations, so it is likely that most of their deplaned international freight, 5,470 tons, terminates at ANC. Based on Boeing estimates of international cargo flows, North Americans average 20.4 pounds of international cargo per person. Applying this factor to the Anchorage metropolitan population would produce an estimate of 2,857 international terminating tons. The higher 5,470-ton estimate reflects Anchorage's greater dependence on air transportation for its imports and its proximity to the Asian market.

International originating freight was estimated as a residual. As shown in Table 2.9, once estimates of international-to-international and domestic-to-international transfer freight are subtracted from total international enplaned tonnage, an estimate of 51,072 originating tons of international air freight is generated. According to U.S. Department of Commerce air export data for 1997, there were 72,835 total tons of air exports from the Anchorage Customs District. However, some of these commodities, especially those that do not have a history of being manufactured in Anchorage, are air transfer commodities and therefore do not constitute originating freight.

It should be noted that the originating and terminating air freight numbers presented in Table 2.9 are estimates and, therefore, are not as accurate as the enplaned and deplaned air freight data that are based on U.S. DOT statistics and air carrier interviews.

2.2.4 Estimated Transit Freight

As noted in Section 2.2.2, the Airport counts of transit freight are inaccurate because some carriers inappropriately count transfer cargo as transit cargo and because FedEx and JAL do not provide transit cargo tonnage counts. **Table 2.10** presents an estimate of international transit freight at ANC, which includes adjustments for these factors. A comparison of Airport counts and K&A tabulations shows that 156,325 tons of enplaned transfer cargo and 124,907 tons of deplaned transfer cargo were inappropriately counted as transit cargo by the air carriers. Estimates of FedEx and JAL transit tonnage were developed based on transit cargo data from the two most similar carriers: UPS for FedEx and Nippon Cargo Airline for JAL. As shown in Table 2.10, once the above adjustments are made, the estimate of true international transit freight at ANC becomes 1,239,944 tons.

Table 2.10 also shows an estimate of the total international air freight flowing through ANC in 1997. This estimate includes O&D freight, transfer freight, and transit freight. Deplaned transfer freight is excluded to avoid double counting enplaned transfer freight. As shown, approximately 1.48 million tons of international air freight passed through ANC in 1997.

Again, it should be noted that the transit freight numbers in Table 2.10 are estimates like the O&D numbers in Table 2.9 rather than actual counts.

Table 2.10

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated Transit Freight - Calendar Year 1997

Category	Tonnage Estimate
Airport Count of Calendar 1997 Transit Freight (a)	1,208,220
Adjustment for Incorrectly Tabulated Transfer Freight	
Airport Count of Enplaned Freight - CY 1997 (a)	124,896
Keiser Associates Count of Enplaned Freight - CY 1997 (b)	281,221
Net Adjustment for Enplaned Transfer Freight (c)	(156,325)
Airport Count of Deplaned Freight - CY 1997 (a)	87,314
Keiser Associates Count of Enplaned Freight - CY 1997 (b)	212,221
Net Adjustment for Deplaned Transfer Freight (c)	(124,907)
Adjustment for Enplaned and Deplaned Air Mail (d)	(89,058)
Total Adjustment for Incorrectly Tabulated Transfer Freight (e)	(370,291)
Adjustment divided by 2 (f)	(185,145)
Transit Tonnage Less Adjustment for Transfer Tonnage (g)	1,023,075
Adjustment for FedEx and JAL	
FedEx (h)	63,562
JAL (i)	185,342
Subtotal	248,904
Transit Freight Including FedEx and JAL	1,271,978
Less Domestic Transit (a)	32,035
Estimated International Transit Tonnage	1,239,944

Estimated Total ANC International Freight Flow- CY 1997

Estimated International Transit Freight	1,239,944
International to International Transfer Freight (j)	30,421
Domestic to International Transfer Freight (j)	22,964
International to Domestic Transfer Freight (j)	130,132
International Originating Freight (j)	51,072
International Terminating Freight (j)	5,470
Total Estimated ANC International Freight Flow	1,480,003

(a) HNTB compilation of ANC Monthly Statistics by Carrier.
(b) Table 2.7.
(c) Airport count less Keiser Associates count.
(d) Table 2.8.
(e) Sum of adjustments for enplaned and deplaned transfer freight and mail.
(f) Divided by 2 to avoid double counting of enplaned and deplaned transfer tonnage.
(g) ANC count of transit tonnage less adjustment for transfer tonnage.
(h) FedEx ratio of transit tons to aircraft landed weight assumed to be the same as for UPS.
(i) JAL ratio of transit tons to aircraft landed weight assumed to be the same as for Nippon Cargo Airline.
(j) Table 2.9.

Sources: As noted and HNTB analysis.

2.2.5 Aircraft Operations

Table 2.11 presents the recent history of aircraft operations at the Airport. Total annual aircraft operations at ANC have increased slightly from 221,259 in 1990 to 231,562 in 1997. Between 1990 and 1997, passenger aircraft operations increased slightly. Regional carriers increased operations significantly while the other passenger categories experienced slight declines. Domestic air carrier passenger airlines enplaned an increasing number of passengers with fewer aircraft by using larger aircraft at higher load factors. Consistent with the increased cargo tonnage, air cargo operations have increased. GA operations have declined while military operations have fluctuated with no discernable long-term trend. In 1997, passenger operations accounted for 51 percent of the total, all-cargo operations accounted for 29 percent of the total, GA operations accounted for 18 percent of the total, and military operations accounted for 2 percent of the total.

Operations at LHD, located adjacent to ANC, are included since the FAA tabulates ANC and LHD operations together. In 1997, there were an estimated 82,213 aircraft operations at LHD, consisting of air taxi and GA activity. ANC and LHD accounted for a combined total of 313,775 aircraft operations in 1997.

2.2.6 Peaking Characteristics

Table 2.12 shows the existing seasonal distribution of operations for the different types of aviation activity at ANC. As shown, passenger operations show a pronounced summer peak as a result of the increased tourist activity at that time. The demand for air cargo is more evenly distributed through the year, therefore, all-cargo aircraft operations show less seasonality. GA and military activity also peak during the summer since flying conditions are better.

Tables 2.13, 2.14, and 2.15 show the hourly distribution of aircraft arrivals, departures, and operations by major category for ANC. The most pronounced peaking is shown by the "other international" cargo carriers, which includes the five carriers involved in transfer operations (FedEx, UPS, United, Northwest, and Polar). To accommodate their transfer operations, these carriers schedule aircraft to arrive and depart at similar times. Currently, the carriers operate a westbound bank early in the morning, followed by an eastbound bank in the late morning or early afternoon.

2.3 PASSENGER PROJECTIONS

As noted previously, the passenger projections developed in the TAMS Needs Assessment Report were adapted for use in this study. The final draft of the TAMS study was published in July 1997 and used 1995 as the base year. The TAMS passenger forecast methodology involved first identifying and selecting influential factors, developing an initial mathematical projection, adjusting the initial forecast to incorporate subjective information that had been gathered, and finally reviewing and revising the report with the assistance of airport and airline officials. The TAMS forecasts incorporated the following factors:

- Strong growth in the cruise ship industry, which is helping to stimulate tourism. Growth is especially strong among East Coast and Midwest visitors and young and middle-aged visitors.

Table 2.11

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Aircraft Operations

Calendar Year	Passenger Operations: Air Carrier (a)	Passenger Operations: Regional Carrier (a)	Passenger Operations: Charter (a)	Passenger Operations: International (a)	Air Cargo (b)	Other (c)	Itinerant (d): GA	Itinerant (d): Military	Local (d): GA	Local (d): Military	Total (d)
Ted Stevens Anchorage International Airport Operations											
1990	51,985	32,727	7,616	13,064	37,890	17,490	44,469	2,670	13,109	239	221,259
1991	50,808	41,640	7,752	6,910	39,824	26,119	41,277	3,555	14,332	196	232,413
1992	54,093	59,085	6,844	5,818	38,760	13,786	37,226	3,483	12,944	179	232,218
1993	50,268	53,552	6,183	3,747	40,628	9,359	35,943	3,486	14,000	314	217,480
1994	49,244	56,780	4,825	3,676	45,400	8,503	34,793	3,633	9,995	302	217,151
1995	44,774	56,760	5,664	4,251	49,622	5,190	36,372	3,629	8,754	176	215,192
1996	47,484	47,994	6,446	6,238	57,764	1,478	32,899	3,323	3,017	123	206,766
1997	45,726	59,990	5,682	6,494	66,490	1,666	36,480	3,835	5,003	196	231,562
Lake Hood Operations (e)											
1996	-	-	-	-	-	22,465	52,194	-	11,737	-	86,396
1997	-	-	-	-	-	23,304	51,536	-	7,373	-	82,213
Ted Stevens Anchorage International Airport and Lake Hood Operations											
1996	47,484	47,994	6,446	6,238	57,764	23,943	85,093	3,323	14,754	123	293,162
1997	45,726	59,990	5,682	6,494	66,490	24,970	88,016	3,835	12,376	196	313,775

(a) TAMS Needs Assessment Report for 1990-1995. HNTB compilation of ANC aircraft landings data for 1996-1997.
(b) HNTB compilation of ANC landings data for 1990-1997.
(c) Undetermined operations. Difference between FAA counts of Air Carrier and Air Taxi operations and ANC counts of commercial (passenger and freight) operations.
(d) FAA APO data base. Excludes Lake Hood operations. Non-Lake Hood operations for 1996 and 1997 estimated based on previous years' distribution of operations between ANC and Lake Hood.
(e) Lake Hood operations estimated based on 1995 distribution of operations between ANC and Lake Hood.

Sources: As noted and HNTB analysis.

Table 2.12

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Monthly Distribution of Operations (a)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Passenger (b)												
Domestic Air Carrier	7.24%	6.40%	7.15%	6.98%	8.41%	10.28%	**11.63%**	11.59%	8.78%	7.56%	6.90%	7.09%
Regional Carrier	7.24%	6.26%	7.58%	7.14%	8.43%	10.67%	**10.70%**	10.29%	9.10%	8.20%	7.02%	7.38%
International Carrier	7.86%	6.25%	6.10%	6.74%	8.87%	9.78%	10.09%	**11.52%**	9.47%	8.46%	7.04%	7.82%
All-Cargo (c)												
Domestic	7.20%	6.89%	7.86%	8.29%	8.86%	**9.31%**	8.58%	8.97%	8.24%	9.02%	8.52%	8.25%
International	7.53%	7.04%	8.73%	8.39%	8.58%	8.51%	8.23%	8.10%	8.65%	**9.08%**	8.95%	8.21%
General Aviation (d)	5.21%	5.44%	7.80%	7.49%	9.72%	12.03%	12.14%	**12.37%**	10.02%	7.88%	5.52%	4.37%
Military (d)	7.71%	6.35%	8.29%	8.96%	8.87%	**9.95%**	8.78%	8.71%	9.46%	9.30%	6.92%	6.70%
Total (d)	6.97%	6.39%	7.69%	7.65%	8.86%	10.24%	**10.47%**	10.41%	9.05%	8.11%	7.09%	7.07%

(a) Peak month in bold.
(b) Ted Stevens Anchorage International Airport, Fiscal 1997 and 1998 Monthly Statistics by Carrier: Number of Passenger Landings.
(c) Ted Stevens Anchorage International Airport, Fiscal 1997 and 1998 Monthly Statistics by Carrier: Number of Cargo Landings.
(d) Ted Stevens Anchorage International Airport and FAA APO Data System.

Sources: As noted and HNTB analysis.

Table 2.13

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Hourly Distribution of Aircraft Arrivals at Ted Stevens Anchorage International Airport: 1998

	Passenger Carrier			Cargo					
Hour	**Air Carrier**	**Regional Carrier**	**International Carrier**	**Technical Stops**	**Other International**	**Domestic**	**General Aviation**	**Military**	**Total**
0000-0059	7.7%	0.0%	7.1%	1.9%	0.0%	0.0%	0.7%	1.7%	1.8%
0100-0159	3.1%	2.3%	0.0%	1.9%	0.0%	2.2%	0.4%	0.3%	1.4%
0200-0259	0.0%	0.0%	7.1%	3.8%	0.0%	0.0%	0.4%	0.6%	0.8%
0300-0359	0.0%	1.1%	0.0%	3.8%	0.0%	0.0%	0.1%	0.3%	0.7%
0400-0459	0.0%	0.0%	**14.3%**	1.9%	15.8%	4.4%	0.3%	1.4%	1.8%
0500-0559	0.0%	2.3%	7.1%	**11.3%**	0.0%	4.4%	0.4%	1.4%	2.5%
0600-0659	1.5%	1.1%	7.1%	7.5%	0.0%	**13.3%**	1.2%	1.1%	3.5%
0700-0759	3.1%	2.3%	0.0%	5.7%	0.0%	11.1%	2.4%	1.9%	3.5%
0800-0859	3.1%	6.9%	7.1%	5.7%	0.0%	2.2%	3.8%	1.7%	4.2%
0900-0959	3.1%	4.6%	7.1%	0.0%	10.5%	6.7%	5.2%	3.0%	4.6%
1000-1059	3.1%	4.6%	7.1%	9.4%	5.3%	2.2%	5.9%	9.1%	5.3%
1100-1159	4.6%	5.7%	7.1%	3.8%	**36.8%**	0.0%	5.7%	**11.3%**	6.5%
1200-1259	3.1%	6.9%	0.0%	5.7%	10.5%	6.7%	7.3%	5.0%	6.2%
1300-1359	6.2%	6.9%	**14.3%**	7.5%	5.3%	11.1%	7.5%	10.5%	**7.6%**
1400-1459	9.2%	4.6%	0.0%	1.9%	5.3%	4.4%	7.4%	7.4%	5.9%
1500-1559	3.1%	**10.3%**	0.0%	5.7%	5.3%	4.4%	7.1%	6.1%	6.4%
1600-1659	3.1%	3.4%	0.0%	5.7%	5.3%	8.9%	7.8%	5.2%	5.8%
1700-1759	1.5%	5.7%	**14.3%**	3.8%	0.0%	0.0%	**8.3%**	5.2%	5.3%
1800-1859	6.2%	4.6%	0.0%	3.8%	0.0%	4.4%	7.4%	6.9%	5.4%
1900-1959	9.2%	5.7%	0.0%	1.9%	0.0%	4.4%	7.4%	5.2%	5.8%
2000-2059	7.7%	**10.3%**	0.0%	1.9%	0.0%	2.2%	4.9%	6.3%	5.4%
2100-2159	6.2%	4.6%	0.0%	1.9%	0.0%	2.2%	4.2%	5.0%	3.8%
2200-2259	4.6%	0.0%	0.0%	0.0%	0.0%	0.0%	2.8%	2.8%	1.7%
2300-2359	**10.8%**	5.7%	0.0%	3.8%	0.0%	4.4%	1.4%	0.8%	4.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Peak Hour Percent	10.8%	10.3%	14.3%	11.3%	36.8%	13.3%	8.3%	11.3%	7.6%

Sources: Passenger and Cargo airline schedules as provided by ANC, ATCT counts for July 1998, and HNTB analysis.

Table 2.14

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Hourly Distribution of Aircraft Departures at Ted Stevens Anchorage International Airport: 1998

	Passenger Carrier			Cargo					
Hour	**Air Carrier**	**Regional Carrier**	**International Carrier**	**Technical Stops**	**Other International**	**Domestic**	**General Aviation**	**Military**	**Total**
0000-0059	7.8%	0.0%	0.0%	1.9%	0.0%	0.0%	0.7%	1.7%	1.5%
0100-0159	9.4%	0.0%	7.1%	3.8%	0.0%	2.1%	0.4%	0.3%	2.3%
0200-0259	0.0%	1.1%	0.0%	1.9%	0.0%	0.0%	0.4%	0.6%	0.6%
0300-0359	0.0%	0.0%	7.1%	3.8%	0.0%	2.1%	0.1%	0.3%	0.9%
0400-0459	0.0%	3.3%	0.0%	3.8%	0.0%	6.3%	0.3%	1.4%	1.8%
0500-0559	0.0%	0.0%	**14.3%**	1.9%	0.0%	**10.4%**	0.4%	1.4%	1.9%
0600-0659	**10.9%**	**8.9%**	**14.3%**	**9.4%**	20.0%	**10.4%**	1.2%	1.1%	6.9%
0700-0759	3.1%	6.7%	0.0%	7.5%	0.0%	2.1%	2.4%	1.9%	3.9%
0800-0859	9.4%	8.9%	7.1%	5.7%	**46.7%**	4.2%	3.8%	1.7%	**7.2%**
0900-0959	3.1%	5.6%	0.0%	7.5%	20.0%	4.2%	5.2%	3.0%	5.4%
1000-1059	1.6%	5.6%	7.1%	0.0%	0.0%	2.1%	5.9%	9.1%	4.0%
1100-1159	4.7%	7.8%	0.0%	9.4%	0.0%	6.3%	5.7%	**11.3%**	6.1%
1200-1259	6.3%	6.7%	7.1%	3.8%	6.7%	8.3%	7.3%	5.0%	6.9%
1300-1359	7.8%	4.4%	**14.3%**	5.7%	0.0%	8.3%	7.5%	10.5%	7.0%
1400-1459	3.1%	5.6%	7.1%	7.5%	0.0%	8.3%	7.4%	7.4%	6.3%
1500-1559	4.7%	4.4%	0.0%	1.9%	0.0%	8.3%	7.1%	6.1%	5.3%
1600-1659	3.1%	6.7%	0.0%	5.7%	6.7%	**10.4%**	7.8%	5.2%	6.6%
1700-1759	3.1%	**8.9%**	0.0%	3.8%	0.0%	2.1%	**8.3%**	5.2%	6.0%
1800-1859	1.6%	4.4%	**14.3%**	3.8%	0.0%	2.1%	7.4%	6.9%	5.0%
1900-1959	6.3%	1.1%	0.0%	3.8%	0.0%	0.0%	7.4%	5.2%	4.3%
2000-2059	3.1%	3.3%	0.0%	1.9%	0.0%	0.0%	4.9%	6.3%	3.2%
2100-2159	7.8%	4.4%	0.0%	3.8%	0.0%	0.0%	4.2%	5.0%	4.0%
2200-2259	0.0%	2.2%	0.0%	1.9%	0.0%	2.1%	2.8%	2.8%	1.9%
2300-2359	3.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.8%	0.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Peak Hour Percent	10.9%	8.9%	14.3%	9.4%	46.7%	10.4%	8.3%	11.3%	7.2%

Sources: Passenger and Cargo airline schedules as provided by ANC, ATCT counts for July 1998, and HNTB analysis.

Table 2.15

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Hourly Distribution of Aircraft Operations at Ted Stevens Anchorage International Airport: 1998

	Passenger Carrier			Cargo					
Hour	Air Carrier	Regional Carrier	International Carrier	Technical Stops	Other International	Domestic	General Aviation	Military	Total
0000-0059	7.8%	0.0%	3.6%	1.9%	0.0%	0.0%	0.7%	1.7%	1.7%
0100-0159	6.2%	1.1%	3.6%	2.8%	0.0%	2.2%	0.4%	0.3%	1.9%
0200-0259	0.0%	0.6%	3.6%	2.8%	0.0%	0.0%	0.4%	0.6%	0.7%
0300-0359	0.0%	0.6%	3.6%	3.8%	0.0%	1.1%	0.1%	0.3%	0.8%
0400-0459	0.0%	1.7%	7.1%	2.8%	8.8%	5.4%	0.3%	1.4%	1.8%
0500-0559	0.0%	1.1%	10.7%	6.6%	0.0%	7.5%	0.4%	1.4%	2.2%
0600-0659	6.2%	5.1%	10.7%	**8.5%**	8.8%	**11.8%**	1.2%	1.1%	5.2%
0700-0759	3.1%	4.5%	0.0%	6.6%	0.0%	6.5%	2.4%	1.9%	3.7%
0800-0859	6.2%	**7.9%**	7.1%	5.7%	**20.6%**	3.2%	3.8%	1.7%	5.7%
0900-0959	3.1%	5.1%	3.6%	3.8%	14.7%	5.4%	5.2%	3.0%	5.0%
1000-1059	2.3%	5.1%	7.1%	4.7%	2.9%	2.2%	5.9%	9.1%	4.7%
1100-1159	4.7%	6.8%	3.6%	6.6%	**20.6%**	3.2%	5.7%	**11.3%**	6.3%
1200-1259	4.7%	6.8%	3.6%	4.7%	8.8%	7.5%	7.3%	5.0%	6.6%
1300-1359	7.0%	5.6%	**14.3%**	6.6%	2.9%	9.7%	7.5%	10.5%	**7.3%**
1400-1459	6.2%	5.1%	3.6%	4.7%	2.9%	6.5%	7.4%	7.4%	6.1%
1500-1559	3.9%	7.3%	0.0%	3.8%	2.9%	6.5%	7.1%	6.1%	5.9%
1600-1659	3.1%	5.1%	0.0%	5.7%	5.9%	9.7%	7.8%	5.2%	6.2%
1700-1759	2.3%	7.3%	7.1%	3.8%	0.0%	1.1%	**8.3%**	5.2%	5.6%
1800-1859	3.9%	4.5%	7.1%	3.8%	0.0%	3.2%	7.4%	6.9%	5.2%
1900-1959	**7.8%**	3.4%	0.0%	2.8%	0.0%	2.2%	7.4%	5.2%	5.1%
2000-2059	5.4%	6.8%	0.0%	1.9%	0.0%	1.1%	4.9%	6.3%	4.3%
2100-2159	7.0%	4.5%	0.0%	2.8%	0.0%	1.1%	4.2%	5.0%	3.9%
2200-2259	2.3%	1.1%	0.0%	0.9%	0.0%	1.1%	2.8%	2.8%	1.8%
2300-2359	7.0%	2.8%	0.0%	1.9%	0.0%	2.2%	1.4%	0.8%	2.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Peak Hour Percent	7.8%	7.9%	14.3%	8.5%	20.6%	11.8%	8.3%	11.3%	7.3%

Sources: Passenger and Cargo airline schedules as provided by ANC, ATCT counts for July 1998, and HNTB analysis.

- A stable economy in Alaska, resulting in an increase in business-oriented trips.

- An increasing number of conventions taking advantage of the hotel capacity in the off-peak season.

- Many of the jobs in Alaska, such as oil, construction, seafood, or tourism are short-term or seasonal and stimulate turnover and travel in the population.

- The costs of accommodating additional government regulations (higher insurance rates) on regional carriers are expected to constrain regional carrier growth more than air carrier growth.

- Since the oil industry is entering a mature phase with less exploration and infrastructure development, it is expected to generate less growth in air travel to the bush (which is primarily conducted by regional carriers) than it has in the past. Change could occur with development of the ANWR, the National Petroleum Reserve Alaska, or the proposed Alaska Natural Gasline.

- Domestic charter enplanements are very dependent on the oil industry and are therefore expected to grow very slowly, reflecting the mature status of the oil industry.

- Increased international traffic is expected as a result of tourism development, anticipated Asian economic growth in the long term, and the opening of new markets such as China and Latin America.

The TAMS forecasts were compared with actual activity levels in 1996 and 1997 to determine whether they were sufficiently accurate to be used without change or whether some adjustments were required.

This section evaluates the TAMS forecasts of domestic air carrier, regional carrier, charter, and international enplanements as well as domestic and international transit passengers. Combination passenger-cargo carriers (combis) are included in this section. Adjustments were made in instances where there was a notable divergence between actual and forecast levels. In addition, the TAMS forecasts were interpolated and extrapolated to conform with the Airfield/Air Cargo Master Plan Update horizon years of 2003, 2008, and 2020. In general, the TAMS forecast growth rates were used to project passenger activity levels, and the underlying variables driving passenger growth remain as identified by TAMS. This section also contains derivative forecasts of passenger carrier average aircraft size, load factor, aircraft operations, fleet mix, and peak hour activity.

2.3.1 Passenger Enplanements

Table 2.16 presents recent historical data on passenger enplanements along with the unadjusted TAMS forecasts and the recommended forecast for use in this study.

Table 2.16

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Passenger Enplanements

Calendar Year	Domestic Air Carrier	Domestic Regional Carrier	Domestic Charter/ Other	Total Domestic	Inter-national	Total
			Historical (a)			
1990	1,379,682	160,054	152,323	1,692,059	52,119	1,744,178
1991	1,364,991	201,876	155,031	1,721,898	47,070	1,768,968
1992	1,380,619	260,597	136,889	1,778,105	32,055	1,810,160
1993	1,382,875	257,186	123,664	1,763,725	30,064	1,793,789
1994	1,510,800	301,327	96,505	1,908,632	25,862	1,934,494
1995	1,516,345	309,043	113,281	1,938,669	27,451	1,966,120
1996	1,675,938	270,501	134,709	2,081,148	38,139	2,119,287
1997	1,694,389	276,864	117,156	2,088,409	31,283	2,119,692
			TAMS Forecast (b)			
1995	1,516,345	309,043	113,281	1,938,669	27,451	1,966,120
1997 (c)	1,673,807	325,426	115,969	2,115,201	36,471	2,151,672
2000	1,910,000	350,000	120,000	2,380,000	50,000	2,430,000
2005	2,290,000	430,000	120,000	2,840,000	70,000	2,910,000
2010	2,700,000	510,000	120,000	3,330,000	85,000	3,415,000
2015	3,120,000	570,000	130,000	3,820,000	100,000	3,920,000
			Recommended Forecast (d)			
1997	1,694,389	276,864	117,156	2,088,409	31,283	2,119,692
1998	1,774,000	296,000	118,000	2,188,000	38,000	2,226,000
1999	1,853,000	315,000	119,000	2,287,000	44,000	2,331,000
2000	1,933,000	334,000	120,000	2,387,000	50,000	2,437,000
2001	2,010,000	353,000	121,000	2,484,000	54,000	2,538,000
2002	2,087,000	373,000	121,000	2,581,000	58,000	2,639,000
2003	2,164,000	392,000	122,000	2,678,000	62,000	2,740,000
2008	2,567,000	478,000	125,000	3,170,000	79,000	3,249,000
2020	3,584,000	630,000	133,000	4,347,000	115,000	4,462,000

(a) Table 2.5.
(b) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997. Low forecast for domestic air carrier. Base forecast for other categories.
(c) Interpolated.
(d) TAMS projected numbers interpolated from 1997 and extrapolated to 2020 for domestic air carrier, charter, and international. Regional carrier numbers interpolated from 1997 to 2005 TAMS forecast levels.

Sources: As noted and HNTB analysis.

Domestic air carrier passenger enplanements in 1997 diverged from the interpolated TAMS forecast by less than 2 percent. Over time, such deviations from the long-term trend are not unusual. However, after discussions with FAA staff and a re-examination of the underlying assumptions, it was determined that the TAMS low forecast growth rates were more realistic for the domestic air carrier forecast. The forecasts of tourism growth in the TAMS low forecast are more consistent with the most recent ISER forecasts of tourist expenditures.[4] In addition, the TAMS low forecast of non-tourist passengers is more consistent with the most recent ISER forecast of Anchorage employment. The TAMS low forecast growth rates were applied to the 1997 base year levels and carried through the forecast period. As shown, domestic air carrier enplanements are projected to increase from 1.7 million in 1997 to 3.6 million by 2020, an average annual increase of 3.3 percent, which is slightly higher than the 3 percent average annual growth rate since 1990. As discussed in the TAMS report, the tourism and cruise ship industry is expected to be a major driver of future air carrier growth.

Regional carrier passenger enplanements in 1997 were 15 percent lower than had been projected by TAMS, primarily due to the loss of service by MarkAir Express. Nevertheless, even from the 1997 base year, the annual growth rate required to achieve the TAMS projected 2015 levels would be 4.1 percent, which is still significantly less than the FAA-projected growth rate for total U.S. regional carriers over the same period (5 percent).[5] Consequently, the long-term TAMS regional carrier forecast levels still appear reasonable. The growth rate required to achieve the TAMS 2000 forecast level (8.2 percent) appears less likely, so it was assumed that ANC regional carrier enplanements would not converge with the TAMS forecast levels until 2005. As shown under the recommended forecast in Table 2.16, regional carrier enplanements are projected to increase from 276,864 in 1997 to 630,000 by 2020, an average annual increase of 3.6 percent. The historical growth rate experienced from 1990 to 1997, 8.1 percent, was much higher; however, this is primarily due to the influx of regional carrier service in the early 1990s to replace lost MarkAir service.

Charter and other passenger enplanements in 1997 were approximately 1 percent higher than the interpolated TAMS forecast. Therefore, no adjustment was made in these forecasts other than those required for conformance with the new horizon years. As shown, charter and other enplanements are projected to increase from 117,156 in 1997 to 133,000 in 2020, an average annual increase of 0.6 percent. This compares to a 3.7 percent average annual decrease from 1990 to 1997 and a 6.7 percent average annual increase from 1994 to 1997. The significant year-to-year fluctuations result from the volatile nature of non-scheduled services and the low level of activity.

International passenger enplanements in 1997 were 15 percent less than the TAMS interpolated forecast for the same year.

[4] The TAMS base forecast assumed annual tourism growth rates of 7 percent for 1995-2000, 6 percent for 2000-2005, 5 percent for 2005-2010, and 4 percent for 2010-2015. The TAMS low forecast assumed annual tourism growth rates of 6 percent for 1995-2000, 5 percent for 2000-2005, 4 percent for 2005-2010, and 3 percent for 2010-2015. The ISER base case tourist expenditures forecast projects 5 percent annual growth through 2000, then 4 percent until 2010, and 3 percent thereafter.

[5] FAA Aviation Forecasts: Fiscal Years 1998-2009, March 1998.

However, international enplanement activity at ANC is subject to significant year-to-year fluctuations. In 1996, for example, actual international enplanements were 19 percent *higher* than the TAMS forecast. Because of these fluctuations, there was an insufficient basis to adjust the TAMS international enplanement forecast other than what was required to make it compatible with the new forecast horizon years. As presented in Table 2.16, international enplanements are projected to increase from 31,283 in 1997 to 115,000 by 2020, an average annual increase of 5.8 percent. This growth rate is reasonable since international passenger enplanements have increased at a 6.5 percent annual rate since 1994, suggesting the adverse impacts from the loss in passenger aircraft technical stops have been fully realized. The addition of scheduled passenger service to Japan by Northwest Airlines indicates that this growth will continue. Also, the FAA projects that total U.S-Pacific passenger enplanements will increase at a 6.5 percent average annual rate through 2009.[6]

2.3.2 Transit Passengers

Table 2.17 presents the forecast of transit passengers. Again, the TAMS forecast is presented along with the recommended forecast.

During the 1990s, transit passenger activity fluctuated much more than passenger enplanements. In 1997, domestic transit passengers were 20 percent lower than the TAMS forecast levels, whereas international transit passengers were 26 percent higher than the TAMS forecast levels. Consistent with the enplanement forecast, the low TAMS forecast growth rates were used to project domestic transit passengers and the base TAMS forecast was used to project international transit passengers. No other changes were made to the TAMS long-term forecast levels other than those required to conform them to the new forecast horizon years. The domestic transit passenger projections are projected to grow, however, less quickly than the domestic enplanement projections. The international transit passenger projections show an initial slow growth period consistent with the current Asian economic slowdown, followed by a more rapid increase in the long term. Total transit passengers are projected to increase from 791,823 in 1997 to 1,387,000 in 2020, an average annual increase of 2.5 percent. This compares to the average annual 7.4 percent decline in total transit passengers that occurred from 1990 through 1997. Since 1993, the number of transit passengers has increased at an average annual rate of 10.6 percent, supporting the TAMS projections that transit passengers will increase in the future.

2.3.3 Detailed Domestic Air Carrier Passenger Forecasts

This subsection presents the domestic air carrier passenger forecasts in more detail, including projections of average aircraft size, load factor and aircraft operations, and fleet mix and peak hour activity.

Forecast air carrier passenger aircraft departures are dependent on both future enplaned passengers and the number of enplaned passengers per aircraft departure.

[6] FAA Aviation Forecasts: Fiscal Years 1998-2009, March 1998.

Table 2.17

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Transit Passengers

Calendar Year	Domestic Transit	International Transit	Total Transit
	Historical (a)		
1990	124,677	1,232,770	1,357,447
1991	142,655	641,475	784,130
1992	201,756	517,290	719,046
1993	183,415	346,017	529,432
1994	201,066	370,891	571,957
1995	182,497	454,502	636,999
1996	148,105	596,942	745,047
1997	161,504	630,319	791,823
	TAMS Forecast (b)		
1995	182,497	454,502	636,999
1997 (c)	197,498	500,701	698,199
2000	220,000	570,000	790,000
2005	250,000	710,000	960,000
2010	270,000	850,000	1,120,000
2015	280,000	1,000,000	1,280,000
	Recommended Forecast (d)		
1997	161,504	630,319	791,823
1998	168,000	640,000	808,000
1999	174,000	650,000	824,000
2000	180,000	660,000	840,000
2001	185,000	670,000	855,000
2002	190,000	680,000	870,000
2003	195,000	690,000	885,000
2008	214,000	794,000	1,008,000
2020	237,000	1,150,000	1,387,000

(a) Table 2.5.
(b) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997. Low forecast for domestic. Base forecast for international.
(c) Interpolated.
(d) TAMS projected numbers interpolated from 1997 and extrapolated to 2020 for domestic air carrier. International transit numbers interpolated from 1997 to 2005 TAMS forecast levels.

Sources: As noted and HNTB analysis.

The number of enplaned passengers per aircraft departure is, in turn, dependent on average seat capacity and enplaning load factor.

Table 2.18 presents the projected domestic passenger air carrier average aircraft size and load factor projections. Currently, average seats per aircraft are slightly less than projected by TAMS. Consequently, the TAMS-projected growth rate in average aircraft size was applied to the 1997 level. As shown in Table 2.18, average seats per aircraft are projected to increase from 123 in 1997 to 138 by 2020.

Consistent with recent national trends, passenger load factors at ANC have increased substantially and were significantly higher (66.1 percent) in 1997 than had been projected by TAMS (61.6 percent). The FAA projects long-term load factors to be similar to 1997 levels.[7] In addition, current load factors at ANC are higher than those projected by TAMS even by the end of the forecast period. Consequently, as shown in Table 2.18, it was assumed that the projected load factor would remain constant at 66.1 percent throughout the forecast period. Domestic air carrier enplanements per departure are projected to increase from 81.2 in 1997 to 91.2 in 2020.

Table 2.19 shows the forecast of domestic passenger air carrier aircraft departures and operations. The number of operations is projected to increase from 45,726 in 1997 to 83,800 in 2020, an average annual increase of 2.7 percent, compared to an average annual decrease of 1.8 percent from 1990 to 1997. Most of the historical decrease in air carrier passenger operations occurred because of the loss of MarkAir service and increases in average aircraft size and load factor. Based on FAA load factor projections and aircraft order information, future increases in load factor and aircraft size will be less than the projected increase in enplanements. The forecast of aircraft operations is slightly less than the TAMS low forecast, primarily because of the increased load factor.

The fleet mix projections incorporate available information on airline aircraft acquisition and retirement plans and were developed in conjunction with the average aircraft size projections in Table 2.18. The current aircraft fleet mix for the domestic passenger air carriers operating at the Airport consists primarily of narrow-body aircraft such as the Boeing 737 family of aircraft, along with Boeing 757s and MD-80s. As shown in Table 2.16, by 2020, the number of existing aircraft types is expected to decrease, while much of the new fleet is expected to consist of next-generation 737 aircraft and Airbus narrow-body aircraft.

The fleet mix projections in **Table 2.20** are based on the following assumptions:

- Since the forecasts are unconstrained, the fleet mix projections are not limited by the existing number or length of runways.
- The National Noise Policy will be implemented according to its present terms. The policy requires that no Stage 2 aircraft operate in the lower 48 states after December 31, 1999. The ANC fleet mix forecast assumes no waivers that would permit airlines to operate Stage 2 aircraft from Alaska to the lower 48 states after 1999.

[7] FAA Aviation Forecasts: Fiscal Years 1998-2009, March 1998.

Table 2.18

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historic and Projected Average Aircraft Size and Load Factor at ANC
Domestic Passenger and Combi Air Carriers

Calendar Year	Average Seats per Aircraft (a)	Average Load Factor (b)	Enplanements per Aircraft Departure (c)
	Historical (d)		
1990	109	53.2%	58.0
1995	124	61.3%	76.0
1997	123	66.1%	81.2
	TAMS Base Forecast (e)		
1995	124	61.3%	76.0
1997 (f)	126	61.6%	77.8
2000	130	62.0%	80.6
2005	132	62.2%	82.1
2010	136	62.3%	84.7
2015	139	62.5%	86.9
	Recommended Forecast		
1997	123	66.1%	81.2
1998	124	66.1%	81.9
1999	125	66.1%	82.7
2000	126	66.1%	83.5
2001	127	66.1%	83.7
2002	127	66.1%	84.0
2003	128	66.1%	84.3
2008	131	66.1%	86.3
2020	138	66.1%	91.2

(a) Assumed to increase at TAMS projected rate from 1997 base year.
(b) Assumed to remain at 1997 average.
(c) Average seats per aircraft multiplied by average load factor.
(d) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997 and Ted Stevens Anchorage International Airport.
(e) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997.
(f) Interpolated.

Sources: As noted and HNTB analysis.

Table 2.19

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Aircraft Departures and Operations
Domestic Passenger and Combi Air Carriers

Calendar Year	Air Carrier Passenger Enplanements (a)	Enplanements per Aircraft Departure (b)	Aircraft Departures (c)	Aircraft Operations (d)
		Historical (e)		
1990	1,504,359	58.0	25,993	51,985
1995	1,698,842	76.0	22,387	44,774
1997	1,855,893	81.2	22,863	45,726
		TAMS Forecast (f)		
1995	1,698,842	76.0	22,387	44,774
1997 (g)	1,871,305	77.8	24,012	48,024
2000	2,130,000	80.6	26,427	52,900
2005	2,540,000	82.1	30,936	61,900
2010	2,970,000	84.7	35,053	70,100
2015	3,400,000	86.9	39,137	78,300
		Recommended Forecast (h)		
1997	1,855,893	81.2	22,863	45,726
1998	1,942,000	81.9	23,700	47,400
1999	2,027,000	82.7	24,500	49,000
2000	2,113,000	83.5	25,300	50,600
2001	2,195,000	83.7	26,200	52,400
2002	2,277,000	84.0	27,100	54,200
2003	2,359,000	84.3	28,000	56,000
2008	2,781,000	86.3	32,200	64,400
2020	3,821,000	91.2	41,900	83,800

(a) Tables 2.16 and 2.17. Includes domestic transit passengers.
(b) Table 2.18.
(c) Enplanements divided by enplanements per departure.
(d) Aircraft departures multiplied by two.
(e) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997 and Ted Stevens Anchorage International Airport.
(f) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997.
(g) Interpolated.
(h) Enplanements divided by enplanements per departure.

Sources: As noted and HNTB analysis.

Table 2.20

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Passenger and Combi Air Carrier Fleet Mix and Average Aircraft Size

	Seats	1997	2003	2008	2020
Air Carrier Aircraft					
L-188	52	3.9%	3.0%	1.0%	0.0%
727-C	55	3.0%	2.0%	1.0%	0.0%
737-C	56	22.1%	20.0%	17.0%	8.0%
734-C	70	0.0%	0.0%	4.0%	10.0%
DC-9	100	0.0%	0.0%	0.0%	0.0%
737-200	110	3.5%	1.0%	0.0%	0.0%
A-319	112	0.0%	1.0%	2.0%	3.0%
737-300	128	1.1%	1.0%	1.0%	1.0%
737-700	128	0.0%	2.0%	3.0%	5.0%
MD-80	140	23.7%	22.0%	17.6%	11.5%
737-400	140	24.3%	26.0%	25.0%	20.0%
A-320	148	2.7%	3.0%	3.0%	4.0%
MD-90	150	0.0%	1.0%	1.0%	1.0%
737-800	162	0.0%	0.7%	2.0%	3.0%
A-321	170	0.0%	0.0%	1.0%	2.0%
737-900	177	0.0%	2.0%	5.0%	12.0%
757	184	12.3%	12.0%	12.0%	12.0%
767-200	204	2.4%	2.0%	2.0%	2.0%
MD-11	247	0.0%	0.0%	0.0%	0.0%
767-400	250	0.0%	0.0%	0.5%	2.0%
767-300	252	0.1%	0.5%	0.5%	1.0%
DC-10	280	0.5%	0.0%	0.0%	0.0%
777-200	292	0.0%	0.5%	1.0%	2.0%
747-200	370	0.3%	0.2%	0.1%	0.0%
747-400	418	0.0%	0.1%	0.3%	0.5%
		100.0%	100.0%	100.0%	100.0%
Average Aircraft Size (Seats)		123	128	131	138

Sources: Table 2.18 and HNTB analysis.

- In accordance with plans announced by many carriers, hush-kitting of Stage 2 aircraft to meet Stage 3 requirements is assumed. The percentage of hush-kit passenger aircraft is expected to be greatest in the year 2000 and then gradually decline.
- Alaska Airlines is expected to continue to use the B-737 family of aircraft as the mainstay of its fleet, continuing with the B-737-combi and B-737-400, and gradually introducing the B-737-900s it has on order.
- As passenger activity and the average aircraft size increase, the percentage of wide-body aircraft is expected to increase slightly.
- Over the next 20 years, it is anticipated that the newer aircraft, such as the next-generation Boeing 737 and the Airbus A-319 and A-321, will be phased in.
- No supersonic, hypersonic, or tilt-rotor aircraft are projected because of poor operating economies.
- No attempt is made to forecast aircraft types not currently in the planning or development stages.

Table 2.21 presents the forecast of peak hour aircraft arrivals, departures, and operations for domestic passenger and combi-carriers during an average weekday in the peak month. Peak hour operations were projected to increase at the same rate as annual aircraft operations, adjusted by the TAMS base projections of peak spreading. Typically, as passenger activity increases, airlines increase the frequency of service in each market and fill the gaps in their schedules. This tends to result in a greater increase in operations in the off-peak hours than in the peak hours.

2.3.4 Detailed Regional Passenger Carrier Forecasts

This subsection presents the regional carrier passenger forecasts, including projections of fleet mix, average aircraft size, load factor, and aircraft operations. The methodologies are similar to those used to develop the detailed domestic air carrier forecasts.

Table 2.22 presents the projected regional carrier passenger average aircraft size and load factor projections. Currently, average seats per aircraft are very similar to the TAMS projections. Consequently, the TAMS regional carrier aircraft size projections were used in the recommended forecasts. As shown in Table 2.22, average seats per aircraft are projected to increase from 24.5 in 1997 to 25.7 by 2020.

In contrast with domestic air carriers, regional carrier load factors at ANC have decreased substantially and were significantly lower (37.6 percent) in 1997 than had been projected by TAMS (47.4 percent). Since it is difficult to generate profits at these levels, it is likely that regional carriers will limit increases in service until capacity is more in line with demand. Consequently, as shown in Table 2.22, it was assumed that the load factor would increase gradually until the TAMS projected level was reached in 2005. Regional carrier enplanements per departure are projected to increase from 9.2 in 1997 to 13.8 in 2020.

Table 2.23 shows the forecast of regional carrier aircraft departures and operations. The number of operations is projected to increase from 59,990 in 1997 to 91,200 in 2020, an average annual increase of 1.8 percent, compared to the average annual 9 percent increase experienced from 1990 through 1997. Again, most of the historical

Table 2.21

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Peaking Activity
Domestic Passenger and Combi Air Carriers

Calendar Year	Aircraft Operations		
	Peak Hour Arrivals	Peak Hour Departures	Peak Hour Operations
		Historical (a)	
1995	11.8	n/a	15.9
1997 (b)	9.3	9.5	13.4
		TAMS Base Forecast (a)	
1995	11.8	n/a	15.9
1997 (c)	13.0	n/a	17.5
2000	14.8	n/a	19.9
2005	17.1	n/a	23.0
2010	19.4	n/a	26.1
2015	21.9	n/a	29.5
		Recommended Forecast (d)	
1997	9.3	9.5	13.4
1998	9.6	9.8	13.9
1999	10.0	10.2	14.3
2000	10.3	10.5	14.8
2001	10.6	10.8	15.2
2002	10.8	11.0	15.5
2003	11.1	11.3	15.9
2008	12.2	12.4	17.5
2020	14.6	14.8	21.1

(a) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997 and Ted Stevens Anchorage International Airport.
(b) Tables 2.11, 2.12, 2.13, 2.14, and 2.15 and HNTB analysis.
(c) Interpolated.
(d) Peak hour aircraft arrivals, departures and operations assumed to increase at same rate as operations forecast in Table 2.19, adjusted by TAMS projection of peak spreading.

Sources: As noted and HNTB analysis.

Table 2.22

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historic and Projected Average Aircraft Size and Load Factor at ANC
Regional Passenger Air Carriers

Calendar Year	Average Seats per Aircraft (a)	Average Load Factor (b)	Enplanements per Aircraft Departure (c)
	Historical (d)		
1990	21.0	46.6%	9.8
1995	23.5	46.3%	10.9
1997	24.5	37.6%	9.2
	TAMS Base Forecast (e)		
1995	23.5	46.3%	10.9
1997 (f)	23.9	47.4%	11.3
2000	24.5	49.0%	12.0
2005	25.0	50.2%	12.6
2010	25.3	51.3%	13.0
2015	25.5	52.5%	13.4
	Recommended Forecast		
1997	24.5	37.6%	9.2
1998	24.5	39.2%	9.6
1999	24.5	40.8%	10.0
2000	24.5	42.3%	10.4
2001	24.6	43.9%	10.8
2002	24.7	45.5%	11.2
2003	24.8	47.1%	11.7
2008	25.2	50.9%	12.8
2020	25.7	53.7%	13.8

(a) Assumed to increase to TAMS projected levels from 1997 base year.
(b) Assumed to increase to TAMS projected levels by 2005.
(c) Average seats per aircraft multiplied by average load factor.
(d) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997 and Ted Stevens Anchorage International Airport.
(e) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997.
(f) Interpolated.

Sources: As noted and HNTB analysis.

Table 2.23

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Aircraft Departures and Operations
Regional Passenger Air Carriers

Calendar Year	Air Carrier Passenger Enplanements (a)	Enplanements per Aircraft Departure (b)	Aircraft Departures (c)	Aircraft Operations (d)
		Historical (e)		
1990	160,054	9.8	16,364	32,727
1995	309,043	10.9	28,380	56,760
1997	276,864	9.2	29,995	59,990
		TAMS Base Forecast (f)		
1995	309,043	10.9	28,380	56,760
1997 (g)	325,426	11.3	28,668	57,336
2000	350,000	12.0	29,100	58,200
2005	430,000	12.6	34,400	68,800
2010	510,000	13.0	38,900	77,800
2015	570,000	13.4	42,900	85,800
		Recommended Forecast (h)		
1997	276,864	9.2	29,995	59,990
1998	296,000	9.6	30,800	61,600
1999	315,000	10.0	31,500	63,000
2000	334,000	10.4	32,200	64,400
2001	353,000	10.8	32,700	65,400
2002	373,000	11.2	33,200	66,400
2003	392,000	11.7	33,600	67,200
2008	478,000	12.8	37,300	74,600
2020	630,000	13.8	45,600	91,200

(a) Tables 2.16.
(b) Table 2.22.
(c) Enplanements divided by enplanements per departure.
(d) Aircraft departures multiplied by two.
(e) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997 and Ted Stevens Anchorage International Airport.
(f) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997.
(g) Interpolated.
(h) Enplanements divided by enplanements per departure.

Sources: As noted and HNTB analysis.

increase in regional carrier operations occurred in the early 1990s as regional carriers attempted to fill the void created by the loss of MarkAir service. Since that time, the growth in regional carrier aircraft operations has been more moderate. The recommended forecast estimates more regional carrier operations in the short run, but is identical to the TAMS forecast after 2005.

The fleet mix projections incorporate available information on airline aircraft acquisition and retirement plans and were developed in conjunction with the average aircraft size projections in Table 2.22. The current aircraft fleet mix for the regional passenger carriers operating at the Airport consists primarily of small aircraft of 19 seats or less, with some larger 30-seat Saab 340s, 37-seat De Havilland Dash 8s, and 48-seat Convairs. The fleet mix projections in **Table 2.24** are based on the following assumptions:

- The number of small 19-seat aircraft is expected to be gradually reduced in accordance with national projections.
- Toward the end of the forecast period, increased numbers of larger, more modern turboprops, such as the ATR 42, are expected.
- The aging Convair aircraft will be gradually phased out.
- Some regional jets are anticipated to be introduced into the ANC fleet on the long, low-density routes for which they are especially well-suited.
- No attempt is made to forecast aircraft types not currently in the planning or development stages. The aircraft included in the fleet mix forecast can be considered generic types representing all present and future aircraft in their respective size and performance categories.

Table 2.25 presents the forecast of peak hour aircraft arrivals, departures, and operations for regional passenger air carriers during an average weekday in the peak month. Peak hour operations were projected to increase at the same rate as annual aircraft operations, adjusted by the TAMS projections of peak spreading.

2.3.5 Detailed Passenger Charter and Other Carrier Forecasts

This subsection presents the passenger charter carrier forecasts, including projections of average aircraft size, load factor, aircraft operations, and fleet mix. The methodologies are similar to those used to develop the detailed domestic air carrier forecasts.

Table 2.26 shows the projected average aircraft size and load factors for charter and other carriers. In 1997, average aircraft size was significantly lower and load factor was significantly higher than shown in the TAMS forecasts. The recommended forecast uses the TAMS assumptions of constant aircraft size and load factor and applies them to the new 1997 base year levels. Charter carrier enplanements per departure are therefore projected to remain constant at 41.2 passengers.

Table 2.27 shows the forecast of passenger charter carrier aircraft departures and operations. The number of operations is projected to increase from 5,682 in 1997 to 6,400 in 2020, an average annual increase of 0.5 percent compared to an average annual decrease of 4.2 percent from 1990 through 1997. Since 1995, charter aircraft operations have increased slightly, as projected in the TAMS forecast. The recommended forecast is similar to the TAMS forecast.

Table 2.24

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Regional Passenger Carrier Fleet Mix and Average Aircraft Size

	Seats	1997	2003	2008	2020
Regional Carrier Aircraft					
CNA/PA-31	9	25.3%	25.0%	25.0%	25.0%
DHC-6	19	28.2%	27.0%	25.0%	20.0%
SWM/B99	19	7.0%	6.5%	6.0%	3.0%
DHC-3	21	1.0%	1.0%	1.0%	0.0%
SF-340	30	6.7%	7.5%	8.5%	18.5%
DHC-8	37	17.7%	19.0%	21.0%	23.0%
ATR	46	0.0%	1.0%	2.0%	4.0%
CVR	48	14.2%	12.0%	9.5%	3.0%
Regional Jet	50	0.0%	1.0%	2.0%	3.5%
		100.0%	100.0%	100.0%	100.0%
Average Aircraft Size (Seats)		24.5	24.8	25.2	25.7

Sources: Table 2.22 and HNTB analysis.

Table 2.25

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Peaking Activity
Regional Passenger Air Carriers

Calendar Year	Aircraft Operations		
	Peak Hour Arrivals	Peak Hour Departures	Peak Hour Operations
		Historical (a)	
1995	9.0	n/a	12.1
1997 (b)	11.5	9.8	17.5
		TAMS Base Forecast (a)	
1995	9.0	n/a	12.1
1997 (c)	9.1	n/a	12.2
2000	9.2	n/a	12.3
2005	10.4	n/a	14.0
2010	11.4	n/a	15.4
2015	12.3	n/a	16.6
		Recommended Forecast (d)	
1997	11.5	9.8	17.5
1998	11.7	10.1	17.9
1999	12.0	10.3	18.3
2000	12.3	10.6	18.7
2001	12.4	10.7	18.9
2002	12.5	10.7	19.1
2003	12.6	10.8	19.2
2008	13.3	11.4	20.5
2020	15.5	13.3	23.7

(a) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997 and Ted Stevens Anchorage International Airport.
(b) Tables 2.11, 2.12, 2.13, 2.14, and 2.15 and HNTB analysis.
(c) Interpolated.
(d) Peak hour aircraft arrivals, departures and operations assumed to increase at same rate as operations forecast in Table 2.23, adjusted by TAMS projection of peak spreading.

Sources: As noted and HNTB analysis.

Table 2.26

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historic and Projected Average Aircraft Size and Load Factor at ANC
Domestic Passenger Charter and Other

Calendar Year	Average Seats per Aircraft (a)	Average Load Factor (b)	Enplanements per Aircraft Departure (c)
	Historical (d)		
1990	80	50.0%	40.0
1995	80	50.0%	40.0
1997	59	69.7%	41.2
	TAMS Base Forecast (e)		
1995	80	50.0%	40.0
1997 (f)	80	50.7%	40.6
2000	80	51.7%	41.4
2005	80	50.0%	40.0
2010	80	49.2%	39.3
2015	80	51.6%	41.3
	Recommended Forecast		
1997	59	69.7%	41.2
1998	59	69.7%	41.2
1999	59	69.7%	41.2
2000	59	69.7%	41.2
2001	59	69.7%	41.2
2002	59	69.7%	41.2
2003	59	69.7%	41.2
2008	59	69.7%	41.2
t Report: Enplanement and Pass	59	69.7%	41.2

(a) Assumed to stay constant at 1997 levels.
(b) Assumed to stay constant at 1997 levels.
(c) Average seats per aircraft multiplied by average load factor.
(d) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997 and Ted Stevens Anchorage International Airport.
(e) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997.
(f) Interpolated.

Sources: As noted and HNTB analysis.

Table 2.27

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Aircraft Departures and Operations
Domestic Passenger Charter and Other

Calendar Year	Air Carrier Passenger Enplanements (a)	Enplanements per Aircraft Departure (b)	Aircraft Departures (c)	Aircraft Operations (d)
		Historical (e)		
1990	152,323	40.0	3,808	7,616
1995	113,281	40.0	2,832	5,664
1997	117,156	41.2	2,841	5,682
		TAMS Base Forecast (f)		
1995	113,281	40.0	2,832	5,664
1997 (g)	115,969	40.6	2,859	5,718
2000	120,000	41.4	2,900	5,800
2005	120,000	40.0	3,000	6,000
2010	120,000	39.3	3,050	6,100
2015	130,000	41.3	3,150	6,300
		Recommended Forecast (h)		
1997	117,156	41.2	2,800	5,600
1998	118,000	41.2	2,900	5,800
1999	119,000	41.2	2,900	5,800
2000	120,000	41.2	2,900	5,800
2001	121,000	41.2	2,900	5,800
2002	121,000	41.2	2,900	5,800
2003	122,000	41.2	3,000	6,000
2008	125,000	41.2	3,000	6,000
2020	133,000	41.2	3,200	6,400

(a) Tables 2.16.
(b) Table 2.26.
(c) Enplanements divided by enplanements per departure.
(d) Aircraft departures multiplied by two.
(e) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997 and Ted Stevens Anchorage International Airport.
(f) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997.
(g) Interpolated.
(h) Enplanements divided by enplanements per departure.

Sources: As noted and HNTB analysis.

Table 2.28 presents the projected fleet mix for passenger charter carriers at ANC. Because of the characteristic rapid entry and exit of charter carriers at ANC, no attempt was made to develop a fleet mix forecast in great detail. Instead, it was assumed that the existing fleet mix would continue. It is understood that some of the older aircraft would eventually be replaced by newer similarly sized aircraft.

Peak hour projections for charter carriers are not included because of the deficiency of existing data on peak hour activity and the lack of consistent activity patterns that results from unscheduled operations. In addition, since charter carriers account for fewer than 10 departures per day, they have little impact on airport capacity.

2.3.6 Detailed International Passenger Carrier Forecasts

This subsection presents the international passenger and combi-carrier forecasts, including projections of average aircraft size, load factor, aircraft operations, fleet mix, and peak hour activity. The methodologies are similar to those used to develop the detailed domestic air carrier forecasts.

Table 2.29 presents the projected international carrier average aircraft size and load factor projections. The actual average seats per aircraft (315 seats) is much less than had been projected by TAMS for 1997 (370 seats). This is primarily due to the substantial number of Airbus A-340s introduced by Cathay Pacific Airways. The average aircraft size is expected to increase gradually over the forecast period. This is consistent with the large number of Boeing 747-400 and 777 aircraft on order by the Asian carriers and also with the FAA forecast of aircraft size for the Pacific region. Consequently, it was assumed that international air carriers would still achieve the TAMS projected aircraft size for 2015 (345 seats), albeit by a gradual increase rather than a gradual decrease.

As is the case with domestic air carriers, international carrier load factors at ANC have increased substantially and were higher (64.7 percent) in 1997 than had been projected by TAMS for 1997 (61.6 percent) or 2015 (62.5 percent). Consequently, as shown in Table 2.29, it was assumed that the load factor would remain constant at 1997 levels. This is consistent with FAA forecasts that project Pacific load factors to remain at 1997 levels.[8] International carrier enplanements per departure are projected to increase from 203.8 in 1997 to 223.3 in 2020.

Table 2.30 shows the forecast of international carrier aircraft departures and operations. The number of operations is projected to increase from 6,494 in 1997 to 11,400 in 2020, an average annual increase of 2.5 percent. This compares to an average annual decrease of 9.5 percent from 1990 through 1997, resulting from the loss of the technical stops. Most of this loss occurred in the early 1990s. Since 1994, international passenger aircraft operations have increased by more than 20 percent per year, reflecting both increased demand and smaller aircraft. Because the 1997 operations are higher than TAMS projected, the recommended operations forecast is higher than the TAMS forecast in the short run, but gradually converges to the TAMS forecast levels in the long run.

[8] FAA Aviation Forecasts: Fiscal Years 1998-2009, March 1998.

Table 2.28

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Domestic Passenger Charter and Other Fleet Mix and Average Aircraft Size

	Seats	1997	2003	2008	2020
Charter Carrier Aircraft					
Lear Jet	8	2.7%	2.7%	2.7%	2.7%
CNA/PA-31	9	33.7%	33.7%	33.7%	33.7%
SWM/B99	19	12.4%	12.4%	12.4%	12.4%
CASA 212	22	9.1%	9.1%	9.1%	9.1%
737-200	120	41.6%	41.6%	41.6%	41.6%
MD-11	247	0.1%	0.1%	0.1%	0.1%
DC-10	280	0.5%	0.5%	0.5%	0.5%
		100.0%	100.0%	100.0%	100.0%
Average Aircraft Size (Seats)		59	59.2	59.2	59.2

Sources: Table 2.26 and HNTB analysis.

Table 2.29

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historic and Projected Average Aircraft Size and Load Factor at ANC International Passenger and Combi Air Carriers

Calendar Year	Average Seats per Aircraft (a)	Average Load Factor (b)	Enplanements per Aircraft Departure (c)
	Historical (d)		
1990	311	53.2%	165.0
1995	370	61.3%	227.0
1997	315	64.7%	203.8
	TAMS Base Forecast (e)		
1995	370	61.3%	226.7
1997 (f)	367	61.6%	226.2
2000	363	62.0%	225.5
2005	350	62.2%	219.7
2010	347	62.3%	217.4
2015	345	62.5%	215.7
	Recommended Forecast		
1997	315	64.7%	203.8
1998	316	64.7%	204.8
1999	318	64.7%	205.9
2000	320	64.7%	207.0
2001	322	64.7%	208.1
2002	323	64.7%	209.2
2003	325	64.7%	210.3
2008	333	64.7%	215.7
2020	345	64.7%	223.3

(a) Assumed to increase to projected TAMS level by 2015 and then remain constant.
(b) Assumed to remain constant.
(c) Average seats per aircraft multiplied by average load factor.
(d) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997 and Ted Stevens Anchorage International Airport.
(e) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997.
(f) Interpolated.

Sources: As noted and HNTB analysis.

Table 2.30

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Aircraft Departures and Operations
International Passenger and Combi Air Carriers

Calendar Year	Air Carrier Passenger Enplanements (a)	Enplanements per Aircraft Departure (b)	Aircraft Departures (c)	Aircraft Operations (d)
		Historical (e)		
1990	1,284,889	197.0	6,532	13,064
1995	481,953	227.0	2,126	4,251
1997	661,602	203.8	3,247	6,494
		TAMS Base Forecast (f)		
1995	481,953	226.7	2,126	4,251
1997 (g)	537,172	226.2	2,375	4,751
2000	620,000	225.5	2,750	5,500
2005	780,000	219.7	3,550	7,100
2010	935,000	217.4	4,300	8,600
2015	1,100,000	215.7	5,100	10,200
		Recommended Forecast (h)		
1997	661,602	203.8	3,247	6,494
1998	678,000	204.8	3,300	6,600
1999	694,000	205.9	3,400	6,800
2000	710,000	207.0	3,400	6,800
2001	724,000	208.1	3,500	7,000
2002	738,000	209.2	3,500	7,000
2003	752,000	210.3	3,600	7,200
2008	873,000	215.7	4,000	8,000
2020	1,265,000	223.3	5,700	11,400

(a) Tables 2.16 and 2.17. Includes international transit passengers.
(b) Table 2.29.
(c) Enplanements divided by enplanements per departure.
(d) Aircraft departures multiplied by two.
(e) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997 and Ted Stevens Anchorage International Airport.
(f) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997.
(g) Interpolated.
(h) Enplanements divided by enplanements per departure.

Sources: As noted and HNTB analysis.

The fleet mix projections incorporate available information on airline aircraft acquisition and retirement plans and were developed in conjunction with the average aircraft size projections in Table 2.29. The current aircraft fleet mix for the international passenger and combi-carriers operating at the Airport consists primarily of Boeing 747 aircraft with smaller numbers of Airbus A-340 and MD-11 aircraft and some narrow-body aircraft. The fleet mix projections in **Table 2.31** are based on the following assumptions:

- Since the forecasts are unconstrained, the fleet mix projections are not limited by the existing number or length of runways or airfield configuration.
- Consistent with the published fleet acquisition plans of the Asian carriers, the Boeing 747-400 is projected to remain the mainstay of the international passenger aircraft fleet.
- Also consistent with published fleet acquisition plans, more Boeing 767 and 777 and Airbus A-330 and A-340 aircraft will be introduced.
- New aircraft, such as the very long range Boeing 747-400X, and very large aircraft (VLA), such as the Airbus A-3XX, will be introduced in limited numbers. It is anticipated that most of these passenger aircraft will be used in point-to-point service not requiring technical stops.
- Older aircraft, such as the Boeing 747-200, will be gradually converted to freighters or phased out.
- Non-CIS aircraft will gradually replace the Russian Tu-154M and IL-62M.
- No supersonic, hypersonic, or tilt-rotor aircraft are projected because of poor operating economies.
- No attempt is made to forecast aircraft types not currently in the planning or development stages.

Table 2.32 presents the forecast of peak hour aircraft arrivals, departures, and operations for international passenger and combi air carriers during an average weekday in the peak month. Peak hour operations were projected to increase at the same rate as annual aircraft operations, adjusted by the TAMS projections of peak spreading.

2.4 AIR FREIGHT FORECASTS

This section includes a discussion of the air freight forecasts. The principal assumptions guiding the forecasts are discussed first, followed by descriptions of the domestic and international air freight forecasts, and the forecasts of transit air freight.

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. **Figure 2-1** graphically presents the flow of air cargo from Asia to North America and from Asia to Europe.

As shown in Figure 2-1, a variety of routes are available to aircraft carrying air cargo from Asia to North America. The aircraft can travel 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.

Table 2.31

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected International Passenger and Combi Fleet Mix and Average Aircraft Size

	Seats	1997	2003	2008	2020
International Carrier Aircraft					
MD-80	140	2.3%	2.0%	1.5%	1.0%
A-320	150	0.5%	0.5%	0.5%	0.5%
Tu-154M	158	3.1%	1.0%	0.0%	0.0%
IL-62M	174	5.9%	2.0%	0.0%	0.0%
757	185	3.8%	4.0%	4.0%	3.0%
A-310	210	0.5%	0.0%	0.0%	0.0%
767-300	215	1.3%	2.0%	3.0%	3.0%
A-340	233	16.4%	18.0%	18.0%	18.0%
DC-10	241	0.7%	0.5%	0.0%	0.0%
767-400	250	0.0%	0.0%	1.0%	2.0%
747-200/300	270	6.1%	5.0%	2.0%	0.0%
747-100	272	0.7%	0.0%	0.0%	0.0%
747-SP	276	0.5%	0.0%	0.0%	0.0%
A-330	320	0.0%	4.0%	6.0%	6.0%
MD-11	336	4.1%	4.0%	4.0%	2.0%
777-200	343	0.0%	2.5%	4.0%	4.5%
L-1011	362	1.8%	1.5%	0.0%	0.0%
747-400	392	52.2%	52.0%	50.0%	45.0%
777-300	394	0.0%	1.0%	5.0%	10.0%
747-400X	416	0.0%	0.0%	1.0%	2.0%
VLA	600	0.0%	0.0%	0.0%	3.0%
		100.0%	100.0%	100.0%	100.0%
Average Aircraft Size (Seats)		315	325	333	345

Sources: Table 2.29 and HNTB analysis.

Table 2.32

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Peaking Activity
International Passenger and Combi Air Carriers

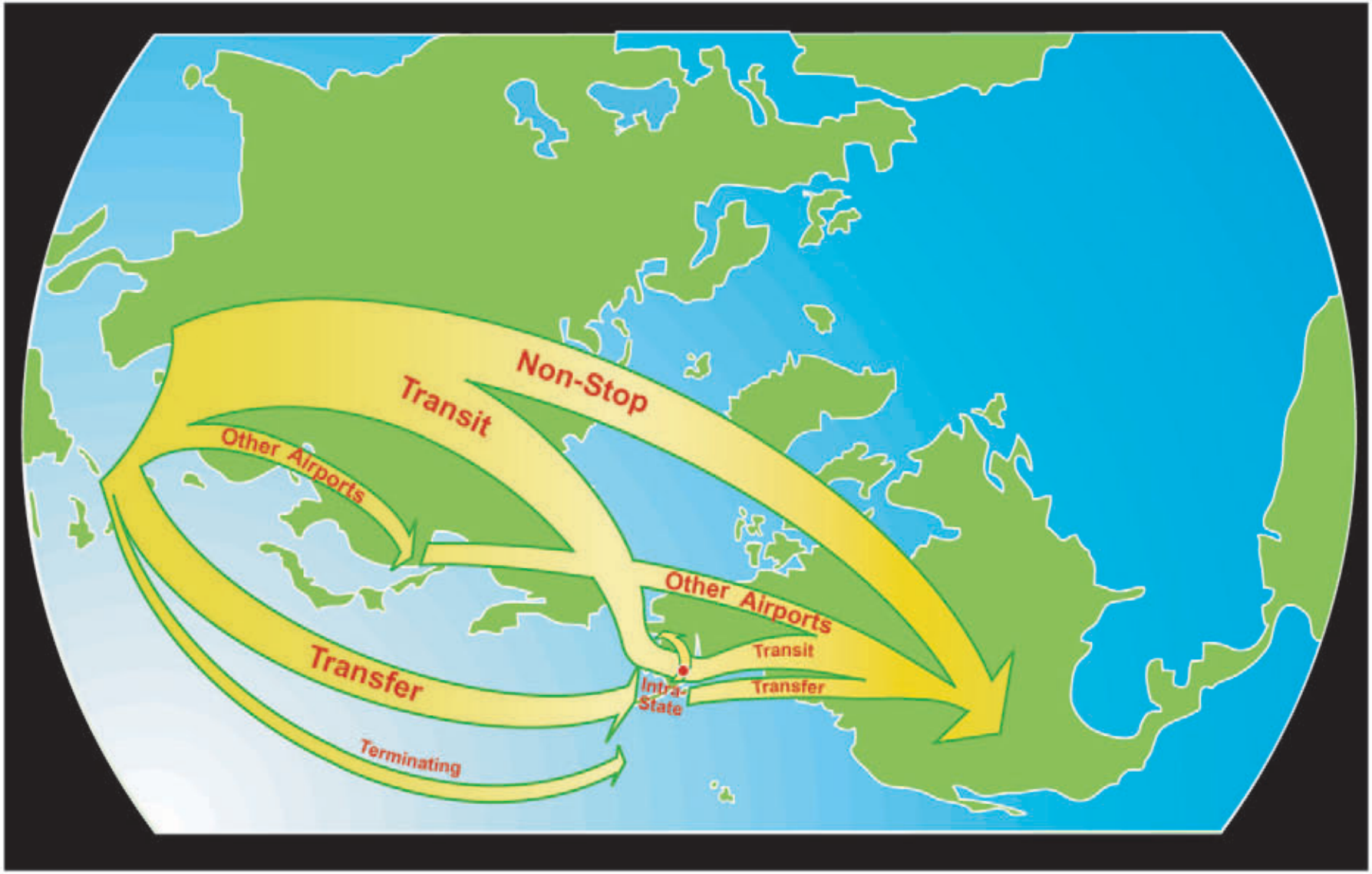
Calendar Year	Aircraft Operations		
	Peak Hour Arrivals	Peak Hour Departures	Peak Hour Operations
		Historical (a)	
1995	0.9	n/a	1.2
1997 (b)	1.8	1.8	3.6
		TAMS Base Forecast (a)	
1995	0.9	n/a	1.2
1997 (c)	1.0	n/a	1.4
2000	1.2	n/a	1.6
2005	1.5	n/a	2.1
2010	1.8	n/a	2.4
2015	2.1	n/a	2.8
		Recommended Forecast (d)	
1997	1.8	1.8	3.6
1998	1.8	1.8	3.7
1999	1.9	1.9	3.7
2000	1.9	1.9	3.8
2001	1.9	1.9	3.9
2002	2.0	2.0	4.0
2003	2.0	2.0	4.1
2008	2.2	2.2	4.5
2020	3.1	3.1	6.0

(a) TAMS Consultants, Inc. Needs Assessment Report: Enplanement and Passenger Aircraft Forecasts, July 1, 1997 and Ted Stevens Anchorage International Airport.
(b) Tables 2.11, 2.12, 2.13, 2.14, and 2.15 and HNTB analysis.
(c) Interpolated.
(d) Peak hour aircraft arrivals, departures and operations assumed to increase at same rate as operations forecast in Table 2.30, adjusted by TAMS projection of peak spreading.

Sources: As noted and HNTB analysis.

Asia-North America Air Cargo Flow

Figure 2-1



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 that 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.

A smaller amount of enplaned or deplaned air cargo actually begins or ends the air portion of its trip at ANC, and 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 with 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 Asia-North America air cargo flow that (1) travels non-stop, (2) becomes transit cargo at ANC or a competing airport, or (3) 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 Critical Air Freight Assumptions

The critical assumptions that were used to guide the air freight forecasts were developed in conjunction with ANC officials and other experts in air cargo, such as K&A. The assumptions include consideration of the socioeconomic environment, the political and trade environment, the air cargo industry, technological development, and airport development and operations, as detailed below.

Socioeconomic Assumptions

- The ISER base demographic and economic projections were used for population, employment, and income projections for the Anchorage metropolitan area and Alaska.
- Consistent with the K&A study, the most recent Boeing projections of world economic growth by region were used for the world economy.
- Consistent with the latest Boeing and Avitas forecasts, recovery of the Asian economies is expected to begin in 2000.

Political/Trade Environment Assumptions

- A continuing reduction in trade barriers, fueling growth in air cargo.
- A continuation of the extension of "Open Skies" agreements, resulting in open skies throughout the world by the end of the forecast period.
- No cabotage within the U.S.
- No extension of U.S. Cargo Transfer Rights beyond Anchorage.
- Increased use of European, Russian, and Central Asian airports as technical stops, but limited development as transfer hubs. Fairbanks will not emerge as a major rival to ANC for technical stops beyond current levels of activity.
- 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 by 1 percent per year (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. This is consistent with recent reductions in oil prices.
- Consistent with the most recent Boeing forecasts, the majority of all-cargo carrier fleet additions are expected to come from converted passenger aircraft rather than new aircraft.
- Cargo operators will continue to place a priority on payload over range, as publicly stated by FedEx.
- 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.

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.
- Existing carriers will continue to expand enplaning, deplaning, and transfer cargo at ANC, and new carriers will introduce service at ANC to keep up with market demand, as defined by the Boeing base forecast growth.
- Third party logistics facilities will gradually develop at ANC to capitalize on increasing transfer activity, Anchorage's strategic location, and extensive air service.

2.4.2 Domestic Air Freight

This subsection discusses domestic enplaned and deplaned air freight, estimates of true O&D cargo, and domestic air freight aircraft operations.

Enplaned and Deplaned Freight

Table 2.33 presents the forecast of domestic enplaned and deplaned air freight, and includes recent historical data and the K&A short-range forecasts for comparison purposes.

Table 2.33

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Base Case Projection of Enplaned and Deplaned Domestic Freight (tons)

Calendar Year	Enplaned Freight	Deplaned Freight	Total Freight	Anchorage Employment (a)
		Historical (b)		
1990	184,338	43,231	227,569	110,000
1991	170,185	47,614	217,799	113,000
1992	146,846	42,200	189,046	114,100
1993	140,633	46,163	186,796	116,600
1994	151,826	49,015	200,841	119,100
1995	149,843	56,064	205,907	119,600
1996	158,025	48,532	206,557	119,950
1997	176,764	46,198	222,962	n/a
		K&A Projections (c)		
1998			228,800	120,430
1999			234,700	122,660
2000			240,900	124,740
2001			247,100	124,900
2002			253,500	125,370
		Recommended Projections (d)		
1998	178,400	47,400	225,800	120,430
1999	182,800	51,000	233,800	122,660
2000	187,000	54,500	241,500	124,740
2001	187,300	54,800	242,100	124,900
2002	188,300	55,600	243,900	125,370
2003	189,900	57,100	247,000	126,210
2008	204,100	70,700	274,800	133,180
2020	269,600	161,500	431,100	164,000

(a) Table 2.2.
(b) Table 2.7.
(c) Keiser Associates, Inc., Anchorage International Airport Preliminary Air Cargo Forecast updated for 1997.
(d) See text for forecasting equations.

Sources: As noted and HNTB analysis.

The long-range domestic air freight forecasts were developed using multi-variable regression analysis. Regression analysis is a statistical method of generating an equation (or model) that best explains the historical relationship among selected variables, such as air cargo and employment. If it is assumed that the model that best explained historical activity will continue to hold into the future, that model's equation can be used as a forecasting equation.

Using historical (1990-1996) data, several relationships were tested including 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, Alaska, out-state Alaska (not including Anchorage), and the United States. The aviation industry variable included U.S. revenue ton miles. Instrument variables representing the adverse impact on the aviation industry of the Gulf War in 1991 and the availability of full service by MarkAir were also tested.[9] The variables were tested in both linear and logarithmic model formulations.

Several of the equations that were calculated showed strong correlations with domestic air freight. The model that produced the best results for enplaned domestic air freight, from both a theoretical and statistical standpoint, was a logarithmic formulation that specified ANC air freight as a function of Anchorage employment, MarkAir service, and the Gulf War. The model that produced the best results for deplaned domestic air freight was similar, except that the Gulf War variable was not statistically significant and was therefore deleted from the equation.

Based on the considerations noted previously, the following equation was selected for the domestic enplaned air freight forecasts:

$$EDFRT = 10^{-1.604133} \times ANEMP^{1.336586} \times GULF \times MARKAIR$$

where:

EDFRT	= enplaned domestic air freight
ANEMP	= employment in metropolitan Anchorage
GULF	= Variable equal to .8906 during the Gulf War, and 1.00 at all other times
MARKAIR	= Variable equal to 1.3535 when MarkAir was offering a full schedule of air cargo service, and 1.00 since that time

R-squared = 0.920
Corrected R-squared = 0.941
F-test = 11.58
Durbin-Watson statistic = 2.65
T-statistic (intercept) = -0.360
T-statistic (Anchorage employment) = 1.52
T-statistic (Gulf war) = -2.01
T-statistic (MarkAir service) = 4.15

The Anchorage employment variable represents the size of the market. The Gulf variable represents the adverse impact on cargo capacity during the Gulf War. The MarkAir variable represents the additional intrastate cargo service that was available when MarkAir had a full schedule of operations. The forecasting model can be interpreted as indicating the following:

- Every 1 percent increase in Anchorage employment will increase enplaned air freight by 1.33 percent.
- The Gulf War depressed activity by 11 percent.

[9] Instrument variables are used to account for variables that are difficult to measure. They are set equal to "1" when a particular activity is occurring (e.g., the Gulf War in 1991) and are set equal to "0" at all other times.

- MarkAir service, when it was available, stimulated air freight enplaned tonnage by 35 percent.

The forecast of domestic deplaned air freight was developed using the following equation:

$$DDFRT = 10^{-15.45315} \times ANEMP^{3.970578} \times MARKAIR$$

where:

MARKAIR = Variable equal to 1.1733 when MarkAir was offering a full schedule of air cargo service, and 1.00 since that time

R-squared = 0.746
Corrected R-squared = 0.619
F-test = 5.87
Durbin-Watson statistic = 2.92
T-statistic (intercept) = -2.44
T-statistic (Anchorage employment) = 3.19
T-statistic (MarkAir service) = 1.90

In the deplaned freight equation, the Anchorage employment variable again represents the size of the market, and the MarkAir variable represents the additional intrastate cargo service that was available when MarkAir had a full schedule of operations. The forecasting model for deplaned domestic freight can be interpreted as indicating the following:

- Every 1.0 percent increase in Anchorage employment will increase enplaned air freight by 3.97 percent.
- MarkAir service, when it was available, stimulated air freight deplaned tonnage by 17 percent.

During review, the two issues described below were raised regarding the applicability of the forecasting equations to domestic air freight at ANC.

First, it was noted that much of domestic air cargo is transfer cargo carried by FedEx and is unlikely to be sensitive to economic conditions in Anchorage. However, both Alaska and U.S economic variables were tested in the forecasting equation, and Alaska variables proved to have a slightly better statistical correlation with domestic enplaned and deplaned freight. It should be noted that the Alaska economy is highly dependent on the overall U.S. economy as well as the Asian economies, and the Alaskan economy indirectly reflects the same variables that drive FedEx growth. Consequently, U.S. economic growth is indirectly incorporated into the forecasting equation.

The second issue was the extent to which the loss of MarkAir air service affected air freight at Anchorage. According to Airport records, between fiscal years 1991 and 1992, MarkAir reduced the number of all-cargo flights at ANC by 49 percent. The four other domestic signatories with all-cargo service at the time (Alaska, Northern Air Cargo, ERA Aviation, and Southcentral Air) increased their all-cargo flights by less than 1 percent during the same period. The loss of MarkAir service left a void at ANC that the other carriers did not fill.

As shown in Table 2.33, domestic enplaned air freight is projected to increase from 176,764 tons in 1997 to 269,600 tons by the end of the forecast period, an average annual increase of 1.9 percent. Deplaned freight is projected to increase from 46,198 tons in 1997 to 161,500 tons by 2020, an average annual increase of 5.6 percent. Total domestic freight is projected to increase at an annual average rate of 2.9 percent, which compares to an average annual historical increase of 4.5 percent since 1993, after the initial loss of MarkAir service. The recommended forecasts are slightly more

conservative than the K&A projections developed through 2002.

The domestic air freight tonnage forecasts in Table 2.33 are dependent on the following assumptions:

- The historical relationship between air freight, Anchorage employment, and air service will continue into the future.
- The base case ISER forecasts of Anchorage employment are valid.
- There will be no future carrier serving ANC with a network similar to MarkAir, which means that future growth will be dependent on local employment and will not gain from the stimulation provided by MarkAir service in the past.
- Fuel prices will continue to be stable.
- The bypass mail system will continue to be in place.
- There will be no outside political events, similar to the Gulf War, which will depress traffic.

Domestic Origin-Destination Freight

Table 2.34 presents the forecast distribution of domestic O&D and transfer freight. Existing domestic O&D freight was estimated in Section 2.2.3.

Most domestic originating cargo at ANC represents air shipments to interior communities. As noted previously, Alaska's economy is especially dependent on air service for the shipment of goods. Since most goods to interior communities are already shipped by air, the traditional source of air cargo growth—an increase in market share at the expense of other modes such as truck and rail—is not possible. In addition, the decline in the oil industry will limit increases in demand while, in the long term, the reduced availability of older aircraft traditionally used in intrastate Alaska may constrain service. The subsidy for bypass mail will also dampen demand for air freight. In combination, these factors suggest that originating domestic freight at ANC will grow at a similar rate to domestic enplaned cargo, an average annual rate of 1.9 percent.

Anchorage is accessible by water, rail, and highway, and is not as dependent on air transportation as more remote communities in Alaska. Consequently, there is more of an opportunity for domestic air cargo going to the Anchorage area to grow at the expense of other transportation modes. Domestic terminating freight is therefore projected to increase at a much faster rate than originating freight. As shown in Table 2.34, terminating freight is projected to increase at the same rate as deplaned freight, an average annual rate of 5.6 percent.

Domestic All-Cargo Aircraft Operations

Table 2.35 shows the projected distribution of domestic air freight between passenger and combi-carriers and all-cargo carriers. Historically, increasing amounts of domestic air freight have been shifted from passenger carriers to all-cargo carriers. However, in the case of ANC, domestic passenger carrier enplanements (and aircraft capacity) are projected to increase more rapidly than domestic air freight. In view of these two conflicting trends, it was assumed that the existing distribution between passenger carriers and cargo carriers would continue. As shown in Table 2.35, all-cargo carrier aircraft are expected to continue to account for an estimated 87 percent of the total domestic air freight.

Table 2.34

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated Distribution of Domestic Cargo Between True O&D and Transfer

Calendar Year	Enplaned Freight			Deplaned Freight		
	Enplaned Freight (a)	Estimated True Originating (b)	Estimated True Transfer (c)	Deplaned Freight (a)	Estimated True Terminating (d)	Estimated True Transfer (e)
			Historical (f)			
1997	176,764	44,882	131,882	46,198	21,484	24,714
			Recommended Projections			
1998	178,400	45,300	133,100	47,400	22,000	25,400
1999	182,800	46,400	136,400	51,000	23,700	27,300
2000	187,000	47,500	139,500	54,500	25,300	29,200
2001	187,300	47,600	139,700	54,800	25,500	29,300
2002	188,300	47,800	140,500	55,600	25,900	29,700
2003	189,900	48,200	141,700	57,100	26,600	30,500
2008	204,100	51,800	152,300	70,700	32,900	37,800
2020	269,600	68,500	201,100	161,500	75,100	86,400

(a) Table 2.33.
(b) Assumed to increase at same rate as enplaned freight. See text for additional discussion.
(c) Enplaned freight less originating freight. Includes transfer to international carrier.
(d) Assumed to increase at same rate as deplaned freight. See text for additional discussion.
(e) Deplaned freight less terminating freight. Includes transfer from international carrier.
(f) Table 2.9.

Sources: As noted and HNTB analysis.

Table 2.35

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Base Case Projection of Enplaned and Deplaned Domestic Freight by Carrier (tons)

Calendar Year	Total Freight (a)	All-Cargo Carriers	Passenger and Combi-Carriers
	Historical (b)		
1997	222,962	195,956	27,006
	Recommended Projections (c)		
1998	225,800	198,500	27,300
1999	233,800	205,500	28,300
2000	241,500	212,200	29,300
2001	242,100	212,800	29,300
2002	243,900	214,400	29,500
2003	247,000	217,100	29,900
2008	274,800	241,500	33,300
2020	431,100	378,900	52,200

(a) Table 2.33.
(b) Estimated distribution of 1997 data based on 1996 Keiser & Associates estimate of 1996 data.
(c) Future distribution assumed to be the same as in 1997. See text for details.

Sources: Keiser & Associates, Anchorage International Airport Preliminary Air Cargo Forecast, and HNTB analysis.

Table 2.36 presents the forecast of domestic all-cargo carrier aircraft departures and operations. Domestic all-cargo aircraft departures exclude aircraft used primarily for air mail (see Section 2.5). Average payload capacity for the domestic fleet was assumed to increase at the same rate as calculated from the Boeing projections of the freighter fleet. Average tons per aircraft departure were assumed to increase at the same rate as average aircraft capacity plus a 1.14 percent average annual increase in average load factor.[10] As shown, total domestic all-cargo aircraft operations are projected to increase from 17,434 in 1997 to 18,400 by 2020, an average annual increase of 0.2 percent.

Table 2.37 shows the forecast of the fleet mix and average payload capacity for all-cargo carriers carrying domestic freight through ANC. The following assumptions were used to develop the fleet mix presented in Table 2.37:

- Since the forecast is unconstrained, the fleet mix projections are not limited by the existing number or length of runways or airfield configuration.
- Consistent with increasing cargo volumes, aircraft manufacturer projections, and fleet orders by the cargo carriers, a significant increase in the wide-body aircraft fleet is projected.
- As they approach the end of their useful economic life, the Stage 2 narrow-body aircraft, including those with hush kits, are expected to be gradually phased out.
- Consistent with Boeing projections, more Boeing 737 freighters are projected to be introduced as replacement narrow-body air cargo aircraft.
- FedEx is projected to add operations by the Airbus A-300, MD-11s, and Ayers LM200s it has on order.
- UPS is projected to add operations by the Boeing 757 and 767-300 aircraft it has on order.
- No attempt is made to forecast aircraft not currently in the planning or development stages.

Table 2.38 shows projected peak hour aircraft arrivals, departures, and operations for the domestic air freight carriers. Since very little growth is projected to occur in annual aircraft operations, little change is projected in the number of peak hour operations.

2.4.3 International Enplaned and Deplaned Air Freight

This subsection discusses international enplaned and deplaned air freight, estimates of true O&D freight, and associated air freight aircraft operations. Since most international enplaned and deplaned freight at ANC is accounted for by the five carriers conducting air freight transfer operations (FedEx, UPS, United, Northwest, and Polar Air), this discussion centers around those carriers. Transit cargo and associated technical stop operations are discussed in Section 2.4.4.

[10] Boeing Commercial Airplane Group, 1998/1999 World Air Cargo Forecast. Load factor growth rate equal to difference between Boeing projection of traffic growth (6.4 percent) and capacity growth (5.2 percent).

Table 2.36

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Aircraft Departures and Operations
Domestic All-Cargo Carriers

Calendar Year	Domestic All-Cargo Tonnage (a)	Tons per Aircraft Departure (b)	Aircraft Departures (c)	Aircraft Operations (d)
		Historical (e)		
1997	195,956	22.5	8,717	17,434
		Recommended Forecast		
1998	198,500	23.1	8,600	17,200
1999	205,500	23.7	8,700	17,400
2000	212,200	24.3	8,700	17,400
2001	212,800	25.0	8,500	17,000
2002	214,400	25.6	8,400	16,800
2003	217,100	26.3	8,300	16,600
2008	241,500	30.0	8,100	16,200
2020	378,900	41.0	9,200	18,400

(a) Table 2.35. Includes enplaned and deplaned tonnage.
(b) Assumed to increase at same rate as Boeing estimate of average freighter aircraft capacity plus 1.14 percent average annual increase in load factor (see text for details).
(c) Enplanements divided by enplanements per departure.
(d) Aircraft departures multiplied by two.
(e) Keiser & Associates and Ted Stevens Anchorage International Airport.

Sources: As noted and HNTB analysis.

Table 2.37

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Domestic All-Cargo Carrier Fleet Mix

	Payload Capacity (tons)	1997	2003	2008	2020
Air Carrier Aircraft					
CNA/Beech	1.5	24.3%	19.0%	15.0%	10.0%
Ayers LM200	3.8	0.0%	3.0%	4.0%	4.0%
DC-3	4.2	1.0%	0.6%	0.3%	0.0%
DHC-4	4.7	1.9%	1.3%	1.0%	0.0%
F-27	6.0	2.4%	1.4%	1.0%	0.0%
L-188	13.0	2.5%	2.0%	1.2%	0.5%
737	14.0	5.8%	5.8%	7.0%	7.0%
DC-6	14.1	10.4%	9.0%	6.0%	3.0%
DC-9	18.0	2.3%	2.1%	1.5%	0.0%
727-100	20.6	2.4%	2.0%	1.0%	0.0%
L-100	25.0	1.9%	2.0%	2.5%	3.0%
757	44.0	1.2%	3.0%	6.0%	10.0%
DC-8	53.1	3.7%	3.0%	2.0%	0.0%
A-300	54.4	2.0%	4.0%	7.0%	10.0%
767-300	65.0	1.0%	3.0%	4.0%	7.0%
DC-10	85.3	9.2%	8.8%	8.0%	6.0%
MD-11	99.0	12.3%	14.5%	17.0%	18.0%
747-100	109.7	6.9%	6.5%	5.5%	4.0%
747-200	118.4	8.8%	9.0%	8.0%	7.0%
747-400	124.6	0.0%	0.0%	2.0%	10.5%
		100.0%	100.0%	100.0%	100.0%
Average Payload Capacity (tons)(a)		47	51	55	66

(a) Assumed to increase at Boeing estimate of average freighter aircraft capacity.

Sources: Boeing 1998/1999 World Air Cargo Forecast and HNTB analysis.

Table 2.38

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Peaking Activity
Domestic All-Cargo Carriers

Calendar Year	Aircraft Operations		
	Peak Hour Arrivals	Peak Hour Departures	Peak Hour Operations
	Historical (a)		
1997	3.9	3.1	6.9
	Recommended Forecast (b)		
1998	3.9	3.0	6.9
1999	3.9	3.1	7.0
2000	3.9	3.1	7.0
2001	3.8	3.0	6.8
2002	3.8	3.0	6.8
2003	3.8	2.9	6.7
2008	3.7	2.9	6.6
2020	4.1	3.2	7.3

(a) Tables 2.11, 2.12, 2.13, 2.14, and 2.15 and HNTB analysis.
(b) Peak hour aircraft arrivals, departures and operations assumed to increase at same rate as operations forecast in Table 2.36, with adjustment for peak spreading as operations increase.

Sources: As noted and HNTB analysis.

Enplaned and Deplaned Air Freight

Since most international enplaned and deplaned freight at ANC is transferred on its way to and from Asia, Europe, and North America, ANC air freight is heavily dependent on air cargo flows between these regions. **Table 2.39** presents the forecasts of these trade flows, developed in the Boeing 1998/1999 World Air Cargo Forecasts.[11] Tonnages have been converted from metric tons to short tons, and 2020 levels were extrapolated at the published growth rates. As shown, most regions are projected to continue to experience rapid growth into the future. One exception is the North America to Asia traffic, which is expected to be relatively stagnant through 2000 because of the Asian financial slowdown. Asia to North America traffic is projected to continue to grow rapidly because of the continuing demand for Asian products from the stronger North American economy.

The Boeing projections are consistent with those developed by Avitas, which sees slow growth in the North Pacific market over the next 3 years, but rapidly accelerating growth thereafter. The Boeing projections (6.4 percent annual worldwide growth and 7.1 percent annual growth for Asia-North America) are conservative compared to other air cargo forecasts, such as the following:

- Airbus – 6.7 percent worldwide and 9.2 percent Pacific annual growth through 2015.
- MergeGlobal – 6.6 percent annual worldwide growth through 2007.
- International Civil Aviation Organization (ICAO) – 7 percent worldwide and 9.5 percent Asia/Pacific annual growth through 2005.

The Boeing Commercial Airplane Group publishes its World Air Cargo Forecast every 2 years. The projections incorporate several forecasting methodologies, including econometric modeling (regression analysis), trend analysis, potential analysis, and judgment. The forecasts include an 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 develops air cargo forecasts for 10 major regions (e.g., Asia-North America, Asia-Europe, and intra-Asia) for a 20-year forecast horizon.

The Boeing base case forecasts incorporate the following factors and assumptions:

- From 1998 to 2017, world Gross Domestic Product (GDP) is projected to increase at an average annual rate of 2.9 percent. The annual GDP growth rate is expected to range from 7.2 percent in China, to 4.2 percent in Asia (not including China or Japan) and Latin America, to 2.3 percent in Europe, 2.1 percent in North America, and 1.9 percent in Japan.
- Asian economies will begin to recover by 2000. Once this occurs, westbound air cargo will increase again. Since air cargo is primarily demand-driven, eastbound cargo is dependent on the health of the North American economy and is much less affected by the Asian economic downturn.

[11] Boeing Commercial Airplane Group, 1998/1999 World Air Cargo Forecast, October 1998.

Table 2.39

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Base Case Global Air Cargo Flow Projections
(Thousands of Tons) (a)

Calendar Year	Asia to North America	North America to Asia	Total Asia North America	Asia to and from Europe	Europe to North America	North America to Europe	Total Europe North America
1995	1,014	1,047	2,061	1,559	1,049	1,087	2,136
1996	1,102	1,091	2,193	1,763	1,157	1,157	2,314
1997	1,344	1,124	2,468	1,929	1,312	1,223	2,536
1998	1,448	1,124	2,572	2,069	1,408	1,305	2,713
1999	1,559	1,124	2,683	2,220	1,511	1,393	2,904
2000	1,680	1,124	2,804	2,382	1,621	1,486	3,107
2001	1,809	1,160	2,969	2,556	1,740	1,585	3,325
2002	1,948	1,246	3,194	2,743	1,867	1,692	3,559
2003	2,098	1,339	3,437	2,943	2,003	1,805	3,808
2008	3,040	1,913	4,953	4,186	2,849	2,496	5,345
2015	5,110	3,153	8,263	6,855	4,665	3,931	8,596
2020 (b)	7,405	4,505	11,910	9,750	6,636	5,436	12,072

(a) Short tons
(b) Extrapolated at 1998-2017 projected growth rates.

Sources: Boeing Commercial Airplane Group, 1998/1999 World Air Cargo Forecast, and HNTB analysis.

- Following the transformation that has occurred in the U.S. domestic air cargo market, Boeing projects the international express share of activity is projected to grow from 6 percent to 36 percent of international air cargo over the next 20 years. This will occur as customers increasingly realize the importance of efficient, rapid, and reliable distribution channels when operating in an increasingly globalized and changing market environment.

- Boeing projects that competition within the air cargo industry will reduce real yields at an average annual rate of 1 percent.

- Boeing projects that, since air cargo will grow more rapidly than passenger traffic, an increasing percentage of air cargo will be carried on freighters instead of passenger and combi-carriers.

- Historically, international air cargo has grown more than twice as fast as GDP, and Boeing projects that this trend will continue. Goods and commodities will increase as GDP increases. With the increasing globalization of the economy, an increasing share of these goods will be traded internationally. Increasing customer service expectations will place a premium on rapid and time–definite delivery and will increase the share of internationally traded goods that are shipped by air.

- The GDP growth rates, reduced yields, increased globalization, and increased service expectations are expected to result in an overall world air cargo growth rate of 6.4 percent. The intra-Asia market is projected to grow the most rapidly (8.2 percent), followed by the Asia-Europe market (7.3 percent), the Asia-North America market (7.1 percent), and the Europe-North America market (7 percent).

Table 2.40 presents the forecast of enplaned and deplaned international air freight at ANC. As shown, ANC enplaned and deplaned tonnage, as a share of total Asia-North America traffic, has gradually increased from 9.7 percent in 1990 to 11 percent in 1997, as cargo transfer operations have become increasingly popular.[12] It is expected that this trend will continue as carriers such as FedEx, UPS, United, Northwest, and Polar expand their transfer activities and as more international carriers explore the operational advantages of using ANC as a transfer center. This activity will open opportunities for third party logistics providers, which will, in turn, further stimulate cargo transfer activity.

As shown in Table 2.40, it is anticipated that the ANC transfer share of the North America-Asia trade flows will continue to increase at historical rates until it reaches 15.1 percent by 2020. A continuing increase in the ANC transfer share can be expected for the following reasons:

- Ongoing investment in cargo parking and transfer facilities by cargo carriers such as FedEx, UPS, United, Northwest, Polar, Alaska, and Northern Air Cargo, as well as third party developers such as Lynxs/Mapco.

- Opportunities for transfer activity by foreign-flag carriers offered by the Alaska Air Cargo Transfer Initiative.

[12] According to K&A statistics, more than 97 percent of deplaned international tonnage at ANC came from Asia and more than 99 of enplaned international tonnage went to Asia in 1997. Consequently, ANC enplaned and deplaned tonnage was estimated as a share of Asia-North America air cargo flow.

Table 2.40

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Base Case Projection of Enplaned and Deplaned International Freight (tons)

Calendar Year	Total Asia North America Cargo (000's of tons) (a)	ANC Share (b)	Enplaned Freight	Deplaned Freight	Total Freight
		Historical (c)			
1990	1,212	9.7%	61,505	56,037	117,542
1991	1,300	11.5%	75,226	74,665	149,891
1992	1,333	14.1%	76,373	112,020	188,393
1993	1,532	9.1%	46,720	93,416	140,136
1994	1,807	9.9%	55,264	123,682	178,946
1995	2,061	10.8%	77,170	144,456	221,626
1996	2,193	11.2%	102,249	144,193	246,442
1997	2,468	11.0%	104,457	166,023	270,480
		K&A Projections (d)			
1998					292,100
1999					315,500
2000					340,700
2001					368,000
2002					397,400
		Recommended Projections (e)			
1998	2,572	11.1%	113,200	173,300	286,500
1999	2,683	11.3%	122,100	181,500	303,600
2000	2,804	11.5%	132,000	190,400	322,400
2001	2,969	11.7%	145,600	201,100	346,700
2002	3,194	11.9%	163,500	215,200	378,700
2003	3,437	12.0%	183,000	230,700	413,700
2008	4,953	12.9%	308,800	331,900	640,700
2020	11,910	15.1%	951,500	846,300	1,797,800

(a) Table 2.39.
(b) ANC share assumed to increase at historical rate. According to Keiser Associates statistics, more than 97.0 percent of enplaned international tonnage came from Asia and more than 99.0 percent of enplaned international tonnage went to Asia in 1997. Consequently, ANC enplaned and deplaned tonnage was estimated as a share of Asia-North America air cargo flow.
(c) Keiser Associates, Inc., Anchorage International Airport Preliminary Air Cargo Forecast updated for 1997 for ANC data. Boeing Commercial Airplane Group for Asia-North America cargo.
(d) Keiser Associates, Inc., Anchorage International Airport Preliminary Air Cargo Forecast updated for 1997.
(e) Total equals Asia North America multiplied by ANC share. Distribution between enplaned and deplaned cargo calculated to balance off difference in international originating and terminating freight (Table 2.41) and domestic enplaning and deplaning freight (Table 2.33).

Sources: Boeing Commercial Airplane Group, 1998/1999 World Air Cargo Forecast, and HNTB analysis.

- Continuing competition in the air cargo industry will force carriers to maximize the efficiency of their route systems, consequently resulting in the use of aircraft with payload and range characteristics appropriate for each segment. Since a change of gauge requires the transfer of freight in any case, scheduling flights to allow the transfer of freight between multiple aircraft becomes more attractive.

The increase in the share of the Asia-North America market from 11.1 percent to 15.1 percent may seem modest, but because of the rapid growth expected in the Asia-North America market, it translates to a more than sixfold increase in enplaned and deplaned international air freight. Such an increase will require a major investment by the participating carriers.

Since most of the expected growth is attributable to transfer activities and, in a transfer, each deplaned ton becomes an enplaned ton, enplaned and deplaned tons are projected to increase by similar amounts. As shown in Table 2.40, total ANC enplaned and deplaned international freight is projected to increase from 270,480 tons in 1997 to 1,797,800 tons in 2020, an average annual increase of 8.6 percent, which compares to a 12.6 percent average annual increase from 1990 through 1997. The rapid growth in the 1990-1997 period reflected the high economic growth in Asia and North America. Although the economies of both these regions are expected to continue to grow over the next 20 years, it is considered unlikely that they can maintain the 1990-1997 growth levels over two full decades. Over the short run, these forecasts are slightly more conservative than the K&A forecasts since they incorporate the effects of the Asian economic downturn.

The forecasts of international enplaned and deplaned tonnage are dependent on the following assumptions:

- The Boeing forecasts of total Asia-North America air cargo flows are valid.
- The Asian economies will re-emerge from their current crisis by 2000, and then resume the rapid growth of the 1990s.
- Asia-North America cargo will continue to comprise the majority of ANC international air freight.
- Fuel prices will continue to be stable.
- There will be enough capacity at Asian airports to accommodate the projected demand.
- U.S. air carriers will continue to expand their transfer operations at ANC.
- The Alaska Air Cargo Transfer Initiative will encourage increased air freight transfer activity among foreign-flag carriers.
- There will be no outside political events, similar to the Gulf War, which will depress traffic over an extended period of time.

International O&D Freight

Table 2.41 shows the forecast distribution of international O&D and transfer freight. Originating and terminating cargo was assumed to increase at the same rate as the Boeing projection of Asia-North America freight. The difference between enplaned and originating freight was assumed to be transfer freight.

Table 2.41

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Estimated Distribution of International Cargo Between True O&D and Transfer

Calendar Year	Enplaned Freight			Deplaned Freight		
	Enplaned Freight (a)	Estimated True Originating (b)	Estimated True Transfer (c)	Deplaned Freight (a)	Estimated True Terminating (d)	Estimated True Transfer (e)
			Historical (f)			
1997	104,457	51,072	53,385	166,023	5,470	160,553
			Recommended Projections			
1998	113,200	53,200	60,000	173,300	5,700	167,600
1999	122,100	55,500	66,600	181,500	5,900	175,600
2000	132,000	58,000	74,000	190,400	6,200	184,200
2001	145,600	61,400	84,200	201,100	6,600	194,500
2002	163,500	66,100	97,400	215,200	7,100	208,100
2003	183,000	71,100	111,900	230,700	7,600	223,100
2008	308,800	102,400	206,400	331,900	11,000	320,900
2020	951,500	246,300	705,200	846,300	26,400	819,900

(a) Table 2.40.
(b) Estimate for 1997 from Table 2.9. Assumed to increase at same rate as Asia-North America cargo (see Table 2.40).
(c) Enplaned freight less originating freight. Includes transfer to domestic carrier.
(d) Estimate for 1997 from Table 2.9. Assumed to increase at same rate as Asia-North America cargo (see Table 2.40).
(e) Deplaned freight less terminating freight. Includes transfer from domestic carrier.
(f) See Table 2.9 for estimate of current true originating and terminating cargo.

Sources: As noted and HNTB analysis.

As shown, originating international air freight is projected to increase from 51,072 tons to 246,300 tons by the end of the forecast period, an average annual increase of 7.1 percent. The forecast assumes continuing growth in Asian demand for Alaskan seafood and forest products supported by low air freight rates, as carriers struggle to fill their aircraft on eastbound routes. Eastbound traffic is projected to grow less quickly than westbound traffic (see Table 2.39).

Terminating international air freight is projected to increase from 5,470 tons to 26,400 tons by the end of the forecast period. The projections assume that demand for Asian goods will increase just as rapidly in Alaska as elsewhere in North America.

International Air Cargo Operations

Table 2.42 presents the forecast of international cargo aircraft operations by carriers primarily engaged in transfer activity. No further increases in average aircraft size are anticipated because the Boeing 747 aircraft is already the standard at ANC and because of the possibility that international carriers will use change-of-gauge operations at ANC, which will result in smaller, shorter range aircraft flying the ANC-North American routes. Although the capacity of each aircraft operation was assumed to remain constant, the average load factor was projected to increase at the Boeing projected rate of 1.14 percent per year, resulting in an increase from 40.4 tons per aircraft departure to 52.5 tons per aircraft departure. International non-technical stop all-cargo operations are projected to increase from 13,384 in 1997 to 68,600 in 2020, an average annual increase of 7.4 percent.

It should be noted that the current 40.4 tons per aircraft departure includes only the cargo that is enplaned or deplaned, not tonnage that is already on board the aircraft. As noted in Section 2.2.2, the cargo information filed by the carriers is incomplete. However, the Airport data on Northwest and Polar suggest that their on-board load factors are between 70 percent and 75 percent, the majority of which is not loaded or unloaded at ANC. The transit cargo on aircraft involved in transfer activity will limit the extent to which the ratio of enplaned and deplaned freight tonnage per aircraft departure can increase in the future. Payload restrictions on Boeing 747-100 and 747-200s resulting from the Stage 2 phase-out requirements will also limit increases in the ratio of enplaned and deplaned tons per aircraft departure.

Table 2.43 presents the forecast of the non-technical stop international air cargo fleet mix and average aircraft size. The current aircraft fleet mix for the international air freight carriers operating at the Airport consists primarily of aircraft from the Boeing 747 family and the MD-11/DC-10 family. The fleet mix projections in Table 2.43 are based on the following assumptions:

- Since the forecasts are unconstrained, the fleet mix projections are not limited by the existing number or length of runways or airfield configuration.
- As the 747-100 and –200 aircraft age, they will gradually be replaced by the Boeing 747-400.
- FedEx is projected to add operations by the Airbus A-300 and MD-11 aircraft it has on order.
- UPS is expected to add operations by the 767 aircraft it has on order.

Table 2.42

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Aircraft Departures and Operations
International All-Cargo Carriers With Significant Enplaned and Deplaned Air Freight at ANC

Calendar Year	Total International Enplaned and Deplaned Tonnage (a)	Tons per Aircraft Departure (b)	Aircraft Departures (c)	Aircraft Operations (d)
		Historical		
1997	270,480	40.4	6,692 (e)	13,384
		Recommended Forecast		
1998	286,500	40.9	7,000	14,000
1999	303,600	41.3	7,300	14,600
2000	322,400	41.8	7,700	15,400
2001	346,700	42.3	8,200	16,400
2002	378,700	42.8	8,900	17,800
2003	413,700	43.3	9,600	19,200
2008	640,700	45.8	14,000	28,000
2020	1,797,800	52.5	34,300	68,600

(a) Table 2.40.
(b) Assumed no increase in average aircraft capacity and 1.14 percent average annual increase in load factor. See text for details. Note that this does not include tonnage that is already on board and is neither enplaned nor deplaned. Consequently, load factors are higher than suggested by the ratio of tons per aircraft departure.
(c) Total tons divided by tons per aircraft departure.
(d) Aircraft departures multiplied by two.
(e) HNTB compilation of Ted Stevens Anchorage International Airport data.

Sources: As noted and HNTB analysis.

Table 2.43

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected International All-Cargo Fleet Mix
International All-Cargo Carriers With Significant Enplaned and Deplaned Air Freight at ANC

	Payload Capacity (tons)	1997	2003	2008	2020
Air Carrier Aircraft					
B-757	44.0	0.3%	1.0%	1.0%	1.0%
A-340	53.0	0.0%	0.0%	0.0%	4.0%
DC-8	53.1	5.9%	5.0%	2.0%	0.0%
A-300	54.4	0.0%	1.0%	3.0%	7.0%
767-300	65.0	2.9%	4.0%	6.0%	8.0%
DC-10	85.3	19.3%	16.0%	13.0%	5.0%
MD-11	99.0	22.2%	24.5%	28.0%	30.0%
747-100	109.7	28.6%	23.5%	17.0%	4.0%
747-200	118.4	21.0%	25.0%	25.0%	17.0%
747-400	124.6	0.0%	0.0%	5.0%	20.0%
747-400X	132.0	0.0%	0.0%	0.0%	4.0%
		100.3%	100.0%	100.0%	100.0%
Average Payload Capacity (tons)(a)		100	100	100	100

(a) Assumed to remain constant. See text for details.

Sources: Boeing Commercial Airplane Group, 1998/1999 World Air Cargo Forecast and HNTB analysis.

- Some narrow-body and small wide-body aircraft will be used to serve the Russian and Canadian markets.
- New aircraft, such as the very long-range Boeing 747-400X, will be introduced into the cargo market by 2020.
- No supersonic, hypersonic, or tilt-rotor aircraft are projected because of poor operating economies.
- No attempt is made to forecast aircraft types not currently in the planning or development stages.

Table 2.44 presents the peak hour forecast of aircraft arrivals, departures, and operations for international air carriers with significant enplaned and deplaned air cargo at ANC (non-technical stop operators). Peak hour activity is projected to increase significantly, but much less quickly than annual operations. It is anticipated that, as the air cargo market expands, carriers add connecting banks, allowing a greater variety of time-definite service options and generating greater productivity from their ground personnel and facilities.

2.4.4 International Transit Freight and Technical Stop Operations

Future international transit freight at ANC will depend on the cargo flows between Asia, North America, and Europe, and on the continued 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 two principal factors: (1) potential competition from other technical stops and (2) continued improvements in aircraft technology that will allow longer flights at full payloads. In addition, some current transit freight could become transfer freight in the future.

International Transit Freight

Table 2.45 summarizes an analysis that was performed to assess ANC's relative advantage as a technical stop under a variety of scenarios. All potential market pairs among the Asian, European, and North American airports listed among the ACI's (Airports Council International's) top 100 air cargo airports were examined, including 90 markets and 8,010 market pairs. The suitability of ANC as a technical stop for each market pair was evaluated based on several criteria. It was assumed that ANC would be the preferred technical stop provided the following criteria were met:

- Each segment to and from ANC could be flown non-stop by an aircraft at full payload (this was tested using aircraft with maximum full payload ranges of 4,000, 4,500, 5,000, and 6,000 statute miles).
- The two markets of the market pair were too far apart to be served by a non-stop flight at full payload.
- No other competing technical stop could serve better than ANC, based on minimizing total great circle distance.

ANC's relative suitability depends on which airports are developed as competing technical stops and the maximum full payload range of the aircraft serving these markets. For example, if airports in Tashkent, Uzbekistan; Khabarovsk, Russia; and Northern Sweden are not potential competitors, the number of feasible market pairs increases as average aircraft range increases. As average aircraft range increases, the northern Asia-North America markets that could be served non-stop would be replaced by even greater opportunities between Southeast Asia-North America markets. However, if the Eurasian airports are considered potential competitors for technical stops, the ANC advantage steadily decreases as aircraft range increases.

Table 2.44

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Peaking Activity
International All-Cargo Carriers With
Significant Enplaned and Deplaned Air Freight at ANC

Calendar Year	Aircraft Operations		
	Peak Hour Arrivals	Peak Hour Departures	Peak Hour Operations
	Historical (a)		
1997	7.2	9.1	9.1
	Recommended Forecast (b)		
1998	7.5	9.5	9.5
1999	7.8	9.8	9.9
2000	8.1	10.3	10.4
2001	8.6	10.8	11.0
2002	9.2	11.5	11.8
2003	9.8	12.2	12.6
2008	12.9	15.9	17.2
2020	16.7	16.7	28.5

(a) Tables 2.11, 2.12, 2.13, 2.14, and 2.15 and HNTB analysis.
(b) Peak hour aircraft arrivals, departures and operations assumed to increase at same rate as operations forecast in Table 2.42, with adjustment for peak spreading as operations increase.

Sources: As noted and HNTB analysis.

Table 2.45

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Circuitry Analysis of Potential Air Cargo Technical Stops
(Number of Market Pairs for Which Anchorage Offers Minimum Great Circle Distance Compared to Other Potential Technical Stops)(a)

Potential Technical Stop	Maximum Range With Full Payload (Statute Miles)						
	Without Eurasian Technical Stops (b)				With Eurasian Technical Stops (c)		
	4000	4500 (d)	5000	6000	4500	5000	6000
Anchorage	460	696	728	876	662	636	514
Vancouver	-	-	48	50	-	48	40
Seattle	-	-	162	58	-	160	46
Dubaii	336	566	538	206	78	42	20
New York JFK	1,000	866	320	80	853	313	62
Tashkent	n/a	n/a	n/a	n/a	424	270	126
Kharabovsk	n/a	n/a	n/a	n/a	36	162	494
Northern Sweden	n/a	n/a	n/a	n/a	691	1,070	938
Non-Stops	3,650	4,314	4,834	5,816	4,314	4,834	5,816
Multiple-Stops	2,654	1,658	1,470	1,014	1,042	565	44
Total	8,100	8,100	8,100	8,100	8,100	8,100	8,100
Potential Anchorage Stops (e)							
Asia-North America	460	644	680	864	638	636	514
Asia-Europe	-	28	40	12	-	-	-
Europe-North America	-	24	8	-	24	-	-
Total	460	696	728	876	662	636	514
Potential Anchorage Stops with Multiple-Stops Reallocated (f)							
Asia-North America	684	810	831	988	732	684	517
Asia-Europe	-	35	49	14	-	-	-
Europe-North America	-	30	10	-	28	-	-
Total	684	875	890	1,002	760	684	517
Potential Anchorage Stops with Multiple-Stops Reallocated (Indexed) (g)							
Asia-North America	84	100	103	122	90	84	64
Asia-Europe	0	100	140	40	0	0	0
Europe-North America	0	100	33	0	93	0	0
Total	78	100	102	115	87	78	59
Potential Anchorage Stops with Multiple-Stops Reallocated (Indexed and Averaged) (h)							
Asia-North America					95	94	93
Asia-Europe					50	70	20
Europe-North America					97	17	-
Total					93	90	87

(a) Includes all North American, Asian and European airports listed in ACI's listing of top 100 air cargo airports.
(b) Assumes Tashkent, Kharabovsk, and Northern Sweden are not available for technical stops.
(c) Assumes Tashkent, Kharabovsk, and Northern Sweden are available for technical stops.
(d) Most closely resembles existing fleet and air carrier operating practices.
(e) Breakdown of markets pairs for which Anchorage provides shortest great circle distance.
(f) Assumes that percentage of multiple-stop markets routed through ANC is the same as the percentage of one-stop markets routed through ANC.
(g) Indexed so that scenario without Eurasian technical stops at 4500 miles at maximum payload equals 100.
(h) Average of scenarios with and without Eurasian technical stops.

Sources: As noted and HNTB analysis.

As an example, Table 2.45 shows that, if the maximum aircraft range with full payload were to rise from 4,500 miles to 6,000 miles, the number of market pairs for which ANC would provide the most efficient technical stop—based on minimizing great circle distance—would increase from 696 to 876 if there were no competition from Eurasian airports. However, if the Eurasian airports were able to offer competitive services, ANC would have a competitive advantage for only 517 market pairs on a great circle distance basis.

With the existing cargo fleet, 4,500 statute miles is the approximate cut off between non-stop service and multiple-stop service, based on existing service patterns. At full payloads, the maximum range of a Boeing 747-200 is approximately 4,000 miles and a Boeing 747-400 is approximately 5,000 miles. It is expected that, by 2008, there will be sufficient Boeing 747-400s or similar aircraft in service so that 5,000 miles will be the average maximum stage length. By 2020, it is anticipated that there will be sufficient new long-range aircraft, such as the proposed Boeing 747-400X, so that 6,000 miles will be the average maximum stage length at full payload.

Since it is uncertain whether the Eurasian airports will be developed as suitable technical stops, the analysis was performed with and without those airports as potential competitors. The average of the two cases was considered the most likely scenario since it assumes some airlines will use these airports, despite the greater risk, as they currently do. As shown in Table 2.45, under this scenario, ANC's suitability as a technical stop will fall to 93 percent of current levels for Asia-North America traffic by 2020, and will fall to 20 percent of current levels for Asia-Europe traffic.

Table 2.46 presents the forecast of international transit freight. As shown, the ANC share of total Asia-North America international air cargo flows is projected to decline in accordance with the analysis in Table 2.45. Based on discussions with ANC staff, it was assumed that ANC would maintain its current share of Asia-Europe international air cargo flows (4.6 percent) because of the additional transfer opportunities to North American markets that would be offered at ANC. Total international cargo flowing through ANC was then estimated as the sum of the projected ANC shares of Asia-North America and Asia-Europe air cargo. Part of the air cargo flow through ANC becomes O&D air freight and part of the flow becomes transfer freight. The rest of the international cargo flow remains transit freight. As shown, estimated transit tonnage is projected to increase from 1.2 million tons in 1997 to 5.1 million tons in 2020, an average annual increase of 6.3 percent. Although transit air freight is expected to grow substantially over the period, its share of the total ANC international air cargo flow is projected to decrease from 83 percent to 76 percent because of the increasing share of air cargo diverted through transfer operations.

The forecasts of international transit tonnage are dependent on the following assumptions:

- The Boeing forecasts of total Asia-North America air cargo flows are valid.
- The Asian economies will re-emerge from their current crisis by 2000, then resume the rapid growth of the 1990s.
- Asia-North America cargo will continue to comprise the majority of ANC international air freight.

Table 2.46

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Base Case Projection of International Transit Freight (tons)

Calendar Year	Total Asia North America Cargo (000's of tons) (a)	ANC Share (b)	ANC Asia North America Cargo (tons) (c)	Total Asia Europe Cargo (000's of tons) (a)	ANC Share (d)	ANC Asia Europe Cargo (tons) (c)	Total ANC International Tonnage (e)	Total International Transfer Freight (f)	International to International Transfer Freight (g)	Total International O&D Freight (f)	ANC International Transit Tonnage (h)
					Historical						
1997	2,468	56.4%	1,391,202 (i)	1,929	4.6%	88,800 (i)	1,480,003 (j)	213,938	30,421 (j)	56,542	1,239,944 (j)
					Recommended Projections						
1998	2,572	56.0%	1,441,000	2,069	4.6%	95,300	1,536,300	227,600	32,400	58,900	1,282,200
1999	2,683	55.7%	1,494,300	2,220	4.6%	102,200	1,596,500	242,200	34,400	61,400	1,327,300
2000	2,804	55.4%	1,552,400	2,382	4.6%	109,700	1,662,100	258,200	36,700	64,200	1,376,400
2001	2,969	55.0%	1,633,900	2,556	4.6%	117,700	1,751,600	278,700	39,600	68,000	1,444,500
2002	3,194	54.7%	1,747,100	2,743	4.6%	126,300	1,873,400	305,500	43,400	73,200	1,538,100
2003	3,437	54.4%	1,868,600	2,943	4.6%	135,500	2,004,100	335,000	47,600	78,700	1,638,000
2008	4,953	52.7%	2,610,500	4,186	4.6%	192,700	2,803,200	527,300	75,000	113,400	2,237,500
2020	11,910	52.4%	6,235,800	9,750	4.6%	449,000	6,684,800	1,525,100	216,900	272,700	5,103,900

(a) Table 2.39
(b) Existing ANC share of total cargo flow assumed to decline at same rate as Potential Anchorage stops with multiple stops reallocated and averaged (see Table 2.45).
(c) Total cargo flow multiplied by estimated ANC share.
(d) Assumed to remain constant as a result of increased transfer activity.
(e) Sum of ANC shares of Asia-North America cargo and Asia-Europe cargo.
(f) Table 2.41.
(g) Projected to increase at same rate as total international transfer freight.
(h) Total ANC international tonnage less international O&D tonnage and less international transfer tonnage (excluding international - to - international tonnage). International - to - international transfer freight is included twice in total international transfer freight so it is deleted once to avoid double-counting.
(i) Estimated based on current distribution of all-cargo airline routes through ANC.
(j) Table 2.10.

Sources: Boeing Commercial Airplane Group, 1998/1999 World Air Cargo Forecast, and HNTB analysis.

- Fuel prices will continue to be stable.
- There will be enough capacity at Asian airports to accommodate the projected demand.
- Eurasian airports will emerge as partial competitors for technical stops.
- Fairbanks will not become a major competitor for technical stops beyond current levels.
- Most cargo carriers will have aircraft with a maximum range at full payload of 5,000 miles by 2008 and 6,000 miles by 2020.
- There will be no outside political events, similar to the Gulf War, which will depress traffic over an extended period of time.

A final critical assumption of the above analysis is that all-cargo carriers will not trade payload for range. As noted previously, the maximum range of a 747-400 at full payload is approximately 5,000 statute miles. Other aircraft have shorter ranges at full payload, including the MD-11F (4,500 statute miles), the Boeing 747-200 (4,000 statute miles), the DC-10-30 (3,800 statute miles), and the Boeing 767-300 (3,500 statute miles).[13] 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.

All-cargo carriers do not typically trade off payload for range because, as MergeGlobal puts it, "cargo doesn't care about non-stops." MergeGlobal continues:

> 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 non-stop 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.[14]

Ted Weise, President and CEO of FedEx, 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.

As a consequence, even though new long-range aircraft, such as the Boeing 747-400 and MD-11, are becoming an increasingly important part of the air-cargo fleet, there are very few all-cargo segments longer than 5,000 statute miles.

International Air Cargo Technical Stop Operations

Transit freight alone requires no facilities and generates no revenue for the Airport; it represents international air freight that is logically routed through ANC to minimize great circle distance but is not diverted by transfer operations. As such, transit freight

[13] Jane's All The World's Aircraft, (1990-1991) and (1996-1997).

[14] MergeGlobal, Inc., "Are Winglets Worth It" in MGI Cargo Analyst, January/February 1995.

is the best indicator of the demand for future technical stop operations, which significantly impact the demand for Airport facilities and the Airport's future revenue potential.

Table 2.47 shows the projected distribution of international transit freight between passenger and combi-carriers and all-cargo carriers. It was assumed that the passenger/combi share would increase by the same amount as passenger aircraft capacity and that the remainder would be carried on all-cargo aircraft. As shown in Table 2.47, all-cargo carrier aircraft are expected to account for an estimated 98 percent of the total international transit freight by 2020.

Table 2.48 presents the forecast of international air freight technical stop operations. The amount of tonnage per aircraft operation was assumed to remain constant, as neither average aircraft capacity nor load factor is projected to increase. No further increases in average aircraft size are anticipated because the average capacity (112 tons) already exceeds that of a Boeing 747-100 aircraft. It is anticipated that smaller, long-range freighters, such as the A-340, will offset the anticipated entry of aircraft with greater payload capabilities, such as the 747-400X and the Airbus A-3XX. No increase in load factor is anticipated because the projected widening between eastbound and westbound trade flows (see Table 2.39) will make it difficult to maintain high load factors in both directions. As shown in Table 2.48, international air freight technical stop operations are projected to increase from 25,812 in 1997 to 108,400 in 2020, an average annual increase of 6.4 percent.

Table 2.49 presents the forecast of the international air freight technical stop operator fleet mix. The current aircraft fleet mix for the international air freight technical stop operators at ANC consists primarily of Boeing 747-200 aircraft, with fewer Boeing 747-400s, Boeing 747-100s, and MD-11 aircraft and some narrow-body aircraft, such as the DC-8. The fleet mix projections in Table 2.49 are based on the following assumptions:

- Since the forecasts are unconstrained, the fleet mix projections are not limited by the existing number or length of runways or airfield configuration.
- Consistent with the published fleet acquisition plans of the Asian carriers, the Boeing 747-400 will gradually replace the 747-200 as the mainstay of the international all-cargo aircraft fleet.
- As carriers retire some of their Boeing 747-200 aircraft, they will add smaller long-range, wide-body aircraft, such as the Boeing 767, MD-11, A-300, and A-340, because of the flexibility they offer in accommodating varying load sizes.
- New aircraft, such as the very long-range Boeing 747-400X, and NLA, such as the Airbus A-380, will be introduced into the cargo market by 2020.
- No supersonic, hypersonic, or tilt-rotor aircraft are projected because of poor operating economies.

No attempt is made to forecast aircraft types not currently in the planning or development stages.

Table 2.50 presents the forecast of peak hour aircraft arrivals, departures, and operations for air freight technical stop operators. As shown, even with an adjustment for peak spreading, technical stop activity is expected to account for 22 peak hour operations by 2020.

Table 2.47

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Base Case Projection of International Transit Freight by Carrier (tons)

Calendar Year	Passenger and Combi-Carriers (a)	All-Cargo Carriers (b)	Total Transit Freight (c)
	Historical (d)		
1997	46,100	1,193,843	1,239,944
	Recommended Projections		
1998	47,200	1,235,000	1,282,200
1999	48,400	1,278,900	1,327,300
2000	49,500	1,326,900	1,376,400
2001	50,400	1,394,100	1,444,500
2002	51,400	1,486,700	1,538,100
2003	52,400	1,585,600	1,638,000
2008	60,800	2,176,700	2,237,500
2020	88,100	5,015,800	5,103,900

(a) Assumed to increase at same rate as passenger aircraft operations adjusted by average international passenger aircraft size.
(b) Total freight less passenger and combi- freight.
(c) Table 2.46.
(d) HNTB compilation of calendar year 1997 ANC data.

Sources: Ted Stevens Anchorage International Airport and HNTB analysis.

Table 2.48

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Aircraft Departures and Operations
International All-Cargo Carriers Which Primarily Operate Technical Stops

Calendar Year	Total All-Cargo International Transit Tonnage (a)	Tons per Aircraft Departure (b)	Aircraft Departures (c)	Aircraft Operations (d)
		Historical (e)		
1997	1,193,843	92.5	12,906	25,812
		Recommended Forecast		
1998	1,235,000	92.5	13,400	26,800
1999	1,278,900	92.5	13,800	27,600
2000	1,326,900	92.5	14,300	28,600
2001	1,394,100	92.5	15,100	30,200
2002	1,486,700	92.5	16,100	32,200
2003	1,585,600	92.5	17,100	34,200
2008	2,176,700	92.5	23,500	47,000
2020	5,015,800	92.5	54,200	108,400

(a) Table 2.47.
(b) Assumed to remain constant. See text for details. Note that some transit tonnage is carried by international all-cargo carriers with significant enplaned and deplaned air freight at ANC (see Table 2.42). Consequently, true load factors for these carriers are lower than suggested by the ratio of tons per aircraft departure.
(c) Total transit tons divided by tons per aircraft departure.
(d) Aircraft departures multiplied by two.
(e) HNTB compilation of Ted Stevens Anchorage International Airport data.

Sources: As noted and HNTB analysis.

Table 2.49

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected International All-Cargo Fleet Mix
International All-Cargo Carriers Which Primarily Operate Technical Stops

	Payload Capacity (tons)	1997	2003	2008	2020
Air Carrier Aircraft					
L-100	25.0	1.3%	1.0%	0.5%	0.0%
757	44.0	0.0%	0.0%	0.0%	0.0%
A-340	53.0	0.0%	0.0%	3.0%	6.0%
DC-8	53.1	5.8%	5.3%	3.0%	0.0%
A-300	54.4	0.0%	0.0%	2.0%	4.0%
767-300	65.0	0.7%	1.2%	3.0%	6.0%
DC-10	85.3	2.0%	2.0%	1.5%	1.0%
MD-11	99.0	9.0%	10.5%	13.0%	15.0%
747-100	109.7	3.4%	3.0%	2.0%	1.0%
747-200	118.4	56.3%	50.5%	38.0%	20.0%
747-400	124.6	21.2%	25.0%	30.0%	40.0%
747-400X	132.0	0.0%	1.0%	2.0%	4.0%
AN-124	165.0	0.2%	0.5%	1.0%	1.0%
VLA	275.0	0.0%	0.0%	1.0%	2.0%
		100.0%	100.0%	100.0%	100.0%
Average Payload Capacity (tons)(a)		112	112	112	112

(a) Assumed to remain constant. See text for details.

Sources: Boeing Commercial Airplane Group, 1998/1999 World Air Cargo Forecast and HNTB analysis.

Table 2.50

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Peaking Activity
International All-Cargo Carriers Which Primarily Operate Technical Stops

Calendar Year	Aircraft Operations		
	Peak Hour Arrivals	Peak Hour Departures	Peak Hour Operations
		Historical (a)	
1997	4.3	3.6	6.4
		Recommended Forecast (b)	
1998	4.4	3.7	6.6
1999	4.5	3.8	6.8
2000	4.7	3.9	7.0
2001	4.9	4.1	7.3
2002	5.2	4.3	7.8
2003	5.5	4.5	8.2
2008	7.2	6.0	10.8
2020	14.7	12.3	22.1

(a) Tables 2.11, 2.12, 2.13, 2.14, and 2.15 and HNTB analysis.
(b) Peak hour aircraft arrivals, departures and operations assumed to increase at same rate as operations forecast in Table 2.48, with adjustment for peak spreading as operations increase.

Sources: As noted and HNTB analysis.

2.5 AIR MAIL

This section discusses the forecasts of domestic and international air mail tonnages, including projections of aircraft operations attributable to air mail at ANC.

Air Mail Tonnage

Table 2.51 presents the forecast of domestic and international air mail tonnage, including recent historical data and the K&A short-range forecasts for comparison purposes. The historical domestic air mail tonnages include bypass air 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. Much of the recent growth in Alaska air mail is attributable to the transfer of traditional air freight to the bypass mail system.

The methodology used to estimate domestic air mail is similar to that used to estimate domestic air freight. The long-range domestic air mail forecasts were developed using multi-variable regression analysis. Using historical (1990-1996) data, several relationships were tested, including the same socioeconomic variables, aviation industry variables, and instrument variables that were tested for the domestic freight forecasting equation. Again, the variables were tested in both linear and logarithmic model formulations.

Several of the equations that were calculated showed strong correlations with domestic air mail. The model that produced the best results for enplaned domestic air freight, from both a theoretical and statistical standpoint, was a logarithmic formulation that specified ANC domestic air mail as a function of non-Anchorage Alaska employment. This relationship reflects the strong dependence by interior Alaskan communities on the bypass mail system for much of their provisions.

Based on the above considerations, the following equation was selected for the domestic air mail forecasts:

$$TDMAIL = 10^{-8.619572} \times OUTEMP^{2.621434}$$

where:

TDMAIL = enplaned domestic air mail

OUTEMP = Alaska employment outside of metropolitan Anchorage

R-squared = 0.689

Corrected R-squared = 0.627

F-test = 11.08

Durbin-Watson statistic = 1.48

T-statistic (intercept) = -2.14

T-statistic (Alaska employment outside of Anchorage) = 3.33

The non-Anchorage Alaska employment variable represents the size of the market, which consists largely of rural communities dependent on bypass mail shipments for many of their provisions. The forecasting model can be interpreted as indicating that every 1 percent increase in non-Anchorage Alaska employment will increase enplaned air freight by 3.33 percent.

Table 2.51

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Base Case Projection of Domestic and International Air Mail (tons)

Calendar Year	Total Domestic Air Mail	Total International Air Mail	Total Air Mail	Non-Anchorage Employment (a)
		Historical (b)		
1990	57,534	2,227	59,761	123,900
1991	54,288	1,947	56,235	125,700
1992	58,786	3,610	62,396	128,300
1993	59,237	2,858	62,095	132,200
1994	65,322	2,318	67,640	135,800
1995	68,168	2,644	70,812	138,300
1996	82,688	2,942	85,630	141,850
1997	84,912	4,146	89,058	n/a
		K&A Projections (c)		
1998			92,800	141,770
1999			96,600	143,740
2000			100,600	145,660
2001			104,700	146,200
2002			109,000	147,030
		Recommended Projections (d)		
1998	85,800	4,300	90,100	141,770
1999	89,000	4,400	93,400	143,740
2000	92,200	4,600	96,800	145,660
2001	93,100	4,800	97,900	146,200
2002	94,400	4,900	99,300	147,030
2003	95,900	5,100	101,000	147,890
2008	109,000	6,100	115,100	155,320
2020	170,800	9,100	179,900	184,300

(a) Table 2.2.
(b) Table 2.8.
(c) Keiser Associates, Inc., Anchorage International Airport Preliminary Air Cargo Forecast updated for 1997.
(d) See text for domestic mail forecasting equation. International mail assumed to increase at projected Boeing rate for mail.

Sources: Boeing Commercial Airplane Group, 1998/1999 World Air Cargo Forecast, and HNTB analysis.

As shown in Table 2.51, domestic air mail is projected to increase from 84,912 tons in 1997 to 170,800 tons by the end of the forecast period, an average annual increase of 3.1 percent; this compares with a historical growth rate of 5.7 percent from 1990 through 1997. The recommended forecasts are slightly more conservative than the K&A projections developed through 2002. It should be noted that domestic air mail is highly dependent on the availability of the bypass mail subsidy. If this subsidy were eliminated, much of the current mail tonnage would revert to domestic air freight.

Table 2.51 also presents forecasts of international air mail at ANC. International air mail accounts for less than 5 percent of total ANC air mail and has shown significant year-to-year fluctuations since 1990, with no consistent pattern. Boeing projects air mail revenue ton kilometers to increase at an average annual rate of 3.5 percent through 2017. Since Anchorage lies at the cross-roads of the Asia-North America market, which is one the fastest growing air freight markets, it is expected that ANC international air mail will, at a minimum, increase at the same rate as the worldwide average. As shown in Table 2.51, ANC international air mail tonnage is projected to increase from 4,146 tons in 1997 to 9,100 tons by 2020, an average annual growth rate of 3.5 percent; the average annual growth from 1990 through 1997 was 9.3 percent.

Air Mail Aircraft Operations

In Alaska, the majority of domestic air mail is shipped under contract by all-cargo carriers. International air cargo is shipped in passenger carriers and generates no additional aircraft operations.

Table 2.52 shows the projected distribution of domestic air mail between passenger and combi-carriers and all-cargo carriers. The all-cargo share of air mail was estimated as the amount of air mail carried by all-cargo carriers, including Air Cargo Express, Alaska Central, Lynden Air Cargo, and Northern Air Cargo. Consistent with the domestic air cargo projections, it was assumed that the existing distribution of air mail between passenger carriers and all-cargo carriers would continue. As shown in Table 2.52, all-cargo carrier aircraft are expected to continue to account for an estimated 45 percent of total domestic air mail.

Table 2.53 presents the forecast of domestic all-cargo carrier aircraft departures and operations attributable to air mail. All-cargo departures by Air Cargo Express, Alaska Central, Lynden Air Cargo, and Northern Air Cargo were allocated between air mail and air freight based on tonnage. Average payload capacity for the domestic fleet was assumed to increase at the same rate as the domestic freighter fleet. Average tons per aircraft departure were assumed to increase at the same rate as average aircraft capacity plus a 1.14 percent average annual increase in average load factor.[15] As shown, total domestic air mail aircraft operations are projected to rise from 9,860 in 1997 to 10,800 by 2020, an average annual increase of 0.4 percent.

Table 2.54 shows the forecast of the fleet mix and average payload capacity for all-cargo carriers transporting air mail to and from ANC. The current fleet mix consists mostly of small aircraft ranging from Beechcraft to Lockheed Electras and DC-6s.

[15] Boeing Commercial Airplane Group, 1998/1999 World Air Cargo Forecast. Load factor equal to difference between Boeing projection of traffic growth (6.4 percent) and capacity growth (5.2 percent).

Table 2.52

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Base Case Projection of Enplaned and Deplaned Domestic Air Mail by Type of Carrier (tons)

Calendar Year	Passenger and Combi-Carriers	All-Cargo Carriers	Total Domestic Mail (a)
	Historical (b)		
1997	46,386	38,526	84,912
	Recommended Projections (c)		
1998	46,900	38,900	85,800
1999	48,600	40,400	89,000
2000	50,400	41,800	92,200
2001	50,900	42,200	93,100
2002	51,600	42,800	94,400
2003	52,400	43,500	95,900
2008	59,500	49,500	109,000
2020	93,300	77,500	170,800

(a) Table 2.51.
(b) All-cargo share includes enplaned and deplaned air mail by Air Cargo Express, Alaska Central, Lynden Air Cargo and Northern Air Cargo.
(c) Future distribution assumed to be the same as in 1997. See text for details.

Sources: Keiser & Associates, Anchorage International Airport Preliminary Air Cargo Forecast and HNTB analysis.

Table 2.53

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Aircraft Departures and Operations
Domestic Air Mail Carriers

Calendar Year	Domestic Air Mail Carrier Tonnage (a)	Tons per Aircraft Departure (b)	Aircraft Departures (c)	Aircraft Operations (d)
		Historical (e)		
1997	38,526	7.8	4,930	9,860
		Recommended Forecast		
1998	38,900	8.0	4,800	9,600
1999	40,400	8.2	4,900	9,800
2000	41,800	8.5	4,900	9,800
2001	42,200	8.7	4,900	9,800
2002	42,800	8.9	4,800	9,600
2003	43,500	9.1	4,800	9,600
2008	49,500	10.4	4,800	9,600
2020	77,500	14.2	5,400	10,800

(a) Table 2.52. Includes enplaned and deplaned tonnage.
(b) Assumed to increase at same rate as for domestic all-cargo carriers.
(c) Domestic air mail carrier tonnage divided by tons per aircraft departure.
(d) Aircraft departures multiplied by two.
(e) Keiser & Associates and Ted Stevens Anchorage International Airport.

Sources: As noted and HNTB analysis.

Table 2.54

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Domestic Air Mail Carrier Fleet Mix

	Payload Capacity (tons)	1997	2003	2008	2020
Air Carrier Aircraft					
CNA/Beech	1.5	57.1%	55.0%	51.0%	46.0%
Ayers LM200	3.8	0.0%	0.0%	4.0%	10.0%
L-188	13.0	10.8%	8.0%	5.0%	2.0%
737	14.0	0.0%	0.0%	5.0%	15.0%
DC-6	14.1	25.4%	20.0%	15.0%	5.0%
DC-9	18.0	0.0%	6.0%	4.0%	1.0%
727-100	20.6	3.5%	6.0%	4.0%	1.0%
L-100	25.0	3.3%	5.0%	9.0%	15.0%
757	44.0	0.0%	0.0%	3.0%	5.0%
		100.0%	100.0%	100.0%	100.0%
Average Payload Capacity (tons)(a)		7	8	9	10

(a) Assumed to increase at same rate as domestic all-cargo fleet.

Sources: Boeing Commercial Airplane Group, 1998/1999 World Air Cargo Forecast and HNTB analysis.

The following assumptions were used to develop the fleet mix:

- Since the forecast is unconstrained, the fleet mix projections are not limited by the existing number or length of runways or airfield configuration.
- As they approach the end of their useful economic life, the older turboprop aircraft, such as the Lockheed Electra and DC-6, are expected to be gradually phased out.
- Many of the large turboprops are expected to be replaced by narrow-body jets, such as DC-9s and Boeing 727s initially, and later Boeing 737 and 757 aircraft.
- Lynden Air Cargo is expected to use more of the Lockheed L-100 aircraft it has on order.
- No attempt is made to forecast aircraft not currently in the planning or development stages.

Table 2.55 shows projected peak hour aircraft arrivals, departures, and operations for the domestic air mail carriers. Since very little growth is projected to occur in the number of annual aircraft operations, little change is projected in the number of peak hour operations.

2.6 OTHER AVIATION ACTIVITY

This section includes a discussion of GA and military activity at ANC as well as LHD.

2.6.1 General Aviation

The GA projections developed in the LFA Master Plan were adapted for use in this study. The forecasts were developed in May 1993 and used 1992 as the base year. The forecasts projected that the high operating costs associated with GA aircraft, the complex operating environment at ANC, and competing airports in the area would all serve to constrain the growth of GA at ANC. Although the General Aviation Revitalization Act of 1994 generated some insurance relief, the LFA assumptions are still valid. The LFA forecasts were compared with actual activity levels in 1997 to determine whether they were sufficiently accurate to be used without change or whether some adjustments were required.

Table 2.56 presents the forecast of GA activity at ANC. As shown, actual operations in 1997 were 17 percent lower than had been projected by LFA. The decline that occurred in recent years has now stabilized. In fact, GA operations increased between 1996 and 1997. Consequently, the LFA projection that GA operations would remain constant after 1997 appears to still be valid. However, the recommended projections incorporate the lower base year level of activity (41,500 annual aircraft operations and 14 peak hour operations). The existing distribution between local and itinerant operations was also assumed to continue.

2.6.2 Military Activity

Table 2.57 presents the recommended forecast of ANC military aircraft operations and the previous LFA forecast. Since military requirements are determined by national policy rather than by local economic conditions, no increases or decreases in military aircraft operations were projected. This is consistent with the FAA projection of national military operations activity[16] and the views of Kulis Air Guard planning staff. As shown, 4,000 annual military operations are projected through the forecast period, of which 5 percent are assumed to continue to be local.

[16] FAA Aviation Forecasts: Fiscal Years 1998-2009, March 1998.

Table 2.55

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Peaking Activity
Domestic Air Mail Carriers

Calendar Year	Aircraft Operations		
	Peak Hour Arrivals	Peak Hour Departures	Peak Hour Operations
	Historical (a)		
1997	2.2	1.7	3.9
	Recommended Forecast (b)		
1998	2.2	1.7	3.9
1999	2.2	1.7	3.9
2000	2.2	1.7	3.9
2001	2.2	1.7	3.9
2002	2.2	1.7	3.9
2003	2.2	1.7	3.9
2008	2.2	1.7	3.9
2020	2.4	1.9	4.3

(a) Tables 2.11, 2.12, 2.13, 2.14, and 2.15 and HNTB analysis.
(b) Peak hour aircraft arrivals, departures and operations assumed to increase at same rate as operations forecast in Table 2.53, with adjustment for peak spreading as operations increase.

Sources: As noted and HNTB analysis.

Table 2.56

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected General Aviation Operations

Calendar Year	Total Operations	Local Operations	Itinerant Operations	Peak Hour Operations
		Historical (a)		
1990	57,578	13,109	44,469	n/a
1991	55,609	14,332	41,277	n/a
1992	50,170	12,944	37,226	17
1993	49,943	14,000	35,943	n/a
1994	44,788	9,995	34,793	n/a
1995	45,126	8,754	36,372	n/a
1996	35,916	3,017	32,899	n/a
1997 (b)	41,483	5,003	36,480	14
		Master Plan Forecast (c)		
FY 1992	53,879	n/a	n/a	17
FY 1997	50,000	n/a	n/a	15
FY 2002	50,000	n/a	n/a	15
FY 2012	50,000	n/a	n/a	15
		Recommended Forecast (d)		
1997	41,483	5,003	36,480	14
1998	41,500	5,000	36,500	14
1999	41,500	5,000	36,500	14
2000	41,500	5,000	36,500	14
2001	41,500	5,000	36,500	14
2002	41,500	5,000	36,500	14
2003	41,500	5,000	36,500	14
2008	41,500	5,000	36,500	14
2020	41,500	5,000	36,500	14

(a) Tables 2.11, 2.12, 2.15 and HNTB analysis.
(b) Excludes estimated Lake Hood general aviation operations.
(c) KPMG Peat Marwick, 1993.
(d) Master Plan growth rates applied to most recent base year (1997).

Sources: As noted and HNTB analysis.

Table 2.57

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Military Aircraft Operations

Calendar Year	Total Operations	Local Operations	Itinerant Operations	Peak Hour Operations
		Historical (a)		
1990	2,909	239	2,670	n/a
1991	3,751	196	3,555	n/a
1992	3,662	179	3,483	1
1993	3,800	314	3,486	n/a
1994	3,935	302	3,633	n/a
1995	3,805	176	3,629	n/a
1996	3,446	123	3,323	n/a
1997	4,031	196	3,835	2
		Master Plan Forecast (b)		
FY 1992	3,931	n/a	n/a	1
FY 1997	3,000	n/a	n/a	1
FY 2002	3,000	n/a	n/a	1
FY 2012	3,000	n/a	n/a	1
		Recommended Forecast (c)		
1997	4,031	196	3,835	2
1998	4,000	200	3,800	2
1999	4,000	200	3,800	2
2000	4,000	200	3,800	2
2001	4,000	200	3,800	2
2002	4,000	200	3,800	2
2003	4,000	200	3,800	2
2008	4,000	200	3,800	2
2020	4,000	200	3,800	2

(a) Tables 2.11, 2.12, 2.15 and HNTB analysis.
(b) Leigh Fisher Associates, 1996 Master Plan.
(c) Leigh Fisher Master Plan growth rates applied to most recent base year (1997).

Sources: As noted and HNTB analysis.

2.6.3 Lake Hood Operations

LHD is located adjacent to ANC. Until October 1997, the FAA counted operations at LHD separately from ANC operations.

Since that time, LHD aircraft operations have been combined with the FAA tower counts for ANC. Since the FAA's Terminal Area Forecast (TAF) is based on combined ANC/LHD operations, a valid comparison requires a forecast of LHD activity.

Table 2.58 presents the forecast of LHD aircraft activity. Currently, LHD is used exclusively by air taxi and GA aircraft operators. In 1997, air taxi operations were above the LFA forecast levels, while GA operations were below the LFA forecast levels. The recommended forecast applies the LFA growth rates for each category to the 1997 base year levels. Air taxi operations are projected to continue to grow with the stimulation provided by tourism. As shown, total LHD operations are projected to increase from 82,213 in 1997 to 96,100 in 2020, an average annual increase of 0.7 percent.

2.7 SUMMARY OF BASE CASE FORECAST

This section summarizes the Base Case Forecasts for passengers, cargo, and aircraft operations. These Base Case Forecasts are unconstrained and assume that there will be adequate airfield, terminal, and cargo facilities to accommodate the projected traffic. As discussed in the beginning of this chapter, recent actual growth rates indicate that the Base Case Forecast is likely high, but is reasonable to use for planning purposes. Slower actual growth could result in construction of improvements not being needed until later in the planning period as discussed in Section 2.8.4.

2.7.1 Passenger Summary

Table 2.59 and **Figure 2-2** summarize the Base Case Forecast of annual passenger enplanement activity at ANC, including domestic air carrier, regional carrier, charter and other, and international carrier passengers. Total annual enplanements are projected to increase from 2.1 million in 1997 to almost 4.5 million by 2020, an average annual increase of 3.3 percent. Total transit passengers are projected to increase at a slower rate, from 791,823 in 1997 to 1,387,000 in 2020, an average annual increase of 2.5 percent.

2.7.2 Cargo Forecast Summary

Tables 2.60 and 2.61 summarize the air freight and air mail tonnage forecasts. Total domestic freight is projected to increase from 222,962 tons in 1997 to 431,100 tons in 2020, an average annual increase of 2.9 percent. Domestic air freight growth rates increase in the long term because the employment projections, upon which they are based, are projected to increase as the Alaska economy transitions from oil production (see Section 2.1). Total international freight, including transit, is projected to increase from 1.5 million tons to 6.9 million tons over the same period, an average annual increase of 6.8 percent. International air freight growth rates are projected to increase in the long term as a result of the projected recovery of the Asian economies. Combined domestic and international freight is projected to increase fourfold over the forecast period, from 1.7 million tons to 7.3 million tons. **Figure 2-3** shows historical and projected enplaned and deplaned air freight. **Figure 2-4** shows the projected increase in international air freight compared to total Asia-North America air cargo.

Table 2.58

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Lake Hood Operations

Calendar Year	Air Taxi	General Aviation: Total GA Operations	General Aviation: Local Operations	General Aviation: Itinerant Operations	Total Operations
		Historical (a)			
1996	22,465	63,931	11,737	52,194	86,396
1997 (b)	23,304	58,909	7,373	51,536	82,213
		Master Plan Forecast (c)			
FY 1992	14,231	70,507	n/a	n/a	84,738
FY 1997	15,500	72,500	n/a	n/a	88,000
FY 2002	16,000	79,000	n/a	n/a	95,000
FY 2012	16,500	83,500	n/a	n/a	100,000
		Recommended Forecast (d)			
1997	23,304	58,909	7,373	51,536	82,213
1998	23,500	60,000	7,500	52,500	83,500
1999	23,600	61,000	7,600	53,400	84,600
2000	23,800	62,100	7,800	54,300	85,900
2001	23,900	63,100	7,900	55,200	87,000
2002	24,100	64,200	8,000	56,200	88,300
2003	24,200	64,600	8,100	56,500	88,800
2008	24,500	66,400	8,300	58,100	90,900
2020	25,400	70,700	8,800	61,900	96,100

(a) Table 2.11.
(b) Estimated Lake Hood share of general aviation and air taxi operations.
(c) Leigh Fisher Associates, 1996 Master Plan.
(d) Leigh Fisher Master Plan growth rates applied to most recent base year (1997).

Sources: As noted and HNTB analysis.

Table 2.59

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Passenger Forecast Summary

	Calendar Year			
	1997	**2003**	**2008**	**2020**
Annual Enplanements				
Domestic Air Carrier	1,694,389	2,164,000	2,567,000	3,584,000
Regional Carrier	276,864	392,000	478,000	630,000
Charter Carrier	117,156	122,000	125,000	133,000
International	31,283	62,000	79,000	115,000
Subtotal	2,119,692	2,740,000	3,249,000	4,462,000
Annual Transit Passengers				
Domestic	161,504	195,000	214,000	237,000
International	630,319	690,000	794,000	1,150,000
Subtotal	791,823	885,000	1,008,000	1,387,000
Annual Enplaned and Transit Passengers				
Domestic	2,249,913	2,873,000	3,384,000	4,584,000
International	661,602	752,000	873,000	1,265,000
Total	2,911,515	3,625,000	4,257,000	5,849,000
	Average Annual Growth Rates			
	1997-2003	**2003-2008**	**2008-2020**	**1997-2020**
Annual Enplanements				
Domestic Air Carrier	4.2%	3.5%	2.8%	3.3%
Regional Carrier	6.0%	4.0%	2.3%	3.6%
Charter Carrier	0.7%	0.5%	0.5%	0.6%
International	12.1%	5.0%	3.2%	5.8%
Subtotal	4.4%	3.5%	2.7%	3.3%
Annual Transit Passengers				
Domestic	3.2%	1.9%	0.9%	1.7%
International	1.5%	2.8%	3.1%	2.6%
Subtotal	1.9%	2.6%	2.7%	2.5%
Annual Enplaned and Transit Passengers				
Domestic	4.2%	3.3%	2.6%	3.1%
International	2.2%	3.0%	3.1%	2.9%
Total	3.7%	3.3%	2.7%	3.1%

Sources: Tables 2.16, 2.17 and HNTB analysis.

Historical and Projected Enplaned and Transit Passengers

Figure 2-2

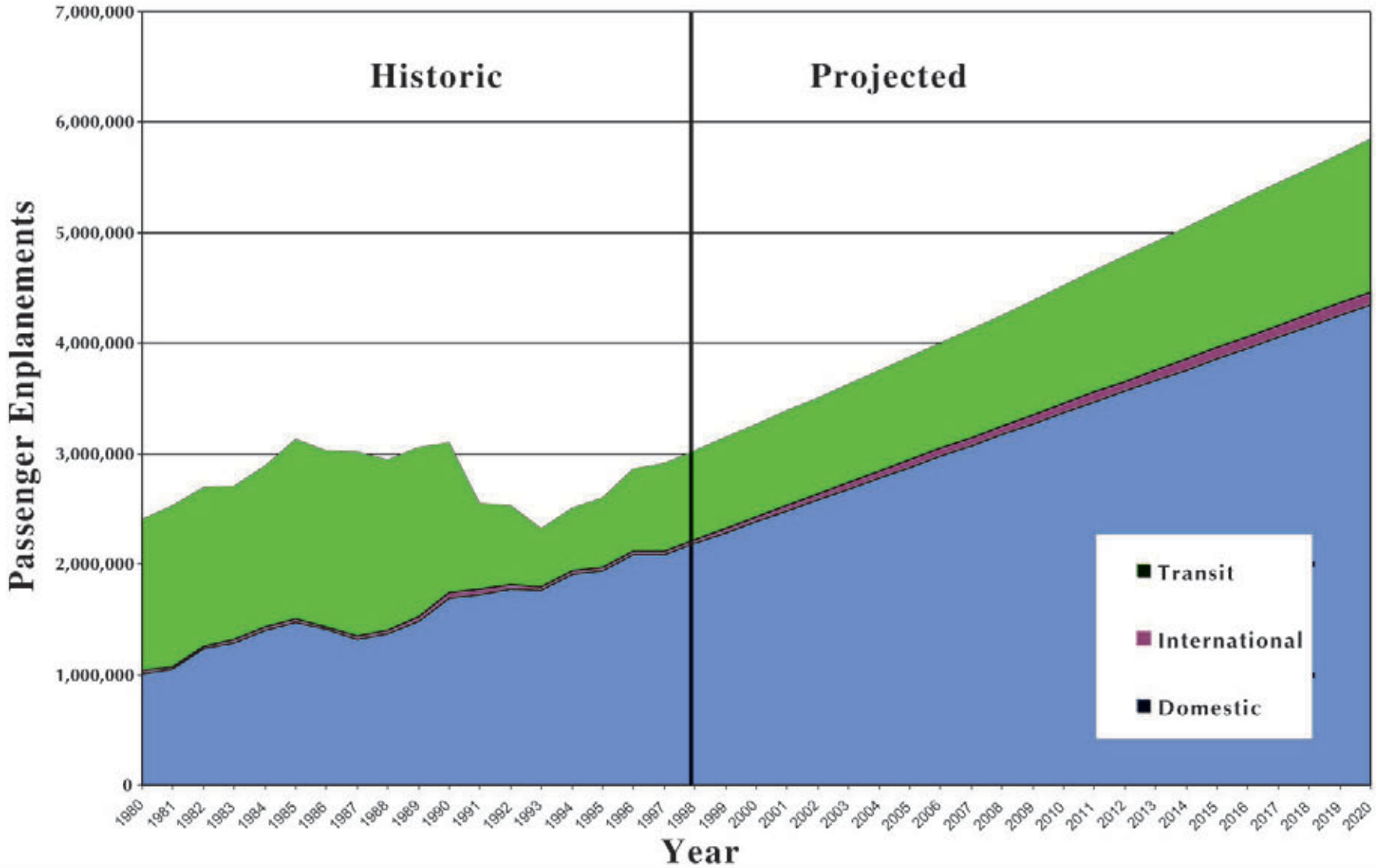


Table 2.60

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Cargo Forecast Summary (Tons)

	Calendar Year			
	1997	2003	2008	2020
Domestic Freight				
Enplaned	176,764	189,900	204,100	269,600
Originating	44,882	48,200	51,800	68,500
Transfer	131,882	141,700	152,300	201,100
Deplaned	46,198	57,100	70,700	161,500
Terminating	21,484	26,600	32,900	75,100
Transfer	24,714	30,500	37,800	86,400
Subtotal (a)	222,962	247,000	274,800	431,100
International Freight				
Enplaned	104,457	183,000	308,800	951,500
Originating	51,072	71,100	102,400	246,300
Transfer	53,385	111,900	206,400	705,200
Deplaned	166,023	230,700	331,900	846,300
Terminating	5,470	7,600	11,000	26,400
Transfer	160,553	223,100	320,900	819,900
Transit	1,239,944	1,638,000	2,237,500	5,103,900
Subtotal (a)	1,510,424	2,051,700	2,878,200	6,901,700
Total Air Freight				
Enplaned	281,221	372,900	512,900	1,221,100
Originating	95,954	119,300	154,200	314,800
Transfer	185,267	253,600	358,700	906,300
Deplaned	212,221	287,800	402,600	1,007,800
Terminating	26,954	34,200	43,900	101,500
Transfer	185,267	253,600	358,700	906,300
Transit	1,239,944	1,638,000	2,237,500	5,103,900
Total (a)	1,733,386	2,298,700	3,153,000	7,332,800
Air Mail				
Domestic	84,912	95,900	109,000	170,800
International	4,146	5,100	6,100	9,100
Total	89,058	101,000	115,100	179,900
Total Freight and Mail	1,822,444	2,399,700	3,268,100	7,512,700

(a) Includes both enplaned and deplaned transfer freight.

Sources: Tables 2.34, 2.41, 2.46 and 2.51 and HNTB analysis.

Table 2.61

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Cargo Forecast Summary - Average Annual Growth Rates

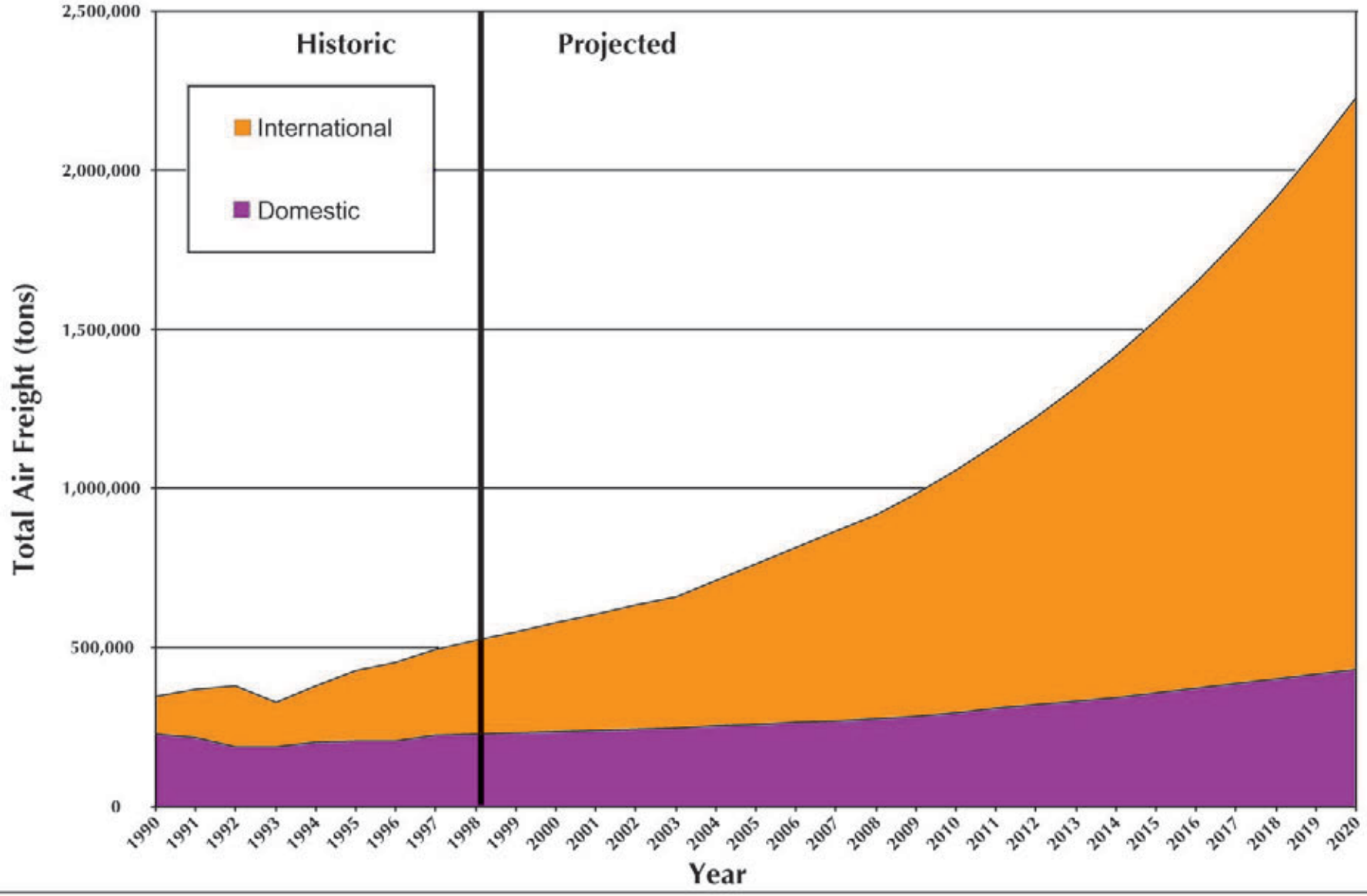
	Average Annual Growth Rate			
	1997-2003	**2003-2008**	**2008-2020**	**1997-2020**
Domestic Freight				
Enplaned	1.2%	1.5%	2.3%	1.9%
Originating	1.2%	1.5%	2.4%	1.9%
Transfer	1.2%	1.5%	2.3%	1.9%
Deplaned	3.6%	4.4%	7.1%	5.6%
Terminating	3.6%	4.3%	7.1%	5.6%
Transfer	3.6%	4.4%	7.1%	5.6%
Subtotal (a)	1.7%	2.2%	3.8%	2.9%
International Freight				
Enplaned	9.8%	11.0%	9.8%	10.1%
Originating	5.7%	7.6%	7.6%	7.1%
Transfer	13.1%	13.0%	10.8%	11.9%
Deplaned	5.6%	7.5%	8.1%	7.3%
Terminating	5.6%	7.7%	7.6%	7.1%
Transfer	5.6%	7.5%	8.1%	7.3%
Transit	4.7%	6.4%	7.1%	6.3%
Subtotal (a)	5.2%	7.0%	7.6%	6.8%
Total Air Freight				
Enplaned	4.8%	6.6%	7.5%	6.6%
Originating	3.7%	5.3%	6.1%	5.3%
Transfer	5.4%	7.2%	8.0%	7.1%
Deplaned	5.2%	6.9%	7.9%	7.0%
Terminating	4.0%	5.1%	7.2%	5.9%
Transfer	5.4%	7.2%	8.0%	7.1%
Transit	4.7%	6.4%	7.1%	6.3%
Total (a)	4.8%	6.5%	7.3%	6.5%
Air Mail				
Domestic	2.0%	2.6%	3.8%	3.1%
International	3.5%	3.6%	3.4%	3.5%
Total	2.1%	2.6%	3.8%	3.1%
Total Freight and Mail	4.7%	6.4%	7.2%	6.4%

(a) Includes both enplaned and deplaned transfer freight.

Sources: Table 2.60 and HNTB analysis.

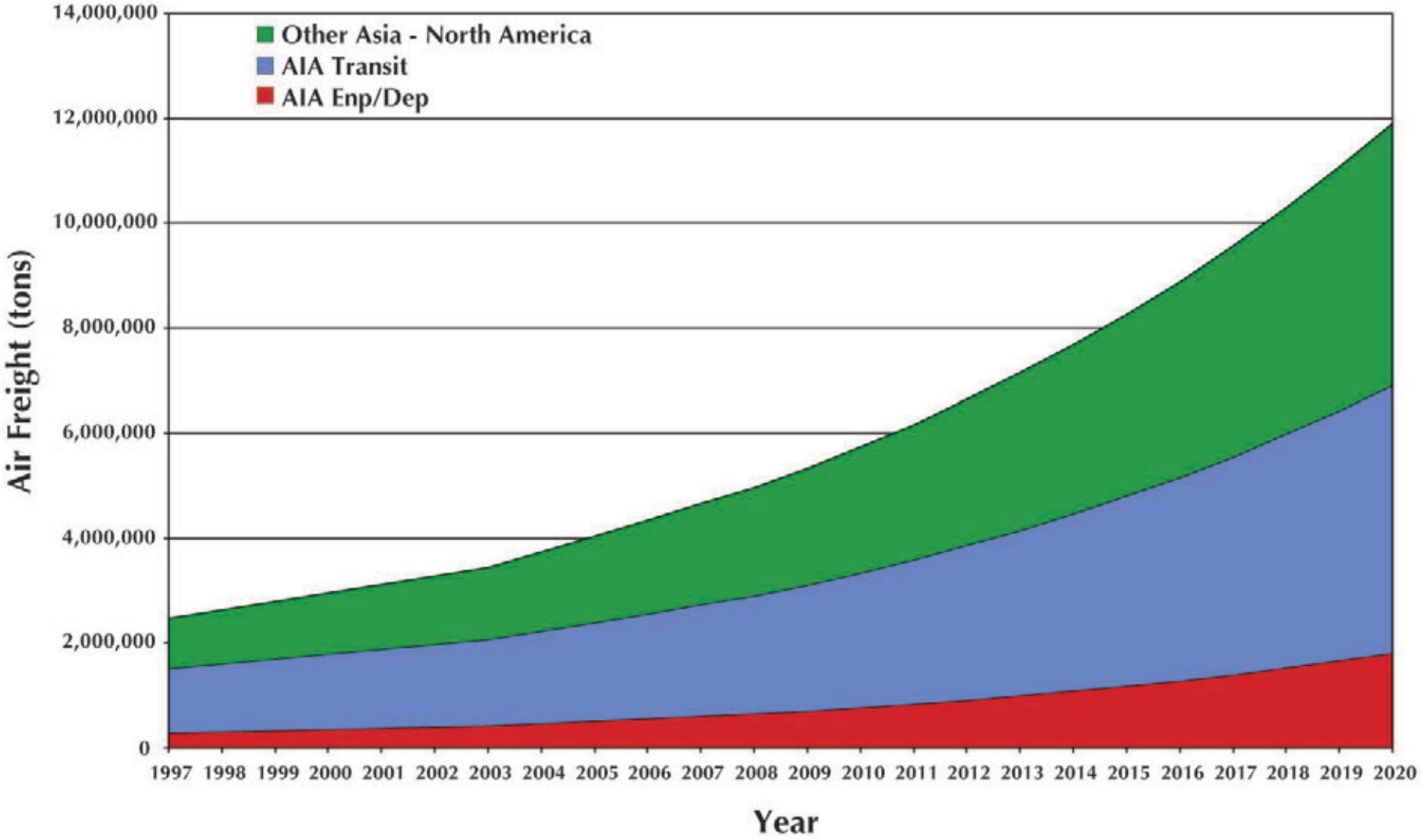
Historical and Projected Enplaned and Deplaned Air Freight

Figure 2-3



Historical and Projected International Air Freight

Figure 2-4



Total air mail is projected to double from 89,058 tons in 1997 to 179,900 tons in 2020, an average annual increase of 3.1 percent.

2.7.3 Aircraft Operations Summary

The forecasts of annual aircraft operations at ANC and LHD are summarized in **Tables 2.62 and 2.63**. Estimated air taxi operations were assumed to increase at the same rate as GA activity at ANC. As shown in the tables, total annual ANC aircraft operations are projected to increase from 231,562 operations in 1997 to 446,200 operations in 2020, an average annual increase of 2.9 percent. The greatest increase is projected among all-cargo operations, which are projected to increase from 29 percent of the total to 46 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 percent over the forecast period, moderating somewhat from the 8.3 percent average annual growth rate that occurred from 1990 to 1997. Domestic and international air carrier passenger aircraft operations are also projected to increase substantially, as shown in **Figure 2-5**.

2.7.4 Combined Fleet Mix

Table 2.64 shows the combined fleet mix for all aircraft at ANC. The fleet mix includes activity for passenger and combi-carriers, cargo carriers, GA, and military. LHD operations are excluded from the mix shown in Table 2.64. The percentage of operations accounted for by wide-body aircraft is projected to increase from 22.2 percent to 46.1 percent by the end of the forecast period.

2.7.5 Hourly Distribution of Aircraft Operations

Table 2.65 presents projections of the hourly distribution of aircraft arrivals, departures, and operations at ANC. These projections are based on the existing distributions presented in Tables 2.13, 2.14, and 2.15 and incorporate the peak spreading assumptions used to develop the peak hour forecasts for the individual activity categories; the numbers do not include LHD operations. Peak hour arrivals, occurring between 1 and 2 p.m., are projected to increase from 30 operations to 52 operations over the forecast period. Peak hour departures, occurring between 8 and 9 a.m., are projected to increase from 35 operations to 63 operations over the same period. As cargo transfer operations begin accounting for an increasing amount of the Airport's activity, the departure peak is anticipated to shift to between 6 and 7 a.m. The overall peak hour currently occurs between 1 and 2 p.m., during which operations are projected to increase from 57 in 1997 to 94 by 2020.

2.8 SENSITIVITY ANALYSIS

The assumptions used in developing the forecasts are likely to vary over the forecast period, and the variations could be material. One way to explore the impact of these variations is to develop alternative scenarios in which the impact on the forecast of a variation in a critical set of assumptions is evaluated. The Base Case Forecast provides the basis for determining what additional facilities will be required at ANC over the next 21 years. However, the Airport must be able to respond to a range of contingencies that could occur, taking into account political and economic changes, technological changes, and changes in the practices of individual air carriers. The recommended development program must be flexible enough to accommodate these contingencies.

Table 2.62

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Aircraft Operations

	Passenger and Combi Carriers					All-Cargo								
Year	Domestic Air Carrier	Regional Carrier	Charter	Inter-national	Total Passenger	Domestic Carrier	Inter-national (a)	Int. Tech. Stop	Air Mail	Total Cargo	Air Taxi (b)	General Aviation	Military	Total
Ted Stevens Anchorage International Airport														
1997	45,726	59,990	5,682	6,494	117,892	17,434	13,384	25,812	9,860	66,490	1,666	41,483	4,031	231,562
2003	56,000	67,200	6,000	7,200	136,400	16,600	19,200	34,200	9,600	79,600	1,700	41,500	4,000	263,200
2008	64,400	74,600	6,000	8,000	153,000	16,200	28,000	47,000	9,600	100,800	1,700	41,500	4,000	301,000
2020	83,800	91,200	6,400	11,400	192,800	18,400	68,600	108,400	10,800	206,200	1,700	41,500	4,000	446,200
Lake Hood Airport														
1997	-	-	-	-	-	-	-	-	-	-	23,304	58,909	-	82,213
2003	-	-	-	-	-	-	-	-	-	-	24,200	64,600	-	88,800
2008	-	-	-	-	-	-	-	-	-	-	24,500	66,400	-	90,900
2020	-	-	-	-	-	-	-	-	-	-	25,400	70,700	-	96,100
Combined Ted Stevens Anchorage International Airport and Lake Hood														
1997	45,726	59,990	5,682	6,494	117,892	17,434	13,384	25,812	9,860	66,490	24,970	100,392	4,031	313,775
2003	56,000	67,200	6,000	7,200	136,400	16,600	19,200	34,200	9,600	79,600	25,900	106,100	4,000	352,000
2008	64,400	74,600	6,000	8,000	153,000	16,200	28,000	47,000	9,600	100,800	26,200	107,900	4,000	391,900
2020	83,800	91,200	6,400	11,400	192,800	18,400	68,600	108,400	10,800	206,200	27,100	112,200	4,000	542,300

(a) International operations by carriers which primarily engage in enplaning and deplaning air freight.
(b) Also includes unclassified aircraft at ANC. Assumed to increase at same rate as general aviation operations.

Sources: Tables 2.19, 2.23, 2.27, 2.30, 2.36, 2.42, 2.48, 2.53, 2.56, 2.57 and 2.58.

Table 2.63

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Aircraft Operations - Average Annual Growth Rates

	Passenger and Combi Carriers					All-Cargo								
Years	Domestic Air Carrier	Regional Carrier	Charter	Inter-national	Total Passenger	Domestic Carrier	Inter-national (a)	Int. Tech. Stop	Air Mail	Total Cargo	Air Taxi (b)	General Aviation	Military	Total
Ted Stevens Anchorage International Airport														
1997-2003	3.4%	1.9%	0.9%	1.7%	2.5%	-0.8%	6.2%	4.8%	-0.4%	3.0%	0.3%	0.0%	-0.1%	2.2%
2003-2008	2.8%	2.1%	0.0%	2.1%	2.3%	-0.5%	7.8%	6.6%	0.0%	4.8%	0.0%	0.0%	0.0%	2.7%
2008-2020	2.2%	1.7%	0.5%	3.0%	1.9%	1.1%	7.8%	7.2%	1.0%	6.1%	0.0%	0.0%	0.0%	3.3%
1997-2020	2.7%	1.8%	0.5%	2.5%	2.2%	0.2%	7.4%	6.4%	0.4%	5.0%	0.1%	0.0%	0.0%	2.9%
Lake Hood Airport														
1997-2003	-	-	-	-	-	-	-	-	-	-	0.6%	1.5%	-	1.3%
2003-2008	-	-	-	-	-	-	-	-	-	-	0.2%	0.6%	-	0.5%
2008-2020	-	-	-	-	-	-	-	-	-	-	0.3%	0.5%	-	0.5%
1997-2020	-	-	-	-	-	-	-	-	-	-	0.4%	0.8%	-	0.7%
Combined Ted Stevens Anchorage International Airport and Lake Hood														
1997-2003	3.4%	1.9%	0.9%	1.7%	2.5%	-0.8%	6.2%	4.8%	-0.4%	3.0%	0.6%	0.9%	-0.1%	1.9%
2003-2008	2.8%	2.1%	0.0%	2.1%	2.3%	-0.5%	7.8%	6.6%	0.0%	4.8%	0.2%	0.3%	0.0%	2.2%
2008-2020	2.2%	1.7%	0.5%	3.0%	1.9%	1.1%	7.8%	7.2%	1.0%	6.1%	0.3%	0.3%	0.0%	2.7%
1997-2020	2.7%	1.8%	0.5%	2.5%	2.2%	0.2%	7.4%	6.4%	0.4%	5.0%	0.4%	0.5%	0.0%	2.4%

Source: Table 2.62.

Historical and Projected Aircraft Operations

Figure 2-5

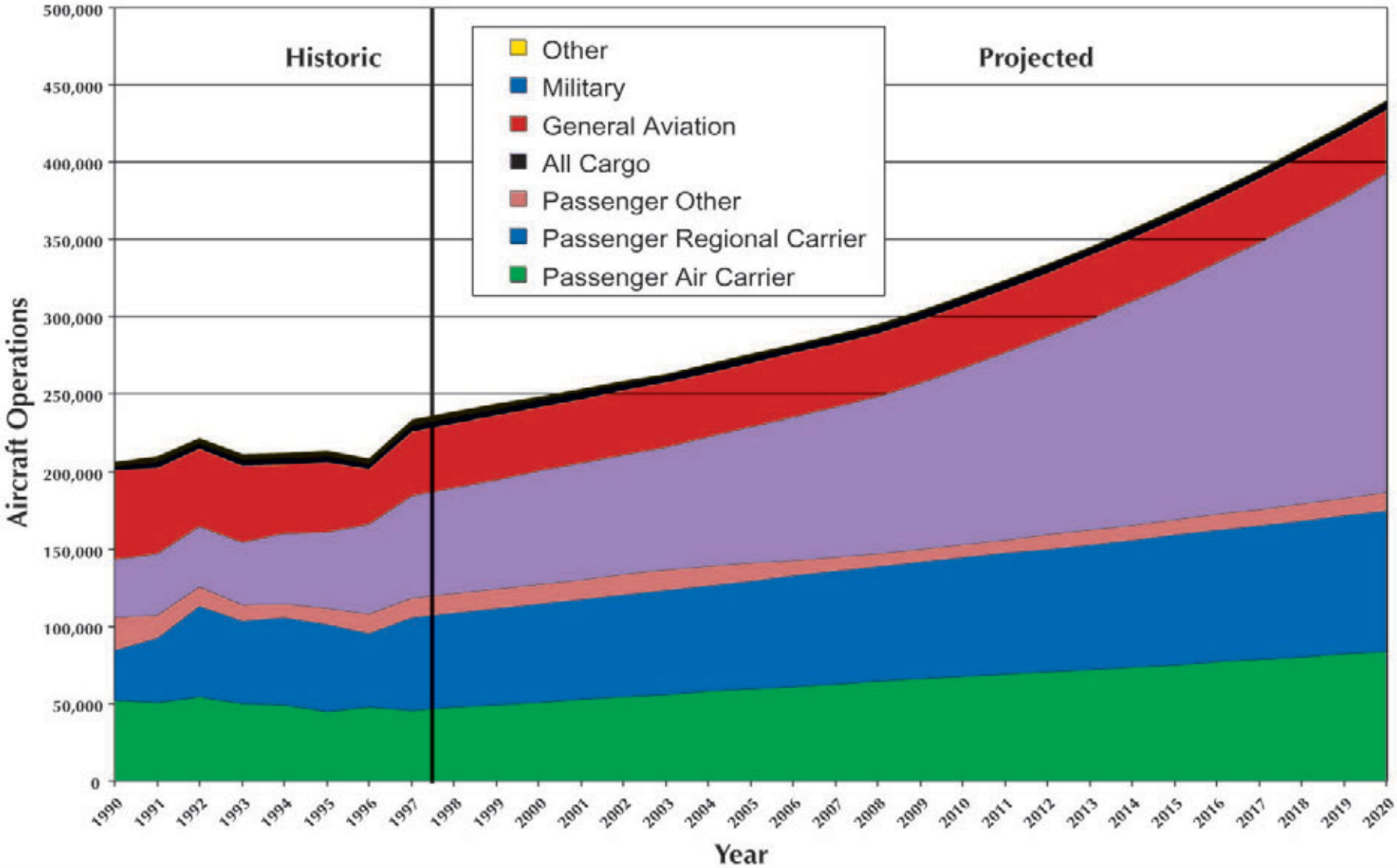


Table 2.64

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Total Aircraft Fleet Mix

	1997	2003	2008	2020
GA Single Engine Piston	13.1%	11.5%	10.1%	6.8%
GA Twin Engine Piston	0.1%	0.1%	0.1%	0.1%
GA Turboprop	0.2%	0.2%	0.2%	0.1%
GA Jet	0.9%	0.8%	0.7%	0.5%
GA Helicopter	4.3%	3.8%	3.3%	2.2%
CNA/PA-31	11.6%	10.4%	9.3%	7.1%
DHC-6	7.3%	6.9%	6.2%	4.1%
SWM/B99	2.1%	1.9%	1.7%	0.8%
DHC-3	0.3%	0.3%	0.2%	0.0%
CASA-212	0.2%	0.2%	0.2%	0.1%
Ayers LM200	0.0%	0.2%	0.3%	0.4%
SF-340	1.7%	1.9%	2.1%	3.8%
DC-3	0.1%	0.0%	0.0%	0.0%
DHC-4	0.1%	0.1%	0.1%	0.0%
DHC-8	4.6%	4.9%	5.2%	4.7%
ATR	0.0%	0.3%	0.5%	0.8%
F-27	0.2%	0.1%	0.1%	0.0%
CVR	3.7%	3.1%	2.4%	0.6%
Lear Jet	0.1%	0.1%	0.1%	0.0%
Regional Jet	0.0%	0.3%	0.5%	0.7%
DC-6	1.9%	1.3%	0.8%	0.2%
L-188	1.4%	1.1%	0.4%	0.1%
L-100	0.4%	0.4%	0.5%	0.5%
727-C	0.6%	0.4%	0.2%	0.0%
737-C	4.4%	4.3%	3.6%	1.5%
737-400C	0.0%	0.0%	0.9%	1.9%
DC-9	0.2%	0.4%	0.2%	0.0%
737-200	1.7%	1.2%	0.8%	0.6%
A-319	0.0%	0.2%	0.4%	0.6%
727-100	0.3%	0.3%	0.2%	0.0%
737-300	0.7%	0.6%	0.8%	0.8%
737-700	0.0%	0.4%	0.6%	0.9%
MD-80	4.7%	4.7%	3.8%	2.2%
737-400	4.8%	5.5%	5.3%	3.8%
A-320	0.5%	0.7%	0.7%	0.8%
MD-90	0.0%	0.2%	0.2%	0.2%
737-800	0.0%	0.1%	0.4%	0.6%
A-321	0.0%	0.0%	0.2%	0.4%
737-900	0.0%	0.4%	1.1%	2.3%
Tu-154M	0.1%	0.0%	0.0%	0.0%
IL-62M	0.2%	0.1%	0.0%	0.0%
757	2.6%	2.9%	3.2%	3.0%
DC-8	1.3%	1.2%	0.8%	0.0%
767-200	0.5%	0.4%	0.4%	0.4%
767-300	0.4%	0.8%	1.4%	3.2%
767-400	0.0%	0.0%	0.1%	0.4%
A-310	0.0%	0.0%	0.0%	0.0%
A-300	0.2%	0.3%	1.0%	2.5%
A-330	0.0%	0.1%	0.2%	0.2%
A-340	0.5%	0.5%	0.9%	2.5%
L-1011	0.1%	0.0%	0.0%	0.0%
DC-10	2.2%	2.0%	1.9%	1.3%
MD-11	3.3%	4.2%	5.7%	9.1%
777-200	0.0%	0.2%	0.3%	0.5%
777-300	0.0%	0.0%	0.1%	0.3%
747-100	2.6%	2.5%	2.2%	1.0%
747-200	8.4%	9.1%	8.8%	7.8%
747-SP	0.0%	0.0%	0.0%	0.0%
747-400	3.8%	4.7%	6.7%	14.5%
747-400X	0.0%	0.1%	0.3%	1.6%
AN-124	0.0%	0.1%	0.2%	0.2%
VLA	0.0%	0.0%	0.2%	0.6%
C130	1.0%	0.9%	0.8%	0.5%
Military Helicopter	0.7%	0.6%	0.5%	0.4%
Total	100.0%	100.0%	100.0%	100.0%

Sources: Tables 2.20, 2.24, 2.28, 2.31, 2.37, 2.43, 2.49, and 2.54 and HNTB analysis

Table 2.65

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Projected Hourly Distribution of Aircraft Operations
Average Weekday Peak Month

	1997			2003			2008			2020		
Hour	**Arr.**	**Dept.**	**Total**	**Arr.**	**Dept.**	**Total**	**Arr.**	**Dept.**	**Total**	**Arr.**	**Dept.**	**Total**
0000-0059	2.8	2.0	4.8	3.1	2.2	5.3	3.5	2.6	6.1	5.7	4.3	10.0
0100-0159	2.2	3.6	5.9	2.4	4.1	6.5	2.8	4.8	7.7	4.6	8.5	13.1
0200-0259	2.8	1.4	4.2	3.3	1.7	5.0	4.1	2.0	6.1	7.5	3.6	11.2
0300-0359	1.6	3.2	4.8	2.0	3.7	5.7	2.6	4.4	7.0	5.7	8.2	13.9
0400-0459	7.5	4.6	12.1	9.2	4.9	14.1	11.6	5.5	17.1	22.6	9.0	31.6
0500-0559	7.5	7.6	15.0	8.7	7.9	16.5	10.9	8.4	19.4	22.4	11.6	34.1
0600-0659	11.2	15.0	26.2	12.0	17.3	29.4	13.3	21.1	34.4	25.5	34.7	60.1
0700-0759	10.9	7.7	18.7	11.4	8.5	19.9	12.3	9.8	22.1	21.0	21.1	42.0
0800-0859	10.3	19.4	29.7	11.4	22.8	34.1	13.3	26.9	40.3	22.2	30.4	52.6
0900-0959	14.7	17.1	31.8	15.5	19.4	34.9	16.8	23.0	39.8	26.0	36.2	62.2
1000-1059	17.3	13.0	30.3	18.8	13.1	31.9	21.1	13.5	34.5	31.8	17.7	49.5
1100-1159	19.9	17.2	37.1	22.6	17.9	40.5	26.1	19.2	45.3	31.5	33.0	64.5
1200-1259	19.7	19.9	39.6	21.1	20.8	41.9	23.2	22.3	45.5	33.9	34.0	67.8
1300-1359	23.9	21.2	45.1	25.2	21.9	47.0	27.2	23.0	50.2	37.5	28.7	66.2
1400-1459	17.1	20.5	37.7	17.8	21.3	39.1	18.7	22.7	41.3	23.4	29.8	53.1
1500-1559	17.7	17.1	34.8	18.7	17.3	36.0	20.2	18.2	38.4	27.9	25.7	53.6
1600-1659	20.7	21.6	42.2	21.6	22.5	44.1	23.1	24.2	47.3	31.0	35.2	66.2
1700-1759	17.7	17.0	34.6	18.3	18.3	36.5	19.1	20.0	39.1	23.0	27.3	50.3
1800-1859	16.8	17.3	34.1	17.1	17.9	35.0	17.7	19.3	37.1	21.0	27.7	48.8
1900-1959	15.8	14.6	30.4	15.9	15.0	30.9	16.3	15.6	32.0	18.2	18.8	37.0
2000-2059	10.9	9.9	20.8	11.0	10.2	21.3	11.4	10.6	22.0	13.2	12.2	25.4
2100-2159	9.4	9.1	18.4	9.5	9.5	19.0	9.8	10.1	20.0	11.7	13.3	25.0
2200-2259	5.1	6.6	11.7	5.1	6.8	11.9	5.1	7.2	12.3	6.1	8.9	15.0
2300-2359	5.6	2.4	8.0	5.9	2.4	8.4	6.5	2.4	9.0	9.9	3.4	13.3
Total	289.0	289.0	577.9	307.4	307.4	614.8	336.8	336.8	673.6	483.3	483.3	966.5
Peak Hour	23.9	21.6	45.1	25.2	22.8	47.0	27.2	26.9	50.2	37.5	36.2	67.8

Sources: Passenger and Cargo airline schedules as provided by ANC, ATCT counts for July 1998, and HNTB analysis.

To address these potential contingencies, three alternative forecast scenarios were selected in conjunction with Airport staff. The first alternative is a high scenario, which assumes more rapid economic growth than the Base Case Forecast and more rapid development of transfer and third party logistics operations at ANC. The second alternative is a low scenario, which assumes less rapid economic growth than the Base Case Forecast and limited development of transfer and third party logistics operations at the Airport. The third alternative explores the potential impact of the full development of Eurasian airports to compete with ANC for transfer cargo and technical stop operations. A fourth constrained scenario will be developed once airfield and ramp capacity are determined later in this study. Much of the background information used to develop the scenarios is provided previously.

2.8.1 Scenario 1: High Growth

Economic growth is a function of strong demographics, technological advancements, private initiative, and government policy. The principal indicators of economic growth (income and employment) are therefore difficult to forecast with precision. Since they are also important determinants of aviation activity, an examination of alternative economic growth scenarios is warranted. High economic growth is also more likely to provide air carriers and third party logistics providers with the revenues for the major investments in aircraft and ground facilities required for the development and expansion of transfer and distribution operations.

Scenario 1 incorporates the following assumptions:

- Population, employment, and income growth in Anchorage and Alaska will follow the high ISER forecasts (see Tables 2.1, 2.2, 2.3, and 2.4) rather than the Base Case Forecasts.

- International air freight and mail will grow in accordance with the high Boeing forecasts, which project an early end to Asian economic difficulties and rapid annual growth in the Asia-North America air cargo market (8.1 percent eastbound and 6.9 percent westbound).

- The share of Asia-North America air cargo that is transferred or processed at ANC due to new airline alliances or major third party logistics operations will increase much more rapidly than the Base Case Forecast. Boeing projects that the share of international air cargo handled by international express operations, such as FedEx and UPS, will increase to 36 percent by 2017. The express cargo will be handled either by integrated air carriers or by airline-forwarder alliances that offer the same level of service. Integrators and air carrier alliances are much more likely to engage in transfer and distribution activity than traditional air freight carriers. The high scenario assumes that, by 2017, 36 percent of Asia-North America air cargo would be captured by integrators or airline alliances and that they would process this cargo using facilities at ANC.

- Passenger activity will grow in accordance with the base TAMS forecasts.

All other assumptions are the same as those used to develop the base forecast.

Table 2.66 summarizes the Scenario 1 forecast. As shown, the high economic growth scenario would result in 5.6 million passenger enplanements by 2020, 25 percent higher than the Base Case Forecast. As a result of high economic growth and the rapid development of transfer and third party logistics centers, total enplaned and deplaned air freight would increase to 6.3 million tons by 2020, which is much higher than the 2.2 million tons projected under the Base Case Forecast. Under Scenario 1, there would be 639,400 total aircraft operations by 2020, 43 percent higher than under the Base Case Forecast. Most of the additional operations would be attributable to increased transfer operations. Technical stop operations would actually be reduced by 42 percent compared to the Base Case Forecast because so much of the current transit cargo would be captured by the air integrators or the airline alliances performing cargo transfers between aircraft.

2.8.2 Scenario 2: Low Growth

Scenario 2 assumes a persistent economic slowdown in the U.S. and the world, translating to an economic slowdown in Alaska and Anchorage as well. If the economy grows less rapidly than projected, aviation activity would also be reduced. Also, under an economic slowdown, air carriers and third party logistics providers could not generate the revenues for the major investments in aircraft and ground facilities required for the development and expansion of transfer and distribution operations at ANC.

Scenario 2 incorporates the following assumptions:

- Population, employment, and income growth in Anchorage and Alaska will follow the low ISER forecasts (see Tables 2.1, 2.2, 2.3, and 2.4) rather than the Base Case Forecasts.
- International air freight and mail will grow in accordance with the low Boeing forecasts, which project the Asian economic downturn to last 5 years. The low Boeing forecasts project reduced annual growth in the Asia-North America air cargo market (7.2 percent eastbound and 5 percent westbound).
- Since the revenues required for investment in major transfer/distribution facilities at ANC would be less likely to be available, the share of Asia-North America air cargo that is transferred or processed at ANC is not projected to increase above the present level. The low scenario assumes that, by 2020, only 11 percent of Asia-North America air cargo is enplaned or deplaned at ANC.
- Passenger activity will grow 1 percent per year more slowly than in the Base Case Forecast. This corresponds to the approximate difference between the ISER base case and low case employment and income growth rates.

All other assumptions are the same as those used to develop the base forecast.

Table 2.67 summarizes the Scenario 2 forecast. As shown, the low economic growth scenario would result in 3.6 million passenger enplanements by 2020, 20 percent lower than the Base Case Forecast. As a result of low economic growth and the limited development of transfer and third party logistics centers, total enplaned and deplaned air freight would increase to only 1.4 million tons by 2020, lower than the 2.2 million tons projected under the Base Case Forecast. Under Scenario 2, there would be 358,800 total aircraft operations by 2020, 20 percent lower than under the Base Case Forecast.

Table 2.66

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Forecast Activity
Scenario 1: High Forecast

	Calendar Year				Average Annual Growth Rate
	1997	2003	2008	2020	1997-2020
Passengers					
Enplanements					
Domestic Air Carrier	1,694,389	2,324,000	2,868,000	4,380,000	4.2%
Regional Carrier	276,864	452,000	582,000	890,000	5.2%
Charter Carrier	117,156	124,000	131,000	147,000	1.0%
International Carrier	31,283	74,000	101,000	161,000	7.4%
Total Enplanements	2,119,692	2,974,000	3,682,000	5,578,000	4.3%
Total Transit	791,823	1,117,000	1,402,000	2,190,000	4.5%
Total Enplaned and Transit	2,911,515	4,091,000	5,084,000	7,768,000	4.4%
Air Cargo (tons)					
Domestic Freight					
Enplaned	176,764	212,800	270,100	420,700	3.8%
Deplaned	46,198	80,000	162,400	606,000	11.8%
Subtotal	222,962	292,800	432,500	1,026,700	6.9%
International Freight					
Enplaned	104,457	312,500	652,700	2,785,100	15.3%
Deplaned	166,023	361,100	668,700	2,527,900	12.6%
Transit	1,239,944	1,542,700	1,896,700	3,054,300	4.0%
Subtotal	1,510,424	2,216,300	3,218,100	8,367,300	7.7%
Total Air Freight					
Enplaned	281,221	525,300	922,800	3,205,800	11.2%
Deplaned	212,221	441,100	831,100	3,133,900	12.4%
Transit	1,239,944	1,542,700	1,896,700	3,054,300	4.0%
Subtotal	1,733,386	2,509,100	3,650,600	9,394,000	7.6%
Air Mail					
Domestic	84,912	118,700	207,600	384,500	6.8%
International	4,146	5,400	6,700	11,400	4.5%
Total	89,058	124,100	214,300	395,900	6.7%
Total Freight and Mail	1,822,444	2,633,200	3,864,900	9,789,900	7.6%
Aircraft Operations					
Domestic Air Carrier	45,726	61,200	73,200	104,400	3.7%
Regional Carrier	59,990	77,400	90,800	129,000	3.4%
Charter Carrier	5,682	6,000	6,400	7,200	1.0%
International Carrier	6,494	9,000	11,200	17,600	4.4%
Domestic Air Freight	17,434	19,600	25,400	44,000	4.1%
International Air Freight (a)	13,384	31,200	57,800	202,600	12.5%
International Transit Freight	25,812	32,000	39,200	63,000	4.0%
Air Mail	9,860	11,800	18,000	24,400	4.0%
Air Taxi	1,666	1,700	1,700	1,700	0.1%
General Aviation	41,483	41,500	41,500	41,500	0.0%
Military	4,031	4,000	4,000	4,000	0.0%
Total	231,562	295,400	369,200	639,400	4.5%

(a) International operations by carriers that primarily engage in enplaned and deplaned freight.

Source: HNTB analysis.

Table 2.67

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Forecast Activity
Scenario 2: Low Forecast

	Calendar Year				Average Annual Growth Rate
	1997	2003	2008	2020	1997-2020
Passengers					
Enplanements					
Domestic Air Carrier	1,694,389	1,974,000	2,234,000	2,826,000	2.2%
Regional Carrier	276,864	369,000	430,000	530,000	2.9%
Charter Carrier	117,156	108,000	105,000	97,000	-0.8%
International Carrier	31,283	58,000	72,000	100,000	5.2%
Total Enplanements	2,119,692	2,509,000	2,841,000	3,553,000	2.3%
Total Transit	791,823	849,000	916,000	1,160,000	1.7%
Total Enplaned and Transit	2,911,515	3,358,000	3,757,000	4,713,000	2.1%
Air Cargo (tons)					
Domestic Freight					
Enplaned	176,764	178,500	183,700	212,600	0.8%
Deplaned	46,198	47,400	51,700	79,800	2.4%
Subtotal	222,962	225,900	235,400	292,400	1.2%
International Freight					
Enplaned	104,457	159,400	240,900	590,700	7.8%
Deplaned	166,023	205,700	265,100	519,400	5.1%
Transit	1,239,944	1,541,000	1,984,900	4,319,200	5.6%
Subtotal	1,510,424	1,906,100	2,490,900	5,429,300	5.7%
Total Air Freight					
Enplaned	281,221	337,900	424,600	803,300	4.7%
Deplaned	212,221	253,100	316,800	599,200	4.6%
Transit	1,239,944	1,541,000	1,984,900	4,319,200	5.6%
Subtotal	1,733,386	2,132,000	2,726,300	5,721,700	5.3%
Air Mail					
Domestic	84,912	86,400	90,700	111,200	1.2%
International	4,146	4,700	5,300	6,800	2.2%
Total	89,058	91,100	96,000	118,000	1.2%
Total Freight and Mail	1,822,444	2,223,100	2,822,300	5,839,700	5.2%
Aircraft Operations					
Domestic Air Carrier	45,726	52,000	57,000	67,000	1.7%
Regional Carrier	59,990	63,200	67,000	76,800	1.1%
Charter Carrier	5,682	5,200	5,000	4,800	-0.7%
International Carrier	6,494	6,600	7,000	9,200	1.5%
Domestic Air Freight	17,434	15,000	13,800	12,600	-1.4%
International Air Freight (a)	13,384	16,800	22,200	42,400	5.1%
International Transit Freight	25,812	32,200	41,800	91,800	5.7%
Air Mail	9,860	8,600	8,000	7,000	-1.5%
Air Taxi	1,666	1,700	1,700	1,700	0.1%
General Aviation	41,483	41,500	41,500	41,500	0.0%
Military	4,031	4,000	4,000	4,000	0.0%
Total	231,562	246,800	269,000	358,800	1.9%

(a) International operations by carriers that primarily engage in enplaned and deplaned freight.

Source: HNTB analysis.

2.8.3 Scenario 3: Full Competition by Eurasian Airports

The extent to which Eurasian airports, such as Tashkent, Uzbekistan and Khabarovsk, Russia, compete with ANC for air cargo transfer operations and technical stops could significantly impact future aviation activity levels at ANC. The Base Case Forecast assumed a level of Eurasian competition halfway between full competition and no competition (see Section 2.4.4). If competing airports in the former Soviet states or northern European air cargo airports such as Lulea, Sweden are fully developed and are deemed reliable by the air cargo industry, they could draw away cargo flights that would minimize their great circle distance by refueling at those airports rather than ANC. Scenario 3 assesses the impact on ANC of competition from fully developed Eurasian technical stops and transfer centers.

Scenario 3 incorporates the same assumptions as the Base Case Forecast regarding the ISER state forecasts, the Boeing air cargo forecasts, and the TAMS passenger forecasts. The analysis in Table 2.45 showed that, if there is full competition among airports and if minimizing great circle distance is the principal routing criterion used by carriers, the ANC share of Asia-North America traffic would fall to 59 percent of current levels rather than the 93 percent share estimated for the Base Case Forecast. This reduced share is the basis of the forecast of total international air cargo flow under Scenario 3. The principal long-term competition for Asia-North America air cargo would come from Khabarovsk, Russia. Once air cargo aircraft with 6,000-mile ranges at full payload come into use, Khabarovsk, Russia would be an effective consolidation point for Chinese and Southeast Asian cargo flying to North America.

Because reliable and geographically well-positioned technical stops may become candidates for transfer operations, it would also be more difficult for ANC to increase its share of international cargo transfer activity. Consequently, Scenario 3 assumes that the share of Asia-North America air cargo transferred or processed at ANC will not increase above the present level. The full competition scenario assumes that, by 2020, only 11 percent of Asia-North America air cargo would be enplaned or deplaned at ANC.

Table 2.68 summarizes the Scenario 3 forecast. As shown, the passenger forecasts and the domestic air cargo forecasts are the same as in the Base Case Forecast. As a result of the reduced share of air freight transfer activity, total enplaned and deplaned air freight would increase to only 1.7 million tons by 2020, lower than the 2.2 million tons projected under the Base Case Forecast. Because of the reduced share of transfer and technical stop operations, there would be 384,600 total aircraft operations by 2020, 14 percent lower than under the Base Case Forecast.

Table 2.68

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Summary of Forecast Activity
Scenario 3 - Full Competition by Eurasian Airports

	Calendar Year				Average Annual Growth Rate
	1997	2003	2008	2020	1997-2020
Passengers					
Enplanements					
Domestic Air Carrier	1,694,389	2,164,000	2,567,000	3,584,000	3.3%
Regional Carrier	276,864	392,000	478,000	630,000	3.6%
Charter Carrier	117,156	122,000	125,000	133,000	0.6%
International Carrier	31,283	62,000	79,000	115,000	5.8%
Total Enplanements	2,119,692	2,740,000	3,249,000	4,462,000	3.3%
Total Transit	791,823	885,000	1,008,000	1,387,000	2.5%
Total Enplaned and Transit	2,911,515	3,625,000	4,257,000	5,849,000	3.1%
Air Cargo (tons)					
Domestic Freight					
Enplaned	176,764	189,900	204,100	269,600	1.9%
Deplaned	46,198	57,100	70,700	161,500	5.6%
Subtotal	222,962	247,000	274,800	431,100	2.9%
International Freight					
Enplaned	104,457	164,500	259,800	705,100	8.7%
Deplaned	166,023	212,100	282,900	599,900	5.7%
Transit	1,239,944	1,500,100	1,875,500	3,126,100	4.1%
Subtotal	1,510,424	1,876,700	2,418,200	4,431,100	4.8%
Total Air Freight					
Enplaned	281,221	354,400	463,900	974,700	5.6%
Deplaned	212,221	269,200	353,600	761,400	5.7%
Transit	1,239,944	1,500,100	1,875,500	3,126,100	4.1%
Subtotal	1,733,386	2,123,700	2,693,000	4,862,200	4.6%
Air Mail					
Domestic	84,912	95,900	109,000	170,800	3.1%
International	4,146	5,100	6,100	9,100	3.5%
Total	89,058	101,000	115,100	179,900	3.1%
Total Freight and Mail	1,822,444	2,224,700	2,808,100	5,042,100	4.5%
Aircraft Operations					
Domestic Air Carrier	45,726	56,000	64,400	83,800	2.7%
Regional Carrier	59,990	67,200	74,600	91,200	1.8%
Charter Carrier	5,682	6,000	6,000	6,400	0.5%
International Carrier	6,494	7,200	8,000	11,400	2.5%
Domestic Air Freight	17,434	16,600	16,200	18,400	0.2%
International Air Freight (a)	13,384	17,400	23,800	49,800	5.9%
International Transit Freight	25,812	31,400	39,200	65,600	4.1%
Air Mail	9,860	9,600	9,600	10,800	0.4%
Air Taxi	1,666	1,700	1,700	1,700	0.1%
General Aviation	41,483	41,500	41,500	41,500	0.0%
Military	4,031	4,000	4,000	4,000	0.0%
Total	231,562	258,600	289,000	384,600	2.2%

(a) International operations by carriers that primarily engage in enplaned and deplaned freight.

Source: HNTB analysis.

2.8.4 Updated Airport Estimates

As noted in the beginning of this Chapter, the Airport forecasts used in this Master Plan Update were first prepared in 1999 based on 1997 data. In 2001, the forecasts were reviewed to ensure that they were still reasonable for planning purposes. This analysis, included in Appendix A, found that passenger enplanements and passenger operations were growing slower than forecast. Cargo tonnage was growing slower than forecast, but cargo operations were growing faster than forecast. Updated source documents for local and worldwide economic conditions and other data used in the forecasts were also reviewed to see if there had been any major changes in the underlying data. This review found that there were no major changes to the underlying data. Based on this review, it was determined that, although some aviation sectors were growing more slowly than forecast, and others were growing more rapidly than forecast, the forecasts were still valid for long term planning purposes.

Since the forecast review was complete, worldwide political and economic events have continued to adversely affect aviation operations. As shown in **Table 2.69**, aircraft operations at ANC between 1997 and 2001 reflect these adverse impacts, with estimated operation levels remaining fairly stagnant. In late 2001, Airport staff prepared an updated aircraft operations forecast based on trends seen since the late 1990s at ANC. This forecast assumes an annual growth rate of 4.5 percent for cargo operations, a 1.25 annual percent growth rate in passenger operations, and no growth in other activity categories. **Figure 2-8** presents estimated operations levels through 2001 and the Airport forecast for comparison purposes with the other forecast scenarios.

As discussed earlier, the Base Case Forecast approved by the FAA in 1999 is used for planning purposes in this document; however, projects identified will not be implemented until justified by actual growth of operations. Thus, facilities identified as needed to accommodate approximately 300,000 operations by 2008 based upon the Based Case Forecast may actually not be needed until 2012 or later based upon the Airport's more recent operations forecasts. It is appropriate, however, to plan in advance for these facilities even if implementation is delayed for up to several years.

Summary

Tables 2.70 and 2.71 summarize the results of the forecast scenarios and compare the results to the Base Case Forecast, including comparisons of passenger enplanements, domestic and international air freight, air mail, and total aircraft operations. **Figures 2-6, 2-7, and 2-8** graphically depict the variations in projected passenger enplanements, air freight, and aircraft operations among the Base Case Forecast and scenarios. It should be noted that some of these scenarios are more likely to occur than others, and they should not be given equal weight.

Table 2.69

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Aircraft Operations, Calendar Years 1997 through 2001 (1)

	Commercial (2)	GA	Military	Total
1997	185,966	41,483	4,031	231,480
1998	176,493	44,725	4,449	225,667
1999	175,333	44,515	5,340	225,188
2000	185,162	42,993	5,228	233,383
2001	177,697	38,669	6,550	222,916

Notes:
1. Estimates.
2. Commercial includes all domestic and international scheduled and non-scheduled passenger and cargo operations (including air carrier, regional, and air taxi).

Source: FAA ANC ATCT; HNTB analysis.

Table 2.70

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Comparison of Scenarios and Base Case

	Calendar Year			
	1997	**2003**	**2008**	**2020**
Passenger Enplanements				
Base Case	2,119,692	2,740,000	3,249,000	4,462,000
Scenario 1	2,119,692	2,974,000	3,682,000	5,578,000
Scenario 2	2,119,692	2,509,000	2,841,000	3,553,000
Scenario 3	2,119,692	2,740,000	3,249,000	4,462,000
Domestic Freight (tons)				
Base Case	222,962	247,000	274,800	431,100
Scenario 1	222,962	292,800	432,500	1,026,700
Scenario 2	222,962	225,900	235,400	292,400
Scenario 3	222,962	247,000	274,800	431,100
International Enplaned and Deplaned Freight (tons)				
Base Case	270,480	413,700	640,700	1,797,800
Scenario 1	270,480	673,600	1,321,400	5,313,000
Scenario 2	270,480	365,100	506,000	1,110,100
Scenario 3	270,480	376,600	542,700	1,305,000
Total Freight (tons)				
Base Case	1,733,386	2,298,700	3,153,000	7,332,800
Scenario 1	1,733,386	2,509,100	3,650,600	9,394,000
Scenario 2	1,733,386	2,132,000	2,726,300	5,721,700
Scenario 3	1,733,386	2,123,700	2,693,000	4,862,200
Total Mail (tons)				
Base Case	89,058	101,000	115,100	179,900
Scenario 1	89,058	124,100	214,300	395,900
Scenario 2	89,058	91,100	96,000	118,000
Scenario 3	89,058	101,000	115,100	179,900
Total Operations				
Base Case	231,562	263,200	301,000	446,200
Scenario 1	231,562	295,400	369,200	639,400
Scenario 2	231,562	246,800	269,000	358,800
Scenario 3	231,562	258,600	289,000	384,600

Source: Tables 2.59, 2.60, 2.62, 2.66, 2.67 and 2.68 and HNTB analysis.

Table 2.71

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

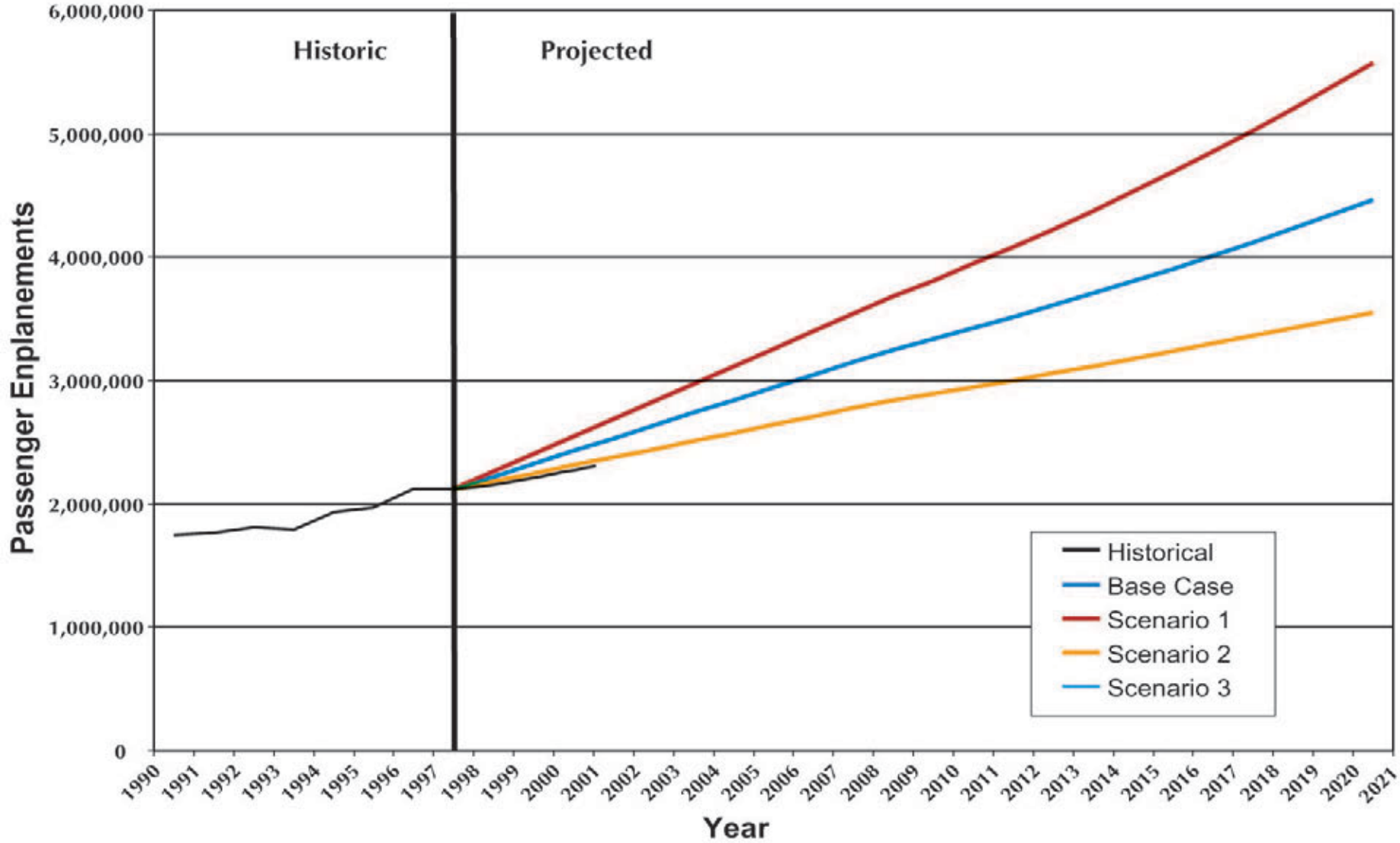
Comparison of Scenarios and Base Case - Average Annual Growth Rates

	Average Annual Growth Rate			
	1997-2003	**2003-2008**	**2008-2020**	**1997-2020**
Passenger Enplanements				
Base Case	4.4%	3.5%	2.7%	3.3%
Scenario 1	5.8%	4.4%	3.5%	4.3%
Scenario 2	2.9%	2.5%	1.9%	2.3%
Scenario 3	4.4%	3.5%	2.7%	3.3%
Domestic Freight (tons)				
Base Case	1.7%	2.2%	3.8%	2.9%
Scenario 1	4.6%	8.1%	7.5%	6.9%
Scenario 2	0.2%	0.8%	1.8%	1.2%
Scenario 3	1.7%	2.2%	3.8%	2.9%
International Enplaned and Deplaned Freight (tons)				
Base Case	7.3%	9.1%	9.0%	8.6%
Scenario 1	16.4%	14.4%	12.3%	13.8%
Scenario 2	5.1%	6.7%	6.8%	6.3%
Scenario 3	5.7%	7.6%	7.6%	7.1%
Total Freight (tons)				
Base Case	4.8%	6.5%	7.3%	6.5%
Scenario 1	6.4%	7.8%	8.2%	7.6%
Scenario 2	3.5%	5.0%	6.4%	5.3%
Scenario 3	3.4%	4.9%	5.0%	4.6%
Total Mail (tons)				
Base Case	2.1%	2.6%	3.8%	3.1%
Scenario 1	5.7%	11.5%	5.2%	6.7%
Scenario 2	0.4%	1.1%	1.7%	1.2%
Scenario 3	2.1%	2.6%	3.8%	3.1%
Total Operations				
Base Case	2.2%	2.7%	3.3%	2.9%
Scenario 1	4.1%	4.6%	4.7%	4.5%
Scenario 2	1.1%	1.7%	2.4%	1.9%
Scenario 3	1.9%	2.2%	2.4%	2.2%

Source: Table 2.67 and HNTB analysis.

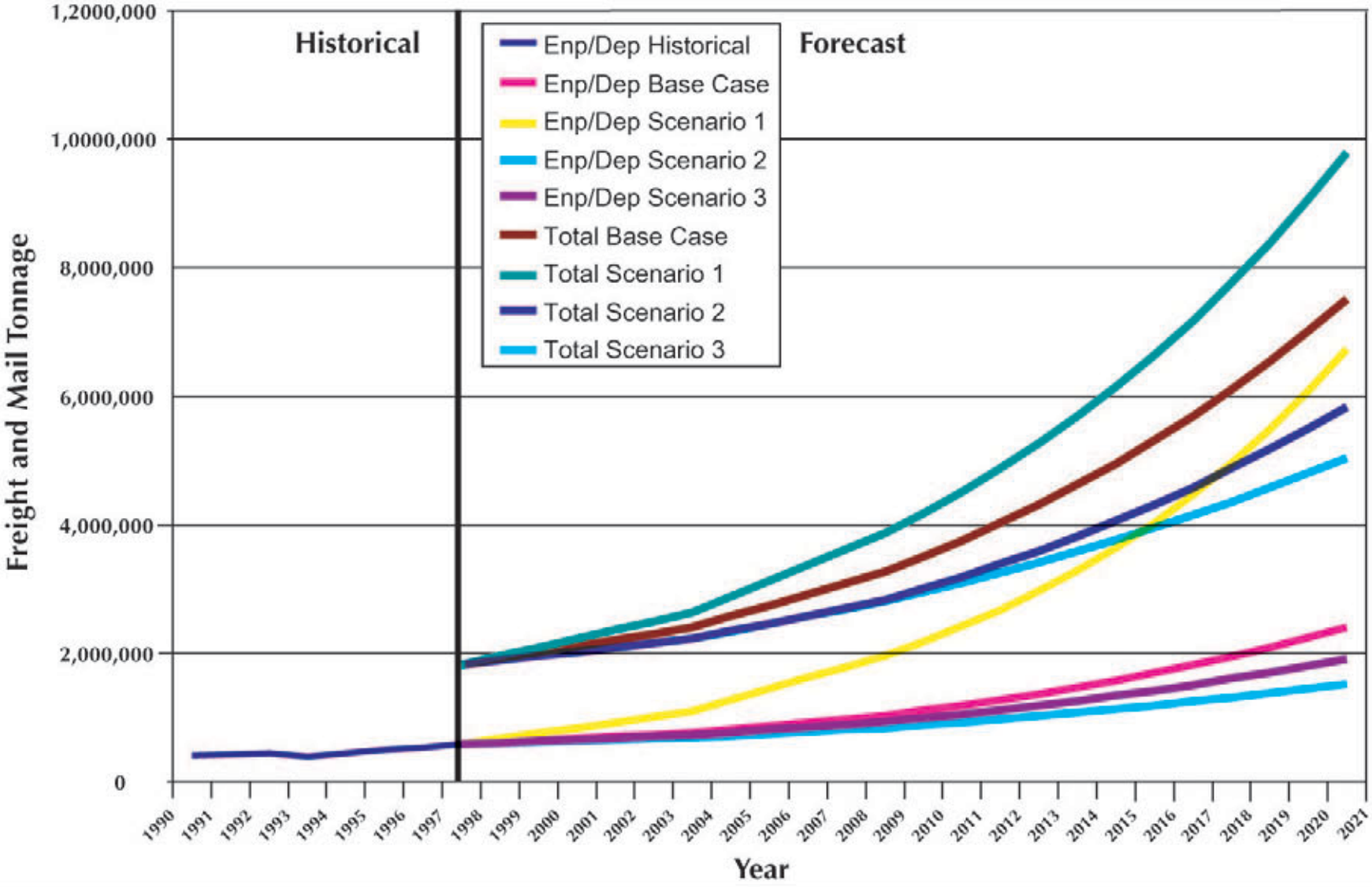
Forecast Scenarios: Passenger Enplanements

Figure 2-6



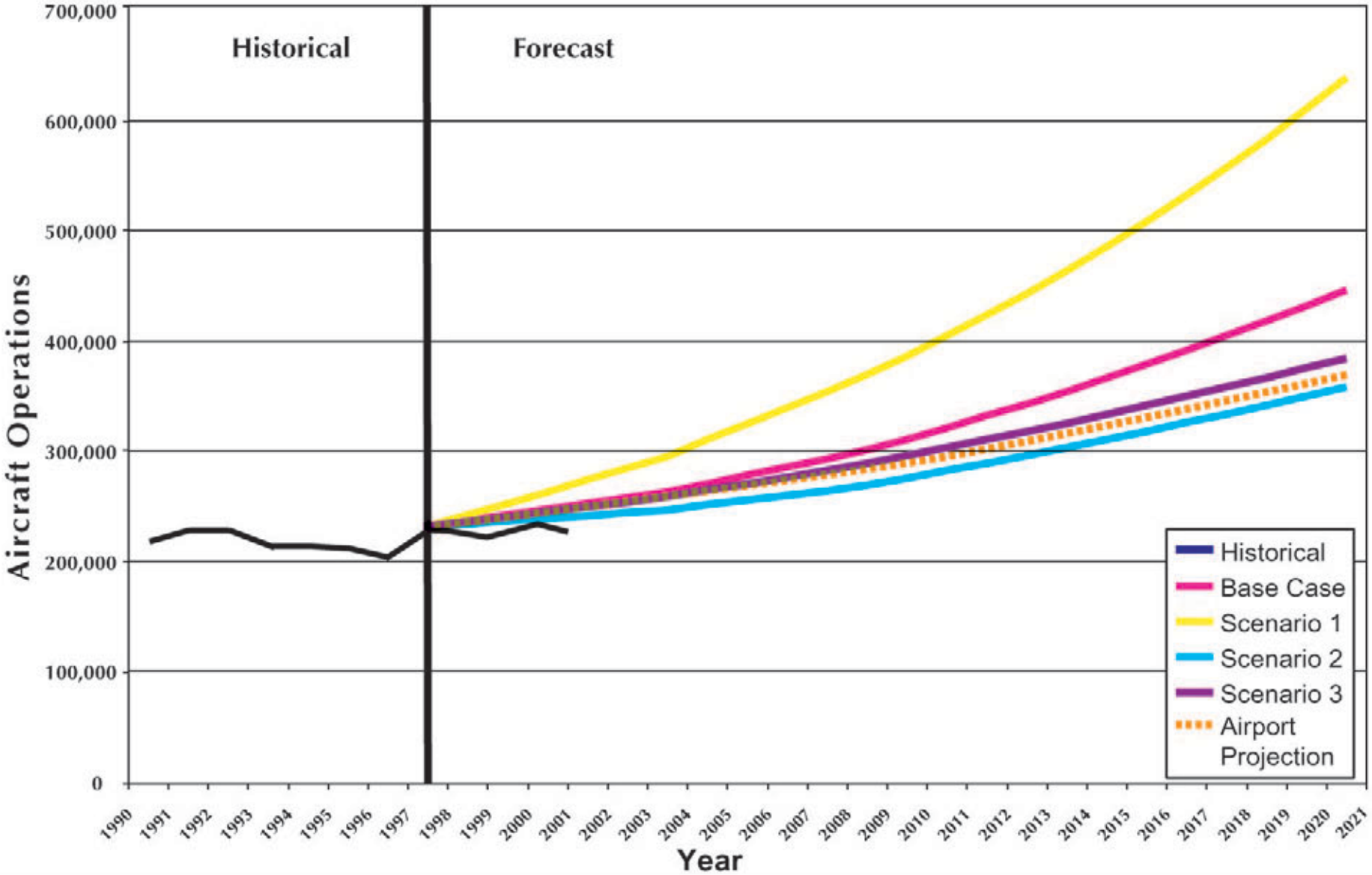
Forecast Scenarios: Air Freight

Figure 2-7



Forecast Scenarios: Aircraft Operations

Figure 2-8



Chapter Three
FACILITY REQUIREMENTS

3.1 INTRODUCTION

This chapter describes the facilities required to accommodate the forecast demand at ANC over the course of the planning period—through 2020. Facility requirements were determined by comparing the aviation demand projections presented in Chapter Two with the capacity of the various functional airport areas, including:

- Airspace Capacity
- Airfield Capacity and Delay
- Airfield Improvements
- Landside and Airside Buildings
- Cargo Surface Transportation
- Air Cargo
- Support Facilities

Facility requirements are presented in phases corresponding to the horizon years 2003, 2008, and 2020 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.

3.2 AIRSPACE CAPACITY

The FAA recently completed an airspace study for the Anchorage area. This airspace study used the FAA's airspace simulation model, SIMMOD. The findings of the study suggest that airspace will be a constraining factor at ANC as operations continue to grow.

3.2.1 Airspace Issues

The airspace study projects that average delays at ANC will increase from a baseline value of about 6.8 minutes to about 22.3 minutes per aircraft at a 25 percent traffic increase and 59.2 minutes per aircraft at a 50 percent traffic increase.[17] It should be noted that the model is constructed of both the airport and airspace structure, therefore, the delay measurements include those occurring from both airport deficiencies and airspace deficiencies.

The greatest delay comes from the configuration that consists of all landings and takeoffs on Runway 14. Part of the delay is attributable to the single runway configuration. However, airspace node delay diagrams[18] show that a considerable part of the delay comes from airspace interactions with EDF. These delays result from a direct conflict between approaches to Runway 14 at ANC and Runway 6 (the primary runway) at EDF.

Presently, airspace interactions with EDF are the greatest constraint. There are other airspace constraints in the area that have not yet become major factors, but may become factors in the future as traffic increases. These additional constraints include the

[17] Anchorage Area Airspace Study, Data Package Number 5 (Draft) May 1999, Exhibit 8.

[18] Anchorage Area Airspace Study, Data Package Number 4 (Draft) February 1999, Exhibit 33.

mountainous terrain immediately east of the Airport and the VFR flyways, governed by FAR Part 93 (see Chapter One – Inventory of Existing Conditions) used by the high volume of GA 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 major issues at existing traffic levels. However, if the Airport adds runways and/or additional navigational aids (NAVAIDs) to improve airport capacity, the limitation of airspace options may become a factor.

To date, the FAA's airspace study did not identify potential future airspace constraints beyond EDF because the SIMMOD model was run with the existing airport structure in place, and the airport structure causes some of the delays. The model will need to be run with an updated airport structure to ascertain whether or not the airspace constraints, in some of the areas listed above, become a limiting factor on operations to or from a reconfigured airfield.

3.2.2 Airspace Alternatives

A number of recommendations to potentially reduce airspace congestion and delays have been formulated based on the preliminary airspace analysis. These recommendations include alternatives to reduce airspace interactions between ANC and EDF. The best way to reduce interactions between the two facilities would be to provide an approach to existing Runway 15 at EDF. Implementing this would take some time, as environmental clearances would be required, and it may be necessary to widen and lengthen Runway 15, eliminate high terrain obstacles in the approach, and possibly use new technology to provide the proper missed approach clearance. These alternatives still need to be evaluated by the FAA for feasibility at ANC and within the Anchorage Bowl.

Interim fixes to be evaluated by FAA for EDF include developing offset approach courses that are clear of interactions with ANC. These new approaches could then be used in all VFR conditions, and even higher minima IFR conditions. Straight-in ILS 6 approaches to EDF would only be used during very poor visibility or low ceiling conditions, or when ANC is only using the 6-24 parallels. This procedure, using CRDA between two airports, is still in the development stage. The airspace study recommends further evaluation and using the Anchorage area as a location to study use of this technology.

Another interim fix to be evaluated would be to develop operational procedures and install software in the radar system to allow Simultaneous Converging Instrument Approaches (SCIA). This would improve, but not eliminate EDF and ANC interactions. The software system, called Converging Runway Display Aid (CRDA), provides "ghosting" on the approach radar screen and allows controllers to more effectively provide separation for aircraft on converging approach courses. This interim fix will be further addressed in the FAA Airspace Study.

Provide Greater Airspace Arrival Capacity to the 6-24 Parallels at ANC. By adding NAVAIDs and an additional radar system, the 6-24 parallels could be used more often. A localizer directional aid (LDA) at an offset

angle to one of the parallel runways would allow two arrival streams to occur at the Airport during a greater percentage of time. Coupling the LDA with a Precision Runway Monitor (PRM) radar system would allow the two streams during an even greater percentage of time. The PRM system would provide pilots with better positive navigational guidance to the Airport, while allowing controllers to accurately monitor the converging aircraft. This would enable the controllers to direct aircraft away from each other if there were problems. The two aircraft simultaneously approaching the Airport would still need to spot each other visually, but could do so much closer to the Airport and at much lower ceiling and visibility minimums than without the systems. The FAA term for this combined system is Simultaneous Offset Instrument Approaches (SOIA).

Other systems available include an LDA alone or an LDA combined with an aircraft Flight Management System (FMS), with an FAA system acronym of SCIA. Neither of these systems can be used as often as the SOIA. The SCIA system can only be used by aircraft equipped with FMS, presently only part of the air carrier fleet. International aircraft also may not be able to use the SCIA system. In summary, the SOIA system is recommended as a first choice pending further study.

Provide Better Converging Approach Capacity at ANC. Capacity at ANC could be improved by increasing the amount of time converging approaches could be performed. This could be accomplished by using the CRDA system described under the airspace recommendation. It is recommended for further evaluation since this CRDA procedure is still in the development stages.

3.3 AIRFIELD CAPACITY AND DELAY

Aircraft delay is directly related to airfield capacity. It is therefore essential to evaluate airfield capacity and resultant aircraft delays. This analysis is used to determine the airfield's capability to serve existing and future air traffic demand. This section details the relationship between airfield capacity and aircraft delay, and factors that influence the ultimate capacity of an airfield.

3.3.1 Airfield Capacity Factors

Airfield capacity is the total number of aircraft that can operate from an airfield, during a given amount of time, when there is a continuous demand for service (i.e., when there is always at least one delayed aircraft that is waiting to depart or land). Capacity is often measured in 1-hour increments; this is known as hourly capacity. Capacity can also be measured on an annual basis; this is known as Annual Service Volume (ASV). In this section, airfield capacity and delay were calculated using FAA Advisory Circular AC 150/5060-5, the Airport Capacity and Delay Manual, and the FAA Annual Delay Model.

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 significant 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. Conversely, increased separation will reduce

capacity. 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: VFR and IFR. These flight rules are closely related to the two categories of weather conditions: visual meteorological conditions (VMC) and instrument meteorological conditions (IMC). VMC exist during generally fair to good weather and IMC exist during times of rain, low clouds, or reduced visibility (whenever visibility falls below three statue miles or the ceiling drops below 1,000 feet 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 compared to IFR.

During IMC, IFR are in effect for all aircraft, which means that ATC is responsible for the separation of aircraft and exercises positive control over aircraft. Additionally, aircraft must meet certain minimum equipment requirements, and pilots must be specially certified and meet proficiency requirements. IFR aircraft fly assigned routes and altitudes and use a combination of radio NAVAIDs and vectors from ATC to navigate. Aircraft separation is increased during IMC and airfield capacity is reduced as a result.

The majority of commercial traffic in the area, regardless of weather, is operated under IFR flight plans. In an effort to increase capacity in both the airspace and the airports in the area, ATC will allow IFR aircraft to maintain visual separation when weather permits. Visual approaches can be conducted by IFR aircraft whenever the ceiling is 2,100 feet or greater and the visibility is three miles or greater. Conversely, IFR separation is maintained whenever the ceiling is less than 2,100 feet or visibility is less than three miles. During summer months, VFR conditions exist 94 percent of the time and IFR conditions exist 6 percent of the time. During winter months, VFR conditions exist 74 percent of the time and IFR conditions exist 26 percent of the time.

Fleet Mix

Fleet mix affects airborne aircraft separation requirements, and therefore has a significant impact on airfield capacity. Where possible, ATC uses different runways, arrival/departure routes, and altitude to separate aircraft. Separation for successive aircraft on the same runway and/or arrival/departure route considers two factors. First, separation between heavy, large, and small traffic is maintained to avoid wake turbulence from turbojet traffic. Wake turbulence is two counter-rotating cylindrical air masses created when the wings lift an aircraft. The velocity of the wind within these cylinders can be hazardous to other aircraft encountering them in flight, especially when a light aircraft follows a heavier aircraft. Minimum IFR separation between two aircraft is three nautical miles, but this separation is increased when wake turbulence is a factor. For example, small

aircraft, such as a Cessna 172, are separated from heavy aircraft, such as a B747, by six nautical miles. Small aircraft are separated from B757 aircraft by five nautical miles. **Table 3.1** shows the standard separation between aircraft.

The second factor considered regarding aircraft separation is that 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.

Fleet mix must be calculated in order to determine airfield capacity at ANC. Aircraft are assigned to one of four categories for this capacity analysis. These categories are shown in **Table 3.2**. The fleet mix is refined into a Mix Index (MI), which is a weighted percentage of aircraft using the Airport with a maximum takeoff weight (MTOW) greater than 41,000 pounds. The index is derived using the following equation:

$$\mathbf{MI = C + 3D}$$

In the formula, 'C' and 'D' represent the percentage of category C and category D aircraft using the Airport, respectively. The MI increases as the percentage of large, heavy aircraft using the Airport increases. In general, airfield capacity decreases with an increase in the MI.

Table 3.1

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Minimum IFR Separation Standards

	Trailing A/C			
Leading A/C	**Heavy**	**B757**	**Large**	**Small**
Heavy	4nm	5nm	5nm	6nm
B757	3nm	3nm	4nm	5nm
Large	3nm	3nm	3nm	4nm
Small	3nm	3nm	3nm	3nm

Source: FAA Order N7110.157.

Table 3.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Aircraft Classification

Aircraft Classification	Takeoff Weight (pounds)	Type of Aircraft	Average Approach Speed (knots)
A	41,000 or less	Small single-engine propeller aircraft, such as C-172, C-207, PA-28	95
B	41,000 or less	Small twin-engine aircraft, including propeller-driven and some business jets, such as PA-31, C-310, Cessna Citation	120
C	41,000 pounds – 255,000 pounds	Large aircraft such as MD-80, B737, A320	130
D	255,000 pounds or greater	Heavy aircraft such as B-747, B-757, B-767, B-777	150

Sources: FAA Advisory Circular 150/5060-5, Airport Capacity and Delay (with changes), and HNTB analysis.

The MI was developed from the fleet mix data contained in the forecast chapter. The 1998 fleet mix has 26.6 percent category C aircraft and 26.0 percent category D aircraft. This translates into a MI of 105. The MI is forecast to increase to 115 in 2003, 128 in 2008, and 165 in 2020.

Runway Use Configuration

Runway use is determined by a number of factors at ANC, including prevailing winds, airfield layout, runway length, and the preferential runway use plan. There are three active runways at ANC, including a single north-south runway (14-32) and two parallel east-west runways (6L-24R and 6R-24L).

Separation distance between parallel runways also impacts capacity. For aircraft operations to be totally independent on parallel runways, regardless of weather, they must be separated by at least 4,300 feet with an ASR, under current FAA guidelines. As such, aircraft operations are dependent on the existing parallel runways at ANC, which are separated by only 700 feet. If the ideal separation of 4,300 feet is considered infeasible, further analysis of benefits and costs would be appropriate. 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 runway dependencies is depicted in **Figure 3-1**.

The preferential runway use plan is intended to minimize noise impacts on surrounding communities. With the plan and when possible, aircraft take off and land over the water as much as possible. Departing aircraft use Runways 24L, 24R, and 32, while arriving aircraft use Runways 6L, 6R, and 14.

Prevailing winds can limit the use of the preferential runway use plan. Aircraft operating from an airport generally need to take off and land into the wind (known as a headwind) in order to reduce takeoff and landing ground roll length. Aircraft can also operate in a crosswind (i.e., when the wind is not blowing directly down the runway). Use of any runway-operating configuration is ultimately limited by the maximum crosswind or tailwind that aircraft can safely handle. Winds beyond these limits force a change to a different runway-operating configuration.

ATC will use the runway-operating configuration that maximizes the capacity of the airfield and reduces noise impacts when prevailing winds permit. There are currently four primary runway use configurations at ANC. These configurations, along with the percentage use in the summer and winter months, are provided in **Figure 3-2**. Runway use is based just on weather and not actual runway use. As shown, Configuration A, with arrivals to Runways 6R and 6L and departures on Runway 32, is the predominant configuration in use at the Airport.

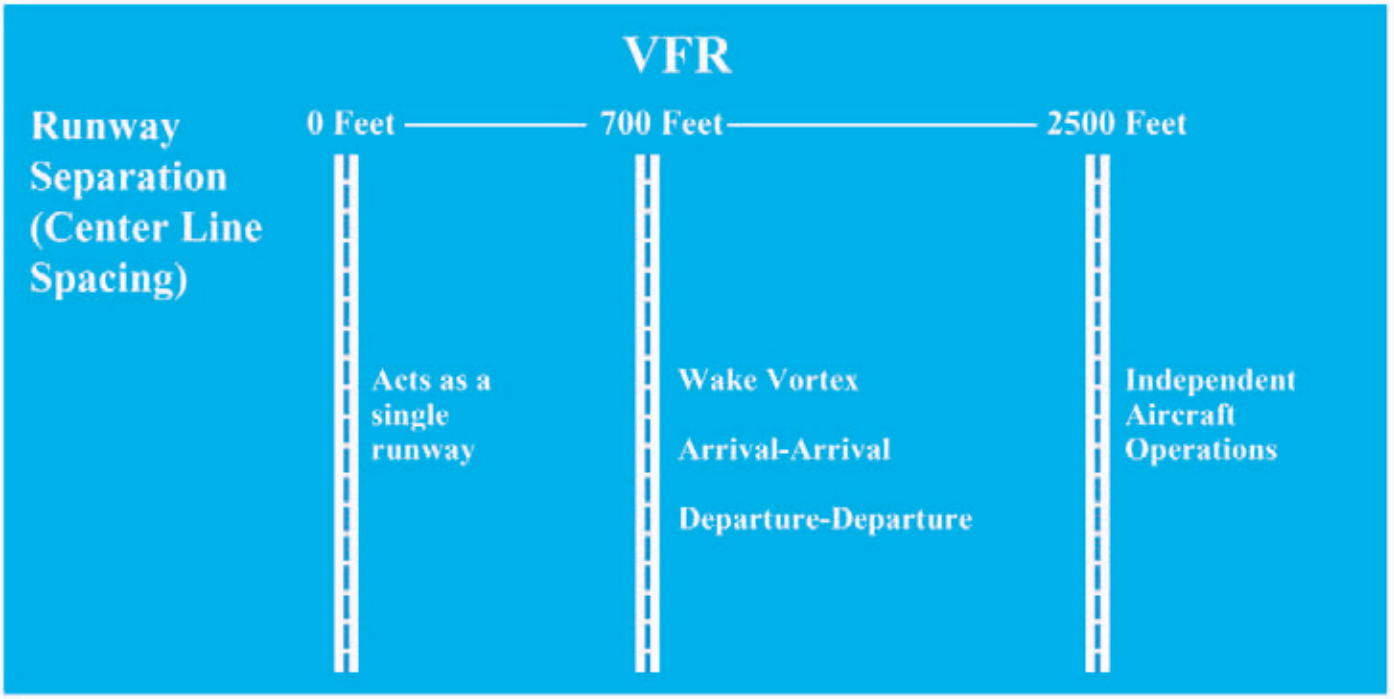
3.3.2 Runway Capacity

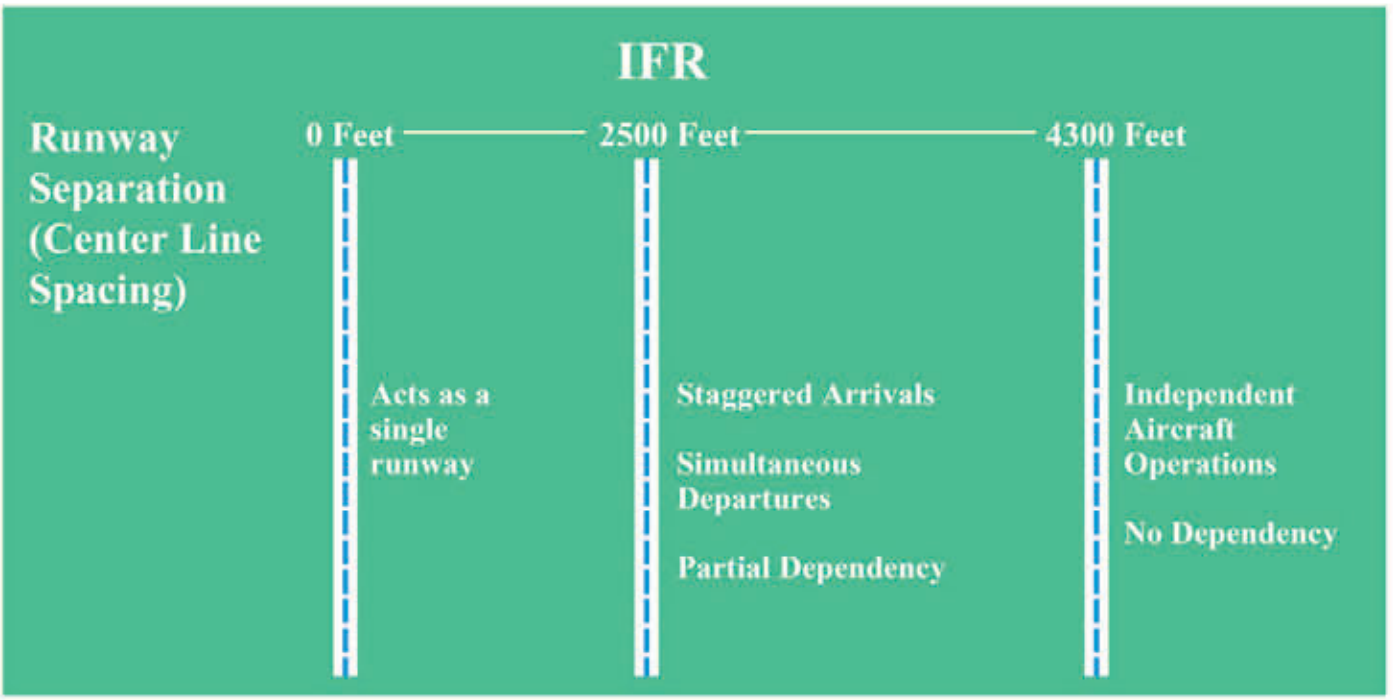
The FAA AC 150/5060-5, Airport Capacity and Delay, were used to estimate runway capacity at ANC under VFR and IFR conditions. It is important to note that the capacities provided in this section are theoretical and do not consider the impact of airspace interactions with EDF.

The four runway use configurations, along with their corresponding hourly VFR and IFR capacities, are shown in Figure 3-2. As indicated, Configuration A provides the dual

ATC Dependencies for Parallel Runways

Figure 3-1



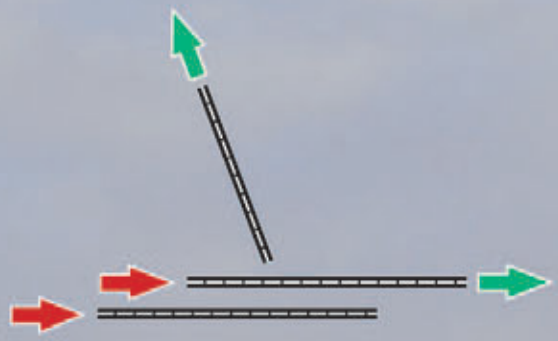


Ted Stevens Anchorage International Airport

General Airfield Operating Configurations

Figure 3-2

Configuration A



Percent Use	
Summer	35%
Winter	52%

Hourly Capacity	
VFR	145
IFR	82

Configuration B

Percent Use	
Summer	21%
Winter	7%

Percent Use	
Summer	23%
Winter	8%

Hourly Capacity	
VFR	145
IFR	60

Configuration C

Percent Use	
Summer	1%
Winter	1%

Percent Use	
Summer	7%
Winter	25%

Hourly Capacity	
VFR	105
IFR	58

Configuration D

Percent Use	
Summer	1%
Winter	5%

Percent Use	
Summer	12%
Winter	1%

Hourly Capacity	
VFR	56
IFR	54

benefit of having the most capacity and being consistent with the Airport's desire to direct as many operations as possible over the water areas west and north of the Airport. A more detailed description of each runway use configuration capacity is provided below.

Configuration A has arrivals on the two east-west parallel runways, and departures on the single north-south runway. During VFR conditions, all runways operate independently. Two arriving aircraft can land simultaneously when wake turbulence is not a factor. This yields a maximum hourly capacity of 145 operations. During IFR conditions, the two parallel runways are dependent and effectively serve as a single runway on which only one aircraft can land at a time. Northbound departures from Runway 32 remain independent of arrivals. This yields a maximum hourly capacity of 82 operations. It is important to note that the maximum hourly arrival capacity in IFR conditions is only 30 operations.

In **Configuration B**, aircraft depart from the two east-west parallel runways, and arrive to the south on the single north-south runway. During VFR conditions, two departing aircraft can take off simultaneously when wake turbulence is not a factor. Arriving aircraft can also land independently on Runway 14. Departing aircraft have a slightly lower runway occupancy time and, as a result, the dual departures used in this configuration (as opposed to Configuration A) yield the same hourly capacity of 145 operations. During IFR conditions, all runways are dependent and the entire airfield effectively serves as a single runway. This limits hourly capacity to 60 operations, with arrival capacity limited to only 30 operations.

Configuration C uses the east-west parallel runways for both arrivals and departures, and does not use the north-south runway. During VFR conditions, the runways operate independently when wake turbulence is not a factor. This yields an hourly capacity of 105 operations. During IFR conditions, the runways are dependent and serve as a single runway. This limits hourly capacity to 58 operations, with an arrival capacity of 30 operations.

Configuration D uses only the single north-south runway, and does not use the east-west parallel runways. As a result, the VFR capacity of this configuration is only 56 operations and the IFR capacity is 54 operations.

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 AC 150/5060-5, Airport Capacity and Delay, was used to estimate the Airport's ASV. The aircraft operations can exceed the theoretical ASV, sometimes by significant amounts, with corresponding increases in delay. In contrast, hourly capacities are physical capacities that generally cannot be exceeded. 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 351,800 (434,000) operations. As demand continues to increase, the peak hour as a percentage of average day traffic is projected to decrease, which will result in a projected increase in the ASV. The ASV in 2020 is calculated to be 406,700 (502,000) operations. In general, delays increase significantly as the

annual demand approaches and exceeds the ASV. Annual demand in 2020 is forecast to be 466,800 operations, indicating a possible need for additional long-range capacity.

Peak-Hour Demand vs. Capacity

The FAA Annual Delay Model determines annual delay based on an analysis of hourly delay in representative hours of the year. Several demand profiles must be provided to calculate aircraft delay:

- Annual demand
- Monthly distribution of annual demand
- Daily distribution of weekly demand
- Hourly distribution of daily demand

Average hourly aircraft demand was developed using the above referenced monthly, daily, and hourly distribution of demand. Total peak-hour demand is forecast to increase from 57 operations in 1997 to 99 operations in 2020. Peak hour arrivals are forecast to increase from 30 in 1997 to 54 in 2020. Peak hour departures are projected to increase from 35 in 1997 to 67 in 2020.

The 1998 and 2020 peak-hour demand versus capacity relationships for total demand, arrival demand, and departure demand are provided in **Figures 3-3 through 3-8**. The results indicate two critical deficiencies with the existing capacity of the airfield at ANC. During IFR conditions, all runway use configurations have an arrival capacity of approximately 30 operations. During IFR conditions, estimated 1998 peak hour arrival demand exceeds the arrival capacity for all configurations. As demand continues to grow, IFR arrival capacity will continue to be a significant capacity issue at ANC. During VFR conditions, demand exceeds capacity only in the single north-south runway configuration.

3.3.3 Annual Delay and Delay Costs

ASV is a good indicator of potential long-range capacity issues, but average annual aircraft delay, expressed in minutes of delay per aircraft operation, is a better measure of an airport's ability to accommodate projected aircraft demand on a daily basis. Average annual delay is based on how often weather conditions are good or poor, demand variations, and runway capacity. If delay costs exceed the costs of providing new capacity, additional capacity is warranted.

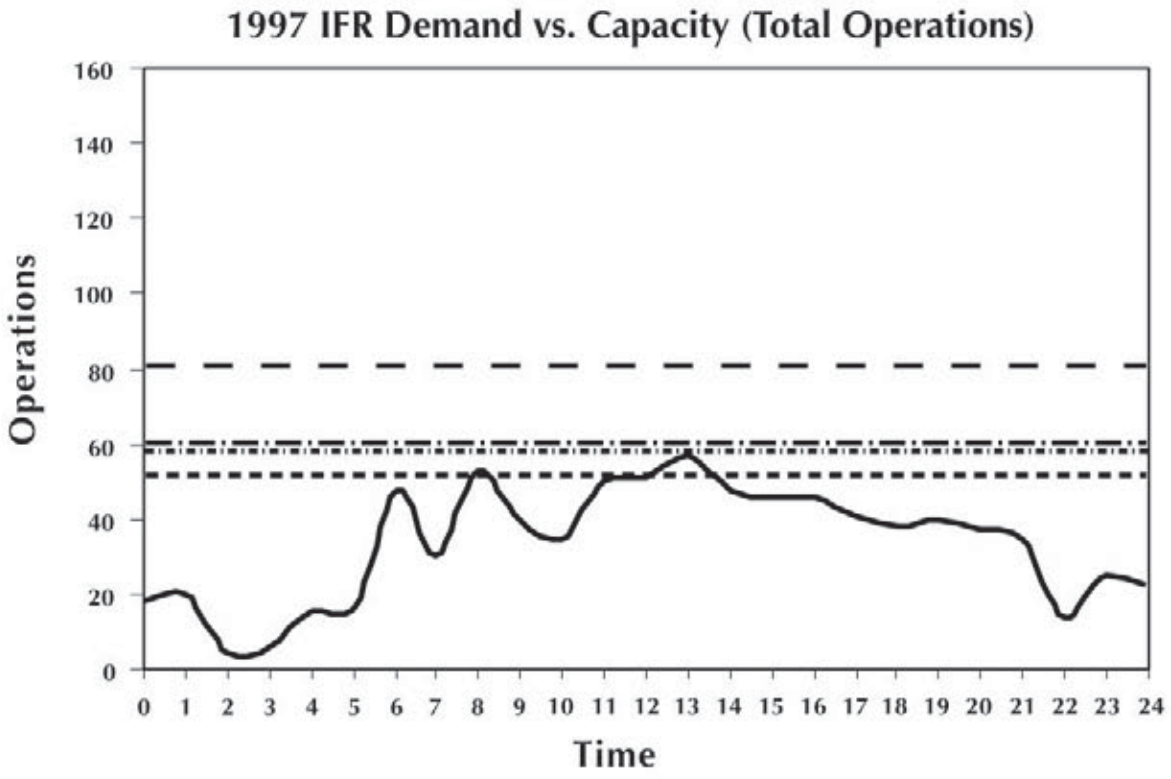
Average Aircraft Delay

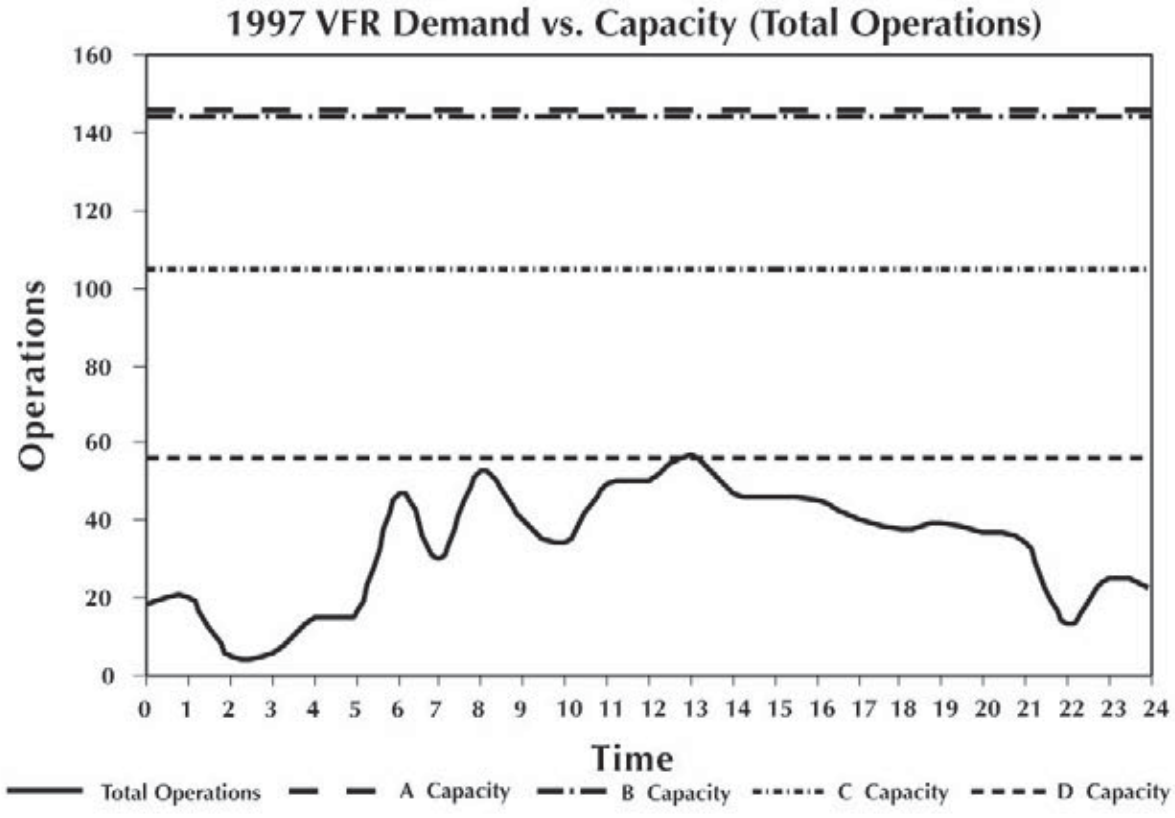
The FAA Annual Delay Model was used to estimate runway delays at ANC. The average aircraft delay in 1997 was estimated to be approximately 1.7 minutes per operation. By the year 2018, the average delay per operation is projected to increase to nearly 30 minutes per operation. Average and annual aircraft delays are shown in **Table 3.3** and **Figure 3-9**. It is important to note that these are only runway delays. The resulting delays in the FAA Airspace Study are considerably higher and include both ground and airspace delays in addition to runway delays.

To put these projected delays into perspective by using a common delay methodology, some of today's more congested airports like Chicago O'Hare and Newark experience average annual delays of between 6 and 7 minutes. An average annual delay of 6 to 7 minutes equates to peak hour delays of 30 to 40 minutes. At ANC, these levels of delay would be reached between 2008 and 2013 without any airfield capacity enhancement.

1997 Demand vs. Capacity (Total Operations)

Figure 3-3

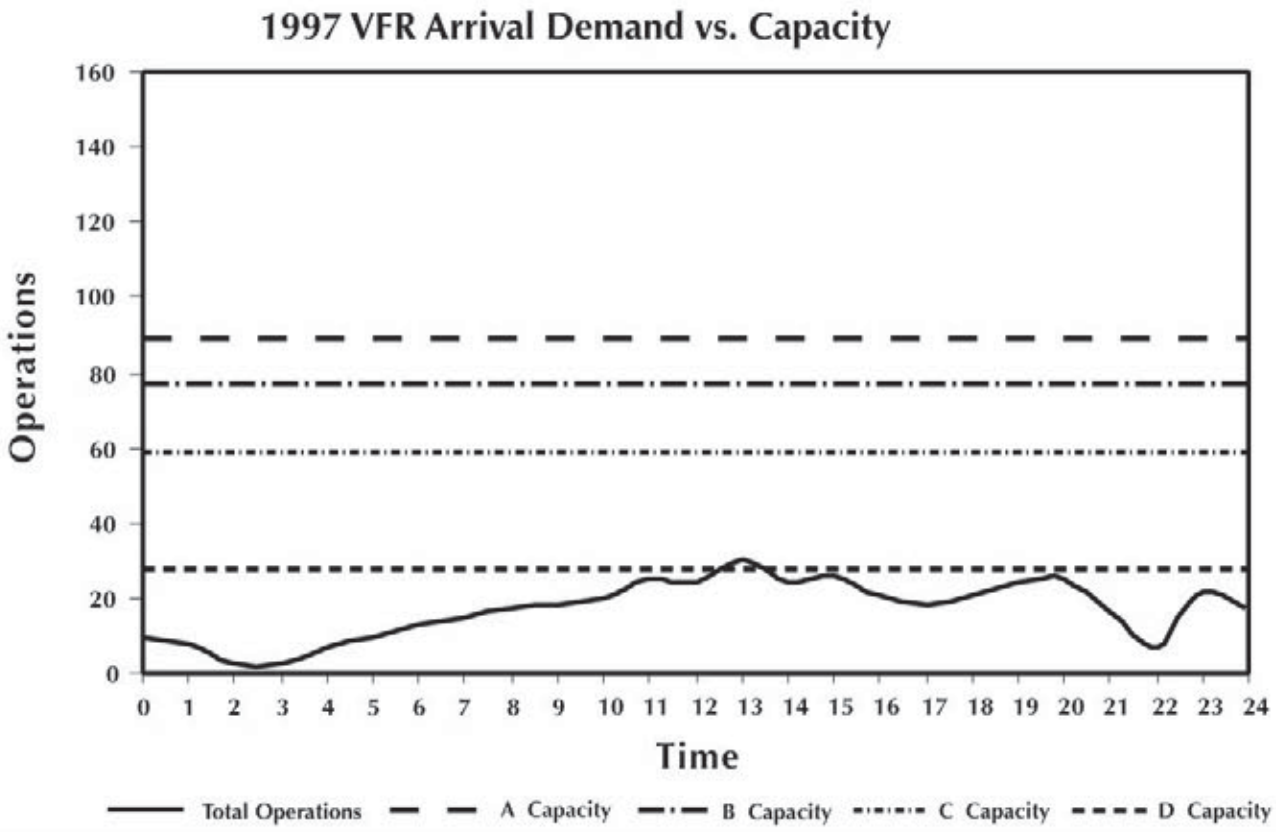


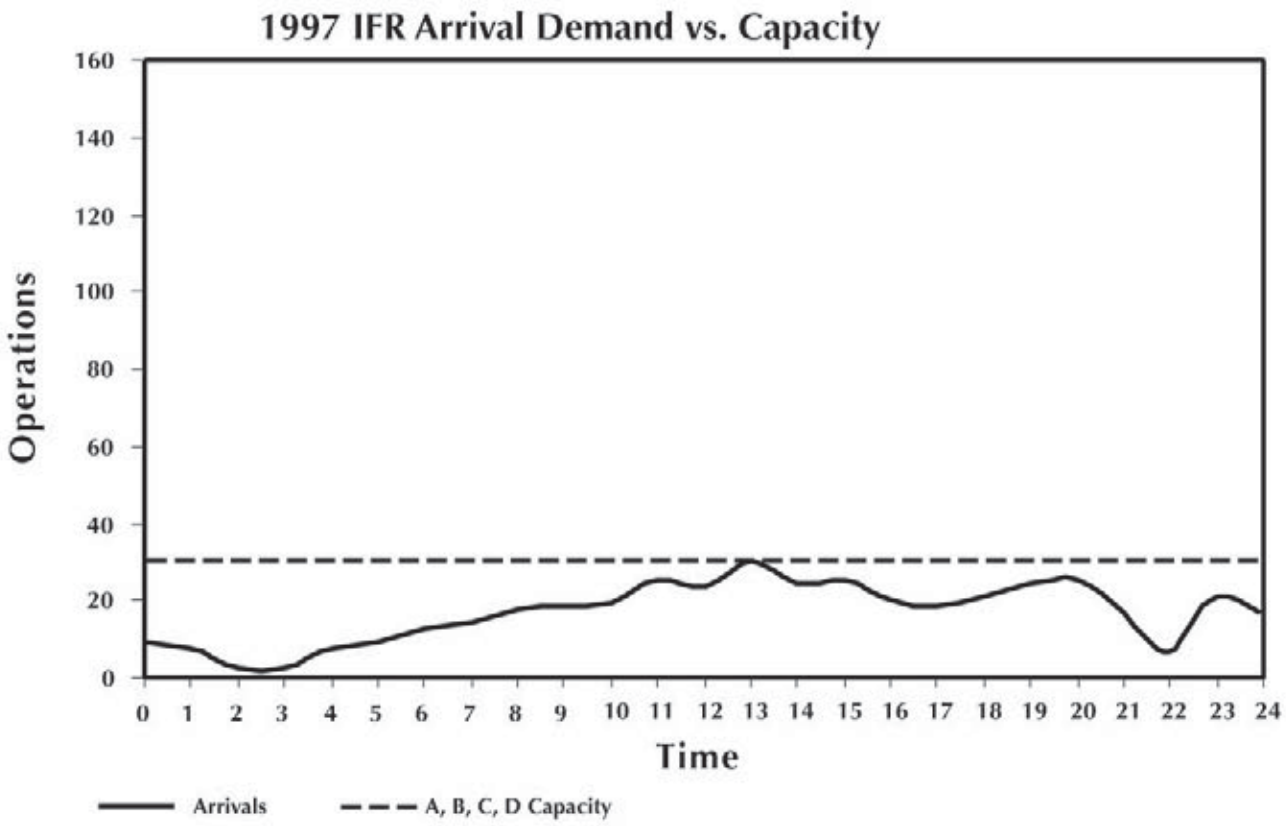


Ted Stevens Anchorage International Airport

1997 VFR and IFR Arrival Demand vs. Capacity

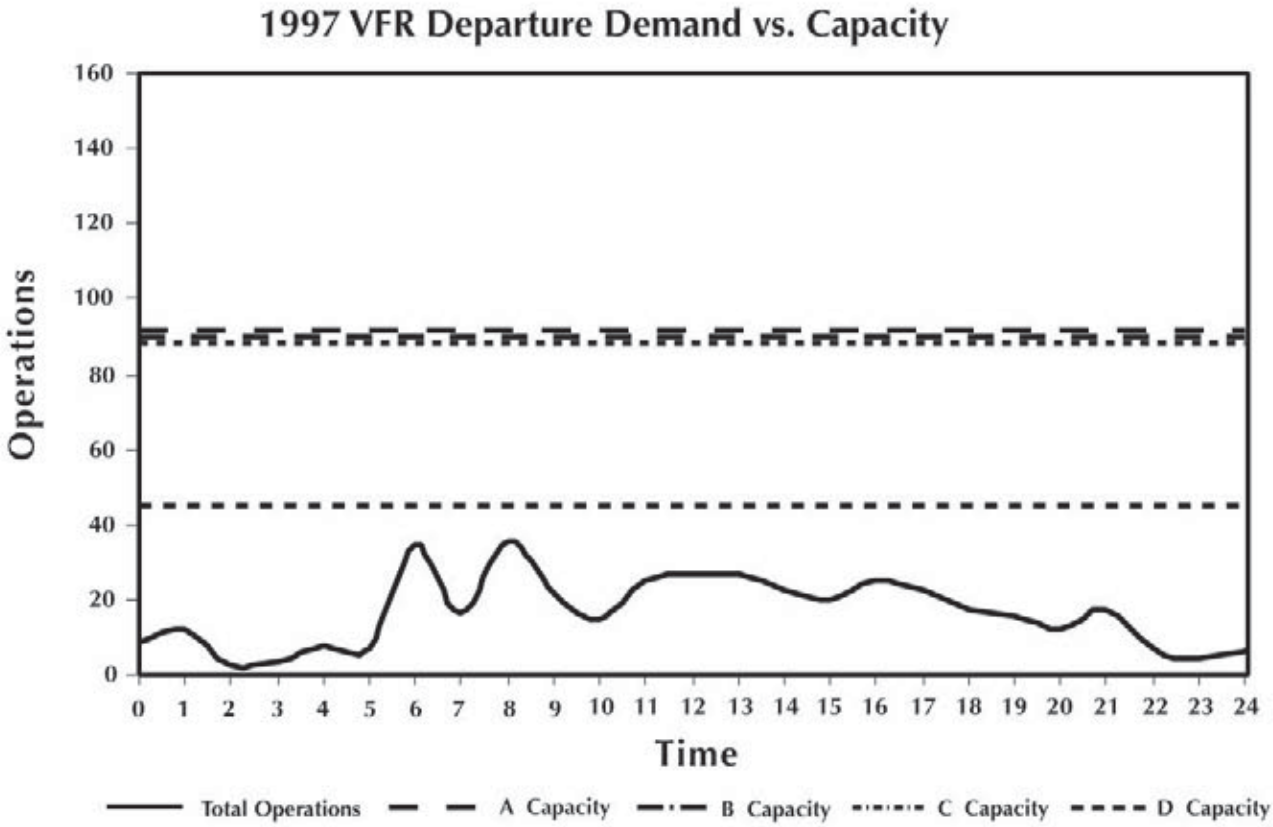
Figure 3-4

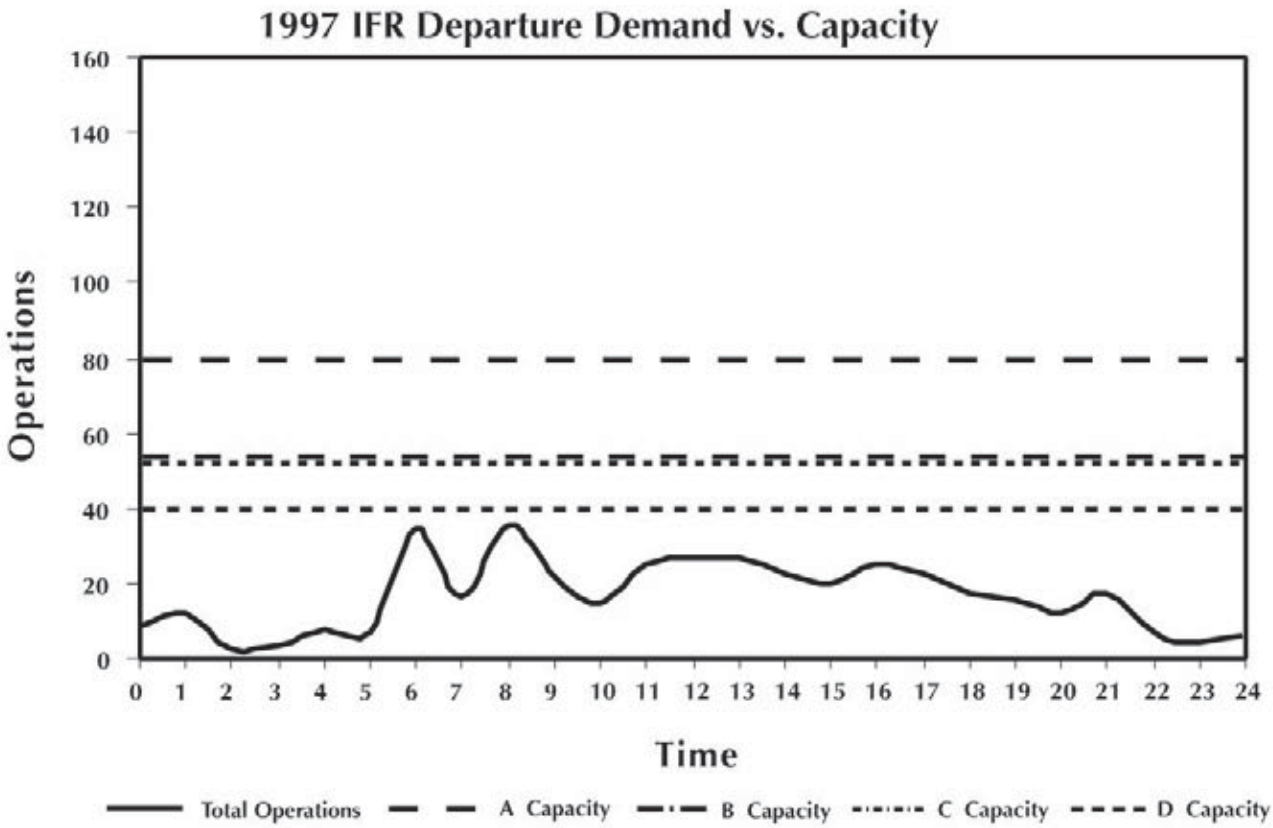




1997 VFR and IFR Departure Demand vs. Capacity

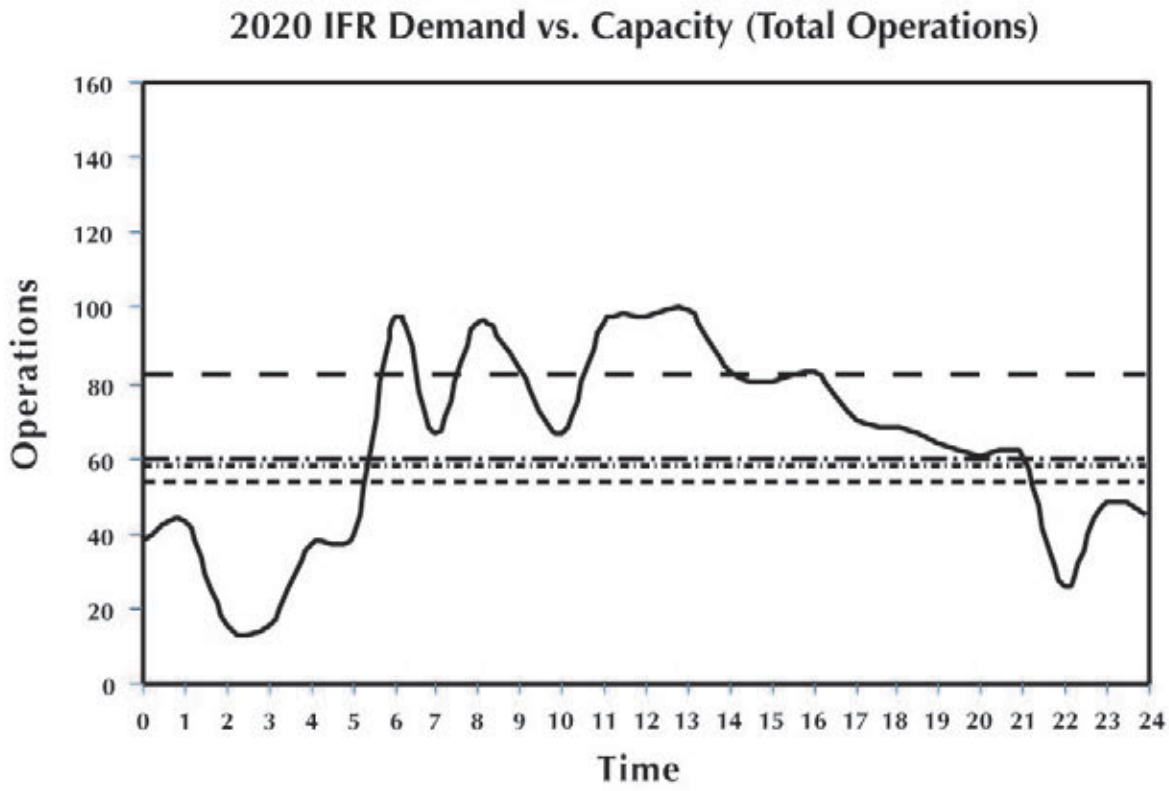
Figure 3-5

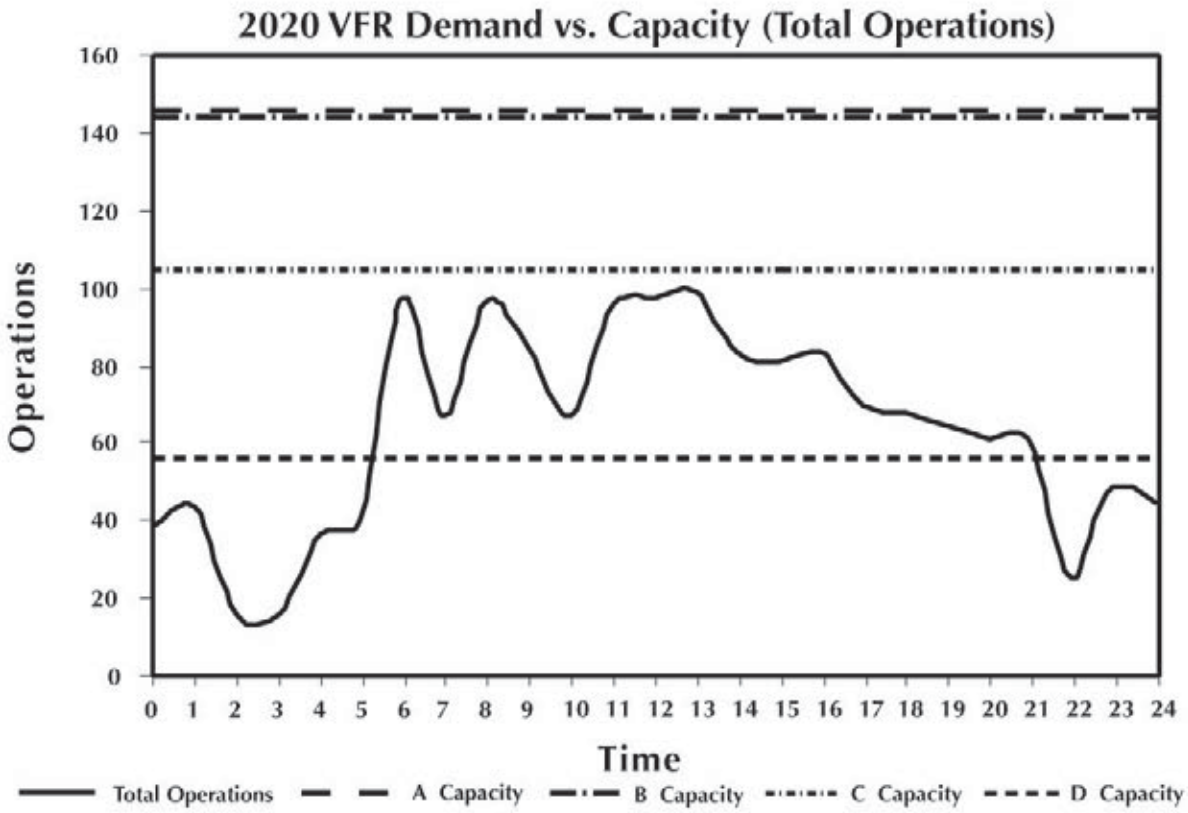




2020 Demand vs. Capacity (Total Operations)

Figure 3-6

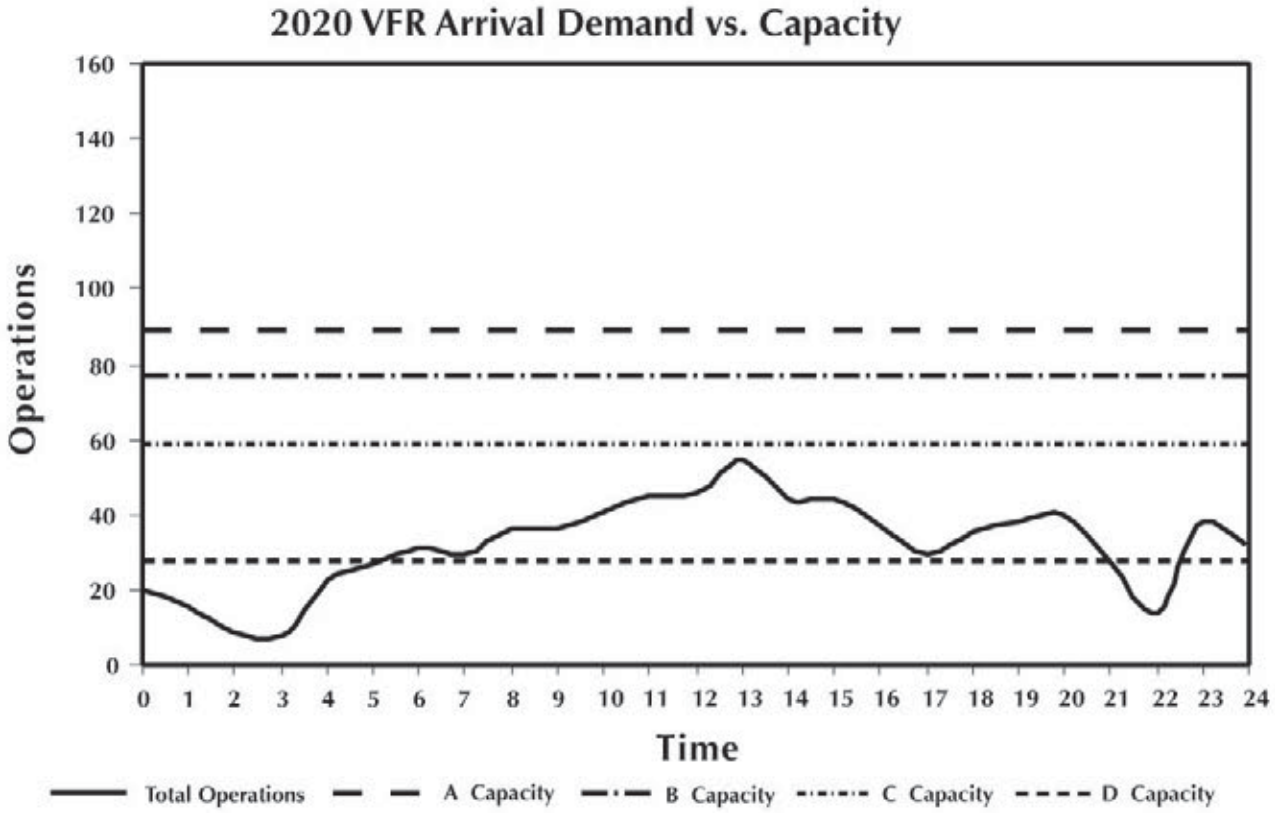


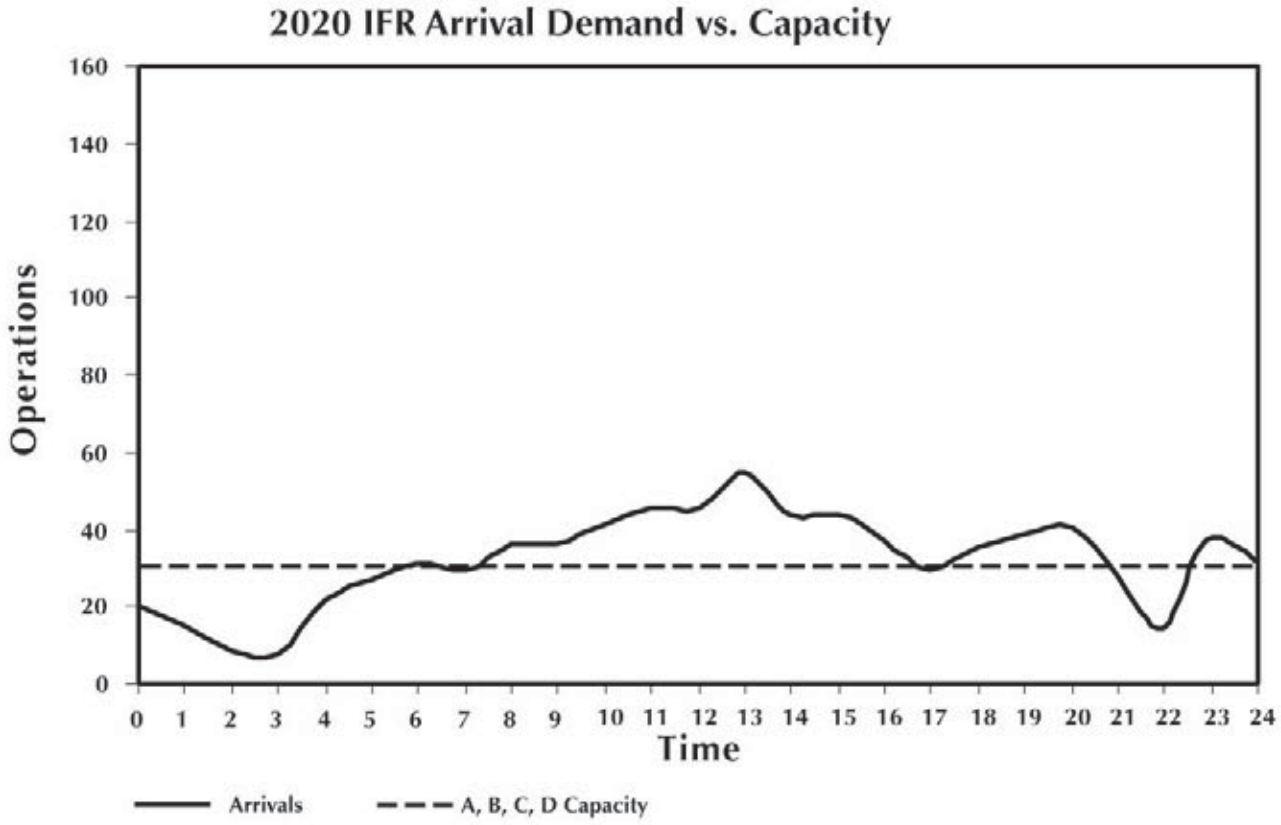


Ted Stevens Anchorage International Airport

2020 VFR and IFR Arrival Demand vs. Capacity

Figure 3-7

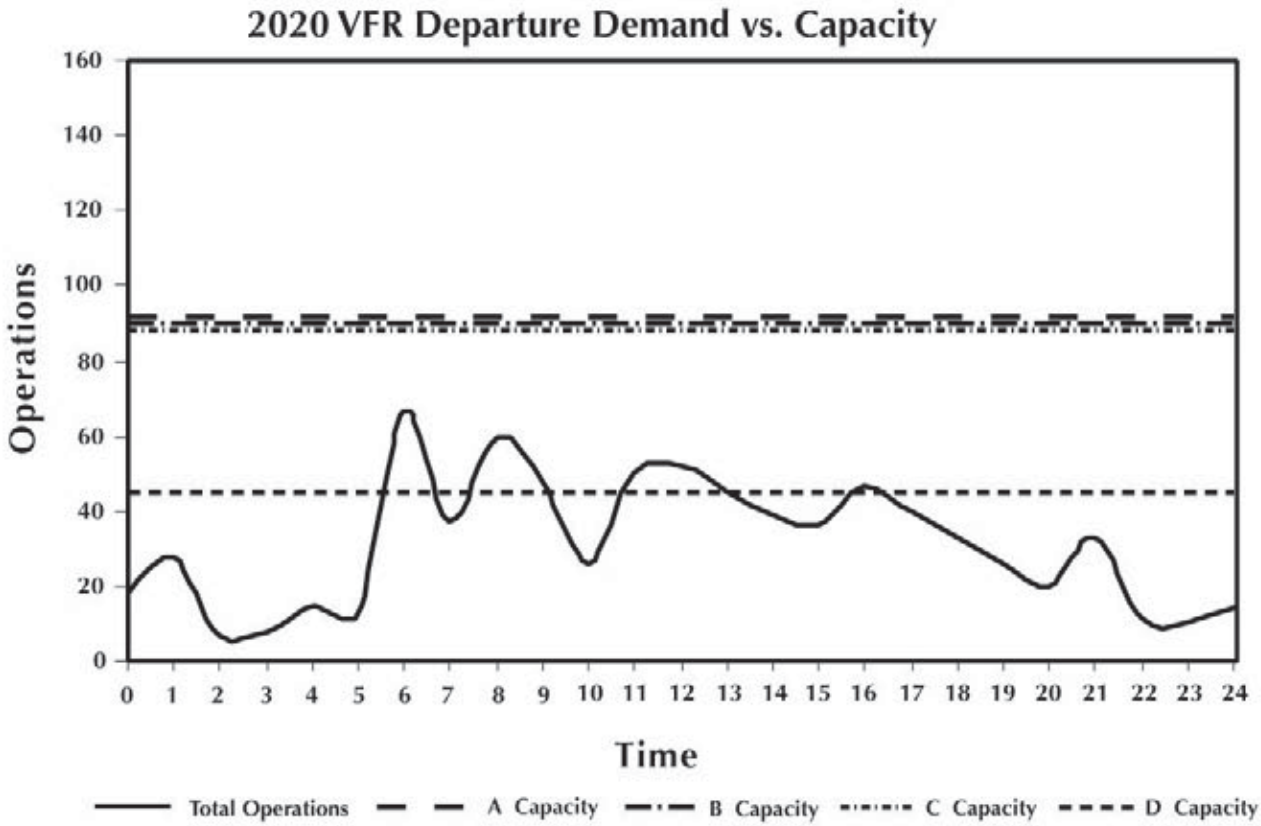




Ted Stevens Anchorage International Airport

2020 VFR and IFR Departure Demand vs. Capacity

Figure 3-8



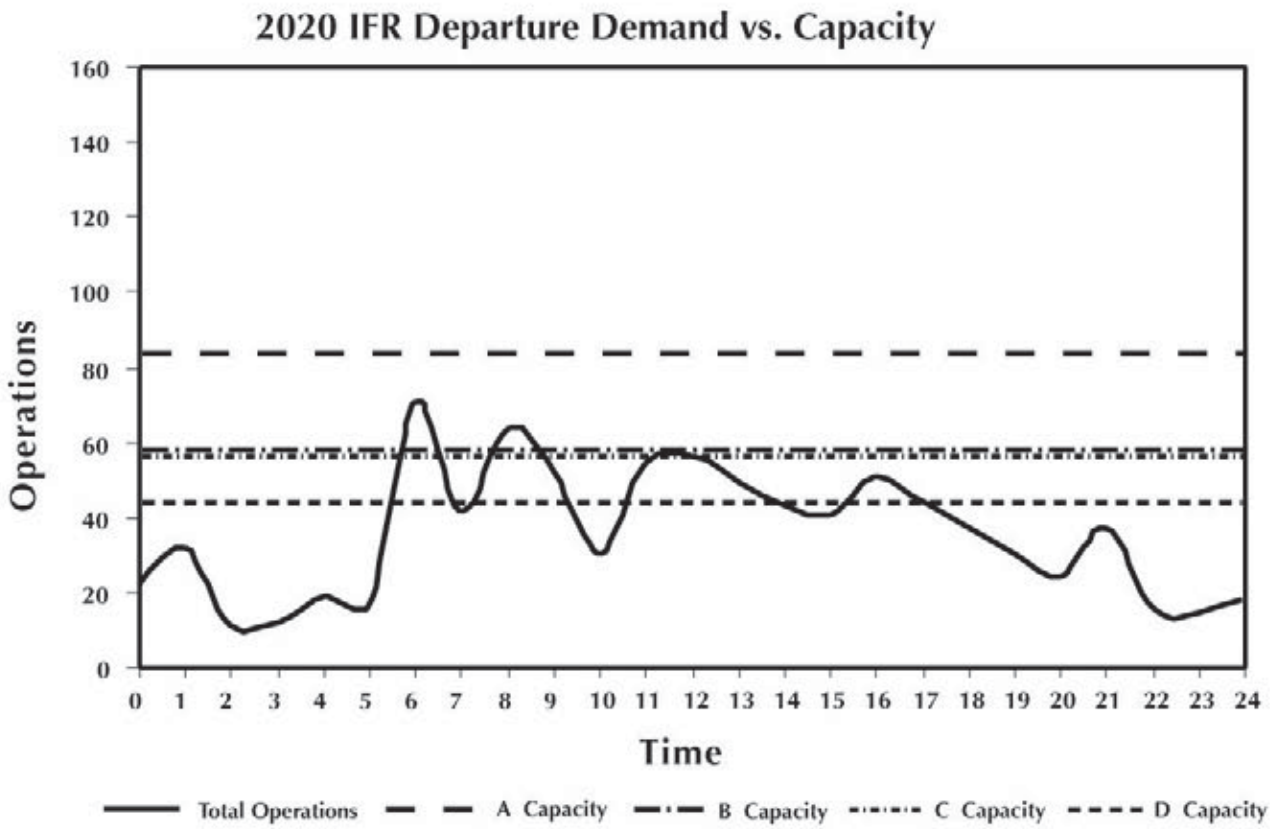


Table 3.3

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Aircraft Delay

Year	Annual Operations	Average Delay per Aircraft (minutes)	Annual Delay (hours)	Annual Delay Cost (millions$)
1997	231,562	1.5	5,600	8.3
2003	263,200	2.8	12,400	19.8
2008	301,300	5.3	26,300	45.8
2013	347,300	9.4	54,100	103.9
2018	400,700	16.3	108,700	230.8
2020	446,200	23.6	175,800	384.9

Source: HNTB analysis.

Delay Costs

The average aircraft operating costs for the base year of 1997 were estimated to be $1,477 per hour, or $24.62 per minute. These costs include fuel, oil, maintenance, and crew costs. Operating costs are projected to increase to $2,190 per hour, or $36.50 per minute, by 2020. These figures are in 1998 dollars and do not account for inflation. Using these average operating costs, and the projected annual activity level of 466,800 operations in 2020, the annual delay costs at ANC are projected to increase from $8.3 million in 1997 to approximately $384.9 million by the year 2020.

In conclusion, aircraft delays and delay costs will increase significantly throughout the planning period. By 2020, average delay will total approximately 24 minutes, peak hour delays will reach 70 minutes, and the total cost of delay to the users is projected to reach $385 million. Given the time-sensitive nature of much of the existing and projected activity at ANC (i.e., the necessity to meet a landing slot time in Tokyo), many carriers may find this level of delay unacceptable and could look to alternative airports for fueling services or for conducting transfer cargo operations. Long-term airfield capacity issues, based on forecast level of operations, should be addressed by demand management, aviation technology advances, and/or facility improvements.

3.4 AIRFIELD REQUIREMENTS

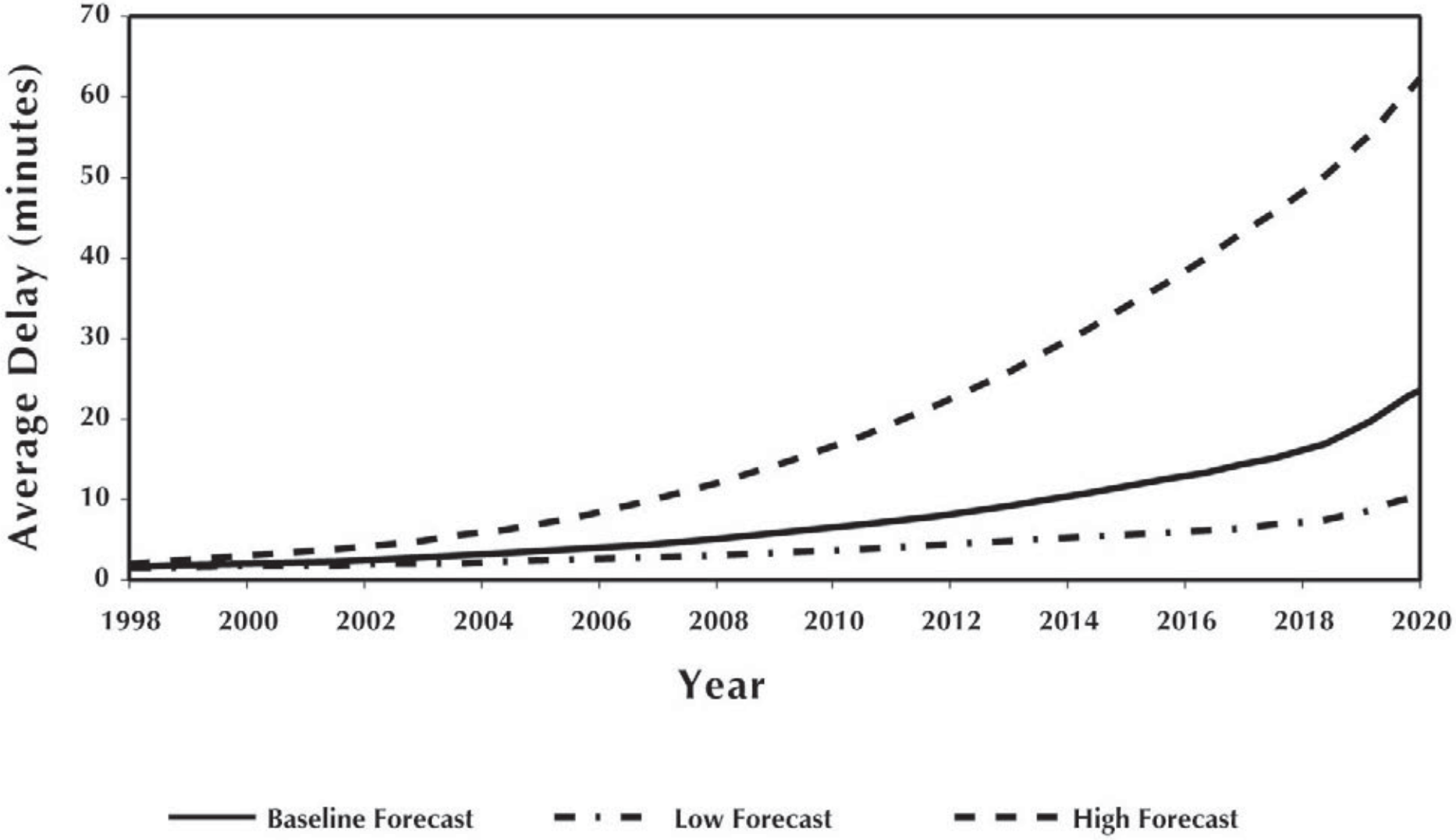
3.4.1 Design Criteria

The FAA specifies that a critical aircraft or class of aircraft must be established for an airport. The critical aircraft determines the specific separation standards that should be applied to airfield facility design, such as runway/taxiway separation, runway/taxiway widths, and building setbacks. The critical aircraft is determined by identifying the most demanding aircraft or group of aircraft that uses the airport on a regular basis. To qualify as the critical aircraft, a threshold of 500 annual itinerant operations or 250 annual departures must be performed or be forecast for that aircraft or class of aircraft.

The appropriate Airport Reference Code (ARC) for an airport is established based on the critical aircraft. The ARC is comprised

Average Aircraft Delay

Figure 3-9



of two components: (1) the aircraft approach category, which represents the approach speed of the aircraft and (2) the Aircraft Design Group (ADG), which is based on the wingspan of the aircraft. FAA design criteria are categorized by ARC, which take into account both the aircraft's approach speed and wingspan.

Aircraft Approach Category. The FAA groups aircraft based on their approach speed and maximum certificated landing weight. Approach speed equals 1.3 Vso, where Vso is aircraft stall speed. The stall speed and maximum certificated landing weight are established by the certificating authority of the Country of Registry. The aircraft approach categories are as follows:

Approach Category	Approach Speed
A	less than 91 Knots
B	91 Knots or more but less than 121 Knots
C	121 Knots or more but less than 141 Knots
D	141 Knots or more but less than 166 Knots
E	166 Knots or more

Source: AC 150/5300-13 with changes, and HNTB analysis.

Aircraft Design Group. The FAA establishes ADGs based on the physical characteristics of aircraft. ADGs link airport dimensional standards and separation criteria to aircraft wingspans. The specific ADGs are as follows:

Design Group	Wingspan Criteria
Group I	up to but not including 49 feet
Group II	49 feet up to but not including 79 feet
Group III	79 feet up to but not including 118 feet
Group IV	118 feet up to but including 171 feet
Group V	171 feet up to but not including 214 feet
Group VI	214 feet up to but not including 262 feet

Source: AC 150/5300-13 with changes, and HNTB analysis.

The ARC for ANC is D-V based on the current and continued use of the Boeing 747 class of aircraft. As previously noted, an aircraft qualifies as the critical aircraft when 250 annual departures are performed. Total annual departures performed by both the Boeing 747-200 and Boeing 747-400 exceed 250. No change in critical aircraft is projected.

The runway length required for takeoff by the Boeing 747-200 is greater than that for the Boeing 747-400, as discussed in more detail in a subsequent section of this study. Thus, the 747-200 is the critical aircraft for runway length. The Boeing 747-400 has a greater wingspan than the Boeing 747-200 and, thus, is the critical aircraft for airfield separation. The eventual introduction of larger ADGVI aircraft in the latter phases of the planning period may require modifications to the airfield for their operation. The alternatives chapter of the study will evaluate options for accommodating ADGVI aircraft.

3.4.2 Runway Length

Runway length requirements were determined based on the current and forecast fleet of aircraft expected to regularly serve the Airport. Runway 6R-24L is 10,897 feet long, Runway 6L-24R is 10,600 feet long, and Runway 14-32 is 11,584 feet long, as discussed in Chapter Two – Inventory of Existing Conditions. All passenger air carriers, regional/commuter aircraft, and GA aircraft can be accommodated with the existing runway lengths. Historically, the cargo carriers operating large turbojet aircraft have had the greatest runway length requirements.

Three surveys of the commercial carriers operating at the Airport have been

conducted in an effort to establish the optimum runway length needed to accommodate their operations. These surveys were conducted in 1993, 1994, and 1996.

The responses from these previous surveys were reviewed as part of this study to identify the carriers and the specific aircraft they are operating at ANC. Over the years, the cargo carriers, particularly those serving Southeast Asia, have expressed a desire for additional runway takeoff length. These carriers have indicated an inability to operate with a full payload over their respective stage lengths on Runway 14-32, which currently provides the longest available takeoff runway length. Although a number of carriers have entered and exited the Anchorage market since the survey was conducted, the aircraft typically operated by past and present carriers include the Boeing 747-100/200/400, 737, 757 series, the DC10-10/30 and MD11, and Airbus 319/320/340 aircraft with stage lengths ranging upwards of 3,000-4,000 nautical miles.

A further review of these previous surveys indicates that the design aircraft at ANC for runway length requirements is the Boeing 747-200. An analysis of runway length requirements for several of the key aircraft identified in the previous survey was conducted to verify the results. The required runway length is determined by a combination of factors, including airport elevation (144 feet MSL), mean maximum temperature (65 °F), runway gradient, engine type, aircraft flap settings, and aircraft take-off weight. As shown below, the analysis confirms the B747-200 is the relevant design aircraft and that the optimum runway length should be 12,200 feet.

Aircraft	Runway Length Requirement (feet)
B747-200	12,200
B747-400	12,100
B767-200	10,400
MD-11	11,900

Source: Aircraft manufacturer airport planning manuals.

A second issue addressed in the analysis is whether a longer runway would open up additional markets for ANC using the B747-200. An analysis of allowable payload was conducted to determine payload versus range capabilities for the B747-200 at ANC. **Table 3.4** presents the allowable cargo payload for the Boeing 747-200F for a number of markets currently served out of Anchorage as well as potential markets that could be served in the future. The allowable payload was calculated for the average high temperature of 65 degrees Fahrenheit and existing airport elevation of 144 feet above MSL. The information presented in this table shows the increase in payload possible as runway length increases. Increasing the runway length to 12,000 to 12,500 would enable the current carriers to serve their principal existing markets—Tokyo, Seoul, and Los Angeles—with no payload penalty; however, if maximum payload is a criteria, then additional markets would not likely be supported by ANC. Flights from Southeast Asia would still require a technical stop in Tokyo or some other intermittent stop. ADGVI aircraft are forecast to use ANC during the latter part of the planning period. However, the aircraft manufacturers (Boeing and Airbus) have stated that ADGVI aircraft will be capable of operating with existing runway lengths designed to accommodate ADGV aircraft. Therefore, runways developed to handle B747 aircraft should be capable of handling ADGVI aircraft with no additional runway length. However, runway width would still be an issue.

Table 3.4

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Boeing 747-200 Cargo Payload for ANC Markets by Runway Length

		Runway Length				
		11,584 feet	12,000 feet	12,500 feet	13,000 feet	13,500 feet
Destination	Stage Length	Payload (lbs.)				
Singapore	6,679	94,000	105,000	114,000	114,000	114,000
Tokyo	3,466	239,000	245,000	245,000	245,000	245,000
Seoul	3,777	225,000	235,000	245,000	245,000	245,000
Hong Kong	5,076	166,000	177,000	186,000	186,000	186,000
Los Angeles	2,344	245,000	245,000	245,000	245,000	245,000
London	4,476	193,000	204,000	213,000	213,000	213,000
Frankfurt	4,663	185,000	195,000	213,000	213,000	213,000

Note: Maximum allowable cargo load is 245,000 lbs. or 23.5 ft3, whichever is less at 70 °F.

3.4.3 Runway Width

All runways at ANC are 150 feet wide, which meets the requirements for ADGV aircraft. A 200-foot runway width is recommended for ADGVI aircraft, which are forecast to begin using the Airport on a regularly scheduled basis in the latter part of the planning period. Therefore, a runway width of 200 feet will be required to accommodate ADGVI aircraft when they become more frequent airport users. It is recommended that the main arrival and departure runways be widened to 200 feet per ANC's ADGVI Strategy.

3.4.4 Runway Shoulders

Runway shoulders minimize aircraft blast erosion and support use by airport maintenance and emergency equipment. The runway shoulders can also support aircraft that veer off the runway. Shoulders are designed to improve safety, enhance drainage, and provide blast protection. Runways 6L-24R, 6R-24L, and 14-32 have 35-foot shoulders, which meet FAA ADGV criteria. ADGVI will impose 40-foot shoulder requirements, and long-term plans should include appropriate shoulders where those operations will be performed.

3.4.5 Runway Blast Pads

Blast pads are located at each end of a runway to provide protection from jet blasts during aircraft takeoff. FAA ADGV blast pad dimensions are 400 feet long and 220 feet wide. Runway 6L-24R has blast pads at the FAA-recommended ADGV dimensions of 400 feet by 220 feet in length and width. Runway 14-32 has blast pads 200 feet long and 280 feet wide on the Runway 14 end and 500 feet long and 280 feet wide on the Runway 32 end. (The blast pad dimension on the Runway 14 end is somewhat misleading since this runway end has a 200-foot displaced threshold, which effectively provides an overall blast pad length of 400 feet.) Runway 6R-24L has a 400-foot-long by 220-foot-wide blast pad on the Runway 24L end while the Runway 6R end has a 500-foot-long by 220-foot-wide blast pad.

ANC uses considerable amounts of sand and urea during the winter to maintain runway traction and safety. The sand and urea accumulates in the turfed areas along the

runways and in the extended runway approach areas over the course of the winter season. Jet blast from passing aircraft stirs up this accumulated material and creates the potential for damage to other aircraft through engine ingestion and blowing debris. The Airport has expanded the blast pads, both length and width, at critical areas around the airfield in an effort to minimize the problems associated with this debris. The blast pad at the south end of Runway 14-32 between Runways 6R-24L and 6L-24R has been expanded in an effort to minimize the problem of blowing debris. The blast pad at the northern end of Runway 14-32 has been widened to 280 feet.

ADGVI criteria specify a blast pad length of 400 feet and a width of 280 feet on runways serving these aircraft. The alternatives chapter of this study will identify those runway ends that should have blast pads upgraded to ADGVI requirements.

3.4.6 Runway Clearances

Runway clearances addressed in this section include Building Restriction Lines (BRLs), aircraft parking limit lines, runway safety areas (RSAs), and runway object free areas (OFAs). Each of these criteria provides clearance from potential hazards during routine operations by aircraft on the airfield.

BRLs provide the necessary clearance between the runway centerline and buildings or other fixed objects. The FAA recommends that BRLs encompass the runway protection zone (RPZ), the runway OFA, NAVAID critical areas, areas required for terminal instrument procedures, and the ATC tower line-of-sight. These factors will be applied to any new airfield development in the final plan set for the airport layout plan (ALP).

Aircraft parking limit lines establish the minimum distance an aircraft can be to a runway centerline, based on FAR Part 77 criteria. Aircraft parking limit lines are particularly useful in developing airport terminal concepts. Aircraft parking limit lines for ADGV and ADGVI aircraft are a minimum of 500 feet from the runway centerline. In addition, it is necessary to consider the tail height of parked aircraft to insure they do not penetrate applicable Part 77 surfaces. When the terminal expansion is complete, the following gates will have aircraft size restrictions:

- Gates A-2, A-3, and A-4 will be limited to aircraft no larger than the B757.
- Gates A-5 and A-6 will be limited to aircraft no larger than the B727.
- Gates B-7 and B-8 will be limited to aircraft no larger than the B757.
- Gates A-7 and A-8 will be limited to ADGIV or B757 aircraft to provide commuter aircraft gate taxilane clearances.

RSAs enhance safety by providing cleared areas for airplanes that undershoot, over-run, or veer off the runway. They also provide improved accessibility for firefighting and rescue equipment during emergencies.

The RSA for runways serving ADGV and future ADGVI aircraft is 500 feet wide along the entire runway length, extending 1,000 feet beyond each runway end. RSAs should be graded and free of any structures (other than NAVAIDs with frangible mounts which are permitted due to their essential functions), traverse ways, roads, railroads, and parking areas. All runways at ANC have 500-foot-wide safety areas with the standard 1,000-foot-long RSAs at each end.

Runway OFAs are areas on the ground centered on the runway centerline. OFAs enhance aircraft operational safety by being free of objects, except those necessary for air navigation or aircraft ground-maneuvering purposes. The standard runway OFA for ADGV and ADGVI is 800 feet in width, extending 1,000 feet beyond each runway end. Currently, the OFAs for Runways 6L-24R, 6R-24L, and 14-32 meet the dimensional standards for ADGV and ADGVI aircraft.

Table 3.5 presents the dimensional standards for the referenced runway clearances for ADGV and ADGVI aircraft.

Table 3.5

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Runway Dimensional Standards for Design Group V and VI Aircraft

Category	Design Group V	Design Group 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
Building Restriction Lines	Varies	Varies
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.

3.4.7 Taxiway Requirements

Taxiway requirements at ANC for runway-to-taxiway, taxiway-to-taxiway, and taxiway-to-fixed or movable object are based on ADGV as defined in FAA AC 150/5300-13, *Airport Design*. **Table 3.6** provides a summary of the separation standards for ADGV and ADGVI. As noted previously, ADGVI aircraft are forecast to use the Airport in the latter part of the 20-year planning period. Therefore, ADGVI aircraft separation standards will be required in those areas of the airfield accommodating these aircraft. There would be restrictions to the use of Taxiway K by ADGVI aircraft.

Existing runway-to-taxiway separation for Runway 14-32 and Taxiway R is 600 feet (the standard for ADGVI). For Runway 6L-24R and parallel Taxiway K, the centerline-to-centerline separation is approximately 535 feet. The separation between the runways and their associated parallel taxiways is sufficient for high-speed exits.

A number of taxiway improvements were identified in the FAA, Anchorage Airspace Study, and specific projects were identified by the FAA, ANC staff, and the consultant team. Following are the recommended improvements for the planning period of this study.

- A north-south taxiway parallel to and west of Runway 14-32 is being constructed to reduce head-to-head taxiing on existing Taxiway R.
- Convert Taxiway G off 6R to a true high speed exit to reduce runway occupancy time.
- Improve Taxiway E between 6R and 6L 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.

Table 3.6

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Taxiway/Taxilane Separation Standards for Group V and VI Aircraft

	Design Group	
	V	VI
Taxiway		
Minimum runway centerline to taxiway centerline	400 feet	600 feet
Taxiway centerline to parallel taxiway/ taxilane centerline	267 feet	324 feet
Taxiway centerline to fixed or mobile object	160 feet	193 feet
Taxilane		
Taxilane centerline to parallel taxiway/ taxilane centerline	245 feet	298 feet
Taxilane centerline to fixed or mobile object	138 feet	167 feet

Source: AC 150/5300-13 with changes, and HNTB analysis.

- Extend Taxiway F across the existing Runway 6-24 parallels. A significant volume of traffic taxis to and from the South Airpark, requiring head-to-head operations on Taxiway E. Extending F would alleviate this operational constraint.
- 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.
- Widen Taxiway V, which would help when ANC is in straight Runway 14 operations by allowing ANC ATC to bring more northbound aircraft up Taxiway E along the terminal apron to Taxiway V, keeping them clear of Runway 14 arrivals trying to taxi in (southbound) along Taxiway R.
- Re-open old Taxiway D, which was between current D and E along 6L. This taxiway could be used for 6L 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.

The alternatives chapter of this study will assess additional airfield improvements that should be incorporated into the recommended ultimate airfield layout. The plans phase of the study will address the feasibility, timing, and priority of the recommended airfield improvements.

3.4.8 NAVAIDs

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 6R and 14 are each equipped with ILS. Runway 6R has Category I, II, and III A/B ILS approaches. The Category III approach to Runway 6R permits landings down to 600 feet runway visual range (RVR). Runway 6R also has a VOR/GPS approach and an NDB approach.
- Runway 14 has a Category I ILS approach and a GPS approach.
- Runway 6L has a published GPS approach, an MLS approach, and a Category I ILS approach.
- Runways 6R, 6L, and 14 are equipped with PAPIs, while Runways 24L and 32 are equipped with 6-box Visual Approach Slope Indicators (VASIs). Runway 24R 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. The alternatives chapter will evaluate installation of additional instrument approach capability on existing and any proposed new runways.

3.4.9 Air Traffic Control Tower

The ATCT is located midway between the North and South terminals immediately east of the airport access road. The location and height of the tower relative to the airfield layout and airport buildings has resulted in issues concerning tower shadowing. The shadowing limits the controllers' view of portions of the airfield and terminal areas. Tower shadowing affects portions of the North and East Airparks and the commercial terminal area. Future developments in these areas and development in the West Airpark may exacerbate these problems.

The following specific comments have been identified relative to shadowing:

- Runway 6L and Taxiway K are shadowed by aircraft parked at the Northwest Airlines facility.
- Taxiway K approaching the Runway 6R end has some major shadows because of a hill and ARFF building.
- Parked aircraft at FedEx and UPS shadow Taxiway R.
- Portions of the existing terminal expansion and the new terminal currently under construction shadow Taxiway K.
- Development of additional facilities in the North and West Airparks could result in further tower shadowing.

An Airport Traffic Control Tower Siting Study evaluated the options to minimize tower shadowing and optimize tower viewing at both ANC and LHD. The draft report concludes that further analysis and prioritization will be completed in the final report. The possible options would include raising the height of the tower cab and possibly relocating the ATCT. The ultimate location and configuration of the ATCT would be established in coordination with the FAA in the final tower siting study.

3.5 AIR CARGO

3.5.1 Air Cargo Composition

This section presents the capacity of existing cargo facilities and projected requirements through 2020. Cargo activity at ANC differs substantially from the cargo activity encountered at most airports throughout the U.S. There are three types of cargo activity at ANC, including transit, transfer, and O&D, all of which have different facility requirements. Facility requirements were determined for both freight and air mail. Each type of cargo activity and its specific facility requirement is discussed below.

Transit Cargo. A significant volume of cargo activity is transit cargo. Transit cargo is cargo carried by aircraft arriving to or departing from ANC that remains on the aircraft without being off-loaded. These aircraft use ANC as a technical stop to refuel and/or change crews. Transit cargo does not require significant ground handling equipment or landside buildings and support facilities. Thus, transit cargo has a substantially diminished requirement for airport facilities. The principal facility requirement associated with transit cargo is for aircraft parking aprons. 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, representing approximately 68 percent of 1997 total cargo tonnage.

Transfer Cargo. Transfer cargo is projected to be the highest growing air cargo segment at ANC through the planning period.

Currently, 65 percent of the cargo carriers engage in cargo transfer or handling. Transfer cargo is cargo that is off-loaded from one aircraft and reloaded onto another aircraft and can be international or domestic cargo. This cargo is often moved from "tail to tail" and typically requires very little building space. It should be noted that five carriers—FedEx, UPS, Japan Airlines, Northwest, and Nippon Cargo Airlines—handle a substantial volume of the transfer cargo tonnage at ANC. FedEx has a large percentage of transfer cargo, but they also have a full sort operation at the Airport where containers are broken down and the cargo is sorted for reloading onto outbound containers after clearing customs. UPS also has a sort and customs clearance operation at the Airport, however, to a lesser extent than FedEx. Japan Airlines, Northwest, and Nippon Cargo Airlines typically just transfer containers between aircraft with little or no sorting. Alaska Airlines transfers and sorts cargo for the Alaska market. Two other carriers have expressed their intent to transfer cargo at ANC.

O&D Cargo. 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 represents a relatively small percentage of the total cargo volume (tonnage) at ANC. The remoteness of Alaskan communities and the lack of highway access to most of these communities results in the air shipment of cargo which might typically be trucked elsewhere in the U.S. Whereas substantial percentages of air cargo may be trucked several hundred miles to a regional airport and then air shipped to distant destinations in the lower 48 states, this is not the case in Alaska. For example, the majority of air cargo originating in San Diego, estimated as high as 80 percent, is trucked to Los Angeles International Airport for air shipment. Lacking the highway connections in Alaska, there is a substantially lower need for truck docking facilities at ANC than would be required at similarly sized air cargo hubs in the lower 48 states.

3.5.2 Air Cargo Facilities

Air cargo services are provided by three general categories of operators: air express (integrated), heavy cargo carriers, and freight forwarders. Freight forwarders serve a role as consolidators of freight shipments. Typically, a freight forwarder contracts with an established air cargo operator for air cargo space on the operator's aircraft. The freight forwarder markets this space to shippers who typically do not have large enough volumes of air cargo to justify purchase of the space directly from the carriers. Forwarders consolidate the air cargo from a group of shippers to fill the space they have contracted for and to arrange for multimodal service to the destination.

A total of 75 U.S. airports have been surveyed to establish an average building utilization rate. This survey indicated that the average building utilization rate at U.S. airports is 1.75 square feet per ton of cargo. The survey indicated the range of adequacy for an airport, 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, and handling agents occupy space at the Airport.

Building utilization rate is the measure typically used to define the capacity of freight facilities. Building utilization rates are expressed as square feet per annual ton of freight. ANC currently has approximately 905,000 square feet of cargo building and office space. The building utilization rate analysis for ANC indicates that the cargo facilities of the five carriers performing a significant volume of transfer activity are well-utilized. The combined building utilization rate for these five carriers is approximately 1.12 square feet per ton of freight. The building utilization rate of the remaining carriers falls near the high point of the surveyed scale at 2.77 square feet per ton of freight. Overall, the existing facilities have a combined building utilization rate of 1.53 square feet per ton of freight, based on 1997 freight tonnage at ANC.

The determination of air cargo building requirements was broken down into transfer air cargo building requirements (both domestic and international) and O&D air cargo building requirements (domestic and international). The recommended facility requirements were associated with the specific building utilization rates experienced by the transfer and O&D air cargo operators at ANC. The facility requirements were developed to take into account the differences between the substantially greater building utilization rate for transfer cargo activity versus O&D cargo.

Air cargo building requirements for transfer cargo activity were based on the average building utilization rate for the five carriers with the majority of transfer operations at ANC, which is approximately 1.25 square feet per ton of cargo. The building utilization rate identified for O&D cargo was substantially lower than that for transfer cargo, approximately 2.68 square feet per ton of cargo. However, this building utilization rate is somewhat misleading as it includes other activities and operations being undertaken in the buildings used by these carriers. A number of cargo buildings include operations and activities unrelated to air cargo activity. The square footage identified for these buildings was the gross square footage. Specific breakdowns of the actual area within a building used solely for air cargo activity was unavailable. The building utilization rate used to determine air cargo building requirements for O&D cargo activity was based on the national average of 1.75 square feet per ton of cargo.

Table 3.7 quantifies existing and projected domestic air cargo building space requirements by O&D, mail, and transfer cargo. Total domestic air cargo building area is projected to increase from approximately 467,700 square feet at present to 925,500 square feet by the year 2020.

Table 3.8 quantifies existing and projected international air cargo building space requirements by both O&D and transfer cargo. Total international air cargo building area is projected to increase from a little more than 366,000 square feet at present to almost 2.4 million square feet by the year 2020. Combined domestic and international building area is projected to increase from an existing requirement of approximately 770,900 square feet to almost 3.31 million square feet by the end of the planning period.

Table 3.7

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Domestic Air Cargo Building Requirements

Year	O&D Freight (tons)	Mail (tons)	Building (SF) @ 1.75	Transfer Freight (tons)	Building (SF) @ 1.25	Total Building (SF)
Existing*	66,366	89,058	260,800 [1]	156,596	176,170 [2]	436,970
2003	77,800	101,000	312,900	172,200	215,250	528,150
2008	84,700	115,100	349,650	190,100	237,625	587,275
2020	143,600	179,900	566,125	287,500	359,375	925,500

*1997 data
[1] @ 1.678 SF per ton
[2] @ 1.125 SF per ton.

Source: HNTB analysis.

Table 3.8

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

International Air Cargo Building Requirements

Year	O&D Freight (tons)	Building (SF) @ 1.75	Transfer Freight (tons)	Building (SF) @ 1.25	Total Building (SF)
Existing*	56,542	93,199 [1]	213,938	240,680 [2]	333,880
2003	78,700	137,725	335,000	418,750	556,475
2008	113,400	198,450	527,300	659,125	857,575
2020	272,700	477,225	1,525,000	1,906,250	2,383,475

*1997 data
[1] @ 1.678 SF per ton
[2] @ 1.125 SF per ton.

Source: HNTB analysis.

The Airport has approximately 905,000 square feet of existing cargo building space. When compared to the existing combined air cargo building requirement for ANC, there appears to be an excess of cargo building space. However, as previously noted, some of the existing space designated as cargo space is used for other purposes. This additional space can be classified as "support" space for the airlines. It is important to quantify this space since it is needed by the carriers in support of all of their operations, not just air cargo.

In projecting cargo building requirements for O&D cargo, a building utilization rate of 1.75 square feet per ton was used. The observed building utilization rate at ANC was approximately 2.68 square feet per ton. The difference between the observed building utilization rate and the building utilization rate actually used for O&D cargo building requirements of 0.93 square feet per ton was assumed to represent the space needed for the carriers' support activities. The support building area needed by the carriers was therefore identified by multiplying the O&D cargo tonnage by 0.95 square feet (rounded) per ton for each year to establish an overall building area requirement.

Table 3.9 tabulates the support building area requirements identified for ANC through the planning period. This area is projected to increase from approximately 139,500 square feet to approximately 400,000 square feet by the end of the planning period.

The recently constructed Mapco/Lynx facility provides an additional 100,000 square feet of building area and over 56,600 square yards of additional ramp space. Proposals for development of additional cargo facilities in the North Airpark immediately south of FedEx have also been proposed. Initial planning for this area indicates the potential for an additional 200,000 to 250,000 square feet of building space. ANC needs to identify additional development areas by 2003 based on the short-term development options either underway or under study, and the air cargo analysis presented above.

Table 3.9

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Support Building Area Requirements

Year	O&D Domestic	Mail	Total	Building (SF) @ 0.95
Existing*	66,366	83,643	150,009	139,508 [1]
2003	77,800	101,000	156,500	148,675
2008	84,700	115,100	198,100	188,195
2020	143,600	179,900	416,300	395,485

*1997 data

[1] @ 0.93 SF per ton.

Source: HNTB analysis.

3.5.3 Cargo Apron

ANC has approximately 477,600 square yards of existing cargo apron, including 126,500 square yards on the transient apron. Cargo activity is principally accommodated at the North and East Airparks and, to a lesser extent, the South Airpark. FedEx and UPS are currently the principal operators in the North Airpark. Construction is scheduled for an additional air cargo center at the far north end of the North Airpark which will include additional ramp space and support buildings.

The principal tenants in the East Airpark are Alaska Airlines, Northwest Airlines, Delta Air Lines, Northern Air Cargo, Japan Airlines, and Polar Air Cargo. Numerous other tenants, including freight forwarders and intrastate air cargo operators, are located in both the East Airpark and, to a lesser extent, the North and South Airparks.

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 3.10**. These apron requirements were based on the forecast of peak hour cargo operations throughout the planning period. Using the existing schedule of cargo operations and the projection of future activity, a forecast of average day, peak month cargo operations was developed for the planning horizon years.

Table 3.10

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Air Cargo Aircraft Parking Apron Requirements [a]

	Apron (SY)	[b] 1998	Apron Area (SY)	2003	Apron Area (SY)	Apron Req.	2008	Apron Area (SY)	Apron Req.	2020	Apron Area (SY)	Apron Req.
Domestic All-Cargo[c]												
Small Turboprop[d]	2,350	9	21,150	8	18,800	(2,350)	8	18,800	(2,350)	7	16,450	(4,700)
Large Turboprop[d]	3,400	9	30,600	8	27,200	(3,400)	7	23,800	(6,800)	5	17,000	(13,600)
Narrowbody Jet/L-100[d]	6,200	5	31,000	6	37,200	6,200	7	43,400	12,400	12	74,400	43,400
Subtotal[e]		23	82,750	22	83,200	450	22	86,000	3,250	24	107,850	25,100
International Transfer[f]	12,900	20	258,000	28	361,200	103,200	38	490,200	232,200	63	812,700	554,700
International Transit[g]	11,500	9	103,500	12	138,000	34,500	15	172,500	69,000	31	356,500	253,000
Total Positions and Apron Area		52	444,250	62	582,400	138,150	75	748,700	304,450	118	1,277,050	832,800
Acreage			10.2		13.37	3.17		17.19	6.99		29.32	19.12

(a) Parking for routine aircraft operations only. Does not include allowance for delays of more than 15 minutes.
(b) Based on existing airline schedules provided by ANC, supplemented with all-cargo carrier schedules from the Official Airline Guide.
(c) Domestic operations of international transfer carriers (FedEx, UPS, United, Northwest, Polar) included with International Transfer. Alaska Airlines cargo operations assumed to continue to be handled at passenger terminal. Assumes preferential use.
(d) Change in position requirements by aircraft type based on fleet mix projection in Table 2.37.
(e) Projected to increase at same rate as domestic all-cargo peak hour operations.
(f) Assumes widebody preferential use with 50% of aircraft on ramp at a given time.
(g) Assumes widebody common use with 65% of aircraft on ramp at a given time.

Sources: As noted and HNTB analysis.

The forecast operations were subdivided by aircraft category: domestic all-cargo—small and large turboprop and narrowbody, international transfer, and international transit. A forecast of the number of aircraft on the ground (by category) during the peak period was developed. A forecast of apron requirements was developed for each of the horizon years by establishing the apron requirements for the typical aircraft in each category.

The apron requirements established for the cargo carriers using this methodology would total approximately 582,400 square yards by the year 2003. Apron requirements will increase to approximately 750,000 square yards by the year 2008, then increase to almost 1.3 million square yards by the year 2020.

3.5.4 Air Mail Facility Requirements

The United States Postal Service (USPS) occupies a building in the North Airpark on the west side of Postmark Drive comprised of an approximately 291,000-square foot sorting facility and a 45,000-square foot air mail facility. The building was constructed in two phases, with the original postal facility completed around 1978 and a subsequent expansion in 1996-97. In 1997, the USPS handled approximately 89,058 tons of mail through the existing Air Mail Facility. This translates to a utilization rate of approximately two square feet per ton of air mail.

Discussions with representatives of the USPS indicated the 1996-97 expansion should accommodate their needs for another 10 years. However, the original portion of the postal facilities is outdated and does not meet present and future USPS operating requirements or have current technology. Therefore, an assessment for replacing the existing facility with a new structure designed to incorporate the latest technology is underway. The preliminary timing identified for replacement is within the near-term planning period.

A future expansion to the Air Mail Facility of approximately 40,000-45,000 square feet is anticipated, which would approximately double its size to roughly 85-90,000 square feet. By comparison, a building of approximately 91,000 square feet would be needed in the year 2020 based on the current utilization rate and the forecast air mail tonnage. **Table 3.11** presents the Air Mail Facility requirements for the planning period. Additional space for employee vehicles and delivery trucks would also be needed.

Table 3.11

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Air Mail Building Requirements

Year	Air Mail (Tons)	Building (SF)	Aircraft	Apron (SY)
Existing	89,058	45,000	2	12,400
2003	101,000	51,000	2	12,400
2008	115,100	58,160	3	18,600
2020	179,900	90,900	4	24,800

Source: HNTB analysis.

Aircraft serving the Air Mail Facility are currently loaded and unloaded at the passenger terminal ramp with mail hauled by tug to the Air Mail Facility. However, the USPS is moving toward delivery by dedicated aircraft due to the increasing volumes of mail and the desire to control delivery times and the quality of service. The USPS contracts for delivery to ANC require use of B727 and DC-8 aircraft for their operations. The USPS has expressed a need for ramp space to park these aircraft over the longer term. In addition, the USPS is evaluating the option of developing an airside facility that would provide ramp access between aircraft and USPS facilities and serve as a staging area for bypass mail. Development of a centrally located facility with airside access would facilitate the USPS operations by avoiding the need to haul mail between the terminal area and the existing Air Mail Facility across Postmark Drive.

The alternatives section of this study will evaluate possible sites for an expanded/relocated USPS facility, both on the airside and near its current location.

3.5.5 Freight Forwarding

There are over 35 air freight forwarders serving the Anchorage area. The freight forwarders that specialize in air transport are widely distributed with locations both on- and off-airport. Freight forwarders in the lower 48 states are generally located off-airport as land and lease rates are typically more expensive on-airport than off-airport. However, the opposite is the case in Anchorage where rates on-airport are lower than rates off-airport.

The freight forwarder community can be categorized into three principal groups with a fairly well-defined range of services and functions. The principal groups are:

- Branches of large international freight forwarders, typically with geographic specialization toward Asia and Europe.
- Branches of U.S. firms with broad multi-modal—ocean, air, and road—capabilities.
- Medium- to small-sized local niche specialists.

The large U.S. firms usually have extensive logistics and distribution capabilities and facilities, as do some of the smaller niche specialists.

Information obtained for air cargo studies completed at other airports revealed a divergent view on freight forwarder facility requirements. Increasing volumes of outbound business moves directly from the shipper via third-party pick-up to airside, ready for loading. Increasingly, this freight is pre-palletized by the shipper or freight forwarder.

Customs clearance time has shrunk from as much as seven days to a matter of hours inbound, with most freight forwarders also acting as customs house brokers. Thus, freight forwarders' storage requirements have been reduced.

Conversely, the larger U.S. freight forwarders and some smaller specialists require additional space as their multi-modal business grows or as the range of their logistics functions expands.

Demand for freight forwarding services is expected to grow in relation to the projected increase in overall air cargo growth during the course of the planning period. Projections of space for the freight forwarders are incorporated into the overall

air cargo building space based on existing percentages of space.

3.6 CARGO-RELATED SURFACE TRANSPORTATION ISSUES

For the purposes of this document, there are two primary types of surface-related traffic issues—off-airport and on-airport—related to the air cargo operations at ANC. These issues can be further subdivided into specific areas that will need additional analysis to resolve. The following is an outline of the specific issues identified to date, and what may need to be evaluated in further detail in forthcoming components of this study:

3.6.1 Off-Airport

Impacts associated with cargo traffic utilizing West Northern Lights Boulevard for access to existing cargo facilities and proposed West Airpark development. Long-term access and circulation for the air cargo facilities needs to be reviewed so that adequate access is available to primary corridors without utilizing West Northern Lights Boulevard. Noise, traffic speed, and dissecting the Turnagain neighborhood have been issues identified in the past. Capacity issues related to International Airport Road and Raspberry Road will need to be fully evaluated to ensure that these roadways accommodate circulation needs without forcing increased utilization of West Northern Lights Boulevard.

3.6.2 On-Airport

Connect Access Between Existing and Proposed Airpark Development Areas. Cargo transfer between Airpark areas of ANC will become an even more significant issue as North Airpark grows and West Airpark develops. If an on-airport access option is not developed, related cargo traffic may be forced around the north end of the Airport, causing operational impacts to tenants located in the West Airpark.

Alternative access traffic routes should be evaluated, including tunnels under active taxiways and runways.

Passenger/Cargo Traffic Conflicts. 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. As growth at the Airport occurs, conflicts between passenger and cargo traffic will increase. Alternatives to separate cargo and terminal functions on-airport should be evaluated. Capacities of existing and proposed roadways should be examined to determine what, if any, construction is necessary. The Terminal Redevelopment Program has made improvements to separate northbound traffic from South Terminal traffic and plans an interchange at International Airport Road and Aircraft Drive.

Conflict Between Tug Roads and Public Vehicular Ways. The tug road parallel to Postmark Drive may create visibility and turning movement conflicts between tugs and other vehicles. Relocation of the tug road network or primary vehicle routes may be necessary to prevent these conflicts. This may include relocating Postmark Drive to the east of the Post Office, extending perpendicular access drives and tug roads to maintain appropriate accessibility, and constructing a tug road east of Taxiway R.

Airfield Maintenance Area. The location of the Maintenance Area is critical to the operation of the Airport. A central location

typically decreases travel distances and response times of the maintenance equipment and personnel. Location of this operational group is under review to improve operations, efficiency, and to reduce conflicts with other circulation routes by forcing equipment to travel long distances across several circulation routes.

Security. Security is obviously important at an airport. It is especially important to separate general public vehicles from the taxiways and runways of the airfield. The current small aircraft taxiway that crosses Postmark Drive affords a casual access problem that would physically permit a private vehicle to enter the taxiway unimpeded. Recently, crossing guards were installed at this location. Additional alternatives, such as grade separation, tower activity, additional crossing guards, and other improvements, should be evaluated if further security measures at this location are necessary.

3.7 AIRLINE MAINTENANCE

Airline maintenance hangars and facilities are a function of corporate airline decisions and are difficult to forecast. The airline's headquarters location, hubbing characteristics, fleet size, maintenance scheduling, climate, and location of terminating flights typically determine the location of these facilities. ANC has a variety of maintenance facilities located on the Airport operated by various airlines.

FedEx has a maintenance facility that consists of a hangar/office area totaling approximately 77,500 square feet with 10,500 square yards of ramp space. The hangar can accommodate almost any size aircraft currently in service, including the B747-400 series. Discussions with the manager of this facility indicate that there is an increasing volume of aircraft maintenance handled at this facility. This facility is also used by other airlines serving Anchorage on an as-needed/as-available basis, with priority given to FedEx aircraft.

The FedEx representative noted that, over the course of the coming years, this facility will eventually be completely utilized by FedEx. (It should be noted that, during 1997, FedEx accounted for more than 45 percent of total air freight cargo tonnage at ANC.) Therefore, operators who presently use this facility on an as-needed/as-available basis will not be able to do so in the future. While the representative noted that this facility should accommodate their needs throughout the course of the planning period, FedEx maintains the first right of refusal on the adjoining lease lot, which would allow them to construct an additional maintenance hangar bay.

Alaska Airlines had previously selected Anchorage as a site for a new airline maintenance facility to serve their Alaska operations and remodeled the former MarkAir hangar for use as a maintenance facility. The facility, totaling 50,000 square feet, can accommodate aircraft up to the B737-900. Additional hangars in the East Airpark include Northern Air Cargo, Reeve Airways, and the FAA hangar.

ERA Aviation operates an airline maintenance facility in the South Airpark. Maintenance is performed on ERA aircraft in a 55,000-square-foot hangar/office facility located at the northeast corner of the South Airpark. The building is approximately 20 years old and houses the airline's corporate headquarters on three floors of offices. ERA operates a variety of aircraft, ranging from 18-seat DeHavilland Twin Otters to 37-seat

DeHavilland Dash 8s, with the largest aircraft being the Convair 580.

FS Air is located in the South Airpark on the northwest corner of the Airpark ramp, immediately north of Signature Flight Support. Their operations consist of charter activity, scheduled medical evacuations under contract to an Alaska Native Corporation, and emergency (unscheduled) medivac services. Their operations are housed in a 17,000-square-foot hangar with 4,500 square feet of offices. Various aircraft are operated by FS Air: two Piper Navajos, two Beech Vopars, one CASA 212, one Swearingen Metroliner, and one Learjet Model 35. Aircraft maintenance is performed only on company aircraft in their hangar facility. FS Air has fuel storage facilities on site, which consist of one 8,000-gallon underground storage tank for AvGas and one 10,000-gallon underground tank for Jet A fuel storage. These fuel storage facilities meet all current EPA requirements. FS Air does not currently perform retail fuel sales. However, they have obtained a certificate permitting retail fuel sales and are seeking mobile fueling trucks for this activity.

The forecast volume of average daily international operations will increase by more than threefold over the course of the planning period, from approximately 126 operations per day to more than 500 per day. All carriers operating at Anchorage represent substantial capital investments that the carriers cannot afford to have idle for extended periods of time. Down time of these aircraft represents a substantial added cost to their operators. Therefore, it is expected that, during the course of the planning period, FedEx maintenance requirements will grow to the point they will not be able to allow other operators to use their maintenance facility. It is also expected that FedEx will expand their maintenance operations by adding an additional maintenance bay to the existing structure.

There area number of uncertainties related to future hangar requirements, including an increase in the number of aging airframes requiring more maintenance, anticipated FAA emphasis on airframe/aircraft inspections, and the lack of maintenance space elsewhere in the State for the domestic intrastate carriers. Further land use planning should preserve land increasing airline maintenance area by approximately 80 acres, through 2020.

3.8 SUPPORT FACILITIES

3.8.1 ARFF Facilities

Airports certified under FAR Part 139 (Certification and Operations: Land Airports Serving Certain Air Carriers) must comply with specific ARFF operational requirements. The two primary considerations in determining compliance are response time requirements and equipment and agent requirements. These criteria were developed through research conducted by the FAA and ICAO Rescue and Firefighting Panel. Five airport classes, referred to as indexes, and their corresponding ARFF equipment requirements were identified in this research. The airport index is determined by 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). **Table 3.12** tabulates the five ARFF Indexes and details the specific requirements for an airport to meet each Index.

Table 3.12

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

ARFF Index Classifications

Airport Index	Required No. of Vehicles	Aircraft Length	Scheduled Departures*	Agent + Water for Foam
A	1	<90'	> 1	500#DC or HALON 1211 or450# DC + 100 Gal H2O.
B	1 or 2	≥ 90', < 126' ≥ 126', <159'	< 5	Index A + 1,500 Gel H_2O
C	2 or 3	≥ 126', < 159' ≥159', <200'	≥ 5 < 5	Index A + 3,000 Gel H_2O
D	3	≥159', <200' >200'	≥ 5 < 5	Index A + 4,000 Gel H_2O
E	3	≥ 200'	≥ 5	Index A + 6,000 Gel H_2O

* Daily departures

Source: FAR Part 139 and HNTB analysis.

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 or halon 1211, 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 4,000 gallons.

As shown in **Table 3.13**, the vehicles at ANC have a combined capacity of 28,670 gallons of water and 1,925 gallons of AFFF. These quantities exceed the requirements for an Index E airport, which is currently the most demanding Index under FAR Part 139. While the existing vehicles exceed required ARFF capabilities, the Airport plans for normal replacement or modifications of equipment.

Response time requirements for ARFF vehicles specify that at least one ARFF vehicle, at its assigned post, be able to reach the midpoint of the farthest runway serving air carrier aircraft within three minutes from the time of the alarm to the time of initial agent application. All other required vehicles shall reach this same point from their assigned posts within four minutes from the time of alarm to the time of initial agent application.

The ARFF facilities at ANC are located west of Runway 14-32, immediately north of the passenger terminal complex, enabling the Airport to meet the FAR Part 139 response time requirements. The building was completed in 1986, totaling approximately 20,000 square feet on two levels plus a tower roof cab for vehicle dispatch. The existing ARFF building was designed for expansion to accommodate additional vehicles, as previously noted. The volume of operations growth projected at the Airport and the introduction of Group VI operations may impose further ARFF facility needs. Construction of an additional satellite ARFF facility to provide rapid response on the airfield may be required if additional runway(s) are built during the planning period.

Table 3.13

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Existing ARFF Equipment

Airport Vehicle Number	Type of Vehicle	Manufacturer Make	Year	Material Condition of Vehicle*	Agent	Water Gallons	Foam Gallons	AFFF Gallons	Dry Chemical (Pounds)	CO2 (Pounds)	HALON 1211 Other	Response Time (Midpoint of the Air Carrier Runway)
28911	Engine #1	Oshkosh	1991	Excellent	A	1,585	NA	205	NA	NA	NA	3 Minutes
					B	750	NA	NA	NA	NA	NA	
386	Engine #2	Oshkosh	1983	Good	A	6,000	NA	500	NA	NA	NA	3 Minutes
					B	1,800	NA	NA	NA	NA	NA	
82021	Engine #3	Titan	1986	Excellent	A	3,000	NA	410	NA	NA	NA	3 Minutes
					B	1,800	NA	NA	NA	NA	NA	
82031	Engine #4	Titan	1986	Excellent	A	3,000	NA	410	NA	NA	NA	3 Minutes
					B	1,800	NA	NA	NA	NA	NA	
4051	Engine #5	Titan	1986	Excellent	A	1,500	NA	195	NA	NA	NA	3 Minutes
					B	1,000	NA	NA	NA	NA	NA	
28921	Engine #6	Oshkosh	1991	Excellent	A	1,585	NA	205	NA	NA	NA	3 Minutes
					B	750	NA	NA	NA	NA	NA	
74161	Tanker 1	Westmark	1990	Excellent	A	6,000	100	NA	NA	NA	NA	3 Minutes
					B	1,400	NA	NA	NA	NA	NA	
74581	Tanker 2	Westmark	1990	Excellent	A	6,000	100	NA	NA	NA	NA	3 Minutes
					B	1,400	NA	NA	NA	NA	NA	
4721	Ramp Capt.	Ford	1987	Good	A	NA	NA	NA	NA	NA	500	3 Minutes
					B	NA	NA	NA	NA	NA	NA	
24801	Ramp Capt.	Ford	1990	Excellent	A	A	NA	NA	NA	NA	500	3 Minutes
					B	NA	NA	NA	NA	NA	NA	
12021	Tractor 1	Autocar	1989	Excellent	A	NA	NA	NA	NA	NA	NA	3 Minutes
					B	NA	NA	NA	NA	NA	NA	
12031	Tractor 2	Autocar	1989	Excellent	A	NA	NA	NA	NA	NA	NA	3 Minutes
					B	NA	NA	NA	NA	NA	NA	

LEGEND: A = Quantity of Extinguishing Agent — Halon Agent (1211)

B = Discharge rate in gal/min or l/sec — Response time not given unless rig is manned, in which case it is estimated to be 1 min .05 sec.

Source: ANC Airport Certification Manual and HNTB analysis.
As of 10/97

The Airport Certification Manual for ANC requires that vehicles be protected against prolonged freezing (below 33 degrees Fahrenheit). This requirement is an effort to minimize the potential impact of extremely low temperatures on equipment readiness and firefighting supplies.

The International Association of Firefighters has presented a proposal to update FAR Part 139 requirements relating to ARFF. This proposal would update Part 139 ARFF criteria to more closely incorporate criteria currently mandated by the National Fire Protection Association (NFPA), the Occupational Safety and Health Administration (OSHA), the Department of Defense, and the ICAO.

The NFPA proposal would establish a requirement for additional firefighting equipment and personnel with an expanded mission of "initiating exterior and interior aircraft fire suppression, and extricating trapped victims." In addition, this proposal would require the capability for initial

response to accidents within a period of two minutes anywhere on the airfield or within 1,650 feet of the runway ends, with secondary response within 2.5 minutes. The net result of this proposal could be a requirement for additional ARFF vehicles, personnel, and stations at all Part 139-certified airports.

Additional ARFF capability will also, in all likelihood, be required with the projected introduction of operations by the Group VI aircraft. Specific requirements have not yet been established for these aircraft operations.

It is recommended that additional building area approximating 50 percent of the existing space be planned for, with a similar 50 percent increase in vehicles and support personnel and equipment.

3.8.2 Flight Kitchen Facilities

Lufthansa Sky Chefs (LSC) operates the only flight kitchen at ANC. Based on discussions with the manager of the ANC facility, this flight kitchen is generally operated beyond its actual capacity.

The flight kitchen occupies approximately 29,000 square feet in the Northwest Airlines hangar. This building and the space occupied by the flight kitchen were not designed to serve as a food preparation facility. The facility handles approximately 73 enplaned passengers per square foot, which is low compared with flight kitchens at other airports. In reviewing facilities at other airports, it was determined that a new space specifically designed to accommodate food preparation facilities could be used more efficiently. Therefore, a planning factor of 100 annual enplanements per square foot of kitchen space was used to project flight kitchen facility requirements based on the anticipated improved efficiency and sizing of a new flight kitchen. Flight kitchen requirements should include either a new facility or additional facility to total 44,600 square feet by the year 2020, as shown in **Table 3.14**.

Discussions with the representative revealed their desire for a facility that is designed for their specific needs. In addition, Northwest Airlines representatives indicated a desire to utilize the currently occupied space for Northwest's needs.

Table 3.14

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Flight Kitchen Facility Requirements

Year	Enplanements	Demand (s.f.)	Deficiency (s.f.)
1997 - Existing	2,119,692	29,150	
Required	-	21,200	21,200*
2003	2,740,000	27,400	27,400
2008	3,249,000	32,490	32,490
2020	4,462,000	44,600	44,600

Assumes development of a new facility.

Source: HNTB analysis.

3.8.3 Fuel Storage Facilities

Commercial Carriers

The Airport Fuel Storage Facility, completed in 1996, is located north of Runway 6L-24R 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 22-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 three 4.2 million-gallon, above ground tanks (12.6 million-gallon total capacity of Jet A fuel) for commercial carrier use. This facility provides a 1-week supply of fuel based on current usage. The existing fuel farm has the capability to expand and accommodate two additional 4.2 million-gallon tanks.

Fuel is supplied to the fuel farm via a 12-inch supply pipeline that was recently constructed 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 new pipeline was required to accommodate the rapidly rising fuel demands at the Airport. The recently completed pipeline replaced the 6-inch Crosstown Pipeline that was also supplied by the Port Fuel Facility. An older pipeline that is a branch from the Tesoro Nikiski refinery supplements the new 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 between the North and South Terminals with pipelines extending to the North, South, and East Airparks. Signature Flight Support fuels the aircraft from the hydrants under a contract with the Consortium. Additional fueling pits are located at the international cargo apron at the north end of the Airport on the UPS and FedEx leaseholds.

Table 3.15 presents the historical Jet A fuel usage at the Airport since 1990. Fuel usage began a 3-year decline in 1991, followed by significant and continuous growth beginning in 1994. To estimate future Jet A fuel consumption rates for the commercial operators, the historical Jet A fuel usage for commercial aircraft was compared to historical commercial aircraft departures. In 1997, this comparison yielded a ratio of 7,550 gallons of fuel consumed per commercial aircraft departure.

Table 3.15

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Historical Jet Fuel Demand

Year	Demand (gallons)
1990	509,647,773
1991	479,606,265
1992	461,718,206
1993	454,967,963
1994	483,086,818
1995	528,362,407
1996	588,146,256
1997	648,522,287

Source: HNTB analysis.

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.

Aircraft size is projected to increase throughout the planning period, as discussed in Chapter Two – Activity Forecasts. Aircraft are also becoming more fuel-efficient, therefore, the ratio of fuel consumed per departure is expected to remain relatively consistent throughout the planning period.

Monthly data on fuel sales were provided by ANC. These data were sub-categorized into international carriers' and domestic carriers' fuel purchases. After reviewing the data, July 1997 was identified as the peak month for fuel sales at the Airport. The average daily fuel sales for both domestic and international carriers for July was established simply by dividing the fuel sales for the month for each of these categories by 31 days. The respective total fuel sales were then divided by the number of average day operations for the two categories to arrive at the fuel usage per departure. The resulting ratio was applied to the forecast of commercial aircraft departures (both domestic and international) to determine the estimated total average daily fuel usage.

Domestic fuel usage amounted to almost 1,500 gallons per departure. International fuel usage totaled approximately 25,400 gallons per departure. Projected average daily commercial aircraft fuel consumption for each horizon year in the planning period is tabulated in **Table 3.16**.

The existing commercial aircraft fuel tanks provide approximately a 6.5-day supply of fuel based on current usage. The existing AFSC fuel farm can accommodate projected commercial Jet A fuel requirements for the air carriers through the year 2003 using a planning factor incorporating a 5-day fuel supply. The existing airport fuel farm would need an additional 4.2 million-gallon storage tank by 2008 to maintain a 5-day fuel supply. Existing fuel storage capacity would need to more than double by the end of the planning period using the 5-day planning factor. Fuel storage capacity would need to more than triple by the end of the 20-year planning period using a 7-day planning factor.

Further expansion of the fuel farm will be required during the latter part of the planning period using either the 5- or 7-day fuel storage assumptions. The Airport Fuel Farm was designed with the capability to install two additional 4.2 million-gallon fuel storage tanks, bringing total capacity up to 21,000,000 gallons. With the recent completion of the 12-inch pipeline from the Port of Anchorage, it would appear feasible to use a 5-day fuel storage-planning factor.

Table 3.16

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Average Daily Fuel Consumption for Commercial Aircraft

	Average Day Peak Month Departures		Average Day Consumption Jet A (gallons)		Storage Requirements (gallons)	
Year	Domestic	International	Domestic	International	5-day supply	7-day supply
1997	253.4	63.1	431,086	1,546,440	9,887,630	13,842,682
2003	285.1	83.1	485,014	2,036,595	12,608,048	17,651,267
2008	314.0	113.2	534,179	2,774,279	16,542,291	23,159,208
2020	387.4	254.3	659,047	6,232,324	29,150,339	40,810,475

Source: HNTB analysis.

The existing 14.5-acre fuel farm site appears large enough to be expanded to accommodate two additional 4.2 million-gallon storage tanks beyond the two already planned for. This would increase total capacity to approximately 29.4 million gallons. This expanded fuel storage capacity would meet the needs through the end of the planning period.

General Aviation Fuel

ERA Aviation, Signature Flight Support, and International Aviation Services provide GA fueling services at ANC. ERA sells only Jet A fuel, while Signature and International Aviation Services handle both Jet A and AvGas sales.

ERA Aviation includes a regional airline component that is a partner with Alaska Airlines and the largest regional airline in the State of Alaska. ERA Aviation has a combined total of approximately 114,000 gallons of underground fuel storage located at their leasehold on the South Airpark. Fuel storage consists of two 12,000-gallon tanks and six 15,000-gallon tanks. This capacity represents the combined total for their retail and airline operations. The fuel storage facilities meet all current EPA requirements.

Aircraft fueling is handled by five mobile fuel trucks. Two of these trucks hold 3,000 gallons and support the regional airline operations. The three additional trucks, two of which are 5,000-gallon capacity with one 3,000-gallon capacity, serve the GA needs. Discussions with the ERA Aviation representative indicated that their existing fuel storage capacity would be adequate throughout the planning period.

Signature Flight Support's Jet A fuel is stored in two 30,000-gallon underground storage tanks located near the Signature Executive Terminal in the South Airpark. These fuel storage tanks meet all existing EPA requirements. Jet A fuel is dispensed via two 10,000-gallon tanker trucks, three 5,000-gallon mobile fueling trucks, and one 3,000-gallon mobile fuel truck.

AvGas is stored in mobile equipment consisting of one 10,000-gallon tanker truck and is dispensed via five mobile fueling trucks ranging between 200, 300, and 700 gallons capacity. Signature also supports the GA fueling operations at LHD. However, LHD operations are seasonal due to weather extremes during the winter, so the volume of fuel sales is also seasonal.

International Aviation Services facilities are located in the North Airpark adjacent to Postmark Drive and north of the FedEx maintenance hangar on approximately 6.6 acres of land. Jet A fuel is stored in two 20,000-gallon above ground storage tanks, which meet all existing EPA requirements. Jet A fuel is dispensed via six 10,000-gallon fueling trucks, one 8,000-gallon fueling truck, and two 5,000-gallon fuel trucks.

AvGas is stored in two 20,000-gallon above ground storage tanks and is dispensed via nine mobile fueling trucks, ranging between 750 and 5,000 gallons capacity.

Discussions with representatives of International Aviation Services indicated that over 95 percent of their total fuel sales are at ANC. In addition, the company has a conditional use permit to construct up to 1.2 million gallons of fuel storage capacity on their existing leasehold. If construction on this facility does not begin in 1999, the permit will expire at the end of the year. International Aviation Services presently obtains its fuel from the AFSC.

Jet A fuel storage requirements for GA do not appear to be a problem at ANC. ERA Aviation, which sells only jet fuel, has indicated their facilities will be adequate through the planning period. The proposed expansion of fuel storage by International Aviation Services should also meet their needs through the planning period. Signature Flight Support did not identify a need for expanded fuel storage, although that would appear to be a probability in the future. It should be noted that the forecasts do not project an increase in GA activity at ANC during the course of the planning period. However, the composition of GA activity is expected to shift to a higher proportion of operations by corporate aircraft. Discussions with representatives of Signature and ERA reinforce this assessment based on their experience over the past five years at ANC. The master plan recommends the Airport allow for an additional 150,000 gallons of Jet A fuel for corporate GA activity.

3.8.4 Airport Field Maintenance Facility

The Airport Field Maintenance Facility is located west of Postmark Drive. The facility is in the area bounded by the USPS immediately to the west, DeHavilland Avenue immediately to the south, Aircraft Drive on the east, and a proposed right-of-way for a relocated Postmark Drive on the north. The current land area totals approximately 27.5 acres with numerous buildings for vehicle storage, sand/urea storage, maintenance shops, and warehouses. The existing building area totals approximately 92,000 square feet.

This site poses some constraints to efficient operations as vehicles are located somewhat remote from the AOA and must cross Postmark Drive when moving to or from the AOA. The ANC maintenance staff has also raised a concern due to the time required to travel back and forth to the AOA, which hampers efficient and timely airfield maintenance.

The Airport plans to relocate the airfield maintenance facility to the west side of Postmark Drive, north of the North Terminal. This site would entail developing new facilities for the Quick Turnaround Facility (QTF) and the FMC to replace the existing and proposed facilities at the current site adjacent to the USPS facility, east of Postmark Drive.

This alternative site overcomes the accessibility issues encountered at the existing Airfield Maintenance Facility site, with its accessibility to the airfield. The need to provide additional space for maintenance facility growth may be needed in the future. Given the projected increase in airport activity through the planning period and the prospect of new runway construction, capability must be provided to expand the airfield maintenance facility to meet the needs of ANC in the coming years.

The Airport conducted a study to identify specific facilities and improvements to serve ANC in the future. Airfield development, including runway(s) and taxiways, and landside development representing aprons, roadways, and vehicle parking during the course of the planning period, will substantially increase the total area that must be maintained by the airfield maintenance staff and equipment.

The study indicates an increase of 35 to 40 percent in airside and landside areas to maintain. A corresponding increase in Airfield Maintenance Facility area, both buildings and equipment, should be provided for. In general, an additional 10 to 15 acres

of land should be reserved for an expanded airfield maintenance facility with an additional building area of approximately 96,000 square feet.

The Airport Snow Disposal Master Plan (see the following section) 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 3.17**.

3.8.5 Other Aviation-Related Facilities

The other aviation-related facilities at ANC consist of:

- General aviation
- Rental cars
- Military

General Aviation. The GA component at ANC is related to, but distinct from, GA activity at LHD. GA at ANC is comprised of corporate activity with a smaller percentage of activity by light single and twin-engine privately owned GA aircraft. Discussions with controllers in the tower indicated there are a number of GA aircraft based at LHD that occasionally fly out of ANC. This number fluctuates between the summer and winter months, with increased activity during the summer months. A portion of the GA activity at ANC is also comprised of instrument flight training by aircraft based at other airports around the Anchorage Basin. ANC and EDF are used for instrument training activity since they have the only instrument approaches in the area.

ERA Aviation and Signature Flight Support are each full service FBOs serving the GA segment at ANC.

The primary FBOs of ERA Aviation are located in the South Airpark on approximately 10.5 acres of land. Their facilities include four hangars, the newest of which will be opening in the summer of 1999.

Table 3.17

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Equipment Needs

Year	Grader	Broom	Snow Blower	Sand Truck	Dump Truck	T-Dozer/ Loader
2004	0	0	0	1	2	2
2009	2	2	0	0	0	0
2014	1	1	1	1	1	0
2019	0	0	1	0	1	1
Total	**3**	**3**	**2**	**2**	**4**	**3**

Source: Ted Stevens Anchorage International Airport.

The largest and oldest of ERA's hangars totals approximately 55,000 square feet with three stories of offices. This hangar serves ERA's airline aircraft maintenance activities and the offices are occupied by ERA's corporate staff. In addition, this hangar houses ERA's executive terminal, which includes flight preparation areas, National Weather Service facilities, restrooms, pilot lounge, showers, and vending services.

Two additional hangars comprise 25,000-30,000 square feet each with two stories of offices. The fourth and newest hangar totals 40,000 square feet of space, with additional unfinished space that can be converted to future office use. This facility houses a local corporate aircraft with room for three to four additional aircraft. The representative from ERA indicated that their existing facilities, including the recently completed hangar, will accommodate their needs throughout the planning period.

The principal facilities of Signature Flight Support are also located in the South Airpark, directly across Taxiway F from ERA's facilities, on approximately 7.5 acres of land. Signature's hangar in the South Airpark totals approximately 28,000 square feet and includes their executive terminal.

The executive terminal includes flight preparation areas, National Weather Service facilities, restrooms, pilot lounge, showers, and vending services. Signature has an additional 21,000-square foot hangar located in the East Airpark that includes an additional 8,000 square feet of offices located on approximately 5.5 acres of land. This facility primarily serves the smaller GA piston aircraft and includes tiedowns for approximately 10 aircraft. Between five and six of these tiedowns are for based aircraft with the remainder available for transient aircraft.

The representative from Signature Flight Support noted that they are in need of additional space for facility expansion. The representatives from both ERA Aviation and Signature Flight Support expressed a need for more convenient customs processing capability at ANC. A substantial portion of both operators' activity includes international operations by corporate aircraft flying between the lower 48 states and Pacific Rim countries.

ANC serves as a technical and refueling stop for these operations, similar to the situation experienced by the air cargo operators. These operations include aircraft ranging in size up to the Boeing 737.

Discussions indicate that the majority of these operations occur between 2 and 4 a.m. When customs clearance is required, the aircraft must stop at the International Terminal ramp near the base of the ATCT. This poses substantial logistical and physical problems for both operators. The smaller, corporate aircraft must commingle with some air carrier aircraft on the ramp and there are no secured facilities for passengers to wait in during the customs process. At times, it is necessary for these aircraft to park at the far aircraft refueling positions, which raises additional concerns due to inadequate lighting.

The existing preferred customs clearance area at the base of the ATCT will no longer be available after construction of the new terminal facilities. ERA and Signature representatives both expressed the need for a customs clearance facility that would provide an enclosed waiting area for passengers and crew. The area should also be well-lit and segregated from the terminal ramp occupied by the larger international air cargo and passenger aircraft.

GA operations at ANC are not forecast to increase during the planning period. However, it is expected that there will be a need for additional facilities to accommodate the growing corporate activity and the international component of GA. The corporate GA component and use of more sophisticated aircraft justifies, for planning purposes, allocation of its corresponding additional GA space from 40 to 50 percent beyond existing levels.

Rental Cars. Rental cars are presently located in the parking structure and the adjacent surface lot located directly across International Airport Road from the south (domestic) terminal at ANC.

In 1998, the Airport commissioned a study to develop a Rental Car Demand Forecast for the Airport. The study used a number of variables to project rental car demand at the Airport. A forecast of monthly and hourly rental car demand in the peak month of August was developed based on the analysis contained in the referenced study. **Table 3.18** tabulates the results of the rental car demand study.

Table 3.18

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Rental Car Demand

	Demand	
Year	**Peak Month**	**Peak Hour**
Existing Spaces	-	-
2005 Spaces	3,536	535
2010 Spaces	4,656	705
2015 Spaces	5,760	872

The forecast of rental car spaces is projected to grow to 535 peak hour spaces in the year 2005, 705 spaces in the year 2010, and 872 spaces by the year 2015. The Airport is currently undertaking studies to determine the appropriate method to accommodate rental cars at ANC, including development of a consolidated rental car and public parking garage facility.

Military. Military operations at ANC consist of the Kulis ANG Base (Kulis), located adjacent to and south of Runway 6R-24L. The base, which is home to the Alaska Air National Guard, comprises 129.45 acres that are leased from ANC. The mission of the Alaska ANG is for airlift and search and rescue. The base is home to the 176th Group and 144th Tactical Airlift Squadrons, which both have Federal and State missions. The Federal mission is to provide trained aircrews and support personnel for airlift and airdrop during all contingencies in Alaska and worldwide. The State mission is to provide these same skills when called on by the Governor of Alaska.

The 210th Air Rescue Squadron was activated at Kulis in 1990, with the mission of manning, equipping, and training a combat-ready rescue squadron. The base houses a total of 16 aircraft, including nine C-130s, six HH 60Gs, and three HC-130s, supported by 404 full-time personnel and 1,200 part-time ANG personnel.

The ANG developed a 20-year Master Plan for Kulis, which is the foundation for the information contained in this section. This master plan was developed to accommodate 18 total aircraft in the short term (eight C-130s, four HC-130s, and six HC-60Gs) and 30 aircraft in the long term (sixteen C-130s, six HC-130s, and eight HC-60Gs).

A substantial portion of the acreage leased by the ANG is currently underdeveloped. The Base Master Plan proposes fully developing the existing acreage and incorporates recommendations for additional leased land on the northwest and southwest corners of this leasehold. The acreage the ANG is considering amounts to approximately eight additional acres.

3.8.6 Miscellaneous Facilities

Miscellaneous facilities include facilities supporting FAA operations and commercial developments on the Airport, such as gas stations and vehicle parking. 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.

Airport commercial development is likewise extremely difficult to quantify, given the impacts of local market conditions on the demand for these types of facilities. However, it should also be noted that airports in general are extremely 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. Service stations, hotels and motels, airport parking facilities, and business parks all gravitate to locations on and immediately adjacent to major commercial airports.

The prime areas for commercial development at ANC are somewhat limited since convenient access to both the terminal area and primary access routes into and out of the Airport are a high priority for these potential commercial facilities.

3.9 UTILITY REQUIREMENTS/ISSUES

Most any development in the western and southern portions of the Airport necessary to support an expansion of the cargo capabilities of ANC will require a full complement of utility services. Most of the utility companies have recognized that some expansion into these areas is inevitable and have been planning accordingly. At this stage of the Master Plan Update, we will look at the existing and planned utilities in these areas. We will also discuss the future improvements already being planned by the respective utilities and assess their capabilities for supporting additional development.

3.9.1 Public Water, Domestic, and Fire Protection

Recently, the lack of sufficient water on the Airport has been a constraint to development. In response to these needs, the Anchorage AWWU and the State of Alaska have 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. With these improvements in place, there is now sufficient pressure and capacity available in the mains to support existing airport development and a substantial amount of future expansion.

There is an existing 16-inch water main passing under Runway 14-32 near the Crash Rescue facilities. Presently, its sole purpose is to carry water to the sewage treatment plant at Point Woronzof and the new 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 pressure in the West Airpark for more fire flow purposes. The Clithero Detoxification Center (Clithero Center) is not connected to this system; it has its own well. AWWU has no current plans for further expansion of this water system. It is available to serve development in the area.

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.

3.9.2 Sanitary Sewer

Several years ago, a 12-inch ductile iron sewer line was constructed to serve the Clithero 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 Clithero 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 Clithero 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 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 ongoing discussion regarding what must be done to convey these lines to AWWU. Apparently, they are now maintained by ANC and Kulis personnel.

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.

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 this area.

Drainage in the area south of the Runway 6R-24L parallel is primarily surface drainage. A large swale extends 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 runway and Taxiway K to carry this drainage northward. The outfall meets up with the previously described system 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. Future improvements include upgrading old International Airport Road basin, reconstruction of kilo and main terminal basin, and the South Airpark, and transferring drainage flow west. Further implementation of the drainage plan has been put on hold pending deicing control recommendations of the task force. No restraints on development are perceived.

3.9.4 Natural Gas

The entire ANC is served by Enstar Natural Gas Company (Enstar). Enstar reports that at the present level of usage and rate of growth at ANC, the Airport will "run short of gas" within two to three years unless additional supplies are brought to the area. The highest use area is the North Airpark, which lies at the western terminus of the current distribution network.

To strengthen their distribution system, Enstar is planning to construct a 6-inch high pressure gas main through the terminal area from the east. They are currently working with the Terminal Expansion Design Team to identify the appropriate routing for this main. Its objective is to supply high pressure gas to a reducing station adjacent to Taxiway Victor, just east of Postmark Drive. When this connection is made, potential gas shortages at the Airport will be alleviated.

There is an existing 6-inch gas line passing under Runway 14-32 near the Crash Rescue 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. Availability of sufficient gas to feed this line is dependent on completion of the 6-inch truck line through the terminal area.

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.

3.9.5 Electric Service

CEA provides services to the entire Airport. They feel there is adequate power available to meet any foreseeable needs. An existing underground distribution system skirts the shoreline from the Point Woronzof treatment plant down the approach end of the parallel runways, 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.

CEA has an aggressive construction schedule that has been developed in accordance with the 1996 Airport Master Plan. A new feeder line was installed during the 1999 construction season along the alignment of a proposed new road through the West Airpark. It will be a direct bury line in conduit. When energized, it will replace an existing line that comes down the shoreline about where the Coastal Trail now runs. The other feeder lines in the West Airpark will be upgraded or replaced as development takes place.

The existing CEA distribution substation for the Airport is located near Spenard Road. It is likely that an additional distribution substation will be needed sometime in the next five to 10 years. ANC will work with CEA on a siting analysis to determine the appropriate site for the substation based on forecast energy needs. In addition, CEA has proposed development of a cogeneration facility in the terminal area to provide energy and heating needs for future terminal operations. This issue will be reviewed in future terminal planning efforts.

3.10 SNOW DISPOSAL SITES/DEICING

The ANC Comprehensive Airport Snow Management and Operations Program Draft Report has not yet been reviewed and approved by ANC. According to the map in the plan that shows snow disposal facility locations, there is a proposed snow disposal facility off the approach end of the parallel runways that is being proposed for "dirty" snow disposal. Near the Point Woronzof sewage treatment plant is an area designated for "clean" snow disposal, which is currently shared by the MOA. Another significant snow disposal site is located immediately west of the South Airpark. It is identified as a disposal site for the South Airpark area.

The report emphasizes the development of snow storage adjacent to individual pavement areas wherever they are found or planned. This trend would reduce the need for more and larger central snow storage areas.

A new snow disposal area was recently constructed northeast of the Post Office.

ANC is also developing a Watershed and Deicing Management Program for the Airport. This effort takes a comprehensive look at all stormwater, snow disposal, and water quality issues for the Airport.

Current deicing efforts at ANC utilize approximately 40 percent ethylene and 60 percent propylene glycol. Water quality impacts from the use of these materials are highest in the outfalls to Lakes Hood and Spenard.

Substantial accomplishments have been made in the implementation of the 1993 Comprehensive Drainage Master Plan. Significant phases implemented to date

include: (1) switching from glycol-based airfield deicing to potassium acetate deicer, (2) upgrading the Postmark Drive stormwater drainage trunk line, (3) construction of the Lake Hood water well, (4) installation of oil and grease separators on outfalls to Lakes Hood and Spenard, and (5) construction of a diversion structure to divert the international basin drainage with deicers from Lakes Hood and Spenard to Cook Inlet.

3.11 SUMMARY

As shown in **Table 3.19**, the greatest increase in land area requirements will be for additional air cargo facilities. With approximately 1,200 acres of land available for future development, one of the most significant challenges facing the Airport will be how best to both meet facility requirements and balance airfield capacity needs with future land requirements. 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.

A summary of key findings is as follows:

- Airfield – Threefold increase in average delays in 10 years; almost twentyfold in 20 years.
- Cargo – Fourfold increase in 20 years.
- Other – Average of 25 percent increase in 20 years.

Table 3.19

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Facility Requirements Summary

Land Use	Existing	2020	Growth
Airfield	1,416.5	*	*
Terminal			
Airside	83.1	83.1	
Landside	67.9	67.9	
Air Cargo	152.2	617.5	465.3
Postal Service	21.6	30.5	8.9
Airline Maintenance/Support	41.1	53.1	12.0
Support Facilities			
ARFF	13.4	20.1	6.7
Flight Kitchen	0.7	1.0	0.3
AFSC Fuel Storage & Support	21.0	21.0	-
General Aviation Fuel	7.8	7.8	-
Field Maintenance Facility	18.0	38.5	11.0
Other Facilities			
General Aviation	31.9	47.9	16.0
Rental Cars	14.2	35.8	21.6
Military	129.5	137.5	8.0
Miscellaneous Facilities			
Snow Disposal Facilities			

* Varies

Chapter Four
REGIONAL AIRPORT DEVELOPMENT ALTERNATIVES

The objective of this task was to evaluate a range of potential alternatives to accommodate projected aviation demand in the Anchorage region as part of the ongoing master planning effort. A general evaluation of the alternatives was conducted. If the analysis had indicated new airport facilities in the region were advisable, a more detailed level of evaluation of the final alternatives would have been conducted under a separate effort.

4.1 DESCRIPTION OF GENERAL ALTERNATIVES

The analysis compared alternatives at the current site with alternatives to develop a supplemental or replacement aviation facility within the region. The analysis of supplemental and replacement airports focused on utilizing either Fire Island or Point MacKenzie to supplement ANC, or to develop a new site in Point MacKenzie. Due to its limited size, Fire Island could only serve as a supplemental airport. These sites are depicted in **Figure 4-1**.

The analysis did not include a site selection study. If a regional alternative that included a new airport, either supplemental or replacement, had been selected for further study, then a primary subsequent task would have been to undertake a site selection study for the new airport. For example, in addition to the Point MacKenzie area, Kenai Airport has been mentioned as a possible supplemental airport and could have been studied.

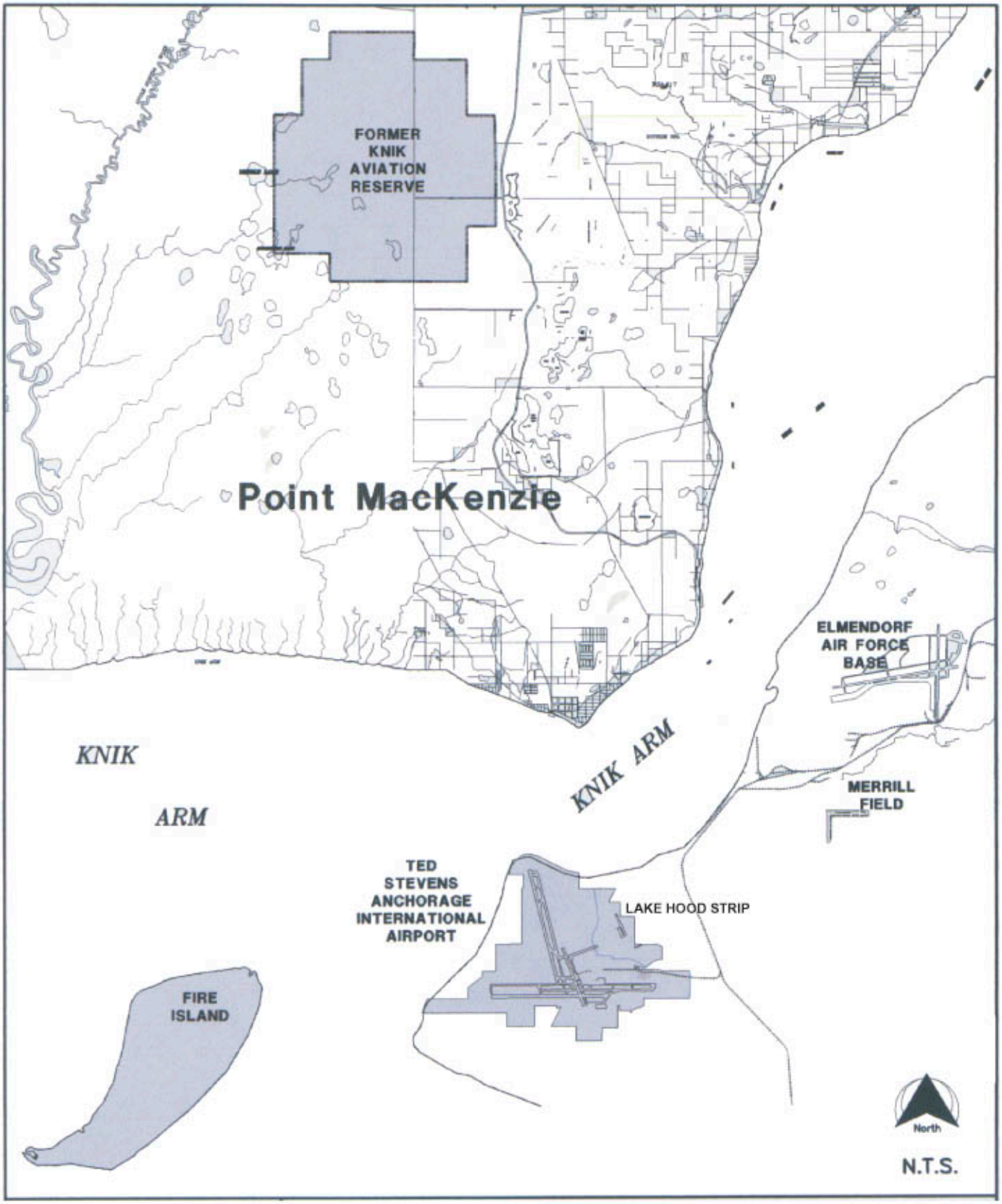
There are valid reasons for assuming Fire Island and Point MacKenzie as alternative sites to be studied in this analysis. First, development of an airport on Fire Island has been discussed within the community and the principal owners of the island have completed some feasibility studies. For this reason, the development of Fire Island as a supplemental airport was included in this analysis.

The Point MacKenzie site centers on the area known as the former Knik Aviation Reserve. The reserve was created in the early 1970s to be set aside for a potential future airport to address long-term growth in aviation operations in the region. The site was chosen for its relatively flat terrain and little evidence of any major environmental concerns that could not be mitigated. It is one of the few areas in the region that could support the development of a new airport and, as such, was included in the analysis. The range of alternatives considered includes the following:

- Alternative 1 – No Airfield Expansion at ANC. This would include no other regional expansion.
- Alternative 2 – Limited Airfield Expansion of ANC within Existing Borders.

Airport Sites Considered

Figure 4-1



- Alternative 3 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island.
- Alternative 4 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport in Point MacKenzie.
- Alternative 5 – Full Development of ANC including Development beyond Existing Borders.
- Alternative 6 – Closure of ANC and Development of a New Airport in Point MacKenzie.

4.2 DESCRIPTION OF FIRE ISLAND AND POINT MACKENZIE

A general overview of the Fire Island and Point MacKenzie sites is provided below.

4.2.1 Fire Island

Currently uninhabited, Fire Island's historical development has been limited primarily to a small-scale government installation and seasonal fish camps. The remaining portions of the island are in their natural forested state. There are no ground transportation links to the island. Presently, access is only by small boat or aircraft.

Location

Fire Island is located within the MOA, approximately three miles offshore from the Anchorage mainland. It is an elongated island aligned in the northeast-southwest direction, parallel to the Point Woronzof to Point Campbell shoreline. It is situated just west of Anchorage, at the confluence of Knik and Turnagain Arms (see **Figure 4-1**).

Size

The island is 5.3 miles in length, 2.2 miles across at its greatest width, and contains 4,240 acres of land.

Topography

The perimeter of the island is characterized by steeply rising bluffs, ranging in height from 80 to nearly 300 feet above tide level. There are two low-lying sand spots at the extreme north and southwest ends of the island. The remainder of the island is hummocky. Elevation ranges in height from 50 to 300 feet.

Wind Data

Winds are generally not strong in the Anchorage area, however, they are highly subject to the variety of landforms, water bodies, and vegetation that affect both the velocity and direction of winds. Current wind data for Fire Island are unavailable at this time, but a limited wind speed study on Fire Island was completed in 1948 and is provided in **Table 4.1**. The data were recorded during a 3-month period from February to April 1948, and were taken on the beach southwest of Race Point (Figure 4-5). Prevailing winds during that period were from the NNE and measured low-to-moderate wind speeds.

Table 4.1

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Fire Island Winds (1948)

Month	Mean Prevailing Direction	Mean Speed (mph)	Hours <10 mph	Hours 11-30 mph	Hours >30 mph
February	NNE	9	55	45	0
March	NNE	10	61	38	1
April	S	4	95	5	0

Source: U.S. Army Corps of Engineers, 1948.

There are two types of strong winds generally found in the Anchorage area, with Fire Island being no exception. The northerly winter winds called Matanuska, usually last for two to three days and reach speeds of 35-50 knots for periods of six hours or more, with gusts of 70-80 knots. The Turnagain or Chugach winds can occur at any time during the year and are southeasterly in direction. These winds reach speeds of 0-90 knots, and are especially strong in the areas where they are channeled through streambeds; they diminish as the terrain flattens. The Turnagain winds blow from the southeast and, because of a lack of obstructions over the open water, they are stronger at Fire Island than they are at ANC.[19] During the winter and spring seasons, the Anchorage Bowl, including Fire Island, experiences a weather pattern that produces widespread turbulence and wind shear. It is the result of frontal action and is compounded by the surrounding mountains. It usually occurs about eight to ten times per year for an average duration of about two to three hours.

Seismic Hazards

According to the Harding-Lawson study in 1979, *Geotechnical Hazards Assessment Study of the Municipality of Anchorage Floodplains,* Fire Island is identified "as an area subject to generally high earthquake intensities and long periods of shaking." The ground under the island is generally made up of "thick unconsolidated sediments," which means it has the potential for more intense and longer shaking than that of an area with shallower sediments and bedrock underneath. This also means that any buildings on the island have a greater potential for damage. The Harding-Lawson study gave the overall ground failure susceptibility a low rating. The exceptions to this rating are at North Point, Shelter Bay, and West Point, where ground failure susceptibility is moderate.

In summation, it has been determined that the vast portion of the island should be able to support development if proper design and construction methods are used. However, further site-specific investigations would be necessary to make any greater determination of degree of hazard to development.[20]

Floodplains

Only four bodies of water exist on the island, ranging in size from five to 50 acres. The terrain is irregular but there are no significant

[19] FAA, 1975; DOT&PF 1979.

[20] Harding-Lawson, Geotechnical Hazards Assessment Study of the Municipality of Anchorage Floodplains, 1979.

streams or creeks at ground level; therefore, there are no significant riverine floodplains.

Land Use/Zoning

Fire Island, though not addressed in the current comprehensive plan for the MOA, is zoned a Transition Zone. This district is intended to include suburban and rural areas that, because of location in relationship to other development, topography, or soil conditions, are not developing and are not expected to develop in the immediate future along definitive land use lines. This Transition Zone is very flexible and until more restrictive zoning is established, would appear to allow for an airport and related industrial uses. Existing uses would not be sensitive to aircraft noise levels.

Land Ownership

Cook Inlet Region, Inc. (CIRI) owns 3,226 acres at Fire Island, with the remaining 1,014 acres held by the U.S. Coast Guard and FAA.

4.2.2 Point MacKenzie (Former Knik Aviation Reserve)

The DOT&PF set aside land in the Point MacKenzie region of the Matanuska-Susitna Borough (Mat-Su) for future airport use in the 1970s. This reserve area was known as the Knik Aviation Reserve. The aviation reserve request was closed in 1980 and the land was included in an agricultural project sale. Portions of the area that were included in the aviation reserve have since been sold off for agricultural uses and are reflected in the land ownership section.

Location

The Knik Aviation Reserve area was located approximately 15 miles northwest of ANC in the Mat-Su. The area lies between the Little Susitna River to the west and Point MacKenzie Road to the east. The location is generally described as "located within township 15 north, range four west, and township 15 north and range five west." The area is bounded by the Susitna Flats Game Refuge on the west and the Goose Bay Game Refuge on the northeast.

Size

The Former Knik Aviation Reserve is roughly 9,345 acres.

Topography

The site was originally chosen for its relatively flat terrain and the fact that it has few wetlands. This offers an attractive site that would require little earthwork on the site and little need to obtain permits for development of the wetland areas. The site ranges from 100 feet in elevation on the western portion to 200 feet at the eastern portion and slopes gently from the southeast to the northwest.

Wind Data

Wind patterns for the area are comparable to Anchorage and Fire Island.

Seismic Hazards

The state of Alaska is considered a highly susceptible area for seismic activity. The area formerly known as the Knik Aviation Reserve Area lies approximately five to ten miles due south of the Castle Mountain Fault. The Castle Mountain Fault has been classified as a right-lateral strike-slip fault.[21] The potential for seismic activity along this fault is high. The fault strikes southwest from the Talkeetna Mountains through the Susitna Lowlands where it is thought to join the Lake Clark Fault in the Aleutian Mountains. Seismic activity along this fault

[21] "Strike Slip Faults in Alaska," USGS Open-File Report, 1966.

is generally associated with low magnitude (3.0-4.5) shallow events. However, six earthquakes of 6.0 or greater have been recorded.

In summary, it has been determined that the Former Knik Aviation Reserve area should be able to support development if proper design and construction methods are used. However, further site-specific investigations would be necessary to make any greater determination of degree of hazard to development.

Floodplains

No major rivers or streams exist in the former Knik Aviation Reserve Area. Therefore, there are no significant riverine floodplains.

Land Use/Zoning

The State lands in the area around the former Knik Aviation Reserve are addressed in the Sate Department of Natural Resources Willow Sub-basin Area Plan, adopted in September 1982. The former reserve was in the Point MacKenzie management unit, which is designated for agricultural use. The State plan calls for other uses on State lands to be designed to accommodate development of the proposed Point MacKenzie Port Facility, industrial area, and community. The private lands in the area were not zoned and could be developed for residential uses. The only exception would be a Special Land Use District at the new port location. The status of parcels within the former Knik Aviation Reserve are that the state owned parcels and former state owner parcels now owned by farmers have agricultural covenants restricting uses to agriculture. The covenants do allow for incidental uses as long as the primary use remains agriculture. An example of an incidental use is a communications tower on a small corner of an agricultural parcel. Until the law changes, these parcels will continue to be used for agricultural purposes.

Land Ownership

The Knik Aviation Reserve area contains approximately 9,345 acres. Of this, the state of Alaska owns approximately 6,687 acres. The remaining 2,658 acres are privately owned.

4.3 DEMAND ALLOCATION

The purpose of this section is to describe the assumptions and methodology used in allocating demand for each alternative under consideration. Depending on the alternative, long-term demand could be met by other airports outside the region including airports in other countries, new supplemental airports within the region, or entirely at ANC. Once the demand allocation process was determined, facility requirements for ANC and any new airports, depending on the selected alternative, were developed and are provided in the next section. Based on the facility requirements, layouts were then developed for each alternative. The airport layout for each alternative serves as the basis from which the evaluations of the alternatives, including costs, travel times/distances, environmental impacts, operational impacts, and others, were conducted.

The demand allocation process is based on two factors: (1) consideration of the practical level of aircraft delay at which operational growth within the region would become impacted, and (2) determination of which segments of demand currently operating at ANC would be most impacted by increased airfield delays. The analysis assumed that when a practical level of aircraft delay is reached at ANC, demand

would not increase without airfield expansion within the region, which could include the development of new airport facilities. This analysis is intended to be a theoretical exercise to initiate the discussion and evaluation of long-term capacity solutions for the region.

There are two critical points concerning the limitations of this type of approach. First, the DOT&PF cannot prohibit aircraft from landing at ANC. As such, activity at ANC could continue to grow beyond any arbitrary capacity limit established in this study. Second, it is understood that there are many other factors, operational, market, financial, and political, that would actually influence which, if any, carriers would relocate to a new airport (supplemental or replacement), if that were the preferred long-term (year 2020) solution for the Anchorage region.

If a new airport were recommended, extensive market and feasibility analyses would need to be conducted. Public and airport user input would be solicited, and extensive negotiations with carriers would be undertaken before any new airports were constructed in the region.

The analysis is organized into two sections. The first section discusses the airfield capacity and delay at ANC to determine at what activity level growth is affected by delays. The second section discusses the potential segments of activity that could be allocated to the supplemental facility or outside the Anchorage region.

4.3.1 Airfield Capacity and Delay at ANC

For planning purposes, the relationship between airfield capacity and airfield delay has been used to determine the number of aircraft operations that can be accommodated at the Airport during a specified period of time. *There is no standard or specification to define an acceptable level of delay that is applicable to all airports.* Previous FAA capacity methodologies recommended that additional capacity be added when average annual delay reaches between four and six minutes. This was considered the practical capacity corresponding to a tolerable level of delay. On the opposite end of the spectrum, the FAA Airport Benefit-Cost Analysis (BCA) Guidance recommends capping growth forecasts used to calculate the BCA of airport development projects when average annual delay exceeds 20 minutes per operation. At this level of delay, most airports would experience gridlock during peak periods. The most congested airports in the country—Newark, LaGuardia, Atlanta, and Chicago-O'Hare—experience average annual delays between seven and 12 minutes.

Average annual delay includes delays that occur during both peak periods of activity (late morning through early afternoon at ANC) and off-peak periods such as late evening through early morning. As a result, peak hour delays are usually considerably higher than average annual delays. For example, an average annual delay ranging between seven and 12 minutes would correspond to peak hour delays ranging between 30 and 60 minutes.

In addition, the range of "acceptable" aircraft delay varies by type of user. For example, domestic passenger carriers and GA traffic may have a relatively high tolerance for delay. Conversely, the international integrated cargo carriers may 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 like Tokyo. One

integrated carrier at ANC indicated that when peak hour delays exceed 60 minutes per operation for more than 20 percent of the time, that carrier would consider shifting operations to a less congested airport.

Based on the range of delays discussed above, an average annual delay of approximately six minutes was used to allocate demand with each of the considered alternatives. A review of the FAA Aviation Capacity Enhancement (ACE) Plan indicates that most airports presently operating at similar delay levels, and with the capability to readily expand, have plans to implement some capacity enhancement measure. Airports currently operating at similar delay levels that cannot expand are considering other measures such as demand management, regional solutions such as new airports, or implementation of legislative measures such as the slot system.

The results of the facility requirement analysis indicated that with no improvements, average annual delay is projected to increase to more than 20 minutes per aircraft by 2018. Average annual delay is projected to reach approximately six minutes per operation by 2008 without any airfield capacity enhancements based on the Base Case Forecasts. (As noted in Chapter 2, actual operations growth may be lower, slowing these delay increases.)

4.3.2 Allocation of Activity

The allocation of demand for each alternative considers the level of capacity enhancement at ANC and the demand segment assumed for the allocation. As discussed in the beginning of Chapter 2, the forecasts used in this demand allocation analysis were developed in 1998. Since that time, actual growth rates have been lower than forecast, and therefore it is unlikely that the forecasts used in this allocation analysis are overstated. However, the analysis still provides useful planning information for a long-term perspective.

ANC Capacity Enhancements

For the purpose of demand allocation, the no expansion alternative assumes that no new runways are developed at ANC. For those alternatives that assume limited airfield expansion at ANC (Alternative 2), with or without the development of a new supplemental airport at either Point MacKenzie or Fire Island (Alternatives 3 or 4), development at ANC includes an additional north-south runway. Full development of ANC (Alternative 5) includes both a new north-south runway and a new east-west runway.

A new north-south runway would be close-spaced (less than 2,500 feet from the existing north-south runway) and would provide for simultaneous arrivals and departures during VFR conditions. VFR conditions are in effect approximately 85 percent annually. However, ATC would treat the pair of runways as a single runway when wake turbulence is a factor. A new north-south runway would be included with Alternatives 2, 3, and 5.

The separation of a new east-west runway could be between 2,500 and 5,000 feet from Runway 6L-24R. A 2,500-foot separation would allow simultaneous arrivals and departures during VFR conditions. At this separation, wake turbulence would not be a factor. In addition, this separation would provide for simultaneous IFR departures and staggered IFR arrivals. A runway separated by 5,000 feet (4,300 feet from Runway 6R-24L) would allow simultaneous arrivals and departures during IFR conditions providing

greater capacity and delay reduction benefits. **Figure 4-2** depicts each capacity enhancement with corresponding levels of delay throughout the planning period based on the Base Case Forecast level of operations. The delay levels were calculated using the FAA Annual Delay Model. A more detailed analysis using SIMMOD, the FAA's airfield and airspace simulation model, will be conducted in subsequent tasks.

Using Base Case Forecasts, average annual delay level is projected to reach six minutes by 2008 with the no airfield expansion alternative (Alternative 1) and by 2011 for the limited airfield expansion alternative (Alternatives 2-4). If it is assumed, as discussed above, that growth would be constrained at these delay levels, the number of operations that would be allocated outside of the region or to a new airport would range between 145,000 for the no build alternative and 110,000 operations with limited airfield expansion by 2020. Average annual delay for the full development alternative (Alternative 5) would range between four and six minutes by 2020, depending on the new east-west runway separation. This can be attributed to the fact that, while full development (a new north-south and east-west runway) provides both IFR and VFR capacity enhancement, the limited expansion (new north-south runway) provides only additional VFR capacity. The 2020 Base Case Forecast demand could be accommodated with full expansion of ANC.

In general, the greater the runway-to-runway separation, the greater the delay reduction benefit, and potentially the greater the cost to implement. While the 2,500 foot runway-to-runway separation keeps average delays at approximately six minutes per operation and, therefore, meets capacity needs for the planning period, a runway separated by 5,000 feet would be the most conservative alternative in terms of worst case impacts. Therefore, the 5,000-foot separation was used for all subsequent analysis presented in this report. The final airfield configuration would be determined based on a detailed BCA on the potential runway separation options.

Again, although this capacity analysis is based on the year that each capacity improvement project would be required based on the Base Case Forecast, the proposed projects would not actually be implemented until needed, based on actual growth in operations. Since the forecasts were developed in 1999, ANC staff has noted that operations growth has been lower than forecasted growth. This may result in extending the number of years before the capacity enhancement projects are needed.

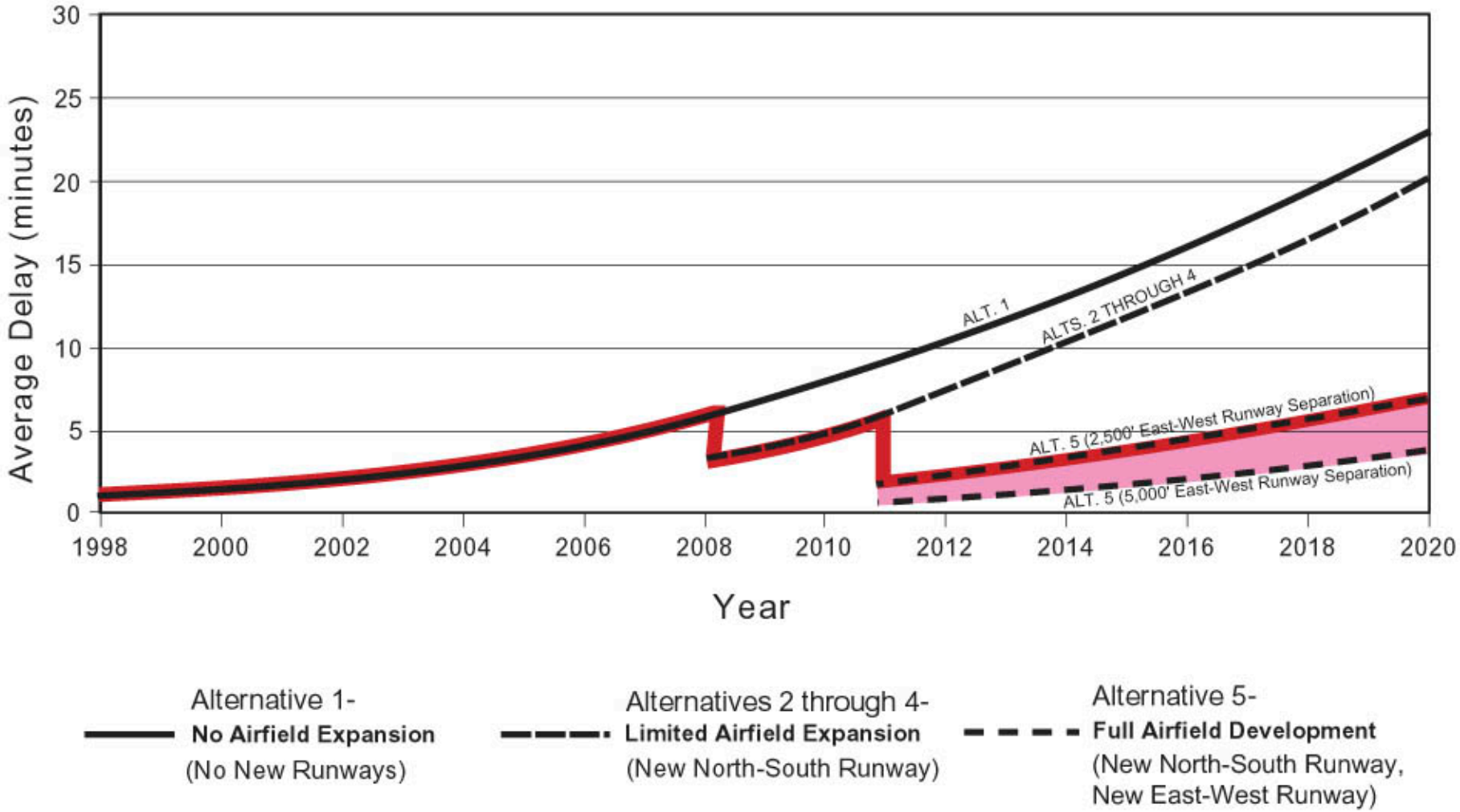
Demand Segment Allocation

As noted earlier, allocation of demand is problematic because an airport has limited means to direct traffic to another airport and because many airport users would experience operational inefficiencies if they relocated operations from the primary airport in the region. The demand segments selected for reallocation include international cargo, international transient cargo, and GA/air taxi operating out of ANC. These demand segments were considered the most likely activities that could be reallocated for the reasons described below.

International Cargo - International cargo activity is the most time-sensitive. International cargo is defined as cargo that either originates in, or is destined for, a foreign country and undergoes some level of handling at ANC such as a sort. A relatively small portion of the international cargo originates and is destined for the

Average Aircraft Delay For Base Case Forecast

Figure 4-2



Anchorage/Alaska economy. The portion of international cargo that is not destined for the Anchorage area would be reallocated. Activity generated by the existing integrated carriers, like FedEx and UPS, and heavy carriers engaged in cargo handling, such as Northwest Cargo, are not part of this reallocation because of the large existing investment in facilities and impact to their local operations.

International Transient Cargo - Although there is some interdependence on international cargo with passenger traffic, the international transient, or tech-stop (sometimes called gas-and-go), operations are the least dependent on other segments of activity and require the fewest ancillary facilities, such as warehouses and landside cargo handling facilities. As noted earlier, the practicality of this reallocation would need to be investigated further in a market analysis if a supplemental or replacement alternative were selected. Specific considerations for the market analysis would include:

- Whether or not carriers would actually move operations to a new site (since an airport could not mandate the move);
- The effect of the move on the efficiency of the cargo carriers' operations;
- The amount of operations that could be expected to move to the new airport versus to non-Alaskan airports; and
- The effect added operational costs, such as split ground handling, would have on the continued use of Alaskan airports.

General Aviation/Air Taxi - A portion of the GA activity at ANC can be attributed to the availability of better airfield instrumentation for precision landings. If provided at other airports (including the supplemental airport), there is a reasonable potential that some GA traffic could be relocated. This scenario does not relocate GA operations from LHD because LHD operations normally do not reduce capacity of ANC and are not included in the ANC forecasts. Many busy airports around the country encourage GA to relocate to a nearby reliever airport in an effort to relieve congestion. However, this action by itself would not be sufficient to relieve congestion at ANC since GA activity is not anticipated to grow significantly through the planning period.

As discussed earlier, a six-minute average annual delay threshold was used as the capacity constraint for time-sensitive activity such as international cargo. Since passenger carrier, domestic cargo, and airmail are not considered time sensitive, these operations are expected to continue to grow at ANC throughout the planning period.

The allocation of demand, based on the Base Case Forecast, is depicted in **Table 4.2**, which shows the demand that could be reallocated outside of the region, or to a supplemental facility, based on the assumptions described above for the no airfield expansion (Alternative 1) and limited airfield expansion (Alternatives 2-4) alternatives. If ANC were fully expanded or if the Airport were relocated (Alternatives 5 and 6), the Base Case Forecast level of operations could be accommodated within the region. For Alternatives 1-4, 50 percent of GA and air taxi has been allocated from ANC.

Table 4.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Preliminary Regional Capacity Alternatives Allocation of Base Case 2020 Demand

	Alternative 1		Alternatives 2 - 4		Alternatives 5 & 6
	ANC	Outside of Region	ANC	Outside of Region or Supplemental Airport	ANC or New Airport
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
International 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 Annual Operations	**301,000**	**145,200**	**336,100**	**110,100**	**446,200**

Source: HNTB analysis.

No Airfield Expansion (Alternative 1)

Approximately 78 percent of the anticipated Base Case Forecast 2020 demand for international cargo could be accommodated at ANC given the existing airfield configuration. The remainder of this activity, as well as 100 percent of international cargo tech-stops, would be accommodated at other airports outside the region. This could include Fairbanks, Kenai, or foreign airports such as those in Canada, Far East Russia, Korea, and China.

Limited Airfield Expansion (Alternatives 2-4)

ANC could accommodate 80 percent (year 2020 Base Case Forecast demand) of the international cargo demand if an additional north-south runway was constructed. This represents the integrated carrier activity, including expansion through the planning period. The remainder of the international cargo activity could go to a new airport (or elsewhere outside the region). This would leave approximately 31 percent of tech-stops that could be accommodated at ANC. As with Alternative 1, the remainder of this activity could go to a new airport outside the region if the 2020 Base Case Forecast were to be met.

4.4 FACILITY REQUIREMENTS

Based on the allocation of Base Case Forecast demand, facility requirements were developed for six alternatives. The requirements include airfield, air cargo building, air cargo ramp, support building, air mail facility, flight kitchen, fuel storage and handling, aircraft hangar, aircraft tie-down area, ARFF, airport maintenance, and passenger terminal facilities.

Airfield requirements were calculated based on AC 150/5060-5, *Airport Capacity and Delay*. The allocation of airfield requirements is only applicable to the supplemental or replacement airport scenarios. Based on the Base Case Forecast demand, allocation of a supplemental facility would have to accommodate between 110,000-145,000 operations, and a replacement airport would have to accommodate the full, unconstrained demand forecast of 446,000 operations by 2020. The ASV of a single runway is approximately 240,000 operations. This would satisfy the requirement for the supplemental facility. Three runways, two independently separated, would be required to satisfy the unconstrained Base Case Forecast demand.

The fleet mix projected to use the supplemental facility primarily includes widebody aircraft, including the Boeing 747 series. The existing 11,584 feet of available takeoff length on Runway 32 is expected to be adequate through the planning period to reach existing markets. A runway length of 12,200 feet would be required to accommodate all aircraft without any weight restrictions.

Tables 4.3 through 4.7 depict all other facility requirements for the five scenarios described above. The facility requirements, provided in Chapter Three, were used as the basis for calculating these requirements. For the purpose of this evaluation, the facility requirements were converted to land area requirements, which are generally depicted for each alternative below. Detailed layouts have not been developed.

4.5 DESCRIPTION OF CONCEPTUAL AIRPORT ALTERNATIVES

Listed below are descriptions of the alternatives that will be the basis for analysis related to operations, environmental impacts, economic and land use opportunities, airspace, political, and financial factors.

Alternative 1 – No Airfield Expansion at ANC. This would include no other regional expansion. As depicted in **Figure 4-3**, this alternative includes no new runways at ANC. With no new runways, Base Case Forecast demand is projected to exceed airfield capacity by approximately 2008. Fairbanks, or airports outside Alaska, could serve the demand that could not be provided at ANC if the airlines found it cost effective. Because aircraft activity can continue to grow before it reaches the 6-minute delay level, and some activities are not delay sensitive, there would still be substantial facility expansion, especially air cargo, included with this alternative.

Alternative 2 – Limited Airfield Expansion of ANC within Existing Borders. As shown in **Figure 4-4**, this concept includes a new 10,500-foot parallel north-south runway that is located 906 feet west of existing Runway 14-32. As described earlier, this would add VFR arrival and departure capacity. This limited expansion is projected to extend Airport airfield capacity through approximately 2011 and beyond if a lower rate of growth or additional improvements in air traffic technologies are realized.

Table 4.3

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Alternative 1
No Airfield Expansion

Component	Existing Facilities	New Facilities	Total Requirement		2020 Master Plan Requirement (2)
Terminal					
Building	1,084,000	216,000	1,300,000		1,300,000
Gates	31	8	39		39
Apron	470,000		470,000		470,000
Parking					
Terminal-Structure	1,131	874	2,005		2,005
Terminal-Surface	900	845	1,745		1,745
Rental Car	342	400	742		742
Domestic Air Cargo (SF)	436,970	488,530	925,500		925,500
International Air Cargo Building (SF)	547,680	1,312,320	1,860,000	(1)	2,383,500
Support Building Area (SF) @ 0.95	139,508	255,992	395,500		395,500
Air Cargo Ramp (SY)					
Domestic Cargo	113,450	31,350	144,800		144,800
International Transfer	337,000	297,000	634,000	(1)	812,700
International Transit	103,500	0	0	(1)	356,500
Air Mail Facility					
Building (SF)	45,000	45,600	90,600		90,600
Apron (SY)	12,400	12,400	24,800		24,800
Flight Kitchen Requirements (SF)	12,400	32,200	44,600		44,600
Fuel Storage (gallons)					
(7-day supply)	13,842,682	3,789,318	17,632,000	(1)	40,810,500
GA-Jet A	214,000	0	214,000	(1)	364,000
GA-AvGas	50,000	0	50,000		50,000
General Aviation					
Hangar (SF)	199,000	30,000	229,000	(1)	300,000
Office (SF)	53,000	10,000	63,000	(1)	80,000
Apron (SY)	95,000	20,000	115,000	(1)	144,000
ARFF	20,000	0	20,000		20,000
Airport Maintenance Building (SF)	92,000	0	92,000	(1)	240,000

Notes: (1) Reflects constrained forecast
(2) Base case 2020 unconstrained forecast

Source: HNTB analysis.

Table 4.4

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Alternative 2
Limited Airfield Expansion of ANC
(New north-south runway)

Component	Existing Facilities	New Facilities	Total Requirement		2020 Master Plan Requirement (2)
Terminal					
Building	1,084,000	216,000	1,300,000		1,300,000
Gates	31	8	39		39
Apron	470,000		470,000		470,000
Parking					
Terminal-Structure	1,131	874	2,005		2,005
Terminal-Surface	900	845	1,745		1,745
Rental Car	342	400	742		742
Domestic Air Cargo (SF)	436,970	488,530	925,500		925,500
International Air Cargo Building (SF)	547,680	1,359,100	1,906,780	(1)	2,383,500
Support Building Area (SF) @ 0.95	139,508	255,992	395,500		395,500
Air Cargo Ramp (SY)					
Domestic Cargo	113,450	31,350	144,800		144,800
International Transfer	337,000	313,200	650,200	(1)	812,700
International Transit	103,500	7,015	110,500	(1)	356,500
Air Mail Facility					
Building (SF)	45,000	45,600	90,600		90,600
Apron (SY)	12,400	12,400	24,800		24,800
Flight Kitchen Requirements (SF)	12,400	32,200	44,600		44,600
Fuel Storage (gallons)					
(7-day supply)	13,842,682	12,832,318	26,675,000	(1)	40,810,500
GA-Jet A	214,000	0	214,000	(1)	364,000
GA-AvGas	50,000	0	50,000		50,000
General Aviation					
Hangar (SF)	199,000	30,000	229,000	(1)	300,000
Office (SF)	53,000	10,000	63,000	(1)	80,000
Apron (SY)	95,000	20,000	115,000	(1)	144,000
ARFF	20,000	0	20,000		20,000
Airport Maintenance Building (SF)	92,000	0	92,000	(1)	240,000

Notes: (1) Reflects constrained forecast
(2) Base case 2020 unconstrained forecast

Source: HNTB analysis.

Table 4.5

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Alternatives 3 & 4
Limited Airfield Expansion of ANC
Supplemental Airport (Fire Island or Point MacKenzie)

Component	Existing Facilities		New Facilities: Anchorage	New Facilities: New Airport	Total Requirement	2020 Master Plan Requirement (2)
Terminal						
Building	1,084,000		216,000		1,300,000	1,300,000
Gates	31		8		39	39
Apron	470,000				470,000	470,000
Parking						
Terminal-Structure	1,131		874		2,005	2,005
Terminal-Surface	900		845		1,745	1,745
Rental Car	342		400		742	742
Domestic Air Cargo (SF)	436,970		488,530	0	925,600	925,500
International Air Cargo Building (SF)	547,680		1,359,100	476,720	2,383,700	2,383,500
Support Building Area (SF) @ 0.95	139,508		255,977	0	779,500	395,500
Air Cargo Ramp (SY)						
Domestic Cargo	113,450		31,350	0	144,800	144,800
International Transfer	337,000		313,200	162,500	812,700	812,700
International Transit	103,500		7,015	245,985	419,600	356,500
Air Mail Facility						
Building (SF)	45,000		45,600	0	90,600	90,600
Apron (SY)	12,400		12,400	0	136,400	24,800
Flight Kitchen Requirements (SF)	12,400		32,200	0	44,600	44,600
Fuel Storage (gallons)						
(7-day supply)	13,842,682		12,832,318	14,135,500	40,810,500	40,810,500
GA-Jet A	214,000	(1)	0	182,000	396,000	364,000
GA-AvGas	50,000	(1)	0	25,000	75,000	50,000
General Aviation						
Hangar (SF)	199,000	(1)	0	150,000	349,000	300,000
Office (SF)	53,000	(1)	0	40,000	93,000	80,000
Apron (SY)	95,500	(1)	0	72,000	167,500	144,000
ARFF	20,000		0	20,000	40,000	20,000
Airport Maintenance Building (SF)	92,000		56,000	92,000	240,000	240,000

Notes:(1)Although keeping existing facilities would exceed requirement, analysis assumes no demolition of existing facilities at ANC.
(2) Base case 2020 unconstrained forecast

Source: HNTB analysis.

Table 4.6

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Alternative 5

Full Development of ANC

(New north-south runway, new east-west runway)

Component	Existing Facilities	New Facilities	Total Requirement (1)
Terminal			
Building	1,084,000	216,000	13,000,000
Gates	31	8	39
Apron	470,000		470,000
Parking			
Terminal-Structure	1,131	874	2,005
Terminal-Surface	900	845	1,745
Rental Car	342	400	742
Domestic Air Cargo (SF)	436,970	488,530	925,500
International Air Cargo Building (SF)	547,680	1,835,820	2,383,500
Support Building Area (SF) @ 0.95	139,508	255,992	395,500
Air Cargo Ramp (SY)			
Domestic Cargo	113,450	31,350	144,800
International Transfer	337,000	475,700	812,700
International Transit	103,500	253,000	356,500
Air Mail Facility			
Building (SF)	45,000	45,600	90,600
Apron (SY)	12,400	12,400	24,800
Flight Kitchen Requirements (SF)	12,400	32,200	44,600
Fuel Storage (gallons)			
(7-day supply)	13,842,682	26,967,818	40,810,500
GA-Jet A	214,000	150,000	364,000
GA-AvGas	50,000	0	50,000
General Aviation			
Hangar (SF)	199,000	101,000	300,000
Office (SF)	53,000	27,000	80,000
Apron (SY)	95,500	48,500	144,000
ARFF	20,000	0	20,000
Airport Maintenance Building (SF)	92,000	148,000	240,000

Notes: (1) Same as 2020 Master Plan Requirements

Source: HNTB analysis.

Table 4.7

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Alternative 6
Close ANC, Build Replacement Airport

Component	New Facilities	Total Requirement (1)
Terminal		
Building	1,300,000	1,300,000
Gates	39	39
Apron	470,000	470,000
Parking		
Terminal-Structure	2,005	2,005
Terminal-Surface	1,745	1,745
Rental Car	742	742
Domestic Air Cargo (SF)	925,500	925,500
International Air Cargo Building (SF)	2,383,500	2,383,500
Support Building Area (SF) @ 0.95	395,500	395,500
Air Cargo Ramp (SY)		
Domestic Cargo	144,800	144,800
International Transfer	812,700	812,700
International Transit	356,500	356,500
Air Mail Facility		
Building (SF)	90,600	90,600
Apron (SY)	24,800	24,800
Flight Kitchen Requirements (SF)	44,600	44,600
Fuel Storage (gallons)		
(7-day supply)	40,810,500	40,810,500
GA-Jet A	364,000	364,000
GA-AvGas	50,000	50,000
General Aviation		
Hangar (SF)	300,000	300,000
Office (SF)	80,000	80,000
Apron (SY)	144,000	144,000
ARFF	20,000	20,000
Airport Maintenance Building (SF)	240,000	240,000

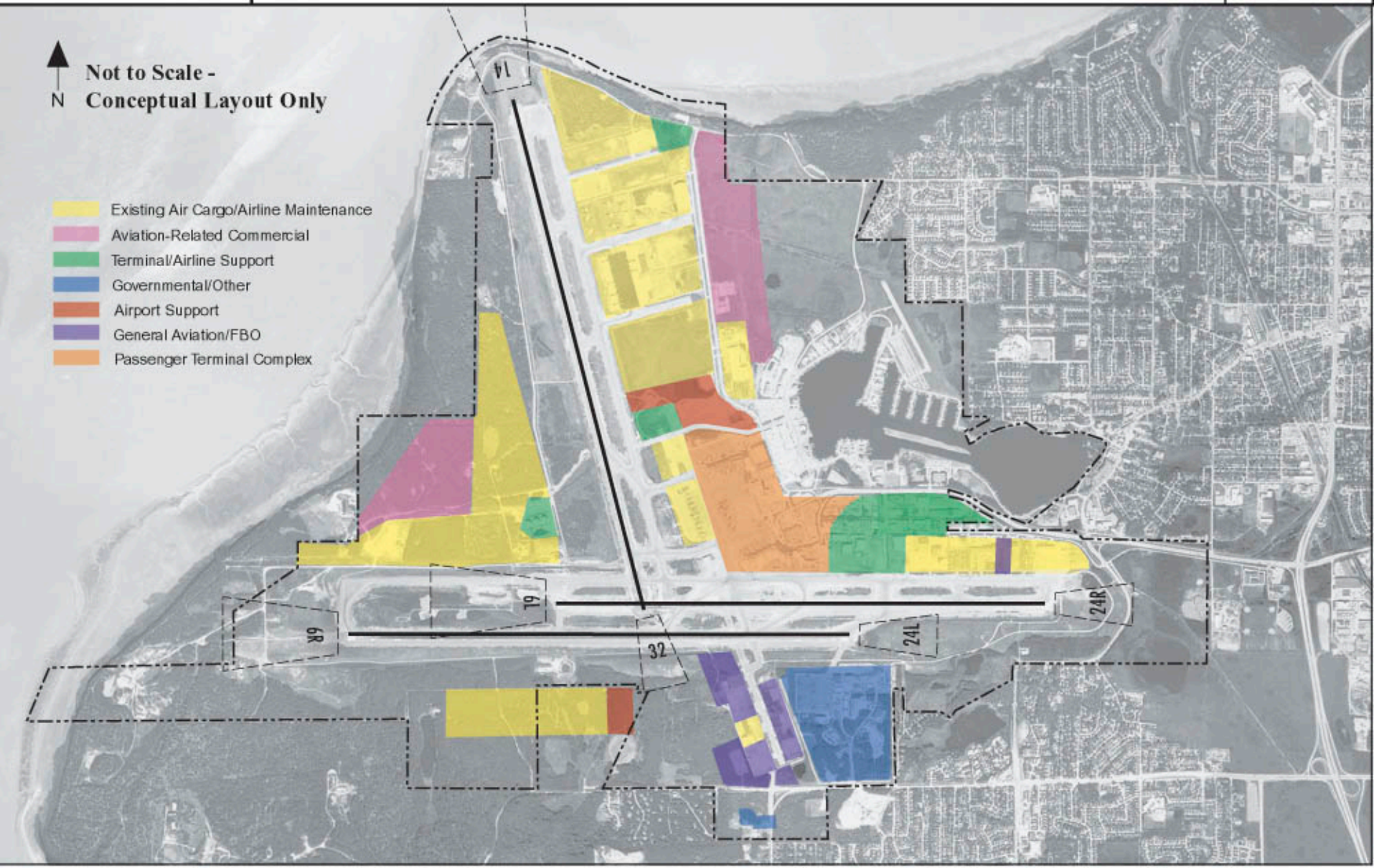
Notes: (1) Same as 2020 Master Plan Requirements

Source: HNTB analysis.

Ted Stevens Anchorage International Airport

Alternative 1 - No Airfield Expansion within the Region Including ANC

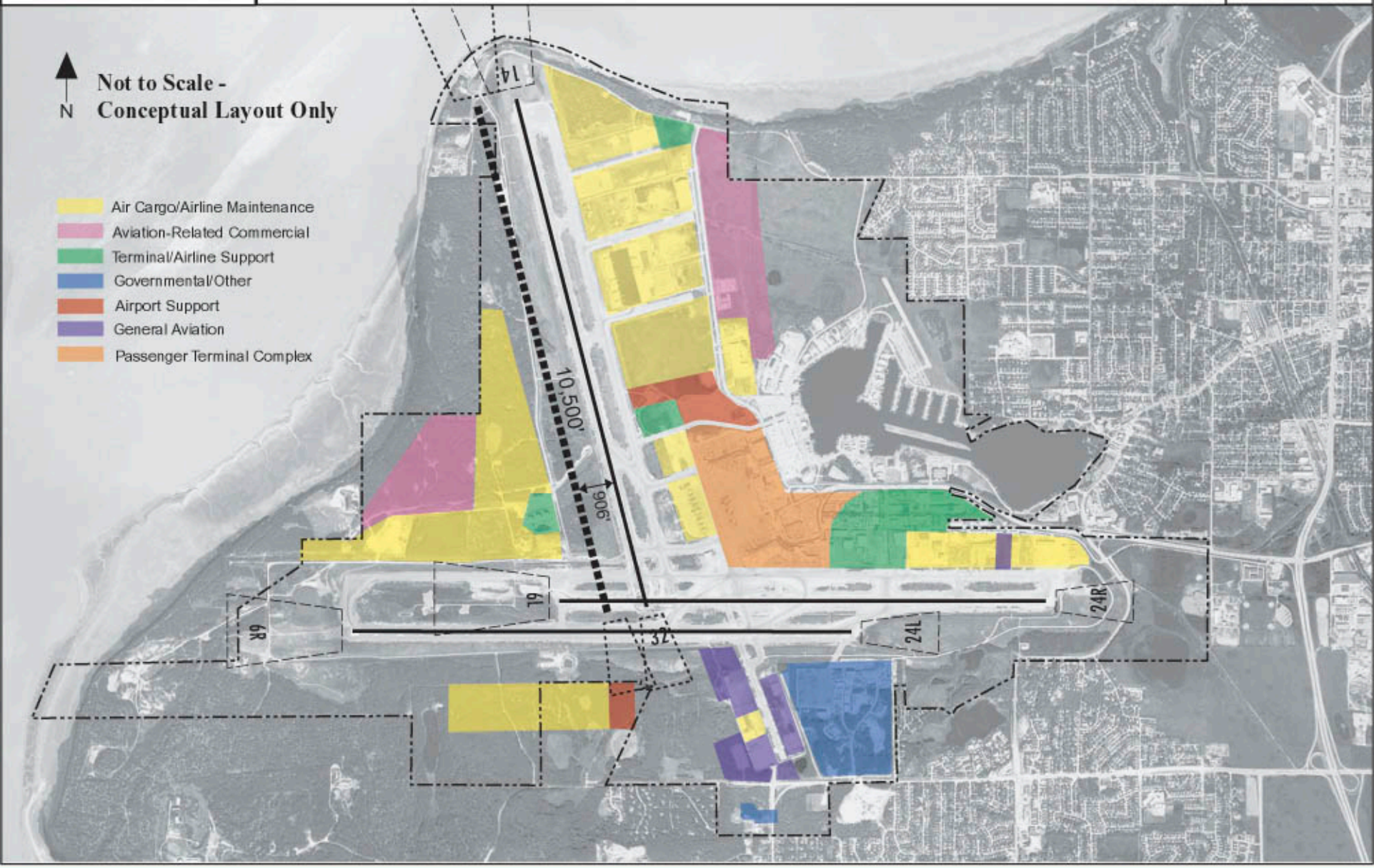
Figure 4-3



Ted Stevens Anchorage International Airport

Alternative 2- Limited Airfield Expansion of ANC
(Also ANC Component of Alternatives 3 and 4)

Figure 4-4



Alternative 3 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island. This alternative includes the improvement described in Alternative 2, plus additional facilities on Fire Island. As shown in **Figure 4-5**, this concept includes a new 9,000-foot east-west runway and a 12,000-foot north-south runway on Fire Island. Although the facility requirements determined that a single runway would accommodate the allocation of airfield demand, a preliminary airspace analysis concluded that two runways are necessary to work within the confined airspace created by ANC, LHD, and EDF. In addition, the northerly Matanuska winds, described in Section 4.2, may require a crosswind runway. The east-west runway is positioned 3,400-4,300 feet south of Runway 6R-24L at ANC, which would allow some independent operations to the new runway at Fire Island and Runway 6R-24L at ANC. Additional length of the east-west runway could be achieved by sliding the runway north. However, this would eliminate any opportunity to run independent operations into the two airports, which means the full potential for capacity gains will not be realized. A causeway would be required for vehicle access to Fire Island.

Alternative 4 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport in Point MacKenzie. This alternative includes the improvements described in Alternative 2, plus additional facilities on Point MacKenzie. As shown in **Figure 4-6**, this concept includes a new 12,200-foot north-south runway and a new 12,200-foot east-west runway. Two runways are provided in this alternative for the same reasons described in Alternative 3. Several airfield configurations were analyzed within the boundaries of the former Knik Aviation Reserve.

Although existing wind data and capacity requirements indicate that a single east-west runway would be adequate to accommodate 2020 Base Case Forecast demand, a north-south runway was included to maintain traffic flows consistent with both EDF and ANC and to provide crosswind capabilities for those days that the northerly Matanuska winds are prevalent.

From an operational perspective, a north-south runway positioned as far to the east on the site as possible would provide the most flexibility for aircraft flow. However, from access and community impact perspectives, the north-south runway was positioned as far to the west on the site as possible. The analysis compares driving distances to assess the need for a Knik Arm Crossing as part of this alternative.

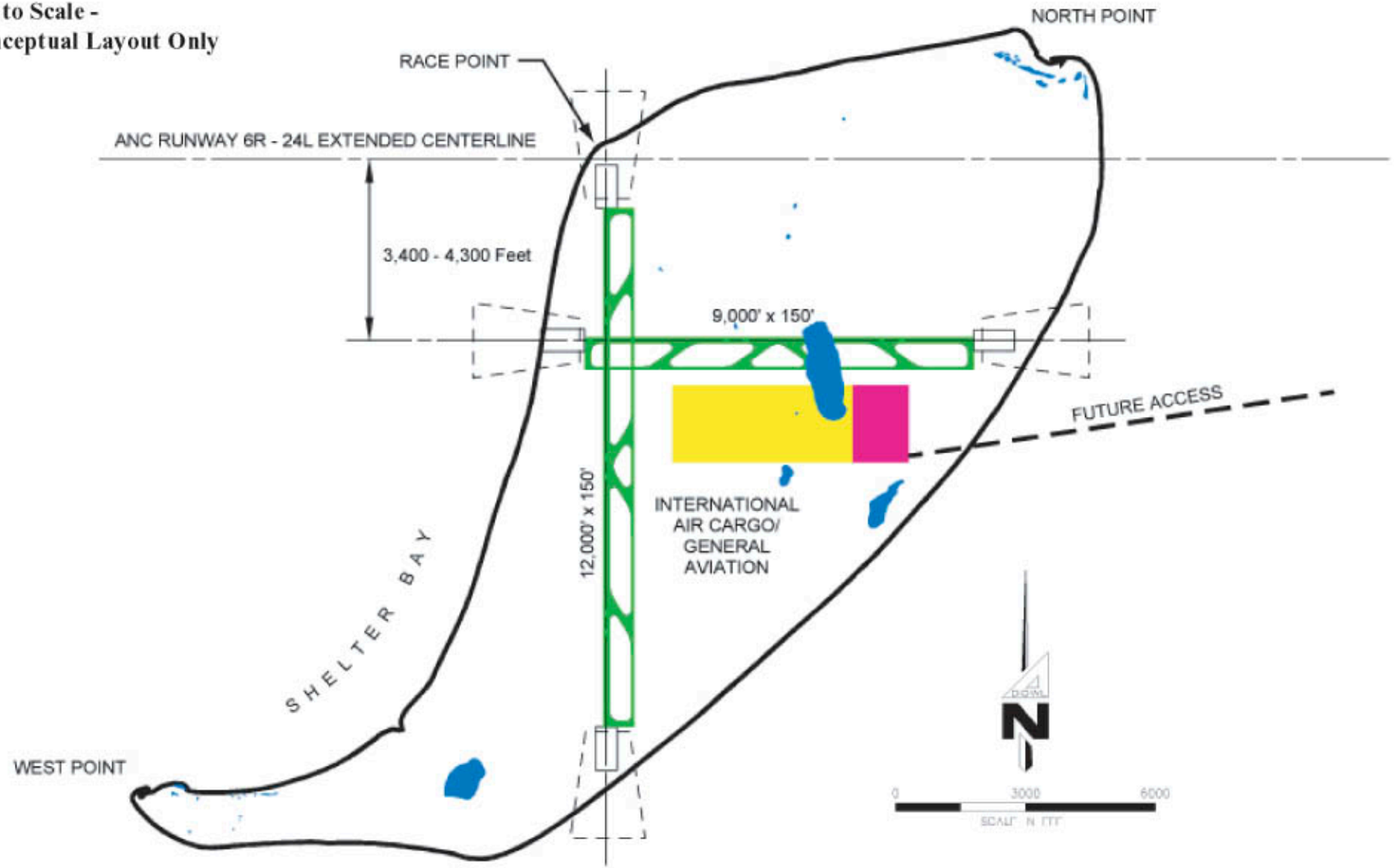
Alternative 5 – Full Development of ANC including Development beyond Existing Borders. As shown in **Figure 4-7**, this alternative includes a new north-south runway, as described in Alternative 2, and a new east-west runway positioned between 2,500 and 5,000 feet from Runway 6L-24R. As indicated previously, this separation would not have any dependencies due to wake turbulence generated by heavy aircraft operating on one of the runways. In addition, independent IFR departures could be accommodated on the parallel runways. The extent of additional IFR arrival capacity would depend on the final runway-to-runway separation. Since the primary use of the runway would be for arrivals, an 8,500-foot runway is provided. This additional runway would allow Base Case Forecast aviation demand to be accommodated through the planning year 2020.

Ted Stevens Anchorage International Airport

Alternative 3- Fire Island

Figure 4-5

Not to Scale - Conceptual Layout Only



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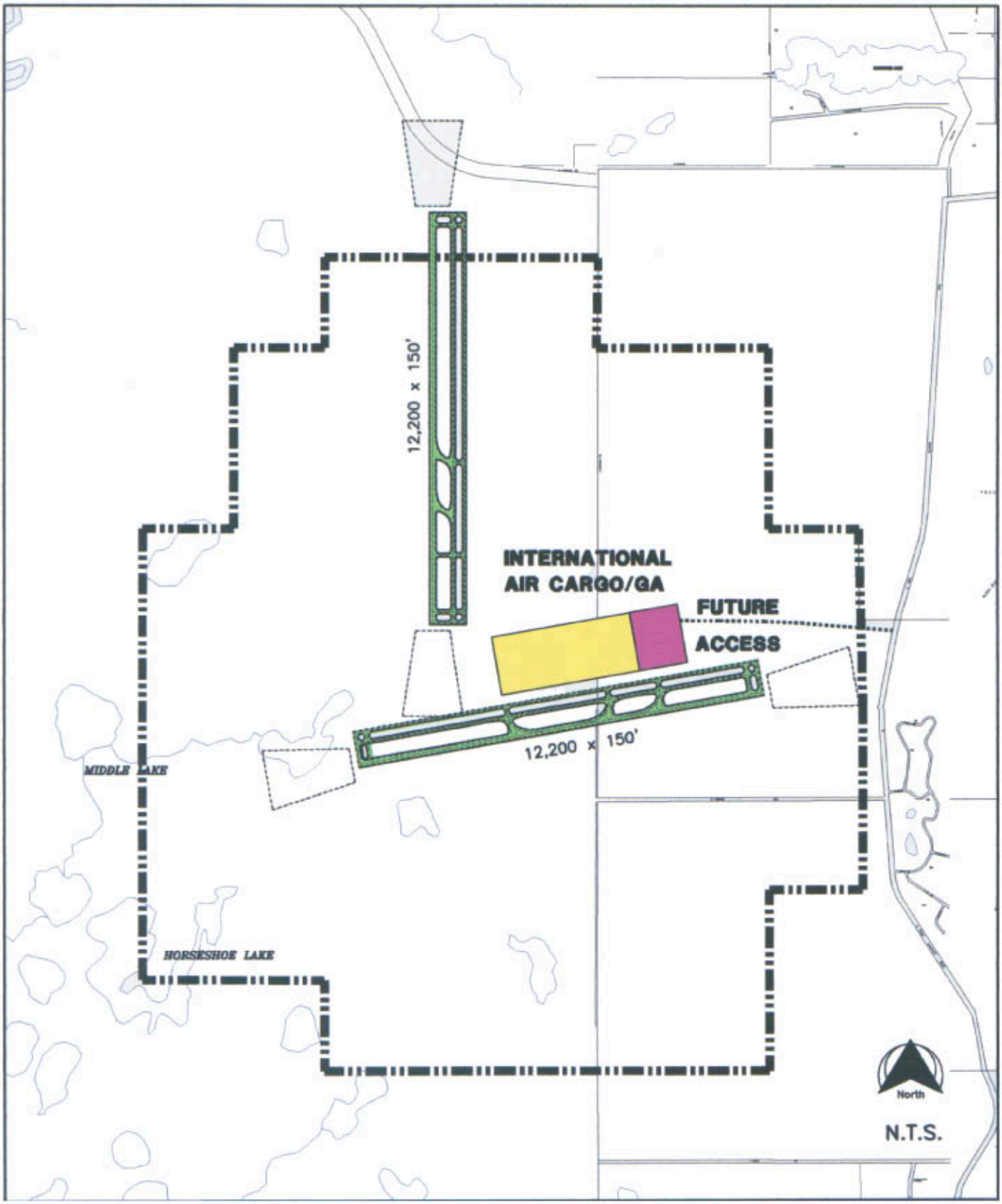
Alternative 4- Point MacKenzie Supplemental Airport

Figure 4-6

Not to Scale - Conceptual Layout Only



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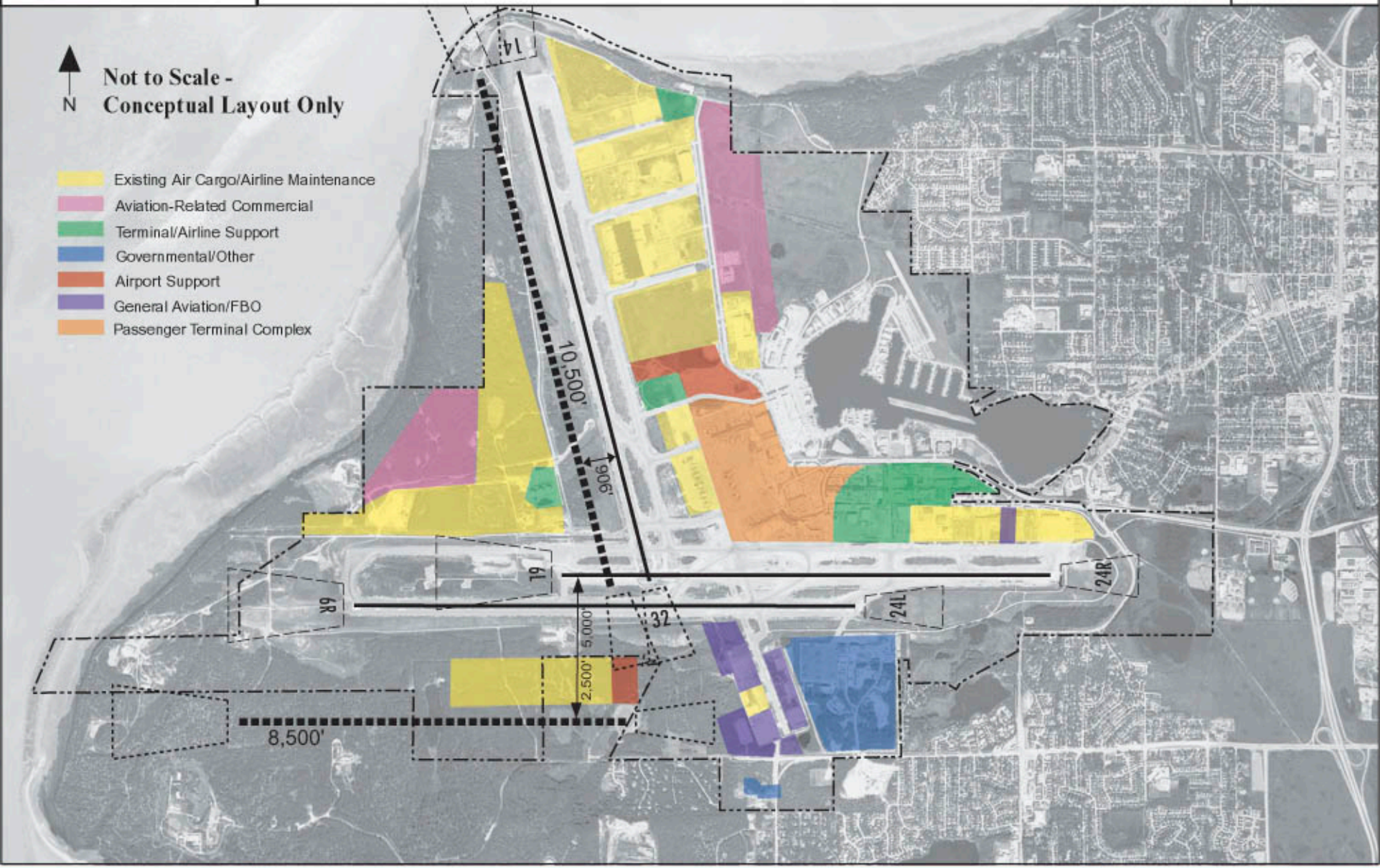
Alternative 5 - Full Development of ANC

Figure 4-7



Alternative 6 – Closure of ANC and Development of a New Airport in Point MacKenzie. **Figure 4-8** depicts the configuration for a replacement airport on Point MacKenzie. This configuration includes two north-south runways separated by 2,500 feet and two east-west runways separated by 4,500 feet. Based on the operational configuration of ANC and the winds described for Point MacKenzie, it is assumed that a crosswind capability will be required. Based on this assumption, all four runways would be required to accommodate the projected Base Case Forecast demand. If a replacement airport is a viable alternative, it would be necessary to obtain additional on-site wind data. Additional airspace analysis would also have to be performed to determine the optimal orientation of the runways. The analysis determined if a bridge across the Knik Arm for access to Point MacKenzie would be required to make a new airport at this location feasible.

4.6 EVALUATION OF ALTERNATIVES

Each alternative was evaluated with respect to a series of criteria using quantitative or qualitative analysis, as appropriate. The results of the analysis are provided in a summary format that relies predominantly on the use of graphics and tables. The detailed evaluation results are included, where appropriate, as appendices to this summary document.

4.6.1 Evaluation Criteria

The evaluation criteria used for this analysis are as follows:

Airside/Landside Considerations – This criterion considers the overall effectiveness of the resulting airport layout. Factors include ease of aircraft taxiing operations to and from the airfield to parking areas and ease of egress to and from the access roadway system to landside facilities. In addition, it considers whether or not each alternative meets the long-term capacity requirements.

Airspace/Safety – The primary objective was to determine if adding a supplemental or third airport to the existing system is feasible. The evaluation also identifies critical airspace capacity issues. Safety criteria include interactions with other aircraft, terrain, and weather.

Surface Transportation – The impact to driving distances and costs for passengers, employees, and commercial vehicles are considered. In addition, the evaluation considers whether or not a bridge across Knik Arm is needed to make a new airport in Point MacKenzie feasible.

Noise Impacts – Projected 2020 noise impacts are identified and quantified for each alternative.

Other Environmental Impacts – Impacts on air quality, wetlands, water quality, Section 4f lands, and others are qualitatively evaluated.

Economic Impacts – The impact on potential job and payroll creation is considered for each of the alternatives. Direct, indirect, and induced economic impacts are not included.

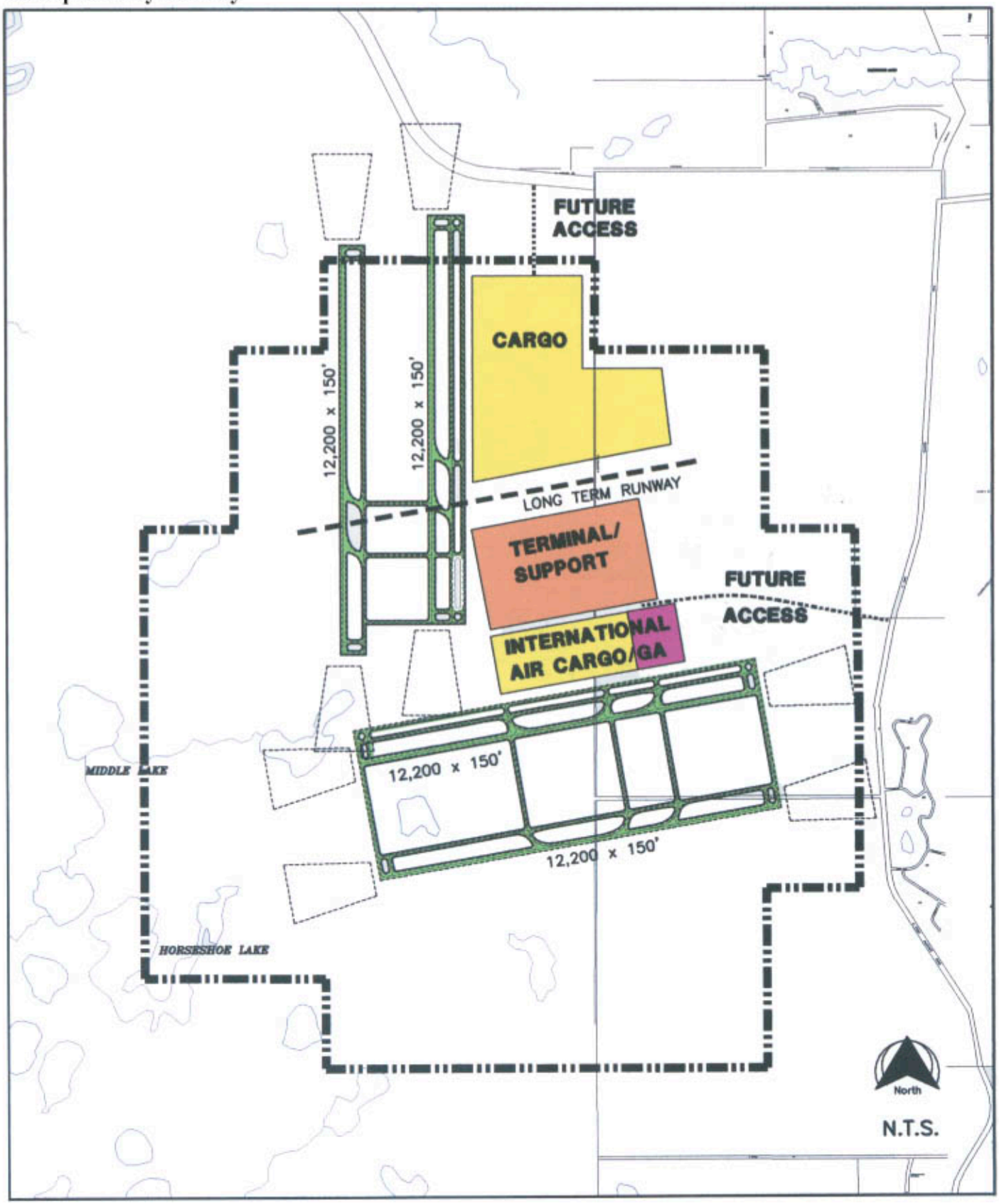
Development Costs – Order-of-magnitude development costs are considered. Potential costs include facility development, land acquisition, environmental mitigation, and off-airport bridges and roads.

Ted Stevens Anchorage International Airport

Alternative 6- Point MacKenzie Replacement Airport

Figure 4-8

Not to Scale - Conceptual Layout Only



Financial Feasibility – The impact to tenant rates and charges are evaluated. The analysis considers capital costs, maintenance and operational costs, and non-airline revenue contribution. The analysis only considers those projects for which DOT&PF has implementation responsibility.

MOA Comprehensive Plan Compatibility – The Anchorage 2020 Anchorage Bowl Comprehensive Plan addresses the community's vision for growth over the next 20 years. The compatibility of each alternative with the MOA Comprehensive Plan is addressed.

The results of the evaluation are described below.

4.6.2 Airside/Landside Considerations

Following are general statements that can be made for several of the alternatives:

- Alternatives 1 through 5 include expansion of landside facilities at ANC. The alternative conceptual layouts indicate that expansion to the west side and, potentially, the south side of the Airport would be required. Access to and between all sides would be critical to making the overall operation efficient. For this analysis, a tunnel from the existing east side development area to the west side was assumed for all five alternatives.

- One advantage to the development of a new airport, supplemental or replacement, is that the airside/landside area could be configured to keep all facilities on one side of the airfield, thus avoiding the need to go around or through (tunnel under) the airfield to get to other development areas.

- Although well managed, the airside/landside interaction with LHD will always be a consideration with Alternatives 1 through 5. Again, the development of a new airport (Alternative 6) would allow for more compatible adjacencies between different types of aviation land uses.

- In Alternatives 1 through 5, there is adequate land area available for terminal expansion. However, there may not be adequate area available for terminal support facilities (e.g., rental car, parking, etc.) expansion. This could require relocation of existing GA, air cargo, airport maintenance, and other airport support facilities to other areas of the Airport that would increase the cost of development.

Alternative 1 – No Airfield Expansion at ANC

The existing airport layout will continue to function efficiently. There will be opportunities through new facility development in the West Airpark and redevelopment of older facilities like those in the East Airpark to reduce non-compatible adjacencies, provide additional areas for terminal support development, and improve the interface with LHD facilities.

Alternative 1 does not meet long-term airfield capacity requirements for the region based on current Base Case Forecast projections. Use of technology and/or demand management techniques would be required to accommodate 2020 Base Case Forecast demand at ANC.

Alternative 2 – Limited Airfield Expansion at ANC within Existing Borders

The existing airport layout will continue to function efficiently. There will be opportunities through new facility development in the West Airpark and redevelopment of older facilities like those in the East Airpark to reduce non-compatible adjacencies, provide additional areas for terminal support development, and improve the interface with LHD facilities.

Alternative 2 may not meet long-term airfield capacity requirements for the region based on Base Case Forecast current projections. Use of technology and/or demand management techniques could be required if the Base Case 2020 Forecast were to be realized.

Alternative 3 – Limited Airfield Expansion at ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island

The existing airport layout at ANC will continue to function efficiently. There will be opportunities through new facility development in the West Airpark and redevelopment of older facilities like those in the East Airpark to reduce non-compatible adjacencies, provide additional areas for terminal support development, and improve the interface with LHD facilities.

The intersecting runway configuration at Fire Island does not provide as much capacity as the existing converging runway configuration at ANC. From east to west, the layout of the airport with roadway/bridge access to aviation facilities to the airfield would work well and would allow for development of compatible adjacencies between aviation-related land uses. However, there may be interaction between the two airports that would require cargo carriers to truck cargo between the two facilities.

Because of airspace issues (see Section 4.6.3, Airspace/Safety), Alternative 3 would not be likely to meet long-term airfield capacity requirements based on current Base Case projections.

Alternative 4 – Limited Airfield Expansion at ANC within Existing Borders and Development of a New Supplemental Airport on Point MacKenzie

The existing airport layout will continue to function efficiently. There will be opportunities through new facility development in the West Airpark and redevelopment of older facilities like those in the East Airpark to reduce non-compatible adjacencies, provide additional areas for terminal support development, and improve the interface with LHD facilities.

- The converging runway configuration at Point MacKenzie would work well with the existing airspace structure. However, long-term growth may require use of a more parallel runway configuration (likely east-west) that could be accommodated with development of a flexible land use plan.

- Development of a new airport site would provide the opportunity for the airside/landside area to be configured to keep all facilities on one side of the airfield, thereby avoiding the need to go around or through (tunnel under) the airfield to get to other development areas. In addition, a new airport site at Point MacKenzie would allow development of compatible adjacencies between aviation-related land uses.

However, there may be interaction between the two airports that would require cargo carriers to truck cargo between the two facilities. Improved vehicle access from Anchorage to the Point MacKenzie would be required.

- Based on current Base Case Forecast projections, Alternative 4 would meet long-term airfield capacity requirements for the region.

Alternative 5 – Full Development of ANC Including Development beyond Existing Borders

The existing airport layout at ANC will continue to function efficiently. There will be opportunities through new facility development in the West Airpark and redevelopment of older facilities like those in the East Airpark to reduce non-compatible adjacencies, provide additional areas for terminal support development, and improve the interface with LHD facilities.

Development of airside and landside facilities on the south side of the Airport, potentially outside existing airport boundaries, would be required. The roads accessing the facilities on the south side would have to be upgraded.

- Based on the Base Case Forecast projections, Alternative 5 would meet long-term airfield capacity requirements for the region.

Alternative 6 – Closure of ANC and Development of a New Airport on Point MacKenzie

This alternative provides the best opportunity to develop an efficient access/landside/airside layout plan for long-term (post-2020) capacity, and maintain compatible adjacencies between aviation-related land uses. Improved access to the site would be required.

- Based on the Base Case Forecast projections, Alternative 6 would meet long-term aviation facility requirements for the region.

4.6.3 Airspace

The purpose of this analysis was to evaluate potential significant airspace issues associated with the alternatives under consideration for expansion of air traffic capacity for the Anchorage area. The method used to conduct the analysis was to develop a general conceptual airspace design for each alternative. Sufficient analysis was performed to identify probable major airspace issues. A detailed analysis is included in **Appendix B**. The study methodology incorporated, to the extent possible, the current FAA airspace and air traffic rules. These rules are based on the safe and efficient separation of aircraft, both from each other and from terrain and other man-made obstacles. New technologies and procedures were considered only for those alternatives that have a high likelihood of success. For example, positive course guidance was assumed in all phases of flight using GPS Wide Area Augmentation System (WAAS) or Local Area Augmentation System (LAAS).

Parameters

The conceptual airspace design attempted to use procedures that would provide the minimum amount of controller/controller coordination. Thus, for each major arrival or departure operation, routings were defined and altitudes assigned to keep aircraft

procedurally separated from other aircraft routings and altitudes within the terminal airspace. The intent was to develop an airspace structure that would minimize interactions between aircraft and allow maximum capacity. This analysis was developed by assuming the following:

- Use of current arrival and departure routes at ANC and EDF.
- Distance and altitude separations based on heavy aircraft at both ANC and the supplemental/replacement airport at either the Fire Island or Point MacKenzie sites.
- Use of climb profile from the FAA's Integrated Noise Model (INM) for B747-400 aircraft at MTOW.

For each alternative, the airspace was designed for four runway use configurations: Configuration A, landings from the west and departures to the north; Configuration B, landings to the south and departures to the west; Configuration D, landings and departures to the east; and, Configuration G, landings to the south and departures to the east. To illustrate the complexity of the airspace design process, conceptual airspace systems are provided for Configuration A (the highest use configuration) for each of the new airport alternatives (Alternatives 3, 4, and 6) in **Figures 4-9 through 4-11**. Airspace systems for all alternatives and configurations are provided in Appendix B.

The viability of alternatives was principally analyzed according to the following factors, which determine the efficiency of the airspace:

- **The number of airspace interactions occurring for a given alternative.** An interaction is where the flight paths of two separate aircraft do not have required vertical and/or horizontal separation and ATC must provide separation. Increases in interactions affect capacity by incurring delays in arrivals and departures. Generally, airspace structures that include only two airports work better than airspace structures that include three airports due to the number of interactions that three airports create.
- **The lengths of air carrier arrival/departure routes.** Increases in route lengths add time/fuel costs for arrivals/departures and affect capacity by incurring delays in arrivals.
- **Impacts on EDF.** This includes new arrival/departure routes or changed altitudes on existing routes that restrict military training routes and other military training activities.
- **Impacts to GA.** This includes new arrival/departure routes or changes in airspace classification that further limits, or altogether restricts, existing GA corridors over Point MacKenzie.
- **Weather factors.** Adverse wind conditions or fog affect capacity by delaying arrivals/departures.

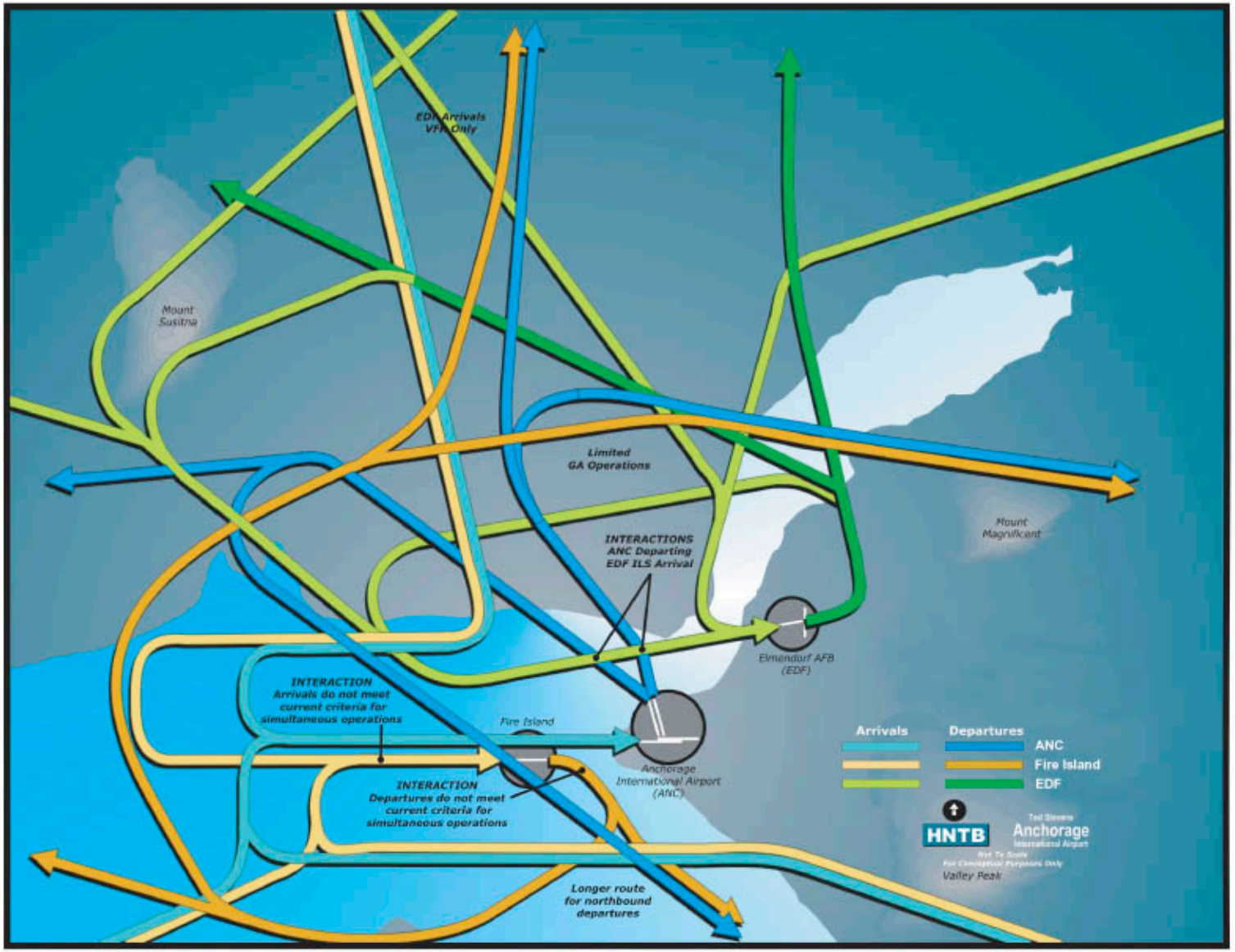
Alternative 1 – No Airfield Expansion at ANC

The airspace structure would not change. The airspace efficiency rating for this alternative is good. ANC and EDF would have the same number of interactions as they do today (four). No additional impacts on air carrier routes, EDF training, or GA would be introduced. No additional limitations (wind, weather) were identified.

Major Arrival and Departure Routes-Alternative 3

Fire Island (2 Runways) Configuration A

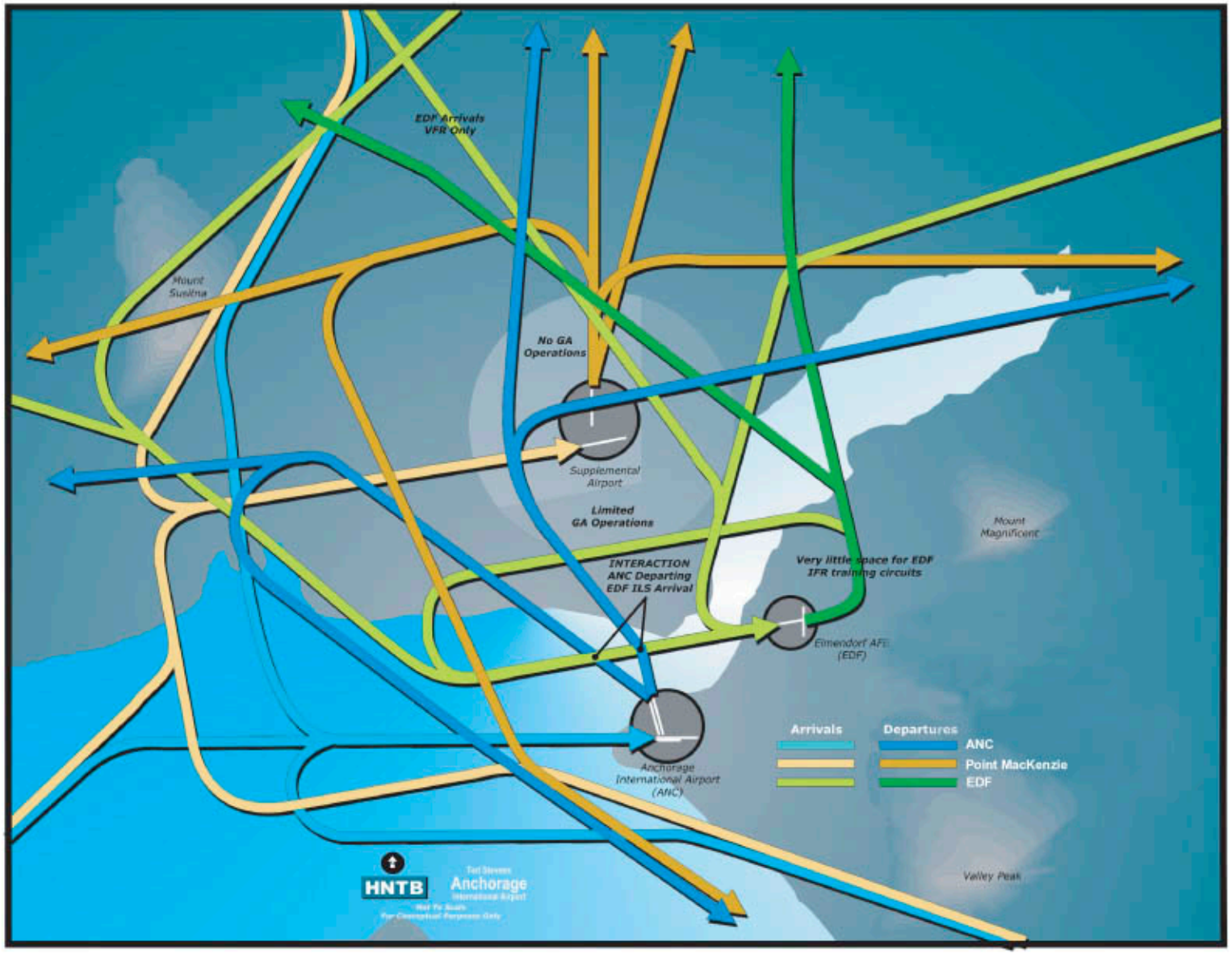
Figure 4-9



Major Arrival and Departure Routes-Alternative 4

Point MacKenzie Configuration A

Figure 4-10

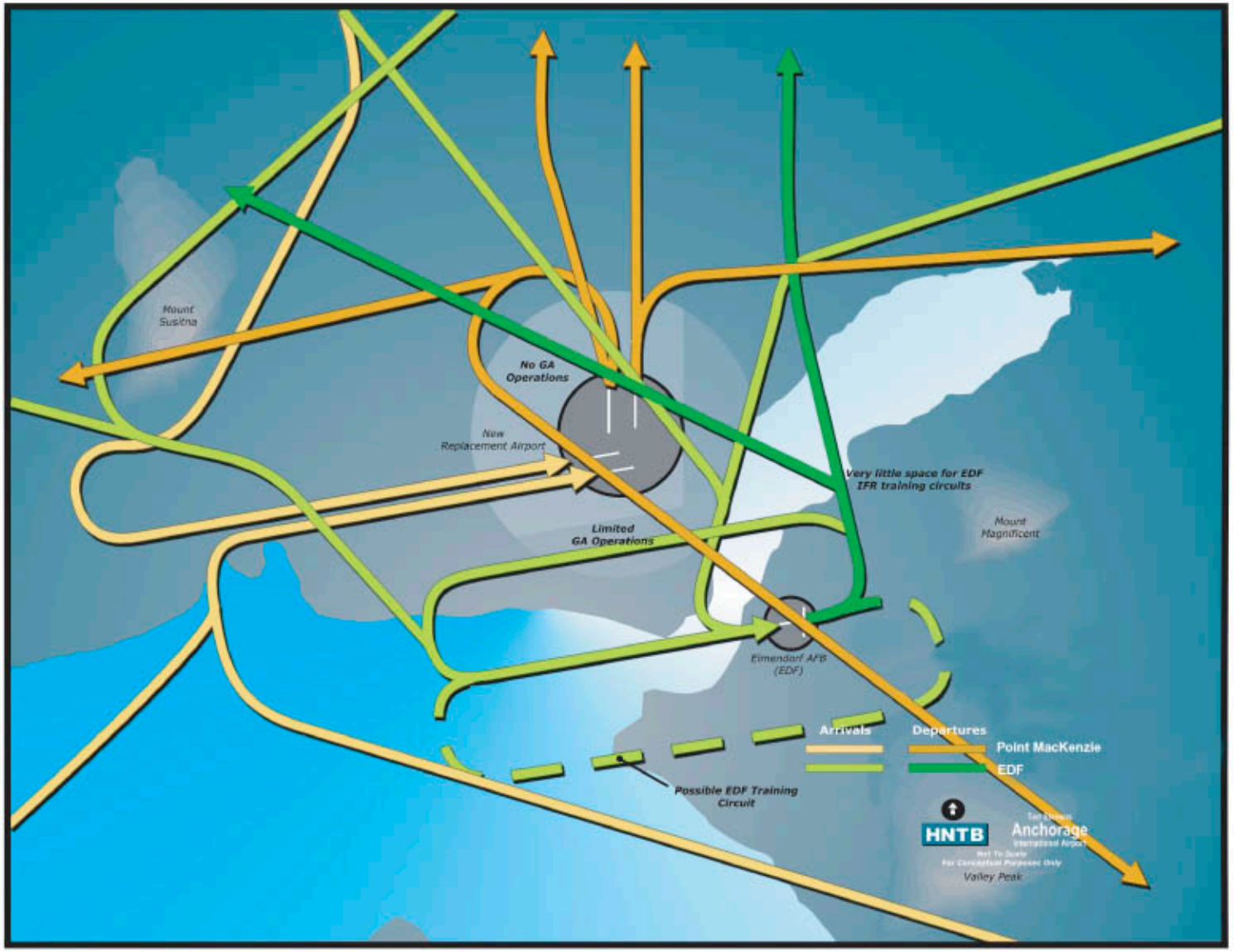


Ted Stevens Anchorage International Airport

Major Arrival and Departure Routes-Alternative 6

Point MacKenzie Configuration A

Figure 4-11



Alternatives 2 — Limited Airfield Expansion of ANC within Existing Borders

The airspace structure would not change. The general airspace efficiency rating would be good. There would be additional interactions with EDF with the addition of a second north-south runway. Discussions with FAA indicate that the operations of the two north-south runways would be similar to the one runway scenario and that delays would vary daily depending on the combined traffic levels of the two airports. No additional impacts on air carrier routes, EDF training, or GA would be introduced. No additional limitations (wind, weather) were identified.

Alternative 3 - Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island

An airspace structure could be designed for this alternative, however, the airspace efficiency rating is poor. Generally, airspace structures with three airports (ANC, EDF and Fire Island) tend to be less efficient than airspace structures for two airports (ANC, EDF). Based on existing criteria, simultaneous operations between the new east-west runway at Fire Island and current Runways 6R-24L and 6L-24R at ANC cannot be conducted because of their proximity to each other. Special procedures and approvals from the FAA would need to be secured for these two runways to operate simultaneously. While these approvals may be possible, there is no certainty that they can be secured. ATC indicates the approvals for these procedures are unlikely for some time, based on technology and reluctance within the FAA to address these types of issues.

This alternative has significantly more interactions (29) than any other alternative. Air Carrier departure routes and EDF training routes would be increased. No additional impacts on GA are anticipated. Fire Island experiences a weather pattern that produces widespread turbulence and wind shear, which may affect operations.

Without the special procedures, there would not be a significant increase in regional airfield capacity and the long-term Base Case Forecast demand would not be met.

Alternative 4 - Limited Airfield Expansion of ANC within Existing Borders and Development of a New Airport at Point MacKenzie

An airspace structure could be designed for this alternative. The airspace efficiency rating is good, however, airspace structures with three airports (ANC, EDF and Point Mackenzie) tend to be less efficient than airspace structures for two airports (ANC, EDF).

This alternative does not eliminate the current interactions between ANC and EDF. Similar to Alternative 2, there would be additional interactions with the second north-south runway at ANC. There are 14 interactions in all, the second highest of the alternatives.

This alternative could increase the length of north departure routes from ANC in some configurations.

The primary impact of the supplemental airport is to EDF IFR training flights; the military would probably have to fly much

longer routes. The EDF training aircraft may be able to fly shorter routes when only a few aircraft at a time are training. All current EDF C-130 station-keeping equipment (SKE) routes would need to be changed and a new drop zone to replace Restricted Area R-2203 would probably be needed. The C-130 VFR and night-vision goggle (NVG) routes would also be impacted.

GA aircraft that transit the area would have to fly much longer routes to avoid the supplemental airport. GA aircraft that want to land or depart close to the supplemental airport would need to receive clearances from ATC. No other limitations (wind, weather) were identified for this alternative.

Alternative 5 — Full Development of ANC Including Development beyond Existing Borders

An airspace structure that includes a new north-south runway and a new east-west runway at ANC could be designed for this alternative. The airspace efficiency rating is good. Generally, airspace structures with two airports (ANC, EDF) are more efficient than airspace structures with three airports (ANC, EDF, and Fire Island or Point MacKenzie).

Similar to Alternative 2, there would be additional interactions with EDF with the addition of a second north-south runway. The new east-west runway was not evaluated in detail, however, input from the FAA indicates that a third east-west runway is feasible from an airspace perspective without significant increases in interactions.

No additional impacts on air carrier routes, EDF training, or GA would be introduced. No additional limitations (wind, weather) were identified.

Alternative 6 - Closure of ANC and Development of a New Airport in Point MacKenzie

An airspace structure could be designed for this alternative. This airspace structure has the potential to improve efficiency over existing conditions and is rated very good. For the most part, the worst interactions between ANC and EDF that affect capacity are eliminated. The new conceptual airspace has the fewest interactions of all the alternatives that might affect airport capacity.

IFR training operations at EDF are affected by Alternative 6, similar to Alternative 4. In both alternatives, all current EDF C-130 SKE routes would have to be changed and a new drop zone to replace Restricted Area R-2203 would probably be necessary. C-130 VFR and NVG routes are also impacted. There is the potential to re-route EDF IFR training operations to the south, which would result in no impact to distance flown for EDF IFR training operations. However, there are operational safety concerns like obstruction clearance requirements and the concern that the new routes might create increased noise impacts to the MOA. These concerns would have to be weighed against the reduction in noise resulting from moving ANC to the new site.

GA aircraft that transit the area would have to fly much longer routes to avoid the new airport. GA aircraft that want to land or depart close to the replacement airport would need to receive clearances from ATC. No other limitations (wind, weather) were identified for this alternative.

Table 4.8 provides an overview of the differences between the alternatives in matrix form. Detailed findings are provided in **Appendix B**.

Table 4.8

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Airspace Evaluation Matrix

	Alternative 1 – No Airfield Expansion at ANC (2 airport system)	**Alternative 2 – Limited Airfield Expansion of ANC within Existing Borders (2 airport system)**	**Alternative 3 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Airport at Fire Island (3 airport system)**	**Alternative 4 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Airport at Point MacKenzie (3 airport system)**	**Alternative 5 – Full Expansion of ANC, including Development beyond Existing Borders (2 airport system)**	**Alternative 6 – Closure of ANC and Development of a New Airport at Point MacKenzie (2 airport system)**
General Airspace Efficiency Rating	Good	Good	Poor	Good	Good	Very good
Total Interactions That Reduce Airspace Efficiency	4	8	29	14	8 (1)	None
Impacts on Air Carrier Arrival/Departure Routes	None	None	Increases Length of ANC West Departure Routes for Configurations D, G	Increases Length of ANC North Departure Routes for Configurations B, G	None (1)	None
Impacts on Elmendorf AFB IFR Training Routes	None	None	Increases Lengths of Existing Routes for Configurations B, G	Increases Lengths of Existing Routes for Configurations B, G	None	Increases Lengths of Existing Routes for Configuration B
Impacts on General Aviation at Point MacKenzie	None	None	None	Significantly Limits Operations	None	Significantly Limits Operations
Other Limitations (wind, weather)	None	None	Wind Shear	None	None	None

Notes: (1) The new east-west runway at ANC was not evaluated in detail, however, the FAA indicated that a third east-west runway is feasible without significant increases in interations. EDF is included in all systems.

Source: HNTB analysis.

4.6.4 Access/Surface Transportation

The results of access surface transportation evaluations are provided, as shown in **Table 4.9**. Detailed analysis is provided in **Appendix C**. All of the proposed alternatives are expected to generate increased traffic to, from, and around the Airport because of the increase in airport operations projected for 2020 as compared to 2000. Some of the alternatives would require major capital construction projects. Alternative 3 would require construction of a causeway to Fire Island to be feasible. Alternatives 4 and 6 would likely necessitate construction of a bridge between Anchorage and Point MacKenzie.

Average driving distance, driving time, travel cost, and Time Costs were calculated for each alternative by selecting a population centroid for the MOA and the Mat-Su. The MOA centroid is located at the intersection of West Northern Lights Boulevard and C Street. The Mat-Su centroid is the intersection of Palmer-Wasilla Highway and Matanuska Trunk Road. For the alternatives that involve travel to a new airport at Point MacKenzie, the intersection of Holstein Avenue and Guernsey Road is used as the trip destination point.

Travel cost per mile is calculated at $0.337 for employees and passenger vehicles. The commercial vehicle travel cost is an average of $0.337 per mile (for automobiles) and $1.50 per mile (for heavy commercial vehicles), equal to $0.9285 per mile to reflect a mixture of passenger vehicles and heavy commercial vehicles being used for commercial purposes. Commercial vehicle trips include only international air cargo and GA-related trips to the supplemental airports.

Table 4.9

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Surface Transportation Costs for Each Alternative, Year 2020*

	Total Annual Travel Cost (Millions of 1998$)	Total Annual Time Cost (Millions of 1998$)	Total Annual Travel and Time Costs (Millions of 1998$)
Alternative 1	47.5	42.6	90.1
Alternative 2	57.9	51.0	108.9
Alternative 3	166.0	144.5	310.5
Alternative 4			
Without a Bridge	327.7	164.7	492.4
With a Bridge	185.3	104.2	289.5
Alternative 5	91.6	78.0	169.6
Alternative 6			
Without a Bridge	757.3	374.2	1,131.5
With a Bridge	354.2	172.9	527.1

*Excludes capital costs of building the bridges for Alternatives 3, 4 and 6.

Source: Northern Economics, Inc.

The number of vehicle trips is a function of the number of employees, airport passengers, or commercial vehicles that travel to a specified airport. The number of vehicle

trips for employees and airport passengers is adjusted downward in this analysis to take into account various vehicle occupancy rates.

Approximately 38 percent of the residents of Mat-Su commute to Anchorage for work, therefore, it is assumed that just over nine percent of the employees at ANC commute from Mat-Su. Travel distances, times, and costs were calculated separately for employees traveling from Anchorage and from Mat-Su to the various alternatives. Passengers are assumed to travel only one way while their escorts are assumed to make a round trip. Passenger operations remain at ANC in Alternatives 1 through 5.

Annual time cost considers the value of employees', passengers', and their escorts' time, using a leisure rate equal to one-third of the wage rate a person would earn if that time were spent working. Employee round-trip commuting time is valued at one-third of the average wage at ANC, based on the total number of employees and the full payroll. Passenger time is valued using one-third of the population-weighted average wage for Anchorage and the Mat-Su. The time cost of commercial vehicles utilizes the full average wage rate for ANC employees. The average wage used for airport workers was $40,246 and the average for all wage and salary jobs in Anchorage was $35,400 (1998$).[22]

Alternative 1 – No Airfield Expansion at ANC

Alternative 1 generates the lowest annual travel and Time Costs in 2020, approximately $90.1 million (1998$). One reason for the significantly lower cost is that ANC would not be able to accommodate all of the operations forecasted for 2020. As a result, there are 6,040 fewer airport employees and fewer commercial vehicle trips than under Alternatives 3 through 6. Another contributing factor is that the round-trip distance between the Anchorage centroid and ANC is only 8 miles. Employees at ANC traveling from the Mat-Su centroid are estimated to travel approximately 90 miles round trip.

Alternative 2 — Limited Airfield Expansion of ANC within Existing Borders

Alternative 2 generates the second lowest total annual travel and Time Costs, $108.9 million (1998$), because the operations demand, estimated to be accommodated at ANC in 2020, generates 3,501 fewer employees and fewer commercial vehicle trips than Alternatives 3 through 6. As with Alternative 1, the round-trip distance between the Anchorage centroid to ANC is eight miles. Employees at ANC traveling from the Mat-Su centroid are estimated to travel approximately 90 miles round trip.

Alternative 3 — Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island

Annual surface transportation costs, $310.5 million (1998$), increase for Alternative 3, in part, because all of the operations demand projected for 2020 can be accommodated in Anchorage when operations are spread between the two airports. Transportation costs also increase because of the added distance traveled by some employees and commercial vehicles to Fire Island. The round-trip mileage from the Anchorage centroid to Fire Island is estimated to be 27

22 Ted Stevens Anchorage International Airport: Economic Significance, 2000, Institute for Social and Economic Research, 2001 draft.

miles, while the round-trip for employees from the Mat-Su is estimated to be approximately 110 miles.

Alternative 4 — Limited Airfield Expansion of ANC within Existing Borders and Development of a New Airport at Point MacKenzie

Two sets of total annual travel costs were calculated for Alternative 4, with and without a bridge. Both scenarios generate significant surface transportation costs. Moving some air cargo operations to Point MacKenzie would result in increased transportation costs for employees and commercial vehicles.

Without a bridge, the annual surface transportation costs are approximately $492.4 million (1998$), even using the assumption that all employees at the new airport at Point MacKenzie would be from Mat-Su, which is 79 miles from Point MacKenzie. It is assumed that employees would not travel approximately 147 miles round trip from the MOA centroid to the new airport.

The total annual travel and Time Costs with a bridge are approximately $289.5 million. This figure includes the assumption that some employees of the Point MacKenzie Airport from both the MOA and Mat-Su would move closer to the new airport because of the long commute (65 miles round trip from the MOA centroid and approximately 79 miles round trip from the Mat-Su centroid).

Alternative 5 — Full Development of ANC Including Development beyond Existing Borders

Under Alternative 5, the total operations demand projected for 2020 would be met at ANC and annual surface transportation costs are estimated to be approximately $169.6 million because of the increase in the number of employees and an increase in the number of commercial vehicle trips.

Alternative 6 — Closure of ANC and Development of a New Airport in Point MacKenzie

With the closure of ANC and a new airport at Point MacKenzie, Alternative 6 would be expected to generate dramatic changes in both population and employment for Anchorage and Mat-Su. Without construction of a bridge, all employees at the new airport are assumed to be Mat-Su residents because of the long travel distance of approximately 147 miles from the Anchorage centroid to the proposed airport. Even so, surface transportation costs are estimated to be $1,131.5 million per year (1998$).

With a bridge, surface transportation costs are estimated to be $527.1 million (1998$). It is assumed that residents from both the MOA and the Mat-Su would move closer to the new airport.

This is the only alternative in which major increases in travel costs would be expected to occur for passengers and their escorts (62 percent from ANC and 32 percent from Mat-Su). Under all the other alternatives, passenger operations remain at ANC.

4.6.5 Noise Impacts

An evaluation of noise exposure was conducted for the six operational alternatives. The purpose of this section is to briefly describe the noise evaluation.

The FAA's INM Version 6.0b, was used to generate the DNL contours. The INM program incorporates the number of annual average daily daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) events, flight paths, and profiles of aircraft to calculate the DNL at many points on the ground near an airport. From a grid of points, contours of equal DNL are drawn by an INM program for overlay onto background maps. For purposes of comparison of the proposed alternative scenario(s), the DNL contours presented are from 60 dB through 75 dB, in 5 dB increments. The results of the INM analysis provide a relative measure of noise levels around airfield facilities.

For the alternatives analysis, the development of operations suitable for input to the INM is described in terms of flight operations, runway use, flight tracks, flight track use, and flight profiles.

Flight Operations

Table 4.2 shows the allocation of annual flight operations for each alternative among airports and aircraft categories. Relative to ANC, Alternative 1 has 301,000 annual operations, Alternatives 2 through 4 have 336,100 annual operations, and Alternative 5 has 446,200 operations. Fire Island and Point MacKenzie would each have 110,100 annual operations for Alternatives 3 and 4. Point MacKenzie's operations for Alternative 6 are identical to ANC for Alternative 5: 446,200 operations.

Operations at LHD were assumed to remain constant at 85,900 operations for all alternatives.

Runway Use

Runway use for each of the alternatives was derived from the 1998 Part 150 Update. An analysis of current radar data found the existing runway use to be consistent with the Part 150. Runway utilization for the alternatives that included new runways was derived from simply splitting equally the use of parallel runways.

The runway use from the NCP was also maintained.

For Alternative 5, arrivals from the east and departures to the east were limited on the new east-west runway for noise abatement purposes. Capacity/delay analysis may show a need to modify this assumption, at which time it would be necessary to generate new DNL contours.

Flight Tracks and Track Use

Modeled flight tracks depict the approximate paths, or ground tracks, that aircraft use as they travel to and from the Airport. A review of current radar data found the existing flight tracks to be consistent with the 1998 Part 150 Update. Therefore, flight tracks were extracted directly from the 1998 Part 150 Update. Flight tracks for new runways were modeled after the equivalent ANC runway. For example, the existing flight track to 6R at ANC was applied to the new east-west runway at Fire Island.

Flight Profiles

Flight profiles model the vertical paths of aircraft during departure and arrival to

determine the altitude, speed, and engine thrust of an aircraft at any point along a flight track. Identical to the Part 150 Update, this evaluation utilized standard INM default profiles.

Alternatives Analysis

The 2020 noise contours for the six alternatives are provided in **Figures 4-12 through 4-17**. The project team modeled DNL dB level contours for the proposed layouts using standard FAA modeling procedures. These contours were then transferred onto the zoning maps published by the MOA to depict the impacted areas. Current municipal tax parcel information for the growth area was obtained from Northern Property Tax Service. Using the municipal zoning maps, residential lot counts were completed for all areas within the 65 dB DNL contour or higher. All residential lots that were impacted by the 2020 DNL contour were included in the count, even if only a small portion of the lot fell within the contour. This criterion is based on Federal guidance that says residential use in these areas is incompatible. The land use impacts related to the development of the various alternatives are described below and summarized in **Table 4.10**.

Alternative 1 – No Airfield Expansion at ANC

Between 200 and 300 residential lots totaling 120 acres would be impacted within the 65 dB DNL and higher contours.

Table 4.10

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Noise Impacts to Residential Areas within the Year 2020 65 dB DNL

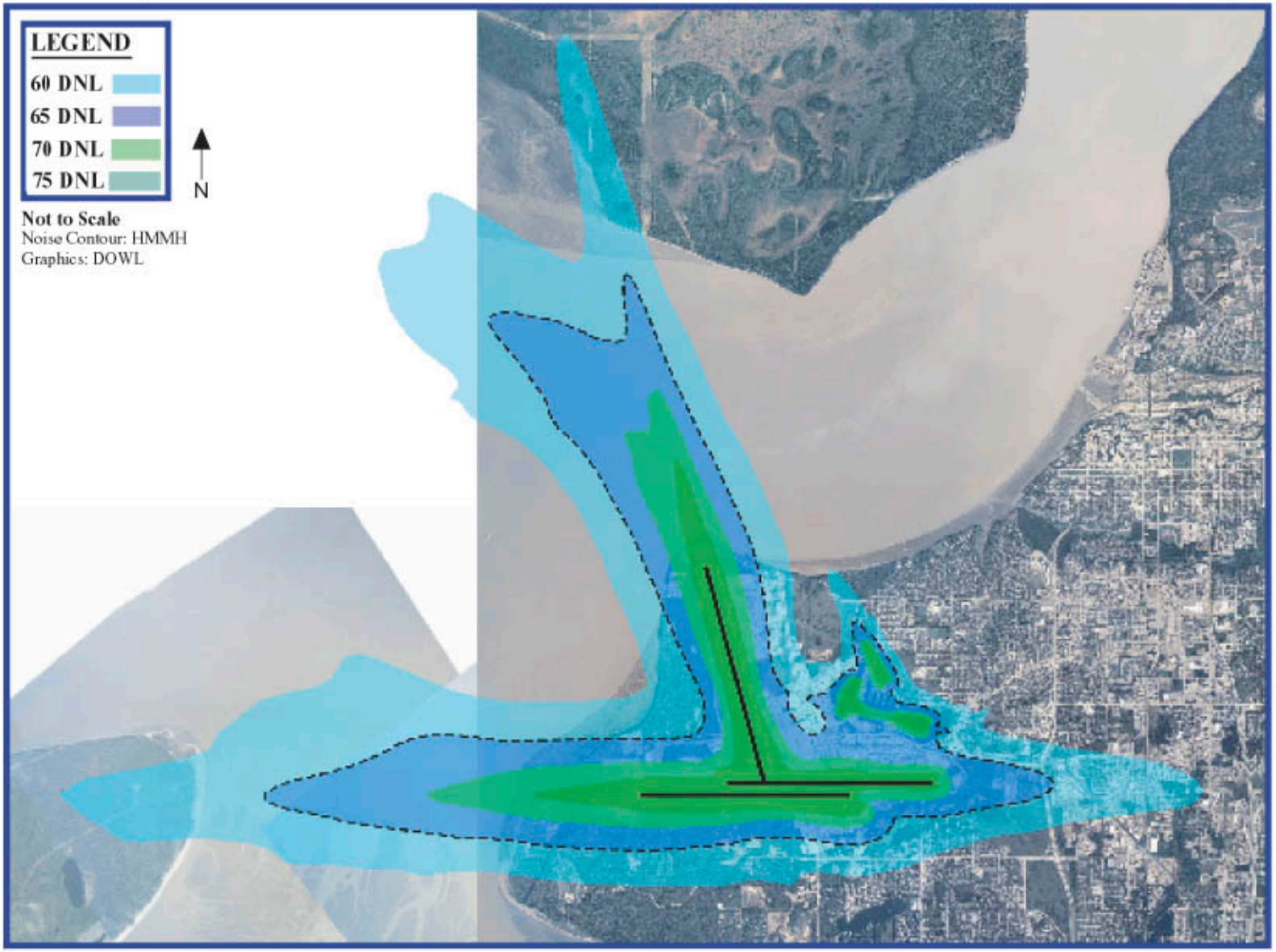
	Non-Compatible Land Uses	
	Residential Lots (ea.)	**Parcel Areas (acres)**
Alternative 1 – No Airfield Expansion at ANC	200-300	120
Alternative 2 – Limited Airfield Expansion of ANC within Existing Borders	200-300	120
Alternative 3 — Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island	200-300	120
Alternative 4 — Limited Airfield Expansion of ANC within Existing Borders and Development of a New Airport at Point MacKenzie		
ANC	200-300	120
Point MacKenzie	25-50	4,700
Alternative 5 — Full Development of ANC Including Development beyond Existing Borders	650-750	350
Alternative 6 — Closure of ANC and Development of a New Airport in Point MacKenzie	25 - 500	12,750 (1)

Note: (1) This area is not zoned and could be developed as residential.

Source: DOWL Engineers.

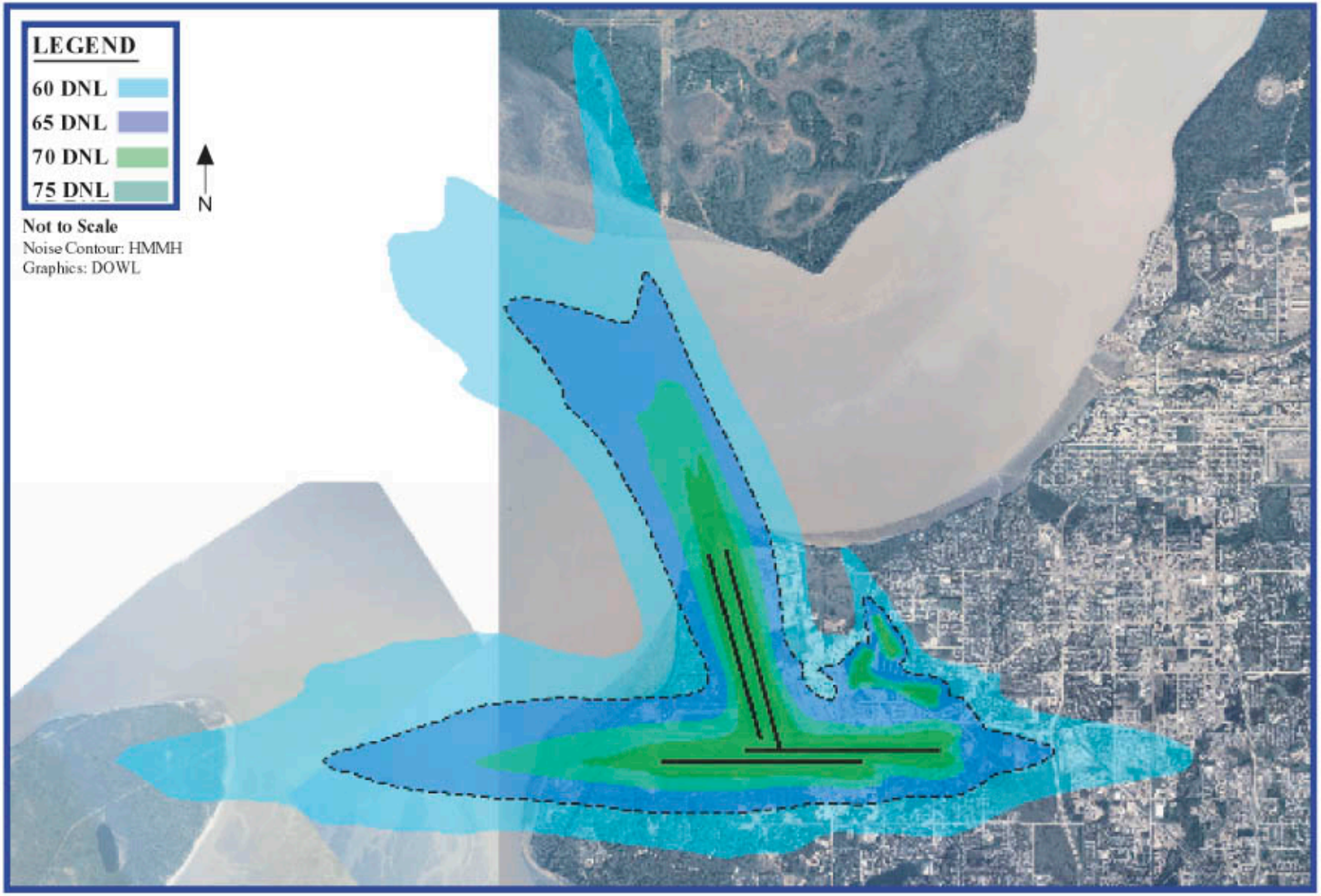
Noise Impacts- Alternative 1

Figure 4-12



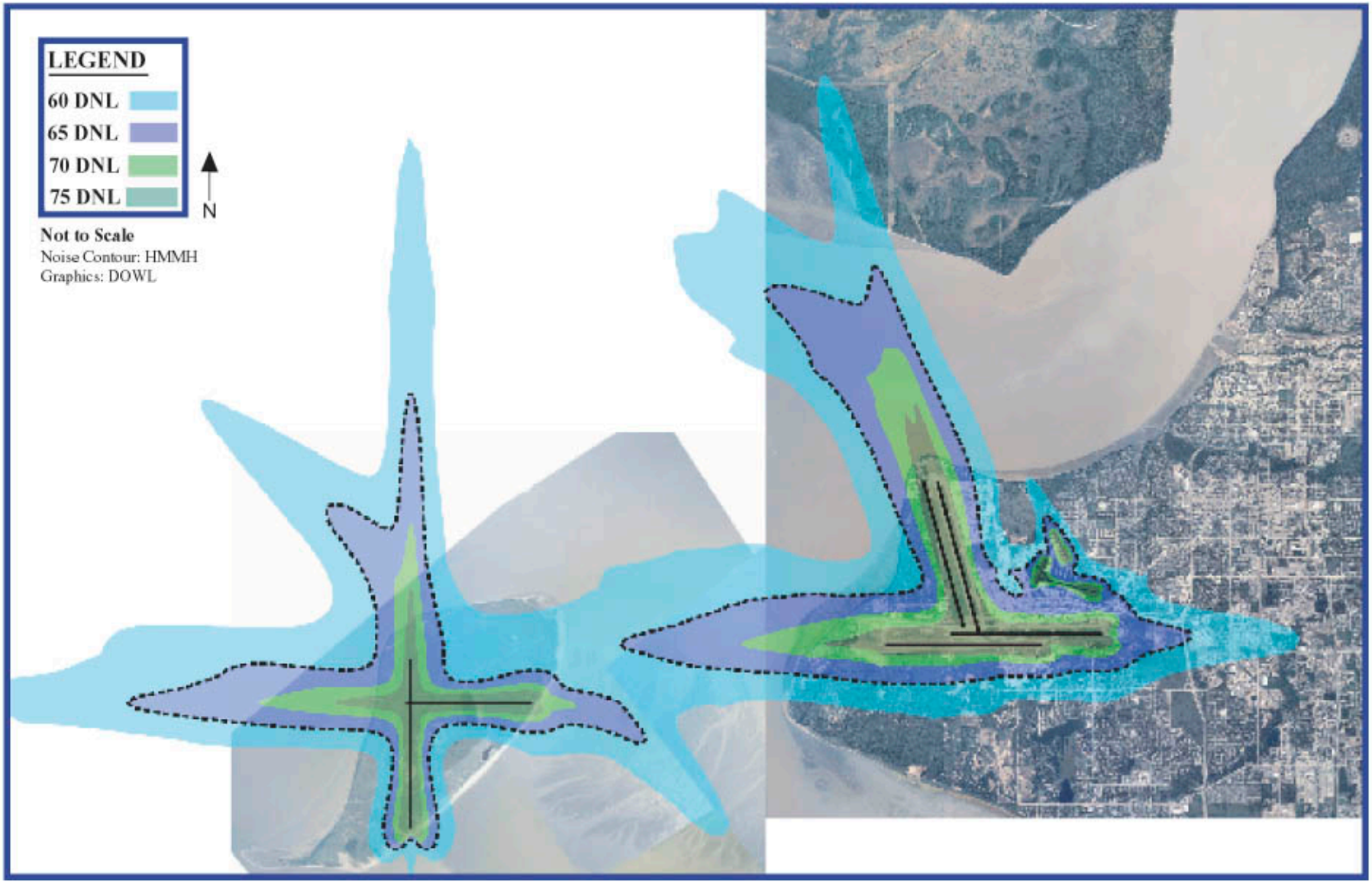
Noise Impacts- Alternative 2

Figure 4-13



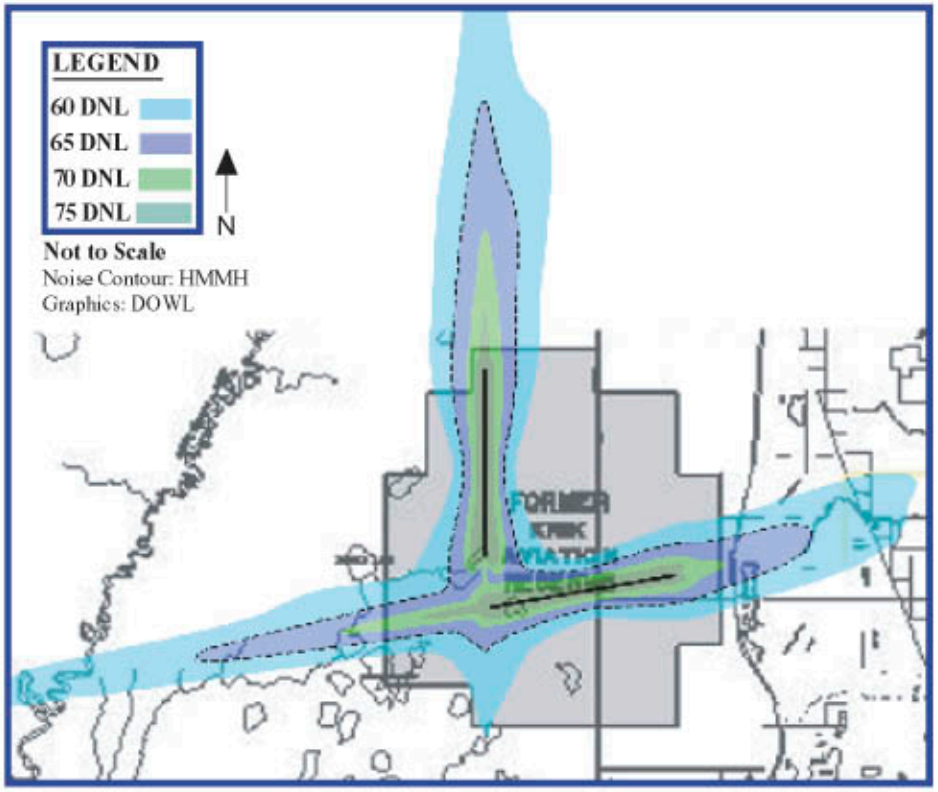
Noise Impacts- Alternative 3

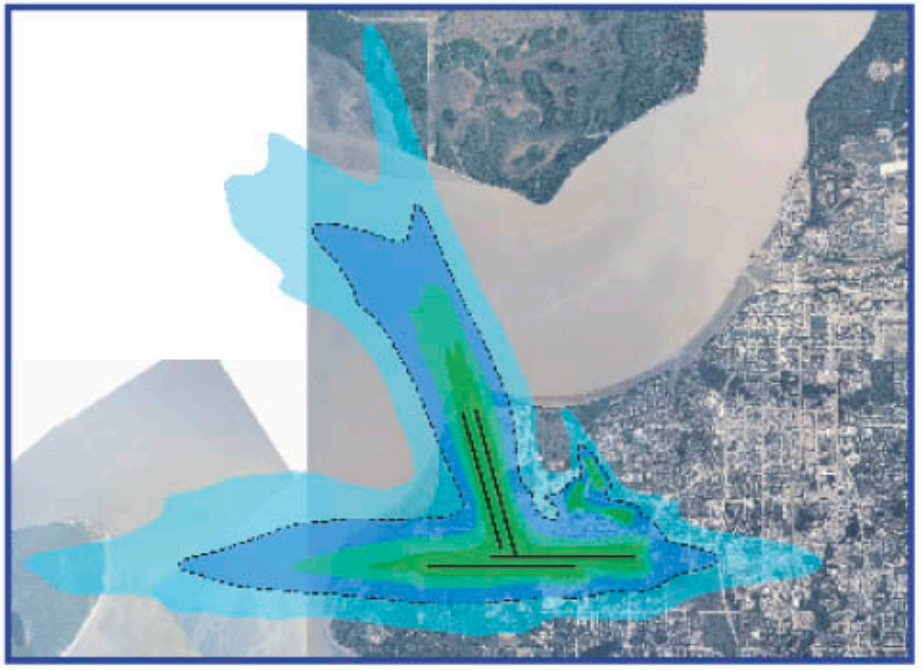
Figure 4-14



Noise Impacts- Alternative 4

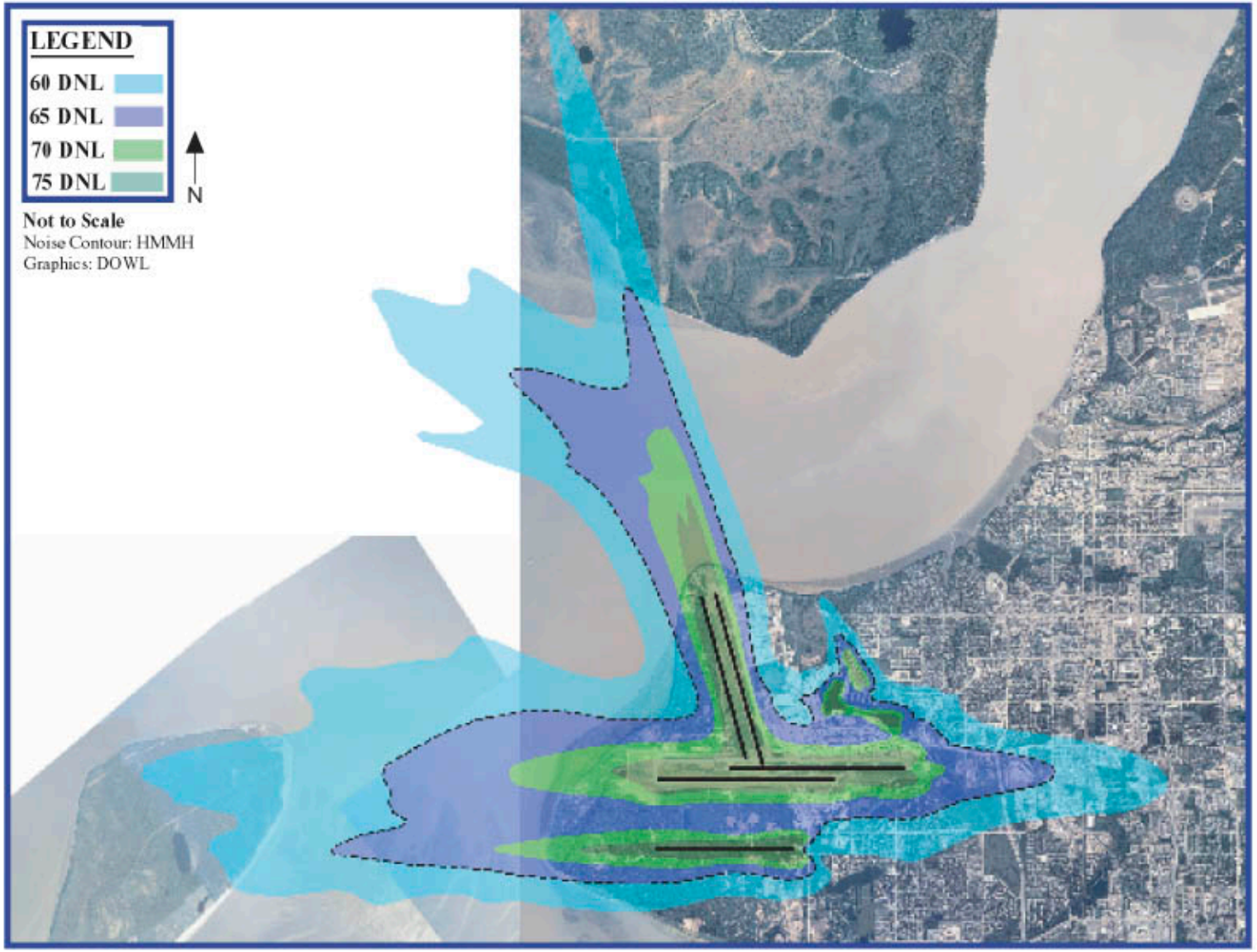
Figure 4-15





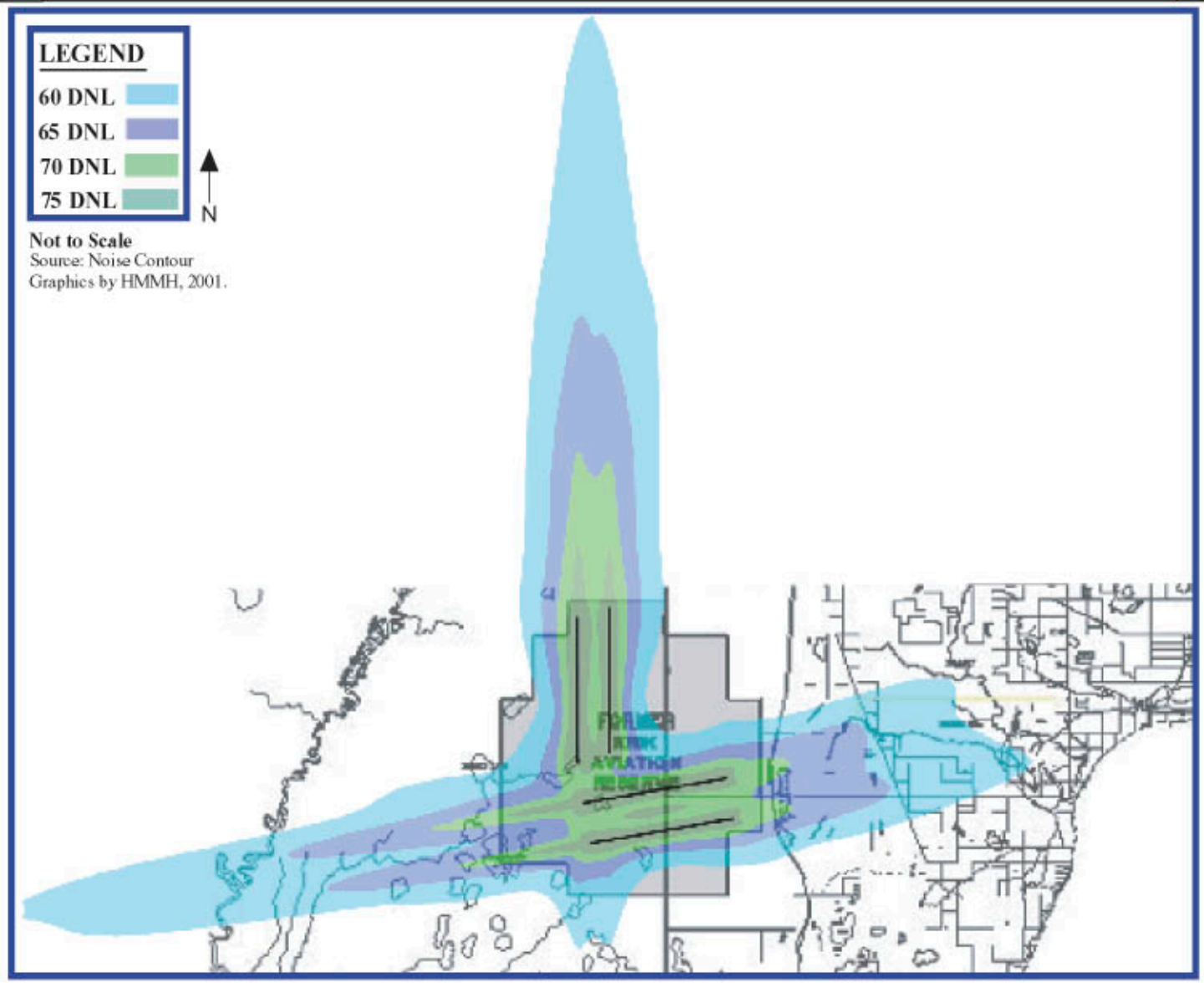
Noise Impacts- Alternative 5

Figure 4-16



Noise Impacts- Alternative 6

Figure 4-17



Alternative 2 — Limited Airfield Expansion of ANC within Existing Borders

Between 200 and 300 residential lots totaling 120 acres would be impacted within the 65 dB DNL and higher contours. The addition of the new north-south runway would create a slightly larger DNL contours north of the Airport. The east-west contours that fall in populated areas would remain unchanged.

Alternative 3 — Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island

Between 200 and 300 residential lots totaling 120 acres would be impacted within the 65 dB DNL and higher contours. DNL contours created by the additional runways at Fire Island overlay Fire Island, which is unpopulated, and Cook Inlet.

Alternative 4 — Limited Airfield Expansion of ANC within Existing Borders and Development of a New Airport at Point MacKenzie

Between 200 and 300 residential lots totaling 120 acres would be impacted within the 65 dB DNL and higher contours. DNL contours created by the additional runways at Point MacKenzie would impact an additional 25 to 50 residential lots and a total of 4,700 acres. The majority of the area has been developed as agricultural land and is not currently zoned. Residential development within the area is limited.

Alternative 5 — Full Development of ANC Including Development beyond Existing Borders

Between 650 and 750 residential lots totaling 350 acres would be impacted within the 65 dB DNL and higher contours. Much of the impact can be attributed to the new east-west runway, which expands the contour further south.

Alternative 6 — Closure of ANC and Development of a New Airport in Point MacKenzie

Between 25 and 500 residential lots totaling 12,750 acres would be impacted within the 65 dB DNL and higher contours. The majority of the area has been developed as agricultural land and is not currently zoned. Residential development within the area is limited. Development of any airport would result in a demand for property to serve the new facility. The area within the 65 dB DNL, while unsuitable for residential development, would not preclude commercial and industrial development.

4.6.6 Other Environmental Factors

Table 4.11 provides a screening level summary of the environmental impacts associated with each of the alternatives being evaluated as part of the ANC Master Plan Update. This matrix compares the relative environmental impacts associated with each alternative. It is neither a detailed environmental impact study nor a National Environmental Policy Act (NEPA)-level analysis, which would be required prior to a major Federal action. Impact categories used in the matrix evaluation are based on those issues typically addressed in the environmental documentation process. Among the issues most likely to be of significant public concern if the alternatives were developed are air quality, noise, wetlands, secondary and cumulative impacts, Section 4f (recreation) lands, Threatened and Endangered species, and construction impacts. Below is a brief summary of the general level of impacts associated with each alternative. This analysis and overview is not intended to be a detailed environmental analysis; however, it provides insight regarding the anticipated issues that might arise if a particular alternative were pursued.

Table 4.11
TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT
Environmental Evaluation Matrix
(1 of 2)

Environmental Impact Categories	Alternative 1 – No Airfield Expansion at ANC	Alternative 2 – Limited Airfield Expansion of ANC within Existing Borders	Alternative 3 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Airport at Fire Island	Alternative 4 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Airport at Point MacKenzie	Alternative 5 – Full Expansion of ANC, Including Development Beyond Existing Borders	Alternative 6 – Closure of ANC and Development of a New Airport at Point MacKenzie
Noise (Homes/Residential Acres within 2020 65DNL)	• Lower impact at Anchorage • 200-300 homes • 120 acres	• Lower impact at Anchorage • 200-300 homes • 120 acres	• Lower impact at Anchorage • 200-300 homes • 120 acres	• Lower impact at Anchorage- ANC: 200-300 homes; 120 acres • Moderate impact at Point Mac: 0 – 50 homes; 4,700 acres	• Higher impact at Anchorage • 650 – 750 homes • 350 acres	• Moderate impact at Point Mac • 0 – 50 homes • 12,750 acres (1)
Air Quality	• Lower impact at Anchorage • Emissions in Anchorage increase with increased operations	• Lower impact at Anchorage • Emissions in Anchorage increase with increased operations	• Moderate impact at Anchorage • Emissions in Anchorage increase with increased operations • Added operations at Fire Island create less impacts due to distance from sensitive receptors in Anchorage • Added travel distance to Fire Island airport increases vehicle emissions	• Moderate overall impact • Emissions in Anchorage increase with increased operations • Added operations at Point Mac create less impacts due to distance from Anchorage non-attainment area • Added travel distance to Point Mac airport increases vehicle emissions	• Higher impact at Anchorage • Most likely highest aircraft emissions in Anchorage due to highest aircraft operations	• Lower impact at Anchorage; higher at Point Mac • Improvement in air quality in Anchorage with shutdown of ANC at existing site • Added travel distance to Point Mac airport increases vehicle emissions • Moves most air quality concerns to Point Mac
Biotic Communities	• Lower impact at ANC	• Moderate impact at ANC • Some impacts on habitat west of ANC Runway 14-32	• Moderate impact at ANC • Some impacts on habitat west of ANC Runway 14-32 • Higher impact on Fire Island. Fire Island flora and fauna including unnamed pond	• Moderate impact at ANC • Some impacts on habitat west of ANC Runway 14-32 • Moderate/High impacts at Point Mac. Proximity to Susitna Flats game refuge and other habitat areas	• High impact at ANC • Some impacts on habitat west of ANC Runway 14-32 • Expansion into Kincaid Park with the development of new east-west runway	• High impact at Point Mac • Large impact associated with relocating entire infrastructure to a previously undisturbed area. • Proximity to Susitna Flats game refuge and other habitat areas
Wetlands Impact	• Lower impact at ANC	• Lower impact at ANC • Lower level of impact on wetlands	• Lower impact at ANC • Lower level of impact on wetlands • Higher impact at Fire Island on unnamed pond	• Lower impact at ANC on wetlands • Moderate impact at Point Mac	• Higher impact on ANC • Higher impacts on Little Campbell Lake • Lower impact on wetlands	• Moderate impact on Point Mac
Water Quality Impacts	• Lower impact at ANC • Increased run-off as a result of more paved surfaces • Increased deicing impacts	• Lower impact at ANC • Increased run-off as a result of more paved surfaces • Increased deicing impacts	• Lower impact at ANC • Increased run-off as a result of more paved surfaces and deicing • Higher impact at Fire Island from construction of new airport	• Lower impacts at ANC • Increased run-off as a result of more paved surfaces and deicing • Higher impact at Point Mac from construction of new airport	• Higher impacts at ANC • Higher increases in run-off as a result of most paved surfaces and deicing at ANC	• Higher impacts at Point Mac; lower impact at ANC • Higher impact at Point Mac from construction of new airport
Secondary and Cumulative Impacts	• Lower impacts at ANC • Some secondary impacts tunnel under N-S Runway	• Lower impacts at ANC • Some secondary impacts associated with N/S runway impacts on Coastal Trail and WW Treatment Plant and Tunnel under N-S Runway	• Higher impacts • Some secondary impacts associated with N/S runway impacts on Coastal Trail and WW Treatment Plant • Impacts associated with Fire Island Access Causeway and Tunnel under N-S runway	• Higher impacts • Some secondary impacts associated with N/S runway impacts on Coastal Trail and WW Treatment Plant and Tunnel under N-S Runway • Impacts associated with Knik Arm Crossing and associated infrastructure development in and around Knik Aviation Reserve	• Higher impacts • Some secondary impacts associated with N/S runway impacts on Coastal Trail and WW Treatment Plant and Tunnel under N-S Runway • Requires in-kind replacement of portion of Kincaid Park	• Higher impacts • Impacts associated with Knik Arm Crossing and associated infrastructure development in and around Knik Aviation Reserve
Compatible Land Use	• Lower impacts at Anchorage	• Lower impacts at Anchorage • Some land acquisition required for development that is parkland or recreational in nature	• Lower impacts at Anchorage • Some land acquisition at ANC required for development that is parkland or recreational in nature • Moderate impacts at Fire Island. Fire Island land required for development is currently unclassified with limited land use conflicts	• Lower impacts at Anchorage • Some land acquisition required for development at ANC that is parkland or recreational in nature • Higher impacts at Point Mac. Significant acreage required for development at Point Mac is farmland or unzoned	• Higher impact at Anchorage • Significant residential and parkland acreage required for development	• Higher impacts at Point Mac. • Significant acreage required for development at Point Mac is farmland or unzoned

Table 4.11
TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT
Environmental Evaluation Matrix
(2 of 2)

Environmental Impact Categories	Alternative 1 – No Airfield Expansion at ANC	Alternative 2 – Limited Airfield Expansion of ANC within Existing Borders	Alternative 3 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Airport at Fire Island	Alternative 4 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Airport at Point MacKenzie	Alternative 5 – Full Expansion of ANC, Including Development Beyond Existing Borders	Alternative 6 – Closure of ANC and Development of a New Airport at Point MacKenzie
Social Impacts	• Lower impacts at Anchorage • Lower impacts due to no required acquisition/relocation of residences/businesses	• Lower impacts at Anchorage • Lower impacts due to no required acquisition/relocation of residences/businesses	• Lower impacts at Anchorage • Lower level of impact due to no required acquisition/relocation of residences/businesses	• Lower impacts at Anchorage • Lower level of impact due to no required acquisition/relocation of residences/businesses • Higher impacts at Point Mac due to acquisition of farms/homes	• Higher impacts at ANC • Higher impacts due to acquisition of homes at ANC	• Higher impacts at Point Mac • Higher impacts due to acquisition of farms/homes in Point Mac
Induced Socioeconomic Impacts	• Lower impacts at Anchorage	• Lower impacts at Anchorage	• Moderate impacts at Anchorage • Potential moderate induced impacts from developing new site at Fire Island	• Lower impacts at Anchorage • Potential high level of induced impacts of developing new site at Point Mac	• High impacts in Anchorage • Potential high induced impact to Sand Lake area from new development	• High impacts at Point Mac • Potential highest level of induced impacts of developing new site at Point Mac
DOT Act, Section 4(f) Lands	• Lower impacts at ANC	• Moderate impacts at ANC • Impacts on Point Woronzof Park and relocation of Coastal Trail	• Moderate impacts at ANC • Impacts on Point Woronzof Park and relocation of Coastal Trail • Possibly Kincaid Park impacts for Fire Island access	• Moderate impacts at ANC • Impacts on Point Woronzof Park and relocation of Coastal Trail	• Higher impacts at ANC • Impacts on Point Woronzof Park, Kincaid Park, and relocation of Coastal Trail	• Lower impacts at ANC. • Some positive benefits associated with moving away from Point Woronzof and Kincaid Parks
Historic and Other Cultural Resources	• Impacts anticipated to be insignificant or nonexistent	• Impacts anticipated to be insignificant or nonexistent	• Impact anticipated to be insignificant or nonexistent	• Impact anticipated to be insignificant or nonexistent.	• Impact anticipated to be insignificant or nonexistent	• Impact anticipated to be insignificant or nonexistent
Threatened and Endangered Species	• Lower impacts. Potential impact on bald eagle nests	• Lower impacts. Potential impact on bald eagle nests	• Lower impacts. Potential impact on bald eagle nests • Possible impacts at Fire Island.	• Lower impacts. Potential impact on bald eagle nests • Possible impacts at Point Mac. Proximity to Susitna Flats game refuge and other habitat areas	• Lower impacts. Potential impact on bald eagle nests	• Lower impacts at ANC. Potential impact on bald eagle nests • Possible impacts at Point Mac. Proximity to Susitna Flats game refuge and other habitat areas
Coastal Zone Management Program	• Lower impacts at ANC	• Moderate impacts at ANC	• Higher impacts for construction of causeway in Cook Inlet Coastal Zone to access Fire Island	• Higher impacts for construction of Knik Arm Crossing to access Point Mac • Point Mac airport also in Coastal Zone	• Moderate impact at ANC	• Higher impacts for construction of Knik Arm Crossing to access Point Mac • Point Mac airport also in Coastal Zone
Farmland	• None	• None	• None	• High impacts at Point Mac. • Displaced farmlands for airport site	• None	• High impacts at Point Mac • Displaced farmlands for airport site
Energy Supply and Natural Resources	• Lower impacts at ANC	• Moderate impacts at ANC Construction project using non-renewable resources	• Higher. Construction project using non-renewable resources	• Higher. Construction project using non-renewable resources	• Higher. Construction project using non-renewable resources	• Higher. Construction project using non-renewable resources
Construction Impacts	• Lower impacts at Anchorage	• Moderate impacts at Anchorage • Some increases in traffic and construction-related noise and emissions	• Moderate impacts at Anchorage • Some increases in traffic and construction-related noise and emissions	• Moderate impacts at Anchorage • Some increases in traffic and construction-related noise and emissions. • Higher impacts at Point Mac of traffic and construction-related nose and emissions from building entire airport and access	• Higher impacts at Anchorage • Some increases in traffic and construction-related noise and emissions	• Higher impacts at Point Mac • Higher increases in traffic and construction-related nose and emissions from building entire airport and access
Overall Anticipated Impacts	• Lower	• Lower	• Moderate	• Moderate	• Higher	• Moderate

Note: (1) This area is not zoned therefore it could be used for residential use.
•

Source: DOWL Engineers.
•

The primary factors used in the evaluation are summarized below:

Noise Impacts: Numbers of homes and residential acres within the 65 DNL contour.

Air Quality Impacts: Emissions related to aircraft operations in Anchorage and Point MacKenzie and vehicle driving distances.

Biotic Communities Impacts: Amount of habitat potentially affected by new development.

Wetlands Impacts: Amount of wetlands affected by new development.

Water Quality Impacts: Amount of new paved surfaces and increased deicing from increased operation levels.

Secondary and Cumulative Impacts: Potential for additional impacts outside this project, to be generated by this project.

Compatible Land Use Impacts: Compatibility of existing land uses for lands acquired for airport expansion (noise criteria also addresses compatible land use).

Social Impacts: Impacts of acquisition/relocation of homes and businesses.

Induced Socioeconomic Impacts: Shifts in population growth, economic activity, and public services demand.

DOT Act, Section 4(f) Impacts: Potential construction within existing parks and trails.

Historic and Other Cultural Resources: Known historic sites or sites with special cultural significance.

Threatened and Endangered Species: Known or potential for construction or airport operations to affect a species classified as threatened or endangered.

Coastal Zone Management: Construction within the Anchorage or Mat-Su Coastal Zone Boundaries.

Farmland: Acquisition of farmlands.

Energy Supply and Natural Resources: Degree to which the construction and airport operations will utilize non-renewable resources.

Construction Impacts: Affect of construction on surrounding areas.

Overall Anticipated Impacts: Combined affects of impacts for each alternative.

Alternative 1 – No Airfield Expansion at ANC

This alternative generally has a lower level of environmental impact than the other alternatives due to the lower level of operations and acres developed. Nevertheless, noise complaints and concerns over air quality associated with increased aircraft operations are expected to increase. The area on and around ANC will continue to grow, at least in the short-term, thereby attracting more commerce and development to the area, increasing traffic on area roads, and resulting in construction-related impacts associated with maintaining existing infrastructure. Impacts associated with wetlands, Threatened and Endangered species, and 4f recreation lands are anticipated to be lower than the other alternatives. The need for an access tunnel under the existing north-south runway would add to the size of the construction efforts and the levels of impacts during construction, including noise, traffic, and air quality.

Alternative 2 – Limited Airfield Expansion of ANC within Existing Borders

This alternative is similar to Alternative 1; however, it includes the construction of a new north-south runway parallel to Runway 14-32 and offset by about 906 feet to the west. Noise contours for this alternative will generally be similar to Alternative 1, though the addition of this runway may slightly decrease noise impacts on area residents (compared to Alternative 1) by moving a portion of the landings and takeoffs and ground noise to the west, farther away from the residences and other sensitive receptors. Some of the reduction in noise is offset by an increase in airport operations in Alternative 2. Air quality will continue to be a concern to area residents because of the increased operations, similar to Alternative 1. The area around ANC will continue to grow, attracting more commerce and development to the area, increasing traffic on area roads, and resulting in construction-related impacts associated with constructing the new runway and maintaining the existing infrastructure.

Impacts associated with wetlands are anticipated to be limited to those areas covered under ANC's existing wetlands permit. Threatened and Endangered species, particularly bald eagle nest(s) west of Runway 14-32, may be impacted. Point Woronzof Park may also be impacted by the new runway construction, resulting in impacts and concerns regarding 4f recreational lands. Also, the need for an access tunnel under the new and existing north-south runways would add to the size of the construction efforts and the levels of impacts during construction (including noise, traffic, and air quality). Tony Knowles Coastal Trail might also be re-located by the runway development. Depending on the runway layout, the Point Woronzof Wastewater Treatment Facility could be impacted, possibly requiring modification of the existing facility.

Alternative 3 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island

The entire discussion for Alternative 2 applies to this alternative, with the added impacts associated with development on Fire Island. Noise contours and air quality emissions for this alternative will generally be similar to Alternative 2 because this alternative assumes ANC handles the same number of operations in Alternatives 2 and 3, and Fire Island accommodates additional operations not included in Alternative 2. Air quality emissions could be increased somewhat from increased driving distances to the island.

Fire Island development would probably disturb a sizeable area of wetlands and habitat in addition to those wetlands developed at ANC. The construction of the Fire Island supplemental airport facilities would require the construction of an access causeway as well as a tunnel under the ANC north-south runway, further adding to the size of the construction effort and the level of impacts during construction (including noise, traffic, and air quality). Depending on the routing of the access road and causeway connection relative to Kincaid Park and Point Woronzof Park, there could be some 4f recreational impacts associated with these facilities. This project would involve construction in the coastal zone and in undeveloped wooded areas, raising concerns regarding the potential for habitat destruction and impacts on Threatened and Endangered species.

Land required on Fire Island is mostly owned by the CIRI. Since most of the property is undeveloped and surrounded by water, land uses on and around Fire Island would generally be compatible with an airport. Construction of the new airport could induce socioeconomic impacts by diverting some of Anchorage's economic activity and public services to a new site.

Alternative 4 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport in Point MacKenzie

The entire discussion for Alternative 2 applies to this alternative, as well as the environmental impacts anticipated from limited airport development at the Knik Aviation Reserve near Point MacKenzie. The Point MacKenzie development would serve a portion of aircraft operations beyond those that can be accommodated at ANC, resulting in fewer air quality and noise impacts on ANC area residents compared to Alternative 5.

Because the Point MacKenzie area is sparsely populated, residences in the 65 dB DNL or higher contours would be low. However, the total acreage in the 65DNL contour potentially developable for residential uses is large, creating potential for a significant impacted population, unless land use restrictions are enacted. Air emissions would increase in the Point MacKenzie area both due to aircraft operations and the vehicle traffic to the airport. Longer drive distances may also effect emissions in Anchorage somewhat.

Point MacKenzie development would probably disturb a sizeable area of wetlands as a result of the development within the reserve and through the construction of access roads and support infrastructure and facilities. The construction of the Point MacKenzie supplemental airport facilities would require/facilitate the construction of the Knik Arm Crossing, further adding to the size of the construction effort and the level of impacts during construction (including noise, traffic, and air quality).

Depending on the routing of the access roads and the Knik Arm Crossing, there could be 4f recreational impacts on parklands and recreational facilities on the Anchorage and the Point MacKenzie sides of the bridge. This project would involve construction in the coastal zone, raising concerns regarding the potential for habitat destruction and impacts on Threatened and Endangered species. Additionally, this site is located between the Susitna Flats Game Refuge and the Goose Bay Game Refuge, areas with high concentrations of migratory waterfowl and other wildlife.

Another impact regarding this alternative relates to secondary and cumulative impacts. The Knik Aviation Reserve is currently within the Mat-Su Borough, which does not currently have zoning restrictions. While the economic impacts associated with a large construction project could be positive, the lack of zoning could lead to land use conflicts and unrestricted and unplanned development on properties adjacent to the new airport. Development of an airport with an associated Knik Arm Crossing would move a major economic activity from Anchorage and stimulate commercial/ industrial development and population growth away from existing developed areas. Land acquisition would be necessary to buy back the Knik Aviation Reserve (mostly owned by farmers) and possibly the surrounding areas, which are now held by a variety of private and public entities.

The secondary and cumulative impacts associated with the airport relocation to Point MacKenzie, and the associated Knik Arm Crossing, are difficult to predict and separate from one another. However, opening up major unzoned land areas to development within 10 miles of Anchorage, and moving one of the major South-central Alaska employment generators to this area will certainly bring about rapid changes to an area that is mostly rural and undeveloped. In addition to the impacts caused directly by the airport relocation, there will be indirect impacts in virtually every major impact category related to housing developments, transportation facilities, commercial ventures, schools and education facilities, and utility services (water, sewer, electrical, and communication) to serve a population mass that currently does not exist in this area.

In addition to the secondary and cumulative impacts at the new site, there will be secondary and cumulative impacts in Anchorage proper that could include decreased property values, reduced economic viability of existing businesses, underutilized infrastructure, commercial vacancies, and other such changes somewhat similar to that experienced by many cities in the United States when people gravitated away from downtown areas in favor of suburban lifestyles in the 50s, 60s, and 70s.

Alternative 5 – Full Development of ANC Including Development Beyond Existing Borders

This alternative is similar to Alternative 2 in that it includes the construction of a new north-south runway parallel to Runway 14-32 and offset by about 906 feet to the west, but it also includes a new east-west runway located between 2,500 and 5,000 feet south of, and parallel to, Runway 6L-24R.

The addition of the north-south runway may slightly decrease noise impacts on area residents (compared to Alternative 1) by moving a portion of the landings and takeoffs and ground noise farther from the residences and other sensitive receptors. However, the reduction in noise is offset by an increase in airport operations and the new east-west runway south of the existing parallel runways. The extent of the impacts will partly depend on how far south the east-west runway would be built. Construction of the runway would result in the need to purchase between 650 and 750 residences.

Air quality emissions will continue to be a concern to area residents because of the increased operations. Wetland impacts of the new north-south runway are anticipated to be limited. However, The construction of the east-west runway could result in sizeable wetland filling, including Little Campbell Lake. Threatened and Endangered species, particularly bald eagle nests west of Runway 14-32, may be impacted. Point Woronzof Park may also be impacted by the new runway construction, resulting in impacts and concerns regarding 4f recreational lands.

The Tony Knowles Coastal Trail might also be re-located by the north-south runway development. Depending on the runway layout, the Point Woronzof Wastewater Treatment Facility could be impacted, possibly requiring modification of the existing facility.

Kincaid Park, a 1,400-acre park, popular with Anchorage residents and visitors, could also be impacted by the new east-west runway. It contains 25 miles of lighted recreation trails, a 12,000-square-foot recreational chalet, an outdoor stadium, biathlon range, and motocross facilities. It is also the southern terminus for the Tony Knowles Coastal Trail and is a popular place

for quiet walking and wildlife viewing. The Kincaid Park lands would be afforded protection and consideration under 4f laws, and any sizeable impacts would result in the need to replace the facility in-kind. Also, because Kincaid Park is a dedicated MOA park, any non-recreational use of this area would require a public vote. Replacement options for Kincaid Park are discussed in **Appendix D**.

The runway projects and associated development, such as the tunnel from the terminal area to the west side, would result in a large construction project, which would have a positive economic benefit but would raise concerns relating to increased traffic, noise, and air emissions. The area around ANC will continue to grow, attracting more commerce and development to the area, increasing traffic on area roads, and resulting in associated construction-related impacts.

Alternative 6 – Closure of ANC and Development of a New Airport in Point MacKenzie

The shutdown and closure of ANC would greatly reduce or eliminate concerns that ANC area residents have with airport-generated noise and air pollution. Airport-related traffic would also be greatly reduced in the ANC area. However, not knowing what would ultimately replace these facilities, it is impossible to visualize the overall impact on the neighborhoods. The MOA would lose tax receipts for the businesses located at ANC that would relocate to the new airport location, as well as from Airport employees relocating to the MatSu area to be closer to work.

The replacement airport at Point MacKenzie could disturb a sizeable area of wetlands as a result of development within the reserve and from the construction of access roads and support infrastructure and facilities. The construction of the Point MacKenzie supplemental airport facilities would require/facilitate the construction of the Knik Arm Crossing, further adding to the size of the construction effort and the level of impacts during construction, including noise, traffic, and air quality.

Depending on the routing of the access roads and the Knik Arm Crossing itself, there could be 4f impacts on parklands and recreational facilities on the Anchorage and the Point MacKenzie sides of the bridge. This project would involve construction in the coastal zone, raising concerns among the resource agencies regarding the potential for habitat destruction and adverse impacts on Threatened and Endangered species. The airport would be located directly adjacent to the Susitna Flats game refuge and is within two miles of the Little Susitna River, an anadromous stream and popular recreation area, and surrounding habitat.

Another impact regarding this alternative relates to development impacts. The Knik Aviation Reserve is presently within the Mat-Su Borough, which does not currently have zoning restrictions. While the economic impacts associated with a large construction project could be positive, the lack of zoning could lead to land use conflicts and unrestricted and unplanned development on properties adjacent to the airport. Development of an airport with an associated Knik Arm Crossing would move a major economic activity from Anchorage and stimulate commercial/industrial development and population growth away from existing developed areas. Land acquisition would be necessary to buy back the Knik Aviation Reserve and possibly the surrounding areas, which are now held by a variety of private (mostly farmers) and public entities.

The secondary and cumulative impacts associated with the airport relocation to Point MacKenzie, and the associated Knik Arm Crossing, are difficult to predict and separate from one another. However, opening up major unzoned land areas to development within 10 miles of Anchorage, and moving one of the major south-central Alaska employment generators to this mostly rural and undeveloped area will certainly bring about rapid changes. In addition to the impacts caused directly by the airport relocation, there will be indirect impacts in virtually every major impact category related to housing developments, transportation facilities, commercial ventures, schools and education facilities, and utility services (water, sewer, electrical, and communication) to serve a population mass that currently does not exist in this area.

In addition to the secondary and cumulative impacts at the new site, there will be secondary and cumulative impacts in Anchorage proper that could include decreased property values, reduced economic viability of existing businesses, underutilized infrastructure, commercial vacancies, and other such changes somewhat similar to that experienced by many cities in the United States when people gravitated away from downtown areas in favor of suburban lifestyles in the 50s, 60s, and 70s.

4.6.7 Economic Impacts

Airport operations are estimated to double between 2000 and 2020 (see **Table 4.12**). The potential number of direct jobs at ANC is estimated to more than double from 8,311 direct airport jobs in 2000[23] to a potential 17,742 jobs by 2020. The study focuses on the actual number of jobs located in the MOA, the amount of payroll for workers in Anchorage, and the amount of tax revenue for the MOA for each alternative. It does not distinguish where workers reside. Some Anchorage residents would be expected to hold jobs at a new airport in Point MacKenzie just as residents of the Mat-Su Borough currently hold approximately nine percent of the direct jobs at ANC, but this study makes no assumptions about population and employment shifts that may result from implementation of the various alternatives. (The technical analysis is attached as Appendix C.)

Alternative 1 – No Airfield Expansion at ANC (this would include no other regional expansion)

Under Alternative 1, ANC would be unable to accommodate all of the 446,200 airport operations projected for year 2020. Approximately 22 percent of international air cargo operations and 100 percent of international tech-stop operations would be accommodated outside of the Anchorage and Mat-Su Boroughs, and potentially out of Alaska. While Airport operations at ANC in 2020 would generate 11,704 jobs with an estimated payroll of $471 million (1998$), an estimated 6,040 jobs with a payroll of approximately $243 million would go elsewhere when ANC could not meet the demand projected for 2020. Jobs at ANC would account for approximately six percent of the projected wage and salary jobs in Anchorage in 2020. Approximately $5 million in airport-related real and personal property tax revenues would accrue to the MOA, while approximately $2.6 million in tax revenue would go elsewhere.

[23] ISER 2001 draft. Does not include U.S. Postal Service and Department of Transportation employees.

Table 4.12

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Direct Jobs, Payroll, and Tax Revenues to the MOA for Each Alternative in Year 2020

	Jobs[1]		Payroll[1] (Millions in 1998$)		Airport Related Real and Personal Property Tax Revenues[2] (Millions in 1999$)	
Alternative	**Direct Jobs in Anchorage[3]**	**Jobs Not Accommodated in Anchorage**	**Anchorage Payroll for Direct Jobs**	**Payroll Not Accommodated in Anchorage**	**Annual Tax Revenues to MOA**	**Annual Tax Revenues to other Local Goverments[4]**
Alternative 1	11,704	6,040	$471	$243	$5.0	$2.6
Alternative 2	13,243	4,501	$533	$181	$5.7	$1.9
Alternative 3	17,742	0	$714	$0	$7.6	$0
Alternative 4	13,243	4,501	$533	$181	$5.7	$1.9
Alternative 5	17,742	0	$714	$0	$7.6	$0
Alternative 6	0	17,742	$0	$714	$0	$7.6

Notes: For ease in comparing impacts, all wages are presented in 1998 dollars when the average wage for airport workers was $40,246 and the average for all wage and salary jobs in Anchorage was $35,400. Source: Ted Stevens Anchorage International Airport: Economic Significance 2000 (ISER, 2001 draft.

[1] Jobs and payroll extrapolated from ISER, 2001 draft, and HNTB allocation of demand.
[2] Business personal property tax revenue and real property tax revenue for 1999 airport activities provided by ANC. Adjustments are based on an average of tax revenues in 1999 per 9,119 direct employees at ANC in 2000.
[3] Does not include the significant number of jobs generated offsite when airport businesses buy offsite goods and services and airport workers spend their salaries in the local community.
[4] Assumes the same mill tax rate as the MOA.

Source: Northern Economics, Inc.

Alternative 2 – Limited Airfield Expansion of ANC within Existing Borders

Under Alternative 2, 20 percent of international air cargo operations and an estimated 69 percent of international tech-stop operations would not be accommodated at ANC in 2020. Approximately 13,243 direct jobs would be generated by ANC operations in 2020, with a payroll of approximately $533 million (1998$). Another 4,501 jobs would go elsewhere along with approximately $181 million in payroll. The 13,243 jobs at ANC would account for approximately eight percent of available wage and salary jobs in Anchorage in 2020. Approximately $5.7 million in airport-related real and personal property tax revenues would accrue to the MOA, while $1.9 million in potential real and property tax revenues would go elsewhere.

Alternative 3 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island

Under Alternative 3, the total estimated operations demand for 2020 would be met in Anchorage by using the airfields at ANC and

Fire Island. There would be approximately 17,742 direct jobs spread between ANC and Fire Island with a total payroll of approximately $714 million (1998$). Airport jobs would account for approximately 10 percent of all wage and salary jobs in Anchorage in 2020. MOA would collect an estimated $7.6 million in airport-related real and personal property tax revenues.

Alternative 4 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport in Point MacKenzie

Under Alternative 4, 20 percent of international air cargo operations and an estimated 69 percent of international tech-stop operations would move to a supplemental airport at Point MacKenzie. Approximately 13,243 jobs would be generated by operations at ANC, while approximately 4,501 jobs would be generated by operations at Point MacKenzie. The payroll at ANC would be approximately $533 million (1998$) and the payroll at the Point MacKenzie Airport would be approximately $181 million. The 13,243 jobs at ANC would account for an estimated eight percent of available wage and salary jobs in Anchorage in 2020. Approximately $5.7 million in airport-related real and personal property tax revenues would accrue to the MOA and approximately $1.9 million in tax revenue would potentially be available for the Mat-Su Borough.

Alternative 5 – Full Development of ANC including Development beyond Existing Borders

Under Alternative 5, 100 percent of the demand allocation in the 2020 Master Plan could be accommodated at ANC. Airport operations would generate approximately 17,742 direct jobs with a payroll of approximately $714 million (1998$). Jobs at ANC would account for approximately 10 percent of all wage and salary jobs in Anchorage in 2020. Approximately $7.6 million in airport-related real and personal property tax revenues would accrue to the MOA.

Alternative 6 – Closure of ANC and Development of a New Airport on Point MacKenzie

Under Alternative 6, 100 percent of the demand allocation in the 2020 Master Plan would be accommodated at the new airport at Point MacKenzie. The approximately 17,742 direct jobs, a payroll of approximately $714 million (1998$), and the airport-related real and personal property tax revenues generated by the expected demand in 2020 would be in the Mat-Su Borough.

4.6.8 Development Costs

Cost estimates for the six alternatives were assembled based on the layouts generated at the master plan level. The estimates are not detailed construction cost estimates but are provided in a level of detail commensurate with the level of detail of the layouts themselves. They are based on gross unit cost values, such as square foot of building, linear foot of taxiway or runway, cost per mile of road, cost per gallon of fuel storage, lump sum cost of environmental mitigation, and the like. The

gross unit costs are based on costs of similar infrastructure recently constructed in Alaska and elsewhere. Programming contingencies (to cover items left out of the estimate or not envisioned as being necessary at this time) and cost estimating contingencies (for items not estimated or underestimated) are included as a percentage of the total construction costs. Similarly, planning, engineering, environmental, and construction management and inspection have been included as a percentage of estimated construction costs. The costs are presented in 2001 U.S. dollars and no escalation to the mid-point of construction has been applied.

Note that in assembling the estimates, it has been assumed that the following improvements will be required at the existing site for Alternatives 1 through 5:

- A new air traffic control tower,
- Upgrades of existing surfaces to meet ADGVI geometric criteria,
- A new West Air Park tunnel under the existing north south runway(s) and taxiway(s),
- Environmental clean-up and remediation at existing and known sites on ANC land,
- Acquisition of incompatible land within the 65 DNL contour, and the acquisition of vacant but incompatibly zoned land within the 60 DNL contour, and
- For Alternative 6, the construction of the North-South Runway at the existing ANC site, along with a supplemental cost of 15 percent of the infrastructure improvement costs included in Alternative 2. This was done to account for the fact that a wholesale relocation of the airport to Point MacKenzie, or elsewhere, would take more than a decade to complete, and some level of modifications would be necessary at ANC to safely keep pace with the growth in operations.

Detailed cost estimates for the six alternatives are provided in **Appendix E**. A summary of cost estimates are included in **Table 4.13**, along with major cost estimating assumptions for each of the alternatives.

Again, it is important to note that the cost estimating numbers presented above are based on a master planning level document and layouts, and they need to be viewed that way. The relative size of the numbers is a good indication of how the costs will compare. However, it is inevitable that changes will occur in design assumptions between now and the final implementation of these plans that may have a significant impact on the cost of facilities.

Note that as a check, the cost of major development at ANC was compared to capital improvement projects and airport relocations in other cities and locations in the United States. The numbers presented above are in good general agreement with these costs from other locations. For instance, the construction and "soft" cost of the new airport in Denver was between $3 and $4 billion. Cost estimates for a new airport at Minneapolis-St. Paul in 1996 was estimated at $4.2 billion for a new six runway airport. There are certainly some differences between what would be constructed in Denver and Minneapolis from a passenger standpoint. But taking into account inflation, the area cost factor differential, the complete lack of infrastructure at the new sites, the difficulty of access to the new sites, and general unknowns at this early master planning stage, the costs seem to "fit" within what would be considered reasonable bounds.

Table 4.13

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Cost Estimate Assumptions

Alternative Number and Description	Cost (Billions)	Major Assumptions
Alternative 1 — No Airfield Expansion at ANC	$1.2[1]	▪ No new runways or taxiways
Alternative 2 — Limited Airfield Expansion of ANC within Existing Borders	$1.5	▪ New runway 906 feet offset west of Runway 14-32, with navigational systems ▪ Includes support taxiways for new runway
Alternative 3 — Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island	$3.1	▪ New runway 906 feet offset west of Runway 14-32, with navigational systems ▪ Includes access causeway to Fire Island ▪ Two new runways, tower, and facilities at Fire Island, ▪ Includes support taxiways for new runways
Alternative 4 — Limited Airfield Expansion of ANC within Existing Borders and Development of a New Airport at Point MacKenzie	$4.1	▪ New runway 906 feet offset west of Runway 14-32, with navigational systems ▪ Includes Knik Arm Crossing, and significant access road construction ▪ Two new runways, tower, and facilities at Knik Aviation Reserve ▪ Includes support taxiways for new runways ▪ Includes water, sewer, storm drainage, electrical, and communications infrastructure
Alternative 5 — Full Development of ANC Including Development beyond Existing Borders	$2.4	▪ New runway 906 feet offset west of Runway 14-32, with navigational systems ▪ New runway 5,000 feet offset south of Runways 6L-24R, with navigational systems ▪ Includes support taxiways for new runways ▪ Significant land acquisition, including residences and commercial and parkland; includes mitigation cost
Alternative 6 — Closure of ANC and Development of a New Airport in Point MacKenzie	$6.3	▪ Close existing ANC facilities, including remediation and clean-up ▪ Includes Knik Arm Crossing, and significant access road construction ▪ Four new runways, tower, and facilities at Knik Aviation Reserve ▪ Includes support taxiways for new runways ▪ Includes water, sewer, storm drainage, electrical, and communications infrastructure

(1) This represents the minimum level of improvements that will be needed at ANC, regardless of the alternative selected.

Source: Dowl Engineers.

4.6.9 Financial Feasibility

The purpose of this section was to conduct a comparative cost analysis of the alternatives. Airport operating expenses, capital improvements, and debt service are funded by the airlines and tenants located at the Airport. No State of Alaska tax revenues, or other general fund revenues are used to support ANC operations or infrastructure development. The capital program proposed for ANC in this Master Plan Update will be funded by a variety of sources including Federal Airport Improvement Program (AIP) funds, Revenue Bond proceeds, Passenger Facility Charges (PFCs), International Airport Revenue Funds (IARF), and other airport cash flow. Therefore, costs of developing and operating ANC and/or an alternative airport are directly related to the costs to the airlines and other tenants to operate their businesses at the airport.

For this analysis, landing fees were used as the indicator for financial feasibility of the alternatives. Landing fees are payable by the airlines for use of the Airport and are calculated by determining total annual ANC expenses, including operating and maintenance (O&M) expenses, annual debt service, debt service coverage and other fund deposit requirements, less all operating revenues and interest earnings. Landing fees at ANC are currently $0.68 per 1,000 pounds of landed weight. Landing fees for the six alternatives reviewed range from $0.99 to $2.68 (in 2001 dollars) per 1,000 pounds of landed weight. Based on current operations levels for some of the Airport's major carriers, an increase in the current landing fee to $2.68 would increase their annual landing fee costs in Anchorage by $5 to $6 million. This could significantly impact the Airport's competitive position in the international aviation markets and influence carriers decisions regarding investing in additional infrastructure in Anchorage or possibly moving their operations to competing foreign airports.

The analysis is based on the capital cost estimates for each alternative. These estimates included contingency cost assumptions and assumed sources of funding. Off-airport transportation projects, including new roads and a bridge across Knik Arm and those projects that would be funded by individual tenants, were not included in the landing fee calculations (they were included in the development cost estimates). Cash flow estimates were provided for each of the six alternatives in 5-year increments. The cash flow estimates where then escalated to the mid-point of construction for each major project category through the forecast period of 2020. Based on this information, a landing fee comparison was developed for each of the six alternatives for Fiscal Year 2020 and they are provided in **Table 4.14**.

Alternative 1 – No Airfield Expansion at ANC

This alternative examines the current conditions of the Airport's existing airfield and terminal facilities. Alternative 1 assumes that some investment will be necessary to maintain and upgrade the existing facilities. The limitations of this alternative are reflected in the number of operations the Airport would lose to other airports located outside the region. The total required investment for Alternative 1 is $1.21 billion in 2001 dollars.

A landing fee of $0.99 per 1,000 pounds of landed weight is the lowest landing fee based on the related capital projects. Upgrades under Alternative 1 deal mainly with investments to the existing airfield and terminal facilities and add limited increases in activity, as stated in the Master Plan forecast.

Table 4.14

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Signatory Landing Fee

	Alternative					
	1	2	3	4	5	6
Total Airport System Requirements:						
O&M Expenses	$ 84,850,126	$ 92,747,435	$ 103,393,386	$ 105,265,143	$ 101,229,334	$ 101,229,334
Debt Service	154,649,654	214,124,439	324,143,084	383,362,863	289,328,777	643,029,790
Fund Deposits	13,377,385	14,147,033	14,936,482	14,949,947	14,920,904	14,920,904
Total Airport System Requirements	$ 252,877,165	$321,018,907	$ 442,472,952	$ 503,577,954	$ 405, 479, 016	$ 759,180,029
Less:						
Total Non-Airline Revenues	(129,080,675)	(153,589,822)	(181,728,130)	(197,112,989)	(172,624,253)	(274,577,669)
Total Net Deficit	$ 123,080,675	$ 167,429,085	$ 260,744,822	$ 306,464,965	$ 232,854,763	$ 484,602,360
Signatory Takeoff Weight	59,087,456	67,639,411	85,791,627	85,791,627	85,791,627	85,791,627
Signatory Landing Fee	$ 2.08	$ 2.48	$ 3.04	$ 3.57	$ 2.71	$ 5.65
Signatory Landing Fee in 2001$	$ 0.99	$ 1.17	$1.44	$ 1.70	$ 1.29	$ 2.68

Source: DOT&PF.

Alternative 2 – Limited Airfield Expansion of ANC within Existing Borders

This alternative provides for the expansion of current facilities within the Airport's boundaries. In Alternative 2, another runway, approximately 10,500 feet long, would be constructed. The Airport would also expect to make additional terminal and landside improvements. Under Alternative 2, the Airport would be able to handle approximately 12.0 percent more annual operations than Alternative 1, but approximately 25.0 percent fewer annual operations than under Alternatives 3 through 6. The total investment is approximately $1.55 billion in 2001 dollars. Alternative 2 adds a runway that can accommodate approximately 12.0 percent more operations than Alternative 1, resulting in approximately a 14.0 percent increase in MTOW. The calculated landing fee under Alternative 2 is $1.17 per 1,000 pounds of landed weight, or 19.0 percent higher than that under Alternative 1.

Alternative 3 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island

Alternative 3 includes all of the construction requirements in Alternative 2, as well as the construction of an air cargo carrier facility on Fire Island. The Fire Island facility will have two runways, in addition to an airport maintenance facility, GA hangar, and an office facility. Annual operations would be increased by approximately 33.0 percent over Alternative 1. The total cost for Alternative 3 is approximately $3.14 billion in 2001 dollars.

Alternative 3 could accommodate the 2020 activity projection but would use two different facilities to accommodate the same number of operations as Alternatives 5 and 6 could from a single location. Therefore, operational expenses were somewhat higher then for those two alternatives. The calculated landing fee for Alternative 3 is $1.44 per 1,000 pounds of landed weight.

Alternative 4 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport in Point MacKenzie

The Alternative 4 concept is similar to Alternative 3, except that the air cargo facilities outside of the Airport's current boundaries would be located at Point MacKenzie rather than on Fire Island. The Point MacKenzie facilities are slightly larger than those envisioned for Fire Island. Alternative 4 is expected to accommodate the same number of operations as Alternatives 3, 5, and 6. The total cost for Alternative 4 is $4.14 billion in 2001 dollars.

Similar to Alternative 3, the calculated landing fee for Alternative 4 is $1.70 per 1,000 pounds of landed weight.

Alternative 5 – Full Development of ANC Including Development Beyond Existing Borders

In addition to the proposed new runway under Alternative 2, this Alternative adds another east-west runway that is 8,500 feet long south of the existing parallel runways. Alternative 5 will allow the same number of operations as Alternatives 3, 4, and 6. The investment required to complete Alternative 5 is $2.42 billion in 2001 dollars.

Alternatives 5 could accommodate the 2020 activity projection but would use only one facility to accommodate the same number of operations as Alternatives 3 and 4 could from two locations. Therefore, operational expenses were somewhat lower then for those two alternatives. The calculated landing fee for Alternative 5 is $1.29 per 1,000 pounds of landed weight.

Alternative 6 – Closure of ANC and Development of a New Airport in Point MacKenzie

This alternative proposes the closure of ANC and the opening of a new airport at Point MacKenzie. The Point MacKenzie airport will have two sets of parallel runways, an international air cargo facility, and a larger terminal structure than what is currently at the Airport. The total cost for constructing the new facility will be $6.29 billion in 2001 dollars.

Clearly, the need to not only expand aviation facilities but also replace existing aviation facilities would have the greatest impact on airline rates and charges. The calculated landing fee for Alternative 6 is $2.68 per 1,000 pounds of landed weight.

4.6.10 Compatibility with MOA

The Anchorage 2020 Anchorage Bowl Comprehensive Plan addresses the community's vision for growth over the next 20 years. It identifies the Airport as a major economic engine and provider of transportation services for Anchorage and Alaska. Major Comprehensive Plan assumptions and conclusions pertinent to growth of the Airport include:

- Assumes no causeway/bridges to Fire Island or Point MacKenzie or uses of these areas to support the growth of Anchorage. It considers these to be speculative and outside municipal control. It recommends a reassessment of Anchorage growth options if expansion to Fire Island or Point MacKenzie is implemented;
- Assumes ANC continues to operate at its current location;
- Recommends growth of ANC be primarily within current boundaries;
- Gives priority for off-airport land uses to residential uses, provided development is conducted in a way compatible with airport noise and safety; and
- Recommends recreation/open space uses on the airport be protected. Loss of recreation lands would only occur if all other options are first eliminated through a collaborative public process.

Alternative 1 – No Airfield Expansion at ANC

This alternative is compatible with Comprehensive Plan recommendations. However, because this alternative constrains the growth of ANC, it does not fully accomplish Comprehensive Plan goals that address safe, efficient, and economical transportation facilities and fostering workforce and economic development.

Alternative 2 – Limited Airfield Expansion of ANC within Existing Borders

Compatibility of this alternative with the Comprehensive Plan is similar to Alternative 1.

Alternative 3 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport on Fire Island

This alternative conflicts with Comprehensive Plan assumptions regarding the development of Fire Island and development at the current airport site.

Alternative 4 – Limited Airfield Expansion of ANC within Existing Borders and Development of a New Supplemental Airport in Point MacKenzie

This alternative conflicts with the Comprehensive Plan assumptions regarding the development of Point MacKenzie and development at the current Airport site.

Alternative 5 – Full Development of ANC Including Development Beyond Existing Borders

This alternative conflicts with the Comprehensive Plan recommendations to limit development within existing borders, give priority for land uses near the Airport to residential uses, and protect recreation/open space on and near the Airport.

Alternative 6 – Closure of ANC and Development of a New Airport in Point MacKenzie

This alternative conflicts with a Comprehensive Plan assumption regarding the development of Point MacKenzie and development at the current Airport site.

4.7 RECOMMENDATION

A summary of the alternatives evaluated in matrix form is provided in **Table 4.15**.

4.7.1 Conclusions

Continued development of ANC at its existing location is considered to be the best regional solution to meet 20-year aviation demand. Cost (and financial feasibility), passenger and business convenience in terms of travel time and cost, secondary and cumulative environmental impacts, and business risk are the primary drivers of this conclusion. Another important consideration is that recent aviation trends at ANC since 1998 have resulted in some uncertainty with the long-term Master Plan Base Case Forecasts. Economic and other events have significantly impacted the aviation industry and could change the long-term outlook for growth in operations. Similarly, continuing improvements in navigation and air traffic control technologies may result in gains in capacity for any given Airport runway configuration.

There is considerable community concern over environmental impacts, such as noise, air quality, and the potential loss of some of Kincaid Park for future Airport development. These concerns must be balanced against concerns regarding the significant change resulting from construction of a new airport in a rural area and the potential secondary and cumulative effects of moving these urban impacts into rural Alaska. ANC will continue to address the environmental impacts of the existing Airport to increase support for the proposed improvements and to reduce the potential environmental impacts associated with airport operations and development.

Table 4.15

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

Alternatives Evaluation Matrix

	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.

4.7.2 Recommendation

Based on the evaluation of alternatives, the Airport has determined that a modified Alternative 2 is the preferred development alternative. Alternative 2 included limited airfield expansion *within existing borders.* The limited airfield expansion includes designation of a new parallel north-south runway to the west of the existing Runway 14-32, when justified by operational demand. Further analysis concluded that this runway would likely require a small amount of land acquisition from the MOA adjacent to AWWU property. The Airport has determined that based on actual recent growth rates, use of new technologies to increase the capacity of the existing airfield infrastructure, increasing use of larger commercial aircraft, and use of demand management, this alternative is expected to address aviation needs for the planning period. The Airport will maximize the use of aviation technology advances, demand management techniques, and other existing regional and State airport resources to achieve the greatest utility of the resulting four-runway system at ANC, thereby delaying the need as long as possible for any additional capacity enhancements. Long-term aviation needs at ANC (beyond 2020) should be re-evaluated within the next five to seven years.

Chapter Five
AIRPORT PLANS

This chapter describes the recommended 20-year investment and development plan for ANC. ANC determined that the preferred development concept to be a modified Alternative 2 after consideration of demand, facility requirements and recommendations, and comments provided by the community, airlines, and other parties. The public involvement process is described more in Section 5.6. The recommended improvements described below are based on this modified Alternative 2 (see Chapter Four, Regional Airport Development Alternatives.) Alternative 2 includes limited airport expansion primarily within the existing Airport boundary. Future airfield expansion is limited to a new parallel north-south runway to the west of existing Runway 14-32 when warranted by operational demand. The Master Plan assumes that with the lower growth in operations being experienced, the potential for new air traffic control technologies that will increase airfield capacity in the future, new larger aircraft that can carry larger loads, and the appropriate use of demand management and other State and regional aviation assets to accommodate operations, the proposed improvements should meet aviation needs for the planning horizon.

The recommendations presented below are reflected in the ALP, which, when approved by the FAA, will serve as a blueprint for future development. FAA approval of the ALP is not approval of any particular project, but of the overall development concept. Cost estimates and a phasing schedule for the recommended projects depicted on the ALP are included along with a discussion of the implementation process.

5.1 OVERALL DEVELOPMENT STRATEGY

The overall development strategy for preparing the recommended plan has the following three objectives:

- To ensure that facilities are developed in an orderly and cost-effective manner, recognizing limited resources. This ensures ANC optimizes the airport's assets to benefit the maximum number of Alaskans.
- To recognize the best use of the limited amount of remaining Airport land.
- To allow for flexibility and to ensure that the Airport is ready to continue orderly growth within the 20-year planning horizon and beyond.

With these objectives in mind, the development plan programs major projects, recognizing that the Master Plan is a living document and must continue to be reevaluated and revised to meet changing needs. None of the projects listed will be implemented until warranted by operational demand. Thus, ANC can always reevaluate the appropriateness of the balance of the plan in light of the latest national and local trends before committing additional resources.

5.2 GENERAL DEVELOPMENT AREAS

The recommended plan identifies specific projects for the following nine functional elements:

1. Airfield.
2. Passenger Terminal.
3. Ground Access.
4. Air Cargo.
5. Airline Support.
6. General Aviation.
7. Airport Support.
8. Fuel Farm.
9. Aviation-Related Development.

The Master Plan recommends increasing the capacity of the airfield with the addition of a second north-south air carrier runway when justified by operational demands. The new runway would be located 908 feet west of Runway 14-32.

Passenger terminal functions will continue to be centrally located northeast of the intersection of Runway 14-32 and Runway 6L-24R. Gateway Alaska projects currently underway will provide additional terminal capacity for the mid-term. The Master Plan recommends providing additional long-term terminal capacity with an additional terminal pier between the existing North Terminal and South Terminal when passenger demand requires it.

The recommended plan accommodates near-term growth in cargo activity in the North Airpark. Long-term cargo capacity (particularly international cargo) should be met by developing the West Airpark.

The Master Plan recommends developing a portion of the South Airpark (up to 17 acres) to meet the future needs of GA. An Anchorage Area General Aviation System Plan is underway to address GA needs in the Anchorage Area, and an LHD Master Plan Update is planned in the near future. ANC and LHD will continue to coordinate with other State resources to address GA needs. Kulis ANG is also in the process of updating its master plan. ANC should continue coordination with the Guard during the update process.

Airport support functions are located in several areas within the Airport property. A new QTF for airfield deicing and an airfield maintenance facility are being constructed north of the North Terminal to provide for more efficient maintenance on the airfield.

There are several issues concerning the long-term development strategy of the East Airpark, including roadways and ground access, identification of the most appropriate land uses, preserving room for long-term extension of Concourse A, the impact of the elevated rail lines (both the line under construction and the proposed rail line), and environmental issues (e.g., former fuel farm and former gas station). Since this Master Plan was focused on airfield and air cargo issues, it is recommended that a specific redevelopment study be prepared for the East Airpark. The study should establish the highest and best use of land parcels, confirm the development hierarchy, and develop an implementation plan for redevelopment as lease terms expire.

5.3 AIRPORT DEVELOPMENT PLAN

The following sections describe the recommended development plan, as depicted on the ALP. For each functional area, a description of the development plan is provided. **Figure 5-1** illustrates the 20-year development plan. **Appendix F** presents a reduced-scale ALP set.

5.3.1 Airfield

Airfield recommendations are grouped into three categories: capacity enhancement projects, upgrades to accommodate new large aircraft, and other airfield improvements.

Capacity Enhancement Projects

The capacity enhancement projects described below are part of a comprehensive long-term strategy for meeting future demand at the Airport. This strategy includes limited airfield capacity improvements primarily within the existing Airport property, demand management, maximizing the use of new air traffic and other aviation technologies, and use of other State and regional aviation resources as appropriate. Specifically, the Master Plan includes the following recommendations:

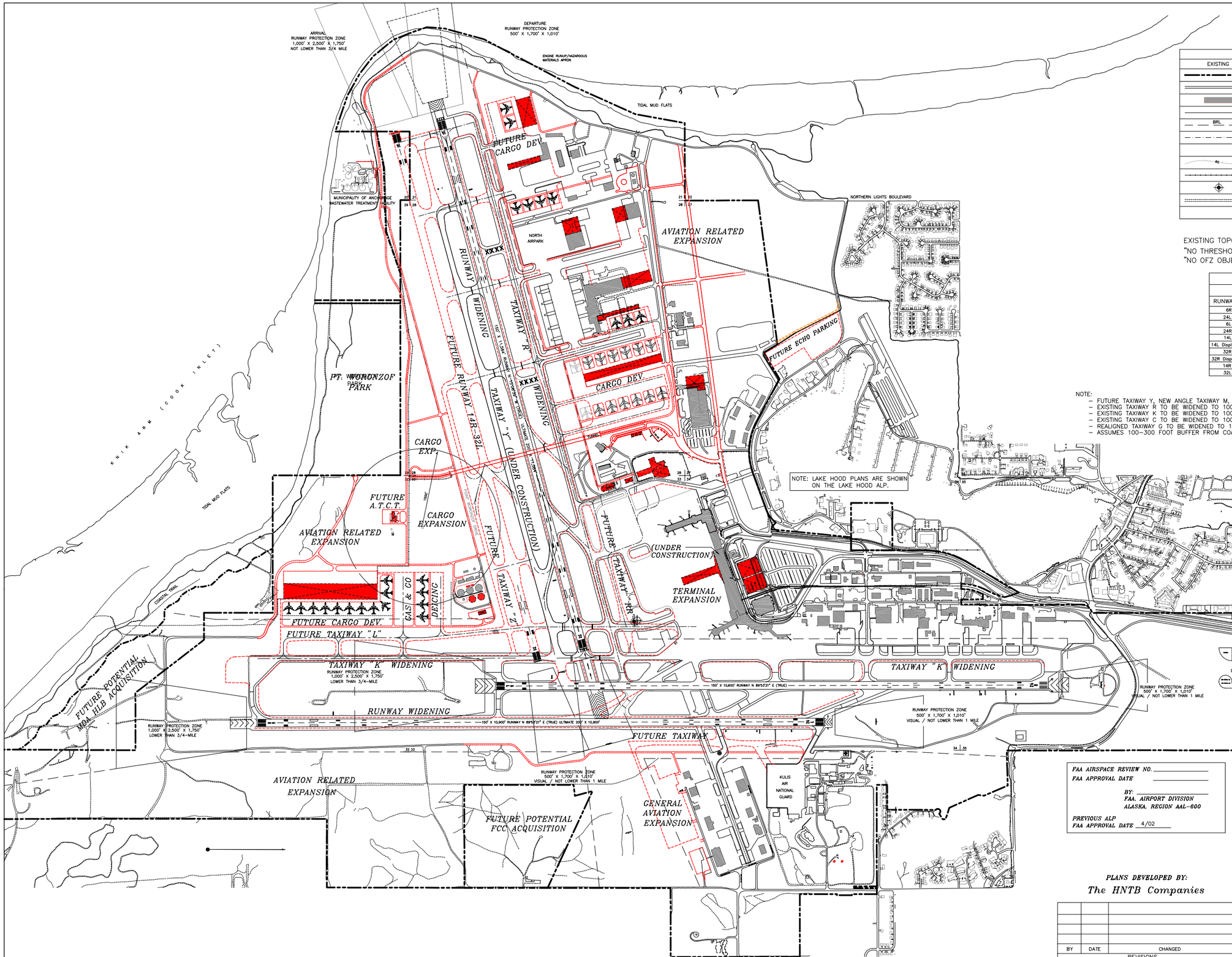
- To postpone the need for new airfield facilities to the latest feasible date, the Airport should construct a new north-south runway parallel to existing Runway 14-32 when warranted by demand.
- To take advantage of available capacity during off-peak periods, the Airport should investigate various demand management techniques to encourage air carriers to schedule flights away from busy periods.
- ANC should continue to encourage investment in the State and regional airport systems to provide additional aviation resources to meet future aviation demands.
- ANC should continue to review all system assets to maximize system effectiveness, minimize costs, and provide an appropriate level of service to the state.
- Lastly, the FAA and other agencies are continuously researching new air traffic control and other procedures and technologies designed to increase airport capacity. As the benefits of these new technologies are quantified and their feasibility is demonstrated, the Master Plan recommends identifying the most beneficial of these technologies for implementation at ANC.

Specific airfield capacity improvement projects at ANC are described below.

New Runway 14R-32L

Based on a benefit-cost analysis, the Master Plan recommends building a second parallel north-south runway when justified by operational demand. The runway, designated Runway 14R-32L, will be located 908 feet west of the existing north-south runway (Runway 14-32).

The runway's location and length were established to reduce the need for fill at the north end and to minimize impacts on Point Woronzof Park, Point Woronzof Road, the AWWU Sewer Treatment Plant, the CEA substation, the coastal trail, the fuel farm, key utilities, and navigational aids (NAVAIDS).



LEGEND		
EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT BOUNDARY
		ROAD
		BUILDING
		AIRFIELD/APRON PAVEMENT
BRL	BRL	BUILDING RESTRICTION LINE
		PARCEL/R.O.W.
		TO BE REMOVED
60	60	GROUND CONTOUR
		FENCE
		AIRPORT REFERENCE POINT (ARP)
		DIRT ROADS / PARKING
		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°56'53.880"	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°10'09.851"	149°59'51.212"	SAME	SAME
14R			61°13'47.784"	150°01'09.156"
32L			61°10'21.360"	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 FOOT BUFFER FROM COASTAL TRAIL.

FAA AIRSPACE REVIEW NO. _____
FAA APPROVAL DATE _____
BY: _____
FAA, AIRPORT DIVISION
ALASKA, REGION AAL-600
PREVIOUS ALP
FAA APPROVAL DATE 4/02

PLANS DEVELOPED BY:
The HNTB Companies

BY	DATE	CHANGED

REVISIONS

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.

20 – YEAR DEVELOPMENT PLAN

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

Ted Stevens Anchorage International Airport

APPROVED

MARYELLEN TUTTELL, AICP — AIRPORT PLANNING MANAGER

DESIGNED	RVW	DRAWN	RVW	FIGURE 5-1
CHECKED	JSM	DATE	JUNE 24, 2002	

FIGURE 5-1.dwg P:_Projects\28395 – ANC Airfield-Air Cargo\CADD\Figures\CHAPTER 5\ JUN 25, 2002 8:22 am

The layout of the runway and associated taxiways has been established to limit the degree of impact on Point Woronzof Park located adjacent to the Airport. No direct impacts to the Park are anticipated, and future noise contours for this area, even with the proposed new runway, are not anticipated to exceed Federal land use compatibility guidelines for recreation areas. Noise and other environmental issues would be evaluated in more detail prior to construction as part of the Environmental Impact Statement (EIS) for the new runway.

Point Woronzof Road would be realigned to preserve access around the perimeter of the Airport. The portion of the road near the AWWU Sewage Treatment Plant site may require some land acquisition from AWWU and will pass close to the electrical substation. The southern part of the new alignment would pass along the back side of potential lease areas along future Taxiway Z (the west parallel taxiway to future Runway 14R-32L) and tie into the existing road just north of the fuel farm. The realigned road would be a 2-lane paved facility built to current MOA standards. Due to increased recent security concerns, the Airport may consider eliminating or limiting Point Woronzof Road access south of AWWU with the development of the access tunnel under the north-south runway.

The proposed embankment at the north end of the runway would impact the driveway and parking lot for the AWWU Sewage Treatment Plant. At a minimum, the fence will have to be relocated and parking areas and driveways will have to be reconstructed. AWWU is preparing a master plan for their facilities that will evaluate their long-term needs on the site and on their adjacent expansion area. Continued coordination with AWWU to discuss impact mitigation alternatives will be required.

The CEA substation straddles the property line between Airport property and the AWWU Sewage Treatment Plant. It appears that the substation would be able to remain in its current location; however, some relocation of feeder lines may be required.

The elevation of the proposed runway and associated taxiways is approximately 20 feet above the existing fuel storage area. This would require significant fill slope distances and likely require some reconstruction of the fuel containment berms, piping, valving, distribution systems, fuel tanks, fencing, and security systems at the existing fuel tank area.

Sections of the existing sewer main crossing under the proposed runway would have to be encased. Existing electric and communication lines would need to be relocated, upgraded, or replaced, as needed. The proposed location for the new electrical vault building is compatible with the new runway location; however, some or all of the conduits would need to be lowered, raised, or otherwise protected.

The existing RVR facilities for Runway 14-32 will not require relocation and are likely suitable to serve the proposed runway. The FAA would need to evaluate the existing glideslope antenna and Point Woronzof receiver site to determine if they would need to be relocated or replaced.

The runway would be designed for air carrier operations with a length of approximately 10,500 feet, with the approach end of Runway 14R sited abeam that of Runway 14. The runway's elevation and the location of its south end were established to maximize the length of the runway without any future impact to Runway 6L.

Runway 14R-32L would be used primarily for arrivals from the north and departures to the north. In VFR, the new runway would allow for dual simultaneous arrival streams when neither aircraft is a "heavy." In IFR, only a single arrival stream would be possible. High-speed exits are planned for both sides of the runway to reduce runway occupancy times.

The new runway and associated taxiways are planned to ADGV standards, which would result in minor operational issues when ADGVI aircraft are operating at the Airport. Based on Obstacle Free Zone criteria, ADGVI aircraft taxiing on Taxiway Y would restrict operations on the new runway to aircraft with wingspans less than 150 feet (e.g., A300). This situation would occur relatively infrequently, primarily when a ADGVI aircraft travels between the existing north-south runway and the West Airpark via Taxiway Y. There would not be operational restrictions to the existing runway.

Approaches to Runway 32L would be limited to visual approaches (similar to approaches to the existing Runway 32), while the north end (Runway 14R) would be equipped with an ILS. Because an approach lighting system would not be feasible due to terrain, the visibility minimum would be ¾ mile (versus the standard ½ mile).

Additional High-Speed Exit Taxiway on Existing Runway 14

A new high-speed exit taxiway, designed to decrease runway occupancy times for aircraft arriving on existing Runway 14, is recommended. This exit taxiway would be located approximately 5,500 feet from the runway threshold and exit to the east.

Reconfigure Taxiway G to High-Speed Taxiway

The Master Plan recommends reconstructing Taxiway G to standard high-speed exit geometry to increase its utilization, thereby decreasing occupancy times for aircraft arriving on Runway 6R.

West Side Engine Runup Pad

The recently completed Ground Noise Study recommended an engine runup pad be located on the west side of the new Runway 14R-32L. The pad will allow aircraft to bypass other planes holding for departure clearance or performing routine engine runups. This will allow the Airport to move these operations further from residential areas.

Taxiway L

East-west Taxiway L should be extended westward by approximately 5,400 feet to provide additional east-west taxiway capacity and to provide access to facilities in the West Airpark. The taxiway would be separated by 600 feet from Taxiway K to maintain ADGVI separation standards. It is recommended that the phasing of this extension be tied to the timing of development in the West Airpark.

Taxiway RR

Computer simulations undertaken as part of the Master Plan and the FAA capacity study indicate that airfield circulation in the vicinity of the terminal will become highly congested in the future as aircraft queued on Taxiway R waiting to depart Runway 32 restrict traffic taxiing between the terminal and the North Airpark. The Master Plan recommends constructing Taxiway RR from Taxiway K to Taxiway V to provide additional north-south taxiway capacity by allowing aircraft to bypass traffic queued on Taxiway R. This

extension would also provide an alternative route for access into and out of the terminal area. Again, this taxiway would be constructed when warranted by operational demands in the terminal area.

Taxiway Y Extension

A north-south taxiway, west of and parallel to Runway 14-32, is currently under construction. This taxiway (Taxiway Y) is designed to provide additional north-south taxi capacity. The taxiway under construction will extend from Runway 6L-24R on the south end through Taxiway S on the north end. The Master Plan recommends extending Taxiway Y to Taxiway Q on the north end when warranted.

Taxiway Z

A parallel taxiway on the west side of proposed new Runway 14R-32L is recommended to provide access to additional development areas to the west. The taxiway will be separated from the runway by 400 feet and will run from Taxiway K on the south end to Taxiway U.

Miscellaneous Taxiway Improvements

Additional taxiway improvements will be made as various portions of the Airport are developed and activity increases.

As the Airport develops the West Airpark, it will be necessary to provide adequate airfield circulation between this area and the terminal area. The Master Plan recommends constructing taxiways, as required, to maintain good airfield circulation. Similarly, a new taxiway will be required to provide access to the expanded GA development area proposed in South Airpark.

Runway Extensions

Chapter Three identified an optimal runway length of 12,200 feet. As part of the Master Plan process, an analysis was conducted to identify the feasibility of providing additional runway length at ANC. Each runway end was examined to determine the potential impacts associated with an extension, including operational, facility, construction, noise, and cost. In summary, the analysis found the following:

- Terrain makes extension of the north end of Runway 14 impractical.
- Extension of Runway 32 to the south would cause significant airfield delays due to conflicts with traffic arriving on the main arrival runway (6R). By 2020, an extension to the south would add 5 minutes of delay per operation.
- Extension of either of the east-west runways would result in new noise impacts to non-compatible areas located east of the Airport. An extension to Runway 6R-24L could also result in aircraft delays and additional noise impacts if the increased length resulted in increased requests for departures off this primary arrival runway.
- Due to obstructions south of the Airport, any extension to Runway 14-32 would not benefit departures to the south on Runway 14.
- A survey of the carriers serving ANC indicates that the existing 11,584-foot usable runway with a 1,000-foot clearway provided with Runway 32 does not constrain current operations by either the Boeing 747-200 or Boeing 747-400.

For these reasons, the Master Plan does not recommend any runway lengthening projects. If future operations require a longer runway, the Airport should re-evaluate the option of

extending Runway 6L to the west versus the option of extending Runway 32 to the south. A more detailed BCA, including aircraft delay, cost of noise mitigation, and cost of constructing the extension, would be required.

Upgrades to Accommodate New Large Aircraft

It is anticipated that larger, ADGVI aircraft will start using ANC by 2008. Therefore, the Master Plan recommends that portions of the airfield be upgraded to ADGVI standards to accommodate these new aircraft.

Near-term upgrades to meet ADGVI design standards include the following:

- Widening Runway 6R-24L,
- Widening Taxiway C,
- Widening Taxiway J,
- Widening/realignment of Taxiway K (the portion between Taxiway C and Taxiway J),
- Widening/realignment of Taxiway R (between S and Q), and
- Upgrading the safety area and blast area of Taxiway Y.

Long-term ADGVI upgrades include the following:

- Widening Taxiway K between Taxiway A and Taxiway C,
- Widening Taxiway R between Runway 6L-24R and Taxiway S,
- Widening Taxiway D,
- Widening Taxiway M,
- Widening Runway 14-32.

To provide ADGVI access to North Airpark facilities, Taxiways S, T, U, and the feeder taxiways to future cargo development in this location should be redesignated as ADGVI taxilanes.

Other Airfield Improvements

Throughout the planning horizon, the Master Plan recommends continued implementation of the previously prepared pavement management plan to ensure that the airfield is maintained in a cost-effective manner.

NAVAIDs

Remote Transmitter/Receiver Relocation

The Master Plan recommends relocating the Remote Transmitter/Receiver (RTR) to the relocated ASR site or another appropriate site. Relocation will likely be required as the west side of the Airport is developed.

Upgrade Runway 6L ILS Approach to Category II/III

To provide increased reliability, the Master Plan recommends providing a second Category II/III ILS approach at the Airport. Upgrading the ILS approach to Runway 6L to Category II/III appears to be the most feasible alternative.

Ultimate Capacity-Related Improvements

It is possible that additional airfield capacity will be required toward the end of the forecast period and beyond. To accommodate future demand beyond what can be accommodated by the improvements described above, the Master Plan recommends preserving all remaining Airport within the existing boundaries for long-term airfield and Airport improvements. The Master Plan recommends that the Airport maximize the use of air traffic control and

other aviation technology advances, demand management techniques, and expansion of other regional and State airports to achieve the greatest utility of the resulting 4-runway system at ANC. It is also recommended that long-term aviation needs at ANC (beyond 2020) be re-examined within the next 5 to 7 years.

As activity at ANC increases, the delays associated with airspace interactions between departures on Runway 32 at ANC and arrivals to Runway 6 at EDF will increase significantly. It is recommended that ANC continue to work with the Air Force to minimize this airspace interaction; this may include adding an instrument approach to Runway 15 at EDF.

5.3.2 Passenger Terminal

Several key projects are recommended for the passenger terminal to accommodate near-term and intermediate-term demand.

The current Terminal Redevelopment Project (part of the Gateway Alaska Program) is designed to accommodate future passenger traffic. Key components of this project include expanding ticket lobbies, baggage claim, aircraft gates, and curb frontage. At its completion, the terminal complex will provide 23 air carrier gates and 20 regional airline parking positions. The project is scheduled for completion in early 2004, at which time the Domestic Terminal will provide a total of 804,000 square feet of space. The International (North) Terminal will provides eight gates.

To provide capacity to accommodate longer-range growth, the Master Plan calls for continued extension of the terminal to increase ticketing, curb, and baggage handling functions and the addition of a new 8- to 10-gate concourse. If required, a ADGVI parking position could be reconstructed on Gate N-8 of the North Terminal per the Airport DGVI Strategy.

5.3.3 Access Roadways, Parking, and Rental Car

The ground access facilities needed to accommodate long-term demand will require the construction of several key projects, which are described below.

Access Roadways

Terminal Area Roadway Improvements

Most roadway improvements are being undertaken as part of the Gateway Alaska Program. These improvements include the following:

- Aircraft Drive/Postmark Drive/ International Airport Road interchange,
- Upgrade Old International Airport Road,
- Jewel Lake Road interchange,
- Minnesota Drive interchange,
- International Road—Minnesota Drive to Old Seward Highway,
- "C" Street widening to six lanes,
- New Seward Highway grade separation,
- Upgrades on International Airport Road to Old Seward Highway.

Other roadway improvements include the construction of Logistics Drive between Postmark Drive and Northern Lights Boulevard to provide access to future aviation-related commercial areas. Design and construction of Logistics Drive would also provide an opportunity to remove public through traffic from Postmark Drive, allowing safer tug crossings to occur to properties on the east side of Postmark

Drive. A series of connector roadways will be constructed between Postmark Drive and Logistics Drive. Aircraft Drive is proposed to be relocated around the new Echo GA parking area at LHD and will tie into existing access roads near the Airport's main snow disposal site. Access roads to development within Postmark Bog and West Airpark will also need to be constructed.

Airfield Tunnel

A tunnel under the airfield is recommended to improve accessibility between the east and west sides of the Airport and to significantly reduce travel time. Currently, public/commercial auto and truck traffic destined for the west side of the Airport primarily uses Postmark Drive or Northern Lights Boulevard to Point Woronzof Drive. Construction of a tunnel under the airfield would reduce traffic on these roads and improve operational efficiency. In addition, numerous trips by airport maintenance vehicles are made between the terminal area and the west side. The Master Plan recommends that the tunnel's cross-section provide dual facilities: one for public use and one for secured airport vehicles.

Other Roadway Improvements

As discussed under the airfield section, the proposed new north-south runway and increased security requirements would result in relocation of Point Woronzof Drive and the Coastal Trail in the vicinity of the new runway and West Airpark. Preliminary analyses indicate that the roadway and the Coastal Trail can be relocated between the new runway and AWWU. With heightened Airport security restrictions from the Transportation Security Administration, ANC is evaluating the need to restrict public access on Point Woronzof Road in some areas. Road access to West Airpark from Point Woronzof Drive may be eliminated or restricted once an east-west access tunnel has been constructed.

Parking

The Master Plan recommends providing additional public parking with a combination of structure parking and surface lots. When completed, the parking improvements associated with the Gateway Alaska Plan will result in a net increase of 182 short-term spaces, 258 short-term spaces, 237 employee spaces, and 67 additional rental car spaces, for a total of 744 spaces. An additional parking structure is recommended when the additional terminal pier is constructed.

Rental Cars

ANC is currently working with rental car companies to identify a long-term program to accommodate future rental car requirements. This may include a consolidated facility on or off Airport property.

Rail Station

The ARRC is constructing a rail station at the Airport just north of the existing parking garage. A pedestrian tunnel will connect the station to Concourse C.

5.3.4 Air Cargo

The Master Plan recommends that cargo requirements be met through a combination of continued expansion in the North Airpark and development of new facilities in the West Airpark. The recommended phasing of future cargo development is described below.

In general, domestic cargo facilities should be accommodated in the East Airpark.

International cargo requirements should be accommodated first in the North Airpark, recognizing that many existing cargo facilities have expansion capability. Additional capacity can be provided by developing cargo facilities in the Postmark Bog area and north of the existing Williams/Lynx site, abeam the Runway 14 threshold (approximately 20 acres). Longer-term international air cargo development should occur in the West Airpark. ANC development plans for West Airpark allow for a buffer area between development areas and the Coastal Trail.

5.3.5 U.S. Postal Service Expansion

It is recommended that the land north of the existing Post Office site be preserved to accommodate future capacity requirements.

5.3.6 Airline Support

Most airline support functions are located in the East Airpark; the Master Plan calls for meeting future support demand at this location. Additional airline support functions, such as aircraft maintenance, can be located in the North Airpark. FedEx has the capability of doubling their maintenance facility in the area.

5.3.7 General Aviation

Although GA forecasts indicate little increase in overall GA activity at ANC, there will likely be a shift toward more sophisticated and larger aircraft types (e.g., business jets). To meet this need, the Master Plan recommends future GA development in the South Airpark, west of existing South Airpark development. This location is consistent with the site recommended in the previous master plan. The 17-acre site provides sufficient flexibility to accommodate future commercial GA expansion requirements as they evolve, including an FBO, conventional hangars, T-hangars, and tie-downs.

5.3.8 Airport Support

Airfield Maintenance

A QTF to support airfield deicing and refueling is under construction south of the AFSC fueling center and north of the North Terminal. A new primary FMC will be constructed east of the QTF along Taxiway V. These locations were selected because they offered the greatest operational effectiveness (resulting from their proximity to the airfield), were the most cost-effective, eliminated the safety issue of vehicles crossing Taxiway V and Postmark Drive, and were the most practical from a security standpoint, as they would reduce the number of times maintenance vehicles would have to use security gates.

New Air Traffic Control Tower

As part of the Master Plan Update process, an ATCT siting study was undertaken to examine various locations and tower heights for a new tower at ANC. A new ATCT is proposed to replace the existing tower, which has numerous line-of-site obstructions. The new tower is proposed to be located on the west side of the Airport at a height of approximately 261 feet AGL. This would likely require construction of a separate tower for LHD. ANC will continue to coordinate with the FAA regarding air traffic control needs.

5.3.9 Fuel Farm

The Master Plan recommends expanding the existing fuel farm to meet future fueling

requirements. There is expansion capacity at the existing site.

5.3.10 Aviation-Related Commercial Development

The Master Plan provides two locations for aviation-related commercial development. The first location is in the Turnagain Bog area of the North Airpark. The second area is in the West Airpark, west of the proposed ATCT site. Again, development of the West Airpark aviation commercial sites will incorporate a buffer between the developed area and the Coastal Trail.

Past terminal planning studies have identified the potential need for a hotel complex at ANC. It is recommended that a new hotel be located in the new parking garage area and connected to the terminal.

Future development will likely increase energy demands and require upgrades to electrical and other utility systems. CEA has expressed interest in pursuing a co-generation facility associated with future development in the terminal area and will likely need to develop another electric distribution substation to meet future demands. ANC will continue to work with CEA and other utilities to plan for efficient expansion of utilities on the Airport.

5.3.11 Land Acquisition

ANC plans to acquire land to address noise compatibility, FAA runway protection standards, potential future development needs, Airport operational issues, and security. Lands identified for acquisition include municipal lands at the end of Runway 6R, Federal Communications Commission (FCC) property located to the west of South Airpark, and vacant private lands in high noise contours in the vicinity of the Airport. Over 200 acres have been identified for potential acquisition and include RPZs, noise impact areas, and other areas needed to enhance Airport operations and security. Properties would be acquired as funding and opportunities allow over several years.

5.4 AIRPORT LAYOUT PLAN

The ALP is one of a series of drawings that comprise the ALP set. This set, which supplements the ALP, includes the following drawings:

- Title Sheet.
- Airport Data Tables.
- Existing Conditions.
- Airport Layout Plan.
- Terminal Complex, East Airpark, and South Airpark Plan.
- West Airpark Facilities Plan.
- North Airpark Plan.
- Airport Airspace Plan (two sheets).
- Runway Approach Profiles.
- Runway End Area Plan and Profiles (six sheets).
- Land Use Plan.
- Off-Airport Land Use Plan with 2020 Noise Contours.
- Property Plan.

Following is a brief description of the drawings in the set.

5.4.1 Existing Conditions

This drawing illustrates the current layout and facilities at the Airport.

5.4.2 Airport Layout Plan

The ALP shows both existing Airport features and the projects recommended in the Master Plan.

5.4.3 Terminal Complex, East Airpark, and South Airpark Plan

This drawing shows a larger-scale view of the terminal area, development in the East Airpark, and facilities in the South Airpark area (including the Kulis ANG).

5.4.4 West Airpark Facilities Plan

This sheet illustrates improvements to the southwestern portion of the Airport.

5.4.5 North Airpark Plan

This sheet portrays the northern section of the Airport, including cargo facility improvements.

5.4.6 Airport Airspace Plans, Runway Approach Profiles, and Runway End Area Plans and Profiles

The purpose of these drawings is to depict objects that exist in the navigable airspace surrounding the Airport. The imaginary surfaces defined in FAR Part 77, Objects Affecting Navigable Airspace, were used to identify obstructions.

Objects below the imaginary surfaces identified in Part 77 are not considered obstructions. Objects that penetrate Part 77 surfaces are considered obstructions and must be mitigated through lighting/marking, lowering, or removal. The specific mitigation effort may depend on the FAA determining whether the object is a hazard to air navigation. If the object cannot be mitigated, on-airport mitigation could result in threshold displacement or increased approach and departure minimums.

Existing obstructions in the vicinity of ANC are listed along with mitigation recommendations.

5.4.7 Land Use Plan

The Airport Land Use Plan categorizes all of the land within the proposed Airport property according to functional uses, including airfield, passenger terminal complex, GA, commercial aviation, air cargo/aircraft maintenance, terminal/airline support, airport support, aviation-related commercial, governmental/other, major roads, buffer areas, and property reserved for future airport development. These land use categories are defined as follows:

- *Airfield:* Airport areas directly related to the landing, takeoff, and taxiing of aircraft, including runways, taxiways, RPZs, airfield approach zones, building and obstacle restriction areas, and certain navigational aids requiring unobstructed clearance areas.

- *Passenger Terminal Complex:* Airport areas dedicated to facilities and services directly related to the accommodation of passengers, such as passenger terminal buildings, aircraft maneuvering and parking aprons, automobile parking (public, employee, tenant, and rental), and terminal roadways. Cargo aircraft refueling may occur in the terminal complex provided it does not interfere with essential passenger related activities.

- *General Aviation:* Airport areas related to the use, maneuvering, parking, and servicing of GA and air taxi aircraft, such as aircraft tie-down lots, taxiways specifically designated for GA aircraft use,

and FBO facilities for servicing and supporting these aircraft.

- *Commercial Aviation:* Airport areas dedicated to commercial interests, such as FBOs, corporate aircraft operations, helicopters, and flight dependent businesses (e.g., aerial photography).

- *Air Cargo/Aircraft Maintenance:* Airport lands related to the accommodation of facilities for the handling of cargo scheduled to arrive or depart by air transport and to the maintenance and repair of aircraft. These facilities include aircraft aprons, buildings, and value-added manufacturing.

- *Terminal/Airline Support:* Lands reserved for facilities providing a wide range of support services for the operations of the airlines, principal tenants in the terminal complex, and passengers, such as belly-cargo services, in-flight catering, minor aircraft and ground equipment maintenance, car rental service lots, ground transportation centers, and administrative services.

- *Airport Support:* Lands reserved for facilities used by Airport management in operating and maintaining Airport and airfield facilities, such as maintenance yards, material storage, equipment storage, and maintenance, ARFF facilities, snow storage areas, and facilities for personnel providing such work.

- *Aviation Related Commercial:* Lands reserved for commercial and industrial uses providing aviation related services to airline, air cargo, commercial aviation, or other principal Airport tenants and users, such as offices, warehouses, retail establishments, parts manufacturing/ testing/assembly, and facilities for the storage and use of equipment used in the provision of services.

- *Governmental/Other:* Airport lands dedicated to the accommodation of facilities and operations of State and Federal agencies located on the Airport.

- *Major Roads:* Airport lands identified as rights-of-way for the principal vehicular movements to, through, and from the primary land use areas of the Airport.

- *Buffer:* Airport lands for which no specific immediate need has been identified and which can be used as a buffer from adjacent off-airport land uses.

- *Reserved for Future Airport Development:* Airport lands for which no specific immediate need has been identified but which need to be reserved to provide flexibility for the Airport in responding to unforeseen events.

5.4.8 Off-Airport Land Use Plan with 2020 Noise Contours

This drawing presents off-Airport land use in the vicinity of the Airport. Five land use categories are illustrated:

- Public lands,
- Single family,
- Multi-family,
- Industrial, and
- Commercial.

Forecast 2020 Airport noise contours are overlaid on the land use plan.

5.4.9 Airport Access/Property Map

The Airport Property Map shows the parcel number, seller, property interest and date each tract within the existing Airport boundary was obtained.

5.5 DEVELOPMENT COST AND PHASING

This section provides a summary of the overall capital costs and their estimated phasing based on the forecasts and facility requirements. Since actual growth in operations may be less than the Base Case Forecast used for this analysis, the phasing is based on reaching actual operations levels. Phase I reflects needs anticipated as operations increase up to 286,000 operations per year. Phase II reflects needs anticipated as operations increase to 332,000 operations, and Phase III reflects needs anticipated as operations increase to 446,000. The forecasts and corresponding facility requirements reflect the modified Alternative 2 with limited airfield expansion alternative, as discussed in Chapter Four.

The total cost estimate to implement the recommended program is approximately $2.2 billion, including tenant investments, through 2020 or an operations level of 446,000. The costs are presented in 2002 dollars and are for planning purposes only. Implementation of recommended capital projects would involve refinement of designs and costs through architectural and engineering analysis. These costs are not detailed construction cost estimates but are considered best estimates. It is anticipated that these projects will be funded through a combination of Federal funds, PFCs, tenant contributions, revenue from airport user charges (such as airline landing fees, terminal rentals, and auto parking), and private development.

A summary of proposed investment costs for each phase is presented in **Table 5.1**. A detailed breakout of the proposed 20-year investment program is presented in **Table 5.2**. **Figure 5-2** illustrates the phasing of the proposed Master Plan investment program. The following is a description of the significant projects by phase.

5.5.1 Phase I

The largest capital development expenditures in Phase I are for the airfield. Projects identified in the Airport's current 5-year Capital Improvement Program (CIP) are included in these costs. The major airfield projects, identified in the detailed investment program, include ADGVI improvements, runway/taxiway maintenance and rehabilitation, and apron reconstruction and expansion. Other maintenance-related improvement projects in the CIP include terminal and infrastructure. New facility development includes airport maintenance and snow storage facilities. Environmental projects for noise abatement, environmental compliance, and deicing improvements are also included in the CIP. A Letter of Intent (LOI) application has been filed with the FAA for five airfield projects included during this phase. These projects include the new north/south parallel Taxiway Y, ADGVI airfield improvements, terminal apron rehabilitation, and cargo apron rehabilitation.

New cargo facility investments are expected in this phase, including both domestic and international building and international aircraft parking apron, including private developments.

Table 5.1

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

20-Year Investment Plan Summary
(2002 Dollars)

Project	Phase I (millions)	Phase II (millions)	Phase III (millions)	TOTAL (millions)
Airfield	$170.4	$331.2	$96.8	$598.4
Air Cargo	$126.2	$193.9	$178.6	$498.6
West Side Development	$-	$34.6	$30.1	$64.7
Terminal	$44.8	$132.4	$119.6	$296.7
Infrastructure	$14.6	$18.0	$25.0	$57.6
Airport Support	$57.4	$80.0	$23.0	$160.4
Airline Support	$-	$26.4	$26.4	$52.9
Rental Cars	$-	$43.0	$-	$43.0
General Aviation	$15.0	$40.0	$15.0	$70.0
Environmental	$46.2	$52.5	$85.5	$184.2
Safety	$47.0	$6.5	$11.7	$65.2
Miscellaneous Project	$28.3	$30.0	$35.0	$93.3
Total	**$549.8**	**$988.5**	**$646.7**	**$2,184.9**

Note: Includes tenant investment.

Source: HNTB and ANC.

Table 5.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

20-Year Investment Plan
(2002 Dollars)

Project	Phase I		Phase II		Phase III		TOTAL
Airfield							
North/South Parallel T/W (Phase 2 of 3)	$16,309,000	*(a)*	$-		$-		$16,309,000
Runway/Taxiway/Rehab./Realignment	$16,421,000	*(a)*	$-		$-		$16,421,000
DGVI Airfield Improvements	$49,886,000	*(a)*	$20,779,000		$-		$70,665,000
Terminal Apron Reconstruction	$12,988,000	*(a)*	$-		$-		$12,988,000
Cargo Apron Reconstruction	$8,356,000	*(a)*	$-		$-		$8,356,000
Airfield Pavement Maint., Electric., Blast	$17,369,000	*(b)*	$40,000,000		$72,000,000		$129,369,000
Taxiway/Runway Improvements	$20,292,000	*(b)*	$-		$-		$20,292,000
Aircraft Apron Expansion	$14,130,000	*(b)*	$-		$-		$14,130,000
Engine Runup Pad	$3,947,000	*(b)*	$-		$-		$3,947,000
Land Acquisition and Mitigation	$7,236,000	*(b)*	$-		$-		$7,236,000
New Runway 14X-32X	$-		$161,192,000		$-		$161,192,000
New Parallel Taxiway Z	$-		$26,600,000		$-		$26,600,000
Taxiway RR	$-		$-		$12,189,000		$12,189,000
Taxiway Y – Phase 3	$-		$-		$4,000,000		$4,000,000
High Speed Taxiway – Rwy 14	$-		$-		$3,415,000		$3,415,000
Taxiway – South Airfield	$3,483,000		$-		$5,243,000		$8,726,000
Airfield Tunnel	$-		$82,600,000		$-		$82,600,000
SUBTOTAL	**$170,417,000**		**$331,171,000**		**$96,847,000**		**$598,435,000**
Air Cargo							
Airmail Facility Apron	$-		$1,830,000	*(c)*	$2,864,000	*(c)*	$4,694,000
Airmail Facility Building, including Pkg.	$1,134,000	*(c)*	$2,922,000	*(c)*	$4,653,000	*(c)*	$8,709,000
Domestic Cargo Ramp	$-		$2,424,000	*(c)*	$3,534,000	*(c)*	$5,958,000
Domestic Cargo Building incl. Parking	$17,412,000	*(c)*	$27,438,000	*(c)*	$48,411,000	*(c)*	$93,261,000
Air Cargo Support Building incl. Parking	$1,733,000	*(c)*	$17,462,000	*(c)*	$29,688,000	*(c)*	$48,882,000
International Transfer Ramp	$63,400,000	*(c)*	$9,773,000	*(c)*	$2,722,000	*(c)*	$75,894,000
International Cargo Bldg. incl. Parking	$42,507,000	*(c)*	$130,344,000	*(c)*	$86,683,000	*(c)*	$259,534,000
International Transit Ramp	$-		$1,657,000	*(c)*	$-		$1,657,000
SUBTOTAL	**$126,186,000**		**$193,850,000**		**$178,555,000**		**$498,619,000**
West Side Development							
West Airpark Infrastructure	$-		$19,544,000	*(c)*	$19,544,000	*(c)*	$39,088,000
Relocate Pt. Woronzof Roadway & Trail	$-		$4,470,000		$-		$4,470,000
Utilities	$-		$10,570,000	*(c)*	$10,570,000	*(c)*	$21,140,000
SUBTOTAL	**$-**		**$34,584,000**		**$30,114,000**		**$64,698,000**
Terminal							
Information Technology Improvements	$1,711,000	*(b)*	$750,000		$1,350,000		$3,811,000
NT Waterline Replacement	$4,902,000	*(b)*	$-		$-		$4,902,000
Energy and Terminal Systems Upgrades	$3,174,000	*(b)*	$2,000,000		$2,000,000		$7,174,000
Terminal Rehabilitation	$22,958,000	*(b)*	$20,000,000		$36,000,000		$78,958,000
Terminal Relocations	$5,000,000	*(b)*	$4,079,000		$2,000,000		$11,079,000
Communication System and Relocation	$5,515,000	*(b)*	$-		$2,000,000		$7,515,000
Terminal Expansion	$-		$41,500,000		$74,700,000		$116,200,000
Terminal Parking - Structure	$-		$15,907,000	*(c)*	$-		$15,907,000
Terminal Parking - Surface	$-		$1,675,000		$-		$1,675,000
Hotel Development	$-		$45,000,000	*(c)*	$-		$-
Duty Free Concessions	$1,500,000	*(c)*	$1,500,000	*(c)*	$1,500,000	*(c)*	$4,500,000
SUBTOTAL	**$44,760,000**		**$132,411,000**		**$119,550,000**		**$296,721,000**

Table 5.2

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT

20-Year Investment Plan
(2002 Dollars)

Project	Phase I	Phase II	Phase III	TOTAL
Infrastructure				
Roads, Util. & Grnds Const. & Upgrades	$13,552,000 *(b)*	$8,000,000	$25,000,000	$46,552,000
Old International Terminal Road Upgrade	$998,000 *(b)*	$10,000,000	$-	$10,998,000
SUBTOTAL	**$14,550,000**	**$18,000,000**	**$25,000,000**	**$57,550,000**
Airport Support				
Airfield Maintenance Facility	$39,354,000 *(b)*	$-	$-	$39,354,000
Equipment	$14,603,000 *(b)*	$17,000,000	$23,000,000	$54,603,000
AOA Snow Storage Facilities	$3,409,000 *(b)*	$-	$-	$3,409,000
ATCT	$-	$63,000,000	$-	$63,000,000
SUBTOTAL	**$57,366,000**	**$80,000,000**	**$23,000,000**	**$160,366,000**
Airline Support				
Fuel Storage	$-	$18,000,000 *(c)*	$18,000,000 *(c)*	$36,000,000
Flight Kitchen	$-	$8,449,000 *(c)*	$8,414,000 *(c)*	$16,863,000
SUBTOTAL	**$-**	**$26,449,000**	**$26,414,000**	**$52,863,000**
Rental Cars				
Parking Expansion	$-	$43,000,000 *(c)*	$-	$43,000,000
SUBTOTAL	**$-**	**$43,000,000**	**$-**	**$43,000,000**
General Aviation				
Lake Hood Improvements *(d)*	$10,000,000	$35,000,000	$10,000,000	$55,000,000
ANC Expansion	$5,000,000 *(c)*	$5,000,000 *(c)*	$5,000,000 *(c)*	$15,000,000
SUBTOTAL	**$15,000,000**	**$40,000,000**	**$15,000,000**	**$70,000,000**
Environmental				
Environmental Compliance and Cleanup	$21,669,000 *(b)*	$27,500,000	$49,500,000	$98,669,000
Deicing System	$9,538,000 *(b)*	$10,000,000	$16,000,000	$35,538,000
Noise Abatement Program Implement.	$14,998,000 *(b)*	$10,000,000	$18,000,000	$42,998,000
Storm Drain/Water Quality	$-	$5,000,000	$2,000,000	$7,000,000
SUBTOTAL	**$46,205,000**	**$52,500,000**	**$85,500,000**	**$184,205,000**
Safety				
Security/Safety/Access Control Improv.	$47,000,000	$6,500,000	$11,700,000	$65,200,000
SUBTOTAL	**$47,000,000**	**$6,500,000**	**$11,700,000**	**$65,200,000**
Miscellaneous Project				
Miscellaneous Project	$28,283,000 *(b)*	$30,000,000	$35,000,000	$93,283,000
SUBTOTAL	**$28,283,000**	**$30,000,000**	**$35,000,000**	**$93,283,000**
Total Development Costs	**$549,767,000**	**$988,465,000**	**$646,680,000**	**$2,184,912,000**

Notes: (a) LOI Projects
(b) 2002-2006 projects included in LOI Financial Plan.
(c) Includes tenant development.
(d) Includes LHD CIP and assumes new LHD ATCT in Phase II.

Source: HNTB and ANC.

FY 2002–2006

FY 2007–2011

FY 2012–2020

NOTE:
– ASSUMES 100–300 FOOT BUFFER FROM COASTAL TRAIL.

NOTE: LAKE HOOD PLANS ARE SHOWN ON THE LAKE HOOD ALP.

NOT TO SCALE

RECOMMENDED DEVELOPMENT PHASING PLAN

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

Ted Stevens Anchorage International Airport

APPROVED

MARYELLEN TUTTELL, AICP — AIRPORT PLANNING MANAGER

DESIGNED	DRAWN	FIGURE 5-2
CHECKED	DATE JUNE 24, 2002	

FIGURE 5-2.dwg P:_Projects\28395 – ANC Airfield–Air Cargo\CADD\Figures\CHAPTER 5\ JUN 25, 2002 8:05 am

5.5.2 Phase II

The largest project identified in the Master Plan for this phase is the construction of the new north-south runway and associated taxiways. Timing for this construction will be based upon need. With improvements in air traffic control technology and other measures, the need for this runway may be delayed until Phase III. Cargo will continue to have significant growth during this period, requiring both domestic and international building and apron expansion. Development of the west-side cargo area would be required to meet the demand for facilities.

Other significant expenditures for new facilities identified in the Master Plan include ADGVI improvements, terminal expansion including structured and surface parking, a new ATCT, rental car expansion, construction of a tunnel under the airfield to connect the east and west development areas, expansion of the flight kitchen and GA.

A number of maintenance, rehabilitation, reconstruction, upgrades, and improvement-type projects that were identified by ANC are also included in this phase.

Environmental projects for this period include continuing compliance activities, cleanup, noise abatement, and storm water quality programs, such as deicing management.

5.5.3 Phase III

The major capital projects continue to be associated with air cargo development and terminal expansion. The west side cargo area would continue development for cargo expansion during this planning period, contributing significant site development costs. The terminal expansion includes a new concourse, gates, and parking.

Other significant capital projects include Taxiway RR, Logistics Drive construction, flight kitchen and GA expansion.

Maintenance, rehabilitation, reconstruction, upgrades and improvement type projects that were identified by ANC are also included during this phase.

5.6 MASTER PLAN PUBLIC PROCESS

Development of this Master Plan Update has incorporated public involvement and input in many ways over the course of the project. The goal of the public involvement program was to gather public input on the Airport's short-term and long-range plans for consideration as these plans are formalized. The public involvement process included multiple presentations at the Airport Community Advisory Committee meetings, Technical and Policy Advisory Committee meetings, public meetings, and community organizations like the Community Councils, Anchorage Lions Club, Rotary Club, and Chamber of Commerce. The Airport's advisory committees were all composed of a variety of representatives from the airline industry, the business community, neighborhoods, civic leaders, the FAA, and the MOA. Five public meetings were held from 1999 through 2001 at various key points in the Master Plan Update process. A public hearing on the Draft Master Plan Update was held on July 17, 2002.

In addition to the public meetings and advisory committees, the process also included two Stakeholder Roundtable Discussions during the development of

Chapter Four on Regional Airport Development Alternatives. Fifty to 65 members of the community attended these by invitation. They represented the general public, airlines, GA interests, recreational and environmental interests, area residents, assembly members, and community leaders. The participants were divided into small working groups to answer 11 general questions concerning the Airport and airport development. The questions focused on the importance of the Airport, aircraft operations, growth forecasts, and issues relating to the various alternatives. Public opinion surveys were also conducted to gauge broader public perspectives on airport operations, growth, and development issues.

There are several common themes and issues that surfaced through the entire public involvement process that were taken into consideration in making a final recommendation. These include:

- The community as a whole understands the economic importance of the Airport.
- The convenience of ANC at its existing location is seen as a major benefit.
- The public is generally in favor of Airport growth within existing boundaries.
- Growth projections may be too aggressive given the current Alaskan and global economy.
- Noise and air quality are among the greatest concerns with the existing Airport site.
- Additional regional airport facilities are desired to meet long-term growth rather than expanding beyond existing Airport boundaries.
- It would be very difficult to compensate for the loss of Kincaid Park if ANC expands beyond current boundaries.
- Fire Island is not viewed as an effective expansion option.
- The Knik Arm crossing is critical to the development of the former Knik Aviation Reserve, if selected as the best long-term option.
- New airport facilities in the former Knik Aviation Reserve offer the capability to buy enough land to protect from long-term encroachment from non-compatible land uses.

ANC also allowed the public to comment on the Regional Airport Development Alternatives. Approximately 300 comments were received; about two-thirds followed a form letter format. The majority of the comments reflected concerns regarding potential impacts on parks and recreation uses, particularly Kincaid Park and the coastal trail, and opposed any alternatives that would encroach on Kincaid Park. Most comments suggested that cargo operations be separated from passenger operations and relocated to a new airport in the region. Many comments supported limited expansion of the existing Airport without encroachments into Kincaid Park.

The Draft Master Plan Update was released for public review on June 28, 2002. The public comment period on the Draft Master Plan Update ran through August 20, 2002. Comments were accepted by mail, e-mail, and phone. A total of 134 comments were received. Approximately half of the comments were in the form of form e-mails, with 37 comments from outside Alaska. Approximately two-thirds of the comments expressed concerns regarding continued

development at ANC, while one-third expressed support for continued development. Major areas of concern included noise, air quality, recreation and traffic. In addition, ANC held a public hearing on the Draft Master Plan Update on July 17, 2002. A total of 23 people testified. A transcript of the public hearing is also included in **Appendix G**. A table summarizing comments received in addition to the public hearing testimony is also included in the appendix. The most common issues raised by the public in the public hearing testimony or written comments are discussed below.

Noise Impacts

Many commentors expressed concerns regarding aircraft noise impacts on the community or on adjacent recreational areas. Noise contours associated with the proposed Master Plan are shown in Figure 4-13. These contours show that even with increased operations in the year 2020, the noise contours are expected to be smaller than historic or current noise contours around the Airport. This is primarily due to fleet turnover, with quieter aircraft replacing older noisier aircraft over time.

It is recognized that aircraft operations result in noise impacts on the surrounding community. ANC has worked hard over the years to develop and implement an NCP to address noise abatement and mitigation for affected areas. ANC's main tool for addressing noise is the Preferential Runway Use System that is used to minimize flights over residential areas by maximizing departures to the north and arrivals to the east. The addition of a second north-south runway is likely to increase use of the Preferential Runway Use System by allowing ANC to continue to use the optimum runway configuration even when one north-south runway is closed for maintenance, repairs, or snow removal—thereby reducing departures to the east over Anchorage. In addition to the Preferential Runway Use System, ANC is implementing a Residential Sound Insulation program in areas most impacted by aircraft noise. Finally, ANC is installing a Flight Track and Noise Monitoring System that will provide much more comprehensive and timely information on noise levels in the community and specific aircraft events.

ANC continues to work with the MOA, the Airport Community Advisory Council, and the community to address ongoing noise concerns. Despite all best efforts, however, there will always be a certain amount of noise associated with Airport operations, and recreation users on Airport properties should recognize that they are recreating in an urban area and adjacent to the community's airport and should not expect a wilderness recreation experience.

Air Quality Impacts

Comments received on air quality issues were focused primarily on odor issues and increased emissions from aircraft and vehicle operations. Although fuel odors from Airport operations may be noticeable under various weather conditions, it is difficult to address fuel odors because odors are subjective and difficult to measure; also there are no odor standards in adopted air quality regulations. Odors are addressed indirectly through regulations on volatile organic compounds and other pollutants. ANC is working with the MOA and the ADEC on air quality issues related to Airport operations and has submitted data to the MOA and ADEC in support of their ongoing efforts. The Airport has also cooperated with these agencies on an air toxics study. This study is

designed to determine if there are hazardous pollutants present at high levels that could be contributing to odor problems. The results from this study are expected to be available in the near future. ANC continues to work with the MOA and ADEC on air quality conformity issues associated with Airport operations and construction.

Traffic Impacts

Commentors also noted concerns regarding increased traffic on West Northern Lights Boulevard (WNLB). ANC is continuing to work to improve International Airport Road as the primary access to the Airport. Future plans for an interchange at International Airport Road and the Seward Highway and an interchange at International Airport Road and Postmark Drive are expected to enhance traffic flow on International Airport Road and minimize incentives to use WNLB instead. ANC has policies reminding tenants of the weight limit on WNLB and prohibits trucks associated with State construction projects from using WNLB for access to the Airport. ANC has recently drafted a Transportation Demand Management Plan to promote transportation alternatives for Airport access, including transit, van pools, and bicycle/pedestrian access. It should be recognized, however, that WNLB is a minor arterial between downtown and the Airport and there will always be some use of it as a secondary access road to the Airport.

Recreation and Open Space Impacts

Many of the comments received cited concerns about current and future impacts on recreational areas, particularly the Coastal Trail and Kincaid Park. Fuel odors and aircraft noise were the primary current impacts noted, while future concerns were related to potential impacts on access and use of these recreational areas.

Many recreational facilities are located on or adjacent to the Airport. In fact, ANC allows recreational use on approximately 265 acres of Airport land under use agreements between ANC and the MOA. Federal regulations regarding Airport grants require that the Airport only grant temporary use of Airport land while these areas are not needed for airport-related uses and that the Airport ensure that such use will not adversely affect existing or future airport uses. The recreation areas on and adjacent to the Airport are urban recreation facilities located within an existing Airport environment and aircraft operations can often be seen, heard, or smelled from these areas. Recreation areas located on or adjacent to airport property should not be expected to have wilderness qualities.

Airport lands were transferred to ANC from the Federal and state governments to ensure that there was adequate land to develop airport facilities as needed to meet aviation demands and some of these lands may be needed for future Airport development. Even the MOA's recent study of lands zoned for commercial and industrial development assumes that industrial development would continue on ANC lands. Similarly, the Comprehensive Plan acknowledges the balancing between Airport and community needs and acknowledges the need for continued airport development primarily within ANC's existing boundaries.

ANC is sensitive to concerns regarding impacts on recreation areas and the proposed ALP provides for buffers adjacent to recreational areas where possible. Buffers are proposed along the eastern boundary of the Airport with the Turnagain community, along the Coastal Trail at the west end of the

Airport's east-west runways, and along the south side of WNLB. ANC has agreed to a joint planning process with the MOA prior to any development on the portion of Turnagain Bog not currently identified for development in the current ALP and for development affecting lands currently used for public recreation.

The only recreation area that is directly impacted by development proposed in this Master Plan is a small portion of the Coastal Trail located near the AWWU wastewater plant. ANC has proposed to relocate the Coastal Trail as part of any development of this area, as discussed in Section 5.3.1 of this Plan.

Wildlife and Wetland Impacts

Comments were received regarding the value of the Airport wetlands as wildlife habitat and the potential impacts on wildlife habitat from development at ANC. ANC recognizes that development will result in a decrease in wildlife habitat and has worked with the Corps of Engineers and other agencies to mitigate for wildlife habitat lost through wetland development. It should also be recognized, however, that the wildlife habitat at the Airport is currently compromised by its location on the Airport. The Airport operates under FAA regulations that require Airports to adopt and implement wildlife hazard management plans. The Airport's wildlife hazard management plan includes both habitat management and wildlife control. Habitat management includes making habitats on the Airport less attractive or less available to wildlife, including geese, ducks, moose, and others. Wildlife control consists of actively hazing wildlife from aviation areas on the Airport. The Airport continues to have safety and property damage problems with wildlife at both LHD and ANC and in compliance with Federal regulations is working to reduce wildlife hazards on the Airport by reducing wildlife habitat and populations as needed.

General Concerns Regarding Adverse Impacts from Cargo Operations

Many commentors stated that cargo operations at the Airport have disproportionate adverse impacts and do not provide net benefits. Cargo operations account for only about 30 percent of total aircraft operations at ANC, yet these operations contribute the majority of landing fees and fuel flowage fees used to fund airport operations. This lowers the cost for passenger operations at ANC. In addition, cargo operations have resulted in significant economic benefits to the Anchorage economy through employment and direct purchases. There is no evidence that cargo operations contribute disproportionately to air or noise emissions associated with Airport operations.

Relocation of Cargo Operations

Many of the written comments received suggested moving cargo operations away from ANC. This was reviewed during the alternatives analysis, using the area previously proposed for future airport development in the Matanuska Susitna Valley near Point MacKenzie. As discussed in Chapter 4 of this document, there are several reasons why this is not considered to be advantageous at this time. These include the lack of any regulatory ability to require cargo operations to move to another airport, increased costs for aviation industry/users at ANC resulting from the loss of cargo landing fee and fuel flowage revenues, airspace issues associated with trying to locate another airport in the region, costs

associated with duplicative airport and airline infrastructure for two airports, the loss of jobs in the Anchorage economy at the Airport and in support facilities, and the significant environmental impacts from moving urban transportation infrastructure and impacts into a rural/recreational area.

In addition, ANC conducted a scientific public opinion survey and roundtables to gauge the broader public perspective on airport development at ANC. These efforts indicated that the majority of people in the Anchorage area support further development of the existing Airport.

Delay of Master Plan to Await Anchorage West Area Plan

ANC has been very supportive of a joint Airport vicinity planning effort with the MOA and has offered to contribute funds to support this effort. At this time, the MOA does not have a definitive timeframe for completing the West Anchorage Area Plan. However, ANC is a State resource that provides important transportation services to the entire State and is part of the National Air Transportation System; therefore ANC must continue to address State and national transportation needs on an on-going basis. ANC's Master Plan Update was initiated to address changing aviation conditions and is needed to ensure that ANC properly plans for future growth. Although ANC wants to work cooperatively with the MOA to address airport-community interactions, the West Anchorage Area Plan is not designed to address long-term airport development needs. It is likely that ANC will again update its Master Plan in the next 5 years and input from the West Anchorage Area Plan can be incorporated into the Master Plan at that time. ANC can also amend the Master Plan prior to the next update if appropriate.

Support for the Airport

Approximately one-third of the comments indicated support for the Master Plan concept proposed. These comments primarily focused on the economic and transportation benefits provided by the Airport to the community and the State.

This Master Plan Update attempts to balance ANC's mission statement to provide safe and efficient transportation services to Alaska with the concerns regarding impacts on the local community from Airport operations. ANC will continue this coordination with the public throughout completion of the Master Plan Update and throughout implementation of the Master Plan through individual projects.

5.7 MASTER PLAN IMPLEMENTATION

This Master Plan Update is being submitted to the FAA for review along with the Airport Layout Plan drawings in Appendix F and an air quality conformity assessment for the first five years of the Investment Plan shown in Table 5.2.

This Master Plan Update is intended to be a blueprint for future development at ANC. The main function of the plan is to ensure that Airport lands and resources are used in their most efficient manner and that development is not approved that would limit essential future infrastructure improvements. The Investment Plan laid out in this chapter reflects the best estimates of the investment needs to meet future aviation demands based upon FAA approved Base Case Forecasts. No Federally funded airport

improvements can be constructed, however, without justified need and compliance with all Federal approval procedures.

Actual implementation of projects listed in the development plan will be proposed as levels of operations justify them. As each project is proposed for implementation, more detailed planning and design efforts will be undertaken and environmental reviews under NEPA, BCA, and other reviews will be required.

LIST OF SELECTED ABBREVIATIONS AND ACRONYMS

A

AC	Advisory Circular
ACE	Aviation Capacity Enhancement
ACI	Airport Council International
ADEC	Alaska Department of Environmental Conservation
ADGV	Aircraft Design Group V
ADGVI	Aircraft Design Group VI
ADP	Anchorage Drainage Plan
AEDC	Anchorage Economic Development Corporation
AFFF	Aqueous Film-forming Foam
AFSC	Anchorage Fueling and Service Company
AGL	Above Ground Level
AIP	Airport Improvement Plan
ALP	Airport Layout Plan
ALSF-II	High Intensity Approach Light System with Sequenced Flashers, Category II/III Configuration
AMASS	Airport Movement Area Safety System
ANC	Ted Stevens Anchorage International Airport
ANG	Air National Guard
ANWR	Arctic National Wildlife Refuge
AOA	Airport Operations Area
APO	Airport Policy and Plans
ARC	Airport Reference Code
ARFF	Aircraft Rescue and Firefighting
ARRC	Alaska Railroad Corporation
ARSA	Airport Radar Service Area
ARTCC	Air Route Traffic Control Center
ASDE	Airport Surface Detection Equipment
ASOS	Automated Surface Observation System
ASR	Airport Surveillance Radar
ASV	Annual Service Volume
ATA	Arrival Transition Area
ATADS	Air Traffic Activity Data Systems
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
AWIS	Automated Weather Information System
AWOS	Automated Weather Observing System
AWWU	Anchorage Water and Wastewater Utility

B

BCA	Benefit-Cost Analysis
BEA	Bureau of Economic Analysis
BGQ	Big Lake Airport
BLM	Bureau of Land Management
BRL	Building Restriction Line

C

CAB	Civil Aeronautics Board
CAT	Category
CEA	Chugach Electrical Association
CIP	Capital Improvement Program
CIRI	Cook Inlet Region, Inc.
CIS	Commonwealth of Independent States
CL	Centerline Lighting
CPI	Consumer Price Index
CRDA	Converging Runway Display Aid
CRM	Collision Risk Model
CY	Calendar Year

D

dB	Decibel
DME	Distance Measuring Equipment
DNL	Day Night Average Sound Exposure Level
DOT	Department of Transportation
DOT&PF	Department of Transportation and Public Facilities
DTA	Departure Transition Area

E

EDF	Elmendorf Air Force Base
EIS	Environmental Impact Statement
ENA	Kenai Municipal Airport
EPA	Environmental Protection Agency

F

FAA	Federal Aviation Administration
FAF	Final Approach Fix
FAR	Federal Aviation Regulations
FBO	Fixed Base Operator
FCC	Federal Communications Commission

FIS	Federal Inspections Facility
FMC	Field Maintenance Complex
FMS	Flight Management System
FRN	Bryant Army Heliport and Airstrip
FY	Fiscal Year

G

GA	General Aviation
GDP	Gross Domestic Product
GOA	Ground Operations Area
GPS	Global Positioning Satellite

H

HIRL	High intensity runway lights

I

IARF	International Airport Revenue Fund
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument landing system
IMC	Instrument Meteorological Conditions
INM	Integrated Noise Model
IRS	Internal Revenue Service
ISER	Institute of Social and Economic Research

L

LAAS	Local Area Augmentation System
LDA	Localizer Directional Aid
LHD	Lake Hood Seaplane Base
LLWAS	Low Level Wind Shear Alert System
LOA	Letter of Agreement
LOI	Letter of Intent

M

MALSR	Medium intensity approach light system with runway alignment indicator lights
MI	Mix Index
MLS	Microwave landing system
MOA	Municipality of Anchorage
MRI	Merrill Field
MSA	Metropolitan Statistical Area

MSL	Mean Sea Level
MTOW	Maximum Takeoff Weight

N

NAS	National Airspace System
NAVAIDs	Navigational Aids
NCP	Noise Compatibility Program
NDB	Non-Directional Beacon
NEM	Noise Exposure Map
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NLA	New Large Aircraft
NVG	Night-Vision Goggle

O

O&D	Origin-Destination
ODALS	Omnidirectional Approach Light System
OFA	Object Free Area
OSHA	Occupational Safety and Health Administration

P

PAPI	Precision Approach Path Indicator
PFC	Passenger Facility Charge
PRM	Precision Runway Monitor

Q

QTF	Quick Turnaround Facility

R

REIL	Runway End Identifier Lights
REIS	Regional Economic Information System
RH	Runway Heading
RNAV	Area Navigation
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RTR	Remote Transmitter/Receiver
RVR	Runway Visual Range
RWY	Runway

S

SCIA	Simultaneous Converging Instrument Approaches
SID	Standard Instrument Departure
SIMMOD	FAA's Airport and Airspace Simulation Model
SKE	Station-Keeping Equipment
SOIA	Simultaneous Offset Instrument Approaches
STAR	Standard Terminal Arrival Route

T

TACAN	Tactical Air Navigation
TAF	Terminal Area Forecast
TDZ	Touchdown Zone Lighting
TERPS	Terminal Procedures
TRACON	Terminal Radar Approach Control

U

USCG	United States Coast Guard
USPS	United States Postal Service

V

VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules
VLA	Very Large Aircraft
VMC	Visual Meteorological Conditions
VOR	Very High Frequency Omnidirectional Range
VORTAC	VHF Omni-Directional Range/Tactical Air Navigation
Vso	Aircraft stall speed

W

WAAS	Wide Area Augmentation System

Z

Z41	Lake Hood Strip Airport