Dillingham

Airport Master Plan

AKSAS Project No. 54742

Prepared for:

Alaska Department of Transportation & Public Facilities
Central Region

Prepared By:

ASCG Incorporated
3900 C Street
Suite 501
Anchorage, Alaska 99503

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APPENDICES

1.0 Introduction

This volume contains the seven chapters described below.

Chapter One introduces the master planning update process, presents a summary of public participation efforts, and identifies issues.

Chapter Two presents the results of a background study and field reconnaissance of the airport including:

- Community Background
- Land Use Inventory
- Socioeconomic Evaluation
- Environmental Overview
- Airport Facilities Inventory

Chapter Three presents a forecast of future aviation demand for the 5-, 10-, and 20-year planning periods and includes:

- Current Airport Activity
- Aviation Forecast Elements

Chapter Four identifies improvements necessary to:

- Bring the airport into compliance with design standards and guidelines
- Accommodate anticipated demand
- Address other issues related to the ongoing operation of the airport within the community

Chapter Five presents alternative concepts for airport development that would remedy the deficiencies identified in Chapter Four.

Chapter Six contains an evaluation of the airport development alternatives, in terms of environmental, operational, and cost factors. The chapter ends with a description of the preferred alternative.

Chapter Seven presents:

- The Airport Layout Plan drawing set, which illustrates the improvements included in the preferred alternative
- A phasing plan for the implementation of the preferred alternative over the 20-year planning period
- Individual descriptions of improvement projects
- Budgetary cost estimates for the projects

The master plan report includes appendices of more detailed documentation and information supporting the findings and recommendations of the master plan.

In addition, the Environmental Assessment for the short-term (five-year) improvements proposed for Dillingham Airport is a separate document that was developed concurrently with this master plan update.

1.1 Master Plan Purpose

The Alaska Department of Transportation and Public Facilities (ADOT&PF) and the Federal Aviation Administration (FAA) initiated this project to update the 1985 Dillingham Airport Master Plan. The purpose of this study is to recommend actions to correct safety and capacity deficiencies; identify facilities required to serve existing and future air traffic demand; and develop a phased implementation plan to improve the airport to meet forecasted aviation needs for the next 20 years. Alternative development concepts were evaluated and presented to airport users and local residents to identify a preferred development alternative.

1.2 Master Plan Goals and Objectives

Careful preparation of goals (broad policy statements) and objectives (specific, attainable, and measurable actions) are essential to the success of a master plan process. The goals and objectives selected for this study are designed to meet community guidelines, address public concerns, and consider the many different interests and factors that exist at the Dillingham Airport.

Goal: To provide airport facilities and services for all users in a fiscally responsible manner that maximizes safety, efficiency, and opportunity for use.

Objectives:

- To develop the airport in a manner which balances the need to conform to the physical development standards as established by federal, state, and local agencies with community needs and financial constraints.
- To prepare recommendations based on a thorough investigation of concepts and alternatives based on technical, economic, and environmental considerations.
- To establish an action plan for the airport's future capital improvement program needs.

Goal: To develop aviation demand forecasts that are responsive to expected socioeconomic factors, economic development potential, and projected demand levels for Dillingham.

Objectives:

- To develop estimates of short-term (five-year), intermediate (ten-year), and long-term (20-year) aviation activity levels at the airport.
- To identify the possible characteristics of future air travel demand.

Goal: To ensure airport compatibility with local land use patterns and plans.

Objectives:

- To define airspace requirements of the airport and identify existing and potential obstructions.
- To identify uses of airport land and assess their impact on the contiguous areas.
- To examine alternative uses of airport property, working within site constraints, to enhance compatibility with local land use patterns.

Airport Layout Plan

EXHIBITS

FIGURES

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- To strive for a minimal amount of environmental impact in the development of the airport facilities.

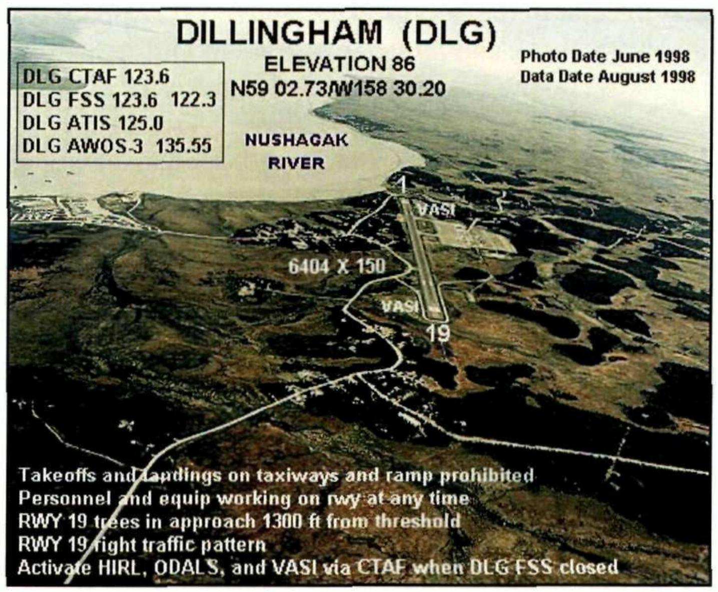
Goal: To produce a plan for airport development that meets the needs and desires of Dillingham residents.

Objectives:

- To develop a public awareness of the airport planning and development process.
- To encourage and utilize comments from all sectors of the aviation community in developing an airport master plan update that can be adopted, endorsed, and implemented.
- To ensure that the public, along with federal, state, and local officials, has an opportunity to participate in the decision-making process during the development of the plan.
- To develop a phased program of specific airside and landside facility improvements to accommodate the forecasts of future aviation demand for Dillingham.

1.3 Background

Dillingham is located in Southwest Alaska at the extreme northern end of Nushagak Bay in northern Bristol Bay, at the confluence of the Wood and Nushagak Rivers. It lies 327 miles southwest of Anchorage. The region has three major mountain ranges: to the northwest lie the Kilbuck Mountains, to the north of the region lie the Taylor Mountains, and the Aleutian Range lies mostly on the eastern portion of the region along the Alaska Peninsula. The climate is maritime, and usually cool, humid, and windy. The Alaska Department of Community and Economic Development lists Dillingham's 2001 population as 2,466. Dillingham is the economic, transportation, and public service center for western Bristol Bay. Dillingham's economy relies heavily on the commercial fishing industry.



Aerial View of Dillingham Airport

The Dillingham Airport is located two nautical miles west of the City of Dillingham. An airport location map (Figure 1.1, Dillingham Location Map) and vicinity map (Figure 1.2, Dillingham Vicinity Map) are located on the following pages.

1.4 Public Outreach

The intent of the public outreach component undertaken by the ADOT&PF is to involve the public, air carriers, and lease holders throughout the planning process. Historically, this has been key to the successful planning and implementation of airport master plans. A proactive public involvement program was devised to inform the citizens about the nature of the proposed project, identify concerns, cultivate support for the project, and set the stage for the public meeting process. The following initiatives were undertaken to ensure the success of the public involvement program for the Dillingham Airport Master Plan.

1.4.1 Public Involvement Plan

The purpose of the Dillingham Airport Master Plan Public Involvement Plan was to ensure that the public and local, state, and federal agencies are informed about the project. The public involvement plan will serve as a guide for gathering relevant information that can be used in project development. Critical milestones and techniques used to gather information and local knowledge are contained in the plan (Appendix C).

1.4.2 Mailing List

Project mailing lists of agencies, organizations, aviation interests, and individuals with an interest in the airport were developed (Appendix C). The lists include residents, businesses, and property owners in Dillingham and at the Dillingham Airport. Among those on the lists are points of contact for the FAA, City of Dillingham, Bristol Bay Economic Development, Curyung Tribal Council, Choggiung Limited – Village Corporation, various state and federal agencies, air carriers, air taxi operators, and airport lessees.

1.4.3 Newsletters

Newsletters were distributed to all parties on the mailing lists. The newsletters provided information regarding the status and findings at critical stages of the project. The newsletters are contained in Appendix C.

FIGURE 1.1
DILLINGHAM LOCATION MAP
DILLINGHAM, ALASKA

FIGURE 1.2
VICINITY MAP
DILLINGHAM, ALASKA

1.4.4 Public Meetings


First Public Meeting in Dillingham, November 2001.

The first public meeting to solicit issues and concerns from Dillingham residents was held on November 14, 2001 at the Dillingham City Council Chambers. The purpose of the meeting was to inform the public about the airport planning effort and solicit concerns and perceptions regarding airport needs. At the meeting, employees of ADOT&PF, FAA and ASCG Incorporated informed participants of the development of the airport master plan. The meeting identified some of the issues and concerns association with the airport.

The second meeting was held on August 22, 2002 at the Dillingham City Council Chambers. The purpose of this meeting was to present the results of the aviation demand forecasts and the analysis of airport facility requirements. The second meeting also provided an opportunity to solicit ideas from participants for airport development alternatives.

The third meeting was held on March 9, 2005 in the Dillingham City Council Chambers to present the results of the evaluation of three development alternatives and the reasons for selecting the preferred alternative. The third meeting also served as a public scoping meeting for the Environmental Assessment. Meeting summaries are contained in Appendix D.

Prior to each meeting notices were placed in the *Bristol Bay Times* and announcements were read on Nushagak Electric and Telephone cooperative radio the week before each meeting.

1.4.5 Airport Advisory Committee

An airport advisory committee, composed of representatives from ADOT&PF, FAA, the City of Dillingham, adjacent landowners, air carriers, and existing leaseholders, was formed to share information relevant to the project. Members functioned as technical advisors in an informal and advisory role. Table 1.1 identifies committee members.

Table 1.1
Dillingham Airport Advisory Committee

Rob Carpenter	Pilot/General Aviation (GA)
Mary Elen Cunningham	FAA Flight Service Station
Donald Darden	Alaska Cargo Services
John Fulton	City Manager, City of Dillingham
Rose Heyano	Curyung Tribal Council
Norm Heyano	Airport Manager, ADOT&PF
Dan Layland	Pilot
Gabriel Mahns	FAA
Mark Mayo	ADOT&PF
Jim Miller	FAA Flight Service Station
Jack Moores	Bristol Bay Native Corporation
John O'Connor	Planning Commission, City of Dillingham

A project website, located at www.dillinghamairport.com, was established to keep the public informed on the latest developments.

1.4.6 Field Reconnaissance

A field visit to the Dillingham Airport was conducted on November 14 and 15, 2001. The purpose of the field reconnaissance task was to conduct a preliminary assessment of field conditions at the airport. The planning team also conducted personal interviews with air carrier and air taxi operators, FAA staff, state maintenance and operations personnel, and city personnel to brief them on the plan and solicit their issues and needs. Appendix E contains summaries of meetings and interviews conducted in November and since the initial field visit.

1.5 Issues Identification

The master planning process was initiated with the identification of airport issues. Dillingham's airport issues were defined by investigating airport records; interviewing airport tenants and operators; interviewing personnel associated with the airport for the State, and City; soliciting discussion during the first public meeting; and obtaining opinions through issues surveys. The community of Dillingham and ADOT&PF established several issues of concern regarding the Dillingham Airport.

Over 70 percent of the respondents rated the following issues as very important or important:

- Failing Runway Pavement
- Poor Runway Line-of-sight
- Insufficient Fencing
- Crosswind Coverage
- Poor Access to Flight Service Station

Over 40 percent of the respondents rated the following issues as important:

- Wetlands Protection

- Improved Fencing
- Additional Aircraft Parking

Several survey respondents added issues and concerns that were not initially suggested on the questionnaire as follows:

- Runway may need to be moved; lack of parking and the small terminal size are issues (standing room only from spring to fall in the PenAir building.) There is only one exit to the outside parking area in each terminal. The main terminal has only one three-foot door opening. It is almost impossible to get in or out with bags.
- The first image of the town is the inadequate terminal.
- Security is non-existent.
- Restrooms at the Dillingham Airport are inadequate.
- Poor aesthetics of the front of terminal.
- Pilots would like enclosed parking for planes.
- Dillingham Airport needs a single, unified terminal.
- Need a crosswind runway, relocate current private airplane parking, and then utilize this area for long-term auto parking.
- Health and safety issues, including passenger access and inadequate restrooms, need to be addressed.
- Airport relocation is important for development and future growth of both the airport and the community.

1.5.1 Runway Condition and Safety Area Deficiency

The runway pavement was in poor condition and a runway rehabilitation project was programmed for 2003. At the time issues were identified, the FAA wanted runway safety area improvement to be part of the project, which would increase the project cost substantially. The required runway safety area is relatively flat ground centered on the runway, 500 feet wide by 8,400 feet long. The existing runway safety area is 200 feet wide by 6,900 feet long. To provide the required runway safety area, it might be necessary to relocate Wood River Road.

1.5.2 Poor Runway Line-of-Sight

In the years since it was built, the north end of the runway has been sinking, so there is now a problem with line-of-sight along the runway. It does not meet the FAA requirement for visibility, from end to end, at 5 feet above the runway surface.

1.5.3 Taxiing on the Runway

Without a parallel taxiway, it is necessary for airplanes to taxi on the runway before takeoff or after landing, depending on which runway is used. This causes delay during busy periods, and is worse when the wind direction necessitates using Runway 19. With taxiing airplanes traveling in one direction and arriving / departing airplanes traveling in the opposite direction on the same pavement, there is a higher probability of collision than if a parallel taxiway were available. The time required for each departure and arrival is lengthened by the time required for back taxiing. During busy periods several airplanes must queue up for departure, creating a tempting situation for multiple pilots to taxi out at once and hold at the runway end for takeoff, rather than wait for the prior airplane to clear the runway. A parallel taxiway would enhance safety by reducing the potential for runway incursions, particularly important because of the line-of-sight problem. It was indicated during the first public meeting that the number one improvement project for the airport should be the parallel taxiway.

1.5.4 Insufficient Fencing

Several problems are related to fencing around the airfield. Although moose and caribou do not normally get inside the runway fencing, foxes and dogs do. At the north end of the runway, the difference in elevation between the runway and the fence location facilitates breeching the fence. The annual FAA certification inspection of the airport in 2000 found about 4,000 linear feet of chain link fence is located within the 500-foot wide primary surface.

1.5.5 Insufficient Vehicle Parking

Vehicle parking for passenger and visitor vehicles is currently insufficient, and worsened after September 11, 2001 when parked cars were prohibited within 300 feet of passenger terminals, unless blast-resistant construction or vehicle inspection provided an equal level of protection. With the lowering of the threat level, parking has been allowed near the terminal building. The long-term parking lot is unlighted and is located a long walking distance from the Alaska Airlines/PenAir terminal.

1.5.6 Limited Aircraft Parking and Enclosed Parking Facilities

Parking for large transient aircraft, such as corporate jets, is limited and may be inadequate for future needs. Enclosed aircraft parking facilities, such as T-hangars (T-shaped buildings each capable of housing one airplane), are limited and may be inadequate for future needs.

1.5.7 Crosswind Coverage

For small aircraft, the existing runway provides less than 95 percent wind coverage, which is the FAA's recommended minimum wind coverage. (See Appendix G for wind analysis of the airport.)

1.5.8 Wetlands

There are wetlands located on the airport and these could impact a crosswind runway location, as well as other proposed improvements, such as runway safety area improvement. (See Appendix H)

1.5.9 Flight Service Station Access

The Flight Service Station (FSS) is currently in leased space on the second story of the Grant Aviation Building. This location is difficult to access for general aviation users because it is fenced off. It has been suggested that the FSS should be located behind the general aviation apron. However, the FSS personnel prefer to be located where they have an unrestricted view of the airfield.

1.5.10 Obstructions to Air Navigation

Trees and other objects penetrate the imaginary surfaces defined by 14 CFR Part 77 that protect airspace around the runway. The cemetery, which is located on a knoll near the runway, is within the 500-foot wide primary surface where no objects should be higher than the runway. Trees penetrate the primary surface on the east side of the runway at the south end and midfield. Trees are also located in the approach surface for Runway 19. The location of the cemetery prevents the airport from meeting the requirements for runway safety area, runway object free area, and primary surface. In addition to trees, several navigation aids penetrate imaginary surfaces. In addition, a pole penetrates the transitional surface just east of the Runway 1 threshold, and an antenna penetrates the transitional surface on the southeast side of the runway.

1.5.11 Encroachment

There is a home on the northwest side of the airport that is accessed through the airport property. For airport safety and security, the road should not be accessible to the public. Continuing to provide access to this home is an issue. Another example of encroachment is the private individual's well located on the southwest part of the airport property.

1.5.12 Inadequate Terminal Building

Travel to Dillingham has increased along with demand from the community for a larger terminal housing multiple airlines. A site for a joint-use terminal was identified by the 1985 Airport Master Plan, but funding the operation of a joint-use terminal is an issue. The terminal would be eligible for FAA grant funding, but it is the ADOT&PF's policy not to operate passenger terminals at rural airports. Instead, the ADOT&PF encourages local governments to take on passenger terminal operation. Airport users report that the Alaska Airlines/PenAir terminal building is often overcrowded, with more occupants than are allowed by the Fire Marshal. Basic comforts of travelers such as restrooms, restaurant, etc., need to be addressed. Residents have also expressed that the terminal building is aesthetically deficient, which is a problem as it is the gateway to their community. The terminal was remodeled after 2001.

1.5.13 Inadequate Water System

The City's water system does not extend to the airport. Currently there are individual wells and the water in these wells is not suitable for drinking. The City may be able to work with ADOT&PF to extend the water and sewer to the airport. The subdivision by the Catholic Mission Church, approximately 700 feet from the long-term parking, has excellent water.

1.5.14 Accommodation of Airport and Community Growth

Relocating the airport was a topic of conversation during the public meeting. Two potential sites were discussed. One would be about 13 miles north of Dillingham, near good sources of rock and borrow material. A potential benefit of this site would be its more central location for serving both Aleknagik and Dillingham. Such a central location, in conjunction with the eventual completion of the Wood River Bridge near Aleknagik, would likely allow closure of the Aleknagik Airport, with significant long-term savings of capital, maintenance, and operational costs. However, moving the airport so far from Dillingham might make it difficult for people who fly in to get groceries, licenses, etc., and existing Dillingham business owners might be opposed to the location. The other site mentioned was west of Kanakanak Road, near the VORTAC navigational aid, where there is room for expansion and better approach and departure clearance. Land traffic would not be an issue nor would wetlands. However, the site would be located within the Togiak National Wildlife Refuge. The cost of a new airport would be high. Also, at any location, protecting the new airport's environs from the encroachment that has occurred at the existing airport would be important. Currently, the City does not have a zoning ordinance; zoning power would be essential to ensure that land use conflicts would not arise.

2.0 Background Study

This chapter presents the existing conditions at and around Dillingham Airport that may influence the future direction of the airport.

2.1 Community Profile

The area around Dillingham, inhabited by both Eskimos and Athabascans, became a trade center when Russians erected the Alexandrovski Redoubt (Post) in 1818. Local Native groups and Natives from the Kuskokwim Region, the Alaska Peninsula and Cook Inlet mixed together as they came to visit or live at the post. The community was known as Nushagak by 1837, when a Russian Orthodox mission was established. In 1884, the first salmon cannery in the Bristol Bay region was constructed by Arctic Packing Co., east of the site of modern-day Dillingham. Ten more were established within the next seventeen years. The Dillingham town site was first surveyed in 1947. The City was incorporated in 1963.[1]

Today, Dillingham is the economic, transportation, and public service center for western Bristol Bay. Commercial fishing, fish processing, cold storage and support of the fishing industry are the primary activities. A total of 277 residents hold commercial fishing permits. In 2000, the estimated gross fishing earnings of residents exceeded $7.1 million. During spring and summer, the population doubles. The city's role as the regional center for government and services helps to stabilize seasonal employment. Many residents depend on subsistence activities, and trapping of beaver, otter, mink, lynx and fox provides cash income. Salmon, grayling, pike, moose, bear, caribou, and berries are harvested.

2.1.1 Location and Regional Setting

Dillingham is located at the extreme northern end of Nushagak Bay in northern Bristol Bay, at the confluence of the Wood and Nushagak Rivers. It lies 327 miles southwest of Anchorage, and is a 6-hour flight from Seattle. The area encompasses 33.6 square miles of land and 2.1 square miles of water. The primary climatic influence is maritime; however, the Arctic climate of the Interior also affects the Bristol Bay coast. Average summer temperatures range from 37°F to 66°F; average winter temperatures range from 4°F to 30°F. Annual precipitation is 26 inches, with 65 inches of snow. Heavy fog is common in July and August. Winds of up to 60-70 miles per hour may occur between December and March.

Courtesy of Bristol Bay Native Association

[1] Alaska Community Database – Detailed Community Information (Taken from on-line database May 2002)

The Nushagak River is ice-free from June through November.[2]

2.1.2 Water and Wastewater System

Approximately 90 percent of homes are fully plumbed. Dillingham's water is derived from four deep wells of which two are now dry. Water is treated, stored in tanks (capacity is 1,250,000 gallons) and distributed. Approximately 40 percent of homes are served by the City's piped water system; 60 percent use individual wells. The core town site is served by a piped sewage system; waste is treated in a sewage lagoon approximately two miles east of the airport. However, the majority of the residents (75 percent) have septic systems.

2.1.3 Electricity

Electricity is provided by Nushagak Electric Cooperative, which has a generating capacity of 59,555 watts.

2.1.4 Fuel

There are three fuel facilities in Dillingham: Peter Pan Seafoods has three fuel tanks at 44,000 gallons; Nushagak Electric has three fuel tanks with 1,850,000 gallons. Bristol Fuels also provides fuel to the community. Fuel is delivered to Dillingham by barge from April through October.

2.1.5 Solid Waste Collection and Disposal

Dillingham Refuse Inc., a private firm, collects refuse three times a week. The landfill is located approximately four miles north of the airport. The Alaska Department of Environmental Conservation (ADEC) has permitted the facility as a Class II landfill. The Senior Center collects aluminum for recycling, and NAPA recycles used batteries. The Chamber of Commerce coordinates recycling of several materials, including fishing web. A new landfill site with a baling facility is currently under construction approximately one mile farther north than the existing landfill, which will make it five miles north of the airport.[3] The City anticipates its completion and the closure of the old landfill in November or December 2002.

2.1.6 Education

The Dillingham City School District operates and maintains two schools in the community. There are 40 teachers and 567 students. Dillingham Elementary School serves students preschool through 5th grade and the Dillingham Middle/High School serves students 6th through 12th grade.

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[2] Alaska Community Database – Detailed Community Information (Taken from on-line database May 2002)

[3] Mitchell, Tracy, 2002. Personal Communication. Alaska Department of Environmental Conservation. Anchorage. April 15, 2002.

2.1.7 Medical Services

Local hospitals or health clinics include Kanakanak Hospital/Public Health Service; Dillingham Medical Center; and Dillingham Health Center. The hospital is a qualified Acute Care Facility. Specialized care is provided by U.S. Indian Health Service Jake's Place, Bristol Bay Area Health Corporation (BBAHC) Our House, and BBAHC Community Mental Health Center. Auxiliary health care is available through Dillingham Volunteer Fire & Rescue Squad, BBAHC medical evacuation, or by commercial flight to Anchorage. These medical facilities serve the nineteen surrounding villages in addition to the community of Dillingham.

2.1.8 Public Safety and Fire

The Dillingham police department was formed in 1971 when Dillingham became a first class city. The Dillingham Police Department is the regional service center for Bristol Bay and 38 surrounding communities and is home base for over 500 fishing vessels. The police department handles communications for the Alaska State Troopers, Fish and Wildlife Protection, Fire and Emergency Medical Services departments and the Dillingham Harbor staff. The police department has seven full-time certified officers. The police department is the only 24-hour, 7 days a week law enforcement center between Unalaska and Bethel.

The Dillingham Correctional Center is a 24-hour, 7 days a week "Community Correctional Center." The jail has eight cells for misdemeanor cases and one felony cell with two detox cells.

The Dillingham Volunteer Fire Department and Rescue is made up of a group of community volunteers. The Department has a total of 42 members both permanent and probationary. The Department maintains three ambulances, four pumpers, two tank trucks, and a utility truck.

2.1.9 Land Use

A Comprehensive Plan for the City of Dillingham was prepared in 1985 and most recently updated in 1998. The plan was written to meet the needs and interests of a diversity of users. The City is currently working on a further update to the 1985 plan. According to the 1985 Comprehensive Plan, the Airport is zoned "Public Facilities." Other areas which are zoned "Public Facilities" include the school, hospital, city hall, senior center, public safety buildings, boat harbor, numerous public office buildings, maintenance buildings and yards, cemeteries and miscellaneous other public uses.[4]

According to the Dillingham Airport Master Plan, 1985, much of the airport property is undesignated wetlands. The Comprehensive Plan addresses the area adjacent to the airport and recommends the continuation of the pattern of residential land use with limited commercial land use that currently exists.

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[4] City of Dillingham Comprehensive Plan, 1985

The 1998 Comprehensive Plan Update includes a City of Dillingham Land Use District Map with two districts, General Use district and Central Business district. The airport is in the General Use district.

Dillingham Airport is located near the junction of the three major roads in the Dillingham area: Kanakanak Spur, Wood River Road, and Aleknagik Road. These road corridors contain the majority of Dillingham's residential development. The proximity of these roads to the airport results in it being surrounded on three sides (northeast through southwest) by substantial residential development.

Approximately 20 percent of Dillingham's commercial land uses are also located in the airport area. The proposed land use plan includes provision for additional future neighborhood commercial areas west of the airport near the intersection of Aleknagik, Kanakanak Spur, and Square Creek Road.[5]

Residential property and the cemetery present potential land use conflicts with the airport property.

Two residences are located on the northwest side of the airport. In order to access this property, individuals drive on Wood River Road to the north end of the runway and then along North Airport Road to the property's driveway. It is difficult to control public access along these roads.

The City Cemetery is located east of Runway 1-19 on a knoll above the runway elevation. The cemetery is still in use and encroaches on areas that are supposed to be cleared around the airfield.

View of cemetery from runway

Dillingham does not have a municipal zoning program. Land use permits are required by the City for all new building and for substantial remodeling. The permits require review of floodplain and other land use conditions.

Although the airport falls within the municipal boundary, it is not subject to municipal zoning or platting ordinances. This is according to the current State ADOT&PF policy based upon an Attorney General's Opinion dated October 24, 1986.

2.1.10 Coastal Management Program

The community of Dillingham is located within the Bristol Bay Coastal Resource Service Area (CRSA). The Bristol Bay CRSA Coastal Management Plan of 1987 and the Nushagak and Mulchatna Rivers Recreation Management Plan of 1990 do not contain any unusual conditions for airport development projects.

[5] City of Dillingham Comprehensive Plan, 1985

2.1.11 Regional Transportation Facilities

Roads

Dillingham is not connected to the continental road system or continental highway network. There is a 23-mile DOT-maintained road from Dillingham to Aleknagik. Within the city limits, individuals travel by personal vehicles, snow machines or all-terrain vehicles..

Trails

Currently the city is working on a winter trails staking project for the community. There are a number of strong advocates for trails in the community. The network of trails should also be accessible to the hiker and mountain biker in the summer. Beach walks could also be part of the trails project.

Marine Facilities

There is a City-operated small boat harbor with 500 slips, a dock, barge landing, boat launch, and boat haul-out facilities. It is a tidal harbor and only for seasonal use. Two barge lines make scheduled trips from Seattle.

Aviation

The public-use aviation needs of the City of Dillingham are served from Dillingham Airport and Shannon's Pond Seaplane Base.

Scheduled cargo service in Boeing 727 aircraft

Typical aircraft type for service to bush communities

Dillingham Airport, owned and operated by the Alaska ADOT&PF, provides commercial passenger and cargo transportation for the population of Dillingham and the western Bristol Bay area. Dillingham Airport is the transshipment hub for passengers and cargo between Anchorage and communities in the region, including Aleknagik, Cape Newenham, Clark's Point, Ekuk, Ekwok, Koliganek, Levelock, Manokotak, New Stuyahok, Portage Creek, Togiak, and Twin Hills. The airport is also the gateway to recreational use of the area in the summer and fall. A more detailed discussion of Dillingham Airport's role within the national and state airport system is located in the Aviation Facilities Inventory in this chapter.

Scheduled passenger service is provided primarily by Alaska Airlines and its affiliated commuter airline, PenAir. Scheduled all-cargo service is provided by Air Cargo Express, Alaska Central Express, Lynden Air Cargo, Northern Air Cargo, and Yute Air Alaska.

Other air carriers and air taxis[6] provide air service that is scheduled and/or nonscheduled, for passengers and/or cargo. Most of these air carriers and air taxis have aircraft based at the airport. Based aircraft at Dillingham Airport also belong to the U.S. Fish and Wildlife Service, the State Troopers, the Tikchik Narrows Lodge, and private pilots living in the area. In the summer and fall a large number of transient general aviation aircraft use the airport, including corporate jets. The following is a summary of aviation activity for the year 2000 at Dillingham Airport:[7]

- 40,647 enplaned passengers
- 2,273 tons of enplaned cargo
- 64,200 aircraft operations (takeoffs, landings, and touch-and-go operations), including 59,542 operations by general aviation aircraft
- 100 based aircraft, including 95 single engine aircraft and 5 multi-engine aircraft
- 56,797 landing or departing aircraft contacted by the Flight Service Station, with the highest daily number, 378, occurring on July 8

Shannon's Pond, located three nautical miles west of the city, provides a 1,400-foot by 100-foot waterlane for floatplane use during visual weather conditions. It has ten based single-engine aircraft and an average of 65 aircraft operations per week, 41 percent transient general aviation, 29 percent air taxi, and 29 percent local general aviation. Although Shannon's Pond is open to the public, the property is owned by a private individual. The Choggiung Corporation owns land between the pond and the highway and is beginning to make plans to improve floatplane facilities.

Sunrise at Shannon's Pond Seaplane Base

2.2 Aviation Facilities Inventory

This section presents an overview of the airport, summarizes airport background and history, describes existing airside and landside facilities, explains conditions that affect flight operations, and lists historical airport revenues and expenses. Figure 2.1 depicts major features of the airport and its environs.

2.2.1 Airport Location

Dillingham Airport is located two nautical miles west of the city of Dillingham. The airport elevation, which is defined as the highest point on the runway, is 88 feet above Mean Sea Level (MSL).

[6] Alaska Island Air, Arctic Circle Air Service, Armstrong Air Service, Bay Air, Bristol Bay Air Service, Frontier Flying Service, Freshwater Adventures, Grant Aviation, Hageland Aviation, Iliamna Air Taxi, King Flying Service, Larry's Flying Service, Mulchatna Air, Nushagak Air Service, Togiak Transportation Services, and Tucker Aviation

[7] FAA Terminal Area Forecast, Fiscal Years 2001 - 2015, FAA-APO-00-7, December 2001; USDOT T-3/T-100 and Commuter Aviation Activity Data; and FAA Flight Service Station Statistics

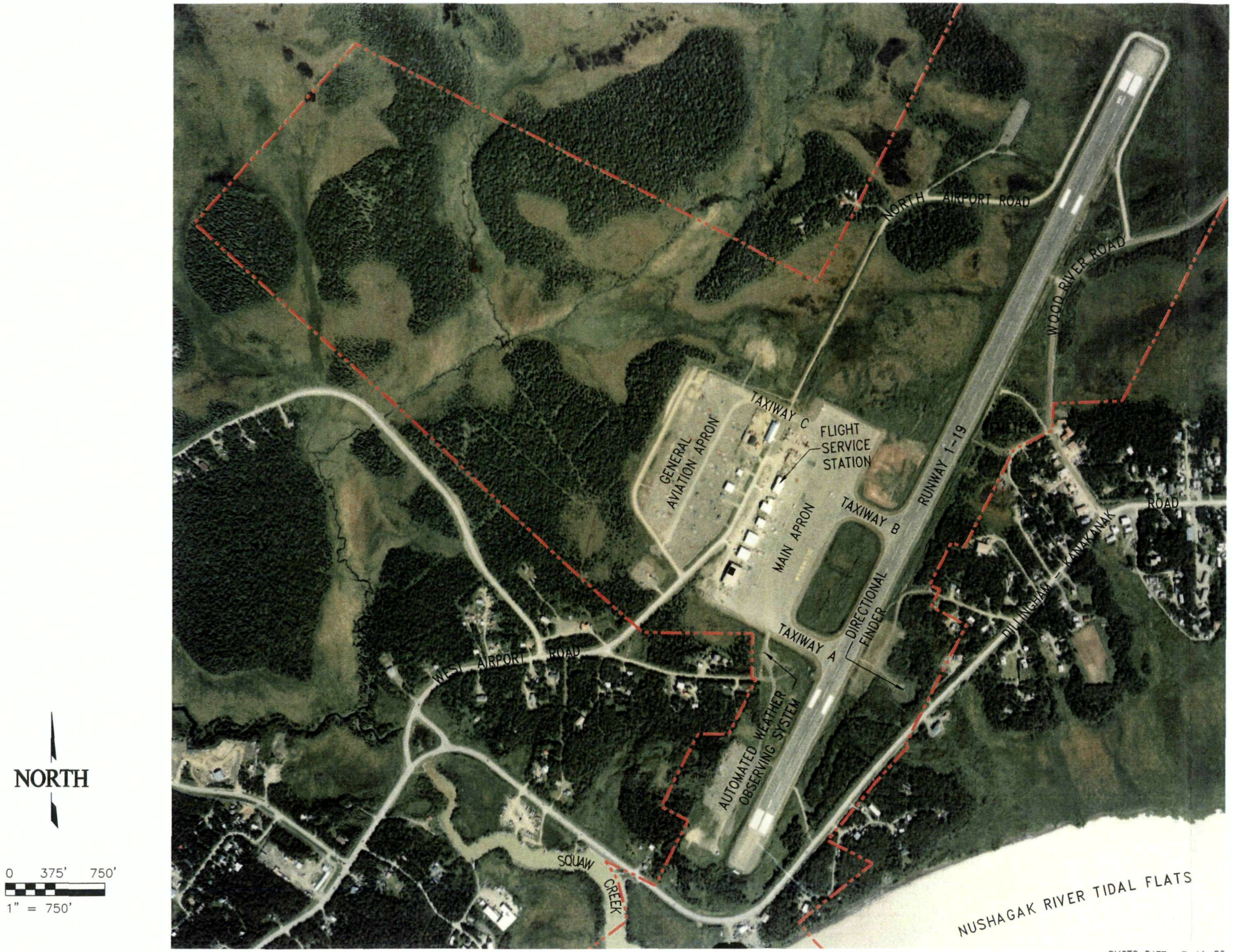

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FIGURE 2.1
AIRPORT FACILITIES
DILLINGHAM, ALASKA

2.2.2 Airport Description

Approximately 597 acres are owned by the ADOT&PF and approximately 68 acres, including the cemetery on the east side of the runway, are controlled by the State of Alaska through either an aviation and hazard easement or a right-of-way permit. ADOT&PF leases land to air carriers and aviation-related businesses, which have made tenant improvements such as buildings, utilities, and parking areas.

The FAA classifies Dillingham Airport within the National Airport System as a non-hub, primary commercial service airport, which is regulated under 14 CFR (Code of Federal Regulations) Part 139. A commercial service airport is one that receives scheduled passenger service and enplanes more than 2,500 annual passengers. Commercial service airports, such as Dillingham, that enplane more than 10,000 annual passengers are primary airports. An airport is defined as an air traffic hub if it enplanes at least 0.05 percent of the passengers in the nation; if under 0.05 percent, the airport is a non-hub. Currently, Fairbanks and Juneau are small air traffic hubs, Anchorage is a medium air traffic hub, and there are no large air traffic hubs in Alaska. In Alaska, Part 139 certification is required for commercial service airports serving aircraft that carry over 30 passengers. Dillingham is classified a Regional Airport by the Alaska Aviation System Plan Update. A Regional Airport is one that 1) is a primary or secondary hub for passenger, cargo, or mail traffic; 2) provides primary access to a population greater than 1,000; or 3) supports economic activities or unusual requirements of regional or statewide significance.

Table 2.1 compares Dillingham Airport with the other three Regional Airports located in ADOT&PF Central Region.

Table 2.1
Comparison of Regional Airports

	Bethel	Cold Bay	Kodiak	Dillingham
Identifier	BET	CDB	ADQ	DLG
Population	5,471	88	6,334	2,466
Runway Size (ft.) (water lanes excluded)	6,398 x 150 1,850 x 75 (gravel)	10,420 x 150 5,160 x 150	7,562 x 150 5,400 x 150 5,011 x 150	6,404 x 150
Surface of Primary Runway	Asphalt	Asphalt	Asphalt	Asphalt
Primary Runway Lights	High Intensity	High Intensity	High Intensity	High Intensity
1999 Passenger Enplanements	100,316	9,489	77,328	38,642

Source: Air Nav (www.airnav.com); U.S. Census Bureau, 2000 Census of Population & Housing; FAA Terminal Area Forecast Fiscal Years 2000-2015 December 2000; Alaska Aviation System Plan Update

In the smaller communities for which Dillingham is the hub, most of the airports have unpaved runways less than 3,000 feet long that can only be used in clear weather conditions. Dillingham is the site of one of six tribal hospitals in rural communities of

Alaska. It is the closest provider of inpatient medical facilities for 18 communities[8] that rely entirely on air transportation for access to medical care, have a total population of 3,768, and are located an average of 96 miles from Dillingham. Dillingham is also one of 24 postal hubs in the state for transporting bypass mail[9] to smaller communities.

2.2.3 Dillingham Airport Background and History

The airport was built in the 1950s. The initial construction consisted of a 3,750 feet-long gravel-surfaced runway and access road. Through the 1960s and 1970s, additional land was acquired, the runway was lengthened, and aprons, facilities, roads, and utilities were added. It was not until 1980 that the runway was paved. The original apron and flight service station building on the east side of the runway were replaced on the west side of the runway.

An airport master plan was completed in 1985. As recommended in the Airport Master Plan, the Main Apron was expanded and a major expansion of the gravel-surfaced GA Apron was built on the west side of the airport. Many of the recommendations of the Master Plan have not yet been implemented, including the following:

- Construction of a crosswind runway in the southwest portion of the airport
- Construction of a joint-use terminal building
- Construction of a full-length parallel taxiway on the west side of the runway

Table 2.2 lists the capital improvements funded by Airport Improvement Program (AIP) grants and the ADOT&PF over the last 20 years

[8] As reported in the FAA's Study for the House and Senate Appropriations Committees, *Aviation Access to Remote Locations in Alaska*, May 2001, the 18 communities are Chignik, Chignik Lagoon, Chignik Lake, Clark's Point, Egegik, Ekwok, Igiugig, King Salmon, Koliganek, Levelock, Manokotak, Perryville, Pilot Point, Platinum, Port Heiden, South Naknek, Togiak, and Twin Hills.

[9] Bypass mail literally bypasses the post office and goes directly to the air carriers eligible to transport it. The bypass mail program of the U.S. Postal Service facilitates the delivery of parcel post to remote communities. Bypass mail accounts for 75 percent of all mail transported in Alaska.

Table 2.2
Past Dillingham Airport Capital Improvements

Project Description	Year Grant Closed	Federal Grant Amount
Acquire crash/fire/rescue (CFR) vehicle; relocate existing maintenance equipment storage building & convert to CFR building.	1983	$580,600
Acquire land for airport development & clear zones; site preparation; extend & widen existing runway safety area; expand apron; install high intensity runway lighting, apron & taxiway lighting; relocate road; obstruction removal	1986	$3,070,336
Land; asphalt surface Runway 1/19 (6,400'), Taxiways A and B, and air carrier apron; construct GA taxiway and apron; construct air carrier apron extension; install security fencing; bury power line; marking & obstruction removal; modify lighting system; drainage and service road; apron floodlight	1986	$7,006,227
Construct sand storage building	1986	$182,142
Pave, mark, and groove runway; pave and mark Taxiways A and B; pave apron; construct and pave apron	1990	$3,403,427
Acquire CFR vehicle	1991	$195,130
Widen and pave access road including utilities relocation	1991	$648,576

Source: Alaska Department of Transportation and Public Facilities

Table 2.3
Planned Airport Capital Improvements

Project Description	Fiscal Year for Funding	Federal Grant Funding Estimate
Airport master plan update	2001	$ 450,000
Runway rehabilitation, including lighting system upgrading and safety area expansion	2003	$4,500,000
General aviation crosswind runway, approximately 2,000 feet long	>2005	$7,500,000
Partial parallel taxiway construction	>2005	$2,000,000

Source: Alaska Department of Transportation and Public Facilities

2.2.4 Runways

The airport has one paved runway, designated 1-19. Runway 1-19 is 6,404 feet long by 150 feet wide, and has a grooved asphalt concrete surface.

Extensive cracking in runway pavement before 2003

At the time of the field reconnaissance in 2001, extensive runway cracking had developed. An aggressive program of crack sealing and cold-mix patching kept the pavement serviceable, but it was clearly in need of rehabilitation. Rehabilitation was the recommendation of ADOT&PF's *2001 Alaska Airport Pavement Report* and the 2000 FAA certification inspection. ADOT&PF was using 5,000-6,000 gallons of crack-sealant per year to maintain the runway. As a result, the surface was getting slicker, and Alaska Airlines pilots expressed concern that the wintertime friction levels on the runway are below the minimum requirements of the FAA.[10]

A pavement rehabilitation project was completed in Federal Fiscal Year 2003.

According to the 2004 *Alaska Airport Pavement Report,* the Pavement Condition Index (PCI) for Runway 1-19 is 94.33. (Figure 2.2) The PCI is a number ranging up to 100, which reflects the weighted average condition of pavement by surface area. The higher the PCI number the better the pavement condition.

The runway pavement load rating is as follows:

Single Wheel	75,000 pounds
Dual Wheel	160,000 pounds
Twin Tandem Wheels	280,000 pounds

Since the runway was lengthened in the 1970s, the north end has been sinking, so there is now a "hump" in the middle and a problem with line-of-sight. The longitudinal gradient of the runway does not meet the FAA requirement for visibility, from end to end, at a point 5 feet above the runway surface.

[10] According to the Airports Engineer, Statewide Aviation, it is not possible to quantify the runway friction because no airport in the state has the Continuous Friction Measuring Equipment recommended by the FAA.

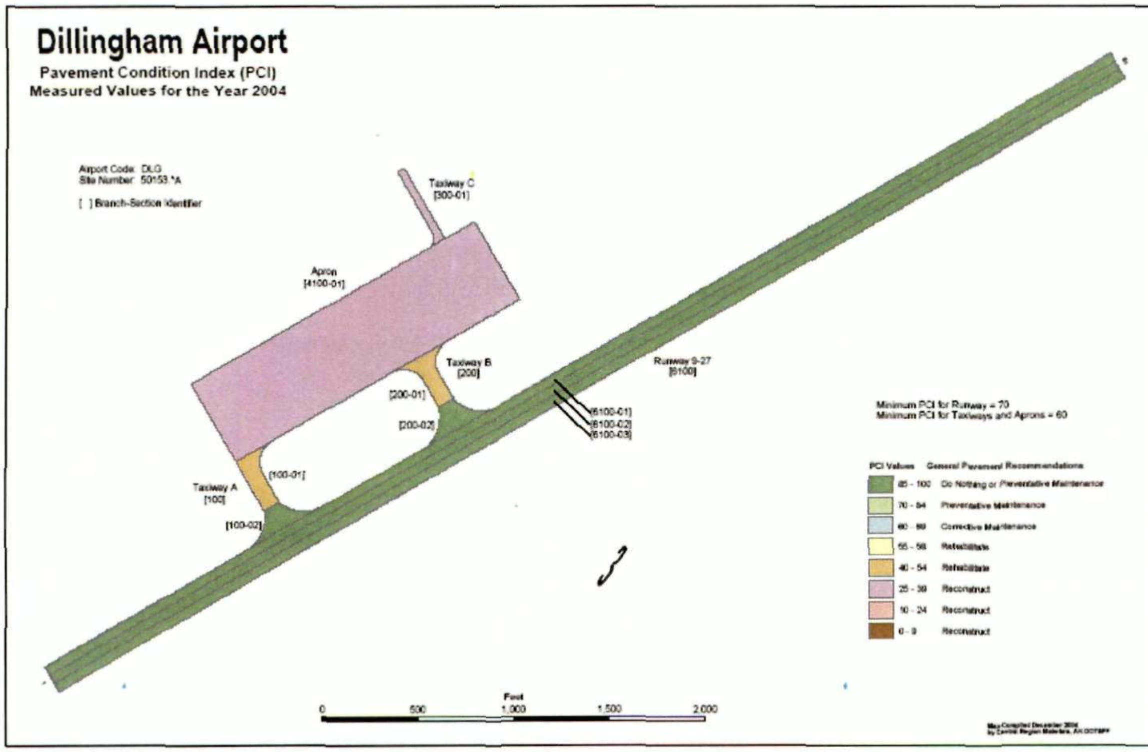
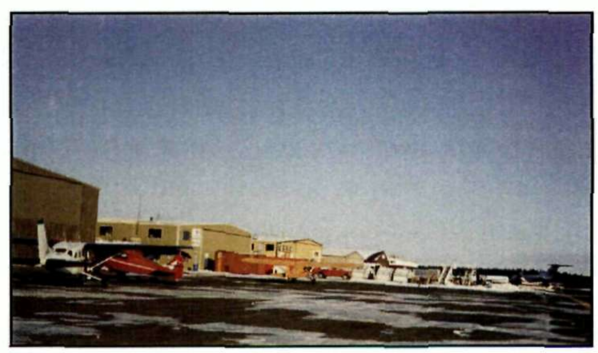


Figure 2.2 Dillingham Airport Pavement Condition Index

2.2.5 Aprons

The airport has two aprons for aircraft parking, the Main Apron and the General Aviation (GA) Apron.



Main apron

The Main Apron is 1,680 feet long by 470 feet deep. Along the west side, south of Taxiway C, lease lots extend 200 feet over the apron. The east edge of the Main Apron, between Taxiways A and B, is designated a large aircraft parking area. The large aircraft parking area is 100 feet deep and 700 feet long. It was developed for aircraft hauling fish, but with the decline in fisheries, it has not been used in over five years. The north end of the Main Apron is where transient aircraft, such as corporate jets, park. When the north end is full, corporate jets park along the east edge of the Main Apron. Airport users report that the space is inadequate at peak times when as many as eight corporate jets are at the airport.

The Main Apron was paved in 1987. The 2004 pavement evaluation found the Main Apron to be in fair condition with a PCI of 39. Reconstruction is recommended.

The GA Apron is gravel-surfaced. It is approximately 1,300 feet long by 370 feet deep, encompassing an area of 52,500 square yards. The south end of the GA Apron is irregularly shaped, due to the crosswind runway that was planned in that area. The GA Apron is marked for 109 aircraft tiedowns, including ten at the south end for transients. Transient helicopter parking is at the south, triangular-shaped end of the GA Apron.

Airport users and the Airport Manager would like to see the GA Apron paved. In addition to providing a more serviceable surface for the small aircraft that use the apron and making the leaseholds on the west side of the apron more attractive, paving the GA Apron would make it easier to keep gravel off the Main Apron, where Foreign Object Damage (FOD) is a serious concern around high value jet aircraft.

There is demand for electrical power at GA aircraft tiedowns; currently, power is only available at a few tiedowns near buildings via extension cords.

2.2.6 Taxiways

Runway 1-19 is accessible from the Main Apron by Taxiways A and B. Taxiway C provides access from the GA Apron to the Main Apron. The three taxiways were paved in 1987 along with the Main Apron. Taxiway A is 90 feet wide has a PCI of 67.07. Taxiway B is 90 feet wide and has a PCI of 73.93. Taxiway C is 62 feet wide and has a PCI of 38. The 2004 pavement evaluation recommends rehabilitation for Taxiways A and B and reconstruction for Taxiway C.

The airport does not have a full-length parallel taxiway. Consequently, it is necessary for airplanes to taxi a long distance on the runway before taking off on Runway 19 and after landing on Runway 1, which delays operations during busy times and increases the potential for runway incursions. As many as six airplanes taxi down the runway at one time and then takeoff one after the other, rather than wait for each airplane to taxi and takeoff individually.

2.2.7 Conditions Affecting Aircraft Operations

This section discusses air traffic management, instrument departures and approaches, enroute and terminal navigational aids, obstructions to air navigation, weather reporting, and airfield lighting, marking, and signage.

Air Traffic Management

Aircraft that are approaching or departing an airport are subject to a system of controls designed to serve one primary purpose – the safe separation of one aircraft from another. Aircraft that fly in the United States are subject to varying degrees of control depending on the specific airspace and meteorological conditions in which they operate. The FAA is responsible for the system of air traffic control. There are two basic types of aircraft flight regimes recognized by the air traffic control system: those operating under Visual Flight Rules (VFR), which depend primarily on the "see and be seen" principle for separation, and those operating under Instrument Flight Rules (IFR), which depend on separation by air traffic controllers. IFR flights are controlled from takeoff to touchdown, while VFR flights are only controlled in the vicinity of airports.

Dillingham Airport does not have an Air Traffic Control Tower.[11] Air traffic control for aircraft flying by IFR is provided from the Anchorage Air Route Traffic Control Center.

Dillingham Airport has a staffed FSS. The FSS provides pilot briefings, enroute communications, lost-aircraft assistance and emergency services, flight clearance relays, and weather and navigational aid status information. The Dillingham FSS is auxiliary to the Automated Flight Service Station (AFSS) in Kenai, which is one of three AFSSs in the state. The Dillingham FSS area of service covers 12 airports and 6,500 square miles.

United States airspace is structured into controlled and uncontrolled areas. Controlled airspace is Class A, B, C, D, or E. Class G is uncontrolled airspace. Class A Airspace is 18,000 feet above MSL, where only IFR flights are permitted along high-altitude designated jet routes. Class B, C, or D Airspace surrounds airports with air traffic control towers. As shown on Figure 2.3, the airspace around Dillingham Airport is Class E at designated times (16 hours a day) and Class G at other times. Class E Airspace is configured to contain all instrument landing and departure procedures. The purpose is to provide positive control of VFR aircraft whenever weather conditions deteriorate below certain ceiling and visibility conditions. Class E Airspace extends up from the ground surface in a defined area within 5 to 10 miles of Dillingham Airport. Within a larger footprint, 10 to 20 miles from the airport, the Class E Airspace starts at an elevation 700 feet above the surface. Class E Airspace around Dillingham Airport extends up to the floor of Class A Airspace.

Within 20 miles of Dillingham Airport are several public and private airports. The closest are Shannon's Pond Seaplane Base and the Kanakanak Hospital Helipad. The Kanakanak Helipad is about three nautical miles southwest of the airport and is not frequently used. Shannon's Pond Seaplane Base is frequently used and is only 1 nautical mile from Dillingham Airport. The orientation of its water lane in a northeast-southwest direction does not create a cross-traffic flow problem with traffic using Runway 1-19. Aleknagik New Airport, Aleknagik Seaplane Base, Tripod Airport, and the private airport Aleknagik are 15 to 20 miles north of Dillingham. Manokotak Airport is west of Dillingham, near the Igushik River. To the south on Nushagak Bay are located Clark's Point Airport and two private airports, Ekuk and Queens. No airspace conflicts with these airports have been identified. Nor have airspace conflicts been identified with the Naknek 1 Military Operations Area, located about 35 miles to the north. Although Dillingham is open to transient military aircraft, few use the airport, probably due to the proximity of King Salmon Airport, where a longer runway, instrument landing system, and a minor US Air Force facility are located.

[11] When the 1985 Airport Master Plan was prepared, the FAA was expected to construct and operate an Air Traffic Control Tower at Dillingham Airport. Since then, the FAA has substantially raised the minimum threshold of aircraft operations for establishing a tower. For less busy airports like Dillingham, the FAA has a cost-sharing program in which the capital cost of a tower is split with the airport sponsor. However, the FAA does not help pay the cost of operating the Tower and most airport sponsors find it prohibitively high.

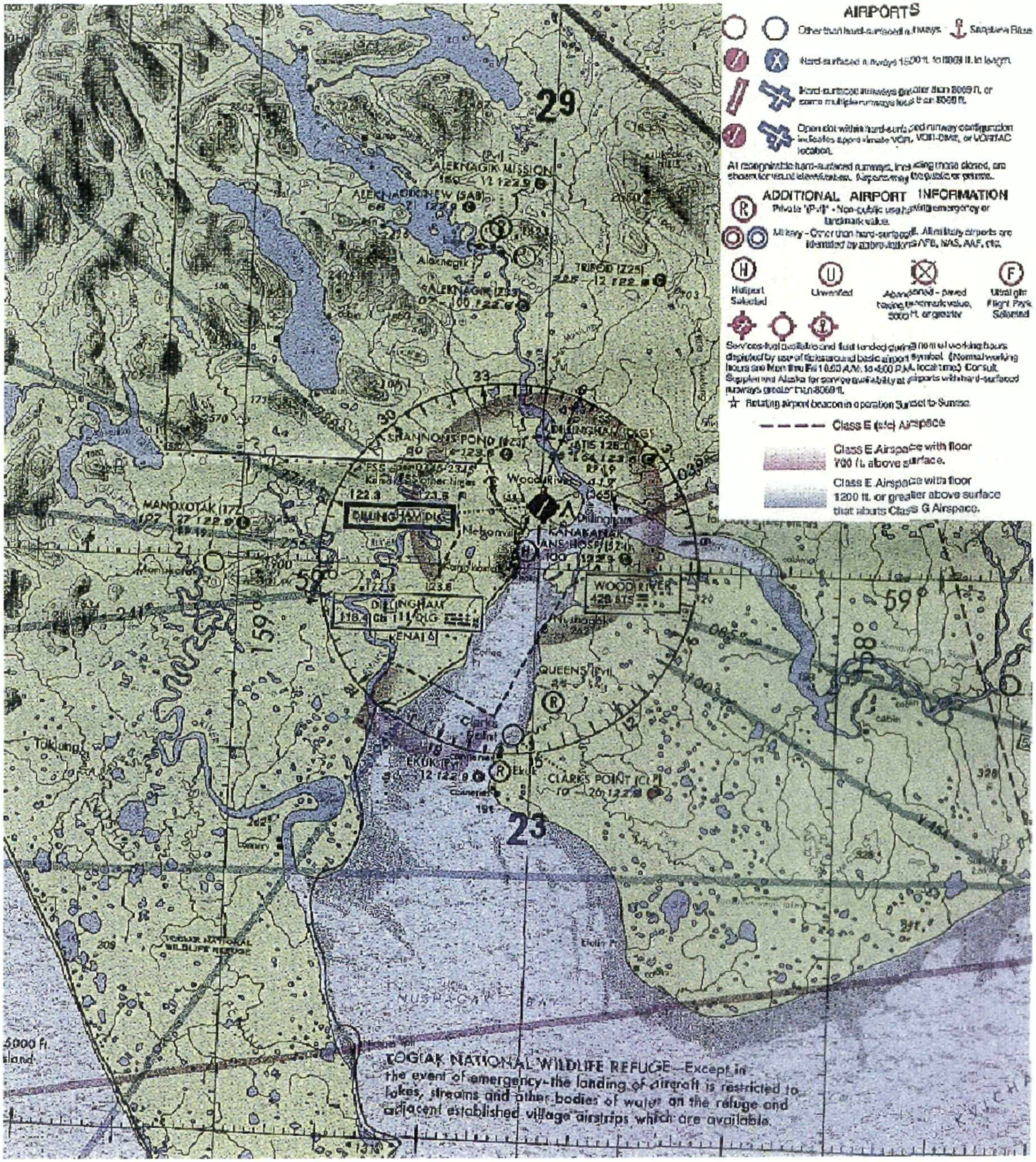


FIGURE 2.3
AERONAUTICAL MAP
DILLINGHAM, ALASKA

Normally, airplanes approaching to land at an airport without an operating control tower make all turns to the left. Dillingham has a nonstandard traffic pattern – right turns for Runway 19 and left turns for Runway 1.

Instrument Departures and Approaches

Runways 1 and 19 have instrument departure procedures. Departure procedures are designed to assist pilots in avoiding obstacles during the climb to the minimum enroute altitude.

Runways 1 and 19 have approach procedures for use during instrument metrological conditions. Each published approach procedure provides for straight-in or circle-to-land approaches. The nonprecision instrument approaches to Runways 1 and 19 use cockpit Global Positioning System (GPS), the Dillingham VORTAC (VHF (Very High Frequency) Omnirange with collocated TACAN (Tactical Air Navigation)) and Nondirectional Beacon (NDB) that are located southwest of the airport, and the airport's Localizer/Distance Measuring Equipment (LOC/DME). Published approach procedures warn that circling is not authorized east of the runway.

Landing at Dillingham Airport is possible when the approach visibility is as low as 1 statute mile for aircraft with approach speeds up to 140 knots (Category C). Category C includes the largest commercial aircraft that regularly use the airport, Alaska Airlines' Boeing 737-200, Northern Air Cargo's Boeing 727-100, and Lynden Air Cargo's Lockheed Hercules.

Until recently, Runway 1 had a Microwave Landing System (MLS). It has been decommissioned and the equipment removed.

Navigational Aids

Navigational aids on and near the Dillingham Airport can be categorized as enroute and terminal. Enroute aids are used for terminal navigation as well as enroute navigation.

Enroute navigational aids include the Dillingham VORTAC and the Wood River NDB, which are located about three nautical miles southwest of the airport near the Kanakanak Hospital.

Terminal navigational aids include the Localizer (LOC) with collocated Distance Measuring Equipment (DME), the VHF/DF (Direction Finder), two segmented circles (showing VFR traffic pattern), two wind indicators, and various lights and lighting systems, which are discussed later in this chapter.

The LOC/DME is located near the Runway 1 threshold. The LOC/DME is used for approaches to Runway 19.

The VHF/DF is operated by Flight Service Station personnel and is used to aid lost or disoriented pilots in finding the airport. The DF antenna is located in the southeast part of the airport.

The segmented circles and wind indicators are located on the west side of the runway, one near each of the Main Apron access taxiways.

The airport does not have a full Instrument Landing System (ILS), which would allow a precision instrument approach with an approach visibility minimum lower than ¾ statute mile. An ILS would use the localizer; however, it would also require a glideslope antenna.

The FAA recently upgraded the localizer so that the system will be more reliable and outages will be shorter. Another recent project was the installation of a Capstone ground station.[12] At the time of the inventory, two other improvements for Runway 1 were planned for the future, but funding was not committed and the timing of their implementation is unknown. One improvement is the installation of Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) and the other is the installation of a Runway Visual Range (RVR). A MALSR is a series of lights extending out from the threshold along the runway centerline to help pilots identify the runway in poor visibility conditions. An RVR estimates the horizontal distance the pilot can see down the runway from the approach end. More recently, the FAA has been considering installing a glideslope antenna and completing an ILS at the airport.

Obstructions

14 CFR Part 77 defines imaginary surfaces around airports that should be kept clear for flight operations. Objects that penetrate these imaginary surfaces are called obstructions. The FAA determines if an obstruction is a hazard to air navigation. The imaginary surfaces defined by Part 77 are the primary, transitional, approach, horizontal, and conical surfaces.

The date of the most recent obstruction survey for Dillingham Airport is January 1992. (See Appendix I for obstruction data for Dillingham Airport.) The obstruction chart indicates trees penetrate the primary surface, the transitional surface, and the approach surface for Runway 19. When the airport was inspected for Title 14 CFR Part 139 certification in 2000, the FAA found a chain link security fence within the 500-foot wide primary surface that immediately surrounds the runway. The fence penetrates the surface for 1,000 linear feet on the north side and 3,000 linear feet on the south side of the runway. The Inspector also noted that, mid-field on the south side of the runway at the cemetery, trees are located in the primary surface.

ADOT&PF has performed some tree trimming to bring the Part 77 surfaces into compliance, but the fence and trees at the cemetery remain obstructions.

Chapter 4 provides more detailed analysis of imaginary surfaces and defines the imaginary surface dimensions appropriate for the long-range future at Dillingham Airport.

Weather Reporting

The airport's weather reporting equipment is an Automated Weather Observing System (AWOS). The AWOS instruments are located south of the Main Apron. The Flight Service Station is responsible for weather reporting. Recently installed at the FSS are "weather cams," which are four remotely operated cameras that provide real-time

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[12] The FAA began the Capstone Program as a safety initiative in 1999. Starting with the Yukon-Kuskokwim Delta area around Bethel, the FAA has been working closely with air carriers to certify and install avionics providing terrain alerting, traffic advisories, and linkage with Anchorage Center to provide "radar-like" services in non-radar airspace. The system combines satellite-positioning equipment and computer-data links for a navigation system that proponents say outperforms radar.

pictures of the airport and are accessible for viewing via Internet at http://akweathercams.faa.gov/viewsite.php.

Lighting, Marking, and Signs

Airport lighting, pavement markings, and signs identifying runways, taxiways, and aprons assist air navigation and ground movement at Dillingham Airport.

Airport lighting consists of a rotating beacon, visual approach slope indicators, approach lights, and edge lighting for the runway, apron, and taxiways.

The rotating beacon, located on a tower near the Aircraft Rescue and Firefighting Facility, helps pilots locate the airport and identifies it as a civilian, public-use airport.

Both Runways 1 and 19 have a Visual Approach Slope Indicator (VASI) system, which aids VFR pilots in landing on the appropriate glide path.

Runway 19 has an Omnidirectional Approach Lighting System (ODALS), which is used with nonprecision approaches to help pilots identify the runway in low visibility conditions. An ODALS consists of seven lights extending 1,700 feet from the threshold along the runway centerline.

ODALS to Runway 19

The runway edge lighting is High Intensity Runway Lights (HIRL). The HIRL, VASIs, and ODALS are pilot-activated using the Common Traffic Advisory Frequency (CTAF).

The taxiway edge lights are Medium Intensity Taxiway Lighting (MITL).

The Main Apron has medium intensity edge lighting. The GA Apron does not have edge lighting, although there is some area lighting from building-mounted fixtures. The Airport Manager reported that more area lighting is needed at the GA Apron for security.

Runway markings are nonprecision-type and in good condition. The signs identifying runways, taxiways, and aprons comply with the requirements of Part 139 and are in good condition.

2.2.8 Landside Facilities Inventory

In the decades since the airport was built in 1953, additional land has been acquired, lease lots for tenants have been developed and buildings and automobile parking areas have been constructed. Figure 2.4 shows existing landside facilities on the airport.

Tenant buildings along West Airport Road

Lease Lots

Most developed lease lots are on the west side of the runway. These privately developed lots are occupied by small passenger and cargo terminal facilities belonging to air carrier operators including Yute Air, Freshwater Adventures, Alaska Airlines, Starflite, Grant Aviation, and Alaska Cargo Services. The lease lots on the east side of the GA apron are occupied by Tucker Aviation, Bristol Bay Air Service, Inc. and Togiak Transportation Inc.

The U.S. Fish and Wildlife Building is located on the west side of West Airport Road.

Airlines and air taxis operating from Dillingham maintain individual passenger and cargo handling facilities or sublet space. Most operators combine passenger, cargo handling, and hangar functions within one building. All facilities are located west of the runway. Before remodeling, the Alaska Airlines/PenAir terminal building was often overcrowded, with more occupants than are allowed by the Fire Marshal. One of the main concerns of the community is the lack of adequate terminal facilities. A site for a joint-use terminal was identified by the 1985 Airport Master Plan. The need for this facility has only strengthened over the years. A terminal could also provide space for a Fixed Base Operator (FBO) for commercial and general aviation.

Alaska Cargo Services, provides ground handling for Northern Air Cargo and Air Cargo Express

Flight Service Station

The FSS is located in the Grant Aviation Building along with the Twin Dragon Restaurant, Frontier Flying Service, and Arctic Circle Air. The FSS is staffed by FAA personnel who are responsible for reporting the conditions at 12 airports as well as weather forecasts, airport traffic advisories, emergency services to aircraft in distress, aeronautical notice dissemination, search and rescue notifications, and flight planning assistance. In December 2001, Dillingham received the Federal Aviation Administration Flight Service Station of the Year award.[13] FSS hours of operation are 7:45 a.m. to 11:45 p.m.

The Grant Aviation Building has multiple users

2.2.9 ARFF and Airport Maintenance

ADOT&PF operates and maintains the Dillingham Airport. The building housing the Aircraft Rescue and Firefighting (ARFF)/Snow Removal Equipment (SRE) facility (Figure 2.4) was constructed in 1996. The building has six bays, one housing the fire truck.

[13] The Bristol Bay Times, December, 2001

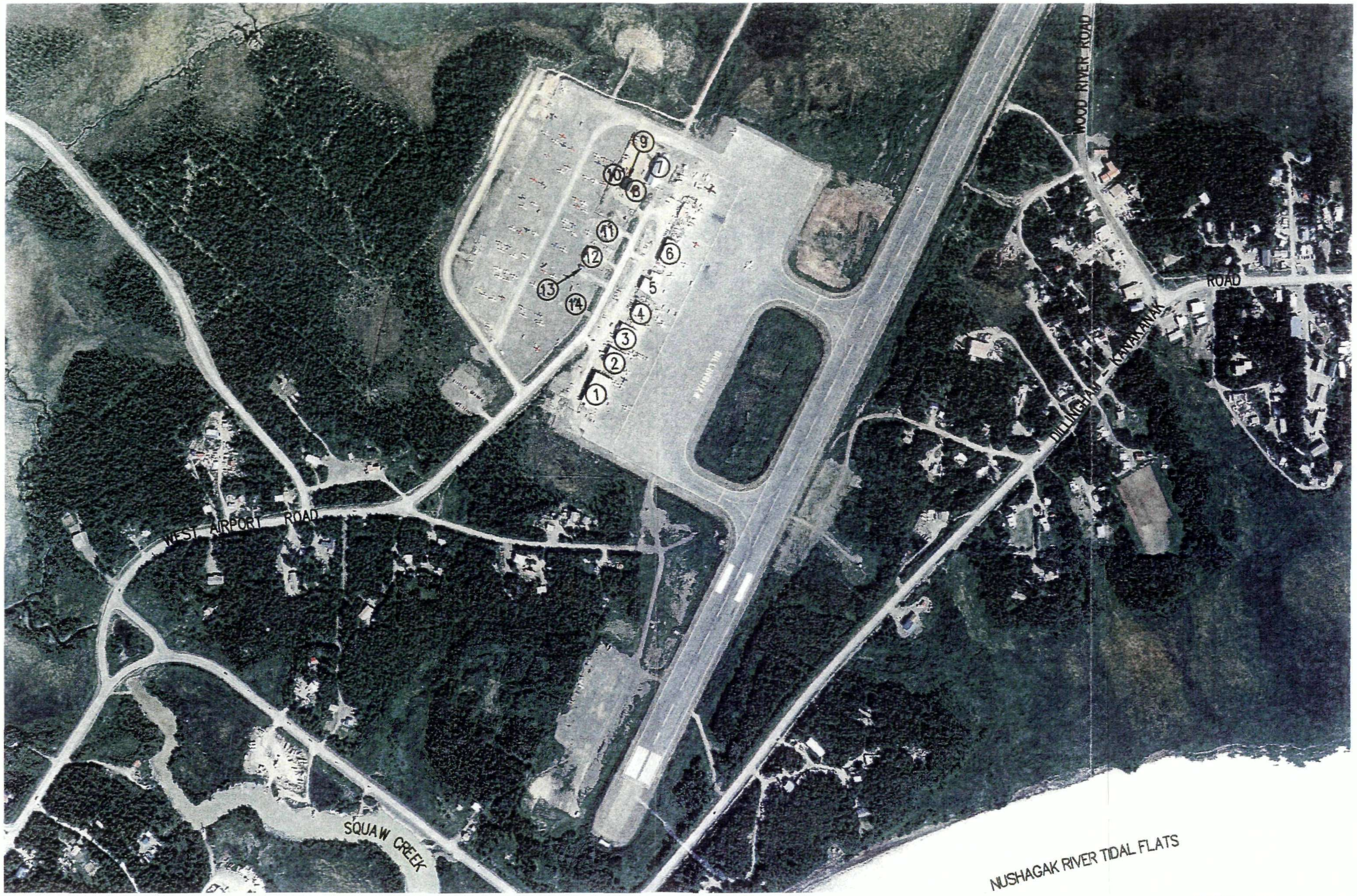

PHOTO DATE : 7-11-00

1. YUTE AIR ALASKA, HAEGELAND AVIATION SERVICES AND LARRY'S FLYING SERVICE
2. FRESHWATER ADVENTURES
3. ALASKA AIRLINES AND PENAIR
4. PENINSULA AIRWAYS, INC.
5. STARFLITE, INC.
6. GRANT AVIATION, FSS, TWIN DRAGON RESTAURANT, FRONTIER FLYING SERVICE, ARCTIC CIRCLE AIR, ALASKA CARGO SERVICES
7. ARFF / SRE BUILDING
8. CITY OF DILLINGHAM
9. STATE SHOP
10. SAND STORAGE
11. TUCKER AVIATION
12. US FISH AND WILDLIFE SERVICE
13. BRISTOL BAY AIR SERVICE, INC.
14. TOGIAK TRANSPORTATION, INC.

FIGURE 2.4
AIRPORT BUILDINGS
DILLINGHAM, ALASKA

The Airport Manager is located in the State Shop Building, east of the general aviation apron just south of the ARFF building.

Maintenance at the airport includes snow removal, pavement repair, lighting maintenance, fence/gate repair, striping, and mowing safety areas. Airport personnel are also responsible for maintaining 60 lane miles of road within the community of Dillingham. There is also an equipment maintenance shop located in town.

Table 2.4 shows the inventory of Dillingham Airport equipment as of November 2001.

Table 2.4
Dillingham Airport Equipment Inventory

Year Purchased	Type
1982	Oshkosh, T3000 ARFF Truck
1983	Wausau, GW 12R Snow Wing
1983	RO Amundson, AM24U U-Blade
1983	Champ, 740 Grader
1986	Cat, 966D Loader 4 yd
1986	Raine, LSB-C U-Blade 12cy
1986	Boss, V-Plow
1991	Rylind, RW12H Snow Wing
1991	Champ, 730A Grader
1992	Boss, UV Snow Plow
1992	Hendrickson FSP5 Sander 1 ½ yd
1992	Stewart Stevens, Snow Blower 3000tph
1993	Diamond, UV V Snow Plow
1993	Boss, V Plow 11.3
1993	Balderson, BW14H Snow wing
1993	Mainland, BM950T Brush Cutter
1993	Autocar 6x4 Dump Truct 8yd
1993	Cat, 14G Grader
1993	Oshkosh, Snow Blower 3000tph
1994	Frink, Snow Plow 18+
1995	Chevy, Stake Bed 4x4 1t
1997	Roso, Asphalt Heat Kettle
1997	Chevy, PU 4x4 ¾ t
1999	MB, Runway Broom Towed

Source: Dillingham Airport Manager, November 2001

The airport is ARFF Index A, which is the requirement at Part 139 certificated airports with at least one scheduled daily departure by an aircraft seating 30 passengers and under 90 feet in length. The Index A requirement is for at least one rescue and firefighting vehicle with 500 pounds dry chemical or Halon 1211 or 450 pounds dry chemical and 1000 gallons water.

The ARFF equipment is staffed only during periods of air carrier operations. ADOT&PF has one firefighting vehicle. The fire truck has 3,000 gallons of water, 400 gallons of Aqueous Film Forming Foam (AFFF), and 500 gallons of dry chemical. The airport also has a backup trailer with 5,000 gallons of water and a 3,000-gallon holding tank for water.

The sand storage building is located west of the State Shop Building (Figure 2.4). The airport uses heated sand for the runway (2/3 sand and 1/3 urea). There is no deicing facility. According to interviews, there is a need for another warm storage building for airport maintenance equipment.

2.2.10 Airport Fuel and Aircraft Services

PenAir sells a small amount of fuel. Alaska Cargo Services has four fuel tanks and is the primary seller of fuel. The remaining companies provide fuel to their own aircraft. The following table lists fuel storage facility owners and capacities for each identified fuel storage facility in Dillingham. There are no aircraft repair services available for transient aircraft.

Table 2.5
Fuel Storage Facilities

	Avgas			Jet Fuel		
Facility Owner	**Stationary**	**Mobile**	**Total**	**Stationary**	**Mobile**	**Total**
PenAir	2,500		2,500		4,000	4,000
Alaska Cargo Services	6,000		6,000		3,000	3,000
Yute Air Alaska	5,000		5,000			
Freshwater Adventures	2,000		2,000			
Grant Aviation		4,500	4,500			
Mulchatna Air	2,000		2,000			
Tucker Aviation	1,500		1,500			
Togiak Wildlife	1,000		1,000			
Bristol Bay Air	500		500			
Bay Air	1,000		1,000			
Alaska Island Air	300		300			
Tikchik Lodge	1,000		1,000			
Total	22,800	4,500	27,300	0	7,000	7,000

Source: Dillingham Airport Manager, February 11, 2002

2.2.11 Airport Access, Circulation and Parking

Dillingham Airport is located approximately four miles from the center of Dillingham, near the junction of Kanakanak, Aleknagik and Wood River Roads. Kanakanak Road provides primary access to the airport property.

Within airport boundaries, all airport terminal and tenant access is provided by the state maintained common-use road (West Airport Road). A short gravel road branches off the Wood River Village road on the east side of the airport. It loops around becoming North Airport Road at the threshold of Runway 19 and provides access to the runway and runway lights. This road also serves the resident located northwest of the airport.

The strip of land located east of West Airport Road, adjacent to the buildings, has been identified as a parking area. This parking strip is an earth and gravel area that lies between the various buildings and West Airport Road. Tenants, employees, and patrons park adjacent to the various buildings whenever space is available. Parking for passengers' vehicles is not currently adequate, and worsened after September 11, 2001 when ADOT&PF was tasked with keeping parked cars 300 feet away from the Alaska Airlines/PenAir passenger terminal.

Separate auto parking for general aviation users is not available. Pilots park personal vehicles in the airplane's tiedown spot while flying. The long-term parking lot is unlighted and is located approximately 0.3 mile from the Alaska Airlines/PenAir terminal.

2.2.12 Airport Utilities

There are no municipal water system hook-ups extended to Dillingham Airport. Tenants provide their own water by drilling wells or storing water in tanks. The water in many of these wells is not suitable for drinking. The subdivision by the Catholic Mission Church, approximately 700 feet from the long-term parking, is reported to have excellent water.

A sewer line runs along West Airport Road.

The Nushagak Electrical Association serves the airport. Electrical services are provided to all existing airport tenants. Overhead power lines are routed to the airport boundary via a 20-foot utility right-of-way that parallels West Airport Road. All electrical lines are underground from the Catholic Mission into the airport and connecting to all tenants' building. According to interviews, there is a demand for electrical power to tiedowns. The only tiedowns with power are those that are close to building with available receptacles. Better floodlighting of the apron is also needed for security. A generator provides emergency power for the ARFF building and runway lights. The city has extended electricity out to Aleknagik Road.

The issue surveys reveal the importance of providing water to the airport. Some surveys indicate wanting water lines from the city. Other surveys support the airport having its own water system with a central well.

2.2.13 Airport Revenues and Expenditures

As with most primary airports owned and operated by ADOT&PF, operating costs for Dillingham Airport exceed revenue. Airport maintenance and operation is subsidized by State General Funds. Table 2.6 compares ADOT&PF revenues and expenses associated with Dillingham Airport for FY 2000 and 2001.

Table 2.6
Dillingham Airport Revenues vs. Expenses
Alaska Department of Transportation and Public Facilities

	FY 2000	FY 2001
Revenues		
Gas and Oil*	$ 20,621	$ 18,987
Rent	64,423	65,838
Interest	128	68
Total	85,172	84,893
Expenses		
Personal Services	387,768	408,231
Travel	11,720	9,032
Contractual	220,494	234,623
Supplies	130,618	170,568
Total	750,600	822,454
Net	(665,428)	(737,561)

*$500 fuel dispensing permit fees for the right to sell fuel on the airport and fuel flowage fees ($0.02 per gallon of fuel sold).
Source: ADOT&PF

Federal grants from the AIP are the major source of funding for airport capital expenditures. Table 2.7 presents a history of AIP grant funding for Dillingham Airport. Entitlement funds are provided to an Airport Sponsor[14] based on actual passenger and cargo levels. Discretionary funds are awarded on the basis of FAA priorities, with the highest priority being projects needed for safety reasons. AIP grants for most types of airport improvements cover 93.75 percent of the projects; the Airport Sponsor provides the remaining funds.

Table 2.7
Airport Improvement Program Grant Information for Dillingham

FY	Grants	Discretionary	Entitlement	Total
1984	1	$ -	$ 182,142	$ 182,142
1986	1	3,087,559	315,868	3,403,427
1987	1	-	195,130	195,130
1988	1	-	648,576	648,576
1990	1	-	455,884	455,884
1991	1	67,095	2,465,210	2,532,305
1995	1	1,570,177	-	1,570,177
1996	1	416,658	-	416,658
2001	1	-	442,609	442,609
Total	9	5,141,489	4,705,419	9,846,908

Source: FAA

[14] ADOT&PF is the Airport Sponsor for over 200 airports in Alaska, including Dillingham Airport.

2.3 Environmental Conditions

The Dillingham area occupies outwash plains, low moraines, a few choppy moraine hills, and many muskegs, lakes, and streams. Rolling terraces and moraines, under forests dominated by either white spruce and paper birch or black spruce, contain well-drained soils without permafrost. The soil consists of silty volcanic ash over very gravelly glacial drift. Slight depressions with sedges and mosses typically have very poorly drained fibrous organic soils with permafrost. Swales in terraces and moraines contain poorly drained silty soils with permafrost. Beneath a thick peaty mat is mottled gray silt loam. The vegetation associated with this soil is mainly tussocks, mosses, low shrubs, and scattered patches of black spruce.

The primary climatic influence is maritime; however, the Arctic climate of the Interior also affects the Bristol Bay coast. Average summer temperatures range from 37° to 66° F; average winter temperatures range from 4° to 30° F. Annual precipitation is 26 inches, with 65 inches of snow. Heavy fog is common in July and August. Winds of up to 60-70 MPH may occur between December and March. The Nushagak River is ice-free from June through November.

2.3.1 Resources Impact Categories

Dillingham Airport Noise

There have been no recorded complaints from Dillingham residents concerning aircraft noise levels. The distance of the airport from the city may provide an effective noise barrier for most Dillingham residents.

Compatible Land Use

Land use in the vicinity of the airport is mainly residential, light commercial, or recreational. The majority of residents in the vicinity live to the east of the existing airport and along the Nushagak River.

Socioeconomic Environment

Dillingham is the economic, transportation, and public service center for western Bristol Bay. Commercial fishing, fish processing, cold storage and support of the fishing industry are the primary activities.

Air Quality

Air quality is not monitored and is assumed to be good.

Water Quality

The water quality in the area is considered good.

Historic, Architectural, Archaeological, and Cultural Resources

The State Historical and Preservation Office (SHPO) was contacted on February 14, 2002 for notification of any historic, architectural, archaeological, and cultural resources. There are no historic, architectural, archaeological, or cultural resources documented by the SHPO within one mile of the Dillingham Airport. There is an undocumented gravesite located just east of the runway. See interview report in Appendix E.

Department of Transportation Act Section 4(f)

Section 4(f) of the Department of Transportation Act requires that transportation projects not use land from parks, recreation areas, wildlife refuges, or historic or cultural sites unless there is no feasible or prudent alternative. Public parks or recreation areas would not be affected. Togiak National Wildlife Refuge lies outside the proposed project boundary.

Biotic Communities

Bristol Bay provides staging and migration habitat for large numbers of waterfowl. Ospreys occur more frequently in this region than in other areas of Alaska. Blackpoll warblers are common breeders in conifer stands north of the Dillingham Airport. Brown bears are common, partially in response to the large salmon runs in this area. Bristol Bay supports the largest run of sockeye salmon in the world. Rainbow trout are a common resident fish in the Squaw Creek drainage, which flows past the landing strip and into Nuchagak River.[15]

Black bears are sparse in the region. Brown bear and moose are abundant. Wolves range throughout the region in low to moderate numbers. The Mulchatna caribou herd migrates through the area. Other mammals that frequent the areas include lynx, red and Arctic foxes, land otter, mink, marten, short-tailed weasel, beaver, muskrat, and snowshoe and Arctic hares. The area contains high quality subarctic waterfowl nesting habitat. Birds linger on lagoons for several weeks during the southern migration. Bald eagles and peregrine falcons breed along the coast and the banks of Squaw Creek and Nushagak River and other salmon streams.[16] No recorded conflicts between wildlife and airport activities have occurred on airport property.[17]

Soils and Vegetation

The soils of the Dillingham area consist of a Histic Pergelic Cryaquepts – Pergelic Cryofibrists Association. The principal components of this association are described below:[18]

- <u>Histic Pergelic Cryaquepts</u>. Histic pergelic cryaquepts are poorly drained soils in nearly level to rolling coastal plains, deltas, and inland basins. They support a thick cover of sedge tussocks, low shrubs, forbs, mosses, and lichens. Mostly they formed in nonacid silty and sandy alluvium.
- <u>Pergelic Cryofibrists</u>. Pergelic cryofibrists are very poorly drained peat soils, in broad depressions, lake borders, and shallow drainage ways. They support dense vegetation that includes mosses, sedges low shrubs, and forbs. The soils consist of layered fibrous moss and sedge peat that is usually very strongly acid. In places, a few thin lenses of volcanic ash occur in the upper 2 feet of the peat.

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[15] US Fish and Wildlife Service, 2001.

[16] Selkregg, LL. *Alaska Regional Profiles,* published by University of Alaska, Arctic Environmental Information Data Center for State of Alaska Office of the Governor (Hammond) and the Joint Federal-State Land Use Planning Commission for Alaska, no date.

[17] Heyano, Norm. Personal Communication – Airport Manager. 2002

[18] USDA. *Exploratory Soil Survey of Alaska,* US Department of Agriculture, Soil Conservation Service, February 1979.

> Small areas of partially decomposed peat are included. These soils are always wet, and permafrost is normally close to the surface. Ice core mounds, or pingos, occur in some areas.

Both soil types have severe to very severe ratings for road construction and should be avoided if possible.

The area around Dillingham consists of upland spruce-hardwood forest and wet tundra. The upland spruce-hardwood forest is fairly dense interior upland forest of such evergreen and deciduous trees as white spruce, black spruce, quaking aspen, balsam poplar (cottonwood), and paper birch.[19]

Endangered and Threatened Species of Flora and Fauna

The United States Fish and Wildlife Service (USFWS) indicated that the Dillingham Airport might be within the wintering range of Steller's eiders. According to the National Marine Fisheries Service, no threatened and endangered marine mammals would be expected in the area.

Wetlands

Moist tundra is common around the airport. It usually completely covers the ground and can be productive during the growing season. The tundra varies from an almost continuous and uniformly developed cotton grass tussock growth to stands devoid of tussocks where dwarf shrubs dominate.[20]

Floodplains.

The two major streams draining the area are the Wood River and the Nushagak River. Dillingham is located at the confluence of these two streams.

Coastal Zone Management Program

The Dillingham Airport is located in the Bristol Bay Coastal Zone Management Program supported by the local CRSA board. The draft local coastal management program does not contain any unusual conditions for airport development projects.

Coastal Barriers

There are no designated coastal barriers in Alaska.

Wild and Scenic Rivers

There are no designated wild and scenic rivers in the project area.

Farmland

There is no farmland designated as prime or unique in the project area and likely no farmland of any type in the area.

Light Emissions

The current airport has approach lighting, high intensity runway lighting, wind cone lighting, and a rotating beacon on the tower next to the ARFF building.

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[19] Selkregg, LL. *Ibid.*

[20] Selkregg, LL. *Ibid.*

Solid Waste

Dillingham Refuse Inc., a private firm, collects refuse three times a week. The solid waste facility is located on Nine-mile Road, about five miles north of the airport. The ADEC has permitted the facility as a Class II landfill. The Senior Center collects aluminum for recycling, and NAPA recycles used batteries. The Chamber of Commerce coordinates recycling of several materials, including fishing web. A new landfill site with a baling facility is currently being planned. The new landfill will be constructed approximately one mile north of the existing landfill, making it about five miles north of the Airport.[21]

Hazardous Material

Jet-A kerosene and 100 low lead aviation gasoline are available at the Dillingham Airport.

A review was made of pertinent environmental records within a one-mile radius for facilities located in the site vicinity. The reviewed records include databases and files available from the ADEC and the EPA. The records search was performed in accordance with standards established in 2000 by the American Society of Testing and Materials (ASTM) (ASTM E-1527-00). The review records include:

- ADEC list of registered underground storage tanks (USTs)
- ADEC leaking UST list
- ADEC contaminated sites list; EPA Resource Conservation and Recovery Act (RCRA). Current RCRA large quantity and small quantity generators. Current RCRA treatment, storage, and disposal (TSD) facilities, including corrective action sites (CORRACTS) and non-CORRACTS facilities
- Comprehensive Environmental Response, Compensation, and Liability Act Information Systems (CERCLIS-State and Federal Superfund)
- EPA National Priority List (NPL)
- Emergency Response Notification System (ERNS)

The following summarizes the results of the record search.

Registered USTs and ASTs. Based on a search of reasonably ascertainable information (VISTA, 2002) there are no registered above ground storage tanks (ASTs) and two registered USTs within the ASTM specified search radius.

Leaking USTs. Based on a search of reasonably ascertainable information (VISTA, 2002), there is one leaking underground storage tank (LUST) site within the ASTM specified search radius (3/4 of a mile).

ADEC Contaminated Sites List. This database is regarded as the state equivalent of the federal CERCLIS listing and includes the following: (1) sites where there has been a confirmed release of a hazardous substance, (2) sites where there has been a confirmed release and investigation or where cleanup has been initiated or completed, and (3) sites where there has been no confirmed release but for which the ADEC has received

[21] Mitchell, Tracy, 2002. Personal Communication. Alaska Department of Environmental Conservation. Anchorage. April 15, 2002.

information indicating there may have been release of hazardous substances. The ADEC uses the federal CERCLIS database. The CERCLIS database contains information about abandoned, inactive, or uncontrolled hazardous waste sites that may require cleanup. VISTA (2002) indicates that there are nine state hazardous waste site located within one mile of the subject site. There are two state hazardous waste sites located on airport property (Figure 2.5).

RCRA List. The RCRA Administration Action Tracking System (RAATS) was searched for RCRA sites located within 1 mile of the site. There are no RAATS sites located within the area of review for the subject property.

RCRA Corrective Action Facilities. RCRA CORRACTS are sites, which are currently performing site clean up in accordance with the RCRA. VISTA (2001) indicates that there are no CORRACTS sites located within one mile of the subject site.

RCRA TSD Facilities. The RCRA TSD listing includes all facilities, which report the treatment, storage, and/or disposal of hazardous waste. There are no such sites located within the area of review for the subject site.

RCRA Generators. The RCRA generators database includes all facilities, which report the generation, transportation, and TSD of hazardous wastes. Separate listings are maintained for large and small generators, respectively defined as facilities that generate more than or less than 1,000 kg of non-acutely hazardous waste per month. There are no RCRA generators located within the area of review for the site.

CERCLIS List. State and federal databases were reviewed to identify properties within the site vicinity that are known to contain environmental contamination or that house facilities that generate, store, treat, transport, or dispose of potentially hazardous materials. The information contained in each reviewed database is summarized below.

- **EPA National Priorities List.** The NPL includes properties or facilities which the EPA has designated as requiring priority remedial action and which Superfund financing has been allotted. VISTA (2001) indicates that there are no such sites located within one mile of the subject site.

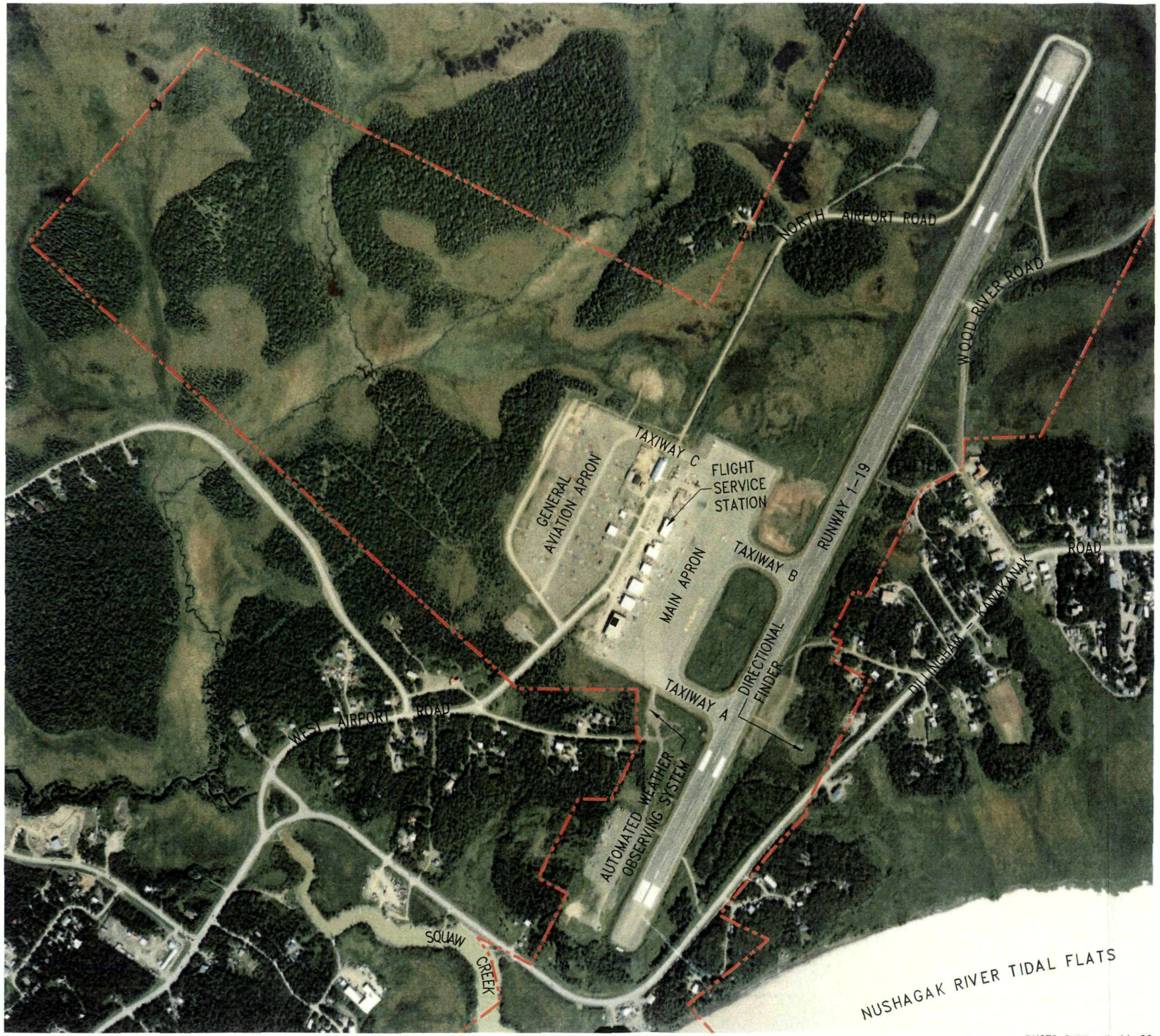


PHOTO DATE : 7-11-00

NORTH

0 375' 750'
1" = 750'

LEGEND

■ 1,200 gallon AVGAS spill on 12/3/92

UNMAPPED SITES

1. Wren Air, Dillingham Airport - LUST (Closed)
2. Dillingham FAA Station, Dillingham Airport - No Further Remedial Action Planned
3. USDOT FAA, Dillingham Airport Nav Aids - RCRA regulated Small Generator
4. Starflite Inc., Airport Road, Dillingham, AK - 4 Gasoline UST: 3 Permanently Out of Use and 1 Temporarily Out of Use
5. Armstrong Air Service Inc., Dillingham Airport - 2 Gasoline UST: Both Removed From Ground 6/15/93
6. MarkAir, Dillingham Station - Heating Oil UST: Temporarily Out of Use
7. Armstrong Air, Dillingham Airport - LUST: Open
8. FAA, Dillingham Quarters Shop - 3 Gasoline UST: Tanks Removed from Ground 9/28/98

NOTES

There are at least 15 USGS reported water wells within the airport boundary.

FIGURE 2.5
AIRPORT ENVIRONMENTAL LIABILITIES
DILLINGHAM, ALASKA

- **EPA CERCLIS Database.** The CERCLIS database contains a list of properties, which have been or are being investigated by the EPA for existing or potential releases of hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund). No such sites are located with in the area of review for the subject property.
- **EPA RCRA Generators List.** The EPA Resource Conservation and Recovery Act (RCRA) generators list is a compilation of registered facilities that generate hazardous waste. No such facilities are located in the area of review for the subject site.
- **EPA RCRA TSD List.** The EPA RCRA TSD list is a compilation of registered facilities that transport, store, or dispose of hazardous wastes. No such facilities are located within the area of review for the subject property.
- **ADEC Contaminated Sites Database.** The ADEC Contaminated Sites listing is a record of known or suspected contaminated sites including leaking underground storage tanks, petroleum spill sites, and sites contaminated with hazardous substances other than petroleum. There are no known sites within a mile of the airport.
- **Emergency Response Notification.** The Federal ERNS is a national database of reported releases of oil and hazardous substances. There are no ERNS sites located within one mile of the airport.

2.3.2 Geology and Soils

Geology

Dillingham is in the Nushagak lowland at the head of Bristol Bay on the west shore of the Nushagak River. The topography of the Dillingham area is flat tundra with numerous lakes and streams and rolling hills with many irregularly shaped moraine knolls and ridges separated by muskegs. The area is bounded by the Wood River to the east, the Nushagak River and Bay to the south, the Tikchik Mountains to the west, and the Nushagak Hills to the north. The Tikchik Mountains form a rugged bedrock highland that is isolated from the main mountain ranges of southern Alaska and bordered on their east side by a system of 12 generally parallel deep glacial lakes, which now occupy Cretaceous sedimentary bedrock basins. The Nushagak Hills are a series of low rounded hills of Cretaceous sediments and Tertiary granite.

The entire area was covered by glaciers during the Wisconsin (Naptowne) glaciation and is comprised of glacial moraine; glaciofluvial, fluvial and eolian deposits; and volcanic ash from the Aleutian Range. A thick layer of eolian silt mantles the uplands. This material is a mixture of silt blown from unvegetated floodplains and hills adjacent to the melting glaciers and volcanic ash.

The Bristol Bay area is close enough to the Aleutian Trench seismic belt that moderate structural and other damage may be expected during a large earthquake. The presence of unconsolidated glacial and fluvial sediments in the lowland areas increases the potential for damage from ground breakage, local subsidence, and sliding (mainly along sea bluffs in town). Effects of the 1964 earthquake in the Bristol Bay area included ground cracking in the alluvial flats of most rivers and some deltas. The Dillingham area is also susceptible to the effects of tsunamis generated by seismically active areas.

Soils

Several subsurface investigations have been conducted on or near the airport property. The following discussion of soil conditions in the Dillingham airport area is relatively general for several reasons: the Dillingham airport occupies a large area; currently undefined development plans do not allow focus on specific areas; and complex geology of the area results in soil conditions that change over relatively short distances.

The soils at Dillingham airport may be summarized into three types (listed from the surface downward): 1) organics (peat), 2) silt, and 3) gravel. The following discussion describes these soils in more detail.

- Organics (Peat) - Most of the boring logs from previous investigations at the Dillingham airport indicate the presence of peat. Thickness of the peat varies from less than 1 foot to about 20 feet, with an average thickness of approximately 4 feet. The thickness varies substantially over relatively short distances. Higher sloped and drained areas such as small hills contain less peat than the lower poorly drained areas. The peat is fibrous, generally saturated, and highly compressible with a low bearing capacity.
- Silt - Silt underlies the peat. Thickness of the silt as noted on the boring logs commonly ranges from 5 to 20 feet. Two kinds of silt are present: organic silt that is most often present directly below the peat layer; and inorganic silt. The inorganic silt is far more prevalent throughout the area. The organic silt and inorganic silt have different engineering properties. The organic silt generally has higher moisture content, higher compressibility, and lower bearing capacity when compared to the inorganic silt. Several previous engineering reports note the moisture content of the silt is often at or above its liquid limit. The liquid limit of a soil is essentially the point at which the soil acts likes a liquid. The silt is difficult to work with when disturbed during construction, especially in the presence of water.
- Gravel - The deepest soil type noted on boring logs is gravel. The gravel is a glacial outwash deposit and may extend for several hundred feet below the ground surface, although the total thickness of the gravel has not been reported. The characteristics of the gravel may vary isotropically. Specifically, this material may vary in classification from gravel to sand, and contain various amounts of silt. The gravel also contains boulders and cobbles at several locations. The outwash gravel is being mined as borrow material.

Engineering considerations associated with the soils in the vicinity of the Dillingham Airport are presented below.

Permafrost. According to the Alaska Regional Profiles, the Dillingham area has been mapped as: "Underlain by isolated masses of permafrost; predominantly occurring in fine-grained deposits. Permafrost is usually found at a considerable depth as relict permafrost or near the surface as thin lenses of small extent where ground insulation is high or low." For this airport master plan update, more than 225 ADOT&PF logs were reviewed and only one boring log noted frozen ground that may have been permafrost. The frozen soil noted may have been a localized area of seasonal frost not yet thawed. However, considering the combination of near-freezing annual air temperatures (34.1 degrees Fahrenheit), fine-grained soils (silts), and surficial peat deposits, the occurrence of permafrost should not be entirely ruled out.

Seismically Induced Settlement. The normally consolidated fine-grained saturated soils at the Dillingham airport are often associated with liquefaction and/or densification under the influence of strong seismic motion.

Groundwater. At numerous locations, the groundwater table is at or near ground surface. During construction it may be necessary to excavate soil beneath the groundwater table. Previous reports note many silt samples with moisture contents at the soils liquid limit. Disturbing this type of soil, especially in the presence of water, will essentially liquefy the soil. Excavations cut into these soils may not remain open for long periods before sloughing of the sidewalls occurs.

Surface Organics. Peat and organic silt are present to depths up to 20 feet below ground surface throughout the Dillingham airport vicinity. From a geotechnical engineering viewpoint, the presence of these highly compressible soils is probably the single-most significant soil feature that will need to be considered in design. The peat and organic silt are highly compressible and have a low bearing capacity. Construction techniques associated with organic soils generally include: 1) overexcavation of peat and replacement with structural fill; or 2) leaving organics undisturbed, placing a geotextile on the surface, and placing gravel fill. Substantial settlement may still occur using the second construction technique.

Waste Piles. Information in previous reports indicates that during past construction silt and organic soil has been placed in waste piles. These waste piles should be located in any future investigations. Facilities should not be founded on these materials.

Material Sites. Information from previous material site investigations and review of existing conditions indicate there is sufficient suitable gravel and sand that can be obtained from several materials sites for use in development of the Dillingham airport and related facilities.

3.0 Aviation Demand Forecasts

An important step in the master planning process is to forecast future demand at the airport. Aviation demand forecasts provide a basis for determining the type, size, and timing of airport facility requirements.

In this chapter, a review of past aviation activity is presented, followed by a discussion of the factors that could affect future aviation activity at Dillingham Airport. After an explanation of forecasting methodology, the forecasts for passengers, cargo, based aircraft, air taxi operations, general aviation operations, military aircraft operations, peak demand, and the Airport Reference Code are presented.

The base year (year in which the most recent actual data was available) for forecasting is 2000. Forecasts were prepared for three future milestones: short term (2005), intermediate term (2010) and long term (2020).

3.1 Historic Aviation Activity

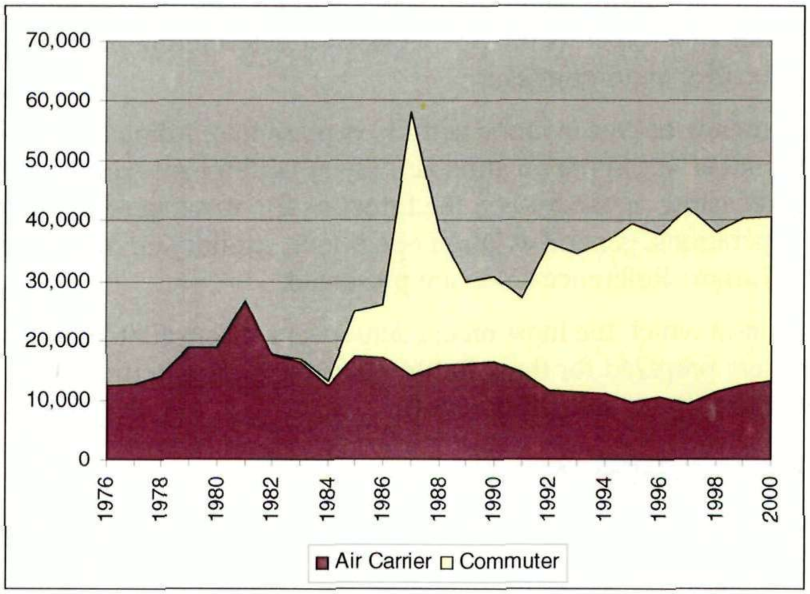
This section describes past and current passenger, cargo, and aircraft activity at Dillingham Airport.

3.1.1 Historical Passenger Activity

Dillingham Airport's air service area is the western Bristol Bay area; it is an air transportation hub for Aleknagik, Cape Newenham, Clarks Point, Ekuk, Ekwok, Koliganek, Levelock, Manokotak, New Stuyahok, Portage Creek, Queens, Togiak, and Twin Hills. Dillingham Airport is also the major access point for tourists and sportsmen visiting the Bristol Bay and Wood River-Tikchik Lake Region. In Fiscal Year 2000, 40,647 passengers were enplaned at Dillingham Airport.[22]. Exhibit 3.1 presents the history of enplaned passengers from 1976 through 2000. The exhibit distinguishes between air carrier and commuter passengers. Air carrier passengers are those on major airlines using aircraft with 60 passenger seats or more. Commuter passengers are those on commuter/regional airlines that fly shorter distances with smaller airplanes than the major airlines.

[22] The source is the FAA's Terminal Area Forecast (TAF), the benchmark for airport master plan forecasts. Data from the US Department of Transportation (DOT) Commuter and Major Airline Activity Statistics are comparable to TAF data – within 1 percent on average since 1990. Actual numbers of enplaned passengers may be higher than reported to the US DOT. In August of 2000, an FAA survey found that only 12 percent of the carriers certificated under Federal Aviation Regulation Part 135 in Alaska reported enplanements.

Exhibit 3.1
Historical Enplaned Passengers



Source: FAA Terminal Area Forecast, Fiscal Years 2001-2015, December 2001

From 1980-1990, the number of passengers grew at an average annual rate of 5.1 percent. Growth continued from 1990-2000, but slowed to an average annual rate of 2.8 percent. The reason for the spike in commuter passengers in 1987 is unknown; it might be an error in data reporting or recording.

A review of the last ten years of passenger statistics indicates that the airlines serving Dillingham have changed. In 1990 and 1991, MarkAir was the only major airline serving Dillingham and it carried more passengers than all the commuter airlines. PenAir, MarkAir Express, and Yute Air Alaska, in order of volume, were the commuter passenger airlines at Dillingham in the early 1990s. Another major airline, Alaska Airlines, began serving Dillingham in 1992. In 1992, the majority of passengers were enplaned on commuter airlines, and since then about 70 percent of enplaned passengers have been on commuter airlines. MarkAir and MarkAir Express ceased operating in 1995 and the airline declared bankruptcy. In 1996 major airline Reeve Aleutian began serving Dillingham, but the airline was more successful in capturing a share of the air cargo market than the passenger market from Alaska Airlines. Merlin Express, a commuter airline, entered the Dillingham market in 1997 and left it in 1998. Yute Air Alaska stopped its scheduled passenger service in 1997, but continues to provide cargo service. Reeve Aleutian declared bankruptcy at the end of 2000. Frontier Flying Service began providing daily flights to Fairbanks via Anchorage in 2001.

As Table 3.1 shows, the commuter airline PenAir, with its affiliate major airline Alaska Airlines, carried the majority of passengers in 2000. Grant Aviation and Reeve Aleutian were the other two major providers of passenger service. Table 3.1 also shows that 64 percent of passengers enplaned at Dillingham Airport go to Anchorage.

Table 3.1
Enplaned Passengers by Airline and Destination, 2000

	Alaska Airlines	Grant Aviation	PenAir	Reeve Aleutian	Other Air Carrier	Total	Market Share
Anchorage	10,429		15,078	1,152		**26,659**	*64%*
Bethel	62	446	48			**556**	*1%*
Clarks Point		654	1,061			**1,715**	*4%*
Ekuk		103	639			**742**	*2%*
Ekwok		284	397		3	**684**	*2%*
King Salmon	167		2,097		1	**2,265**	*6%*
Koliganek		604	613			**1,217**	*3%*
Levelock			412			**412**	*1%*
Manokotak		504	782		1	**1,287**	*3%*
New Stuyahok		654	618			**1,272**	*3%*
Togiak		152	2,988		1	**3,141**	*8%*
Twin Hills		25	347			**372**	*1%*
Other			598	81		**679**	*2%*
Total	**10,658**	**3,426**	**25,678**	**1,233**	**6**	**41,001**	
Market Share	*26%*	*8%*	*63%*	*3%*	*0%*		*100%*

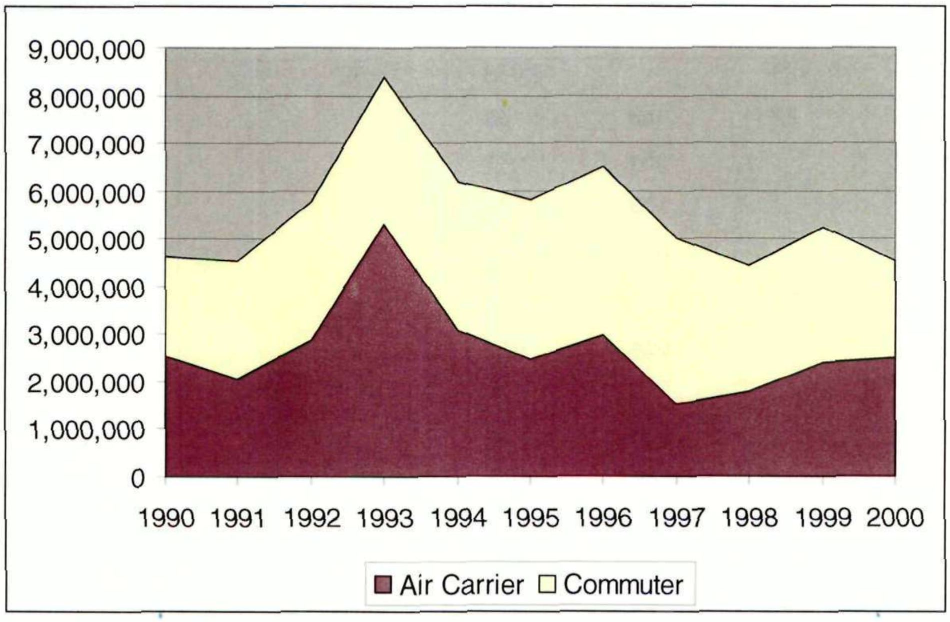
Source: USDOT Commuter and Major Airline Activity Statistics

The Alaska Airlines flight every weekday is in Boeing 737-200 combi aircraft. PenAir uses 30-seat Saab 340 aircraft for its twice-daily service to Anchorage. For PenAir's other destinations, smaller, 6 to 19-seat aircraft are used, such as the Fairchild Metroliner, Navajo Chieftain, Cessna 208 Caravan, and Piper Saratoga. Grant Aviation also flies Navajo and Caravan aircraft. Frontier Flying Service uses the 19-seat turboprop Beech 1900 aircraft for its daily flight to Fairbanks, which stops in Anchorage.

3.1.2 Historical Cargo Activity

Cargo (freight and mail) is carried by the major and commuter passenger airlines operating at the airport. In addition, scheduled all-cargo flights in large aircraft are conducted by Northern Air Cargo (five departures per week), Air Cargo Express (three departures per week), Lynden Air Cargo (three departures per week), and Alaska Central Express (five departures per week). These flights are primarily between Dillingham and Anchorage. Freight and mail is distributed to communities in the region in smaller aircraft by air taxi operators such Alaska Cargo Services, Alaska Island Air, Arctic Circle Air, Bay Air, Bristol Bay Air Service, Grant Aviation, Hageland Aviation, Larry's Flying Service, Mulchatna Air, Tucker Aviation, Togiak Transportation Services, and Yute Air Alaska. In the year 2000, a total of 2,273 tons (4,545,119 pounds) of cargo was enplaned at Dillingham Airport. Deplaned cargo is estimated to be as much as three times the amount of enplaned cargo. Exhibit 3.2 shows historical records of cargo enplaned at Dillingham Airport.

Exhibit 3.2
Historical Enplaned Cargo (pounds)



Source: USDOT, Major and Commuter Airline Activity Statistics

Available statistics indicate the following characteristics of cargo handled at Dillingham Airport:

- An estimated three-fourths of cargo is carried on all-cargo aircraft and one-fourth on passenger aircraft.
- About half the cargo handled at Dillingham Airport is carried on large air carrier aircraft and half on commuter/air taxi aircraft.
- Major air carriers, both passenger and all-cargo airlines, deplane about three-quarters of the cargo they handle. For the most part, the major air carriers bring cargo from Anchorage for consumption in Dillingham and surrounding communities. Commuter airlines and air taxis enplane about three-quarters of the cargo they handle and transport it to smaller communities.
- About three-fourths of cargo is mail and one-fourth is freight. Mail constitutes nearly 90 percent of commuter airlines' cargo.

In the year 2000, enplaned cargo carried on scheduled passenger airlines was bound for the following destinations:

- Togiak (24 percent)
- Anchorage (22 percent)
- King Salmon (16 percent)
- New Stuyahok (11 percent)
- Manokotak (7 percent)
- Koliganek (5 percent)
- Ekwok (4 percent)
- Others (less than 3 percent each)

3.1.3 Historical Aircraft Activity

Aircraft based at the airport include those used by private and commercial pilots. A search of the FAA's Civil Aviation Registry in January 2002 found 18 aircraft are registered to people in Dillingham, Alaska. All are small (under 12,500 pounds maximum) fixed wing aircraft, most with three seats or fewer.

A larger number of aircraft are based at the airport. Government-owned and many commercially owned airplanes at Dillingham Airport are not registered to Dillingham residents. Currently, an estimated 100 aircraft are based at the airport: 95 single-engine and five multi-engine piston aircraft. Approximately 12 of the single-engine aircraft are changed from wheels to skis in the winter. There are no ultralights, gliders, helicopters or jets based at the airport. The number of based aircraft has grown from 43 in 1980.

Annual aircraft operations[23] for the year 2000 are shown in Table 3.2. Table 3.2 indicates the following:

- Total annual operations are divided as follows:
  - three percent air carrier aircraft (at least 60 passenger seats or all-cargo aircraft of equivalent size)
  - four percent commuter aircraft
  - 93 percent GA
  - less than one percent military

General aviation operations are 84 percent itinerant and 16 percent local.

Table 3.2
Year 2000 Aircraft Operations at Dillingham Airport

Itinerant		
	Air Carrier	2,118
	Commuter	2,528
	General Aviation	*49,939
	Military	12
	Subtotal	54,597
Local		
	General Aviation	9,603
	Military	0
	Subtotal	9,603
Total		64,200

**About half of aircraft operations categorized as itinerant general aviation are actually air taxi operations (non-scheduled air transport operations for hire.)*
Source: FY 2000 from Terminal Area Forecast, Fiscal Years 2001 - 2015, December 2001.

[23] An aircraft operation is a takeoff or landing. Local operations are distinguished from itinerant operations. Local operations are primarily known as touch-and-go operations; they include aircraft operating in the local traffic pattern, departing to or arriving from practice areas within 20 miles, or executing simulated approaches or low passes at the airport.

According to Flight Service Station records since 1994, 14 percent of the aircraft using Dillingham Airport are flying by IFR and the rest are flying by VFR.

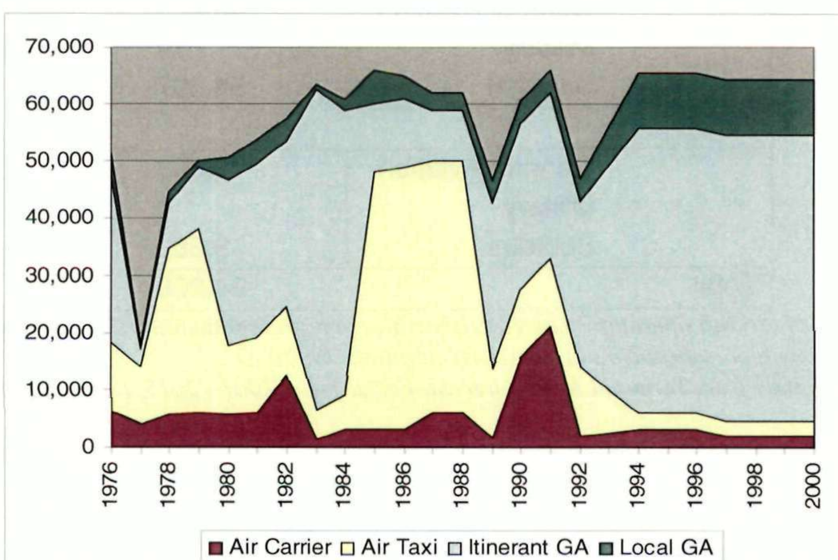
About half of the itinerant general aviation operations are performed by air taxis that are "for hire on-demand." Many operate year-round carrying cargo (bypass mail, primarily) and a few passengers to the communities of the western Bristol Bay. Some air taxis, such as Freshwater Adventures and Tikchik Adventures, operate seasonally and cater to the tourist industry, guiding sportsmen, giving sightseeing tours, and transporting tourists to lodges and recreational sites. All air taxis based at the airport and most transient air taxis operate fixed wing aircraft. A small number of transient helicopters use the airport for various reasons, such as to support fish processors, U.S. Fish and Wildlife surveys, and cellular communication sites.

By definition, general aviation includes all civil (non-military) aviation operations other than scheduled air services and non-scheduled air transport operations for hire. A wide variety of general aviation aircraft operations occur at Dillingham Airport. The airport hosts many recreational flights by transient private aircraft in the summer and fall. These are also the peak seasons for visits by corporate jet aircraft; in 2000 an estimated 35 corporate jets used the airport. Medical evacuations in Merlin, Navajo, and LearJet aircraft also occur about 35 times a year. The U.S. Forest Service's multi-engine firefighting aircraft sometimes use the airport in the fire season.

Military aircraft use Dillingham Airport infrequently. Transient National Guard and Coast Guard aircraft are at the airport occasionally for training or for supporting water rescue operations; the largest military aircraft using the airport is the Lockheed C-130.

Exhibit 3.3 shows annual aircraft operations at Dillingham Airport since 1976, as reported in the Terminal Area Forecast (TAF).

Exhibit 3.3
Historical Aircraft Operations at Dillingham Airport



Source: FAA Terminal Area Forecast, Fiscal Years 2001-2015, December 2001; since no data were provided for 1993, that year was interpolated between 1992 and 1994.

The data are widely varied, with apparently inconsistent categorizing of operations among the air carrier, air taxi, and general aviation classes. However, the total number of aircraft operations for recent years seems valid, based on a comparison with FSS records. Since 1994, the total number of aircraft operations has been reasonably close to the number of aircraft contacted by the FSS. The number of aircraft contacted from 1994 through 2000 is within one percent of the number of aircraft operations recorded in the TAF. In addition, the number of air carrier operations in Exhibit 3.3 is close to the number derived from airline statistics. From a review of airline statistics and schedules, it appears clear that the number of air taxi aircraft operations in the TAF, 2,528[24], includes only the larger commuter aircraft, like PenAir's Saab 340, but falls far short of including all air taxi operations. Consequently, it has been assumed that general aviation operations tabulated in the TAF include the commercial air taxi operators in small piston aircraft.

3.2 Factors Affecting Demand

The reasons for aviation activity to grow, decline, or change are discussed in the following sections. Factors affecting aviation demand are divided into two categories, socioeconomic factors and aviation factors.

3.2.1 Socioeconomic Factors

A region's socioeconomic character significantly influences air transportation demands. Industry, population composition, personal income, and social factors all impact the potential for air traffic generation.

Economic Growth and Industrial Activity

There are two types of regional economies – year-round and seasonal. Dillingham has a fairly stable year-round economy, being the economic, transportation, and public service center for western Bristol Bay. Commercial fishing, fish processing, cold storage and support of the fishing industry, as well as government jobs, transportation employment, and service industries are the economic mainstays.

Relatively new, and in some cases powerful economic players, are the for-profit Native Village Corporations, nonprofit Village Councils/Indian Reorganization Act (IRA) Councils, and other Native organizations. After the 1971 Alaska Native Claims Settlement Act (ANCSA), 24 Village Corporations or Consortiums were formed to invest and manage the land and fund conveyances within the region. Village Councils/IRAs provide for the social and economic wellbeing of their local membership. This includes providing community services, health and public works and community economic development projects.[25] Currently the Curyung Tribe, Choggiung Ltd. (the Village Corporation) and the City of Dillingham are working on a Cultural Heritage Community Center that will provide economic benefits to the region by gaining more spending from existing tourists, create attractions to draw new visitors, diversify the economy, decrease

[24] Equivalent to only 3.5 departures per day.

[25] Bristol Bay Campus, University of Alaska Fairbanks

dependence on the salmon industry, provide occupational skills training, professional career development, and establish a locally owned/operated tourism industry.[26]

Up until the mid 1990s, residents of Bristol Bay prospered with the fishing industry. Unfortunately, with the increased worldwide supply of farmed salmon from Chile and Norway, salmon prices have been in a downward trend leaving Bristol Bay's economy in a depressed state. According to the *Anchorage Daily News, November 13, 2001*:

"Bristol Bay, Alaska's biggest and most valuable salmon fishery, is expected to produce an extremely low commercial red salmon catch next summer, according to government and university forecasts.... Last year's Bristol Bay fishery was worth about $34 million at the docks, compared with seasons in excess of $200 million in the early 1990s. Last year, fishermen took home 40 cents a pound at the docks, the lowest price since 1975 – as they competed against the salmon created by the rapid rise of foreign fish farms.... In the late 1980s, Bristol Bay fish spiked to more than $2 a pound. People want to stay in the communities, but as the fishing economy decreases, schools in Egegik, Pilot Point and other communities are facing shutdown because enrollment has dropped to only 12 or 14 students.... The borough collects a 2 percent raw tax on fish landing and that income figures to total less than $300,000 compared to as much as $2.9 million as recently as 1995.... The fishing crisis is changing attitudes on mining and oil and gas drilling."

From interviews with Dillingham City Councilors and employees, the City is trying to take a proactive approach to the declining fishing industry by diversifying the economies of the community into tourism and exploring the development of mining and oil. The Bristol Bay Area does have tourism potential. Tourism growth in the Bristol Bay area is directly attributable to the vast amount of acreage set aside for recreational purposes. The area has hundreds of miles of usable rivers in the Togiak, the Nushagak, the Mulchatna, the Kvichak, the Naknek, the Branch, and the Egegik Rivers. A number of Bristol Bay residents are investing in the sport fishing and tourism industry. Interest in development of tourism is growing as evidenced by the number of participants attending workshops periodically held throughout the region.[27] Dillingham is growing as the place for eco-tourism with the abundance of wildlife and guided and unguided adventures.

Table 3.3 illustrates the wage and salary employment by industry data for the Dillingham Census Area.

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[26] Cultural Heritage Community Center, Dillingham, Alaska

[27] Bristol Bay Campus, University of Alaska Fairbanks

Table 3.3
Wage and Salary Employment by Industry – Dillingham Census Area, 1990-1998

	1990	1991	1992	1993	1994	1995	1996	1997	1998	One Year Change
Total Employment	1,837	1,943	2,024	2,079	2,113	2,055	2,064	2,223	2,308	3.8%
Mining	*	0	5	*	*	*	*	*	*	
Construction	52	31	40	47	37	50	43	32	17	-45.0%
Manufacturing	771	540	572	519	503	480	432	451	462	2.3%
TCPU*	141	159	141	142	130	107	161	175	168	-3.7%
Wholesale	*	*	2	*	2	1	2	*	*	
Retail	198	142	151	209	222	223	207	223	207	-7.2%
Finance, Ins.	57	48	59	55	85	80	75	91	83	-9.4%
Services	521	472	492	551	571	569	609	696	746	7.1%
Government	651	561	558	545	554	542	534	538	606	12.7%
Federal	89	55	63	56	56	54	50	52	51	-1.9%
State	70	63	62	58	59	60	64	67	76	13.5%
Local	492	443	433	431	439	429	420	419	480	14.4%
Miscellaneous	*	*	3	*	*	*	*	*	*	

**Transportation, Communication and Public Utilities*
Source: Alaska Department of Labor and Workforce Development Research & Analysis Section

Total employment in the Dillingham census area only grew by 3.8 percent from 1990 to 1998. Construction employment had the largest decrease (45 percent) for the same time period. Retail trade, finance and transportation/communications also showed a decrease in employment for the same time period. Government had the largest increase in employment. The service area remains the largest employer. The city's role as the regional center for government and services helps to stabilize seasonal employment. Many residents depend on subsistence activities, and trapping of beaver, otter, mink, lynx and fox provides cash income. Salmon, grayling, pike, moose, bear, caribou, and berries are harvested.

Population Composition

There are no population numbers prior to 1990 for the Dillingham Census Area. For reporting purposes, the Dillingham Census Area is spread out among 12 identified communities. Table 3.4 illustrates the historical regional population for the area. The surrounding communities' population grew moderately from 1950 to 2000. Dillingham itself has grown by almost 400 percent for the same 50-year reporting period (yielding an average annual growth rate of 2.9 percent). Between 1990 and 2000, the Dillingham Census Area population grew 23 percent. The average annual growth rate for the Dillingham Census District from 1990 to 2000 was 2.1 percent. The average annual growth rate for the City of Dillingham from 1990 to 2000 was 2.0 percent. Much of the growth for the Dillingham area occurred in the 1980s and early 1990s when the commercial fishing industry and fish processing were at their peak. Residents say that during the spring and summer, the population in Dillingham nearly doubles.

Table 3.4
Historical Regional Population, 1950-2000

Area	1950	1960	1970	1980	1990	2000
Aleknagik	153	N/A	128	154	185	221
Clark's Point	128	138	95	79	60	75
Dillingham City	577	424	914	1563	2017	2466
Ekwok City	131	106	103	77	77	130
Ekuk NNVSA	N/A	40	51	N/A	3	2
Koliganek	90	100	142	117	181	182
Monokotak	120	N/A	N/A	294	385	399
New Koliganek	N/A	N/A	N/A	N/A	N/A	182
New Stuyahok	88	145	216	33	391	471
Portage Creek	N/A	N/A	N/A	48	5	36
Togiak	108	220	383	470	613	809
Twin Hills	N/A	N/A	67	70	66	69
Dillingham Census Area	**N/A**	**N/A**	**N/A**	**N/A**	**4,012**	**4,922**

Source: U.S. Census Bureau, Census of Population & Housing 1950, 1960, 1970, 1980, 1990, and 2000.
Notes:

1. In the 1960 Census, Aleknagik was reported as Aleknagik Lake with 181 persons and Aleknagik Mission with 80 persons.
2. New Koliganek was created in the 2000 Census
3. Ekuk is an Alaska Native Village Statistical Area (ANVSA)
4. Portage Creek is an ANVSA

More recent population fluctuations are presented in Table 3.5. As this table shows, the Dillingham Census Area has grown 23 percent since 1990. The overall growth of the southwest region has also been positive with an increase of 8 percent since 1990.

Table 3.5
Recent Population Trends

Area	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Growth
Dillingham Census Area	4,012	4,169	4,247	4,361	4,302	4,389	4,476	4,519	4,686	4,731	4,922	23%
Southwest Region	38,479	39,338	40,401	40,501	37,118	37,128	37,449	37,599	38,289	38,443	41,481	8%
Statewide	550,043	569,063	586,684	596,808	600,765	601,646	604,966	609,311	621,400	622,000	656,000	19%

Source: Alaska Department of Labor, Research & Analysis Section, Demographics Unit

Population projections for the Dillingham Census Area (Table 3.6) were provided by the Alaska Department of Labor, Research & Analysis Section, Demographics Unit. The Dillingham Census Area includes Aleknagik, Clark's Point, Dillingham City, Ekwok City, Ekuk, Koliganek, Manokotak, New Koliganek, New Stuyahok, Portage Creek, Togiak, and Twin Hills.

Table 3.6
Population Growth Scenarios
Dillingham Census Area

Average Annual Growth Rates			
Year	High	Medium	Low
1998-2003	2.68%	1.31%	0.27%
2003-2008	2.44%	1.41%	0.44%
2008-2013	2.50%	1.59%	0.57%
2013-2018	2.55%	1.59%	0.61%

Source: Alaska Department of Labor, Research & Analysis Section, Demographics Unit Projected Population by Labor Market Region and Borough /Census Area

Using the average medium rate for 1998-2018 (1.48 percent annual growth), a population projection for the Dillingham Census Area is presented in Table 3.7.

Table 3.7
City of Dillingham Population Projection
(medium average annual growth rate)

Year	Population
2000	4,922
2005	5,297
2010	5,700
2020	6,700

Personal Income

Personal income serves as a good indicator of an individual's financial ability to travel. Growing personal income levels allow stronger purchasing power and provide greater opportunity for air travel.

Table 3.8 presents the annual per capita personal income (PCPI) from 1994 to 1999. Residents of the Dillingham Census Area experienced an 18 percent increase per capita in income during that period. Comparatively, Dillingham's average PCPI is higher than the state average, but lower than the national average.

Table 3.8
Per Capita Personal Income by Area 1994-1999

Region	1994	1995	1996	1997	1998	1999	Percent Change 1994-1999
Dillingham Census Area	$22,054	$22,714	$22,873	$24,216	$25,046	$25,935	18%
State of Alaska	$25,253	$25,798	$26,057	$26,990	$27,835	$28,629	13%
United States	$22,581	$23,562	$24,651	$25,924	$27,203	29,451	30%

Source: U.S. Department of Commerce, Bureau of Economic Analysis

Per capita income figures are calculated by dividing an area's total personal income by its entire resident population. Because of their inclusiveness, these data are often considered a good measure of economic well-being. However, these data represent averages, not medians, and do not offer insight into income distribution. Demographics also affect per capita income data. The economic opportunities of the different regions explain most of the variation in per capita income data.

3.2.2 Aviation Factors

The aviation factors affecting demand that are discussed in this section are fleet changes, bypass mail, September 11, special aviation activity, and community actions.

Fleet Changes

Within the next 20 years, it is likely that new aircraft will be introduced into the fleet using Dillingham Airport and other aircraft will be retired.

The Boeing 737-200C convertible has been Alaska Airlines' workhorse in rural parts of the state. During the day, the airline operates the airplane in the combi configuration, seating between 26 and 111 passengers. At night, many of the convertibles are operated in the full freighter configuration between Alaska and Seattle. The existing fleet is aging and the airplanes' lifespan may not extend through the 20-year planning period. On the other hand, in 2001 Alaska Airlines acquired a ninth 737-200C. In the future, Dillingham Airport may be used by the 737-700C,[28] which is Boeing's replacement for the 737-200C. The 737-700C is a combi, but the partitioning between passengers and cargo is not flexible, as in the 737-200C. Also, the 737-700 is more expensive.

In 2001, Alaska Airlines took delivery of the first Boeing 737-900 produced, one of 11 ordered by the airline. The 172-seat, 138-foot long airplane might also appear in the Dillingham fleet someday. When the Dillingham Airport forecasts were prepared, it was assumed that the major air carrier passenger fleet at Dillingham would continue to be dominated by the 737-200C throughout the planning period because of the airplane's flexibility in carrying passengers and cargo. If another major airline enters the Dillingham market, it is likely to use 737 or similar narrowbody aircraft, as Wien Air and Mark Air did in the 1980s and 1990s.

The Boeing 727 aircraft is quickly disappearing from the Lower 48 passenger fleet. The last 727, a freighter, was delivered to FedEx in 1984. FedEx will continue to have a large fleet of 727s for years, but they are being replaced, often by larger 757 freighters. Another problem with the 727 is that it is hush-kitted and noisier than most commercial airplanes allowed by the 1990 Airport Noise and Capacity Act. Northern Air Cargo flies a 727 to Dillingham Airport about three times a week. Given the availability of retired 727s and the fact that Alaska is exempt from the Airport Noise and Capacity Act, it is assumed the 727 freighter will remain in the intrastate fleet through the planning period.

In the 1960s, Lockheed began producing its C-130 Hercules aircraft in a civilian freighter version, the L-382, which is used by Lynden Air Cargo at Dillingham Airport. A new

[28] Since the forecasts for Dilligham Airport were prepared, Alaska Airlines has decided to replace their 737-200 fleet with 737-400s converted to combis. Alaska Airlines' Boeing 737-400 passenger jets are used elsewhere in Alaska and the Lower 48.

generation civilian Hercules was certified in the mid-1990s, but is not being produced. With the prospect of a new generation of Hercules aircraft and the large number of military C-130s that may be available for conversion to civilian freighters, it is assumed that the Hercules will remain in Dillingham Airport all-cargo fleet through the 20-year planning period.

The Lockheed L-188 Electra, which was flown by Reeve Aleutian until its recent bankruptcy, has probably left the commercial Alaskan fleet forever. The DC-6's long-range future is also uncertain. The DC-6 is now in scheduled use at Dillingham Airport by Northern Air Cargo and Air Cargo Express. Since production of the aircraft stopped in 1958, it is difficult to find parts and some may require custom reproduction. Also, the DC-6 engines use 100 octane leaded fuel, which is becoming increasingly unavailable due to Environmental Protection Agency mandates. Other aircraft with high compression engines (Cessna 185, 206, 207 and Piper PA 31, 32) use 100 octane leaded fuel. Work is underway to produce 96 octane unleaded fuel as a replacement for 100 octane leaded, but it cannot be used by DC-6 aircraft. Even if 100 octane unleaded fuel continues to be refined, scarcity could drive up the cost to the point that the DC-6 would be uneconomical to operate. Like the DC-6, the Curtiss C-46 is in commercial cargo use at Dillingham Airport, was developed as a military airplane in the 1940s, and has been out of production for decades. The aviation demand forecasts for Dillingham Airport assume the average freighter size will increase in the next 20 years, as airplanes such as the DC-6 and C-46 are phased out of the fleet. The DC-6 and C-46 are uniquely suited to serve airports with short, unpaved runways; finding replacement aircraft that can fill that need will be difficult.

Regional jets are a rapidly growing part of the U.S. commercial airlines fleet, and will continue to be a major feature of the North American market, according to long-range aircraft production forecasts.[29] In 2000, regional jets accounted for 38 percent of aircraft orders and 24 percent of aircraft deliveries in the U.S.[30] Since the mid-1990s, airlines have used regional jets, mostly the 50-seat Bombardier Canadair, to "right-size" service. Regional jets have replaced larger narrowbody jets in some markets and they have replaced smaller turboprop aircraft in other markets. Substantial growth in regional jet service has occurred even though some major airlines are constrained by "scope clauses" in their contracts with pilots. The regional jet combines the comfort and speed of a turbojet aircraft with the convenience of frequent flights made economically feasible by its smaller size.

The regional jet has not been seen in the commercial Alaskan fleet, but history has shown that the intrastate Alaskan fleet lags behind national fleet trends. In the 20-year future, the regional jet may be used by a commuter airline such as PenAir to provide service between Dillingham and Anchorage. PenAir now uses the 30-seat turboprop Saab 340 for flights between Dillingham and Anchorage. Other and larger turboprop airplanes, such as the 30 to 70-seat DeHavilland Dash 8, may be added to Dillingham's fleet. Turboprop commuter airplanes with 19 seats, such as the Beech 1900 used by Frontier

[29] Boeing Commercial Airplane Group: Current Market Outlook 2001

[30] FAA Office of Aviation Policy and Plans: Aviation Industry Overview, Fiscal Year 2000, March 2001

Flying Service and PenAir, may be replaced with 30-seat turboprops. As the number of passengers and the demand for speed and comfort grow, the average size of commuter aircraft used between Dillingham and Anchorage is expected to grow.

The fleet mix of commuter and air taxi aircraft used between Dillingham and Bush communities is projected to change less over the next 20 years. The low populations and relatively primitive airports in these communities limit, economically and physically, the type of airplanes that can be used. Some upgrading, such as from 6-seat to 9-seat aircraft, is projected. The ADOT&PF's Southwest Alaska Transportation Plan proposes a minimum runway length of 3,300 feet for all community airports. This will tend to encourage the use of slightly larger, faster aircraft in the future between Dillingham Airport and its satellite communities, but this change will have little or no effect on the design standard used for Dillingham.

Bypass Mail

The bypass mail program of the U.S. Postal Service, operating in Alaska since 1970, is "what fuels the airline industry in Bush Alaska."[31] When the Dillingham Airport forecasts were prepared, Alaskan Congressmen had recently proposed legislation, the Alaska Bypass Mail, Passenger and Freight Stability Act of 2001, which would change the program. It was thought that Dillingham Airport could be affected, not only because it is a hub for transporting bypass mail to smaller communities, but also because of the overall changes to Alaskan airlines that might result.

Under the bypass mail program, air carriers are designated by the Postal Service to deliver qualified items, and restrictions are the same as the fourth class mail restrictions. Individual packages can be no heavier than 70 pounds nor have combined dimensions of more than 108 inches. If a shipper, such as a merchandiser, has 1,000 pounds or more of individual packages with a common destination, the shipment qualifies for the bypass mail program. Individual packages are bundled together for movement direct to the air carriers, bypassing the post office.

At the time the Dillingham Airport forecasts were prepared, bypass mail was evenly distributed among carriers. Persons who wanted to ship bypass were directed by the Post Office to the eligible carrier with the lowest total weight dispatched. To be eligible, a carrier was required fly to a destination at least three times per week.

With the program, postal subsidies helped passenger and freight service in rural Alaska. In recent years, the system faltered because some companies were flying mail but were not carrying many passengers or much freight. Senator Ted Stevens and Representative Don Young proposed legislation to enhance the postal subsidies for passenger service by making only mainline carriers eligible to carry bypass mail to hubs. Mainline carriers are those operating under CFR Part 121 and include PenAir, as well as Alaska Airlines, Lynden Air Cargo, Northern Air Cargo, and Air Cargo Express. Small carriers believed many would go out of business and passenger and cargo service to remote communities would be reduced dramatically and become more expensive.

[31] "Bypass mail limits could ruin some carriers," Alaska Journal of Commerce, November 12, 2001

If the legislation proposed were passed, it was thought Dillingham Airport might see an increase in service from mainline carriers as a result. On the other hand, the number and traffic levels of Part 135 carriers at Dillingham Airport might be reduced. Alaska Airlines, PenAir, Air Cargo Express, Lynden, Northern Air Cargo, Alaska Central Express, and Frontier Flying Service carried bypass mail from Anchorage to Dillingham. From Dillingham to the villages, the mail was carried by PenAir, Grant Aviation, Larry's Flying Service, Arctic Circle Air, Yute Aviation, and Hageland Aviation.

For the Dillingham Airport aviation demand forecast, it was assumed that the regulatory framework for airline service in Bush Alaska would remain unchanged through the 20-year planning period.[32]

September 11

Passenger traffic and airline flights dropped as much as 20 percent nationwide in the month following the national tragedy that occurred on September 11, 2001. Aviation experts predicted that a recovery to "pre-9/11" activity levels could take a year or more, and this has proven to be the case. Many noted that some of the decline could be attributed to the recession that began earlier in 2001 rather than to fear of flying. On the other hand, when terrorists converted commercial airliners into missiles, they may have jolted the airline industry permanently. More business people are relying on video conferences and corporate aviation, and some vacationers may never regain their confidence in commercial aviation. The FAA's Terminal Area Forecast, published in December 2001, included a disclaimer that the events of September 11 had not been considered in the forecasts and that they would be considered in a later revision. Alaska is more reliant on air transportation than the United States as a whole, both as a matter of tradition and as a matter of necessity. Accordingly, September 11 should have less of an effect in Alaska than in the other states.

For the Dillingham Airport forecasts, the effects of September 11 were considered temporary, and not material to the long-term prospects of aviation demand at Dillingham Airport.

Special Aviation Activity

Certain events and activities might spur substantial growth in aviation demand at Dillingham Airport:

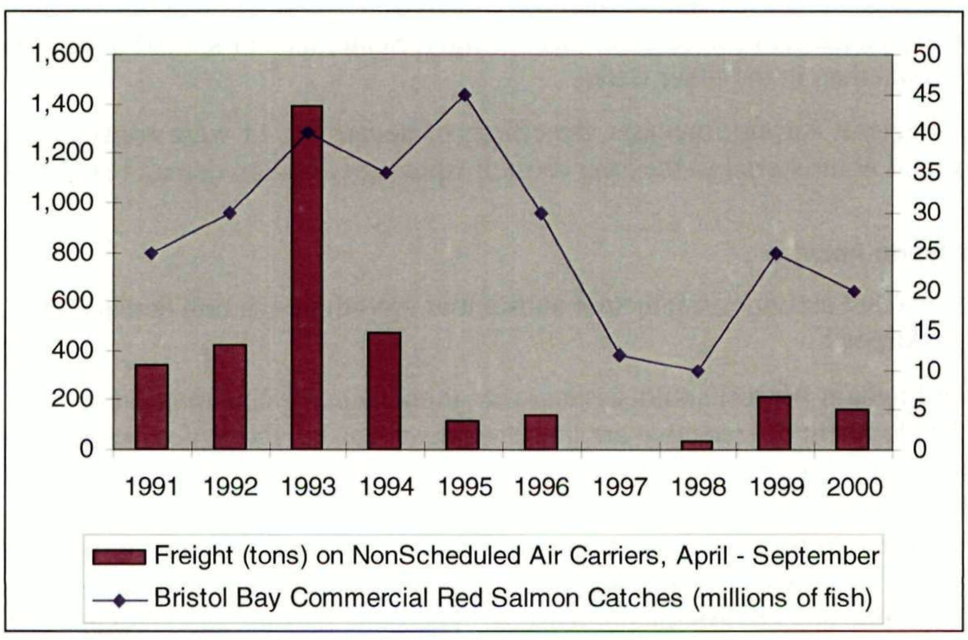
- Dillingham Airport could serve as the staging site for construction or development of areas that are inaccessible by roads. Examples are petroleum and mineral exploration/production and the development of resorts and lodges. As the fishing industry declines, people in the region may become more receptive to petroleum and mineral extraction. Alaska's Outer Continental Shelf and interior lands have oil and gas resources that have not been developed for economic and environmental reasons. The same reasons have prevented the exploration for and extraction of minerals in the region.

[32] The proposed bypass legislation did pass and has resulted in some bankruptcies and reorganizations of small air cargo carriers.

The development of a new lodge or resort is a more likely prospect in the near term. Tourism, particularly sport fishing and hunting, is an established industry in the region.

- In the 1980s and early 1990s Dillingham Airport was the site of significant numbers of fish flights (all-cargo aircraft loaded with fresh fish). The 1985 Airport Master Plan was published shortly after record Bristol Bay salmon runs in 1982 and 1983. Although the Plan could not accurately tabulate the amount of fish hauled, it stated, "During the peak fishing months of June and July, fish flights may constitute as much as 50 percent of total operations occurring during that season." Data on fish flights are unavailable. However, data on nonscheduled freight carried by air carriers may convey a picture of the decline in fish haul through the 1990s (Exhibit 3.4). Except in the mid-1990s, the amount of fish caught and the amount of freight carried on nonscheduled air carrier rise and fall in the same years. Also, it should be noted that rise in fish caught would not necessarily translate to an increase in fish value or of fish product going through the airport. Currently, most fish product is processed locally or by floating processors, frozen, then shipped by boat to market. Only certain high value products, such as cod milt or herring roe, warrant air transport, and then only when a market for that specific product can be reached economically by air.

Exhibit 3.4
Comparison of Historical Air Freight and Fish Catch Data



Source: USDOT Airline Activity Statistics and Alaska Department of Fish and Game

The aviation demand forecasts for Dillingham Airport do not account for large increases arising from speculative events and activities. However, all-cargo activity is projected to grow modestly, rather than decline as might be expected considering the current economic outlook in the region. Also, peak demand for all-cargo activity is established using data from the last decade, rather than the most recent year, to account for unusually high levels of all-cargo activity that might occur with fish flights or a major construction project.

Community Actions

Airlines and other aviation-related businesses are influenced by marketing efforts and incentives. ADOT&PF does not engage in activities such as marketing the community to airlines or encouraging businesses to locate at the airport through speculative development. The City of Dillingham or a civic group might launch an air service marketing campaign. Alternatively, the City of Dillingham might develop a joint-use terminal or take over airport operation from the State and engage in a more active role in air service development. The primary reason more airports in Alaska have not been transferred from State to local government is financial: given current rate structures, most State-owned airports in Alaska must be subsidized by the State General Fund to stay in operation.

The forecast for Dillingham Airport assumes the airport remains in the control of the ADOT&PF and does not assume any special incentives are put in place for air service or aviation-related business.

Another type of community action that could affect future aviation activity at the airport would be opposition to infrastructure development or airfield expansion. Strong public opposition could delay or prevent airport improvement.

The aviation demand forecasts for Dillingham Airport are unconstrained; in other words, it is assumed existing or future limits to facility capacities or operating aircraft fleet can be removed through expansions and improvements. It is also assumed that airport improvements will be constructed as required to meet demand, rather than to induce demand.

3.3 Forecasting Methodology

Aviation activity forecasts have been developed through a combination of mathematical, analytical, and judgmental approaches. Historical patterns were examined for trends and possible relationships between different conditions and from these, projections were made. The linear trend forecasting model measures the historical trend in data and projects that trend as a straight line into the future. The growth trend model also projects the future demand from past demand, but models a continuation of a historical growth rate, which results in an exponential curve. Using the FAA's projected growth rates for aviation activity nationwide and applying them to current Dillingham Airport activity creates a market share model: the forecast is based on the assumption that the airport's share of the national market will remain constant. These projections were compared to forecasts from other sources, thereby providing a range of forecasts for each component of aviation demand.

Information from many sources was used to prepare the aviation demand forecasts. Questionnaires were submitted to air carriers and air taxi operators serving Dillingham and some were interviewed in person or by telephone (Appendix E). Other sources of information used to project aviation demand include:

- Alaska Aviation System Plan Update; TRA-BV Airport Consulting, March 1996
- Boeing Commercial Airplane Group: Current Market Outlook 2001
- FAA Aerospace Forecasts, Fiscal Years 2001 - 2012, March 2001
- FAA Air Traffic Activity Data System, Flight Service Station Statistics
- FAA Long-Range Aerospace Forecasts, Fiscal Years 2015, 2020 and 2025, Office of Aviation Policy and Plans, FAA-APO-01-3. June 2001
- FAA Office of Aviation Policy and Plans: Aviation Industry Overview, Fiscal Year 2000, March 2001
- FAA Terminal Area Forecast, Fiscal Years 2001 - 2015, FAA-APO-00-7, December 2001
- USDOT Airline Statistics: On-Flight Origin and Destination Schedule T-100, Airport Activity Statistics Schedule T-3, and Commuter Online Origin and Destination Data Schedule 298C T-1, compiled by Data Base Products, Fort Worth, Texas

3.4 Aviation Demand Forecasts

In this section, the recommended forecasts for aviation demand are presented for enplaned passengers, enplaned cargo, based aircraft, air taxi and general aviation operations, total aircraft operations, peak demand, and the Airport Reference Code.

3.4.1 Enplaned Passenger Forecast

Annual enplaned passengers are projected to increase from 40,647 in 2000 to 65,065 in 2020. Table 3.9 presents the recommended forecast for enplaned passengers at Dillingham Airport and indicates the average annual growth rates for the short term (2000-2005), intermediate term (2005-2010), and long-term (2010-2020) phases of the planning period. Over the 20-year period, the average annual growth rate would be 2.4 percent.

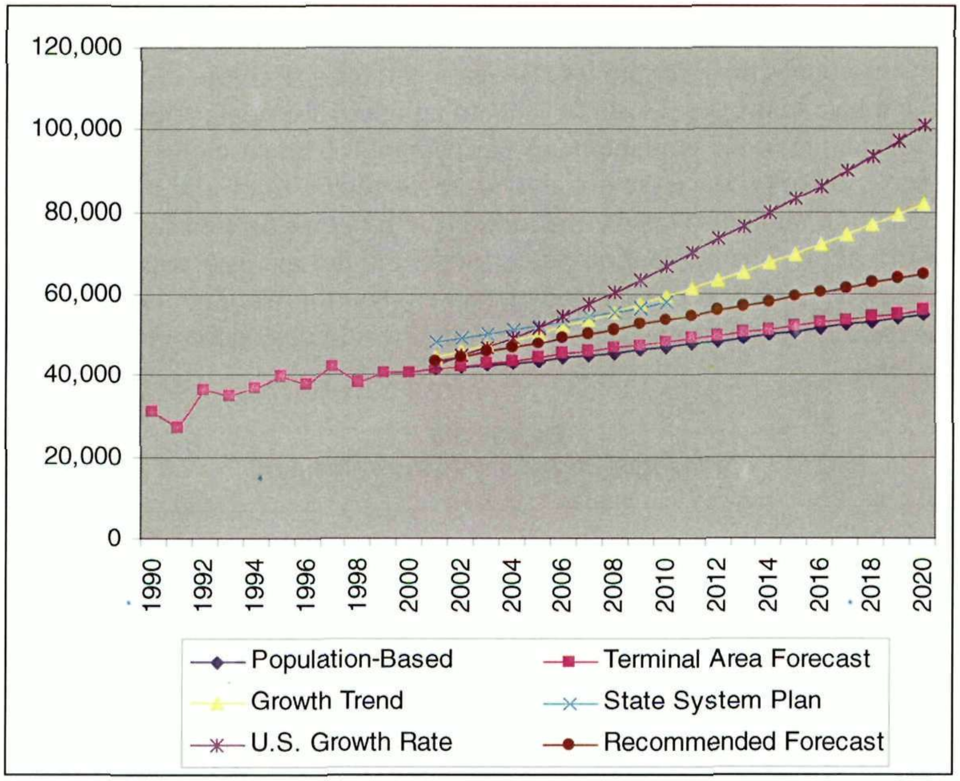
Table 3.9
Enplaned Passenger Forecast

Year	Air Carrier Enplanements	Commuter Enplanements	Total Passenger Enplanements	Average Annual Growth Rate
2000	13,304	27,343	40,647	
2005	13,941	34,132	48,073	3.4%
2010	15,046	38,691	53,737	2.3%
2020	17,568	47,497	65,065	1.9%

The percentage of passengers enplaning in air carrier rather than commuter aircraft is projected to decline over time, consistent with FAA's nationwide projections and with the trend at Dillingham Airport. Over the 20-year forecast period, the average annual growth rate for air carrier passengers is 1.4 percent and for commuter passengers it is 2.8 percent

Exhibit 3.5 presents a compilation of various forecasts considered in determining the recommended forecast. The recommended forecast falls in the mid-range of the models considered.

Exhibit 3.5
Comparison of Enplaned Passenger Forecasts



Using the FAA's projected national growth rates for regional/commuter and major airline passengers, the number of passenger enplanements would reach nearly 101,300 by 2020. The annual growth rates for regional/commuter airlines are 5.7 percent through 2012 and 4.2 percent through 2020. The annual growth rates for major airlines are 3.6 percent through 2012 and 3.7 percent through 2020. However, the U.S. growth rate model may not be appropriate to adopt for Dillingham Airport, since enplanements at Dillingham Airport have grown more slowly than national enplanements in the last five years, 0.5 percent average annual growth compared to 4.0 percent nationwide.

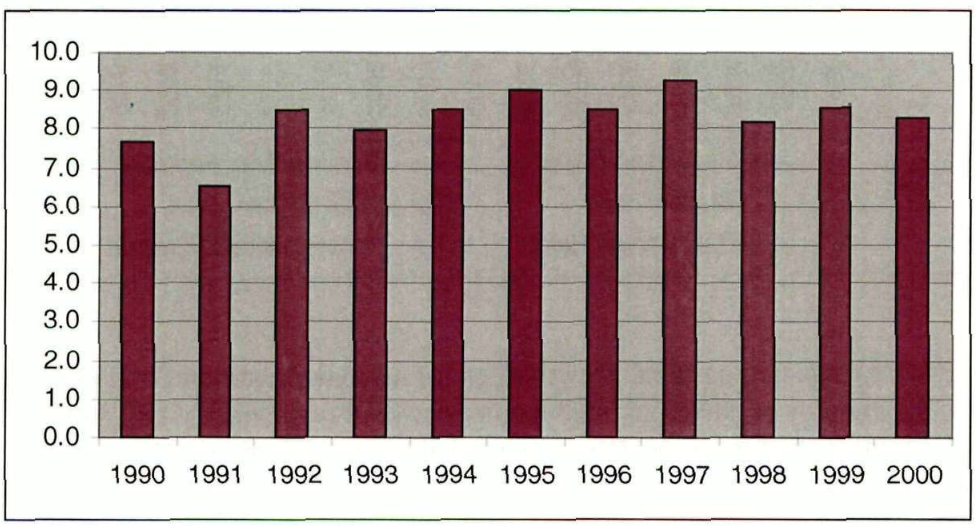
The growth trend model used 1990-2000 data to forecast from. With the growth trend model, the average annual growth rate would be 3.3 percent and enplanements would reach 81,993 by 2020.

The Alaska Aviation System Plan Update (AASP2) used 1990 and 1991 as base years. Although the projection for 2000 (47,199) was higher than actually occurred, the annual growth rate, 2.1 percent was close to the growth that actually occurred between 1990 and 2000.

The FAA's Terminal Area Forecast projected the number of enplaned passengers would increase at an annual rate of 1.7 percent per year. By 2015, the number would reach 52,245; interpolating to 2020, the number of enplanements would reach 56,111.

The population-based model related passenger enplanements to the population of the Dillingham air service area and projected 55,054 enplanements in 2020. In the last 10 years, the population of the Dillingham Census Area has grown from 4,012 to 4,922, which represents an annual growth rate of 2.1 percent. Comparing passenger enplanements to population over the last 10 years, the ratio (Exhibit 3.6) has varied from a low of 6.5 enplanements per person in 1991 to a high of 9.3 enplanements per person in 1997, with an average of 8.3 enplanements per person.[33] The ratio of 8.3 enplanements per person was used to produce the population-based forecast in Exhibit 3.5. The source of future population numbers was the medium growth rate projection by the Alaska Department of Labor. The population-based model did not increase enplanements to account for growing numbers of nonresident passengers (tourists), nor did it account for residents having a growing propensity to fly, which would be consistent with national FAA projections.

Exhibit 3.6
Passenger Enplanements per Resident



The recommended forecast is the linear trend model. The linear trend model used 1990-2000 data from which to forecast. With the linear trend model, the number of passengers would increase every year at a growth rate between 2.6 and 1.8 percent. The linear trend model produced results that fell in the low to middle range of the other forecasts.

From the projection of passenger enplanements, it was possible to project the number of operations by the aircraft carrying passengers. To project the number of aircraft operations, it was necessary to calculate the average seating capacity of the aircraft that

[33] The ratio of annual passenger enplanements to population is 8.0 in Alaska, considerably higher than the national average of 2.7 annual passenger enplanements per resident, according to the FAA Alaskan Region, Regional Airports Plan, Fall 2000.

will be used and consider how full the aircraft will be. Table 3.10 presents the forecast of passenger aircraft operations.

In 2000, Alaska Airlines' flights held an average of 22 passengers per departure. It was assumed that, as passenger numbers grow in the future, Alaska Airlines would be more likely to change the passenger/cargo configuration to accommodate more passengers than increase the number of flights substantially. The number of passengers per departure was projected to grow to 40 by 2020.

For the commuter fleet it was assumed that 50-seat aircraft (turboprop or regional jet) would be introduced to the Dillingham market by 2005. A gradual increase in average commuter aircraft size was projected. The average number of seats per departure would grow from 20 to 24 over the 20-year period. A load factor (percentage of filled seats) of 65 percent is assumed through the planning period

Table 3.10
Passenger Aircraft Operations Forecast

	2000	2005	2010	2020
Air Carrier Aircraft				
Lockheed Electra (6 Passengers per Departure)	410	0	0	0
Boeing 737-200C (23-40 Passengers per Departure)	648	820	860	878
Subtotal	*1,058*	*820*	*860*	*878*
Commuter Aircraft				
50-Seat (Canadair RJ, DHC-8 Dash 8)	0	512	736	1,584
30-Seat Turboprop (Saab 340, DHC-8 Dash 8)	2,528	2,048	2,212	1,780
19-Seat Turboprop (Beech 1900)	0	854	738	594
Subtotal	*2,528*	*3,414*	*3,686*	*3,958*
Total Aircraft Operations	***3,586***	***4,234***	***4,546***	***4,836***

3.4.2 Enplaned Cargo Forecast

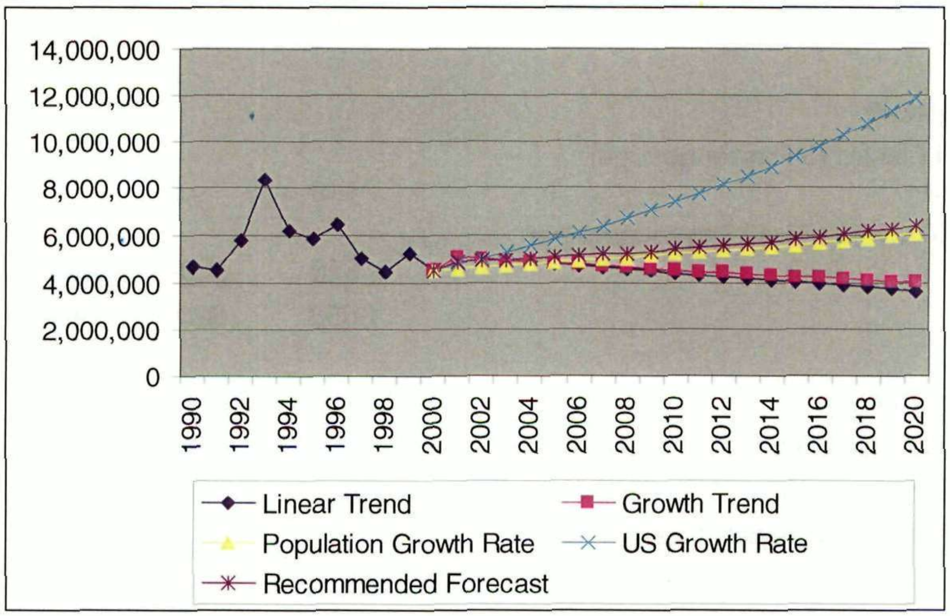
Table 3.11 presents the recommended forecast for enplaned cargo, which is an average of trend, market share, and population-based models. Over the 20-year planning period, enplaned cargo is projected to grow at an average annual rate of 1.7 percent, from 4,545,119 pounds to 6,398,145 pounds. Over the 30-year period from 1990 to 2020, the average annual growth would be 1.1 percent.

Table 3.11
Enplaned Cargo Forecast

Year	Enplaned Cargo (pounds)	Average Annual Growth Rate
2000	4,545,119	
2005	5,070,223	2.2%
2010	5,389,874	1.2%
2020	6,398,145	1.7%

Exhibit 3.7 presents a compilation of forecasting models for enplaned cargo. The FAA's Terminal Area Forecast and the AASP2 do not include forecasts for cargo.

Exhibit 3.7
Comparison of Forecasts for Pounds of Enplaned Cargo



The linear trend model detected a declining trend in 1990-2000 data; a continuation of the trend would result in negative annual growth of 1.5 to 2.0 per year over the next 20 years. By 2020, annual enplaned cargo would decline to 3,668,992 pounds. The growth trend model used 1990-2000 data to determine an average annual growth rate of -1.2 percent. This negative growth rate was applied to future years, resulting in a forecast for 4,027,984 pounds of enplaned cargo in 2020. Because it seemed unreasonable to use data from a period of unusual economic decline to project the long-range future, neither the linear trend nor the growth trend model was adopted for Dillingham's air cargo forecast.

The FAA's national forecast for cargo revenue ton miles (RTMs) calls for annual growth at 5.0 percent through 2012 and 4.8 percent annual growth for years after 2012. Using the national growth rate model, enplaned cargo pounds would reach nearly 12 million pounds by 2020. Cargo amounts at Dillingham Airport have been declining over the past ten years, a period when there was strong cargo growth nationwide, therefore, it was concluded that the national growth rates would be too high to adopt for Dillingham's future.

It is reasonable to infer that population growth would spur air cargo growth. The population growth rate model used the medium growth rates for the Dillingham Census Area, 1.31 percent per year increasing to 1.59 percent per year, and applied it to enplaned cargo. The population growth rate model produced a forecast that falls in the mid-range of the other forecasts, 6,041,217 pounds by 2020.

The recommended forecast is an average of the other four models, resulting in projections slightly higher than the population growth rate model.

From the projection of enplaned cargo, it was possible to project the number of aircraft operations by all-cargo aircraft.

In 2000, the estimated number of all-cargo aircraft operations in air carrier aircraft was 1,060. The average departure carried 1.7 tons[34], divided among the following air carriers:

55 percent Northern Air Cargo, in Boeing 727 and Douglas DC-6 aircraft
25 percent Lynden Air Cargo, in Lockheed L-382 aircraft
20 percent Air Cargo Express, in DC-6 and C-46 aircraft

Table 3.12 presents the forecast for all-cargo, air carrier aircraft operations. The projection was based on the 2000 statistics that indicated that 43 percent of cargo enplaned at the airport is on all-cargo air carrier aircraft. The average load per aircraft was projected to grow to 2.5 tons by 2020. The fleet mix projects retirement for the C-46 and DC-6 aircraft and introduction of the Boeing 737 freighter.

Table 3.12
All-Cargo Aircraft Operations Forecast

	2000	2005	2010	2020
B 727	371	378	381	270
B 737	0	54	163	539
C-46	106	108	54	0
DC-6	318	270	218	0
L-382	265	270	272	270

Aircraft operations for smaller all-cargo aircraft are included in the air taxi and general aviation operations forecast.

[34] The average enplaned load is far less than payload capacity for these aircraft. More cargo is deplaned than enplaned. For example, the cargo handler for Lynden Air Cargo reported the average deplaned load is 10 tons. Airline activity statistics show the average enplaned load is less than 2 tons.

3.4.3 Based Aircraft Forecast

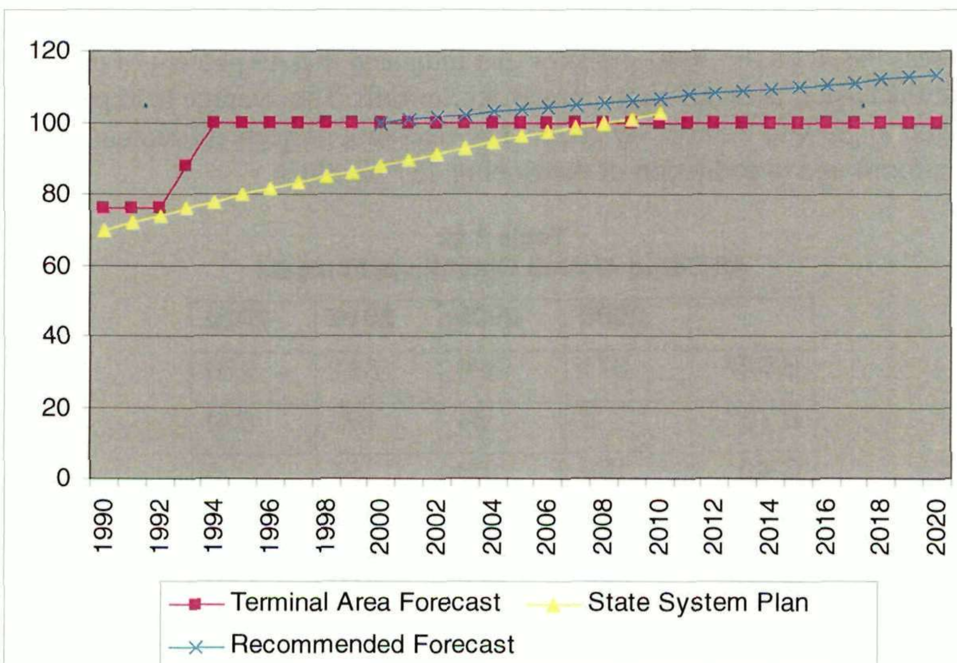
The recommended forecast for based aircraft is presented in Table 3.13. Based aircraft are projected to grow from 100 in 2000 to 113 in 2020, an average annual growth rate of 0.6 percent. The recommended forecast for based aircraft applies the FAA's national growth rates for general aviation aircraft.

Table 3.13
Based Aircraft Forecast

Year	Based Aircraft	Average Annual Growth Rate
2000	100	
2005	104	0.8%
2010	107	0.6%
2020	113	0.5%

Exhibit 3.8 shows various based aircraft forecasts.

Exhibit 3.8
Comparison of Based Aircraft Forecasts



The FAA's Terminal Area Forecast projects no change in the number of based aircraft at Dillingham Airport through 2015. The Alaska Aviation System Plan Update used 1990 as its base year and projected through 2010, using the following annual growth rates: 2.7 percent for the first five years, 1.9 percent for the next five years, 1.8 percent for the next five years, and 1.2 percent for the last five years.

The recommended forecast for based aircraft applies the FAA's national growth rates by type of aircraft. Piston aircraft, the majority of aircraft based at Dillingham Airport, are projected to grow at 0.7 percent per year through 2005 and at 0.6 percent per year after

2005. The same growth rates are projected for single-engine and multi-engine aircraft. The fleet mix for based aircraft will remain 95 percent single-engine and 5 percent multi-engine aircraft through the forecast period.

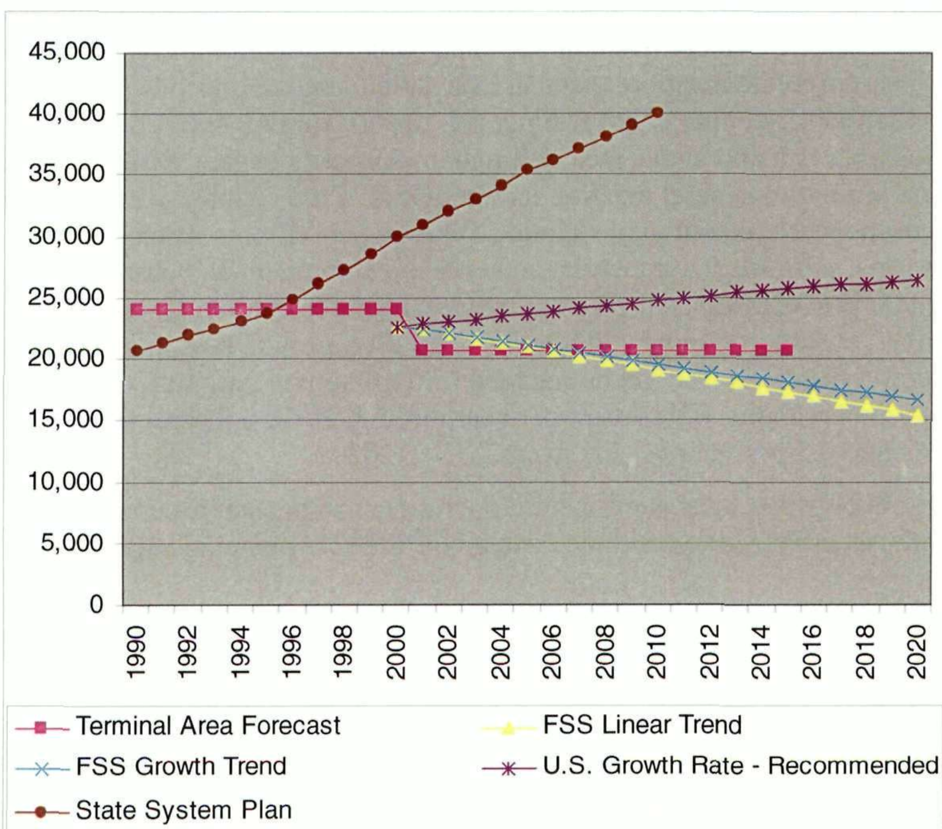
3.4.4 Air Taxi and General Aviation Operations

Table 3.14 presents the forecast for air taxi and general aviation aircraft operations at Dillingham Airport, which uses the U.S. growth rate for general aviation operations. Exhibit 3.9 compares the various forecasts for air taxi and general aviation aircraft operations.

Table 3.14
On-Demand Air Taxi Aircraft Operations Forecast

Year	Air Taxi and General Aviation Operations	Average Annual Growth Rate
2000	59,542	
2005	62,270	0.9%
2010	65,123	0.9%
2020	69,481	0.6%

Exhibit 3.9
Comparison of On-Demand Air Taxi Operations Forecasts



The Terminal Area Forecast projects general aviation operations, which include air taxi operations, to remain a constant 59,542 from 2001 through 2015.

FSS data on the number of aircraft contacted might provide a more accurate picture of how air taxi and general aviation operations have risen and fallen than the TAF. Between 1994 and 2000, the number of aircraft contacted by the FSS has averaged 64,537, varying from a low of 56,767 in 2000 to a high of 71,720 in 1997. A linear trend model based on the seven years of FSS data yielded a negative annual growth rate, varying between -2.7 and -5.3 percent. A growth trend model yielded an annual growth rate of -2.5 percent. Applying the annual growth rates from the linear and growth trend models, the number of aircraft operations would decline to 29,444 and 37,547, respectively, by 2020. Being based on a period of economic decline in the region, the trend models may present too pessimistic a picture of future demand.

The AASP2 prepared separate forecasts for commercial, air taxi, and general aviation operations, using 1992 as a base year, and statistics[35] that are very different from the TAF. In order to use the AASP2 for comparison purposes, a forecast was derived from the System Plan growth rate for air taxi and general aviation operations projections. The derived annual growth rates were 2.4 percent between 2000 and 2005 and 2.1 percent from 2005 to 2010. The high growth projected by the System Plan-derived model seemed unlikely.

The air taxi operations at Dillingham Airport are similar to general aviation operations – the same type of aircraft, mostly single-engine piston, and similar recreational purposes, such as sightseeing, fishing, and hunting. Dillingham Airport has a large number of recreational operations, evident from the seasonal nature of operations reported by the FSS. It also has corporate aviation, medical evacuation, and various other commercial uses, such as support for commercial fishing, cell towers, mining and petroleum industries, logging, fish and game, etc. Dillingham Airport's general aviation and air taxi operations are similar to general aviation in other parts of the country, particularly non-urban areas of the western contiguous United States, where driving distances are too long for business trips, scheduled commercial air service is infrequent and costly, and where small airplane traffic is associated with agriculture, resource extraction, large parks and wildlife refuges, and sport fishing and hunting. The FAA growth rates for U.S. general aviation aircraft operations were recommended for Dillingham Airport's air taxi and general aviation operations: 0.9 percent per year through 2010, 0.8 percent per year from 2010 to 2015, and 0.5 percent per year from 2015 to 2020.

The current split between local and itinerant operations, 84 percent itinerant and 16 percent local, was projected to continue through the 20-year planning period.

[35] According to the System Plan, the year 1992 included 27,000 commercial operations, 1,000 air taxi operations, and 33,000 general aviation operations.

3.4.5 Summary of Aircraft Operations Forecast

Table 3.15 compiles the recommended forecasts for aircraft operations[36] at Dillingham Airport. Annual aircraft operations are projected to grow from 64,200 to 75,407 over the 20-year planning period, which represents an average annual growth rate of 0.8 percent.

Although a very small percentage of annual aircraft operations, transient corporate jet traffic is significant to Dillingham Airport because of the high demand for aircraft parking it creates. Corporate jets are the fastest growing segment of general aviation. More corporations have found jets to be affordable through fractional ownership and preferable to the delays and security concerns associated with commercial airline travel. Aircraft as large as the B-737, which seats 110-150 in its airline configuration, are being outfitted as corporate jets. In the year 2000, an estimated 70 corporate jet aircraft operations occurred at Dillingham Airport. The FAA's national forecasts project that in the next ten years, the turbojet general aviation fleet will grow at an annual rate of 3.3 percent and the hours flown by turbojet general aviation aircraft will grow 2.4 percent per year.

Table 3.15
Aircraft Operations Forecast

	2000	2005	2010	2020
Air Carrier Aircraft				
Passenger	1,058	820	860	878
All-Cargo	1,060	1,079	1,089	1,078
Subtotal Air Carrier Aircraft	2,118	1,899	1,949	1,956
Commuter/Air Taxi Aircraft	2,528	3,414	3,686	3,958
General Aviation				
Air Taxis	24,970	26,153	27,352	29,182
Private General Aviation	24,969	26,153	27,352	29,182
Subtotal General Aviation	49,939	52,306	54,704	58,364
Military	12	12	12	12
Total Itinerant Operations	54,597	57,631	60,351	64,290
Local General Aviation Operations	9,603	9,963	10,420	11,117
Total Aircraft Operations	64,200	67,594	70,771	75,407

[36] Military aircraft operations are a low 12 per year at Dillingham Airport. The FAA's Terminal Area Forecast projects 12 aircraft operations by military aircraft through 2015, and this number was assumed for the projection through 2020. With nearby King Salmon Airport providing a better facility for military aircraft use, there is no reason for projecting an increase in the use of Dillingham Airport by military aircraft.

3.4.6 Peak Demand

As airport activity fluctuates from month to month, day to day, and hour to hour, airside and landside facilities need to be designed to accommodate peak levels of use. The forecasts of annual passengers, cargo, and aircraft operations serve as the bases for generating forecasts of peak demand. Peak demand is usually expressed as "Peak Month" (the month in a calendar year when the highest level of activity occurs), "Design Day" (the average daily level of activity during the Peak Month), and "Design Hour" (the busiest hour within the Design Day). The methodology used to generate forecasts of peak demand is described below.

Peak Month

The peak month activity for passengers, cargo, and aircraft operations are as follows:

Passengers: Airline statistics from 1990-2000 indicate that the peak month for passenger enplanements is July, which contains 17 percent of the annual total.

Cargo: Airline statistics from 1990-2000 indicate that July is also the peak month for enplaned air cargo, containing approximately 22 percent of the annual total.

Aircraft Operations: Seven years of FSS data indicate that the peak month for aircraft operations occurs in July or August and contains approximately 14 percent of the annual total. FSS data reflects the seasonal nature of the air taxi and general aviation operations that constitute 93 percent of operations at the airport. Scheduled passenger and all-cargo aircraft operations and military aircraft operations are less affected by season, with the peak month containing an estimated 12 percent of annual totals.

Design Day

Peak activity occurs in July or August, both months having 31 days. Dividing the peak month demand by 31 days derives the design day demand.

Design Hour

The busiest hours within the design day for passengers, cargo, and aircraft operations are as follows:

Passengers: The hour before an Alaska Airlines departure would be the busiest of the day, containing approximately 35 percent of the total passengers enplaned that day. With time, the number of daily departures is projected to increase and the busiest hour would contain a lower percentage of the daily total. The peak hour is projected to decline to 30 percent by 2020.

Cargo: The peak hour for cargo is assumed to mirror the peak hour for passengers, 35 percent of the daily total in 2000, declining to 30 percent by 2020.

Aircraft Operations: With the long hours of daylight in the summer, air taxi and general aviation aircraft operations can start as early as 6 a.m. and last until 10 p.m. The busiest hour is assumed to contain 12.5 percent of the design day aircraft operations for general aviation and air taxis, and 25 percent of the design day operations for other aircraft.

The forecasts of peak month, design day, and design hour activity appear in Table 3.16. It is important to note that the design day and design hour do not represent the busiest hours or days that occur. Instead, they represent busy conditions that are appropriate for design. For example, the calculated design day for aircraft operations in 2000 is 269 aircraft operations, a number much lower than the 378 aircraft contacts reported by the Flight Service Station on July 8, 2000.

Table 3.16
Peak Demand Forecast

	2000	2005	2010	2020
Enplaned Passengers				
Annual	40,647	48,073	53,737	65,065
Peak Month	6,910	8,172	9,135	11,061
Design Day	223	264	295	357
Design Hour	78	90	97	107
Enplaned Cargo (pounds)				
Annual	4,545,119	5,070,223	5,389,874	6,398,145
Peak Month	999,926	1,115,449	1,185,772	1,407,592
Design Day	32,256	35,982	38,251	45,406
Design Hour	11,289	12,234	12,623	13,622
Air Carrier, Commuter, and Military Aircraft Operations				
Annual	4,658	5,325	5,647	5,926
Peak Month	559	639	678	711
Design Day	18	21	22	23
Design Hour	5	5	5	6
Air Taxi and General Aviation Aircraft Operations				
Annual	59,542	62,269	65,124	69,481
Peak Month	8,336	8,718	9,117	9,727
Design Day	269	281	294	314
Design Hour	34	35	37	39
Total Aircraft Operations				
Annual	64,200	67,594	70,771	75,407
Peak Month	8,895	9,357	9,795	10,438
Design Day	287	302	316	337
Design Hour	38	40	42	45

3.4.7 Airport Reference Code

The Airport Reference Code (ARC) is an important parameter for airport design that results from the forecast of aviation demand. The ARC relates to a system designed by the FAA to define airport facility standards appropriate for the aircraft using a particular airport. The first component of the ARC, a letter, refers to aircraft approach category. The second component, a Roman numeral, is the Airplane Design Group. Table 3.17 explains the Airport Reference Code components and lists aircraft that use or might be expected to use Dillingham Airport.

Table 3.17
Airport Reference Code (ARC) Components

Aircraft Approach Category		
Approach Category	Approach Speed (knots)	Typical Aircraft
A	Less than 91	Cessna 150, 172, 206; Piper Navajo; DeHavilland DHC-6 Twin Otter
B	91 to 120	Beech 1900; Convair 580; DeHavilland DHC-8; Douglas DC-6; Fairchild Metroliner, Saab 340
C	121 to 140	ATR 72; Boeing 727, 737; Canadair RJ; Gates Learjet; Lockheed L-382 Hercules (C-130)
Airplane Design Group		
Airplane Design Group	Wingspan (feet)	Typical Aircraft
I	Less than 49	Cessna 150, 172, 206; Gates Learjet; Piper Navajo
II	49 to 78	Beech 1900; Canadair RJ; DeHavilland DHC-6 Twin Otter; Fairchild Metroliner, Saab 340
III	79 to 117	ATR 72; Boeing 727, 737; Convair 580; DeHavilland DHC-8; Douglas DC-6
IV	118 to 170	Boeing 757; Lockheed L-382 Hercules (C-130)

The ARC relates to the design aircraft, which is the most demanding aircraft type that regularly uses the airport. To qualify as the design aircraft for an airport, at least 500 annual itinerant operations should occur by the particular aircraft (or group of aircraft). In 2000, there were 648 operations by Alaska Airlines' Boeing 737-200; therefore, it qualifies as the design aircraft and the appropriate ARC for Dillingham Airport is C-III. Within the 20-year planning period, it is expected that the design aircraft will continue to be the Boeing 737-200. Even if the Boeing 737-200 is replaced by aircraft such as the Boeing 737-400 passenger aircraft or the 737-700 freighter, the Airport Reference Code would be C-III.

4.0 Airport Facility Requirements

4.1 Introduction

Floatplane comes in for a landing at Dillingham Airport

The purpose of Chapter 4 is to identify improvements necessary to bring the airport into compliance with existing design standards and guidelines, accommodate anticipated demand, and address other issues related to the ongoing operation of the airport within the community. Airport development needs through the planning year 2023 are identified. To account for the time difference between capital improvement programming and aviation demand forecasting, aviation activity levels forecast for 2005, 2010, and 2020 will be used to determine facility requirements and capital improvement programs for the years 2008, 2013, and 2023, respectively. The final section of this chapter summarizes the airport improvements needed. How to accomplish these improvements is addressed in the alternatives analyses (Chapters 5 and 6). Figure 4.1 shows the existing Dillingham Airport.

4.2 Airfield

The following narrative is divided into sections for airport role, airport reference code and approach visibility minimums, airfield capacity, runways, taxiways, aprons, airport pavements, floatplane facilities, and helicopter facilities. FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, provides most of the airport design standards that are used to define airside requirements. Other FAA advisory circulars are cited in this airfield analysis. In addition, 14 CFR Part 77, *Objects Affecting Navigable Airspace*, and 14 CFR Part 139, *Certification & Operations – Land Airports Serving Certain Air Carriers*, were consulted to determine airside requirements. Part 139 compliance is required because Dillingham Airport has passenger service in aircraft with 30 or more seats.

4.2.1 Airport Role

The role of Dillingham Airport in the national and state airport system is not projected to change over the 20-year planning period. Dillingham is classified a Regional Airport by the Alaska Aviation System Plan Update and is projected to remain a Regional Airport in the future. Dillingham Airport will also continue to be classified by the FAA as a non-hub primary commercial service airport, which is regulated under Part 139.

4.2.2 Airport Reference Code and Approach Visibility Minimums

Many of the FAA design standards for airports are keyed to the ARC that was explained in Table 3.17.

The ARC relates to the most demanding aircraft type that regularly uses the airport; regular use is defined as at least 500 annual itinerant operations. The ARC for Dillingham Airport is C-III and is not projected to change in the future. Throughout the

LEGEND

PROPERTY BOUNDARY

AVIGATION AND HAZARD EASEMENT AND RIGHT-OF-WAY

PHOTO DATE: 5/21/02 0 500 1000

FIGURE 4.1
EXISTING AIRPORT

DILLINGHAM, ALASKA

1"=1000'

20-year planning period, it is projected that the design aircraft will be Alaska Airline's Boeing 737. Currently, the design aircraft is the 737-200. Even if the 737-200 is replaced by aircraft such as the 737-400 passenger aircraft or the 737-700 freighter, the Airport Reference Code would be C-III.

FAA design standards are also keyed to the approach visibility minimums of instrument approaches to runways. Currently, Runways 1 and 19 each have an approach visibility minimum of 1 statute mile for Approach Category C aircraft. To the extent practical, runways should be planned to accommodate the future upgrading of instrument approaches. The FAA has programmed the installation of approach lighting and runway visual range equipment that is used for precision instrument approaches, indicating it plans to improve approach instrumentation at Dillingham Airport in the future. The most stringent design standards related to instrumentation, for approach visibility minimums less than ¾ statute mile, will be analyzed for Runways 1 and 19.

Many of the FAA design standards for airports are keyed to the ARC. The ARC relates to a system designed by the FAA to define airport facility standards appropriate for the aircraft using a particular airport. The first component of the ARC refers to aircraft approach category and the second component is the Airplane Design Group. Table 4.1 explains the components of the ARC.

Table 4.1
Airport Reference Code Components

Aircraft Approach Categories		**Airplane Design Groups**	
Category	Approach Speed	Group	Wingspan
A	Less than 91 knots	I	Up to 49 feet
B	91 to 120 knots	II	49 to 78 feet
C	121 to 140 knots	III	79 to 117 feet
D	141 to 165 knots	IV	118 to 170 feet
E	166 knots or more	V	171 to 213 feet
		VI	214 to 261 feet

Source: FAA Advisory Circular 150/5300-13, Airport Design

The ARC relates to the most demanding aircraft type that regularly uses the airport; regular use is defined as at least 500 annual itinerant operations. The ARC for Dillingham Airport is C-III and is not projected to change in the future. Throughout the 20-year planning period, it is projected that the design aircraft will be Alaska Airline's Boeing 737. Currently, the design aircraft is the 737-200. Even if the 737-200 is replaced by aircraft such as the 737-400 or the 737-700, the Airport Reference Code would be C-III.

FAA design standards are also keyed to the approach visibility minimums of instrument approaches to runways. Currently, Runways 1 and 19 each have an approach visibility minimum of 1 statute mile for Approach Category C aircraft. To the extent practical, runways should be planned to accommodate the future upgrading of instrument approaches. The FAA has programmed the installation of approach lighting and runway visual range equipment that is used for precision instrument approaches, indicating it plans to improve approach instrumentation at Dillingham Airport in the future. FAA personnel have more recently discussed moving the localizer and adding a glideslope antenna for an instrument landing system approach to Runway 1. The most stringent design standards related to instrumentation, for approach visibility minimums less than ¾ statute mile, will be analyzed for Runways 1 and 19.

4.2.3 Airfield Capacity

The capacity of the runway system to accommodate existing and future demand was determined using the FAA AC 150/5060-5, *Airport Capacity and Delay,* and consultation with FAA Flight Service Station personnel. Among the significant factors that affect airfield capacity are weather conditions, runway system configuration and use, and aircraft fleet mix.

Visibility, cloud ceiling and wind direction affect airport use

The primary weather conditions that affect airport use are visibility, cloud ceiling, and wind direction. At Dillingham Airport, instrument meteorological conditions[37] occur 10 percent of the time. Instrument weather occurs more often in winter (18 percent of the time in December) than in summer (8 percent of the time in June). On average the weather is worse than the runway approach visibility minimum (1 statute mile) 2 percent of the time. Fortunately, the worst visibility conditions of the day occur between 3:00 and 5:00 a.m., when there is little use of the airport. The prevailing winds favor the use of Runway 1 (north flow) in the winter and Runway 19 (south flow) in the summer.[38] Higher levels of summer traffic imply that Runway 19 is used more, but this does not appear to be the case. Except in strong tailwind conditions, users prefer Runway 1 because it is more convenient for takeoff and because most aircraft can exit at Taxiway B after landing on Runway 1 and thus avoid back taxiing. In addition, wind data indicate that high velocity winds occur more often from the north than from the south.

Taxiing in preparation for takeoff

The runway system configuration factor most significant to Dillingham Airport's capacity is the location of exit taxiways. The lack of a parallel taxiway necessitates taxiing on the runway before takeoff or after landing. Because the methodology in *Airport Capacity and Delay* assumes the

[37] Instrument meteorological conditions occur when visibility is less than 3 miles and the cloud ceiling is lower than 1,000 feet. Weather data for Dillingham Airport was obtained for the period of 12/72 – 12/97.

[38] Optimally, aircraft should takeoff and land into the wind.

presence of a parallel taxiway, it was necessary to consult with Flight Service Station personnel to estimate the time needed for aircraft operations on Runways 1 and 19. The estimates assume that small aircraft (under 12,500 pounds) do not use the full runway length, but large aircraft and those flown in scheduled commercial flights use the full runway length. For VFR operations, the estimated time per landing operation varies from half a minute for the approach component of a touch-and-go to four minutes for a large aircraft to land on Runway 1, turn, and taxi back to the exit taxiway. Time per takeoff operation varies from half a minute for the departure component of a touch-and-go to three minutes for a large aircraft to taxi to the Runway 19 threshold, turn, and takeoff.

If a crosswind runway is constructed at Dillingham Airport, it will significantly affect the runway system configuration, but it will not substantially increase the airport's capacity for aircraft operations. For the most part, the runways could not be used for simultaneous operations, due to the conflicting direction of air traffic.

A runway use consideration that affects an airport's capacity is the amount of training (touch-and-go) traffic. Touch-and-go operations are counted as local operations. Now and through the forecast period, local operations comprise 13 percent of annual aircraft operations.

Fleet mix is significant because differences in speed and size of aircraft affect the requirements for lateral and in-trail separation of aircraft. Faster aircraft following slower aircraft must be separated by a greater distance than two aircraft of the same speed. (A Boeing 737 has an approach speed of 140 knots, twice that of a Beech Bonanza.) *Airport Capacity and Delay* accounts for the influence air traffic separations have on runway capacity by considering the weight of aircraft operating at the airport. The largest aircraft using the airport are Class C (maximum takeoff weights between 12,500 and 300,000 pounds). Class C aircraft account for 7 percent of current aircraft operations and are projected to grow to 8 percent in the long-term future.

Annual Service Volume (ASV) is the number of annual aircraft operations that can be accommodated on a runway system under the various airport operating conditions that would be encountered over a year's time. Using methodology from *Airport Capacity and Delay*, the existing and future ASV for Dillingham Airport is estimated to be 66,300 annual aircraft operations.

Hourly capacity is the maximum number of aircraft operations that can occur on a runway system in a particular hour under two operating scenarios – VFR and IFR. At Dillingham Airport, hourly VFR capacity is 46 aircraft operations and hourly IFR capacity is 30 aircraft operations. Since many general aviation and air taxi aircraft do not fly IFR,[39] the IFR hourly capacity is lower, based on the fleet mix. Average time per aircraft operation is assumed to be nearly a minute longer in IFR conditions than in VFR conditions.

Table 4.2 compares projected aviation demand with airfield capacity. Annual and VFR design hour demand was determined in Chapter 3. IFR hourly demand is estimated to

[39] Only 14 percent of aircraft that contact the Flight Service Station are flying IFR, according to data from 1994 - 2000. However, in the type of airspace around Dillingham, VFR flights are possible when Special VFR conditions exist (visibility between 1 and 3 statute miles) and if approved by Air Traffic Control.

consist of all air carrier and commuter aircraft operations and half of air taxi and general aviation operations.

According to FAA guidance, airfield capacity enhancing projects should be planned when demand reaches 60 percent of capacity. Annual and hourly aircraft operations demand at Dillingham Airport currently exceeds 60 percent of capacity. Consequently, alternatives for increasing airfield capacity, such as the provision of a parallel taxiway, should be considered by this Master Plan Update.

Table 4.2
Aircraft Operations Capacity vs. Demand

	Annual Service Volume	VFR Hourly Capacity	IFR Hourly Capacity
Capacity:	66,300	46	30
	Annual Demand	**VFR Hourly Demand**	**IFR Hourly Demand**
2000 – Demand	64,200	38	20
2000 – % of Capacity Used	97%	83%	67%
2005 – Demand	67,594	40	21
2005 – % of Capacity Used	102%	87%	70%
2010 – Demand	70,771	42	22
2010 – % of Capacity Used	107%	91%	73%
2020 – Demand	75,407	45	23
2020 – % of Capacity Used	114%	98%	77%

Note: The capacities listed do not include "workaround" tactics now in practice, such as multiple aircraft taxiing out at once for takeoff on Runway 19. Also, the capacities do not include the added capacity of a crosswind runway. A crosswind runway that does not intersect with Runway 1-19 would increase capacity during visual weather and when diverging takeoffs occur. Depending upon the configuration, a crosswind runway could increase Annual Service Volume by as much as 10 percent.

4.2.4 Runways

This section analyzes the number, type, and size of facilities for aircraft landing and takeoff facilities needed at Dillingham Airport over the next 20 years. This section also identifies runway deficiencies related to FAA design standards.

Number and Type of Runways

The number of runways needed for an airport depends upon the level of aviation demand, wind coverage, and type of landing surface needed for the using aircraft.

Without a parallel taxiway, the number of runways at Dillingham Airport will not be adequate to meet future aviation demand levels. The addition of a full parallel taxiway for Runway 1-19 with appropriately located exit taxiways could increase the runway's capacity to as much as 230,000 annual aircraft operations[40], more than three times the level of demand projected for 2020. The addition of another runway to meet the projected aviation demand would be much more costly and impactive on the environment than the provision of a parallel taxiway, so adding a runway to increase capacity is not recommended.

The previous airport master plan recommended the construction of a crosswind runway in order to provide the amount of wind coverage recommended by the FAA. Wind coverage is the percent of the time crosswind components are below an acceptable velocity. High crosswinds or tailwinds were factors in five of 27 accidents that occurred at or near Dillingham Airport in the last 20 years, according to the National Transportation Safety Board (NTSB) aviation accident database. The desirable wind coverage for an airport is 95 percent, computed on the basis of maximum crosswind speeds that are defined for different sizes of aircraft (lower for smaller aircraft). The wind analysis performed for the previous master plan, using data from 1972-1975, determined that Runway 1-19 had only 91.18 percent wind coverage for aircraft as large as Group II. Updated wind analysis using 1992-1999 data (Appendix G) was performed for this master plan update and concluded that wind coverage for Group II is adequate (96.97 percent) and coverage for Group I (93.98 percent) is almost adequate.

Leaving the apron aboard an Alaska Airlines regularly scheduled flight

Although Dillingham Airport may have more pressing airport improvement needs than a crosswind runway now, a future crosswind runway should be considered in the airport development alternatives. The crosswind runway should meet Airplane Design Group I standards. Although the previous master plan recommended the orientation should be 12-30, the updated analysis indicates a runway orientation between 9-27 and 10-28 would be most aligned with crosswinds. However, the wind coverage of Runway 1-19 is so close to 95 percent that a wide range of crosswind runway alignments would allow the coverage to exceed 95 percent.

Dillingham Airport now has one type of landing surface for aircraft -- a paved runway for wheeled aircraft. Floatplanes and skiplanes in the area use Shannon's Pond Seaplane Base, which also has a land-based runway, so facilities for landing floatplane and skiplanes are not needed at Dillingham Airport. The airport does not have a gravel-surfaced runway, which is preferred by pilots of large diameter, "tundra-tire" aircraft. Many of the small, fixed wing aircraft based at Dillingham Airport are equipped with tundra tires because they are well suited for landing on the gravel-surfaced runways and the unimproved airstrips, beaches, and gravel bars at their flight destinations. As reported in the NTSB aviation accident database, three of 27 aviation accidents that occurred at or

[40] Advisory Circular 150/5060-5, Figure 2-1.

near Dillingham Airport in the last 20 years involved pilots of tundra-tire aircraft losing control when landing on paved Runway 1-19. Some airports in Alaska provide gravel surfaces at the ends or at the sides of paved runways to provide more friction for landing tundra-tire aircraft. However, gravel located near airfield pavements increases the airport maintenance workload and creates more opportunities for FOD (foreign object damage) to aircraft, a particular concern with turbojets and turboprops.

About 12 of the aircraft based at Dillingham Airport operate on skis in the winter, although the ADOT&PF does not maintain a snow-covered strip for them. At some airports in Alaska, gravel runways are maintained in the winter for skiplanes. At the other three Regional Airports in Central Region ADOT&PF, only Bethel has a gravel-surfaced runway. Nevertheless, if a crosswind runway is constructed at Dillingham Airport, it should be gravel-surfaced[41] for use by tundra-tire aircraft and skiplanes, to increase its usefulness.

The crosswind runway should not intersect with Runway 1-19 for the following reasons: the possibility of runway incursions would be lessened, gravel from the crosswind runway would not be tracked onto the paved runway, and one runway could remain open if the other were closed by construction, maintenance, or an accident. Although a runway visibility zone between runways would only be required between intersecting runways, as much visibility as practical between the two runways is recommended.

Runway Length

Runway 1-19 is the appropriate length to serve the forecasted demand at Dillingham Airport.

Runway length is not determined by ARC, but by a combination of factors, including aircraft performance characteristics, operating weight,[42] temperature, airport elevation, runway gradient, and runway surface condition. FAA AC 150/5325-4, *Runway Length Requirements for Airport Design*, states that the recommended length is determined by considering either the family of aircraft having similar performance characteristics or by a specific aircraft needing the longest runway. In either case, the choice should be based on aircraft that are projected to use the runway on a regular basis, which is considered to be at least 250 departures in a year.

When the maximum gross weight of aircraft forecasted to use the runway regularly is 60,000 pounds or less, the runway length should be designed for a family of aircraft. The proposed crosswind runway would be used by small airplanes (12,500 pounds maximum), so its length should be designed for a family of aircraft. When aircraft more than 60,000 pounds use the runway regularly, which is the case for Runway 1-19, runway length should be determined for a specific design aircraft. Alaska Airline's Boeing 737-200 represents the most demanding aircraft regularly using Dillingham Airport now. Over the next 20 years, some or all of the 737-200 fleet might be replaced by 737-400 or 737-700 aircraft.

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[41] An alternative would be a paved runway with gravel ends, which may provide operational and maintenance benefits over a full-length gravel runway.

[42] Aircraft operating weight is determined not only by payload by also by the fuel load, which is determined by nonstop trip distance, also knows as stage length or length of haul.

Table 4.3 presents the results of the runway length analysis that was performed using the FAA Airport Design Computer Model, which incorporates the guidance from *Runway Length Requirements for Airport Design*.

Table 4.3
Runway Length Requirements

Airport and Runway Data	
Airport elevation	88 feet MSL
Mean daily maximum temperature of the hottest month	62.5° F
Maximum difference in runway centerline elevation	17 feet
Length of haul for airplanes of more than 60,000 pounds	500 miles*
Wet and slippery runways	
Runway Lengths Recommended for Airport Design	
Small airplanes with approach speeds of less than 30 knots	300 feet
Small airplanes with approach speeds of less than 50 knots	810 feet
Small airplanes with less than 10 passenger seats	
75% of these small airplanes	2,250 feet
95% of these small airplanes	2,780 feet
100% of these small airplanes	3,300 feet
Small airplanes with 10 or more passenger seats	3,800 feet
Large airplanes of 60,000 pounds or less	
75% of these large airplanes at 60% useful load	5,240 feet
75% of these large airplanes at 90% useful load	6,630 feet
100% of these large airplanes at 60% useful load	5,400 feet
100% of these large airplanes at 90% useful load	7,000 feet
Airplanes of more than 60,000 pounds	**~ 5,040 feet**

Source: FAA Airport Design Computer Model, based on FAA Advisory Circular 150/5325-4, Runway Length Requirements for Airport Design
** The length of haul used, 500 miles, is the minimum allowed by the model and is more than adequate for trips to and from Anchorage.*

Table 4.3 shows that a primary runway serving small airplanes with approach speeds of 50 knots or more should be 2,250 to 3,800 feet long. Since *Runway Length Requirements for Airport Design* states that a crosswind runway should have a length of at least 80 percent of the primary runway length, the crosswind runway at Dillingham should be at least 1,800 feet long. The crosswind runway proposed by the previous airport master plan was 2,000 feet long. Currently, the ADOT&PF is supporting a minimum runway length of 3,300 feet for Community Airports; this length has been increased from 3,000 feet recommended in the Alaska Aviation System Plan due to the FAA's recent requirement for a minimum runway length of 3,200 feet for a nonprecision approach with a visibility minimum of 1 statute mile. Since Dillingham is a hub for several Community Airports, it is reasonable for the air carriers based in Dillingham and serving these Community Airports to need a runway length comparable to the Community Airports'. Therefore, the proposed crosswind runway should be planned for an ultimate length of 3,300 feet. The initially constructed runway length might be only 2,000 to 3,000 feet, if necessitated by funding limitations or environmental difficulties. To preserve the possibility of a nonprecision instrument approach to the runway, however, the recommended ultimate length is 3,300 feet. According to FAA Order 5100.38B, *Airport Improvement Program Handbook*, a high priority is given to programming at least one nonprecision approach for each secondary runway at commercial service airports, to the extent justified.

An Air National Guard C-130 taxis onto the apron

According to Table 4.3, Runway 1-19 should be 5,040 feet to 7,000 feet long[43] to serve large airplanes (12,500 pounds or more). Specific aircraft with takeoff weights over 60,000 pounds would require the following runway lengths for takeoff fully loaded for a 500-mile haul on a day with 62.5 degrees F temperature:

Boeing 737-200	6,800 feet
Boeing 737-400	6,300 feet
Boeing 737-700	6,100 feet

Although Runway 1-19's length of 6,404 feet is less than the calculated requirement for the 737-200, this model of aircraft is operating now without significant payload penalty. In conclusion, Runway 1-19 is the appropriate length to serve the forecasted demand at Dillingham Airport.

Other Runway Design Standards.

Table 4.4 presents the future dimensional design standards for Runway 1-19 and compares them with the dimensions of the existing runway features. It also presents the dimensional design standards for the proposed crosswind runway. Appendix J, FAA Design Standards, contains graphic illustrations of these runway design standards.

[43] Elimination of the hump in the middle of the runway would reduce the runway length requirement. If the maximum difference in runway centerline elevation were reduced from 17 to 5 feet, the required runway length would be reduced 120 feet.

Table 4.4
Runway Design Standards

	Runway 1-19 Existing Dimensions	Runway 1-19 Required Dimensions	New Crosswind Runway Required Dimensions
Airport Reference Code	**C-III**	**C-III**	**A-I**
Approach Visibility Minimum	**1 mile**	**Lower than 3/4 - mile**	**1 mile**
Runway Width	150 feet	100 feet	60 feet
Runway Shoulder Width	None	20 feet	10 feet
Runway Blast Pad Width	None	140 feet	N/A*
Runway Blast Pad Length	None	200 feet	N/A*
Runway Safety Area Width	200 feet	500 feet	120 feet
Runway Safety Area Length (beyond runway end)	288 feet at Runway 1 and 201 feet at Runway 19	1,000 feet	240 feet
Obstacle Free Zone Width and Length	300 feet x 6,804 feet	400 feet x 6,804 feet**	250 feet x 3,700 feet
Runway Object Free Area Width	300 feet	800 feet	400 feet
Runway Object Free Area Length (beyond runway end)	1,000 feet at Runway 1 and 200 feet at Runway 19	1,000 feet	240 feet
Runway Protection Zones	500 feet x 1,010 feet x 1,700 feet	1,000 feet x 1,700 feet x 2,500 feet***	250 feet x 450 feet x 1,000 feet (small airplanes only)

**If the proposed crosswind runway or runway ends are gravel-surfaced, blast pads will not be needed.*
***An Inner Approach Obstacle Free Zone is required for runways with approach lights. An Inner-Transitional Obstacle Free Zone is required for runways with approach visibility minimums lower than ¾-mile. See the text for more information.*
****If approach visibility is >3/4 mile but <1 mile, requirement would be 1,000 feet x 1,510 feet x 1,700 feet.*

Runway and Shoulder Width. Runway 1-19 is now 150 feet wide, which exceeds the requirements for the current and future ARC, C-III (Table 4.4). Reducing the runway width is not recommended, however, because aircraft that need 150 foot-wide runways use the airport. The width required for C-III aircraft that weigh over 150,000 pounds, such as the Boeing 727 used by Northern Air Cargo, is 150 feet. A runway width of 150 feet is also required for ARC C-IV, which includes the Hercules aircraft used by Lynden Air Cargo and the military. The wider than standard runway also helps aircraft landing in strong crosswind conditions. In addition, 150 feet is the runway width at Bethel, Cold Bay, and Kodiak, which are also Regional Class airports in the Central Region of ADOT&PF.

Runway 1-19 lacks paved runway shoulders. Paved shoulders, 20 feet wide, are required to meet design standards for the ARC.

Blast Pads. Blast pads protect runway ends from ground erosion, particularly by jet blast. Neither runway end has blast pads. Blast pads, 140 feet wide by 200 feet long, are required to meet design standards for the ARC.

Runway Safety Area. The Runway Safety Area is a cleared, drained, graded, and preferably, a turf area symmetrically located about the runway. Under normal conditions, the Runway Safety Area is capable of supporting snow removal, firefighting and rescue equipment, and the occasional passage of aircraft without causing major damage to the aircraft. The RSA should have no potentially hazardous ruts or humps, and it must be clear of objects, except those that must be located there because of function. The RSA should not contain roads, because the vehicles using them would be objects.

Currently the Runway 1-19 Safety Area, 200 feet wide and extending 288 feet beyond the Runway 1 threshold and 201 feet beyond the Runway 19 threshold, does not comply with FAA design standards (500 feet wide and extending 1,000 feet beyond each runway end). Due to the location of Dillingham-Kanakanak Road, an extension southward would be costly. Alternative ways to comply with the requirement should be considered, including the relocation of the Runway 1 threshold. Compliance with runway safety area standards is necessary for Part 139 certification and is a high priority for all airports, although the FAA recognizes that full compliance may not be immediately practical. Appendix K contains an analysis of RSA practicability.

If providing the required RSA length beyond the runway end is infeasible, the FAA allows for the use of declared distances. If no extensions to the RSA length were made, compliance could be through RSA widening and the displacement of the Runway 1 threshold by approximately 700 feet and the Runway 19 threshold by approximately 800 feet. As a result, the Accelerate-Stop Distance Available (ASDA) would be 5,600 feet for Runway 1 and 5,700 feet for Runway 19, and the Landing Distance Available (LDA) would be 4,900 feet for each runway. These shorter distances would probably not eliminate any aircraft types that now use the runway, but might create payload penalties that could increase the cost of passenger and cargo service. In fact, a representative of Alaska Airlines has stated that the company would oppose such a reduction in runway length at Dillingham. For a runway length of 5,600 feet available for takeoff, the payload capability on the Dillingham-Anchorage route would be reduced by approximately 3,500 pounds.[44]

Obstacle Free Zone. Obstacle Free Zones (OFZ) must be maintained around runways. The OFZ clearing standard precludes taxiing and parked aircraft and object penetrations, except for frangible visual navigational aids that need to be located in the OFZ because of function. The runway OFZ is the airspace above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline. The runway OFZ extends 200 feet beyond each runway end.

For Runway 1-19, which serves aircraft over 12,500 pounds and has approach visibility minimums greater than ¾ mile, the OFZ must be 400 feet wide. Runway 1-19 meets the OFZ length, but not the width, due to the fence around the north end of the runway. For

[44] Compared with 6,400 feet available for takeoff, at 15 degrees C

the proposed crosswind runway, which would serve small airplanes exclusively, the OFZ must be 120 feet wide.

Runway 19 has an approach lighting system, which means it is required to have an Inner-Approach OFZ, which is 400 feet wide and begins 200 feet from the runway threshold at the same elevation as the runway threshold, and rises at a slope of 50:1 to a point 200 feet beyond the last light unit. The Inner-Approach OFZ complies with the requirement.

If the instrument approach to Runway 1 or 19 is upgraded to an approach visibility minimum lower than ¾-mile in the future, an Inner-Transitional OFZ will be required. For CAT I runways, the Inner-Transitional OFZ begins at the edge of the OFZ, rises vertically for a calculated height and then slopes out at 6 (horizontal) to 1 (vertical) to a height of 150 feet above the airport elevation. For Runways 1 and 19, the calculated height is 50 feet. The trees in the cemetery on the east side of the runway would penetrate the Inner-Transitional OFZ.

Improvement of an instrument approach at Dillingham Airport might also require a Precision Obstacle Free Zone (POFZ). The POFZ is a volume of airspace above an area beginning at the runway threshold, at the threshold elevation, and centered on the extended runway centerline, 200 feet long by 800 feet wide. The surface is in effect only when all of the following conditions are met:

- Vertically guided approach.
- Reported ceiling below 250 feet and/or visibility less than ¾ statute mile (or RVR below 4,000 feet).
- An aircraft on final approach within 2 miles of the runway threshold.

When the POFZ is in effect, only the wing (not the fuselage not the tail) of an aircraft holding on a taxiway waiting for runway clearance may penetrate the POFZ.

Object Free Area. The Runway Object Free Area (OFA) is an area on the ground centered on a runway centerline provided to enhance the safety of aircraft operations by having the area free of objects, except those needed for air navigation or aircraft ground maneuvering purposes. As with the RSA, a road should not be located within the OFA.

Ground, grave markers, and trees in the cemetery east of the runway are located within the runway safety and object free areas.

The OFA for Runway 1-19 does not comply with the design standards to be 800 feet wide and extend 1,000 feet beyond runway ends. The OFA is 300 feet wide between fences at the north end. Even if the fence were relocated, graves, terrain, and trees at the cemetery east of the runway are within the required OFA, about 200 feet from the runway centerline. The OFA extends at least 1,000 feet beyond the Runway 1 threshold and 200 feet beyond the Runway 19 threshold.

Runway Protection Zones. The Runway Protection Zone (RPZ) is a trapezoidal area centered about the runway centerline beginning 200 feet beyond the end of the area usable for takeoff or landing. Its function is to enhance the protection of people and property on the ground. The RPZ includes part of the runway OFA, and the remainder of the RPZ is a controlled activity area. In the controlled activity area, residences, places of assembly, and fuel storage are prohibited. Land uses that do not attract wildlife or interfere with navigational aids are permitted, such as agricultural operations and automobile parking. The FAA recommends that airports own the land within the RPZ, although obtaining easements to control land use in the RPZ is acceptable if it is impractical for the airport owner to acquire the land.

As shown in Table 4.4, the RPZs at Dillingham Airport shown on the 1988 ALP are currently of the appropriate size, 500 feet at the inner width, 1,010 feet at the outer width, and 1,700 feet long. However, the land uses within the RPZs do not fully comply with FAA guidance. There are buildings located within the RPZs at both ends. At the north end, the RPZ extends beyond the airport property and at the south end, the RPZ is mostly on property for which the ADOT&PF has avigation and hazard easements.

If the approach visibility minimums for the runways are lowered to below ¾-mile, the required RPZ will be considerably larger, 1,000 feet wide at the inner width, 1,700 feet wide at the outer width, and 2,500 feet long. The RPZ would extend beyond airport property and easement control at both ends. For an approach visibility minimum lower than 1 statute mile, but not lower than ¾ mile, the RPZ would need to be 1,000 feet by 1,510 feet by 1,700 feet.

Runway Gradient and Line of Sight. The longitudinal gradient of Runway 1-19 is 0.26 percent, which meets the requirement for Aircraft Approach Category C.[45]

Airport Design states that an acceptable runway profile permits any two points five feet above the runway centerline to be mutually visible for the entire runway length, unless the runway has a full-length parallel taxiway. With a full-length parallel taxiway, an unobstructed line of sight five feet above the runway centerline is required for one-half the runway length. The high point of Runway 1-19 is approximately 3,000 feet from the south end and is 7 feet above the south runway end and 17 feet above the north runway end. If the runway had a full-length parallel taxiway, the existing runway profile would meet the line-of-sight requirement for an unobstructed view along half the runway length.

Threshold Siting Requirements. The runway threshold should be located at the beginning of the full-strength runway pavement. However, displacement of the threshold may be required when an object that obstructs the airspace required for landing aircraft is beyond the airport owner's power to remove, relocate, or lower. Thresholds may also be displaced for environmental considerations, such as noise abatement, or to provide the standard runway safety and object free areas.

Airport Design states that for approach ends of runways expected to serve large airplanes with approach visibility minimums not lower than 1 mile, no object should penetrate a surface that starts at the threshold and slopes upwards from the threshold at 20 (horizontal) to 1 (vertical). In plan view, the centerline of this surface extends 10,000 feet along the extended runway centerline. The surface extends laterally 200 feet on each

[45] Maximum of plus or minus 1.5 percent, except that that the maximum slope in the first and last quarter of the runway is a maximum of plus or minus 0.8 percent

side of the centerline at the threshold and increases in width to 500 feet at a point 1,500 feet from the threshold; thereafter, it extends laterally 500 feet on each side of the centerline. The surfaces for the Runway 1 and 19 thresholds appear to meet these required clearances, except for the localizer and DME, which need to be removed from the safety area. The obstruction chart, field-surveyed in 1991, shows that trees on the rising terrain north of the runway are just below the Runway 19 threshold siting surface.

For approach ends of runways expected to serve large airplanes with approach visibility minimums less than 3/4 mile, no object should penetrate a surface that starts 200 feet from the threshold and slopes upwards at 34 (horizontal) to 1 (vertical). In plan view, the centerline of this surface extends 10,000 feet along the extended runway centerline. The surface extends laterally 400 feet on each side of the centerline at the threshold and increases in width to 1,900. Trees on rising terrain outside the airport property would penetrate the threshold siting surface for Runway 19. The small hill southeast of and within 1,000 feet of the Runway 19 threshold would also penetrate the surface.

Any threshold displacements and relocations considered in the airport development alternatives should be examined for compliance with threshold siting requirements. According to *Airport Design*, if a penetration to a threshold siting surface exists, one or more of the following actions is required: removal or lowering of the object, displacement of the threshold, raising of visibility minimums, or prohibition of night operations.

4.2.5 Taxiways

Runway 1-19 lacks a full-length parallel taxiway connected to each end of the runway. Such a taxiway expedites the flow of traffic between runways and aircraft parking areas and greatly enhances safety. Without a parallel taxiway, aircraft must back-taxi on the runway before takeoff or after landing, greatly increasing opportunities for runway incursions.

Dillingham is not the only primary commercial service airport in Alaska lacking a parallel taxiway, but the situation is rare at primary airports outside Alaska.[46] Funding guidance in FAA Order 5100.38B, *Airport Improvement Program Handbook,* states that a partial parallel taxiway is only considered at general aviation airports where the cost to construct the full length is excessive and the benefits do not warrant it, implying that a full-length parallel taxiway should be provided at commercial service airports.

As described in the analysis of airport capacity, a parallel taxiway would increase the capacity of Runway 1-19 for aircraft operations. Planning for such a capacity-enhancing project is justified based on the current level of annual aircraft operations. A full parallel taxiway would also solve the runway line-of-sight problem. For instrument approaches

[46] Of the ten non-Alaska primary airports that follow Dillingham in the ranking of airports by passenger boardings in 2001, nine have full-length parallel or non-parallel taxiways and one has a partial parallel taxiway. Those airports are Pease International Tradeport (NH), West Tinian (MP), Oxnard (CA), Santa Maria Public (CA), Southwest Georgia Regional (GA), Pitt-Greenville (NC), Reading Regional (PA), Rota International (MP), Texarkana Regional-Webb Field (AR), and Rafael Hernandez (PR).

to be upgraded to an approach visibility less that 1 statute mile, a parallel taxiway is required.[47]

Another reason for a parallel taxiway is to comply with the runway line-of-sight standard discussed previously.

A parallel taxiway serving ARC C-III should be located at least 400 feet from the runway, measured between centerlines.

Taxiways serving Airplane Design Group III are required to be 50 feet wide with 20-foot wide shoulders.[48] Taxiways A and B are 90 feet wide. For Airplane Design Group III, the required Taxiway Safety Area width is 118 feet and the required Taxiway Object Free Area is 186 feet.

Taxiways serving Airplane Design Group I are required to be 25 feet wide and those serving Group II are required to be 35 feet wide. Both Group I and Group II taxiways are required to have 10-foot wide shoulders. Taxiway C serving the GA Apron is 60 feet wide. For Airplane Design Group I the required Taxiway Safety Area width is 49 feet and the required Taxiway Object Free Area is 89 feet. For Group II the required Taxiway Safety Area width is 79 feet and the required Taxiway Object Free Area is 131 feet. Currently, the GA Apron is designed for Airplane Design Group I and the demand for tiedowns in the future will continue to be mostly for Group I aircraft. However, depending on how the Main and GA Aprons are expanded in the future, there may be apron areas where Group II criteria are appropriate, such as to serve transient corporate jet aircraft.

4.2.6 Aprons

The following analysis of aprons is divided into two parts. The first part covers demand for the GA Apron (small aircraft) and the second part covers demand for the Main Apron (large aircraft and small aircraft used by leaseholders on the Main Apron).

Currently, the gravel-surfaced, 52,500 square yard GA Apron has 109 tiedowns, including 10 available for transient aircraft. The capacity appears to be adequate for existing demand. Aerial photographs taken in various times of the year in 2000, 2001, and 2002 indicate between 40 and 60 percent of the tiedowns in use. Considering that the photographs were taken during good visibility conditions, it could be assumed that some of the based aircraft normally using tiedowns were in the air.

It is reasonable to assume that tiedown demand will grow at the same rate as based aircraft, 13 percent over the 20-year planning period. Gravel tiedown aprons should be replaced with paved aprons over time. Table 4.5 indicates the requirement for the GA Apron over the planning period, using a factor of 482 square yards per tiedown, which is the area that now exists and is adequate for Airplane Design Group I. Approximately 10 percent of the tiedowns should be reserved for transient aircraft.

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[47] Tables A16-1A through A16-1C, FAA Advisory Circular 150/5300-13, Change 7, *Airport Design*

[48] The required width is 60 feet for aircraft, such as the Boeing 727-200, with a wheelbase of 60 feet or more. Since the 727 is not the design aircraft for Dillingham Airport, it should not determine taxiway width; however, fillets where taxiways intersect other taxiways, taxilanes, and the runway should be sized to accommodate turns by the 727.

Table 4.5
General Aviation Apron Requirements

	Existing	2008	2013	2023
Tiedowns	109	113	117	123
Available Apron (sq. yd.):	52,200	52,200	54,466	56,394
Apron Area Required (sq. yd.)	52,200	54,466	56,394	59,300
New Apron Required (sq. yd.)		2,266	1,928	2,906

The Main Apron, 1,680 feet long by 470 feet deep, encompasses 87,733 square yards of pavement. Seven lease lots are on the west side, extending as much as 200 feet onto the apron. On the east side, between Taxiways A and B, is an area 700 feet by 100 feet designated for large aircraft parking. North of Taxiway C, apron area is available for transient aircraft parking.

Currently, aircraft power-in and power-out of the Main Apron and passengers enplane and deplane on the apron. At many airports with commercial service in large aircraft, passengers use loading bridges and aircraft are towed away from the terminal gates. Powering in and out reduces operating costs, but uses more apron area per aircraft. It is assumed that apron-level passenger loading and aircraft power-out will continue at Dillingham Airport through the planning period for the following reasons. When the 737-200 is used in its passenger/cargo configuration, passenger loading is through the rear cabin door, instead of the front cabin door, which is the one normally used with loading bridges. Towing aircraft and using loading bridges would require more equipment and personnel. An upper-level departure gate area would be required in the terminal. Apron-level loading would still be required for the PenAir flights in smaller aircraft, so that the Alaska Airlines/PenAir terminal would require departure gates on two levels.

Alaska Airlines/PenAir terminal

The Main Apron should be sized for peak aircraft parking demand. The parking demand can be estimated from the forecast design hour for aircraft operations displayed in Table 3.16. Assuming an average parking period of one hour for large aircraft and two hours for small aircraft, and assuming half the small aircraft are parked on the GA Apron, the calculated current Main Apron parking demand is for 19 aircraft – two large aircraft (air carrier and commuter airlines) and 17 small aircraft (general aviation and air taxis). This calculated demand is close to the actual number of parked aircraft observed in recent aerial photographs. Aerial photographs taken in July 2000 and September 2001 show between 17 and 18 aircraft parked on the apron – one at the north (transient) end and the rest on the west side. None is parked in the large aircraft area on the east side. Based upon interviews with the Airport Manager and Flight Service Station personnel, the east side of the apron is used when large numbers of corporate aircraft (up to eight at once) are at the airport.

In 20 years demand for aircraft parking on the Main Apron is projected to grow to 23 aircraft – three large and 20 small. The capacity of the Main Apron is estimated to be 25 aircraft, based upon an average of 3,500 square yards per aircraft, which takes the fleet mix into account. Consequently, the Main Apron appears to have adequate capacity throughout the planning period. However, the useful area of the Main Apron would be reduced by 10, 500 square yards if a precision instrument approach were established for Runway 1-19. The required primary surface would widen from 500 feet to 1,000 feet, which would also move the 7:1 transitional surface further to the west. Aircraft could not be parked along the eastern edge of the apron. Assuming a precision instrument approach is established in the intermediate-term of the planning period, Main Apron requirements would be as shown in Table 4.6. It should be noted that apron area per aircraft could vary greatly based upon taxilane layout. In addition, the amount of apron area required is dependent on where it is needed; for example, more apron area than projected could be needed to adequately serve a new lease lot of reasonable width.

Table 4.6
Main Apron Requirements

	Existing	2008	2013	2023
Peak Parking Demand (no. of aircraft)	19	19	20	23
Parking Apron Required (sq. yd.)	66,500	66,500	70,000	80,500
Available Parking Apron (sq. yd.)	87,733	87,733	77,200*	77,200
New Apron Required (sq. yd.)	0	0	0	3,300

**Primary surface around runway enlarged due to establishment of precision instrument approach.*

4.2.7 Airport Pavements

Every year the ADOT&PF Pavement Management Group surveys the pavement condition at approximately one-third of the 50 paved civil airports in Alaska. Dillingham Airport was surveyed in 2004. Conditions are rated according to the Corps of Engineers Pavement Condition Index (PCI) method described in FAA AC 150/5380-6, *Guidelines and Procedures for Maintenance of Airport Pavements*. A perfect, new pavement would have a PCI of 100, while pavement with a PCI of 0 would be completely failed. According to guidelines set by the Alaska State Legislature, runways should be a minimum PCI of 70 and taxiways and aprons should be a minimum PCI of 60. Runway 1-19, overlaid in 2003, had a PCI of 94.33 in 2004; the pavement analysis recommendation was nothing or preventative maintenance. Taxiway A's PCI in 2004 was 67.07 and Taxiway B's was 73.93; rehabilitation was recommended. The PCI for the Main Apron and Taxiway C was below 40; reconstruction was recommended.

4.2.8 Helicopter Facilities

Although there are no helicopters based at the airport, transient helicopters use it regularly. Currently, the Airport Manager has directed them to use the triangular southeast end of the GA Apron, where there are no fixed wing aircraft tiedowns.

FAA AC 150/5390-2A, *Heliport Design*, provides guidance on helicopter facilities at airports. *Heliport Design* states that separate facilities and approach/takeoff procedures for helicopters may be necessary when the volume of fixed-wing aircraft and/or helicopter traffic impacts operations. Although helicopter traffic is not adversely impacting airport operations now, it is prudent to consider providing separate helicopter facilities and approach/takeoff procedures in the alternatives for long-term future development. The heliport location depends on several variables. Close proximity to the passenger terminal is important if helicopter passengers are transferring to other airlines or otherwise need terminal facilities. On the other hand, many helicopter operations at Dillingham Airport do not need to be close to the passenger terminal because they are chartered for purposes such as cargo transport or surveillance. Another consideration in the siting of helicopter facilities is to provide adequate separation from areas where small fixed wing aircraft operate, due to the potential damage from rotor wash.

Transient helicopters use the GA Apron

The types of helicopters using the airport are mostly light turbine, such as the Bell Long Ranger, which can carry six passengers. Its maximum takeoff weight is 4,150 pounds, it is 43 feet long, and its rotor diameter is 32 feet. Using the Bell Long Ranger as the design helicopter, the Touchdown and Lift-off Area (TLOF) should be 32 feet by 32 feet (rotor diameter), paved with concrete, furnished with edge lighting, and designed for a 6,500 pound load (1.5 times design helicopter's maximum takeoff weight). The Final Approach and Takeoff Area (FATO) should be 65 feet by 65 feet (least dimension not less than 1.5 times overall helicopter length. A safety area 20 feet in width must surround the FATO and be free and clear of objects. In case more than one transient helicopter is using the airport at the same time, a helicopter parking position should also be designated, 55 feet by 55 feet, providing for the rotor diameter plus 1/3 rotor diameter clearance.

A Protection Zone is required under helicopter takeoff and landing areas. The purpose and land use restrictions for the Protection Zone are the same as for the Runway Protection Zones. The Protection Zone would be trapezoidal in shape, beginning at the 65-foot wide FATO, extending out 280 feet to a width of 200 feet. The Protection Zone is required under the approach surface to where the approach surface would be 35 feet above the FATO.

To the extent practical, helicopter approach/takeoff paths should be independent of approaches to active runways. The distance between the FATO centerline and a runway center line for same direction VFR operations is 500 feet for airplanes up to 300,000 pounds and helicopters up to 12,000 pounds.

4.3 Avigation

This section presents airport needs associated with airspace, air traffic control, obstructions, navigational aids, lighting, and marking.

4.3.1 Airspace and Air Traffic Control

Dillingham Airport does not have serious airspace conflicts with other airports, although Shannon's Pond Seaplane Base is only about 1 nautical mile from the airport. The northeast-southwest orientation of the water lane is compatible with Runway 1-19 traffic. If a new crosswind runway is built, potentially conflicting traffic patterns on Dillingham Airport and between Dillingham Airport and Shannon's Pond Seaplane Base will be established. Fortunately, during low visibility conditions, only Runway 1-19 could be used, however, even for operation in good weather, care should be taken to reduce conflicting traffic patterns and circumstances where pilots using different runway would have trouble seeing each other.

An air traffic control tower would enhance safety at the airport. A review of the NTSB database of aviation accidents over the last 20 years found that four of 27 accidents that occurred at or near Dillingham Airport involved midair collisions or near misses. On May 24, 1988, a Cessna 206 and an Era Aviation Aerospatiale helicopter collided in midair one-half mile south of the airport. On June 26, 1992, the pilot landing a PenAir Fairchild SA227 broke out of the clouds and saw a Mark Air Cessna 207 directly in front; after evasive action, the aircraft passed within 100 feet of each other.

The last Airport Master Plan Update planned for an air traffic control tower at Dillingham Airport. However, Dillingham Airport is not projected to be busy enough to qualify for an air traffic control tower throughout the planning period. Using criteria from FAA Order 7031.2C, *Airway Planning Standard Number One, Terminal Air Navigation Facilities and Air Traffic Control Services*, and the current mix of aircraft operations at Dillingham Airport, the minimum number of annual operations for the airport to be a candidate for an air traffic control tower would be approximately 150,000. A funding program for FAA to provide half the capital cost of a tower is available and national legislation has been introduced recently to make air traffic control tower construction eligible for FAA Airport Improvement Program grants. However, even if the capital cost of the tower were heavily subsidized, the annual operating cost would probably be too high for ADOT&PF to bear. Nevertheless, given the safety enhancement an air traffic control tower would provide and the stringent visibility requirements a tower would entail, it is recommended that a site for a tower be reserved at Dillingham Airport.

The air traffic control tower site should be located where traffic arriving and departing on all runways would be in view from the tower cab. The tower should also provide a good view of taxiways and the Main Apron. The location should be where future construction would not block the view from the tower and where the tower would not derogate the signal generated by any existing or planned electronic navigational aids. Road access, utility availability, and proximity to existing amenities for controllers' use are siting considerations. Security is another consideration; the site should be fenced to keep unauthorized personnel away from the building and its parking area. According to *Airport Design*, a typical air traffic control tower site will range from 1 to 4 acres. The tower should not be sited where it would penetrate Part 77 imaginary surfaces.

4.3.2 Part 77 Penetrations

Regulations on the protection of an airport's airspace are defined by 14 CFR Part 77. The regulation defines a series of standards used for determining obstructions to an airport's navigable airspace. This is accomplished through the creation of a set of airport imaginary surfaces, penetration of which represents an obstruction, but not necessarily a hazard, to air navigation. Vehicles on roads might be obstructions, as well as fixed objects; the height of required vehicle clearance is 10 feet for private roads and 15 feet for public roads.

A Part 139-certificate holder must ensure that each object within its authority that penetrates the imaginary surfaces must be removed, marked, or lighted, unless determined to be unnecessary by a FAA aeronautical study.

Airport imaginary surfaces consist of the following elements, which are illustrated in Figure 4.2:

- Primary Surface: This surface is longitudinally centered on each runway and extends 200 feet beyond each runway end (if the runway is paved). The elevation of the primary surface of a given runway is the same as that of the nearest point on the runway centerline. For Runway 1-19's current instrument approaches (approach visibility minimum 1 mile), the primary surface width is 500 feet. For approach visibility minimum lower than ¾ mile, the width is 1,000 feet. The proposed crosswind runway, which would be a runway serving only small, propeller-driven aircraft would require a primary surface 250 feet wide for visual approaches and 500 feet wide for nonprecision approaches.
- Approach Surface: This is a trapezoidal-shaped surface that begins at the primary surface of each runway end and slopes upward and outward for a prescribed distance. The most restrictive approach surface in Part 77 is for a precision approach, which is planned for Runways 1 and 19: it slopes up at 50:1 for the first 10,000 feet and at 40:1 for the next 40,000 feet, expanding to an outer width of 16,000 feet. For the current nonprecision approaches to Runways 1 and 19, the approach surface slopes up at 34:1 for a distance of 10,000 feet; its outer width is 3,500 feet. For a nonprecision instrument runway serving only small, propeller-driven aircraft, the approach surface slopes up from the primary surface at 20:1 for a distance of 5,000 feet, expanding to a width of 2,000 feet. For a visual runway serving only small, propeller-driven aircraft, the approach surface slopes up from the primary surface at 20:1 for a distance of 5,000 feet, expanding to a width of 1,250 feet.
- Transitional Surface: This surface is a plane with a 7:1 slope that extends upward, outward, and at right angles from the primary and approach surfaces, terminating at the airport horizontal surface.
- Horizontal Surface: This is a horizontal plane 150 feet above the airport elevation (the highest point on the runway, or 88 feet above MSL, according to the 2002 survey). This surface is defined by drawing semi-circles of a given radius from the ends of the primary surfaces. For a visual runway, the radius is 5,000 feet and for an instrument runway, the radius is 10,000 feet.

- Conical Surface: The conical surface is an enclosed plane that extends upward and outward from the horizontal surface at a 20:1 slope

The most recent obstruction chart for Dillingham Airport was field-surveyed in June 1991. (Appendix I)

Although many trees have been removed from the 500-foot wide primary surface of Runway 1-19 since the obstruction survey, obstructions remain. Ground, grave markers, and trees within the cemetery east of the runway penetrate the primary surface. The perimeter fence and North Airport Road penetrate the primary surface at the north end. At the south end the localizer and DME (distance measuring equipment) penetrate the primary surface; they are also within the runway safety area and should be relocated. Trees and terrain penetrate the Runway 19 approach surface.

If the instrument approaches were improved to provide approach visibility minimums under ¾ miles, the primary surface would double in width, approach surfaces would be wider and lower, and penetrations of the Part 77 surfaces would worsen. More trees on the east side of the runway would penetrate the primary surface. A portion of the primary surface would extend beyond airport property on the east side of the runway, where there are buildings and roads. The 50:1 approach to Runway 1 would be clear, but the 50:1 approach to Runway 19 would include more terrain and trees. Of particular concern is a hill developed with houses, located approximately 1,000 feet north and 500 feet east of the Runway 19 threshold, which would penetrate the approach surface.

It is the FAA's responsibility to determine if an obstruction is a hazard to aviation. It seems unlikely that the FAA would approve an instrument approach visibility minimum lower than ¾ mile at Dillingham Airport without some obstruction removal. Removing penetrations from the threshold siting surfaces and obstacle free zone that would be required for the proposed precision approaches would reduce obstructions in the Part 77 surfaces. Airport development alternatives should analyze ways to lessen the Part 77 obstructions that are not on airport property and would be very difficult to remove, such as the cemetery and the terrain in the Runway 19 approach.

For a heliport, the primary surface has the same dimensions as the Final Approach and Takeoff Area (65 feet square for the design helicopter at Dillingham Airport). The approach surface begins at each end of the primary surface with the same width as the primary surface and extends outward and upward for a horizontal distance of 4,000 feet, where the width is 500 feet. The slope of the heliport approach surface is 8:1. Heliport transitional surfaces extend up and out from the lateral boundaries of the primary and approach surfaces at a slope of 2:1 for 250 feet horizontally, measured from the centerline of the primary and approach surfaces.

4.3.3 Navaids, Lighting, and Marking

Runways 1 and 19 should be planned for precision instrument approaches with approach visibility minimums lower than ¾ statute miles. According to FAA Order 5100.38B, *Airport Improvement Program Handbook*, a high priority is given to programming at least one precision approach system, vertical visual guidance system, and full approach lighting system for each primary runway at commercial service airports, to the extent justified. A glide slope antenna would be needed for the airport to have a precision approach using an instrument landing system (ILS). The localizer needed for an ILS is already in place, although it should be relocated outside the runway safety area. Also, the runway has the high-intensity edge lights (HIRL) that would be needed for a precision approach. Although precision GPS approaches are not being commissioned now, they will be in the near future. Due to cost considerations, the FAA may be more likely to establish a GPS approach with vertical guidance than complete the ILS at Dillingham Airport.

VASIs on Runways 1 and 19 should be replaced with PAPIs, consistent with the FAA's modernization plan.

Airfield lighting should be improved along with other improvements. Each runway end with a precision approach should have a Medium Intensity Approach Lighting System with Runway Alignment Identifier Lights (MALSR). A MALSR is a 2,400-foot economy approach lighting system used for CAT I precision approaches. The MALS portion is 1,400 feet long and the RAIL portion extends 1,000 feet farther out from the runway. The new parallel taxiway and new access taxiways should have Medium Intensity Taxiway Lights (MITL). The crosswind runway should have Medium Intensity Runway Lights (MIRL) and Runway End Identifier Lights (REIL). The GA Apron needs additional area lighting, and when it is paved, edge lighting should be installed.

Runway 1-19's markings meet the FAA standards for nonprecision runways and must be upgraded when a precision approach is commissioned. According to FAA AC 150/5340-1H, *Standards for Airport Markings*, a nonprecision approach requires the following marking elements: designation, centerline, threshold, and aiming point. A precision runway also requires side stripes and touchdown zone markings. If thresholds are relocated or displaced in the future, runway markings must be modified accordingly.

Runway 1-19 does not have distance remaining signs, which are recommended for all runways used by turbojet aircraft. Airfield signage should be expanded and modified if the primary runway configuration is modified and if new taxiways and apron areas are constructed

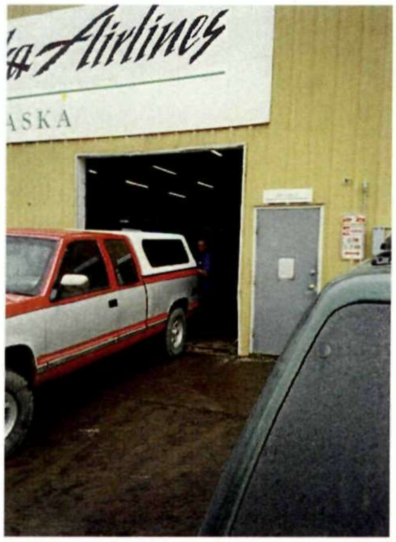
4.4 Airport Security

After the terrorist attacks on America using commercial airliners on September 11, 2001, the Transportation Security Administration (TSA) was formed and is now responsible for airport security. Security tasks once performed by airline employees are now done by TSA employees, so more building and parking area is needed.

The seating capacity of aircraft used for scheduled service determines the extent of passenger and baggage screening. Screening has long been required for Alaska Airlines passengers, but the screening became more thorough, increasing congestion in the terminal. The already crowded terminal building was required to have explosive detection equipment and personnel to screen all baggage. Since 9/11, the terminal has been remodeled, but the building has not been enlarged.

The projection of building area required for the passenger terminal, which is later in this chapter, uses criteria that predate TSA. These TSA-driven areas are not included in the terminal building area calculations for Dillingham Airport, however, some excess building area is built into the calculations because they assume all future passengers will use the one terminal building, rather than be dispersed among several individual air carrier terminals as now occurs.

A rule prohibiting parked automobiles within 300 feet of the Alaska Airlines passenger terminal was enforced shortly after September 11, 2001. In December 2002, Under Secretary of Transportation Security James Loy announced that the 300-foot parking buffer requirement would be lifted so long as the nation's terror-alert status stays at yellow ("elevated") or below. If the threat is raised, TSA will require special procedures for keeping the front of terminals clear. For this document, it has been assumed that vehicular parking can still be located close to the terminal building in the future, but additional parking should be available beyond the 300-foot buffer. If the terminal building is expanded in the future, it would be an appropriate time to assess the building's ability to withstand an explosion and determine the trade-offs between blast resistant design and close-in parking. Blast resistance should be considered in any new terminal design.



Vehicles currently park for loading and unloading right next to the Alaska Airlines/PenAir terminal

Most of TSA's new requirements relate to commercial aviation, not general aviation. The Dillingham Airport is fully fenced now, but some gates may need to be replaced with electronic gates providing more controlled access, such as via security badge. Automobile access to the GA Apron may be restricted in the future.

4.5 Landside Facilities

4.5.1 Passenger/Cargo Terminal

Buildings located on leaseholds contain passenger terminal area totaling approximately 7,550 square feet and cargo terminal area totaling approximately 13,190 square feet (Table 4.7). Alaska Airlines and its commuter airline affiliate, PenAir, transport about 90 percent of the passengers at Dillingham. Both airlines operate from one building. With only 2,400 square feet dedicated to passenger terminal functions, this building is often overcrowded and does not meet the needs of the community.

Table 4.7
Dillingham Airport Existing Passenger/Cargo Terminal Building Areas

	Passenger	Cargo
Flight Alaska (Yute Air)	900 sq.ft.	4,500 sq.ft.
Freshwater	1,000 sq.ft.	
PenAir/Alaska	2,400 sq.ft.	4,800 sq.ft.
Grant Aviation, etc.	2,750 sq.ft.	2,750 sq.ft.
Alaska Cargo Services		640 sq.ft.
Bristol Bay	500 sq.ft.	500 sq.ft.
Total	7,550 sq.ft.	13,190 sq.ft.

Note: The areas were estimated from visual inspections and site plans. No floor plans were available and no measurements were taken.

Comments expressed at the public meetings in Dillingham supported the development of a joint use terminal facility, particularly for passengers. Such a facility should not only be less crowded than the existing PenAir/Alaska terminal, but should also provide more amenities for passengers and a more attractive appearance. A consolidated terminal would also better accommodate the TSA's requirements. The last master plan update recommended a site for a joint use terminal, but one has not been developed. The ADOT&PF does not have a large enough maintenance and operating budget to operate terminal facilities at rural airports. The City of Dillingham might sponsor a joint use terminal, as the City of Homer has at the State-owned airport there, but financial self-sufficiency of the terminal operation would be an issue. Although they are not operated by public entities, Dillingham Airport actually has several joint use terminal buildings, in addition to the one used by both PenAir and Alaska Airlines. One building consolidates terminal facilities for Grant Aviation, Frontier Flying Service, and Arctic Circle Air, as well as houses the Flight Service Station and a restaurant. Another building accommodates Flight Alaska, Larry's Flying Service, and Hageland Flying Service, as well as ground handling for Lynden Air Cargo. Alaska Cargo Services' building houses its own air cargo business and ground handling for Northern Air Cargo.

Alaska Cargo Services and Northern Air Cargo

Airport alternatives should examine the options of developing a publicly operated joint use terminal or continuing to use privately operated buildings for passenger and cargo terminals.

Passenger terminal size requirements were analyzed on the basis of the air traffic forecast, (FAA AC 150/5360-9, *Planning and Design of Airport Terminal Facilities at Non-Hub Locat*ions, and 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*). Passenger terminal requirements are based upon an approximate number of square feet required to process an enplaning passenger from curbside to aircraft.

For the 20-year future passenger demand, the size of a consolidated passenger terminal could vary from 9,000 square feet (*Planning and Design of Airport Terminal Facilities at Non-Hub Locations*), to 16,000 square feet (based on the FAA's guideline of 150 square feet per peak hour enplaned passenger), to 32,500 square feet (based on 0.5 square feet per annual enplaned passenger typical of terminal space in Alaska).

Because it is the most detailed method for projecting building area, the guidance in AC 150/5360-13 "Terminal Space Design Standards" has been used to estimate building area for various functions that occur in the Dillingham Airport passenger terminal. For the 20-year future, this method projects the need for a passenger terminal building containing 24,182 square feet. This size is based upon forecast design hour of 107 enplaned passengers. Although not all of the passengers and cargo are handled through the terminal building, the sizing for the facility assumes they are. For a single building to accommodate a design hour with 107 enplaned passengers is reasonable, considering that the seating capacity of a 737-400 aircraft or a 737-200 aircraft in full passenger configuration exceeds 100.

Table 4.8 presents the estimated functional area requirements, using FAA's "Terminal Space Design Standards" and based on the design hour enplaned passengers in Table 3.16. The future area projections are compared with the existing building areas. The current calculated design hour contains 78 enplaned passengers.

Table 4.8
Dillingham Airport
Passenger Terminal Building Area Requirements

Function	Current*	2008	2013	2023
Ticket Lobby		900	970	1,070
Airline Operational		4,320	4,656	5,136
Baggage Claim		900	970	1,070
Waiting Rooms		1,620	1,746	1,926
Eating Facilities		1,444	1,552	1,712
Kitchen and Storage		1,444	1,552	1,712
Other Concessions		450	485	535
Toilets		270	291	321
Circulation, Mech., Mnt., Walls		10,440	11,252	12,412
Total (Square Feet)	7,550	21,788	23,474	24,182

** Areas devoted to individual functions in the various terminal buildings are unknown.*

The long-term forecast for enplaned cargo was 3,200 tons. Based on this 20-year future cargo demand, a consolidated cargo terminal should be 9,600 square feet in size. This projection uses the planning parameter of 3.0 square feet per ton, nearly twice the national average of 1.75 square feet per ton annual cargo, due to special peaking characteristics of fish haul. As with passenger terminal facilities, the cargo facility requirements are projected for all the enplaned cargo forecast for the airport (Table 3.16). Existing cargo terminals, with 13,190 square feet, should be adequate throughout the planning period.

Based on the 20-year projections for passenger and cargo terminal facilities, a consolidated or Joint Use Passenger/Cargo Terminal Building should be at least 34,000 square feet with adequate storage room for cargo and a cargo dock (24,200 square feet for the passenger terminal as shown in Table 4.8, plus 9,600 square feet for cargo). Since existing cargo terminal area is adequate for the long-term future and since several air cargo carriers at Dillingham Airport do not provide passenger service, passenger and cargo terminals might be developed separately.

Even if a publicly sponsored consolidated terminal is infeasible, the airport needs a site where a passenger airline using large aircraft, such as Alaska Airlines, could establish a terminal of sufficient size and with appropriate surface access. A passenger terminal serving a large number of passengers, such as the Alaska Airlines/PenAir facility, should have a dedicated, one-way loop access road that provides a lane next to the building for loading and unloading vehicles, at least one passing lane, and an easy means for vehicles to recirculate. The main terminal should also have nearby, dedicated short-term parking for greeters (people picking up passengers) and the handicapped.

4.5.2 General Aviation Improvements

Dillingham Airport lacks basic amenities for general aviation users, such as shelter from the weather, restrooms, and a pay phone. Pilots and passengers of transient business aircraft from the Lower 48 are accustomed to attractive, comfortable Fixed Base Operator (FBO) facilities with amenities such as pilot lounges, conference rooms, courtesy transportation, and food service. Dillingham Airport also lacks aircraft repair services available for transient aircraft. A suitable site should be designated for the establishment of a privately-run FBO, which might provide aircraft maintenance, aircraft charters and sales, flight support operation to include pilot services, fuel, hangars, flight planning, conference room, pilots lounge, etc.

ADOT&PF will not fund the development of hangars, but supports the allocation of land to meet the projected demand for hangars. Most hangars at Dillingham Airport are built on individual lease lots, but they are mostly leased to commercial aviation operators. Individual general aviation pilots would likely find lease and development costs too high. Also, available lease lots are only one-half acre, not large enough for multiple hangars. Consequently, this plan recommends the designation of a specific area for future general aviation hangar development. One individual or business, such as the airport's future FBO, might develop hangars and lease them to individuals, or a group of aircraft owners might jointly develop hangars with condominium-type ownership. All hangar development and leasing would be subject to ADOT&PF restrictions.

The demand for general aviation hangars depends on aircraft owner preference, area climate, and cost. The most common and cost effective structure used for providing maximum general aviation parking capacity in the minimum space is nested T-hangars.

T-hangars provide an individual hangar for each aircraft. The alternative of a large building holding several aircraft does not provide as much control and privacy for the individual aircraft owner.

There are currently no T-hangars at Dillingham Airport. During one of the public meetings, a comment was made that if land were available five pilots would be interested in developing a cooperative, and managing a T-hangar development. It is estimated that T-hangars for 25 to 50 percent of the based aircraft would fill the need; by 2023, there would be demand for 28 to 56 T-hangars. Rows of T-hangars for small aircraft require 75 feet of separation for one-way traffic between them and 125 feet for two-way traffic. According to the FAA AC 150/5300-13 *Airport Design*, based on two-way traffic and units with a 40-foot clear door and a 30-foot clear depth, 10 T-hangar units can be accommodated on one acre of land. With one-way taxilanes, one acre of land can accommodate 14 T-hangars.

For planning purposes, about 1 to 5 acres of land should be designated for the development of either T-hangars or other multiple user hangar space.

4.5.3 Lease Lots

Excluding land used or reserved for the ADOT&PF, land leased to the City of Dillingham for its fire station, and land leased to the FAA and National Weather Service for equipment, Dillingham Airport has 19 lease lots for aviation businesses. Several small air carriers and air taxis operate from individual leaseholds – on their own lease lots they can store their aircraft and perform aircraft maintenance for their own fleets and for general aviation customers. At other leaseholds, particularly along the main apron, the lot is leased to one entity who has subleased space to multiple aviation businesses. See Appendix L, Leaseholder Information, for detailed lease lot drawings.

Of the eight existing lease lots located on the east side of West Airport Road, seven are occupied. The only vacant lot is at the south end and is currently undesirable because it lacks frontage on the main apron. Of the eleven leaseholds located on the GA apron, seven are occupied. Demand may be greater for lots on the main apron than on the GA apron because lots on the GA apron lack paved apron, are less visible and accessible, and they cannot be used for large aircraft. On the other hand, fewer lots may be leased on the GA apron because the apron is newer than the main apron and the land has not been available for lease as long.

The current leaseholds on the main apron vary in size, but they all exceed the ADOT&PF recommendation of a minimum lease lot size of 22,500 square feet with the first 50 feet being on the apron and reserved for aircraft parking. Most lease lots on the main apron extend 200 feet onto the apron for large aircraft parking. The current leaseholds on the GA apron also vary in size; however, they are all below the ADOT&PF

Leasehold along the main apron

Dillingham-Kanakanak Road provides access to the airport from the central business district. Within airport boundaries, all airport terminal and tenant access is provided by a state-maintained, common-use road (West Airport Road).

North Airport Road is located at the threshold of Runway 19 and provides access to the runway and runway lights as well as providing access to the residences located northwest of the airport. In the past North Airport Road continued south of the residences, connecting with West Airport Road. Since the construction of the GA apron and the fencing of the airport, the road no longer passes through the terminal area of the airport. Vehicular traffic has developed a rough road around the north end of the GA apron and connecting with the road on the west side of the GA apron. Access to the residences northwest of the airport should be addressed in airport development alternatives.

Currently portions of Dillingham-Kanakanak Road, Wood River Road and North Airport Road are too close to the runway for various clearances and areas required for aviation safety. As the airport is improved in the future, aviation safety clearance areas will be larger and require even more road realignment than currently required.

Access to the Alaska Airlines terminal is inadequate to handle the number of vehicles loading and unloading people when Alaska Airlines' 737 flights arrive and depart. Currently there is no dedicated terminal curb drive, just an inadequately sized parking area in front of the building. For safety and efficiency, a one-way road, with lanes for standing and passing vehicles, and looped to allow easy recirculation to the terminal, should be provided. Ideally, the terminal loop road should not carry any traffic not associated with the terminal.

4.6.2 Vehicle Parking

Parking requirements discussed herein are primarily for the passenger/cargo terminal area and the general aviation tiedown area. The holders of individual lease lots are obligated to provide adequate parking for their employees and customers on their leaseholds.

East of West Airport Road is a parking area along four lease lots, including the PenAir/Alaska Airlines terminal, which accommodates approximately 20 spaces and is used for employees and short-term passenger parking. A long-term parking lot for passengers is located south of the GA apron, approximately 1,700 feet from the Alaska Airlines/PenAir terminal on 0.65 acres of land, with approximately 45 spaces.

Terminal parking requirements are summarized in Table 4.10. Currently there are 65 parking spaces for short-term, long-term and employee parking. The FAA Advisory Circular 150/5360-13 recommends 1.5 parking spaces per design hour enplaned passengers. Approximately 400 square feet is needed per vehicle to allow for parking, maneuvering room for imperfect parking techniques, snow removal, generous space width for people handling baggage, and landscaping. For the year 2023, approximately 1.5 acres of land should be designated for parking at the airport. Public parking lots should be located to limit walking distances from parked automobiles to terminals to no more than 1,000 feet.

Rental car parking does not exist at the airport. If a rental car facility were to be located at the Dillingham Airport, using the FAA-recommended formula of 750 originating passengers or one peak hour passenger per rental car stall, 107 car rental stalls will be needed for 2023 or 1.0 acre of land.

Table 4.10
Dillingham Airport Terminal Parking Space Requirements

Terminal Parking Spaces	Current	2023
Short-Term	20	85
Long-Term	45	75
Total	65	160
Car Rental	0	107

While it may not be feasible to provide an appropriate terminal loop access road in the near-term future, increasing the amount of general use parking reasonably near the Alaska Airlines/PenAir terminal would reduce the vehicle congestion immediately in front of the terminal building.

Congestion at the terminal led to ADOT&PF's clearing an area for the 45-space long-term parking lot (unpaved, irregularly-shaped, unmarked, and unlit), located approximately 0.3 mi from the passenger terminal. There is no sidewalk from the long-term parking to the terminal. Due to congestion around the passenger terminal, some people use the long-term lot for short-term parking and walk West Airport Road carrying baggage, a situation both inconvenient and unsafe. The long-term lot needs to be improved or replaced.

Currently, there is no parking area available specifically for general aviation tiedown users. The number of general aviation parking spaces needed is calculated as equivalent to 25 percent of the number of tiedowns, which equates into 31 spaces in 2023, or approximately 0.3 acres.

4.6.3 Utilities

There are no municipal water system hook-ups extended to Dillingham Airport. There is a need to either extend water lines from the city or create a separate water system specifically for the airport. The City's new water/wastewater plan addresses the inadequacies of the water system at the airport and plans to serve the airport.

Electrical power is needed in the tiedown area as well as better floodlighting of the apron. The only tiedowns with power are those that are close to buildings with available receptacles. If the long-term parking remains in its current location better lighting is also needed.

4.6.4 Land Use Compatibility

The development of land uses that are not compatible with airports and aircraft noise is a growing concern across the country. In addition to noise, there are other issues, such as safety and other environmental impacts. The objectives of compatible land use planning are to encourage land uses that are generally considered to be incompatible with airports (such as residential, schools, and churches) to locate away from airports and to encourage land uses that are more compatible (such as industrial and commercial uses) to locate around airports.[49] The Land Use Compatibility Guide identifies four key issues for evaluating the types of land uses to be considered compatible around airport:

- The impact of aircraft noise and noise compatibility planning
- The potential for airspace conflicts from tall structures in the vicinity of an airport
- The possibility of electronic interference with aviation navigation aids
- The potential for interaction between aircraft and wildlife attractants

Local planning agencies play an important role in land use compatibility by determining appropriate and inappropriate use of properties around airports through Comprehensive Plans, Zoning Regulations, Subdivision Regulations, Building Codes, Housing Codes, Capital Improvement Programming, Official Map Regulations and Infrastructure Extensions. Land use compatibility depends on local land use decisions as well as development and operational changes at the airport.

Using the guidelines above, land use conflicts exist on or adjacent to the airport property. There are two residences with an access road located west of the runway. Not only is this an incompatible land use, the road is also located with the runway object free area and the runway safety area. A housing subdivision is also located south of the main apron, clearly not a compatible land use with the airport. There are also houses northeast of the runway. One residence is on airport property, southeast of the runway.

The City Cemetery is approximately 150 feet from the runway centerline. Where the cemetery is closest to the runway, the ground, several grave markers, and many trees are higher than the runway. The land within 250 feet of the runway centerline is required to be a runway safety area, where the ground must be relatively flat, lower than the runway, and capable of supporting snow removal, firefighting and rescue equipment, and the occasional passage of aircraft without causing major damage to the aircraft. The area within 400 feet of the runway centerline is required to be free of objects (runway object free area). When the instrument approaches are improved to provide visibility minimums lower than ¾ mile, the area within 500 feet of the runway centerline (primary surface) must be free of obstructions that extend above the adjacent runway elevation.

4.7 Summary of Requirements

Airfield

- The current runway length and width are adequate for the long-term future. Runway 1-19 needs shoulders and blast pads. The runway safety area, 200 feet by 6,893 feet, must be enlarged to 500 feet by 8,400 feet in order to meet FAA design standards. The required runway object free area and obstacle free zone also do not meet FAA design standards. Terrain, grave markers, and trees in the cemetery east of the runway and the fence and road around the north end of the runway are the major violations of these design standards.

- Currently, the best approach to Runway 1-19 has a 1 mile visibility minimum. Both Runways 1 and 19 will be planned for instrument approaches with visibility minimums lower than ¾ mile. More stringent runway design standards and

[49] Land Use Compatibility and Airports, FAA Guidance

airspace protection will be required. The runway protection zone, in which occupied buildings are prohibited, will increase from 500 feet by 1, 010 feet by 1,700 feet to 1,000 feet by 1,700 feet by 2,500 feet and will encompass more buildings. Also, the imaginary surface required for the approach to Runway 19 will become lower and wider, so it will be penetrated by trees and terrain. The primary surface will widen from 500 to 1,000 feet and will encompass most of the cemetery. With the wider primary surface from which the transitional surface slopes upward at 7:1, more trees on both sides of the runway will become obstructions in the transitional surfaces.

- Runway 1-19 does not meet the FAA's requirement for line-of-sight between runway ends, 5 feet above the runway, because the middle of the runway is at a much higher elevation than the ends. Compliance requires changing the longitudinal gradient or providing a full-length parallel taxiway.
- Additional reasons justify the construction of a parallel taxiway. A parallel taxiway would enhance safety by eliminating back-taxiing on the runway, which would reduce opportunities for runway incursions. Eliminating back-taxiing would also double the runway's capacity for aircraft operations. Currently, annual demand has nearly reached Runway 1-19's capacity. Finally, a parallel taxiway is required in order to have an instrument approach with visibility minimum lower than 1 mile.
- A crosswind runway is needed to meet the FAA threshold for 95 percent wind coverage for the smallest aircraft that use the airport. Runway 1-19 alone provides 94 percent wind coverage for this class of aircraft. To meet the demand of tundra tire users, the crosswind runway should be gravel-surfaced.
- A public heliport with adjacent helicopter parking is needed.
- During the 20-year planning period, the taxiways and Main Apron pavements will require rehabilitation or reconstruction. The GA Apron should be paved.
- Recommended avigation improvements include replacement of VASIs with PAPIs; approach lighting systems; GA Apron lighting; addition of runway distance remaining signs; and designation of a future air traffic control tower site.
- Additional paved apron is needed for aircraft parking. Over the 20-year planning period, the GA Apron should be expanded from 52,200 square yards to 59,300 square yards. The 87,733-square yard Main Apron should be large enough to satisfy demand through the planning period, until a precision instrument approach is established. The precision approach would double the size required for the primary surface. Then, the useable area of the Main Apron would be reduced to 77,233 square yards, about 15,000 square yards less than the projected requirement of 92,000 square yards in 20 years.

Terminal Facilities

- The existing individual buildings do not meet the needs of the air carrier/commuter/air taxi passengers or the visual image the City of Dillingham would like to project. A total area of 24,200 square feet is required by 2023 for a passenger terminal that would serve all air carrier and commuter airlines operating at the airport. The total area now devoted to passenger terminal functions in various buildings is 7,550 square feet. Existing cargo terminals, with 13,190 square feet, should be adequate throughout the planning period.

Lease Lots

- There are currently nineteen lease lots located on the Dillingham Airport. Eleven of the lots are occupied. Lease land demand in the future is expected to be for larger size lots to accommodate larger individual air carrier operations, consolidated terminals, more full-service fixed base operation, and multiple hangars.
- About 1 to 5 acres of land should be designated for T-hangar development. It is estimated that 28 to 56 T-hangars are needed for the 20-year forecast.

Support Buildings

- The existing Flight Service Station needs replacement. A new location needs to be designated.
- A warm storage building is needed in the ADOT&PF complex. The existing maintenance shed is not heated and contains urea storage

Parking and Access

- At a minimum the number of passenger parking spaces at the airport should increase from 65 to 160 for the 20-year forecast. Approximately 1.5 acres are needed for passenger parking and 1.0 acres of land needs to be designated for car-rental parking.
- An area for 31 parking spaces or approximately 0.3 acres of land is needed to accommodate the 20-year forecast for general aviation users.
- The access road to the residences northwest of the airport needs to be relocated or the residences relocated.
- Portions of Dillingham-Kanakanak Road, Wood River Road and North Airport Road are too close to the runway. These roads may need to be realigned as the airport is improved.
- A one-way terminal access road with lanes for standing and passing vehicles is needed to improve circulation in front of the terminal area.

Utilities

- The existing wells are not sufficient to meet the needs of the airport. The City's waterlines need to be extended or a separate water system needs to be developed for the airport. The immediate need for drinkable water is a priority for safe operation of the airport and its users.
- Electrical power is needed in the tiedown area. Floodlighting is needed on the apron and long-term parking area.

Land Use Compatibility

- The road leading to the private residences west of the runway needs to be relocated or the residences need to be relocated. The residence on airport property southeast of the runway needs relocation or the property surplused.
- The issues related to the cemetery need to be addressed in airport development alternatives.
- Noise abatement measures may need to be taken in regards to the housing near the airport.

5.0 Development Alternatives

5.1 Introduction

Chapter 4 described the deficiencies of Dillingham Airport in the context of existing and projected demand and the FAA standards prescribed to meet the usage. This chapter discusses alternatives for accommodating the identified demand and for correcting deviations from applicable standards. Three alternatives were identified to accomplish the long-term (20-year) needs. The fourth alternative is the No-Action Alternative. Chapter 6 provides a preliminary evaluation of the alternatives.

5.2 Identification of Alternatives

The major facility requirements and ideas for alternatives were presented at a public meeting in Dillingham on August 22, 2002. The airport development alternatives presented in this chapter were influenced by discussions at the public meeting and discussions at a meeting of various departments of ADOT&PF and the FAA that was held in Anchorage shortly after the public meeting. See Appendix D for minutes of the two meetings.

5.2.1 Constraints to Airport Development

An important step in identifying alternatives is analyzing the context in which airport development must occur. Physical constraints to the development of Dillingham Airport are illustrated on Figure 5.1. The airport is landlocked in all directions but west, and development to the west would be expensive due to the unsuitable soils in that area. The runway does not meet FAA design standards for its current usage and instrument approaches. In order to develop more precise instrument approaches, which would increase the reliability of air service and would enhance aviation safety, larger safety clearances around the runway and at runway ends would be required. Additional land and building acquisition, terrain removal, and tree clearing would also be required.

Constraints illustrated on Figure 5.1 include large wetland areas north and west of the developed part of the airport; a cemetery that is approximately 75 feet from the edge of the runway; roads that are close to the runway on all sides; and buildings that are within the current runway protection zones, where no occupied buildings should be located. Access to private residences on the northwest is through airport property. A residential area is located near the runway and Main Apron on the southwest side of the airport property. Nearby residential development may be impacted by a future crosswind runway and by primary runway relocations.

In the identification of development concepts, none of the airport constraints was considered infeasible to overcome. Instead, various runway placements were considered in order to assess their impact.

5.2.2 Screening of Development Constraints

Many ideas for development alternatives were considered before deciding on three. For instance, relocating the airport to another site was mentioned at the first two public meetings held in Dillingham. The main reason for considering airport relocation was the

FIGURE 5.2
POSSIBLE RELOCATION SITES FOR DILLINGHAM AIRPORT

DILLINGHAM, ALASKA

1"= 4 MILES

idea was rejected because it would require a large amount of land acquisition near the developed community and significant rerouting of Wood River Road. Also, it would bring the noise of aviation activity closer to residential areas.

The alternative concepts that were chosen for analysis provide a fairly wide range of options; however, all provide the following:

- 6,400 foot x 150 foot primary runway with 8,400 foot x 500 foot safety area, meeting ARC C-III, with precision-type approaches (approach visibility minimums lower than ¾ mile) to both ends and a full parallel taxiway on the west side.
- 3,300 foot x 60 foot gravel crosswind runway with parallel taxiway.
- Additional passenger terminal, cargo terminal, apron, and auto parking to accommodate projected demand.
- Improved passenger terminal curb access and internal road circulation.
- All three development alternatives address the need to site a heliport, T-hangars, a fixed base operator/GA terminal, a flight service station, and an air traffic control tower.

Key differences in the three development alternatives include:

- Locations of the primary and crosswind runways. (See Appendix K for runway safety area practicability analyses for the three primary runway locations.)
- Amount and direction of apron expansion.
- Impacts of airfield development on public roads and the cemetery.
- Locations of landside facilities.

The preferred alternative may combine elements of different alternatives, including the No-Action Alternative.

The development alternatives presented in this chapter address the requirements for 2023, although some of the improvements are needed sooner. Airport improvements should be implemented as required to meet demand and as funding is available. The improvement of the runway safety area will likely be phased. Although the FAA will not approve a nonstandard runway safety area, the agency recognizes that compliance might require project phasing to be practical. Phasing the construction of the crosswind runway – for example, a shorter initial length, no parallel taxiway, and no lighting -- may also be required, due to funding constraints. Aircraft parking apron area in the alternatives may exceed the projected 2023 requirement because of the location where the apron is needed, such as an apron to serve a new terminal site or an apron for large aircraft that is located far enough from the runway that parked aircraft do not penetrate the runway's imaginary transitional surface.

5.3 No-Action Alternative

Considering a no-action alternative is vital for an environmental assessment, but it is also important for assessing the operational impacts of not improving the airport. No capital improvements would be constructed under the No-Action Alternative. The airport would continue to be maintained and operated in its current configuration.

5.4 Alternative A

Alternative A is depicted in Figure 5.3. With Alternative A, Runway 1-19 would be shifted northward 500 feet and westward 150 feet in order to reduce the impact on the cemetery and surrounding roads. The runway safety area would be 500 feet wide and would extend 1,000 feet beyond each runway end. A new paved parallel taxiway would be built on the west side of the runway. Precision-type GPS approaches (visibility minimum less than ¾ mile) would be planned for both runway ends. The approaches would require medium intensity approach lighting systems. Most of North Airport Road would be closed and a new road would be built to provide access to the existing residence west of the runway.

Although the cemetery would be located outside the runway safety area, some of the graves closest to the runway would need to be relocated and terrain and vegetation removed. The western 200 feet of the cemetery would be within the primary surface and should not have any higher objects than the adjacent runway surface. With the larger primary surface required for the improved approaches, some trees on the southwest and east side would need to be removed or trimmed. The 34:1 approach surface to Runway 19 now contains obstructions (trees and the small hill along Wood River Road, northeast of the threshold). When the Part 77 approach surface slope is reduced to 50:1 for a precision approach and the runway end is moved farther north, more trees and terrain will penetrate the Part 77 approach surface. Part 77 would not require the removal of all the obstructions, but all trees that are higher than the 34:1 threshold siting surface would have to be trimmed or removed for the runway to have a precision instrument approach. The small hill would be at the edge of the threshold siting surface so that terrain removal may not be required. The larger runway protection zones required for precision approaches would require land acquisition or easements at the north and south ends of the runway, including several buildings.

A new gravel Runway 8-26 would be constructed northwest of the GA Apron. The ultimate size of the runway would be 3,300 feet long by 60 feet wide and it should be planned for medium intensity edge lighting, runway end identifier lights and non-precision approaches. Runway 8-26 would be used exclusively by small aircraft (maximum 12,500 pounds). With both the primary and crosswind runways, wind coverage for small aircraft (Airplane Design Group I at 10.5 knots) would be 98 percent, above the 95 percent recommended by the FAA. A parallel taxiway is planned for the runway.

A lighted heliport is sited on the south end of the expanded Main Apron in Alternative A.

The Main Apron would be expanded 800 feet to the south on acquired land to serve a new joint use passenger/cargo terminal. The existing gravel GA Apron would be paved, except for the portion reserved for future T-hangar development. The Main Apron would be extended to the west along existing Taxiway C and the taxiway would be relocated to the northern edge of the expanded apron. West of the Main Apron, Taxiway C would be designed for Airplane Design Group II.

Alternative A anticipates the development of a joint use passenger and cargo terminal south of the Yute Air leasehold. The site would be convenient to the public and have concern that it might not be possible to meet safety-related needs at the existing airport site. Two relocation sites were suggested (Figure 5.4).

One relocation site was 14 miles from the center of Dillingham on Aleknagik Road. At this location, the geotechnical conditions are much better for construction than around the existing airport. A source of gravel for construction is nearby. A new airport at this site might also serve the community of Aleknagik, which has a very substandard airport, in addition to Dillingham. Two major disadvantages of the site were apparent. One disadvantage is the distance from Dillingham. The greater distance would be an inconvenience to residents, who use the airport frequently for passenger and cargo air service, and also patronize the restaurant and gift shop at the airport. The greater distance between Dillingham and the airport would also reduce the likelihood that visitors destined for lodges and other recreational areas in the area would visit Dillingham. The second major disadvantage is that the proposed airport site would be much closer to mountainous terrain. In order to have instrument approaches that could be used in very low visibility conditions, runways should have unobstructed, straight-in, low slope (50:1) approach paths and unobstructed missed approach paths.

The second relocation site was around the existing Dillingham VORTAC about three miles southwest of the current airport and past Kanakanak Hospital. This site would be more convenient than the Aleknagik Road site and the land in this area is flat, with airspace that would be unobstructed by terrain. However, the land's suitability for construction is questionable. Utility poles on the property are leaning, indicating the possible presence of peat and/or permafrost. The presence of wetlands on the site and the close proximity of the Togiak National Wildlife Refuge are environmental concerns.

Airport relocation would be very costly. For example, the 2000 Airport Master Plan for Barrow estimated the cost of constructing a new Regional Airport there would be $115 million. Similar costs would be expected at Dillingham. The Environmental Impact Statement alone might cost $1 million dollars or more and could take several years to complete. Improving the existing airport is much easier to fund than building a new airport because improvements can be built in stages, as funding is made available. A new airport would require a large initial investment to provide an operational facility. Also, a new airport must be built to comply fully with FAA design standards, in order to receive Airport Improvement Program funding. Another disadvantage of relocation is the abandonment of the State and Federal investment in the existing airport.

Because of their many disadvantages, airport relocation alternatives were eliminated from further consideration. Cost estimates prepared for this master plan confirmed that the safety-related needs of the airport site could be met at the existing site for a much lower cost than constructing a new airport.

Another development alternative that was considered and rejected was to construct the crosswind runway on the east side of the airport. The reason for considering this option was that the geotechnical conditions would be better for construction than on the west side of the airport. Development of a tiedown apron and lease lots on the east side of the airport next to the new runway would provide expansion capability for commercial operators of large aircraft on the west side of the airport. Thus, construction in the low, wet, peat soils that are dominant on the west side of the airport would be avoided. The

LEGEND

- PROPERTY BOUNDARY
- REQUIRED RSA (RUNWAY SAFETY AREA) - FLAT GROUND
- REQUIRED ROFA (RUNWAY OBJECT FREE AREA)
- CURRENT REQUIRED RPZ (RUNWAY PROTECTION ZONE) - NO BUILDINGS, AIRPORT CONTROL
- RPZ AND PRIMARY SURFACE FOR PRECISION INSTRUMENT APPROACH
- AVIGATION AND HAZARD EASEMENT AND RIGHT-OF-WAY

NO POTABLE WATER

FIGURE 5.1
AIRPORT CONSTRAINTS

DILLINGHAM, ALASKA

1"=1000'

NOTE: LAND WITHIN RUNWAY PROTECTION ZONES (RPZ) SHOULD BE AIRPORT PROPERTY OR EASEMENT OBTAINED FOR LAND USE CONTROL.

LEGEND

PROPERTY BOUNDARY

AVIGATION AND HAZARD EASEMENT AND RIGHT-OF-WAY

FIGURE 5.3
ALTERNATIVE A

DILLINGHAM, ALASKA

1"=1000'

room for a 35,000 square foot passenger and cargo terminal with expansion capabilities. The site would also accommodate parking and access drives.

With the assumed relocation of Alaska Airlines/PenAir to the proposed joint use terminal, the existing Alaska Airlines/PenAir terminal would be available to be occupied by an FBO and the FSS. The FBO might include fuel sales, aircraft maintenance, and aircraft rentals and charters. The FBO facility would also serve as a GA terminal, providing amenities such as telephone, restrooms, flight planning and waiting area for general aviation pilots and their passengers. The apron adjacent to the FBO could be used for the parking of corporate aircraft. West of West Airport Road, a 2-acre portion of the existing gravel apron would be reserved for T-hangar development (20 hangars).

An area north of the new gravel runway would be reserved for air traffic control tower. The site would have good visibility of both runways and the building would be accessible by the realigned North Airport Road.

West Airport Road would remain as the primary access to the Dillingham Airport. At the new joint use terminal a new one-way loop road would be dedicated exclusively to terminal traffic, providing access to the terminal curb and to the terminal parking lot. Within the terminal loop road approximately 2.0 acres of parking would accommodate 200 short-term, long-term and rental car parking spaces. The existing long-term parking lot on the west side of West Airport Road would be available for general aviation tiedown users' vehicles.

Most of North Airport Road would be closed. A new access road would be built from the proposed air traffic control tower site north to provide access to the resident located west of the runway and the proposed air traffic control site.

A small section of Wood River Road would be within the relocated Runway 1-19 object free area and primary surface. Some realignment of the road might be necessary to ensure that vehicles on the road do not penetrate the object free area and primary surface.

5.5 Alternative B

Figure 5.4 presents Alternative B. With Alternative B a new primary Runway 18-36 would be constructed with the south threshold at the same location as the existing Runway 1-19 and the north end rotated counter clock-wise about 5 degrees. The realignment would reduce the impact on the cemetery and surrounding roads. The wind coverage of the realigned primary runway would be slightly better than existing Runway 1-19, 94.4 percent compared to 94.0 percent at 10.5 knots. The runway safety area, 500 feet wide and extending 1,000 feet beyond each runway end, would require the relocation of North Airport Road. Figure 5.4 indicates that Dillingham-Kanakanak Road would be placed in a tunnel within the runway safety area. A new paved parallel taxiway would be built on the west side of the runway. Precision-type GPS approaches would be planned for both runway ends. This would require medium intensity approach lighting systems.

With Alternative B, trees that penetrate the primary surface would be trimmed. It is assumed that the small amount of terrain and grave markers that would penetrate the edge of the primary surface would remain. The 34:1 approach to the north runway end now contains obstructions (trees and terrain). When the Part 77 approach surface slope is

NOTE: LAND WITHIN RUNWAY PROTECTION ZONES (RPZ) SHOULD BE AIRPORT PROPERTY OR EASEMENT OBTAINED FOR LAND USE CONTROL.

LEGEND

PROPERTY BOUNDARY

AVIGATION AND HAZARD EASEMENT AND RIGHT-OF-WAY

FIGURE 5.4
ALTERNATIVE B
DILLINGHAM, ALASKA
1"=1000'

reduced to 50:1 for a precision approach, more trees and possibly some distant terrain will penetrate the Part 77 approach surface. With the realignment of the runway, the small hill along Wood River Road northeast of the existing runway would not be located within the approach surface. Part 77 would not require the removal of all the obstructions, but all trees that are higher than the 34:1 threshold siting surface would have to be trimmed or removed for the runway to have a precision instrument approach.

The larger runway protection zones required for precision approaches would require land acquisition or easements at the north and south ends of the runway including several buildings on the south end.

A new gravel Runway 10-28 would be constructed northwest of the terminal area. The ultimate size of the crosswind runway is 3,300 feet long by 60 feet wide and it should be planned for medium intensity edge lighting, runway end identifier lights, and nonprecision approaches. It would be used exclusively by small aircraft (maximum 12,500 pounds). With both the primary and crosswind runways, wind coverage for small aircraft (Airplane Design Group I at 10.5 knots) would be 99 percent, above the 95 percent recommended by the FAA. A parallel taxiway is planned for the runway.

A heliport, including a lighted concrete pad would be sited at the location of the existing long-term parking lot, west of West Airport Road.

The Main Apron would be expanded to the south, north and west. The south apron expansion would serve two new lease lots, one reserved for a consolidated cargo terminal and one reserved for a large aircraft user. To provide more room for large aircraft parking, the southward Main Apron expansion also extends farther west than the existing Building Restriction Line. At this location 737-sized aircraft could be parked two-deep. With runway realignment and the establishment of a precision approach requiring a wider primary surface, less of the existing Main Apron could be used for large aircraft parking and remain under the Part 77 transitional surface.[50] The realigned runway allows parking of Boeing 737 aircraft in front of the PenAir/Alaska Airlines terminal, parallel to the Building Restriction Line, with the tail of the aircraft at least 759 feet from the runway centerline. Apron expansion to the west and north would connect to the existing GA Apron, which would also be paved, except for the portions that would be converted to vehicular parking for the Alaska Airlines/ PenAir terminal. Taxiway C would be relocated to the north edge of the apron and would be designed to serve Airplane Design Group II so that corporate aircraft could use the adjacent apron.

Alternative B reserves space for a joint use cargo terminal but assumes existing passenger terminals would continue to be maintained for individual airlines. The Alaska Airlines/PenAir facilities are assumed to be expanded and renovated on their two existing lease lots.

The lease lots fronting on the GA Apron would become more attractive because the apron would be paved. A FBO and FSS would be constructed at the current lease lot held by Alaska Cargo Services at the north end of the Main Apron. The FBO might include fuel

[50] The tail height of both the -200 and -400 models of the Boeing 737 aircraft used by Alaska Airlines is 37 feet. The tail height of the Boeing 727 aircraft used by Northern Air Cargo is 34 feet. The tail height of the Hercules aircraft used by Lynden Air Cargo is 39 feet.

sales, aircraft maintenance, and aircraft rentals and charters. The FBO would also provide GA terminal amenities such as telephone, restrooms, flight planning and waiting area. A 3-acre site for T-hangars (30 hangars) would be located at the northwest end of the expanded apron. A space for an air traffic control tower would be located west of and accessed by Dillingham-Kanakanak Road on the east side of the primary runway.

West Airport Road would remain as the primary access to the Dillingham Airport. At the Alaska Airlines/PenAir terminal a new one-way loop road would be developed for exclusive use of traffic needing access to the terminal curb. Parking (200 short-term, long-term and rental car parking spaces) would be provided west of West Airport Road on 2 acres of land that is now part of the GA Apron. An 8-foot wide sidewalk would be developed between the parking lot and terminal building with a designated crosswalk on West Airport Road. Figure 5.4 shows how parking along West Airport Road could be improved to provide more space for GA auto parking and customers of the commercial facilities along West Airport Road.

Airfield improvements would require the relocation of Dillingham-Kanakanak Road on the south end of the runway into a tunnel under the runway safety area. North Airport Road would be closed south of the private residences and a new access road would be built on the north end of the runway providing access to the residences and connecting with Wood River Road.

5.6 Alternative C

Alternative C is illustrated in Figure 5.5. With Alternative C, Runway 1-19 would be reconstructed in place. The runway safety area, 500 feet wide and extending 1,000 feet beyond each runway end, would require the relocation of the Dillingham-Kanakanak Road, Wood River Road and North Airport Road. A new paved parallel taxiway would be built on the west side of the runway. Precision-type GPS approaches would be planned for both runway ends. The approaches would require medium intensity approach lighting systems.

With Alternative C the cemetery would be relocated, because the western 100 feet of the cemetery is within the runway safety area, the western 250 feet is within the object free area, and the western 350 feet (almost all the cemetery) is within the ultimate primary surface. With the larger primary surface required for precision approaches, additional trees would need to be removed along the east side of the runway. The existing 34:1 approach to Runway 19 now contains obstructions (trees and terrain on the small hill that is to the northeast along Wood River Road and trees farther to the north). When the Part 77 approach surface slope is reduced to 50:1 for a precision approach, more trees and terrain will penetrate the Part 77 approach surface. Part 77 would not require the removal of all the obstructions, but all trees and terrain higher than the 34:1 threshold siting surface would have to be trimmed or removed for the runway to have a precision instrument approach. A significant portion of the hill along Wood River Road northeast of the Runway 19 threshold would need to be removed. The larger runway protection zones required for precision approaches would require land acquisition or easements at the north and south ends of the runway. This would include several buildings.

PHOTO DATE: 5/21/02

0 500 1000

NOTE: LAND WITHIN RUNWAY PROTECTION ZONES (RPZ) SHOULD BE AIRPORT PROPERTY OR EASEMENT OBTAINED FOR LAND USE CONTROL.

LEGEND

PROPERTY BOUNDARY

AVIGATION AND HAZARD EASEMENT AND RIGHT-OF-WAY

FIGURE 5.5
ALTERNATIVE C

DILLINGHAM, ALASKA

1"=1000'

A new gravel-surfaced Runway 12-30 would be constructed southwest of the GA Apron. This location was recommended by the last Airport Master Plan Update. The ultimate size of the runway would be 3,300 feet long by 60 feet wide and should be planned for medium intensity edge lighting, runway end identifier lights, and nonprecision approaches. The runway would be used exclusively by small aircraft (maximum 12,500 pounds). With both the primary and crosswind runways, wind coverage for small aircraft (Airplane Design Group I at 10.5 knots) would be 99 percent, above the 95 percent recommended by the FAA. A parallel taxiway is planned for the runway. Land south of the Main Apron would have to be acquired for the new runway's protection zone.

A lighted concrete pad for a heliport is sited west of the existing GA Apron. An access drive would be required for the heliport.

The Main Apron would be expanded northward to serve a new Alaska Airlines/PenAir or other major airline terminal. The existing gravel GA Apron would be paved and a new general aviation tiedown apron would be built further north and served by a relocated Taxiway C, which would be required to meet Airplane Design Group II criteria.

Alternative C does not anticipate the development of a joint use passenger or cargo terminal. It does recognize, however, that the existing Alaska Airlines terminal is constrained not only by building size but also by parking and access. Therefore, a larger site was selected that would be convenient to the public and would have a larger amount of land for development of the building, parking and access drives. The lot at the north end of the Main Apron that is now leased to Alaska Cargo Services would be expanded 50 feet eastward onto the apron and 150 feet westward into the ADOT&PF Reserve. If Alaska Airlines does not choose to relocate to this site, it should be reserved for another major airline terminal.

With the proposed relocation of Alaska Airlines/PenAir, additional space would be available for an additional passenger and/or cargo airline. The lease lots fronting on the GA Apron would become more attractive because the apron would be paved. Two currently available lease lots located west of the existing gravel apron would be designated for a FBO that might include fuel sales, aircraft maintenance, and aircraft rentals and charters. The FBO would also provide GA terminal amenities such as telephone, restrooms, flight planning and waiting area. The apron adjacent to the FBO would be designed for the parking of corporate aircraft. Also adjacent to the FBO would be a 5-acre site designated for T-hangar development (50 hangars). West of the existing GA apron, a 0.5-care parking lot (50 spaces) would be developed for the vehicles of GA airport users.

The current location of the FSS is good because of its second floor location and view of the runway. With this alternative, it is assumed the existing facility would be renovated and expanded as necessary.

Currently undeveloped land at the south end of the terminal area on the east side of West Airport Road would be reserved for a future air traffic control tower site.

West Airport Road would remain as the primary access to the Dillingham Airport. The road to the GA Apron would be expanded further west to provide access to the new GA tiedown apron and its adjacent vehicle parking lot (0.5 acres, 50 spaces). A one-way loop road would be built to provide access to the new major airline terminal curb. Within the terminal loop road, approximately 0.5 acres of parking would accommodate 50 short-term parking spaces. A lot developed on the west side of West Side Airport Road on the triangular end of the existing GA Apron would provide 1.4 acres or 150 GA and long-term parking spaces.

Airfield improvements would require the relocation of Dillingham-Kanakanak Road on the south end of the runway. Wood River Road on the east side of the runway would need to be realigned. North Airport Road would be closed and the residence located west of the runway would be purchased.

6.0 Preliminary Alternatives Evaluation

In this chapter, the alternatives presented in Chapter 5 are evaluated in terms of environmental, operational, and cost factors.

6.1 Initial Environmental Assessment

The purpose of this Initial Environmental Assessment (IEA) was to identify potential beneficial, adverse, and controversial environmental impacts of airport improvement alternatives in Dillingham, Alaska. This IEA was prepared without extensive research or formal resource agency coordination. Professional judgment was used to identify resource impact categories that might concern the public and regulatory agencies. The IEA analyzed the environmental consequences most likely resulting from proposed airport improvement alternatives, including the No-Action Alternative.

An issues-based Environmental Assessment (EA) was prepared after the preferred alternative was selected and is a separate report. FAA Order 5050.4, *Airport Environmental Handbook*, requires that the following impact areas be considered during the environmental analysis:

a. Noise
b. Land Use
c. Social Impacts
d. Induced Social Impacts
e. Environmental Justice
f. Air Quality
g. Water Quality
h. Historic, Architectural, Archeological, and Cultural Resources
i. Department of Transportation Act, Section 4(f)
j. Biotic Communities
k. Endangered and Threatened Species of Flora and Fauna
l. Essential Fish Habitat
m. Wildlife Hazards
n. Wetlands
o. Floodplains
p. Coastal Management Program and Coastal Barriers
q. Wild and Scenic Rivers
r. Farmlands
s. Energy Supply and Natural Resources
t. Light Emissions
u. Solid Waste Impacts
v. Construction Impacts
w. Hazardous Materials
x. Design, Art, and Architectural Applications
y. Short Term Uses and Long Term Productivity; and Irreversible and Irretrievable Commitments of Resources.

6.1.1 Affected Environment

Dillingham is located at the extreme northern end of Nushagak Bay in northern Bristol Bay, at the confluence of the Wood and Nushagak Rivers. It lies 327 miles southwest of Anchorage. The primary climatic influence is maritime; however, the Arctic climate of the Interior also affects the Bristol Bay coast. Average summer temperatures range from 37° to 66° F and average winter temperatures range from 4° to 30° F. Annual precipitation is 26 inches with 65 inches of snow. Heavy fog is common in July and August. Winds up to 60-70 miles per hour occur between December and March. The Nushagak River is ice-free from June through November.

The Dillingham area occupies outwash plains, low rolling moraines, a few choppy moraine hills, and many muskegs, lakes, and streams. White spruce and paper birch dominate forests with well-drained soils without permafrost. Black spruce prevail in permafrost areas.

The soil consists of silty volcanic ash over very gravelly glacial drift. Slight depressions with sedges and mosses typically have very poorly drained fibrous organic soils with permafrost. Swales in terraces and moraines contain poorly drained silty soils with permafrost. Beneath a thick peaty mat is mottled gray silt loam. The vegetation associated with this soil is mainly tussocks, mosses, low shrubs, and scattered patches of black spruce.

6.1.2 Resource Impact Categories

The following is a brief analysis of the impact categories as they pertain to the existing Dillingham Airport.

Noise

Several Dillingham residents voiced concerns about aircraft noise. At a public meeting in Dillingham, Mr. John Bennett, Jr. who lives north of the runway stated that the air taxis are loud over his home. He is concerned about future noise levels. Mr. William Tennyson asked if ADOT&PF will perform a noise study. Ms. Jody Seitz said freight planes over Squaw Creek are very loud.

According to Order 5050.4A, the FAA requires a noise analysis if the forecasted operations exceed 90,000 annual adjusted propeller operations or 700 annual adjusted jet operations. The forecasted Dillingham Airport operations will not meet the adjusted annual propeller operations threshold, but will exceed the annual adjusted jet operations. Therefore, the EA must study the noise impacts in further detail and determine the appropriate measures for mitigation of those impacts.

Land Use

The City of Dillingham is located at approximately 59.04° N Latitude and -158.46° W Longitude. (Sec. 21, T013S, R055W, Seward Meridian.) Dillingham is part of the Bristol Bay Recording District. The area encompasses 33.6 sq. miles of land and 2.1 sq. miles of water.

Land use in the vicinity of the airport is mainly residential, light commercial, or recreational. The majority of residents in the vicinity live to the northeast of the existing airport and along Nushagak Bay.

Social-Economic Environment

Dillingham is the economic, transportation, and public service center for western Bristol Bay. Commercial fishing, fish processing, cold storage and support of the fishing industry are the primary activities. Two hundred and seventy-seven residents hold commercial fishing permits. In 2000, the estimated gross fishing earnings of residents exceeded $7.1 million. During spring and summer, the population doubles. The city's role as the regional center for government and services helps to stabilize seasonal employment. Many residents depend on subsistence activities for food. Residents harvest salmon, grayling, pike, moose, bear, caribou, and berries. The trapping of beaver, otter, mink, lynx, and fox provide cash income.

Environmental Justice

The EPA defines Environmental Justice (Executive Order 12898) as the "fair treatment for people of all races, cultures, and incomes, regarding the development of environmental laws, regulations, and polices." This Executive Order was issued over concerns that minority populations and/or low-income populations bear a disproportionate amount of adverse health and environmental effects.

There are no distinct clusters of minority groups or low-income populations surrounding the Dillingham Airport that are permanent residents. There are temporary low-income groups within the area. Canneries along the Nushagak River house seasonal workers in bunkhouses. These low-income workers are only present during the busy summer fishing season and are not affected by airport operations. Thus, there are no Environmental Justice concerns surrounding the Dillingham Airport.

The No-Action Alternative will not provide any new structures to control surface runoff. The amount of paved surfaces will not increase. No new wetland fills will occur.

Air Quality

The Dillingham air quality is excellent because there are no major industries and the region has low air and land traffic volumes. According to FAA's Airport Environmental Handbook (Order 5050.4A), no air quality analysis is needed if forecasted operations in the study period are less than 1.3 million passengers and less than 180,000 operations annually (Section 47e(5)(c)(1)). The forecasted Dillingham operations will not exceed these thresholds during the 20-year study period. Long-term air quality impacts are unlikely to change substantially from existing conditions, which produce dust during dry runway conditions. Thus, the Dillingham Airport has no air quality concerns.

Water Quality

The water quality in the area is considered good. About 90 percent of homes are fully plumbed. Dillingham's water is derived from three deep wells. Water is treated, stored in tanks (capacity is 1,250,000 gallons) and distributed. Approximately 40 percent of homes are served by the City's piped water system; 60 percent use individual wells. The City has requested funds to extend piped water to the old airstrip and Kenny Wren Road, and expand sewer service to the northeast.

Currently, there is no potable water to the airport. Wells onsite generate poor quality water.

Squaw Creek flows south of the runway. The Nushagak River flows southeast of the runway. Several creeks, muskegs, and ponds surround the airport.

Airport improvements have the potential to impact the surrounding water bodies. Temporary impacts may occur from construction activities. These impacts will be mitigated by the application of standard best management practices to prevent erosion and pollution during the construction. The excavation, transport, and placement of fill material will likely be governed by agency permit conditions related to the timing of construction activities. Long-term impacts may occur from storm water runoff and aircraft refueling operations.

Historic, Architectural, Archaeological, and Cultural Resources

SHPO was contacted on February 14, 2002 for notification of any historic, architectural, archaeological, and cultural resources (Appendix E). SHPO had no historic, architectural, archaeological, or cultural resources documented within one mile of the Dillingham Airport. However, SHPO was aware of a cemetery located just east of the runway.

Mr. John Sorensen is the manager of the cemetery site. More detailed coordination is required with Mr. Sorensen to determine if the site has any cultural and historic significance. This will be a key point and will be discussed further in the Environmental Assessment. The DOT&PF has an avigation and hazard easement on the property.

Department of Transportation Act, Section 4(f)

Section 4(f) of the Department of Transportation Act requires that transportation projects not use land from parks, recreation areas, wildlife refuges, or historic or cultural sites unless there is no feasible or prudent alternative. Public parks or recreation areas would not be affected. Togiak National Wildlife Refuge lies outside the proposed project boundary and would not be affected. If the publicly owned cemetery has historical or cultural significance, it could qualify as a 4(f) property.

Biotic Communities

Bristol Bay provides staging and migration habitat for large numbers of waterfowl. Ospreys occur more frequently in this region than in other areas of Alaska. Blackpoll warblers are common breeders in conifer stands north of the Dillingham Airport. Brown bears are common, partially in response to the large salmon runs in this area. Bristol Bay supports the largest run of Sockeye salmon in the world. Rainbow trout are a common resident fish in the Squaw Creek drainage, which flows past the airport and into Nushagak River (USFWS, 2001).

ADF&G designated Squaw Creek (#325-30-10100-2021) and Nushagak River (#325-30-10100) as important habitat for anadromous fish. Squaw Creek provides rearing habitat for King salmon and Coho salmon juveniles and provides spawning habitat for Coho. Nushagak River provides rearing and spawning habitat for whitefish, Dolly Varden, Sockeye salmon, Chum salmon, Pink salmon, Coho salmon, and King salmon.

Black bears are sparse in the region. Brown bear and moose are abundant. Wolves range throughout the region in low to moderate numbers. The Mulchatna caribou herd migrates through the area. Other mammals that frequent the areas include lynx, red and Arctic foxes, land otter, mink, marten, short-tailed weasel, beaver, muskrat, and snowshoe and

Arctic hares. The area contains high quality subarctic waterfowl nesting habitat. Birds linger on lagoons for several weeks during the southern migration. Bald eagles and peregrine falcons breed along the coast and the banks of Squaw Creek and Nushagak River and other salmon streams (Selkregg, no date). No recorded conflicts between wildlife and airport activities have occurred on airport property (Heyano, 2002).

Soils and Vegetation

The soils of the Dillingham area consist of a Histic Pergelic Cryaquepts – Pergelic Cryofibrists associations. Both soil types have severe to very severe ratings for road construction and should be avoided if possible (United States Department of Agriculture, (USDA), 1979). The principal components of these associations are described below.

Histic Pergelic Cryaquepts are poorly drained soils in nearly level to rolling coastal plains, deltas, and inland basins. They support a thick cover of sedge tussocks, low shrubs, forbs, mosses, and lichens. Mostly they formed in nonacid silty and sandy alluvium (USDA, 1979).

Pergelic Cryofibrists are very poorly drained peat soils, in broad depressions, lake borders, and shallow drainageways. They support dense vegetation that includes mosses, sedges low shrubs, and forbs. The soils consist of layered fibrous moss and sedge peat that is usually very acidic. In places, thin lenses of volcanic ash occur in the upper 2 feet of the peat. These soils are always wet and permafrost is normally close to the surface. Ice core mounds or pingos occur in some areas (USDA, 1979).

The area around Dillingham consists of upland spruce-hardwood forest and wet tundra. The upland spruce-hardwood forest is fairly dense interior upland forest of such evergreen and deciduous trees as white spruce, black spruce, quaking aspen, balsam poplar (cottonwood), and paper birch. (Selkgregg, no date).

Endangered and Threatened Species of Flora and Fauna

The USFWS indicated that the Dillingham Airport might be within the wintering range of Steller's eiders (Stern, 2002). A telephone log is included in Appendix E. According to the National Marine Fisheries Service web site (www.fakr.noaa.gov/protectedresources /default.htm), no threatened and endangered marine mammals reside within the project area.

Essential Fish Habitat

There are no waterbodies within the airport property that contains essential fish species. Squaw Creek and Nushagak River provide Essential Fish Habitat, but they are both outside the project boundaries.

Wildlife Hazards

14 CFR Part 139 defines wildlife hazards as the potential of animals to collide with aircraft on or near an airport. Wetlands and ponds surround the Dillingham Airport, which can attract birds and mammals. Facilities such as the primary runway relocation and the new crosswind runway may bring aircraft into close proximity to areas where birds nest, feed, and fly.

Wetlands

Moist tundra is common around the airport. It usually completely covers the ground and can be productive during the growing season. The tundra varies from an almost continuous and uniformly developed cotton grass tussock growth to stands devoid of tussocks where dwarf shrubs dominate (Selkregg, no date). The National Wetland Inventory Map of the Dillingham Airport area is included in Appendix H.

Wetland types found on the airport property are:

- Palustrine, Emergent persistent/Scrub-Shrub broad-leaved deciduous (seasonally flooded)
- Palustrine, Emergent persistent/Scrub-Shrub broad-leaved deciduous (saturated)
- Palustrine, Scrub-Shrub broad-leaved deciduous (saturated)

Floodplains

The two major rivers that drain the area are the Wood River and the Nushagak River. The Dillingham Airport is located downstream of the confluence of these two rivers.

Coastal Zone Management Program

The Dillingham Airport is located in the Bristol Bay Coastal Zone Management Program. The coastal management program does not contain any unusual conditions for airport projects.

Coastal Barriers

There are no designated coastal barrier resources within the project area.

Wild and Scenic Rivers

There are no designated wild and scenic rivers in the project area.

Farmland

There is no farmland designated as prime or unique in the project area.

Energy Supply and Natural Resources

Nushagak Electrical Cooperative supplies power to the Dillingham Airport. The Cooperative operates diesel generators next to the City. The energy and materials requirements for improving the Dillingham Airport represent a minimal demand on electrical power and natural resources. Reconstruction of the runway will not cause an increase in local energy consumption, because the new lighting system will be essentially the same. Natural resources required for the project include gravel for surface material, borrow material for embankment and access road construction, and fuel for operating construction vehicles. Potential impacts to energy supplies and natural resources from any proposed alternatives are considered negligible.

Light Emissions

The current airport has high intensity runway lighting, wind cone lighting, and a rotating beacon on the tower next to the ARFF building. There may be a slight increase in light emissions from shifting the runway closer to sensitive receptors. –The build alternatives will install new MALSR approach lights at both runway ends (one end has short ODALS system now). New crosswind runway will have edge lights and runway end identifier lights. The new parallel taxiway will have edge lighting and the new apron areas and heliport will be lighted.

Solid Waste Impacts

Dillingham Refuse Inc., a private firm, collects refuse three times a week. The facility is located on Nine-mile Road, about 4 miles north of the airport. The ADEC has permitted the facility as a Class II landfill. The Senior Center collects aluminum for recycling, and NAPA recycles used batteries. The Chamber of Commerce coordinates recycling of several materials, including fishing web. The new landfill will be constructed approximately one mile north of the existing landfill, making it about five miles north of the airport.

The landfill is located sufficiently away from the airport so not to pose as a wildlife attractant. Changes to the amount of waste disposed for any alternative is considered negligible.

Construction Impacts

Airport reconstruction will create temporary construction impacts. Impacts could include noise, dust, water quality, changes in surface transportation patterns, and if the existing airport was reconstructed, changes in plane schedules to accommodate construction activities. Dust and water quality impacts can be minimized through the implementation of best management practices and timing of construction activities to avoid critical times for bird. If the project disturbs more than five acres of land, the EPA requires a Storm Water Pollution Prevention Plan before construction may begin.

Hazardous Materials

Aviation fuel is available at Alaska Cargo Services. No other hazardous materials are known to be within the airport boundaries at this time.

However, a search of environmental records found the following:

1. There is one leaking underground storage tank within ¾ of a mile of the airport. The tank was located in the City of Dillingham.
2. There are nine ADEC hazardous waste sites located within 1 mile of the airport. Two of these sites are on the airport property. These were located at Yute Air and at the west corner of the Peninsula Air hanger. ADEC believes that the groundwater is contaminated under the PenAir hangar.
3. There is one registered underground storage tank next to the airport property. The tank belongs to DJ Enterprises on Wood River Road. DJ has two closed underground storage tanks still on the property.

Based on the findings of the record search, a Phase I Environmental Site Assessment is recommended before constructing improvements or acquiring property at the Dillingham Airport.

6.1.3 Environmental Consequences

Impact Categories Not Discussed

This IEA discusses only the impact categories that may present issues or controversy. Based on initial research, the IEA dismisses the following impact categories for further evaluation because issues or concerns were not discovered:

- Induced Social Impacts – Proposed improvements will not produce secondary social impacts.
- Essential Fish Assessment – No essential fish species reside within the airport property.
- Environmental Justice - There are no distinct clusters of minority groups or low-income populations surrounding the Dillingham Airport that are permanent residents.
- Air Quality – Forecasted traffic will not exceed 180,000. operations per year and thus, will not generate sufficient air pollutants that will require modeling and further analysis.
- Wild and Scenic Rivers – There are no wild, scenic, or recreational designated rivers within the project area.
- Farmland – There are no prime and unique farmlands within the project area.
- Energy Supply and Natural Resources – The proposed improvements will not impact local energy supplies or exhaust local natural resources.
- Light Emissions – The improvements will generate a minimal increase in light emissions.
- Solid Wastes – The alternatives will not increase solid waste generation.
- Design, Art, and Architectural Applications – There are no special art displays planned.
- Short Term Uses and Long Term Productivity; and Irreversible and Irretrievable Commitments of Resources.

The following describes the remaining impact categories.

Environmental Consequences by Impact Category

Noise

Dillingham residents are concerned about potential noise impacts from realigning and extending the existing runway and construction a new GA runway. The EA models the predicted noise contours for short-term projects included in the preferred alternative.

FAA Advisory Circular 5390-2A, *Heliport Design*, states that approaches and departures to and from a new heliport must be submitted to the FAA for approval. Except for instrument approaches, helicopters must operate independently of the active runway. Alternatives A, B, and C propose new heliport facilities. These facilities may generate increased noise.

The No-Action Alternative will not change noise patterns around the airport

Social Impacts

The No-Action Alternative will not construct any new apron space or redistribute existing users. This alternative will not accommodate growing air taxi or air cargo businesses desiring space, support facilities, or a parallel taxiway. The runway will continue to operate inefficiently by forcing pilots to back-taxi on the active surface.

Alternatives A, B, and C will develop facilities that will meet the growing aviation demand in Dillingham. The facilities will also attract business and provide local employment. These alternatives also improve the airport efficiency and safety by fixing many FAA design standard deficiencies.

The relocated runway in Alternative A will not require the relocation of the Dillingham-Kanakanak and Wood River roads, but will require some graves to be relocated from the neighboring cemetery. Alternative B will require the relocation of Dillingham-Kanakanak from the runway safety area. Alternative C will require the relocation of both roads and many graves from the cemetery. All build alternatives will close two access roads to private residences and build a new access from Wood River Road.

Water Quality

Alternatives A, B, and C may impact the water quality surrounding the airport. Alternatives A and B propose relocating the runway, building a new taxiway, and constructing a GA runway. These improvements along with new aprons and vehicle parking will require filling wetlands. Alternative C will have less impact on water quality because only a new parallel taxiway and a new GA runway is planned. Storm water runoff from paved surfaces can carry pollutants to the surrounding wetlands. The final design must incorporate proper drainage and control structures to minimize runoff impacts.

The No-Action Alternative will not provide any new structures to control surface runoff. The amount of paved surfaces will not increase. No new wetland fills will occur.

Historic, Architectural, Archaeological, and Cultural Resources

SHPO was aware of the cemetery located just east of the runway. If further study discovers Native American graves within the cemetery, then these graves will qualify for protection under the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA). NAGPRA directs state governments that receive federal funds and may relocate Native American graves to:

1. Document the presence of Native American human remains;
2. Notify all Indian tribes that are likely to be affiliated with the remains; and
3. Provide an opportunity for the repatriation of human remains.

The cemetery has a small hill that penetrates the runway safety area, the runway object free area, and the Part 77 airspace. There are some graves on top of this hill. Alternative C will require the relocation of many graves within the cemetery. Alternative A will require the relocation of some of the graves. Alternative B and the No-Action Alternative will not impact the cemetery.

Department of Transportation Act, Section 4(f)

If the publicly owned cemetery has historical or cultural significance, it could qualify as a 4(f) property.

Biotic Communities

Alternatives A, B, and C have the potential for impacting surrounding biotic communities by filling wetlands and altering wildlife habitat. Alternative C will impact less wetland. The No-Action Alternative will have no new impacts to biotic communities.

Endangered and Threatened Species of Flora and Fauna

The USFWS indicated that the Dillingham Airport might be within the wintering range of Steller's eiders (Stern, 2002). Alternatives A, B, and C will have negligible effects on Steller's eider habitat. An eider survey should be performed to determine if the bird nests within the airport property. The No-Action Alternative will have no effect on eiders.

Wildlife Hazards

Wetlands and ponds surround the Dillingham Airport, which could attract birds and large mammals. Alternatives A, B, and C propose upgraded facilities, which may cause aircraft/wildlife conflicts. The No-Action Alternative will not increase the potential of creating wildlife hazards.

Wetlands

The US Fish and Wildlife Service has designated large portions of the land surrounding the airport as wetlands. The build alternatives will require some fill in wetlands and will require a permit from the U.S. Army Corps of Engineers. Alternative C will have less impact than the other build alternatives. The No-Action Alternative will have little or no impact on wetland communities.

Coastal Zone Management Program

The build alternatives will require a Consistency Determination from the State of Alaska, Division of Governmental Coordination. At this time, all improvements are anticipated to be consistent with the Bristol Bay Coastal Zone Management Program. The No-Action Alternative will not require a Consistency Determination.

Construction Impacts

Alternatives A, B, and C would create temporary construction impacts. Impacts could include noise, dust, water quality, changes in plane schedules to accommodate construction activities. Dust and water quality impacts can be minimized through the implementation of best management practices and timing of construction activities to avoid critical times for bird nesting. If the project disturbs more than five acres of land, the EPA requires a Storm Water Pollution Prevention Plan before construction may begin.

The contractor will prepare a construction plan that schedules runway closures to minimize impacts to flight operations. The contractor will coordinate schedules with the FAA, so that NOTAMs (Notices to Airmen) are issued in a timely manner. Alternative C will pose problems for the contractor to maintain an operable runway while reconstructing the surface.

Hazardous Materials

A preliminary investigation found land uses within the Dillingham Airport and surrounding property that may generate hazardous waste liabilities. The EA will include a full Phase I Environmental Site Assessment that analyzes the airport property for contamination risks. New refueling and fuel storage facilities must be designed to meet EPA requirements.

6.2 Operational Factors

Operational factors, such as safety, capacity, convenience, functionality, expandability, impact on other areas, and phasing feasibility, are addressed under the following headings:

- Primary Runway
- Crosswind Runway
- Heliport
- Aircraft Parking Aprons
- Terminal Area
- General Aviation Area
- Land Available for Lease
- Air Traffic Control Tower Site
- Vehicle Parking

6.2.1 Primary Runway

Alternatives A, B, and C incorporate many safety improvements that the No-Action Alternative does not. The provision of larger runway safety and object free areas, a parallel taxiway that eliminates back-taxiing on the runway and alleviates the visibility problem along the runway profile, and upgraded instrument approaches and approach lighting systems in Alternatives A, B, and C would greatly enhance aviation safety.

With Alternatives A, B, and C, Runway 1-19 would be brought into compliance with current FAA design standards for ARC C-III. With the No-Action Alternative the runway would remain nonstandard. If the ADOT&PF does not make improvements to the airport to better meet FAA design standards, particularly for the runway safety area, the airport's Part 139 certification could be jeopardized. Part 139 certification allows the airport to have scheduled service in aircraft with more than 30 passenger seats.

Alternatives A, B, and C would also allow precision-type instrument approaches to be developed to both runway ends, while No-Action would not. At the public meetings, concerns were expressed about frequent weather delays. An instrument approach that allows operations in conditions of lower visibility would improve air service reliability. An instrument approach to the north runway end will require the removal of objects penetrating the threshold siting surface, which will be easiest to implement with Alternatives A and B because runway realignment moves the threshold siting surface farther from the small hill near the Runway 19 threshold.

Alternatives A, B, and C would all have a full-length parallel taxiway, which would greatly enhance safety. The potential for runway incursions would be reduced, since back-taxiing on the runway would no longer be necessary. Besides the lack of a parallel taxiway, the No-Action Alternative has a higher potential for runway incursions because the runway does not meet the FAA standard for visibility along the runway length. (The other three alternatives would meet less stringent visibility standards because of the presence of a parallel taxiway.) The parallel taxiway in Alternatives A, B, and C would increase the airport's capacity (annual service volume) to 133,600 aircraft operations, well above the projected demand in 20 years (75,407 aircraft operations). Without the full length parallel taxiway (No-Action Alternative) annual demand will exceed capacity within five years according to Table 4.2, which will result in aircraft delay.

For phasing runway reconstruction, Alternative A would be easiest, since a new runway would be constructed outside of the current runway footprint. Alternative B, with the runway pivoted around its south end, would allow the north end of the new runway to be built without affecting traffic on the existing runway. With Alternative C, where the runway is reconstructed at its current location, keeping the runway open during reconstruction would require narrowing its useable width.

Off-Airport Impacts of Runway Improvement

While it would not provide the benefits to aviation of the other alternatives, the No-Action Alternative would not create the many off-airport impacts that compliance with design standards and upgrading instrument approaches would create. Alternatives A, B, and C would all require major realignment or closure of North Airport Road. Other off-airport impacts would differ among the three alternatives.

Alternative A, because it moves the runway northward, would require the acquisition of many homes and considerable obstruction removal, although its impact at the south end of the runway would be less than the other two action alternatives. Some cemetery graves would need to be relocated in Alternative A, but fewer than in Alternative C, because the runway would be moved 150 feet to the west.

The runway alignment in Alternative B would require fewer off-airport relocations than Alternatives A and C. The 5-degree realignment, pivoting the north end of the runway westward, would move the north runway protection zone so that it would include few occupied buildings. The hill closest to the existing Runway 19 threshold would not be in the runway protection zone or the approach surface. Impacts at the south end of the runway in Alternative B would be the similar to those in Alternative C – relocation of Dillingham-Kanakanak Road and acquisition of land and buildings within the runway protection zone.

Alternative C, which would not move the runway, would have the most significant off-airport impacts -- acquisition of several buildings at the north and south ends of the runway, relocation of the cemetery, and realignment of Dillingham-Kanakanak and Wood River Roads.

Land acquisition, including land that is under aviation and hazard easement or right-of-way, would be comparable for all three development alternatives:

No-Action Alternative:	0 acres
Alternative A:	106 acres
Alternative B:	100 acres
Alternative C:	108 acres

Impact on Apron Use

The runway location in the No-Action Alternative and Alternative C is the same, but Alternative C would have more impact on existing apron usage than No-Action. The precision approach primary surface would be larger than the existing nonprecision primary surface and would eliminate the use of about 8 percent of the apron for aircraft parking. Both Alternatives A and B would move the runway and its primary surface closer to the apron, further reducing useable apron. With Alternative A, large aircraft[51] could only be parked near and parallel to the building restriction line. With Alternative B the apron use would be more restricted at the north end than at the south. After a precision approach is established at the airport, Northern Air Cargo could no longer park its aircraft[52] near Alaska Cargo Services, although it could use the planned apron expansion northwest of the existing apron. The transitional surface restrictions at the Alaska Airlines terminal in Alternative B would be the same as in Alternative A. To make up for the aircraft size restriction at the north end of the main apron, the south apron expansion in Alternative B would extend farther west so that 737-sized aircraft could be parked two-deep.

6.2.2 Crosswind Runway

Alternatives A, B, and C would add a gravel-surfaced crosswind runway to the airport. The runway would be on the northwest side of the primary runway in Alternatives A and B and on the southwest side of the primary runway in Alternative C.

As Table 6.1 shows, all three proposed crosswind runway locations would increase airport wind coverage at 10.5 knots to more than the 95 percent threshold recommended by the FAA, while the No-Action Alternative would remain below the recommended threshold.

Table 6.1
Runway Wind Coverage

Alternative	Primary Runway	Crosswind Runway	Wind Coverage (at 10.5 knots)
No-Action	1-19	none	94%
A	1-19	8-26	98%
B	18-36	10-28	99%
C	1-19	12-30	99%

[51] The tail height of both the -200 and -400 models of the Boeing 737 aircraft is 37 feet. If the runway has a precision approach the aircraft would have to be parked so that the tail is at least 759 feet from the runway centerline. With the building restriction line in Alternative A, 835 feet from the runway centerline, the aircraft would need to be parked nearly parallel to the runway, rather than at an angle (nose in towards the terminal) that would be better for directing jet blast away from adjacent parked aircraft.

[52] Boeing 727 (wingspan 108 feet, tail height 34 feet), DC-6 (wingspan 118 feet, tail height 29 feet), or ATR 72 (wingspan 89 feet, tail height 25 feet).

In terms of safety, all alternatives have some advantages over the others. The No-Action Alternative's advantage is that it has fewer conflicting flight paths. However, compared with the other alternatives, the No-Action Alternative would create a greater chance of accidents attributed to crosswinds. Also, since it would not have a gravel-surfaced runway, the No-Action Alternative would have a higher probability of accidents occurring during the landing of aircraft with tundra tires. Alternative A's crosswind runway orientation would place fewer occupied buildings in direct alignment with the runway than Alternative B's or C's. Alternative C would provide less visibility between the primary and crosswind runways than Alternatives A and B, because its southwestern location would place more view-blocking buildings between the runways. On the other hand, the Alternative C crosswind runway location has a safety advantage over Alternative A and B in that it does not require aircraft taxiing on the primary runway's parallel taxiway to hold for operations on the crosswind runway.

The addition of a crosswind runway would increase the annual capacity of the airfield for aircraft operations by approximately 10 percent. The capacity enhancement of a crosswind runway would be more significant during snowy conditions. Smaller aircraft could use the crosswind runway while snow is being removed from the primary runway, particularly important before the arrival of the Alaska Airlines flight. Having another runway for aircraft to use during snow removal operations on the primary runway would also enhance safety.

Alternatives A and C require no land acquisition for the crosswind runway, while Alternative C requires the acquisition of land and buildings for the crosswind runway protection zones. The crosswind runway in Alternative A could be lengthened slightly within airport property, while the ones in Alternatives B and C could not.

Alternative C has the longest taxi distance between the crosswind runway and the GA Apron.

The crosswind runway locations in all three alternatives will impact how the apron areas can grow in the future, although Alternative B is the least restrictive as far as the future expansion of the terminal area to the west.

In terms of construction phasing, the crosswind runways in all three alternatives could be built at anytime, since they would be built on undeveloped ground.

6.2.3 Heliport

Having a designated location for helicopter activity (Alternatives A, B, and C) would provide safety and operation efficiency benefits over the No-Action Alternative, where a location is not officially designated.

Heliport locations in Alternatives A, B, and C provide separation of helicopter activity from small, fixed wing aircraft parking areas. In all three development alternatives the heliport would be located far enough from the runways that same direction VFR operations can occur. In Alternative A the heliport would be on the Main Apron and helicopters would use airspace already cleared for the primary runway. In Alternative B the heliport would be where the existing long-term auto parking is now; many approaches could be from the west, over undeveloped land. In Alternative C the heliport would be north of the proposed crosswind runway; most approaches would be from the south and would pass over the road.

Alternative A places the heliport near the main passenger and cargo terminal, which would be convenient for passenger and cargo transfer. On the other hand, access to this location would likely be subject to more security restrictions than access to the heliports in Alternatives B and C, which are located in the general aviation area.

The heliport in Alternative A could not be built until the land there is acquired. The heliport in Alternative B would require the construction of replacement automobile parking before it could be built on the existing parking lot. Alternative C's heliport could be built at any time.

6.2.4 Aircraft Parking Aprons

Table 6.2 compares the useable apron area provided in the four alternatives. With the improvement of primary runway instrument approaches in Alternatives A, B, and C, the useable area of the existing Main Apron would be reduced. Alternatives A and B, which move the runway westward, would further reduce the Main Apron's useable area. Table 6.2 includes apron area where aircraft as tall as 15 feet could be parked without penetrating the Part 77 transitional surface of the primary runway. Table 6.2 also takes into consideration reductions in the size of the existing GA apron due to conversion to vehicle parking and to the provision of T-hangars.

Table 6.2
Comparison of Useable Apron Areas (square yards)

	2023 Projected Need	No-Action	Alternative A	Alternative B	Alternative C
Large Aircraft - paved	80,500	87,700	94,500	80,700	82,300
Small Aircraft - unpaved	0	52,500	0	0	0
Small Aircraft - paved	59,300	0	59,500	50,600	43,800
Subtotal	139,800	140,200	154,000	131,300	126,100
T-Hangars	4,800-24,200	0	9,700	14,500	24,200
Total	144,600-164,000	140,200	163,700	145,800	150,300

Alternatives A, B, and C would expand the Main Apron to serve new land leases and to improve the parking for large transient aircraft. Parking for large, transient general aviation aircraft, such as business jets, would be located west of the Main Apron in these three alternatives. In Alternative C, the existing GA Apron would be designed for Airplane Design Group II so that it could serve large transient general aviation and a wider range of based commercial aircraft than it now serves.

The No-Action Alternative would provide gravel-surfaced general aviation tiedowns, while the other alternatives would provide paved tiedown apron. Gravel surfacing provides a lower level of service than pavement and increases the potential for FOD to aircraft from loose gravel.

Alternatives B and C rely on T-hangars to meet the full general aviation parking demand for 2023 (59,300 square yards). If T-hangar development does not occur before tiedown capacity is exceeded, the area reserved for T-hangars could be converted to apron.

6.2.5 Terminal Area

With the No-Action Alternative, the existing passenger/cargo facilities would remain in their current condition. Congestion inside the terminal building and at the terminal curb would increase with growth in demand. People would find it more and more difficult to find a parking space. Off-airport entrepreneurs would likely fill the void by shuttling passengers from remote parking lots or by providing cab service. The number of vehicle trips to the airport might increase instead of decrease. It is possible that Dillingham would see an end to improvements in air service, either in flight frequency or aircraft size, because of inadequate terminal facilities.

Alternatives A, B, and C would provide three different scenarios for terminal expansion: a joint-use passenger and cargo terminal (Alternative A), a joint-use cargo terminal (Alternative B), and a new site for Alaska Airlines/PenAir or other major airline terminal development instead of a joint-use terminal (Alternative C).

Alternative A would develop a joint use passenger and cargo terminal south of the Flight Alaska (formerly Yute Air) leasehold. The site would be convenient to the public, have expansion capability and would accommodate parking and a one-way loop access drive. This location would be less congested than the current terminal location. Having both passenger and cargo operations in one facility would be convenient for users such as Alaska Airlines and PenAir. On the other hand, it is usual for larger, busier airports to segregate cargo and passenger terminals. Several air carriers operating at Dillingham Airport transport cargo only.

With Alternative B, Alaska Airlines and PenAir are assumed to remain on the two adjacent lots leased by PenAir, but the terminal facility would be renovated and expanded or replaced. The new facility would address the needs of a larger terminal; however, it would be difficult to maintain business during construction. A new one-way loop road would be dedicated to provide access to the terminal curb. Since there would be no room to develop parking in front of the building, all terminal parking would be provided on the west side of West Airport Road and a wide, lighted sidewalk would be developed between the parking lot and terminal building. Although the sidewalk would provide more convenience and safety for airport users than the current walk along the road from the long-term parking lot (No-Action Alternative), it would provide less convenient access than Alternative A and it would need to be maintained in the winter time with snow and ice removal.

With the realignment of the runway in Alternative B, aircraft with tail heights over 30 feet could not be parked on the north end of the Main Apron without penetrating the Part 77 transitional surface. Therefore, two new lease lots at the expanded south end of the apron should be reserved for users of large, tall aircraft. One would be reserved for a joint use cargo terminal, which could include the ground handling of Northern Air Cargo that now occurs on the north end. The other lot would be available for another large aircraft user, possibly a competitor for Alaska Airlines.

Alternative C does not anticipate the development of a joint use passenger or cargo terminal. However, a site is designated for the future relocation of the Alaska Airlines/PenAir terminal or a new major airline terminal. Alternative C reserves a site for a new terminal for Alaska Airlines or another major airline at the north end of the Main Apron. The main disadvantage of this site, compared to the south end of the apron, is that there is less room for the vehicular parking needed throughout the planning period. The majority of parking spaces would be at least 1,000 feet away from the terminal, so that shuttle service between the terminal and the parking lot would be warranted. If Alaska Airlines and PenAir move into a new facility at this site, their current lot(s) would be available for other airlines to lease.

Alternatives A and C would provide more flexibility in responding to TSA initiatives than Alternatives A and No-Action because new passenger facilities would be built.

Because of funding issues, Alternatives B and C are more feasible for terminal facilities. However, Alternative A would provide the most convenient terminal location and the most capability to expand beyond the 20-year planning period.

6.2.6 General Aviation Area

With the No-Action Alternative, an FBO with general aviation terminal amenities would not be developed. The FSS would not be upgraded as desired by the FAA. T-hangar development by the private sector might occur, but it would be more costly, since no road access, utility extensions, or lot preparation would be done.

FBO and FSS

FBO and FSS sites are designated on Alternatives A, B, and C. As with terminal buildings, the ADOT&PF would not fund an FBO building. Funding from the private sector would be eased by the guarantee of a lease for the FSS in the building, which is proposed in Alternatives A and B.

With Alternative A, the FBO and FSS would be co-located in the current Alaska Airlines/PenAir building, which would become available upon the construction of the new joint-use terminal building. Parking for transient aircraft at the FBO would be constrained by the adjacent leaseholds and many users of the FSS would have to walk cross the street from the GA Apron to access this building. Renovating an existing building would be a lower cost than a new building, but its feasibility would depend on the feasibility of the joint-use terminal. Alternative A would easily provide the second level airfield view desired for the FSS

Alternative B designates the existing Alaska Cargo Services lot as the site of a new facility that would combine the FBO and the FSS. The site is the best of the three alternatives, with ample adjacent transient apron, convenience to both the Main and GA Aprons, and the potential for a good view of both runways for the FSS. The greatest disadvantage of Alternative B is that the lot is already under a long-term lease; however, the current leaseholder might develop the FBO.

Alternative C reserves two currently available lease lots on the west side of the general aviation apron for a single FBO tenant. Although the land would be available for lease immediately, an FBO at this location would probably not be financially viable until the apron adjacent to it is paved and has taxilanes and parking positions for Design Group II aircraft, to meet the needs of transient corporate jets. Since the FBO location would not provide the FSS with a view of the airfield, the FSS in Alternative C would be expanded and renovated at its current location on the upper floor of the Grant Aviation building.

T-Hangars

T-hangar sites are developed on Alternatives A, B, and C. As with the terminal and FBO buildings, the ADOT&PF would not fund the construction of T-hangars or other types of hangars. However, non-exclusive use taxilanes providing access to hangars would be eligible for FAA grant funding to a qualified sponsor. Alternative A designates a 2-acre site on the south end of the existing gravel apron, which can accommodate 20 T-hangars; Alternative B designates a 3-acre site, which can accommodate 30 T-hangars; and Alternative C designates a 5-acre site, which can accommodate 50 T-hangars. In all cases, T-hangar sites are adjacent to the GA Apron so that they could be used for tiedown expansion if the demand for tiedowns exceeds capacity before T-hangars are developed.

6.2.7 Land Available for Lease

Table 6.3 shows the number, size, and type of land leases that would be available with the four alternatives. With the No-Action Alternative, some growth in lease lot demand may be accommodated, since five of the nineteen lots available are not leased. However, the only lots available are on the GA Apron, which is not paved. Alternative A would gain one large lease lot on the Main Apron for the joint use passenger/cargo terminal. With Alternative B, two new large lease lots would be developed on the south side of the Main Apron and Alaska Airlines/PenAir would combine two lease lots into one. Alternative C would expand the lease lot used by Alaska Cargo Services for use by a new major airline terminal.

Table 6.3
Comparison of Lease Lot Allocation

	No-Action		Alternative A		Alternative B		Alternative C	
	Number	Acreage	Number	Acreage	Number	Acreage	Number	Acreage
Main Apron-Existing	8	12.2	8	12.2	7	12.2	7	10.8
Main Apron-New*	-	-	1	3.2	2	5.1	1	2.7
GA Apron	11**	5.0**	11	5.0	11	5.0	11	5.0
T-Hangars	-	-	1	2.0	1	3.0	1	5.0
Total	19	17.2	21	22.4	21	25.3	20	23.5

* Lease area for terminal or large aircraft lot would extend 200 feet onto apron
** Unpaved

6.2.8 Air Traffic Control Tower Site

The No-Action Alternative would not designate an air traffic control tower site. Alternatives A, B, and C would reserve land for the future development of this safety-enhancing facility.

Alternative A sites the tower northwest of the two runways, where it would be accessible by North Airport Road from the north. The site would afford good views of both runways and most apron areas. The site's relative remoteness would facilitate security.

Alternative B's tower location, on the east side of the primary runway and next to Wood River Road, would have excellent visibility of all runway ends and the full Main Apron.

The tower would be located at the south end of the terminal area, on the east side of West Airport Road in Alternative C. The site would provide good visibility of both runways. With only one acre available, the site might not be large enough; the FAA estimates 1 to 4 acres is needed for a typical control tower site.

Of the three alternative sites for the air traffic control tower, a tower at the Alternative B site would be the least likely to be an obstruction in runway transitional surfaces.

6.2.9 Vehicle Parking

Table 6.4 compares the number of vehicle parking spaces that would be available with the alternatives. The table covers only spaces associated with the terminal building and spaces for users of general aviation tiedowns.

Table 6.4
Comparison of Parking Spaces

	No-Action	Alternative A	Alternative B	Alternative C
Total Number of Parking Spaces (long-term, short-term, car rental and GA auto)	65	263	240	250

Alternative A provides for 263 parking spaces. Both short-term and long-term parking would be next to the joint use passenger/cargo terminal. The existing long-term lot would remain and would most likely be used for GA auto parking as well as over flow of long-term parking.

Alternative B has the least amount of parking spaces with 240. The majority of these spaces would be located west of West Airport Road. A short-term parking area would be located west of the Alaska Airlines/PenAir terminal with approximately 55 parking spaces. The existing long-term parking lot would be lost due to the development of a heliport.

Alternative C provides 50 short-term parking spaces at the new terminal site. This alternative provides long-term terminal parking at the south end of the GA apron. The GA automobile parking would be located west of the existing GA tiedown apron. The existing long-term parking area is within the crosswind runway's protection zone/extended object free area and should not be used.

Alternative A would provide the best terminal parking situation, with all parking convenient to the building without requiring pedestrians to cross West Airport Road and with land available for parking expansion to the west. Alternative C would provide the least convenient terminal parking for the new terminal site. Alternative B's and Alternative C's general aviation parking would be more convenient for users than Alternative A's.

6.2.10 Summary of Operational Evaluation

Table 6.5 summarizes the operational evaluation of Dillingham Airport alternatives for future development. In the table "+" indicates a positive comparative evaluation, "0" indicates a neutral comparative evaluation, and "-" indicates a negative comparative evaluation. Some factors in the table are not applicable (NA) to the No-Action Alternative.

Table 6.5
Comparative Operational Evaluation

	No-Action	Alternative A	Alternative B	Alternative C
Primary Runway				
Compliance with FAA Standards	-	+	+	+
Precision Approach	-	0	+	0
Loss of Useable Apron	+	-	-	0
Off-Airport Impacts	0	-	-	0
Capacity	-	+	+	+
Phasing	NA	+	0	-
Crosswind Runway				
Wind Coverage	-	+	+	+
Gravel Landing Facility	-	+	+	+
Capacity	-	+	+	+
Taxi Distance from Apron	NA	0	0	-
Visibility between Runways	NA	0	0	-
Off-Airport Impacts	+	0	-	-
Heliport				
Operational & Safety Impact	-	+	+	+
Convenience to Terminal	NA	+	0	-
Convenience to GA Area	NA	-	0	+
Phasing	NA	-	-	+
Aircraft Parking Apron				
Amount	-	+	0	0
Surface	-	+	+	+
Terminal Area				
Functionality	-	+	0	0
Capacity	-	+	0	0
Funding Feasibility	+	-	0	0
Phasing	NA	+	-	-
General Aviation Area				
FBO	-	0	+	0
FSS	-	0	+	0
Land Available for Lease				
Large Aircraft	-	0	+	0
Small Aircraft	-	+	+	0
Air Traffic Control Tower Site	-	+	+	0
Vehicle Parking				
Terminal	-	+	0	+
General Aviation	-	0	+	+
Total	-15	+11	+9	+5

6.3 Cost Factors

The alternative with the lowest capital cost is the No-Action Alternative. Of the other three alternatives, Alternative A has the lowest cost:

Alternative A	$47,458,047
Alternative B	$66,549,738
Alternative C	$59,864,210

It should be noted that these cost estimates should be used only for comparing and evaluating alternatives. The same unit cost was used for all land acquisition. The cost estimates do not represent complete capital improvement programs. They do not include projects such as airfield pavement rehabilitation and master plan updates that will be required for all alternatives, including No-Action. All estimated costs are in present day dollars, although some projects will not be needed for many years and their costs at that time will be escalated by inflation.

The estimates above include costs for projects that will not be eligible for FAA Airport Improvement Program grant funding and costs for some projects that ADOT&PF is unlikely to fund, due to their low priority.

Maintenance costs will be lower for No-Action than the other alternatives, since the taxiways, aprons, and roads will not be expanded. There is little difference in the on-airport maintenance costs of the other three alternatives. Alternative B is likely to create the highest off-airport maintenance and operating costs with the placement of Dillingham-Kanakanak Road in a tunnel. Because it closes North Airport Road, Alternative C's off-airport maintenance and operating costs will be lower than Alternatives A and B.

6.4 Recommendation of Preferred Development Alternative

6.4.1 Additional Evaluation of Alternatives A and B

Following review by the ADOT&PF and the FAA, Alternatives A and B were judged to be better than the other two alternatives considered. The No-Action Alternative was eliminated from further consideration because it would not bring the airport into compliance with FAA design standards or accommodate future growth in aviation demand. Alternative C, which would leave the primary runway at its current location, was rejected because of its high cost and negative off-airport impacts of bringing the runway safety area and other design standards into compliance.

Alternative A mitigated the off-airport impacts of runway design standard compliance by relocating the runway 150 feet westward and 500 feet northward from its current location. Alternative B mitigated the off-airport impacts by rotating the runway 5 degrees counter clock-wise from the current south threshold. In the operational evaluation presented in Table 6.5, both Alternatives A and B received similar scores and the Initial Environmental Assessment did not identify significant differences between Alternatives A and B. Consequently, additional comparative evaluation of Alternatives A and B was conducted prior to the selection of a preferred alternative. The additional evaluation focused on more quantification of impacts on wetlands, the cemetery, and residences and non-aviation businesses.

Both Alternatives A and B would impact 12 acres of wetlands, as shown in Table 6.6.

Table 6.6
Wetland Impacts for Alternatives A and B

	Alternative A (acres)	Alternative B (acres)
Primary Runway	3	7
Primary Runway Taxiway	3	2
Crosswind Runway	4	2
Crosswind Taxiway	2	1
Total	12	12

The fill required for the primary runway safety area in Alternative A would be substantially less than in Alternative B, since the runway alignment would not change. All of the existing RSA embankment would be used in Alternative A, which provided a $9 million lower cost than Alternative B, as well as lower wetland impact.

The wetland impact of the crosswind runway would be 3 acres less in Alternative B than in Alternative A. Nevertheless, the crosswind runway location in Alternative A is preferable for several reasons. Noise impact is likely to be lower in Alternative A because the runway is aligned with undeveloped land east of the airport. Alternative B is aligned with residential development east of the airport. For the same reason, Alternative A's crosswind runway location would include a safety enhancement not present in Alternative B – takeoffs to the east and landings from the east would be over undeveloped land. The runway protection zones for Alternative A's crosswind runway would be completely within airport property, unlike Alternative B. It is possible that the crosswind runway length might be phased or might never reach the 3,300-foot length planned due to cost or environmental constraints. If the runway length were constrained by the creek that flows west of the airport, which was the determining factor for runway length in the last airport master plan, Alternative A would allow a 400-foot longer runway than Alternative B to be built east of the creek.

Both Alternatives A and B move the primary runway away from the cemetery so that the cemetery would remain outside the RSA, which is required to extend 250 feet from the runway centerline. (The closest grave is approximately 169 feet from the current runway centerline.) However, in both Alternatives A and B trees, grave markers, and terrain on the west side of the cemetery would penetrate the required object free area, which extends 400 feet from the runway centerline, and the ultimate[53] primary surface, which extends 500 feet from the runway centerline.

[53] When and if an instrument approach with visibility minimum of ¾ mile or lower is established. For the current approach visibility minimums, the primary surface must extend only 250 feet from the runway centerline.

Table 6.7 indicates the number of graves that would be within the OFA for Alternatives A and B. The table counts all graves within 400 feet of the runway centerline, even through the cemetery terrain slopes downward to the east, so that some of the penetrating objects on the east side of the cemetery are markers or trees and not the graves themselves.

Table 6.7
Approximate Number of Graves Within the Runway Object Free Area
Alternatives A and B

Alternative	Approximate No. of Graves Located Within OFA
Alternative A	93
Alternative B	77

Note: The numbers presented in this table are estimated. No survey data has been collected on the location or number of graves present in the cemetery. The area of cemetery potentially affected was determined from Figure 5.3 and Figure 5.4.

Alternative A has more graves within the OFA than Alternative B, 93 compared to 77, although both have a large number. Removal of such a large number of graves would be costly and have a detrimental impact on the community. Rather than remove graves, ADOT&PF could enforce the avigation easement it has on the cemetery property to prevent additional burials, as well as seek FAA approval of a nonstandard OFA at the cemetery. Since 1981, the ADOT&PF has had an avigation easement on the cemetery property, which is owned by Choggiung Limited. The easement allows, among other things, the right to clear the land of "obstructions of every description" that infringe upon the Part 77 airport imaginary surfaces and to clear other objects that "endanger the landing, taking off or maneuvering of aircraft." Actively educating Choggiung and others in the community about the easement and its importance to aviation safety and preventing future burials in the cemetery would help justify the FAA's granting approval of a nonstandard OFA. The ADOT&PF could also seek a favorable airspace determination from the FAA for the cemetery's obstructions in the primary and transitional surfaces. From the standpoint of safety, it is better that the cemetery is located near the center of the runway than near the runway ends.

If graves are not relocated, the fact that Alternative B has slightly fewer graves within the OFA and primary surface than Alternative A is not a meaningful discriminator between the two alternatives.

The ultimate impact on residences and businesses appears to be greater with Alternative A than B, as shown in Table 6.8, although Alternative B requires property acquisition for the RSA, while Alternative A does not. The number of structures located on current airport property or within the current RPZ appears in the table, as well as the number within the ultimate RPZs of Alternatives A and B.

Table 6.8
Potentially Affected Properties by Runway Development
Alternatives A and B

Alternative	No. of Private Residences Within the RPZ	No. of Commercial Properties Within the RPZa	No. of Private Residences within the RSA	No. of Commercial Properties within the RSA
Alternative A (Ultimate)	9b	1	0	0
Alternative B (Ultimate)	4c	1	0	1
Current Airport Property and RPZ	3d	1	--	--

Note: Property acquisition in the terminal area is excluded from this table. The number and type of structures is based on interpretation of an aerial photograph from May 21, 2002 along with ground truthing during a site visit by ASCG personnel in October 2003.
The commercial property listed for each alternative and the current RPZ is the same.
The nine private residences listed include one apartment building with up to 15 units and one church located off the north end of the runway on Waskey Road. The church is located in a single family home.
All four structures are single-family homes.
Two residences appear to be within the current RPZ at the north end of the runway. The third structure appears to be on current airport property east of the runway.

The commercial property south of Dillingham-Kanakanak Road, which must be removed for the RSA in Alternative B, is within the current RPZ and within the future RPZs of Alternatives A and B. The property has been granted to the State of Alaska from the US Bureau of Land Management. Two large industrial type structures are located on the property, along with a large amount of miscellaneous equipment and two fuel dispensers, served by at least one and possibly two underground storage tanks. The property did not appear to be active at the time of a site visit in October 2003. Since the buildings do not appear to be the type prohibited by FAA criteria for RPZs (residences and places of assembly), it is possible that they could remain until higher priority improvements are funded. According to FAA criteria, fuel storage facilities should not be located in the RPZ. If the storage tanks are empty, their location with the RPZ is not a land use compatibility problem. If this property is to be disturbed, further investigation, including subsurface soil borings, should be conducted to determine if petroleum contamination exists.

Although more residences are located in the RPZs of Alternative A than in Alternative B, the cost of additional relocations do not justify choosing Alternative B over Alternative A. Without including residential relocation costs, the estimated cost of Alternative A is $19 million less than the cost of Alternative B, far more than enough to purchase five additional buildings, even accounting for the fact that the apartment building contains up to 15 dwelling units. If the ADOT&PF enforces its easement on the residential property northeast of the airport along Wood River Road and acquires land or easements north of its existing property, obstructions in the current and future approach surfaces could be cleared or lessened.

In addition to the lower cost and lower wetland impact, a reason for preferring the primary runway location in Alternative A to Alternative B is that it has more useable aircraft parking apron. With Alternative A, it would be possible to park 737-sized aircraft at any lot on the Main Apron without the aircraft penetrating the ultimate transitional surface.[54] With Alternative B, large aircraft would have to be parked at the south end of the apron to avoid transitional surface penetrations; the apron next to Alaska Cargo Services, where large cargo aircraft park now, would be restricted the most.

Considering the additional wetlands, cemetery, and relocation analyses, along with the operational evaluation in Table 6.5 and the estimated capital costs presented earlier in this chapter, Alternative A appeared to be the best of the four alternatives considered for the future development of Dillingham Airport. Still, the impacts of moving the runway closer to the Main Apron concerned the FAA, who requested analysis of another development alternative for the RSA. This new alternative was designated C-1 in Appendix K, Runway Safety Area Practicability Analysis. Alternative C-1 kept the existing runway centerline but moved the runway 500 feet to the north, which avoided the large amount of fill and impact on Dillingham-Kanakanak Road south of the runway. The cost of the Alternative C-1 RSA was $19,730,000—lower than Alternative B ($25,067,000) and Alternative C ($24,055,000), but higher than Alternative A ($16,490,000). With Alternative C-1, there were graves and houses within the RSA footprint needing removal. Because of its higher cost than Alternative A, Alternative C-1 was rejected and was not developed into a full 20-year alternative with crosswind runway, heliport, apron, vehicular parking, and other landside improvements.

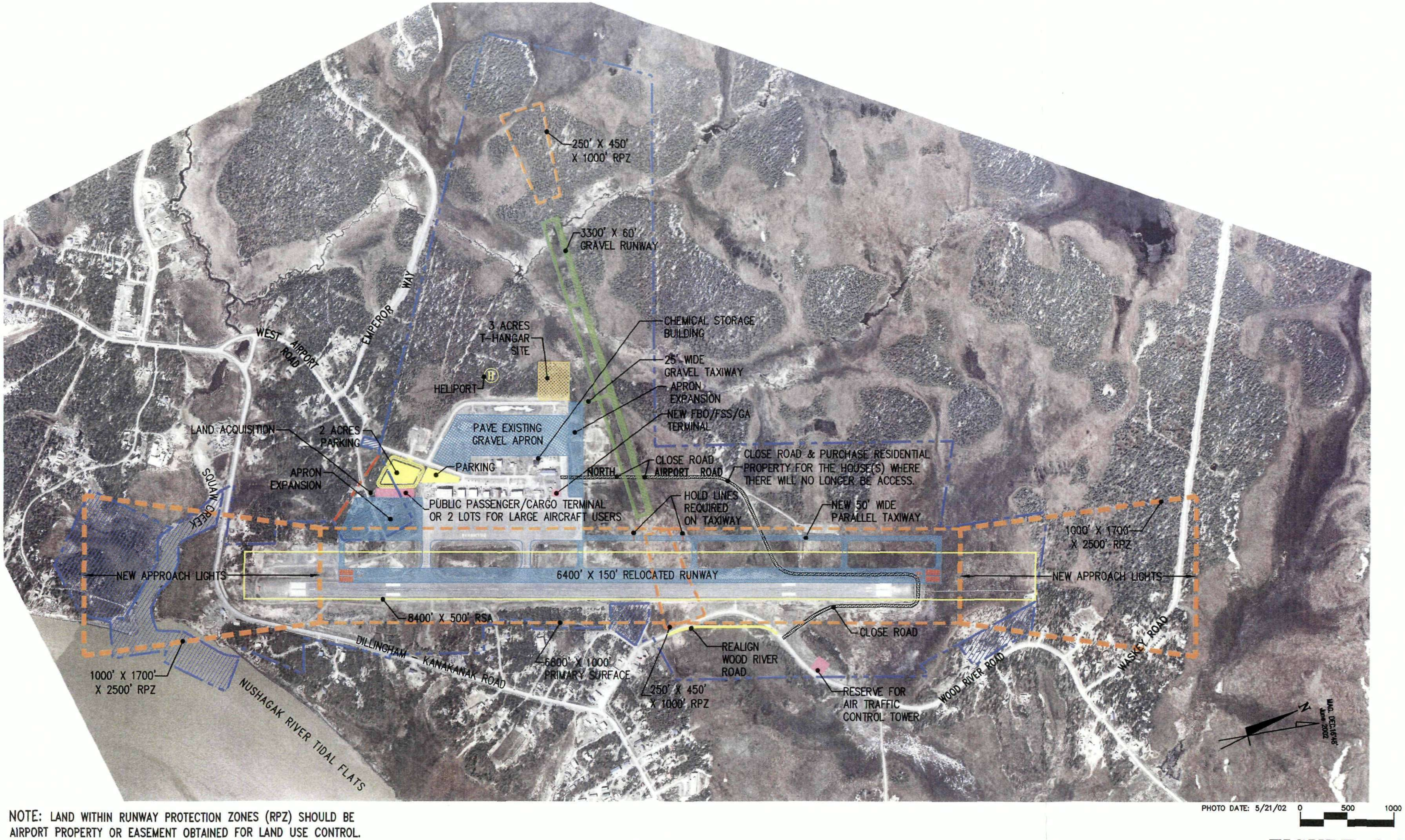
6.4.2 Preferred Development Plan

While Alternative A appeared to be the best alternative of those analyzed, the alternatives evaluation and review by ADOT&PF and FAA personnel resulted in some improvements recommended for Alternative A. The preferred development plan for the airport, illustrated by Figure 6.1, reflects most of the features of Alternative A; however, it also includes some features of the No-Action Alternative and Alternatives B and C.

As shown on Figure 6.1, Runway 1-19 would be shifted northward 500 feet and westward 150 feet in order to reduce the impact on the cemetery and Dillingham-Kanakanak Road. The runway safety area would be 500 feet wide and would extend 1,000 feet beyond each runway end. A new paved parallel taxiway would be built on the west side of the runway. The airport would be planned to accommodate precision-type[55] approaches (visibility minimum lower than ¾ mile) to both runway ends. The approaches would require medium intensity approach lighting systems.

[54] After the instrument approach improves to a visibility of ¾ miles or lower and the primary surface widens to 1,000 feet

[55] Recently the FAA has considered installing an ILS to Runway 1, which would be a precision approach. Instrument approaches using GPS are not designated precision, but can, with augmentation, have visibility and ceiling minimums comparable to CAT I ILS precision approaches.



NOTE: LAND WITHIN RUNWAY PROTECTION ZONES (RPZ) SHOULD BE AIRPORT PROPERTY OR EASEMENT OBTAINED FOR LAND USE CONTROL.

LEGEND

PROPERTY BOUNDARY

AVIGATION AND HAZARD EASEMENT AND RIGHT-OF-WAY

FIGURE 6.1
PREFERRED DEVELOPMENT PLAN

DILLINGHAM, ALASKA

1"=1000'

Although the cemetery would be located outside the runway safety area, some of the graves, markers, terrain, and vegetation would be within the runway object free area, which would extend 100 feet beyond the current cemetery fence. The ADOT&PF would request that the FAA approve this nonstandard condition and would prevent any more burials from occurring in the runway's object free area and primary surface. (The western 200 feet of the cemetery would be within the ultimate primary surface.) The ADOT&PF could accomplish a moratorium on burials by enforcing the avigation easement it already has on the property and through education and communication with the community and cemetery owner.

To accommodate instrument approaches with visibility minimums as low as ¾ mile, a primary surface twice as wide as the current 500-foot wide primary surface would be needed. Some trees on the southwest and east side would need to be removed or trimmed from the ultimate primary surface.

The 34:1 approach surface to Runway 19 now contains obstructions (trees and the small hill along Wood River Road, northeast of the threshold). When the Part 77 approach surface slope is reduced to 50:1 for an approach with visibility minimum lower than ¾ miles and the runway end is mover farther north, more trees and terrain will penetrate the Part 77 approach surface. Although the removal of all Part 77 obstructions is recommended, it should be noted that not all obstructions are deemed hazards to aviation by the FAA and required to be removed. However, all trees that are higher than the 34:1 threshold siting surface must be trimmed or removed for the runway to have an instrument approach with visibility minimum lower than ¾ miles. An avigation easement should be obtained or the property acquired to accomplish this. The small hill northeast of the Runway 19 threshold would be just at the edge of the threshold siting surface so that minimal terrain removal would be required for that surface. Portions of the hill are on airport property and portions are on property for which ADOT&PF has an avigation easement.

According to FAA guidance, land within runway protection zones should be acquired or easements obtained to eliminate land uses incompatible with RPZs. Figure 6.1 shows the larger RPZs required for instrument approaches with visibility minimums lower than ¾ mile. At the south RPZ most of the land is airport property or subject to an avigation easement. The one industrial/commercial property south of Dillingham-Kanakanak Road does not constitute an incompatible land use, unless fuel is stored there. Nevertheless, eventual removal/relocation of the facility is recommended. The north RPZ includes nine residential buildings; seven are single-family homes, one is used as a church, and one is an apartment building with up to 15 units. Two houses are located within the current RPZ. Residential and church uses are incompatible with an RPZ, indicating that the occupants of the buildings should be relocated. Even if the approach is not improved so that the required RPZ encompasses all these residences, the ADOT&PF should acquire avigation easements on property north of the runway so that the current approach surface can be cleared.

The preferred development plan includes construction of a new gravel Runway 8-26 northwest of the GA Apron. The ultimate size of the runway would be 3,300 feet long by 60 feet wide and it should be planned for medium intensity edge lighting, runway end identifier lights, and non-precision approaches. Runway 8-26 would be used exclusively by small aircraft (maximum 12,500 pounds). With both the primary and crosswind runways, wind coverage for small aircraft (Airplane Design Group I at 10.5 knots) would be 98 percent, above the 95 percent recommended by the FAA. A parallel taxiway is planned for the runway.

A heliport would be built west of the existing GA Apron. An access drive would be required for the heliport.

The Main Apron would be expanded 800 feet to the south on acquired land to serve a new terminal or terminals. The Main Apron would be extended to the west along existing Taxiway C and the taxiway would be relocated to the northern edge of the expanded apron. West of the Main Apron, Taxiway C would be designed for Airplane Design Group II (wingspan up to 79 feet). Transient corporate aircraft parking would be adjacent to Taxiway C. The existing gravel GA Apron would be paved.

The preferred development plan anticipates the development of a public passenger and cargo terminal south of the Yute Air leasehold. The new terminal development site would be convenient to the public and have room for a 35,000 square foot passenger and cargo terminal with expansion capability. However, ADOT&PF would not fund the terminal. Since it may not be economically feasible for the City, another governmental entity, or a private enterprise to develop a public terminal, an acceptable option is for the land to be developed into two lease lots for passenger or cargo airlines using large aircraft. The ADOT&PF would still develop a one-way terminal loop road to serve the two individual terminals.

The recommended site for the FSS and FBO is the lease lot now held by Alaska Cargo Services at the north end of the Main Apron. Although ADOT&PF would not fund the facility, it would encourage a partnership of the FAA Flight Service Station, Alaska Cargo Services or another fixed base operator, and the City or other governmental entity. If a governmental entity became the sponsor for the facility, economic development grant funding might be obtained. Having guaranteed tenants would help procure financing. In addition to the FAA Flight Service Station and Fixed Base Operator, the National Weather Service, and FAA Facilities & Equipment might lease space. This "GA terminal" would be less costly to build and operate than a commercial service terminal, making it more feasible for local governmental sponsorship. The building might provide amenities such as telephone, bathrooms, flight planning and waiting area for general aviation pilots and their passengers, and possibly food service and retail concessions. FBO services provided at the building might include fuel sales, aircraft maintenance, and aircraft rentals and charters. Conveniently, the apron adjacent to the FBO/FSS site is planned for the parking of corporate aircraft.

An addition to the preferred development plan is a chemical storage building within the ADOT&PF complex. The building is needed to house runway deicing chemicals and equipment.

A 3-acre site for T-hangars (30 hangars) would be located at the northwest end of the expanded apron. The ADOT&PF will not fund T-hangar development.

Land reserved for an air traffic control tower would be located west of and accessed by Wood River Road on the east side of Runway 1-19. More investigation of the area will be needed to specifically site the tower so that it provides a good view of all flight paths, runways, taxiways, and aprons, so that it is not a hazardous obstruction to aviation, and so that it avoids a landfill reported to be in the area.

West Airport Road would remain as the primary access to Dillingham Airport. At the new public terminal (or two individual terminals), a new one-way loop road would be dedicated exclusively to terminal traffic, providing access to the terminal curb and to the terminal parking lot. Within the terminal loop road, approximately 2.0 acres of parking would accommodate 200 short-term, long-term and rental car parking spaces. The existing long-term parking lot on the west side of West Airport Road would be available for general aviation tiedown users' vehicles. The new loop road and parking would not be constructed until the land is acquired and a terminal constructed. In the short-term future, vehicle parking would be expanded at the south end of the existing terminal area (Block 500A, Lots 1G and 3B).

Because it is located within Runway 1-19's safety area and where Runway 8-26 will be built, North Airport Road would be closed. The residences located west of the runway that depend on North Airport Road for access would be purchased.

A short section of Wood River Road east of Runway 1-19 would be realigned so that vehicles on the road would not penetrate the runway's object free area or ultimate primary surface.

7.0 Airport Development

In this chapter the preferred alternative is further documented by an Airport Layout Plan drawing set and a phased program for capital improvement projects.

7.1 Airport Layout Plan (ALP)

The ALP is an important tool for airport development. Airport improvement projects are not eligible for federal funding grants from the FAA Airport Improvement Program unless these improvements appear on an FAA-approved ALP set. The drawings that comprise the Dillingham Airport ALP are attached at the end of this chapter and are as follows:

Sheet 1	Cover Sheet and Index
Sheet 2	Vicinity Map, Data Tables, and Wind Data
Sheet 3	Airport Layout Drawing - Existing
Sheet 4	Airport Layout Drawing - Ultimate
Sheet 5	Inner Approach Surface Plan & Profile - Runway 1
Sheet 6	Inner Approach Surface Plan & Profile - Runway 19
Sheet 7	Inner Approach Surface Plan & Profile - Runway 8-26
Sheet 8	Airport Airspace Drawing
Sheet 9	Airport Airspace Drawing Profiles
Sheet 10	Airport Property Drawing
Sheet 11	Airport Property Drawing
Sheet 12	Terminal Area Drawing
Sheet 13	Future Land Use Drawing
Sheet 14	Narrative Report

The purpose of each drawing is described in the following sections.

7.1.1 Cover Sheet and Index

Sheet 1 introduces the ALP by providing the drawing index and the Location Map. The Location Map presents the general geographic location of Dillingham.

7.1.2 Vicinity Maps, Data Tables, and Wind Data

Sheet 2 provides a map that shows the airport location relative to the Nushagak River and the road system around the City of Dillingham. The sheet also includes legend, airport data, runway data, heliport data and non-standard condition tables, and the wind rose.

The Airport Data Tables contain information about features such as airport elevation, mean maximum temperature, airport reference point, airport magnetic variation, and taxiway lighting. Dillingham Airport is now ARC C-III and will be ARC C-III ultimately, although the future gravel Runway 8-26 will be A-I.

The Runway Data Table lists many features of the existing and ultimate runways, including information about the size, strength, surface, gradient, navigational aids, lighting, marking, instrumentation, and the size of various areas required to be cleared or subject to use constraints for safety reasons. The most significant changes from existing to ultimate conditions for Runway 1-19 are the larger runway protection zones required by the improvement of instrument approach visibility minimums from 1 statute mile to lower than ¾ statute mile. The lower visibility minimum instrument approaches will also require larger imaginary surfaces, which are shown on Sheets 5 through 9.

The Nonstandard Conditions and Modification of Standards Table lists conditions at the airport that do not meet FAA design standards for airport dimensions and surfaces. Runway 1-19 lacks shoulders and blast pads, deficiencies that are planned to be corrected with improvement projects. The runway line-of-sight is also nonstandard, a condition that will be fixed when a parallel taxiway is added for the runway. The RSA will be brought into compliance with the standard. The OFA for Runway 1-19 will be improved, but the cemetery will still remain in the OFA. The ADOT&PF should request an approved modification of standards for the graves and markers in the OFA.

The wind rose indicates by compass sector the frequency at which winds in a given velocity range occur. Runway orientation is superimposed on the wind rose and the percentage of wind coverage for all-weather conditions is provided. After Runway 8-26 is built, wind coverage for all velocities exceeds 95 percent, the threshold at which the FAA considers a crosswind runway unnecessary.

7.1.3 Airport Layout Drawings

Sheets 3 and 4 show the existing and ultimate layouts for Dillingham Airport. Sheet 3 depicts the existing features of the Dillingham Airport in plan view. The base map uses mapping from 2002 aerial photography and surveying.

The Airport Layout Drawing (ALD) is the primary drawing of the ALP set. The ultimate ALD depicts the projects included in the preferred alternative and planned for implementation over the next 20 years. Sheet 4 illustrates the major future development planned for the airport:

- A relocation of Runway 1-19 to the north and east.
- Runway safety area improvement.
- A full-length parallel taxiway on the west side of the runway with exit taxiways.
- A gravel runway, ultimately 3,300 feet by 60 feet designed for ARC A-I standards and visual approaches.
- Relocation of the localizer antenna and addition of a glide slope antenna to provide an ILS approach to Runway 1 and a future instrument approach with visibility minimum less than ¾ mile to Runway 19.
- Development of a heliport west of the Terminal Apron.
- Apron expansion to the west and south.

- Area for two new lease lots for large aircraft users on the apron (or a consolidated terminal building).
- Chemical storage building.

One of the important things shown on the Airport Layout Drawing is the Building Restriction Line (BRL), a line that shows suitable building areas on the airport. On the west side, the existing BRL is 985 feet from the runway centerline. After the runway is moved 150 feet closer to the west side BRL and a precision instrument approach with visibility minimum as low as ¾ mile is established, the top elevation of buildings and other objects west of the runway could extend 47.8 feet above the closest point on the runway without penetrating the Part 77 transitional surface. On the east side, the ultimate BRL is 750 feet from the runway centerline wherever feasible, indicating a point at which buildings and other objects could be 35.7 feet above the closest point of the runway without penetrating the future Part 77 transitional surface. At the runway ends, the BRL encompasses the runway protection zones, where occupied buildings should not be located.

7.1.4 Inner Portion of Approach Surface Drawings

Sheets 5, 6, and 7 show the inner portion of the approach surfaces for each runway end, including for the new Runway 8-26. The portion of the approach surface that is less than 100 feet above the runway end is illustrated in plan and profile views drawn at a large scale to show detail. Obstruction tables show how much each obstruction penetrates the imaginary approach surface and lists the planned disposition of the obstruction – whether the obstruction will be removed or remain. The profiles for Runways 1 and 19 show the ultimate approach surfaces and the ultimate threshold siting surfaces.

7.1.5 Airport Airspace Drawings

Sheets 8 and 9 show the full approach surfaces and other imaginary surfaces defined by 14 CFR Part 77, *Objects Affecting Navigable Airspace*. Part 77 protects the airspace and approaches to each runway from hazards that could affect safe and efficient airport operation. The surrounding airspace, when possible, needs to be kept free from obstacles that could interfere with aircraft navigation and operations. Any penetration of the Part 77 imaginary surfaces is defined as an obstruction affecting navigable airspace. The FAA determines if such obstructions are hazards to aviation.

Runways 1 and 19 are both planned for instrument approaches with visibility minimums lower than ¾ mile. The gravel Runway 8-26 will have visual approaches and will be a utility runway according to Part 77 (designed for propeller-driven aircraft with 12,500 pounds maximum takeoff weight). Runway 1-19 must meet more stringent Part 77 criteria than a utility runway, because it serves turbine-driven and heavier aircraft.

Different airspace requirements apply to heliports than to runways used by fixed wing aircraft. The future heliport will have a primary surface, an approach surface, and transitional surfaces. The primary surface is the same as the Final Approach and Takeoff Area (FATO), 65 feet by 65 feet. The visual approach surface will begin at the end of the primary surface, have the same width as the primary surface, and extend outward and upward for a horizontal distance of 4,000 feet, where the width is 500 feet. The slope of the heliport approach surface is 8:1. Heliport transitional surfaces extend up and out from the lateral boundaries of the primary and approach surfaces at a slope of 2:1 for 250 feet horizontally, measured from the centerline of the primary and approach surfaces.

7.1.6 Airport Property Map

Sheets 10 and 11 show the Dillingham Airport property boundary and easements. These drawings also indicate how the various tracts of land within the airport boundary were acquired.

7.1.7 Terminal Area Drawing

Sheet 12 provides an enlarged plan view of the ultimate terminal area so that buildings, roads, and auto parking areas can be seen more clearly. The Building Table identifies the buildings and their heights.

7.1.8 Future Land Use Drawing

Sheet 13 depicts the planned future use of airport land. It is the only sheet of the ALP set that considers development beyond the 20-year planning period. By designating land use beyond the need projected in the next 20 years, the viability of the airport is protected for the long-term future. The Land Use Drawing adopts general criteria for the use of airport property (FAA AC 150/5070-6A, *Airport Master Plans*):

- Adherence to standards in support of safe aircraft operations
- Non-interference with line of sight or other restrictions for FAA control towers, navigation aids, and weather equipment
- Use of existing facilities, insofar as possible and depending on the location, condition, and obligations with respect to their use
- Attention to factors that may affect construction cost, such as available utilities and topography
- Flexibility in being able to accommodate changes in demand and expansion, both vertically and horizontally
- Efficiency in ground access to the community
- Priority accorded aeronautical activities where available land is limited
- Encouragement of revenue-producing land uses which support an aviation-oriented infrastructure
- Flexibility of non-aeronautical uses to permit expansion of aeronautical facilities.

Five different land uses are identified on Sheet 13 and described below.

Air Operations Area

The highest priority for the use of airport land is for present and future air operations. This land use is reserved for the runways, taxiways, aprons, navigational aids, and the clearances they require.

Commercial

The *Commercial* designation is for land south of Wood River Road, which does not provide aircraft access to Runway 1-19. Most of the area is within the 65 DNL contour and some is in the 70 DNL. Appropriate uses include hotels, restaurants, offices, retail stores, and light industrial facilities. Development in *Commercial* land use areas must be compatible with aviation. Refer to FAA AC 150/5020-1, *Noise Control and Compatibility Planning for Airports*, for a list of specific types of activity and their noise compatibility levels. Structures must not penetrate Part 77 imaginary surfaces and activities must not emit smoke or produce electromagnetic interference with radio navigation and approach aids.

Commercial Aviation

Activities that should occur on land designated *Commercial Aviation* include aircraft parking and facilities for passenger and cargo airlines and air taxi operators. Other acceptable *Commercial Aviation* land uses are aircraft maintenance, fixed base operators, and other businesses that serve aircraft. Any Part 121 (Alaska Airlines), 135 (Pen Air), and 125 (charter) operations that require passenger and baggage screening by the TSA should be located in the *Commercial Aviation* land use.

General Aviation

The *General Aviation* land use is located at the existing gravel apron and extends west for future expansion. Activities permitted in the *General Aviation* land use are businesses, services, or other functions that directly involve, or are necessary for, the normal operation of aircraft that use an airport, including aircraft loading, unloading, tiedown, parking, storage, sales, service, rental, maintenance, repair, sale or storage of aviation fuel and aviation petroleum products, pilot training, and air charter or air taxi service. Part 135 air carriers with scheduled service that do not require passenger and baggage screening by the TSA may operate within the *General Aviation* land use; however, most of the *General Aviation* land use is limited to aircraft with wingspans less than 49 feet (Airplane Design Group I) that are piston driven and used for personal use and unscheduled air taxi operations. The west apron expansion alongside Taxiway C is intended to provide a taxilane and adjacent parking for Airplane Design Group II (79-foot maximum wingspan) transient aircraft.

Airport Support

The ADOT&PF facilities and the future air traffic control tower site are the areas designated *Airport Support*.

7.1.9 Narrative Report

The narrative report on Sheet 14 summarizes information contained in this Master Plan report, including forecasts, rationale for proposed development, staged development with estimated costs, and description of coordination with government agencies.

7.2 Capital Improvement Projects

Table 7.1 summarizes the 20-year capital improvement program for Dillingham Airport. Projects have been scheduled according to anticipated demand and allocated to one of three phases during the twenty-year planning period. Figure 7.1 illustrates the capital improvement projects by phases. Phase I represents projects that should be undertaken in the first five years (2004 through 2008). Phase II projects are programmed for the second five years (2009 through 2013), and Phase III includes the last ten years of projects (2014 through 2023). The ADOT&PF annually assesses capital improvement priorities and may need to change the project phasing in Table 7.1. Certainly, funding availability can delay the capital program. In addition, capacity-enhancing projects are based on the aviation demand forecasts and should not be implemented if actual aviation activity does not grow as forecast. On the other hand, if activity grows at a higher rate than forecast or if facilities deteriorate more rapidly than anticipated, projects may need to be implemented earlier.

Rough order-of-magnitude cost estimates, in year 2005 dollars, have been prepared for each project. Table 7.1 also identifies each project's eligibility for federal participation through the Airport Improvement Program. While Table 7.1 lists only the projects that will be implemented by the ADOT&PF, this chapter also described projects that might be implemented by the City of Dillingham, the FAA, or a private entity.

Cost estimates were prepared by quantifying the magnitude of each project and applying standard unit cost data to determine total project costs. The costs include allowances for design and construction management. Refer to Appendix M for the detailed costs.

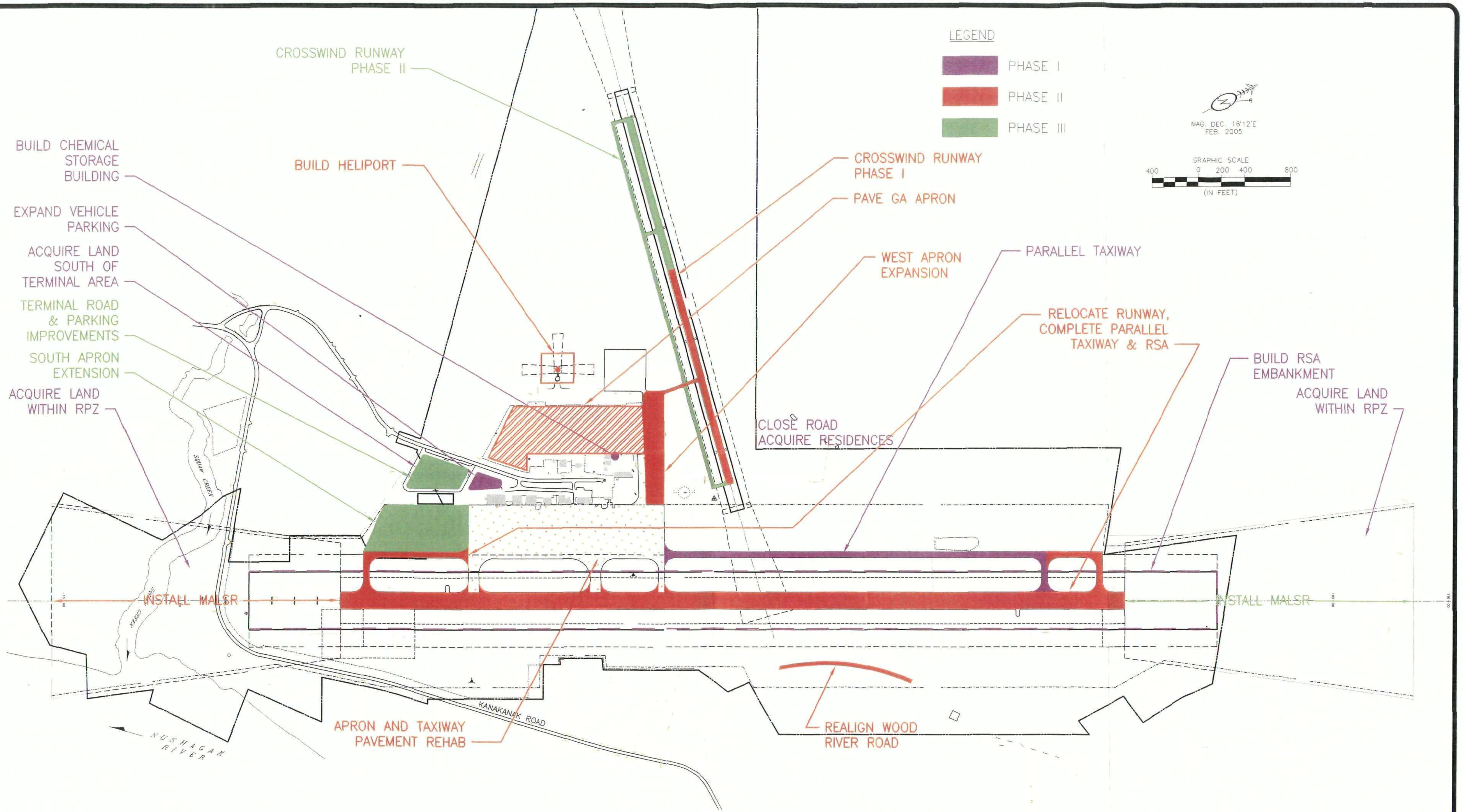


FIGURE 7.1
PHASING PLAN
DILLINGHAM, ALASKA
1"=800'

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Table 7.1
Capital Improvement Program

Capital Improvement Program - Dillingham Airport	Total Cost	Eligible for AIP Funding	State Match for AIP
Phase I: Short Term (2004 - 2008)			
Parallel Taxiway	$5,052,701	$4,736,907	$315,794
Acquire Land South of Terminal Area	$1,080,000	$1,012,500	$67,500
Acquire Land within Existing and Future RPZs	$6,420,000	$6,018,750	$401,250
Build Chemical Storage Building	$1,386,000	$1,299,375	$86,625
Expand Vehicle Parking at South End of Terminal Area	$647,145	$606,698	$40,447
Build RSA Embankment	$16,511,689	$15,479,708	$1,031,981
Subtotal	*$31,097,535*	*$29,153,939*	*$1,943,596*
Phase II: Intermediate Term (2009 - 2013)			
Relocate Runway, Complete Parallel Taxiway & RSA	$6,459,041	$6,055,351	$403,690
Realign Wood River Road	$804,270	$754,003	$50,267
Install MALSR	$568,000	$532,500	$35,500
Apron & Taxiway Pavement Rehabilitation	$1,390,347	$1,303,450	$86,897
West Apron Expansion	$2,153,083	$2,018,515	$134,568
Build Heliport	$49,590	$46,491	$3,099
Pave GA Apron	$935,250	$876,797	$58,453
Crosswind Runway Phase I	$2,271,860	$2,129,869	$141,991
Equipment Allowance	$250,000	$234,375	$15,625
Subtotal	*$14,881,441*	*$13,951,351*	*$930,090*
Phase III: Long Term (2014-2023)			
South Apron Expansion	$2,268,443	$2,126,665	$141,778
Terminal Road & Parking Improvements	$224,775	$210,727	$14,048
Crosswind Runway Phase II	$5,524,090	$5,178,834	$345,256
Install MALSR	$568,000	$532,500	$35,500
Master Plan Update	$450,000	$421,875	$28,125
Equipment Allowance	$1,100,000	$1,031,250	$68,750
Subtotal	*$10,135,307*	*$9,501,851*	*$633,457*
TOTAL	$56,114,283	$52,607,140	$3,507,143

7.2.1 Phase I (2004 – 2008) Projects

Parallel Taxiway

The parallel taxiway is needed because the runway does not meet the FAA design standard for line of sight. An acceptable runway profile permits any two points five feet above the runway centerline to be mutually visible for the entire runway length, unless the runway has a full-length parallel taxiway. If Runway 1-19 had a full-length parallel taxiway, the existing runway profile would meet the line-of-sight requirement for an obstructed view along half the runway length. A parallel taxiway is also required for improving an instrument approach to a visibility minimum lower than 1 statute mile. A parallel taxiway will expedite the flow of traffic between runways and aircraft parking areas and greatly enhance safety. Without a parallel taxiway, aircraft must back-taxi on the runway before takeoff and after landing, greatly increasing opportunities for runway incursions. FAA funding guidance supports the provision of a parallel taxiway at a commercial service airport such as Dillingham. Current levels of operations justify planning a capacity enhancing project, such as the provision of a parallel taxiway.

The paved taxiway will be located on the west side of the runway, will be 50 feet wide, meet Airplane Design Group III standards, and have medium intensity taxiway lights. The taxiway will be located where it will be 400 feet (measured between centerlines) from the runway after the runway is relocated 150 feet westward. Until the land south of the main apron is acquired (another short-term project) and the runway is relocated (in about ten years), the south end of the full-length taxiway cannot be completed.

The project will require closing part of North Airport Road and relocating the residences northwest of the airport that rely on the road for access.

Acquire Land South of Terminal Area

The land is needed for future taxiway, apron, and landside development. The leaseholds at the main apron are constrained from expanding to the north by land reserved for a crosswind runway and to the south by the airport property boundary. Dillingham Airport needs a better and larger passenger terminal. The lease lot size does not provide room for expanding the building and does not accommodate the demand for automobile parking or a safe, efficient road for passenger pick-up and drop-off. While the ADOT&PF's current policies and funding priorities preclude it from sponsoring or operating a terminal building at a rural primary airport, the Master Plan addresses needed airport landside development, such as a terminal, that will be funded by others. Whether or not passenger and cargo terminal facilities continue to be provided by individual air carriers or a joint use terminal is sponsored by an entity such as the City of Dillingham, more land is needed on the main apron for passenger and cargo terminal functions and for facilities servicing the corporate jets that use the airport. All seven of the lots with main apron access are leased. These seven lots total 12 acres. The Master Plan projects the need for two to five more acres of landside development with main apron access in the 20-year planning period.

The Master Plan reserves the land south of the main apron's leaseholds for two development options--a single joint use terminal or two lots used for passenger/cargo carriers operating large aircraft, with a requirement that the size and arrangement of automobile parking and access drives be appropriate for a consolidated terminal function.

In other words, automobile parking would be in a consolidated lot surrounded by a one-way loop access road that would provide for vehicle queuing and safe loading/unloading at a terminal curb common to both tenant facilities.

Aircraft parking apron adjacent to the future leaseholds/joint use terminal and taxiway access to the runway are required for the future landside development to function.

Acquire Land within Existing and Future Runway Protection Zones (RPZs)

The RPZ is a trapezoidal area centered about the runway centerline beginning 200 feet beyond the end of the area usable for takeoff or landing. Its function is to enhance the protection of people and property on the ground. The RPZ includes part of the runway object free area, and the remainder of the RPZ is a controlled activity area. In the controlled activity area, residences, places of assembly, and fuel storage are prohibited. Land uses that do not attract wildlife or interfere with navigational aids are permitted, such as automobile parking. The FAA recommends that the airport sponsor own the land within the RPZ, although obtaining easements to control land use in the RPZ is acceptable if it is impractical for the airport owner to acquire the land. The RPZs required at Dillingham Airport now are 500 feet at the inner width, 1,010 feet at the outer width, and 1,700 feet long. There are buildings located within the RPZs at both ends. At the north end, the RPZ extends about 350 feet beyond the airport property and includes an area under avigation and hazard easement. At the south end, the RPZ north of Squaw Creek is on airport property and from Squaw Creek south, the RPZ is on land for which the ADOT&PF has avigation and hazard easements.

The Master Plan recommends planning for instrument approaches to both runway ends that would have approach visibility minimums lower than ¾ statute mile. To meet the requirement for an approach with visibility minimum lower than ¾ statute mile, the land area within each RPZ would grow from 29.5 acres to 78.9 acres, requiring land acquisition and residential relocation.

Build Chemical Storage Building

The sand used for winter runway pavement maintenance does not comply with FAA specifications because of its wide gradation. Alaska Airlines is planning to replace Boeing 737-200 aircraft with 737-400 models that have a less forgiving engine design for sand ingestion. For these reasons, the ADOT&PF has decided to replace sand with a liquid de-icing material, which will also provide better braking value on the runway. A three-bay addition to the existing sand storage building will be built to house the deicing truck, chemicals, and chemical mixing equipment.

Expand Vehicle Parking at South End of Terminal Area

The PenAir leasehold is too small to provide enough parking and loading/unloading are for users of the Alaska Airlines/PenAir terminal. In the short-term, this parking deficiency will be lessened by developing parking on about 1 acre of land that was previously reserved for an air traffic control tower. The land is Block 500A, Lots 1G & 3B. (This Master Plan reserves an alternative site for an air traffic control tower.)

Build Runway Safety Area (RSA) Embankment

The RSA is a cleared, drained, graded, and preferably a turf area symmetrically located about the runway. Under normal conditions, the RSA is capable of supporting snow removal, firefighting, and rescue equipment, and the occasional passage of aircraft without causing major damage to the aircraft. The RSA should have no potentially hazardous ruts or humps, and it must be clear of objects, except those that must be located there because of function. The RSA required by FAA design standards for Runway 1-19 is 500 feet wide and extends 1,000 feet beyond both runway ends. The current Runway 1-19 safety area is 200 feet wide and it extends 288 feet beyond the south end and 201 feet beyond the north end. The most cost effective way to bring the RSA into compliance is to shift the runway 150 feet to the west and 500 feet to the north and provide the RSA around the relocated runway. The shift in location avoids relocating Dillingham-Kanakanak Road on the south, eliminates a large amount of fill on the south, and avoids RSA impacts on the cemetery east of the runway.

Because a runway pavement project was completed in 2003, the runway relocation should be scheduled for when the pavement has deteriorated to the point of needing major improvement, approximately ten years in the future. The embankment for the relocated runway and its safety area will be placed earlier than ten years in the future, to give the material time to settle and to provide additional safety area for the current runway on the north and west sides. More of North Airport Road must be closed for the RSA.

Although the cemetery will be located outside the relocated runway/RSA, some of the graves, markers, terrain, and vegetation will be within the runway object free area, which will extend 100 feet beyond the current cemetery fence. The ADOT&PF should request that the FAA approve this nonstandard condition and prevent any more burials from occurring in the runway's object free area and primary surface. (The western 200 feet of the cemetery will be within the ultimate primary surface.) The ADOT&PF could accomplish a moratorium on burials by enforcing the avigation easement it already has on the property and through education and communication with the community and cemetery owner.

Other Short Term (Phase I) Needs

Extension of the City's potable water system to the airport is an improvement needed in the short-term future. However, utility infrastructure for lease land is not eligible for AIP or ADOT&PF funding. The City has recently completed a master plan that includes extending water service to the airport. While it is a high priority and recommended in the first phase of water/sewer improvements, it also has a high price, estimated between $600,000 and $1 million.

Depending on market conditions, an FBO may be established, the FSS may be relocated, and T-hangars may be constructed during Phase I. In addition, some of the vacant lease lots at the GA Apron may be leased.

7.2.2 Phase II (2009 – 2013) Projects

Relocate Runway, Complete Parallel Taxiway and RSA

After the fill in the RSA embankment has had time to settle and when the existing runway, overlaid in 2003, is in need of rehabilitation, Runway 1-19 will be relocated 150 feet to the west and 500 feet to the north. The new runway will require edge lighting and precision marking. Navigational aids will be relocated, including the ODALS to Runway

19. The south end of the parallel taxiway, where land will have been acquired in Phase I, will be completed and the parallel taxiway will be extended 500 feet north to serve the new Runway 19 threshold. Objects in the ultimate threshold siting surfaces of the relocated Runways 1 and 19 will be removed.

Realign Wood River Road

A portion of Wood River Road east of the runway will be within the primary surface when the Runway 1 ILS is completed and provides an approach visibility minimum of ¾ mile or less. Approximately 900 feet of the road will be realigned to be outside the primary surface.

Install MALSR (Runway 1)

This approach lighting system for Runway 1 is needed when the ILS is installed, to help pilots identify the runway environment in low visibility weather.

Apron and Taxiway Pavement Rehabilitation

It is projected that the Main Apron and Taxiways A, B, and C will need rehabilitation or reconstruction in the second five years of the planning period. Taxiway C improvement might be combined with the West Apron Expansion project.

West Apron Expansion

This project includes paving an area west of the Main Apron, alongside Taxiway C, which connects the Main Apron to the GA Apron. The new transient aircraft apron will be approximately 150 feet wide by 1,000 feet long and designed for aircraft up to ARC C-II and 30,000 pounds maximum takeoff weight. The apron is intended for corporate and other high performance GA and air taxi aircraft.

Build Heliport

A new general aviation heliport with visual approaches will be built on the west side of the terminal area to accommodate transient helicopters. The design helicopter will be a small helicopter (max. 6,000 pounds), such as those manufactured by Bell, Agusta, or Eurocopter. The Final Approach and Takeoff (FATO) area will be approximately 65 feet by 65 feet (1.5 times helicopter length) and will have a 20-foot wide safety area around it. At a minimum the Takeoff and Liftoff (TLOF) area within the FATO will be paved and approximately 35 feet by 35 feet (1.0 times rotor diameter). An adjacent helicopter parking pad will be included, as well as lighting and marking, fencing, a lighted wind cone, and a short access road that will also serve as a vehicle parking area during helicopter loading and unloading.

Pave GA Apron

The gravel-surfaced GA Apron will be paved to provide a higher level of service to tiedown users and leaseholders at the apron, to reduce FOD, and to help keep any petroleum leaks and spills from polluting the groundwater. The project will include floodlighting and electrical receptacles for a portion of the tiedowns.

Crosswind Runway Phase I

The eastern 1,800 feet of Runway 8-26 will be constructed. The gravel-surfaced runway will be 60 feet wide, ARC A-I, serve small aircraft only (12,500 pounds max.), and have visual approaches, MIRL, REILs, vertical glide slope indicators, and a single taxiway providing access to and from the GA Apron.

Equipment Allowance

Snow removal and/or ARFF equipment will need replacement or augmentation.

Other Intermediate Term (Phase II) Needs

The FAA plans to install an ILS for Runway 1. The parallel taxiway, MALSR, and runway relocation/obstruction removal projects are needed for the ILS. When the ILS is established, the localizer antenna will need to be relocated to the opposite end of the runway (from the south end to the north end). A glide slope antenna will be installed southeast of the runway. The antenna's critical area, which should be clear of buildings, aircraft, and vehicles, will be 800 to 3,200 feet long and 100 to 200 feet wide, depending upon the requirements of the actual equipment installed. Details of the ILS approach are not known; however, a Cat I ILS approach typically has a visibility minimum of ½ statute mile. If the ILS approach visibility minimum at Dillingham Airport is as low as ¾ mile, the Part 77 primary surface will widen from 500 to 1,000 feet.

Depending on market conditions, private development that did not occur in Phase I will occur or grow, such as a full-service FBO, T-hangars, and development on available lease lots at the GA Apron.

7.2.3 Phase III (2014 – 2023) Projects

South Apron Expansion

By Phase III, it is anticipated that the southward expansion of the Main Apron will be needed to serve a joint use terminal or two additional leaseholder(s) providing passenger and/or cargo service in large aircraft (greater than 12,500 pounds). The apron would be approximately 800 feet by 480 feet.

Terminal Road & Parking Improvements

The looped terminal access road and associated 2-acre terminal area parking lot will be constructed to serve the new terminal(s) at the South Apron Expansion.

Crosswind Runway Phase II

The northern 1,500 feet of Runway 8-26 will be constructed, along with a full-length parallel taxiway.

Install MALSR (Runway 19)

To allow establishment of a GPS-supported instrument approach to Runway 19 with visibility minimum less than ¾ mile, an approach lighting system will be needed.

Master Plan Update

A reassessment of the roles, activity levels, using fleets, and facility needs at the airport should be undertaken approximately ten years after completion of the current master plan update.

Equipment Allowance

Snow removal and/or ARFF equipment is expected to need replacement or augmentation.

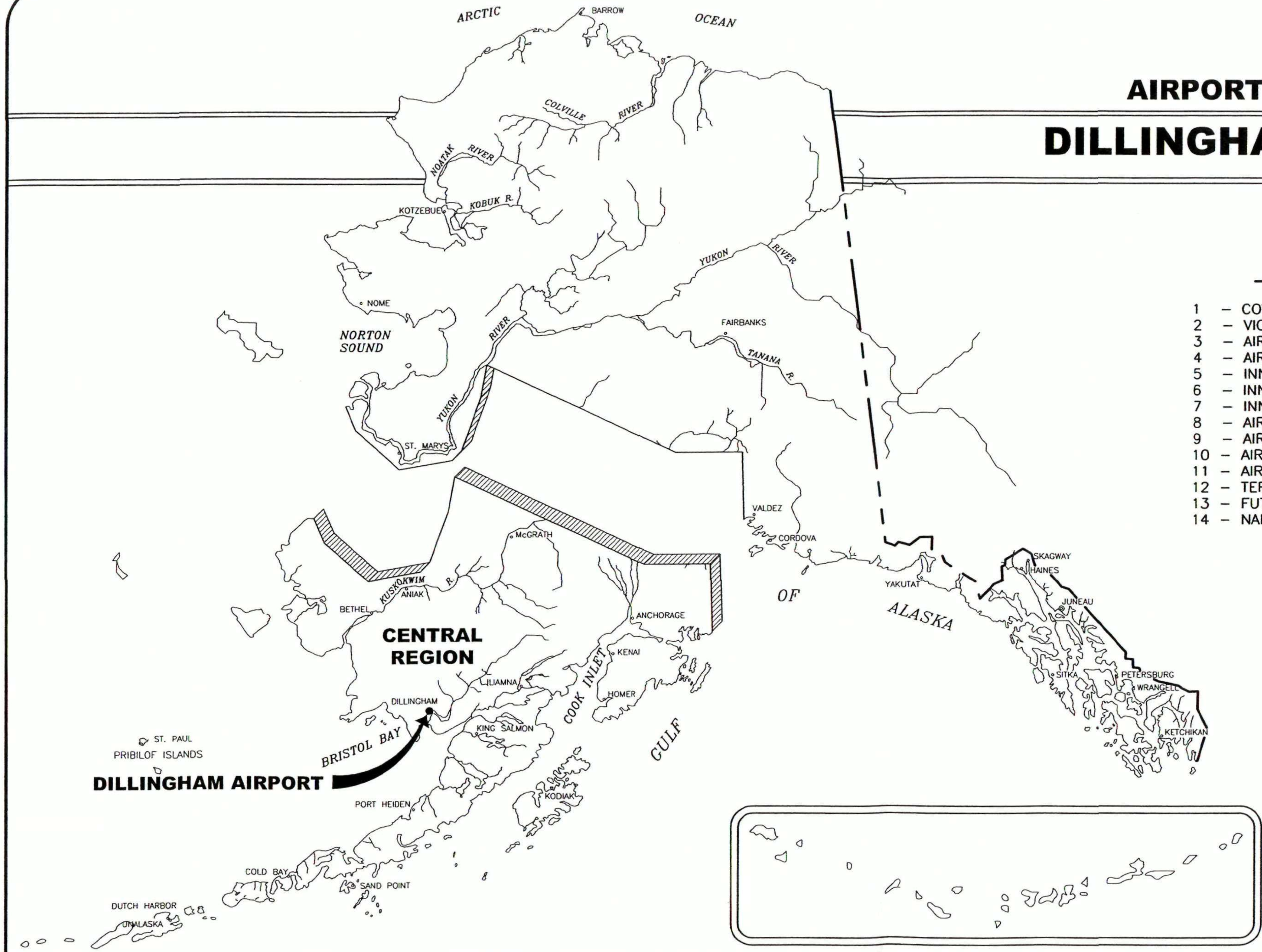
Other Long Term (Phase III) Needs

Expected Phase III projects not funded by the AIP include a new, publicly-sponsored consolidated passenger terminal or individual airline terminals built at the South Apron Expansion. Additional T-hangar and GA Apron lease lot development is expected in Phase III, and a full-service FBO may not be feasible until Phase III.

AIRPORT LAYOUT PLAN FOR

DILLINGHAM AIRPORT (DLG)

2005



DRAWING INDEX

1 – COVER SHEET AND INDEX
2 – VICINITY MAP, DATA TABLES, AND WIND DATA
3 – AIRPORT LAYOUT DRAWING – EXISTING
4 – AIRPORT LAYOUT DRAWING – ULTIMATE
5 – INNER APPROACH SURFACE PLAN & PROFILE – RUNWAY 1
6 – INNER APPROACH SURFACE PLAN & PROFILE – RUNWAY 19
7 – INNER APPROACH SURFACE PLAN & PROFILE – RUNWAY 8-26
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11 – AIRPORT PROPERTY MAP
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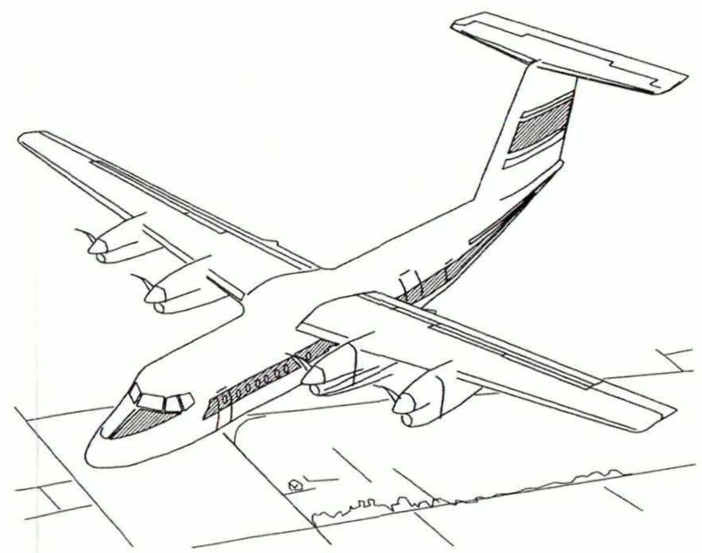
13 – FUTURE LAND USE DRAWING
14 – NARRATIVE REPORT



SPONSORED BY
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
CENTRAL REGION

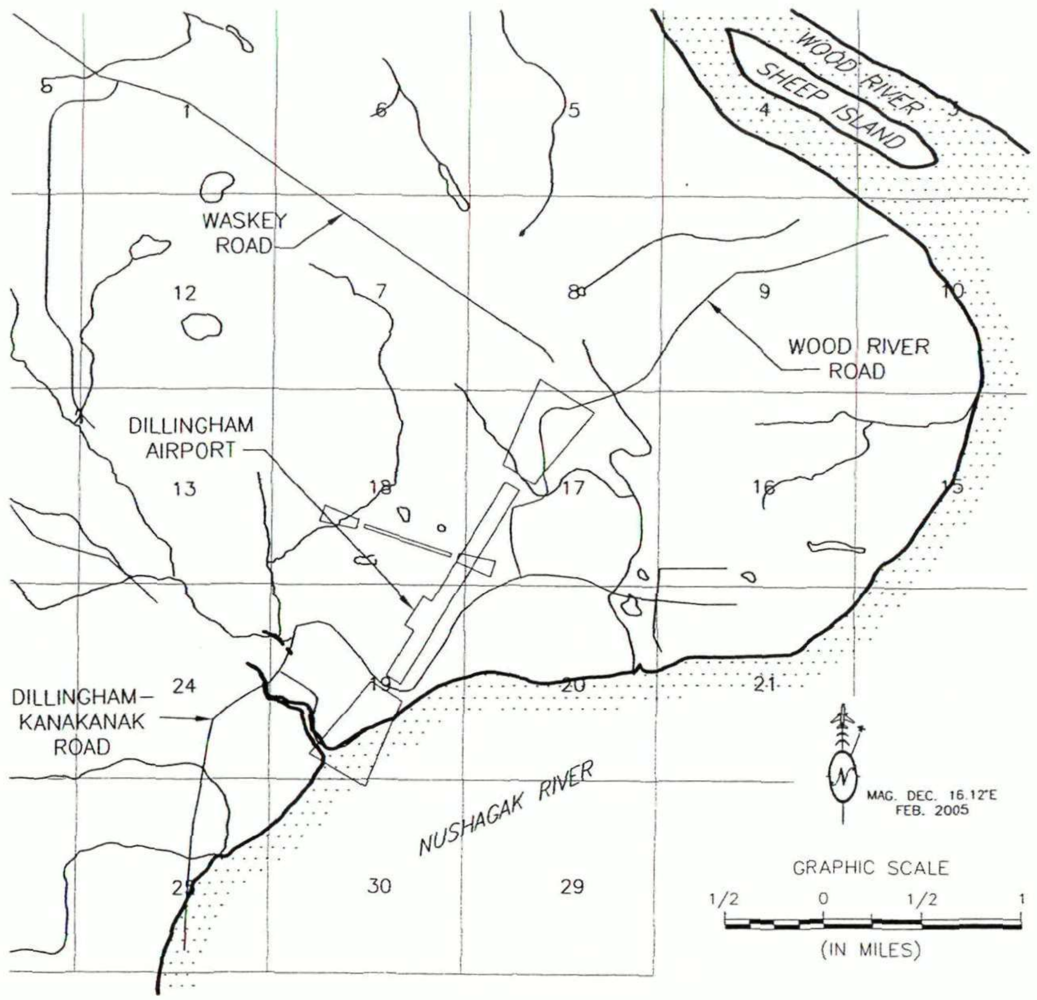
CONCUR	**DATE**
STEPHEN M. RYAN	**CONSTRUCTION & OPERATIONS DIRECTOR**
APPROVED	**DATE**
HARVEY M. DOUTHIT, P.E.	**REGIONAL PRECONSTRUCTION ENGINEER**

AIRPORT LAYOUT PLAN CONDITIONAL APPROVAL
SUBJECT TO ALP APPROVAL LETTER DATED ____________

By: ____________ DATE: ____________
FAA, AIRPORTS DIVISION
ALASKAN REGION, AAL-600

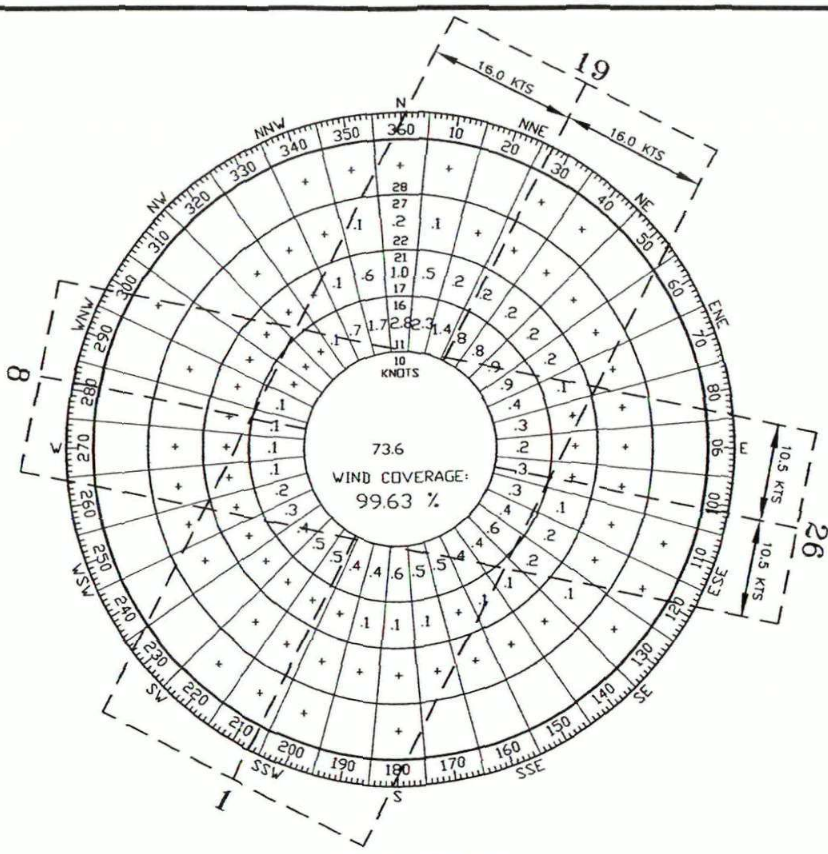
F.A.A. AIRSPACE REVIEW NUMBER:
00-ALL-

DILLINGHAM AIRPORT
AIRPORT LAYOUT PLAN



VICINITY MAP

T 13 S, R 55 W, SEC. 17, 18, 19, 20
SEWARD MERIDIAN



WIND DATA

RUNWAY:	SPEED:	WIND COVERAGE:
8-26	10.5 KNOTS	81.04%
8-26	13.0 KNOTS	88.19%
1-19	10.5 KNOTS	93.92%
1-19	13.0 KNOTS	96.95%
1-19	16.0 KNOTS	98.89%
1-19 / 8-26	10.5 KNOTS	97.64%
1-19 / 8-26	13.0 KNOTS	99.41%
1-19 / 8-26	16.0 / 10.5 KNOTS	99.63%
1-19 / 8-26	16.0 / 13.0 KNOTS	99.77%

SOURCE: ALASKA STATE CLIMATE CENTER
ENRI, UNIVERSITY OF ALASKA

PERIOD: 1992 – 1999

RUNWAY DATA TABLE

ITEM	RUNWAY 1-19 EXISTING	RUNWAY 1-19 ULTIMATE	RUNWAY 8-26 ULTIMATE
APPROACH SURFACES	34:1	50:1	20:1
VISIBILITY MINIMUMS	1 MILE	< 0.75 MILE	VISUAL
INSTRUMENT RUNWAY	NPI/NPI	PI / PI	VISUAL
RUNWAY SURFACE	A.C. PAVING	ASPHALT, GROOVED	GRAVEL
PAVEMENT STRENGTH (1000 LBS.)	S75, T160, TT280	S75, T160, TT280	12.5
TYPE	OTHER THAN UTILITY	OTHER THAN UTILITY	UTILITY
RUNWAY DIMENSION	150' x 6404'	150' x 6400'	60' x 3300'
AIRCRAFT APPROACH CATEGORY	C	C	A
AIRPLANE DESIGN GROUP	III	III	I
TRUE BEARING	N 26°55'36.39" E	N 26°55'36.39" E	S 78°48'00.00" E
EFFECTIVE GRADE	.26%	0.10%	0.37%
TOUCHDOWN ZONE ELEVATION (NAVD88)	87.5' / 87.2'	85.8' / 85.8'	N/A
RUNWAY 1 END COORDINATE (LATITUDE)	59°02'12.59"N	59°02'17.64"N	59°02'56.18"N
(NAD83) (LONGITUDE)	158°30'47.18"W	158°30'45.47"W	158°31'37.72"W
RUNWAY 19 END COORDINATE (LATITUDE)	59°03'08.95"N	59°03'14.07"N	59°02'50.12"N
(NAD83) (LONGITUDE)	158°29'52.60"W	158°29'50.88"W	158°30'35.74"W
RUNWAY SAFETY AREA (RSA)	200' x 6893'	500' x 8400'	120' x 3780'
RUNWAY 1 LENGTH BEYOND R/W END	288'	1000'	240'
RUNWAY 19 LENGTH BEYOND R/W END	200'	1000'	240'
RUNWAY PROTECTION ZONE (RPZ)	1700'x500'x1010'	2500'x1000'x1700'	250'x450'x1000'
RUNWAY OBJECT FREE AREA	300' x 7604'	800' x 8400'	250' x 3780'
RUNWAY OBSTACLE FREE ZONE	300' x 6804'	400' x 6800'	250' x 3700'
RUNWAY LIGHTING	HIRL	HIRL	MIRL
RUNWAY MARKING	NON-PRECISION	PRECISION	VISUAL
RUNWAY VISUAL AND INSTRUMENT NAVAIDS	1 – VOR/DME, REIL 19 – LOC/DME VASI – 4, ODALS	1 – MALSR, REIL 19 – VOR/DME MALSR, REIL	REIL/REIL

HELIPORT DATA TABLE

ITEM	ULTIMATE
ELEVATION (NAVD88 DATUM)	70' (EST.)
HELIPORT SURFACE	TLOF – CONCRETE
APPROACH SURFACES	VISUAL
HELIPORT LIGHTING	YES
HELIPORT MARKING	YES
TOUCHDOWN AND LIFT-OFF AREA	32' x 32'
FINAL APPROACH AND TAKEOFF AREA	65' x 65'
HELIPORT SAFETY AREA	105' x 105'
PROTECTION ZONE DIMENSIONS	
LENGTH	280'
INNER WIDTH	65'
OUTER WIDTH	94'

LEGEND

ITEM	EXISTING	FUTURE
PROPERTY LINE		
BUILDING RESTRICTION LINE	BRL	BRL
AIRPORT REFERENCE POINT (A.R.P.)		
WIND CONE AND SEGMENTED CIRCLE		
CONTOURS	70	70
ROADWAYS		
BUILDINGS		
ROTATING BEACON		
SHORELINE		
ANTENNA		
VASI		
BLUFF		
FENCE	X X X	X X X
MALSR		
REIL		
TAXIWAY		A
THRESHOLD		
RUNWAY SAFETY AREA	RSA	RSA
OBJECT FREE AREA	OFA	OFA
OBSTACLE FREE ZONE	OFZ	OFZ

MODIFICATIONS TO STANDARDS AND NON-STANDARD CONDITIONS

ITEM	EXISTING	STANDARD	ULTIMATE
R/W 1-19 SAFETY AREA	200' x 6893'	500' x 8400'	500' x 8400'
R/W 1-19 5' LINE OF SIGHT	NO	YES	YES *
R/W 1-19 PART 77 PENETRATIONS	YES	NO	NO
R/W 1-19 EAST SIDE STRUCTURES INSIDE BRL	YES	NO	NO
R/W 1-19 APPROACH SLOPE PENETRATIONS	YES	NO	NO
R/W 1-19 OBJECT FREE AREA	300' x 7600'	800' x 8400'	800' x 8400' **
R/W 1-19 SHOULDERS	20'	25'	20'
R/W 1-19 BLAST PADS	NONE	150' x 200'	140' x 200'

* FULL PARALLEL TAXIWAY
** EXISTING CEMETARY TO REMAIN

AIRPORT DATA TABLE

ITEM		EXISTING	FUTURE
IACO AIRPORT IDENTIFIER		PADL	PADL
NATIONAL AIRPORT IDENTIFIER		DLG	DLG
AIRPORT ELEVATION (NAVD88)		87.5	85.8'
AIRPORT REFERENCE POINT (A.R.P.) (NAD83)	LAT.	N/A	59°02'48.34"N
	LONG.	N/A	158°30'34.69"W
AIRPORT REFERENCE CODE		C-III	C-III
MEAN MAX. TEMPERATURE, HOTTEST MONTH (°F)		62.5°	62.5°
AIRPORT AND TERMINAL NAVIGATION AIDS		VOR, DME DF, NDB	VOR, DME DF, NDB
AIRPORT LIGHTING		ROTATING BEACON	ROTATING BEACON
TAXIWAY LIGHTING – RUNWAY 1-19		MITL	MITL
TAXIWAY LIGHTING – RUNWAY 8-26		N/A	N/A
RAMP LIGHTING		FLOOD	FLOOD
SURVEY SOURCE AND TYPE		ASCG, 2002, TOPO.	
MAGNETIC DECLINATION, YEAR		16.2° E, FEB 2005	

FILE: 1110\4331\2005 ALP
DATE: MAY 2005

AIRPORT LAYOUT PLAN CONDITIONAL APPROVAL
SUBJECT TO ALP APPROVAL LETTER DATED ____________

By: ____________ DATE: ____________
FAA, AIRPORTS DIVISION
ALASKAN REGION, AAL-600

F.A.A. AIRSPACE REVIEW NUMBER: 00-AAL-

BY	DATE	REVISIONS

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
CENTRAL REGION

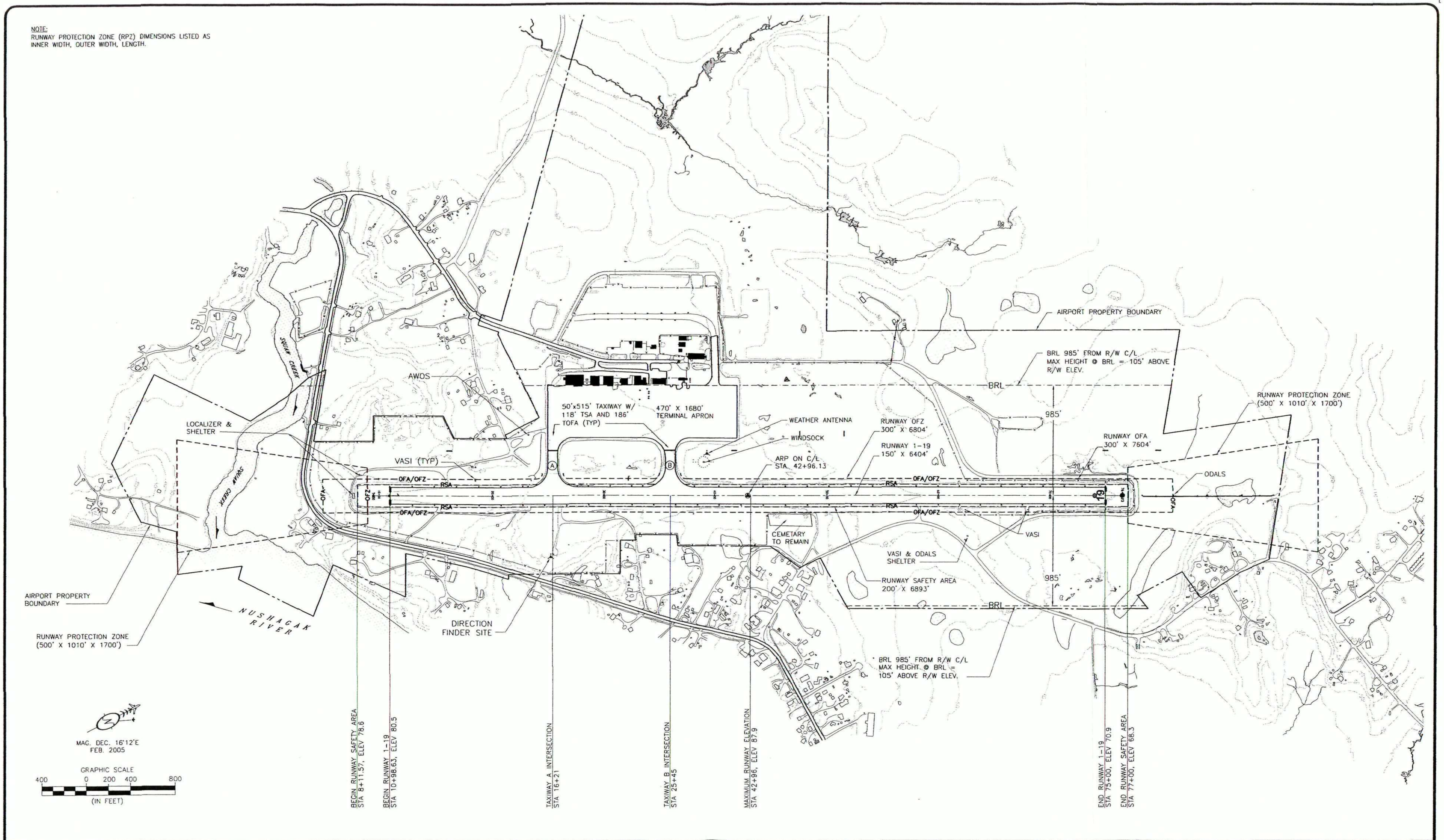
APPROVED: STEPHEN M. RYAN, P.E. — DESIGN SECTION CHIEF
APPROVED: HARVEY M. DOUTHIT, P.E. — PROJECT MANAGER

DATE ____________
DESIGN ____________
DRAWN ____________
CHECKED ____________

DILLINGHAM AIRPORT
AIRPORT LAYOUT PLAN

VICINITY MAP, DATA TABLES, AND WIND DATA

SHEET 2 OF 14



FILE: 1110\4331\2005 ALP
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ALASKAN REGION, AAL-600

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CENTRAL REGION

APPROVED: STEPHEN M. RYAN, P.E. — DESIGN SECTION CHIEF
APPROVED: HARVEY M. DOUTHIT, P.E. — PROJECT MANAGER

DATE ____________
DESIGN ____________
DRAWN ____________
CHECKED ____________

DILLINGHAM AIRPORT
AIRPORT LAYOUT

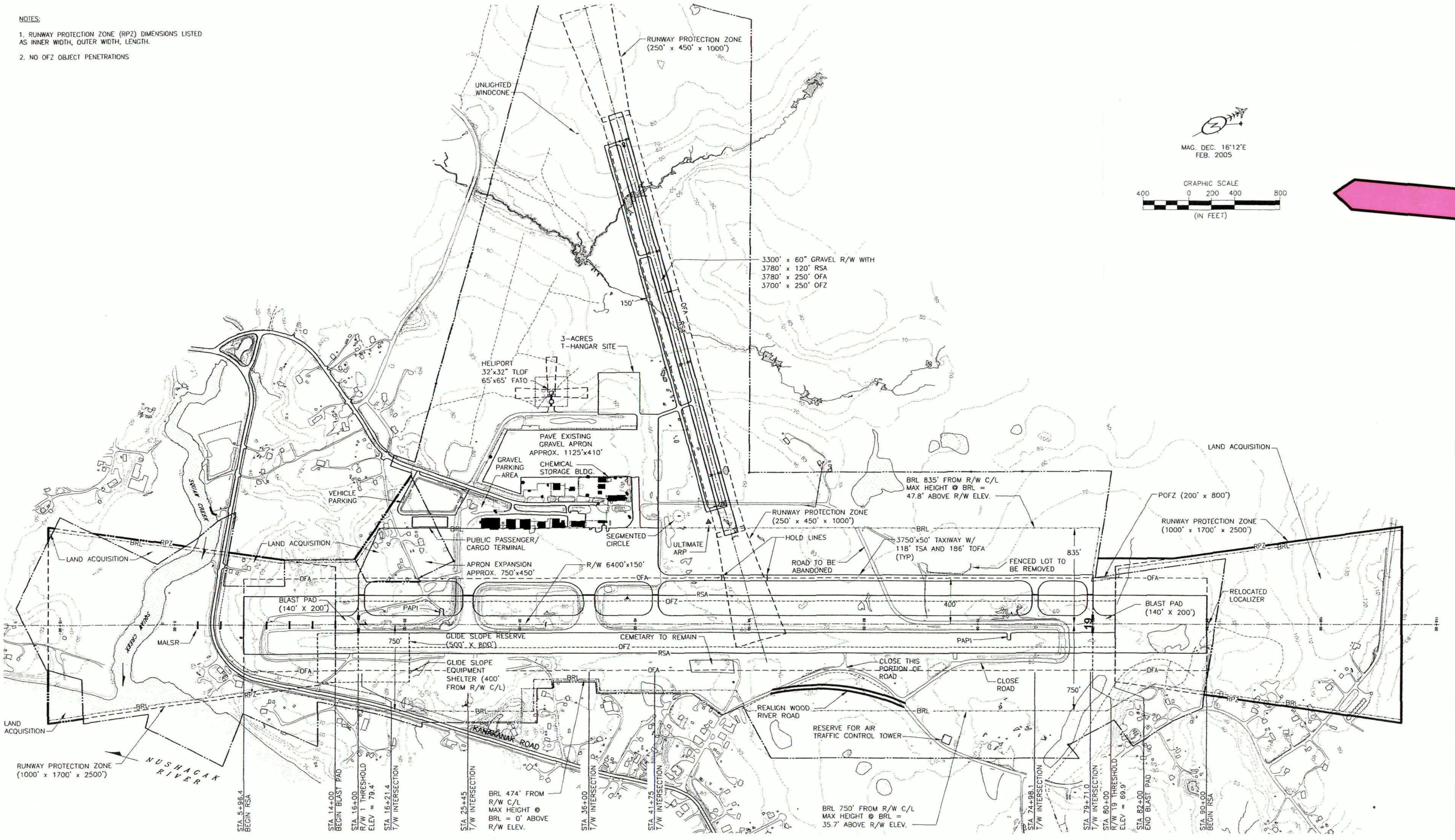
AIRPORT LAYOUT DRAWING - EXISTING

SHEET 3 OF 14

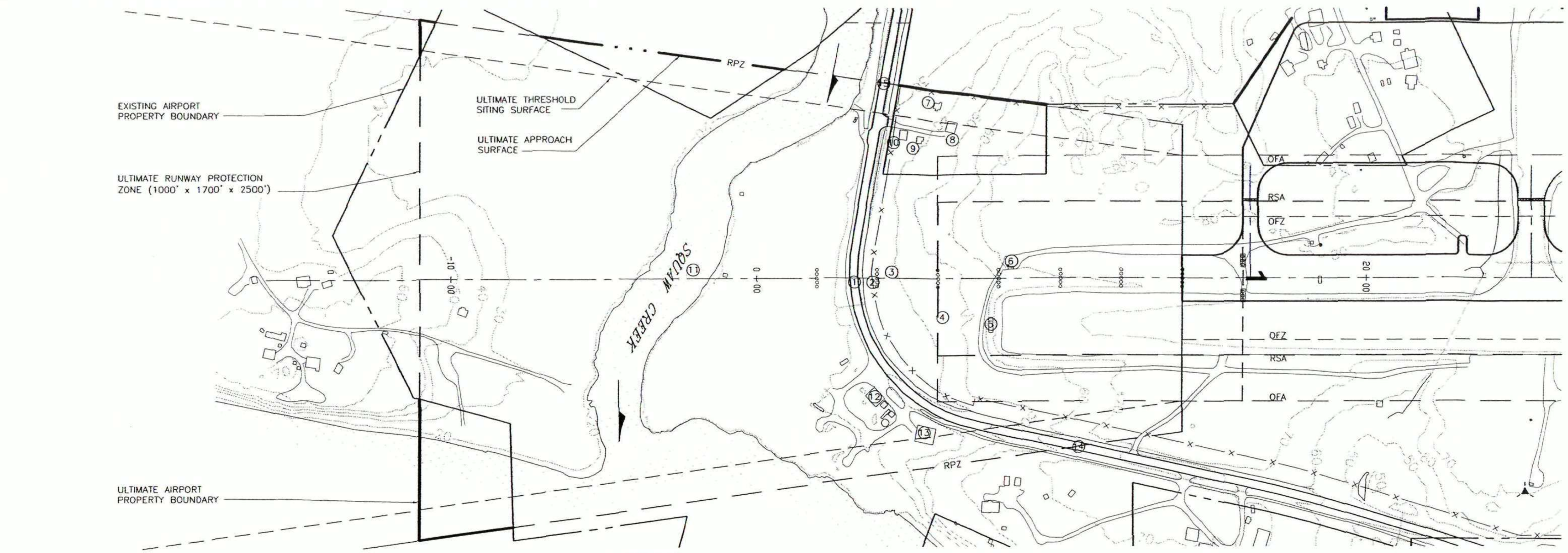
NOTES:

1. RUNWAY PROTECTION ZONE (RPZ) DIMENSIONS LISTED AS INNER WIDTH, OUTER WIDTH, LENGTH.

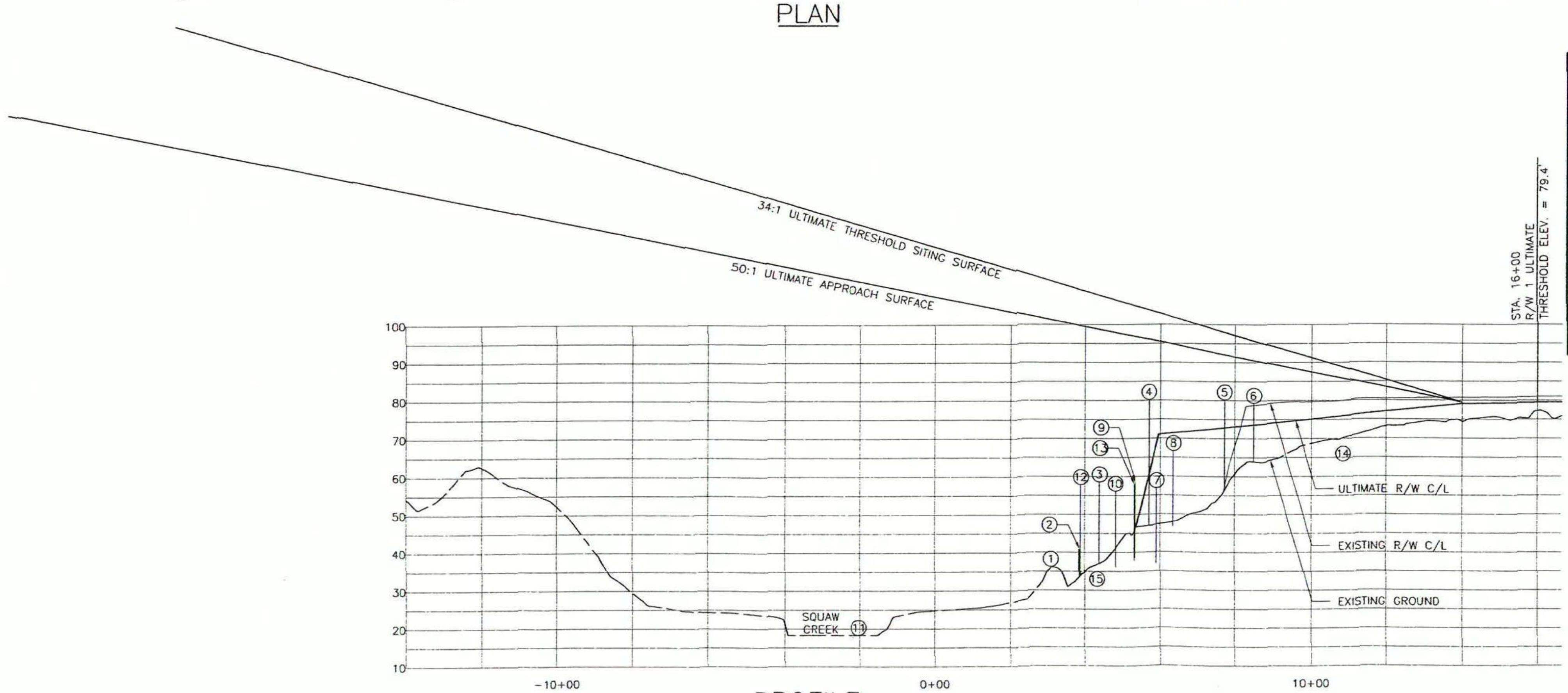
2. NO OFZ OBJECT PENETRATIONS



FILE: 1110\4331\2005 ALP DATE: MAY 2005	AIRPORT LAYOUT PLAN CONDITIONAL APPROVAL SUBJECT TO ALP APPROVAL LETTER DATED ______ By: ______ DATE: ______ FAA, AIRPORTS DIVISION ALASKAN REGION, AAL-600 F.A.A. AIRSPACE REVIEW NUMBER: 00-AAL-	BY | DATE | REVISIONS	STATE OF ALASKA **DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES** CENTRAL REGION APPROVED: STEPHEN M. RYAN, P.E. DESIGN SECTION CHIEF APPROVED: HARVEY M. DOUTHIT, P.E. PROJECT MANAGER	DATE ______ DESIGN ______ DRAWN ______ CHECKED ______	**DILLINGHAM AIRPORT** AIRPORT LAYOUT PLAN AIRPORT LAYOUT DRAWING - ULTIMATE	SHEET 4 OF 14



PLAN



PROFILE

RUNWAY 1 APPROACH SURFACE OBSTRUCTION TABLE

OBSTRUCTION ID #	DESCRIPTION	RUNWAY STA/OFFSET	OBSTRUCTION ELEVATION	SURFACE PENETRATED	AMOUNT OF PENETRATION	DISPOSITION
1	ROAD	3+19, 0	36'	NONE	0'	TO REMAIN
2	FENCE	3+87, 0	43	NONE	0'	TO REMAIN
3	ELECT. UTILITY POLE	4+38, 21L	80' (APPROX)	NONE	0'	TO REMAIN
4	TREES	5+69, 105R	87' (APPROX)	NONE	0'	TO BE REMOVED
5	LOCALIZER ANTENNA	7+72, 150R	80' (APPROX)	NONE	0'	TO BE REMOVED
6	LOCALIZER BLDG	8+49, 35L	86' (APPROX)	NONE	0'	TO BE REMOVED
7	BUILDING	5+90, 549L	57' (APPROX)	NONE	0'	TO BE REMOVED
8	BUILDING	6+36, 478L	67' (APPROX)	NONE	0'	TO BE REMOVED
9	BUILDING	5+33, 441L	59' (APPROX)	NONE	0'	TO BE REMOVED
10	BUILDING	4+80, 451L	56' (APPROX)	NONE	0'	TO BE REMOVED
11	SQUAW CREEK	2+58, 0	18' (APPROX)	NONE	0'	TO REMAIN
12	BUILDING	3+90, 355R	57' (APPROX)	NONE	0'	TO BE REMOVED
13	BUILDING	5+31, 477R	56' (APPROX)	NONE	0'	TO BE REMOVED
14	ROAD	10+85, 540R	64'	NONE	0'	TO REMAIN
15	ROAD	4+32, 635L	31'	NONE	0'	TO REMAIN

NOTES:

1. TOUCHDOWN ZONE ELEVATION = 83.9'.
2. R/W 1 ELEVATION = 79.4'.
3. THERE ARE NO PENETRATIONS AT A 50:1 APPROACH SURFACE FOR RUNWAY 1 (EXISTING AND ULTIMATE).
4. BOTTOM OF OBSTRUCTION NUMBER CIRCLE INDICATES HEIGHT OF OBSTRUCTION.
5. RUNWAY PROTECTION ZONE (RPZ) DIMENSIONS LISTED AS INNER WIDTH x OUTER WIDTH x LENGTH.
6. MALSR LIGHTS NOT SHOWN ON PROFILE.
7. NO THRESHOLD SITING SURFACE OBJECT PENETRATIONS.
8. THE OBSTRUCTION CLEARANCE SLOPE FOR RUNWAY 1 IS EQUAL TO THE 50:1 ULTIMATE APPROACH SURFACE.

MAG. DEC. 16°12'E
FEB. 2005

GRAPHIC SCALE
200 0 100 200 400
(IN FEET)

FILE: 1110\4331\2005 ALP
DATE: MAY 2005

AIRPORT LAYOUT PLAN CONDITIONAL APPROVAL SUBJECT TO ALP APPROVAL LETTER DATED ____________

By: ____________ DATE: ____________
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ALASKAN REGION, AAL-600

F.A.A. AIRSPACE REVIEW NUMBER: 00-AAL-

BY	DATE	REVISIONS

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
CENTRAL REGION

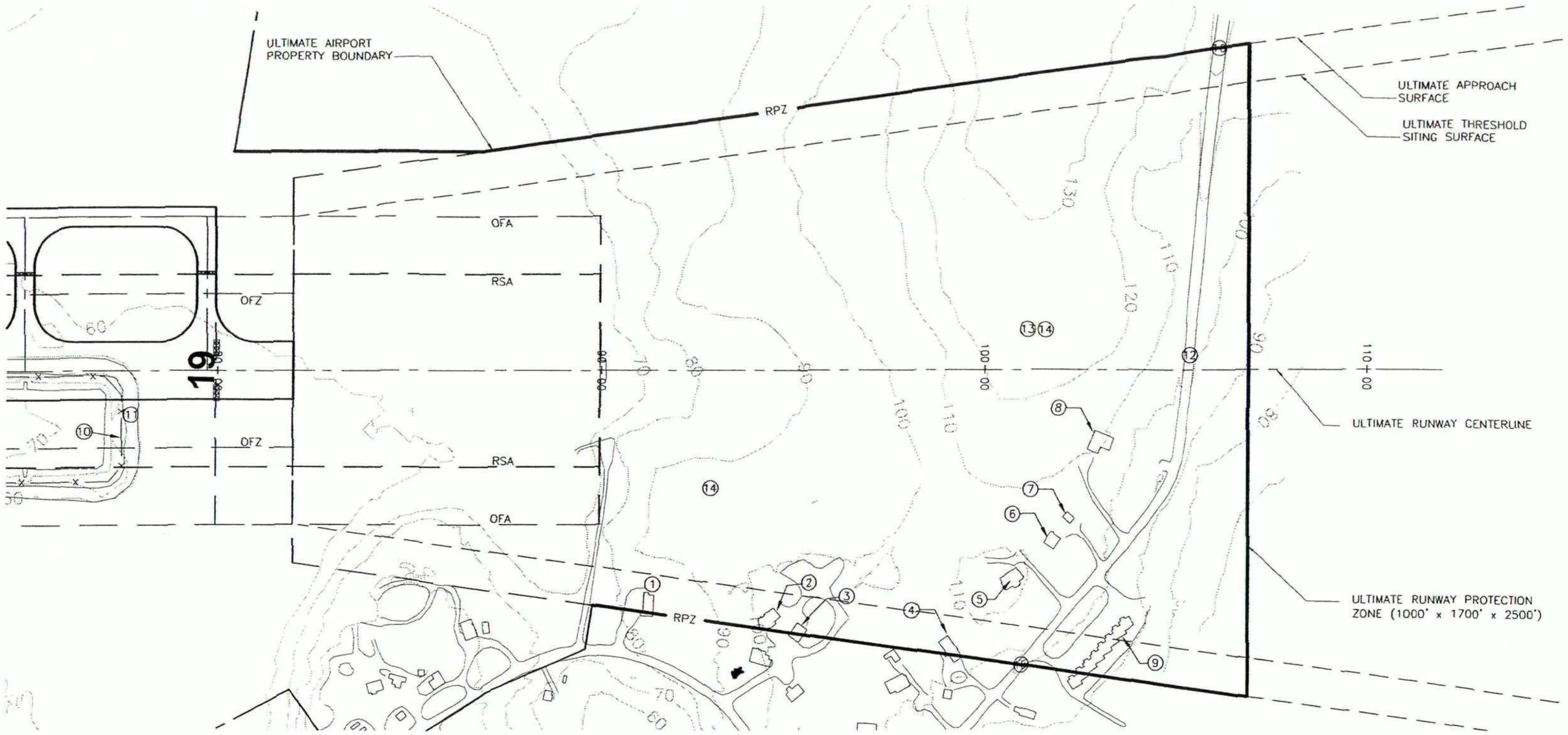
APPROVED: STEPHEN M. RYAN, P.E. — DESIGN SECTION CHIEF
APPROVED: HARVEY M. DOUTHIT, P.E. — PROJECT MANAGER

DATE ____________
DESIGN ____________
DRAWN ____________
CHECKED ____________

DILLINGHAM AIRPORT
AIRPORT LAYOUT PLAN

INNER APPROACH SURFACE PLAN & PROFILE
RUNWAY 1

SHEET 5 OF 14



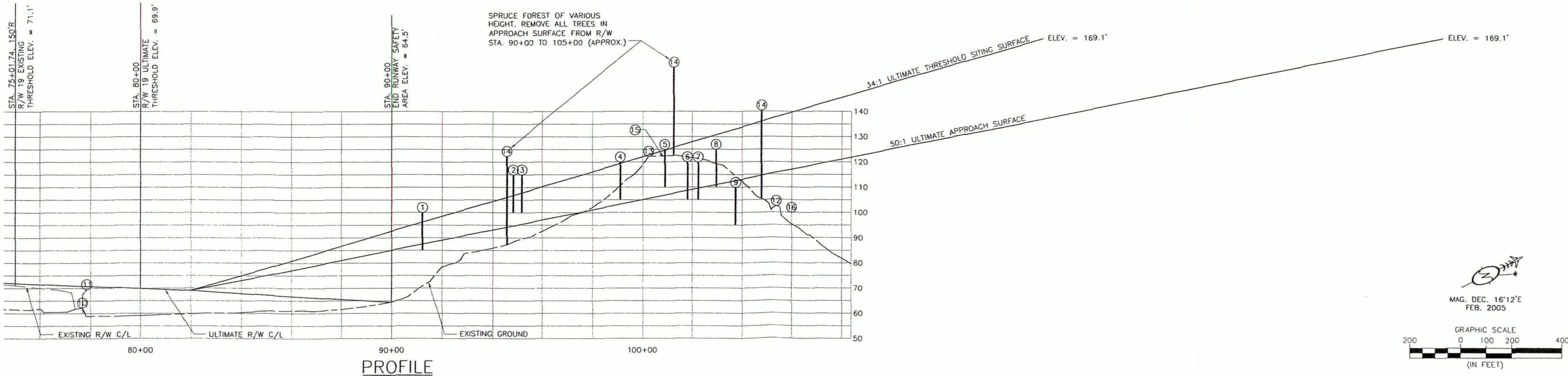
PLAN

RUNWAY 19 APPROACH SURFACE OBSTRUCTION TABLE

OBSTRUCTION ID #	DESCRIPTION	RUNWAY STA/OFFSET	OBSTRUCTION ELEVATION	SURFACE PENETRATED	AMOUNT OF PENETRATION	DISPOSITION
1	BUILDING	91+18, 577'R	100'	34:1 APPROACH	APPROX. 3.8'	TO BE REMOVED
2	BUILDING	94+49, 616'R	115'	34:1 APPROACH	APPROX. 8.2'	TO BE REMOVED
3	BUILDING	95+13, 655'R	115'	34:1 APPROACH	APPROX. 7.2'	TO BE REMOVED
4	BUILDING	99+07, 691'R	120'	34:1 APPROACH	APPROX. 0.6'	TO BE REMOVED
5	BUILDING	100+86, 513'R	125'	34:1 APPROACH	APPROX. 0.3'	TO BE REMOVED
6	BUILDING	92+78, 420'R	120'	50:1 APPROACH	APPROX. 11.3'	TO BE REMOVED
7	BUILDING	102+22, 369'R	120'	50:1 APPROACH	APPROX. 10.4'	TO BE REMOVED
8	BUILDING	102+93, 158'R	125'	50:1 APPROACH	APPROX. 13.9'	TO BE REMOVED
9	BUILDING	103+71, 641'R	110'	NONE	0'	TO BE REMOVED
10	ROAD	77+76, 176'R	62.3'	NONE	0'	TO BE CLOSED
11	FENCE	77+04, 14.5'R	APPROX. 70.0'	NONE	0'	TO BE REMOVED
12	ROAD	105+36, 0	102.6'	NONE	0'	TO REMAIN
13	TERRAIN	100+20, 0	122.2'	50:1 APPROACH	APPROX. 16.6'	TO REMAIN
14	TREES	VARIES	VARIES	34:1 APPROACH	APPROX. 15'	TO BE REMOVED
15	ROAD	100+87, 765'R	122'	NONE	0'	TO REMAIN
16	ROAD	106+01, 833'L	100'	NONE	0'	TO REMAIN

NOTES:

1. TOUCHDOWN ZONE ELEVATION = 82.3'
2. R/W 19 ELEVATION = 69.9'
3. THERE ARE 10 PENETRATIONS AT A 50:1 APPROACH SURFACE FOR RUNWAY 19 (SEE OBSTRUCTION TABLE THIS SHEET.)
4. BOTTOM OF OBSTRUCTION NUMBER CIRCLE INDICATES HEIGHT OF OBSTRUCTION.
5. RUNWAY PROTECTION ZONE (RPZ) DIMENSIONS LISTED AS INNER WIDTH x OUTER WIDTH x LENGTH.
6. OBJECTS PENETRATING THE THRESHOLD SITING SURFACE TO BE REMOVED.
7. THE OBSTRUCTION CLEARANCE SLOPE FOR RUNWAY 19 IS EQUAL TO THE 34:1 ULTIMATE THRESHOLD SITING SURFACE.
8. TSS IS FOR A PRECISION APPROACH OR VISIBILITY MINS LESS THAN 3/4 MILE



PROFILE

FILE:
1110\4331\2005 ALP
DATE:
MAY 2005

AIRPORT LAYOUT PLAN CONDITIONAL APPROVAL
SUBJECT TO ALP APPROVAL LETTER DATED ______

By: ______ DATE: ______
FAA, AIRPORTS DIVISION
ALASKAN REGION, AAL-600

F.A.A. AIRSPACE REVIEW NUMBER: 00-AAL-

BY	DATE	REVISIONS

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
CENTRAL REGION

APPROVED:
STEPHEN M. RYAN, P.E. DESIGN SECTION CHIEF

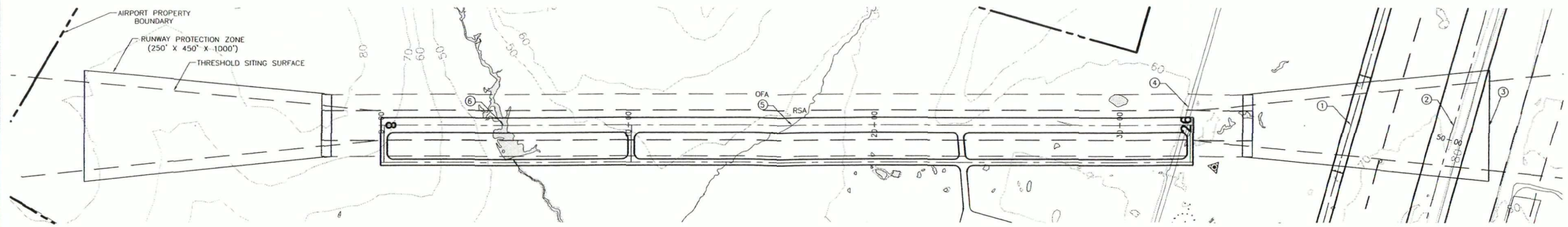
APPROVED:
HARVEY M. DOUTHIT, P.E. PROJECT MANAGER

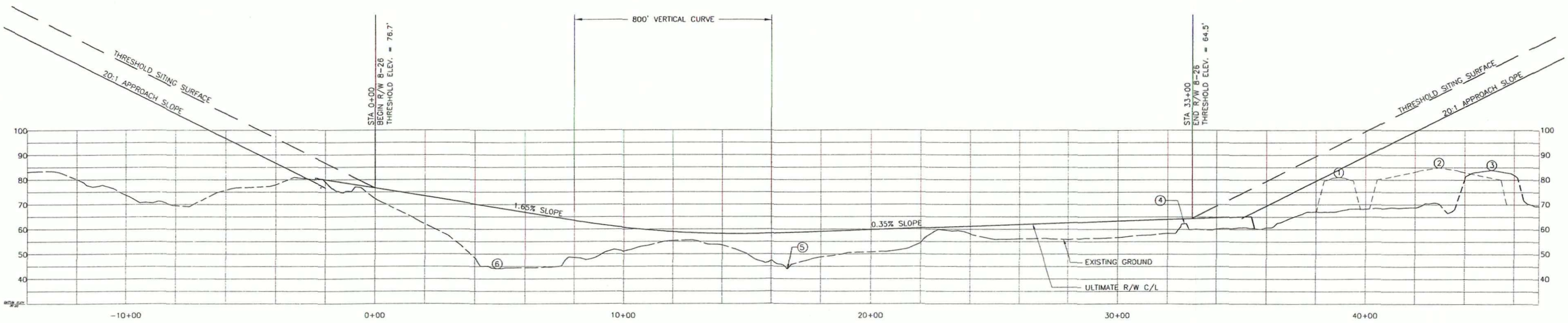
DATE ______
DESIGN ______
DRAWN ______
CHECKED ______

DILLINGHAM AIRPORT
AIRPORT LAYOUT PLAN

INNER APPROACH SURFACE PLAN & PROFILE
RUNWAY 19

SHEET 6 OF 14



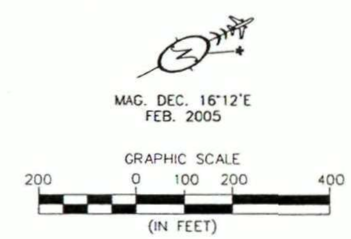


GRAVEL RUNWAY APPROACH SURFACE OBSTRUCTION TABLE

OBSTRUCTION ID #	DESCRIPTION	OBSTRUCTION STA/OFFSET	OBSTRUCTION ELEVATION	SURFACE PENETRATED	AMOUNT OF PENETRATION	DISPOSITION
1	NEW TAXIWAY C/L	39+38.52 , 0	81'	NONE	0'	TO REMAIN
2	NEW RUNWAY C/L	43+54.12 , 0	85'	NONE	0'	TO REMAIN
3	EXIST. R/W C/L	45+09.61 , 0	84'	NONE	0'	TO BE REMOVED
4	AIRPORT ROAD	32+69.73 , 0	62'	NONE	0'	TO BE REMOVED
5	STREAM	16+67.87 , 0	44'	NONE	0'	TO REMAIN - PLACE CULVERT
6	STREAM	04+92.86 , 0	45'	NONE	0'	TO REMAIN - PLACE CULVERT

NOTES:

1. TOUCHDOWN ZONE ELEVATION = 76.7'.
2. R/W 8 ELEVATION = 76.7', R/W 26 ELEVATION = 65.3'.
3. BOTTOM OF OBSTRUCTION NUMBER CIRCLE INDICATES ELEVATION OF OBSTRUCTION, UNLESS OTHERWISE NOTED.
4. THERE ARE NO PENETRATIONS AT A 20:1 SLOPE FOR RUNWAY 8-26.
5. RUNWAY PROTECTION ZONE (RPZ) DIMENSIONS LISTED AS INNER WIDTH x OUTER WIDTH x LENGTH.
6. NO THRESHOLD SITING SURFACE OBJECT PENETRATIONS.
7. FOR BOTH APPROACHES THE 20:1 APPROACH SLOPE EQUALS THE OBSTRUCTION CLEARANCE SLOPE.



FILE: 1110\4331\2005 ALP
DATE: MAY 2005

AIRPORT LAYOUT PLAN CONDITIONAL APPROVAL
SUBJECT TO ALP APPROVAL LETTER DATED ____________

By: ____________ DATE: ____________
FAA, AIRPORTS DIVISION
ALASKAN REGION, AAL-600

F.A.A. AIRSPACE REVIEW NUMBER: 00-AAL-

BY | DATE | REVISIONS

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
CENTRAL REGION

APPROVED: STEPHEN M. RYAN, P.E. — DESIGN SECTION CHIEF
APPROVED: HARVEY M. DOUTHIT, P.E. — PROJECT MANAGER

DATE ____________
DESIGN ____________
DRAWN ____________
CHECKED ____________

DILLINGHAM AIRPORT
AIRPORT LAYOUT PLAN

INNER APPROACH SURFACE PLAN & PROFILE
RUNWAY 8-26

SHEET 7 OF 14

NOTE: VERTICAL DATUM FOR THIS SHEET IS NAD 88. REFER TO THE INNER PORTION OF THE APPROACH SURFACE PLAN VIEW DETAILS FOR CLOSE-IN OBSTRUCTIONS.

ESTABLISHED AIRPORT ELEV.=85.8'

R/W 1 THRESHOLD ELEV.=79.4'
R/W 19 THRESHOLD ELEV.=69.9'

R/W 8 THRESHOLD ELEV.=76.7'
R/W 26 THRESHOLD ELEV.=64.5'

NOTE: CROSSWIND RUNWAY HORIZONTAL SURFACE WAS INCREASED 5.1' TO MATCH PRIMARY RUNWAY HORIZONTAL SURFACE.

GRAPHIC SCALE
2000 0 2000 4000
(IN FEET)

FILE: T110\4331\2005 ALP
DATE: MAY 2005

AIRPORT LAYOUT PLAN CONDITIONAL APPROVAL SUBJECT TO ALP APPROVAL LETTER DATED ______

By: ______ DATE: ______
FAA, AIRPORTS DIVISION
ALASKAN REGION, AAL-600

F.A.A. AIRSPACE REVIEW NUMBER: 00-AAL-

BY	DATE	REVISIONS

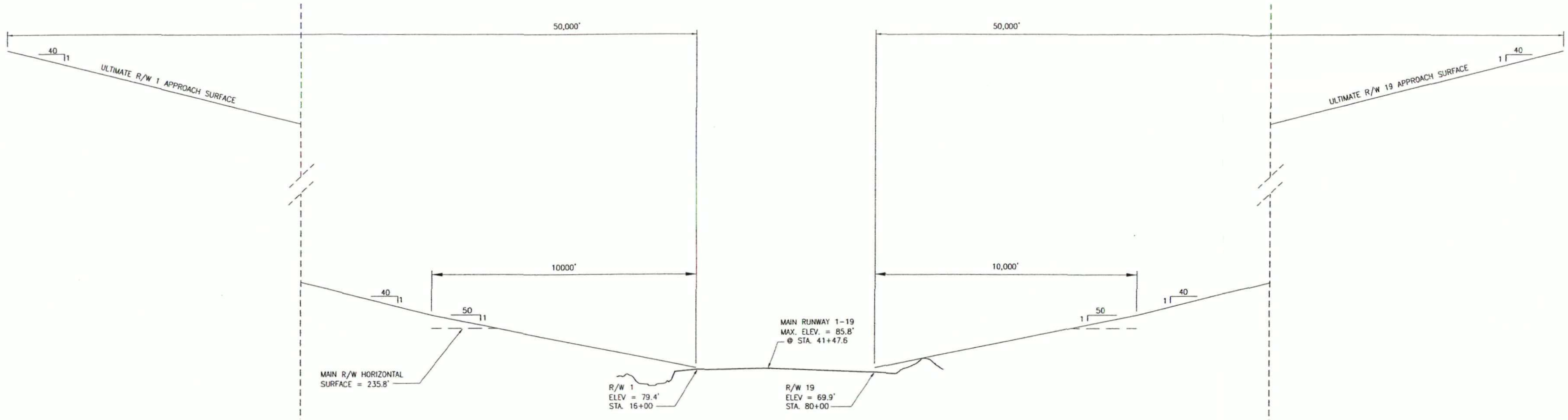
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
CENTRAL REGION

APPROVED: ______ STEPHEN M. RYAN, P.E. — DESIGN SECTION CHIEF
APPROVED: ______ HARVEY M. DOUTHIT, P.E. — PROJECT MANAGER

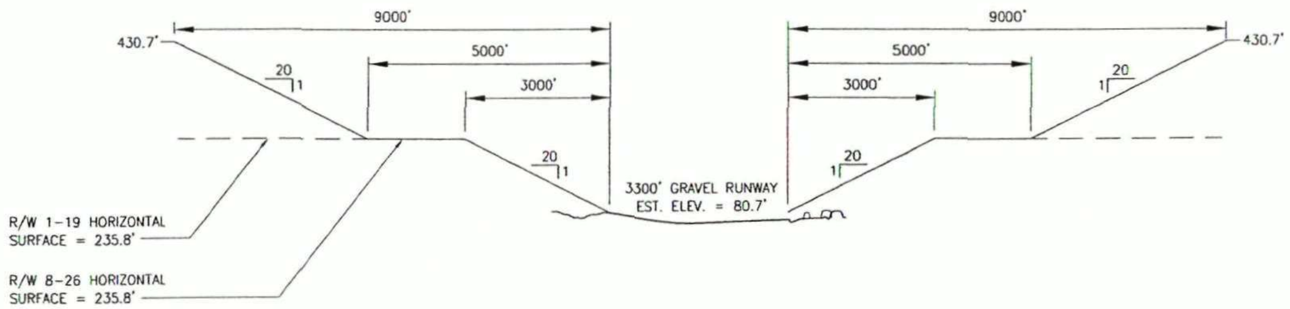
DATE 5/2005
DESIGN RG
DRAWN RG
CHECKED SR

DILLINGHAM AIRPORT
AIRPORT LAYOUT PLAN
AIRPORT AIRSPACE DRAWING

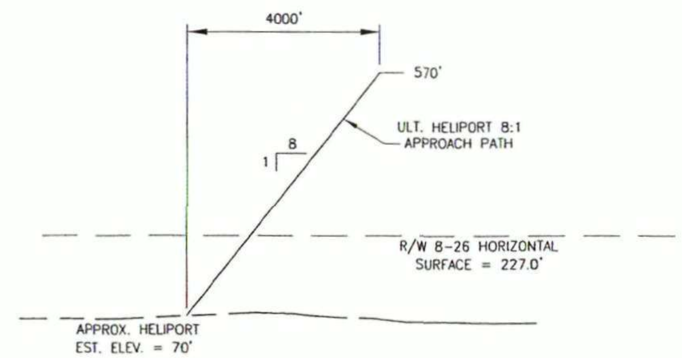
SHEET 8 OF 14



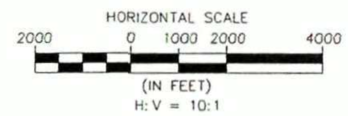
RUNWAY 1-19 PROFILE



RUNWAY 8-26 PROFILE



HELIPORT APPROACH PROFILE



FILE: 1110\4331\2005 ALP
DATE: MAY 2005

AIRPORT LAYOUT PLAN CONDITIONAL APPROVAL
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By: ____________ DATE: ____________
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ALASKAN REGION, AAL-600

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STATE OF ALASKA
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CENTRAL REGION

APPROVED: STEPHEN M. RYAN, P.E. — DESIGN SECTION CHIEF
APPROVED: HARVEY M. DOUTHIT, P.E. — PROJECT MANAGER

DATE ____
DESIGN ____
DRAWN ____
CHECKED ____

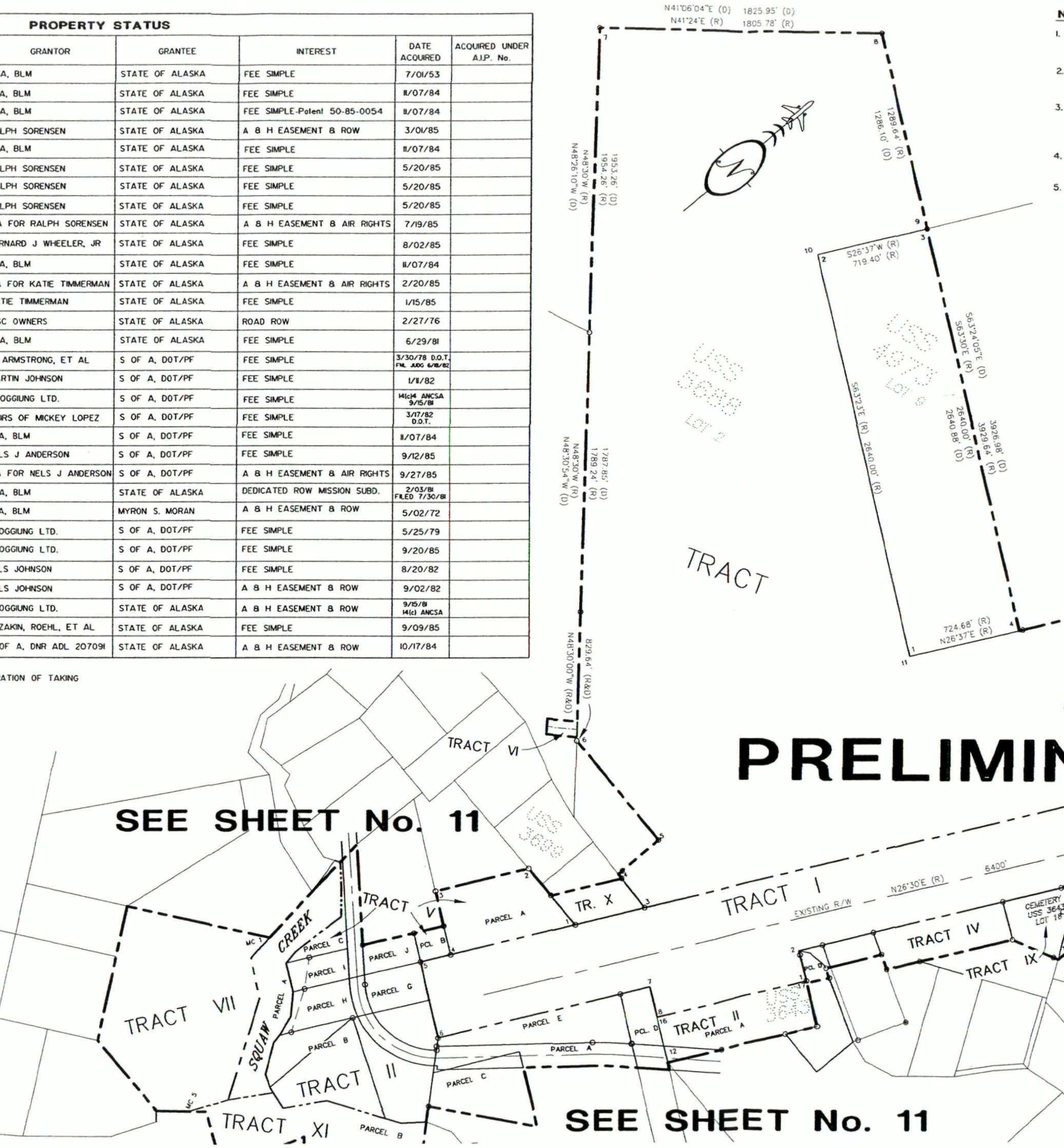
DILLINGHAM AIRPORT
AIRPORT LAYOUT PLAN
AIRPORT AIRSPACE DRAWING PROFILES

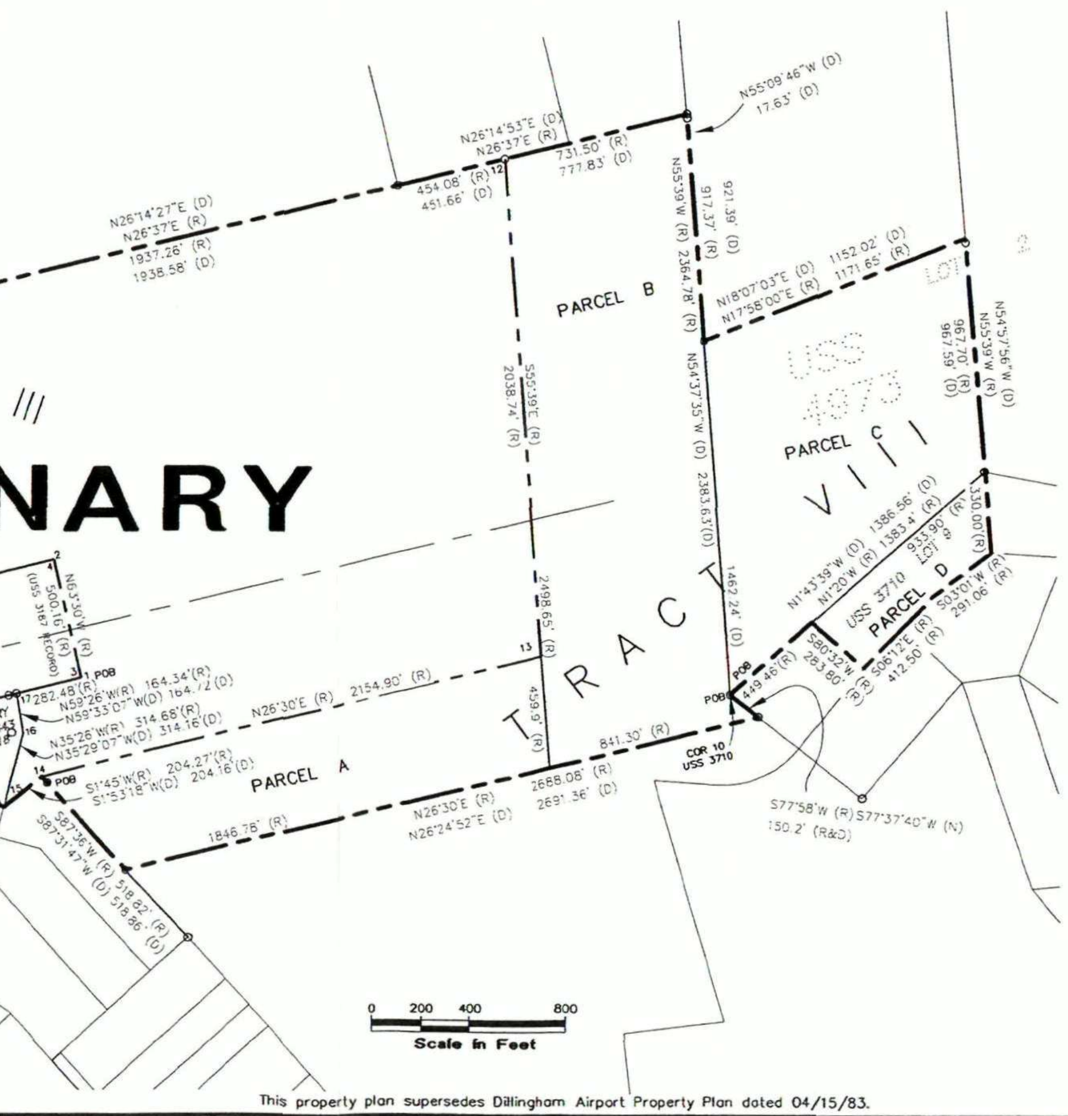
SHEET 9 OF 14

PROPERTY STATUS

TRACT	PARCEL	ADA NO.	AREA ACRES	GRANTOR	GRANTEE	INTEREST	DATE ACQUIRED	ACQUIRED UNDER A.I.P. No.
TRACT I		10191	55.67	USA, BLM	STATE OF ALASKA	FEE SIMPLE	7/01/53	
TRACT II	A	10168	6.89	USA, BLM	STATE OF ALASKA	FEE SIMPLE	11/07/84	
TRACT II	B		7.35	USA, BLM	STATE OF ALASKA	FEE SIMPLE-Patent 50-85-0054	11/07/84	
TRACT II	C		4.445	RALPH SORENSEN	STATE OF ALASKA	A & H EASEMENT & ROW	3/01/85	
TRACT II	D		1.62	USA, BLM	STATE OF ALASKA	FEE SIMPLE	11/07/84	
TRACT II	E-1		5.186	RALPH SORENSEN	STATE OF ALASKA	FEE SIMPLE	5/20/85	
TRACT II	E-2		0.0003	RALPH SORENSEN	STATE OF ALASKA	FEE SIMPLE	5/20/85	
TRACT II	F-1		1.925	RALPH SORENSEN	STATE OF ALASKA	FEE SIMPLE	5/20/85	
TRACT II	F-2		3.712	BIA FOR RALPH SORENSEN	STATE OF ALASKA	A & H EASEMENT & AIR RIGHTS	7/19/85	
TRACT II	G		2.149	BERNARD J WHEELER, JR	STATE OF ALASKA	FEE SIMPLE	8/02/85	
TRACT II	H		2.66	USA, BLM	STATE OF ALASKA	FEE SIMPLE	11/07/84	
TRACT II	I		1.678	BIA FOR KATIE TIMMERMAN	STATE OF ALASKA	A & H EASEMENT & AIR RIGHTS	2/20/85	
TRACT II	J		1.502	KATIE TIMMERMAN	STATE OF ALASKA	FEE SIMPLE	1/15/85	
TRACT II	K		6.3±	MISC OWNERS	STATE OF ALASKA	ROAD ROW	2/27/76	
TRACT III		10168	401.88	USA, BLM	STATE OF ALASKA	FEE SIMPLE	6/29/81	
TRACT IV	A	10586	4.84	R. ARMSTRONG, ET AL	S OF A, DOT/PF	FEE SIMPLE	3/30/78 D.O.T. FNL JUDG 6/18/82	
TRACT IV	B	10587	1.14±	MARTIN JOHNSON	S OF A, DOT/PF	FEE SIMPLE	1/11/82	
TRACT IV	C	11094	0.25±	CHOGGIUNG LTD.	S OF A, DOT/PF	FEE SIMPLE	14(c)4 ANCSA 9/15/81	
TRACT IV	D	11095	0.529±	HEIRS OF MICKEY LOPEZ	S OF A, DOT/PF	FEE SIMPLE	3/17/82 D.O.T.	
TRACT V	A	10168	6.89	USA, BLM	S OF A, DOT/PF	FEE SIMPLE	11/07/84	
TRACT V	B	10168	0.866	NELS J ANDERSON	S OF A, DOT/PF	FEE SIMPLE	9/12/85	
TRACT V	C	10168	1.291	BIA FOR NELS J ANDERSON	S OF A, DOT/PF	A & H EASEMENT & AIR RIGHTS	9/27/85	
TRACT VI		10411	0.443±	USA, BLM	STATE OF ALASKA	DEDICATED ROW MISSION SUBD.	2/03/81 FILED 7/30/81	
TRACT VII	*	11387	23.74	USA, BLM	MYRON S. MORAN	A & H EASEMENT & ROW	5/02/72	
TRACT VIII	A**	10960	20.92±	CHOGGIUNG LTD.	S OF A, DOT/PF	FEE SIMPLE	5/25/79	
TRACT VIII	B**	10960	41.71±	CHOGGIUNG LTD.	S OF A, DOT/PF	FEE SIMPLE	9/20/85	
TRACT VIII	C	11388	31.13±	NELS JOHNSON	S OF A, DOT/PF	FEE SIMPLE	8/20/82	
TRACT VIII	D	11389	4.92	NELS JOHNSON	S OF A, DOT/PF	A & H EASEMENT & ROW	9/02/82	
TRACT IX		11370	3.13	CHOGGIUNG LTD.	STATE OF ALASKA	A & H EASEMENT & ROW	9/15/81 14(c) ANCSA	
TRACT X		11390	2.31	KUZAKIN, ROEHL, ET AL	STATE OF ALASKA	FEE SIMPLE	9/09/85	
TRACT XI		11407	18.77	S OF A, DNR ADL 207091	STATE OF ALASKA	A & H EASEMENT & ROW	10/17/84	

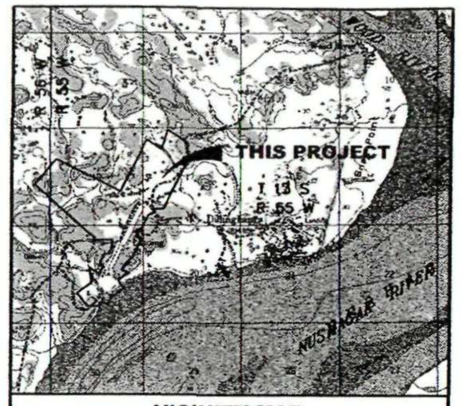
UNDER DATE ACQUIRD D.O.T. MEANS DECLARATION OF TAKING
* SEE NOTE 3
** SEE NOTE 4





NOTES

1. PORTIONS OF TRACTS I AND II CONTAIN COMPUTER-GENERATED DISTANCES BASED ON EXISTING U.S. SURVEYS AND A.D.A. SURVEY OF JULY 1978; A.D.A. FIELD BOOKS NOS. 3083, 3084,1332, AND 1333.
2. TRACT VI IS A PORTION OF A DEDICATED 100' ROAD RIGHT OF WAY WITHIN MISSION SUBD., PLAT APPROVED 2/3/81, FILED 7/30/81 IN THE BRISTOL BAY RECORDING DISTRICT.
3. PERMIT, AVIGATION AND HAZARD EASEMENT & RIGHT OF WAY RESERVED TO STATE OF ALASKA WITHIN U.S. PATENT NO. 50-72-0404, DATED MAY 2, 1972, RECORDED ON OCTOBER 22, 1974 IN THE BRISTOL BAY RECORDING DISTRICT IN BOOK VIII, ON PAGES 281 THROUGH 283.
4. THIS AREA HELD BY BLM 20 YEAR LEASE DATED 8/22/73. BLM WAIVED ADMINISTRATION OF LEASE TO CHOGGIUNG LTD., 2/10/82.
5. ALL DISTANCE AND BEARINGS FOLLOWED BY A "(D)" ARE MEASURED DISTANCES AND BEARINGS FROM DOWL ENGINEERS DATED 8/7/89.



VICINITY MAP

SCALE 1"=1 Mile SOURCE - USGS Dillingham A-7

Located within Sections 17, 18 & 19, Surveyed T 13 S, R 55 W, and Section 13, Surveyed T 13 S, R 56 W, Seward Meridian, Bristol Bay Recording District

SURVEYOR'S CERTIFICATE

I hereby certify that I am properly Registered and Licensed to practice Land Surveying in the State of Alaska, and that this drawing represents the information as shown on the State of Alaska, Department of Transportation and Public Facilities, Dillingham Airport Property Plan. Sheet 1 is not dated, sheet 2 is dated 4/15/83 and some information was included from a DOWL Boundary Survey dated 8/7/89. No current boundary survey was performed.

Date: ____________

Registered Land Surveyor ____________ Registration Number ____________

LEGEND

- o Indicates Monument Shown on DOWL Airport Boundary Survey 1989.
- (R) Record Dimension Dillingham Airport Property Plan.
- (D) Record Dimension DOWL Dillingham Airport Boundary Survey 1989.
- Airport Property Boundary
- Parcel Boundary

STATE OF ALASKA 49TH JAMES H. SHARP NO. 4015-S REGISTERED PROFESSIONAL LAND SURVEYOR

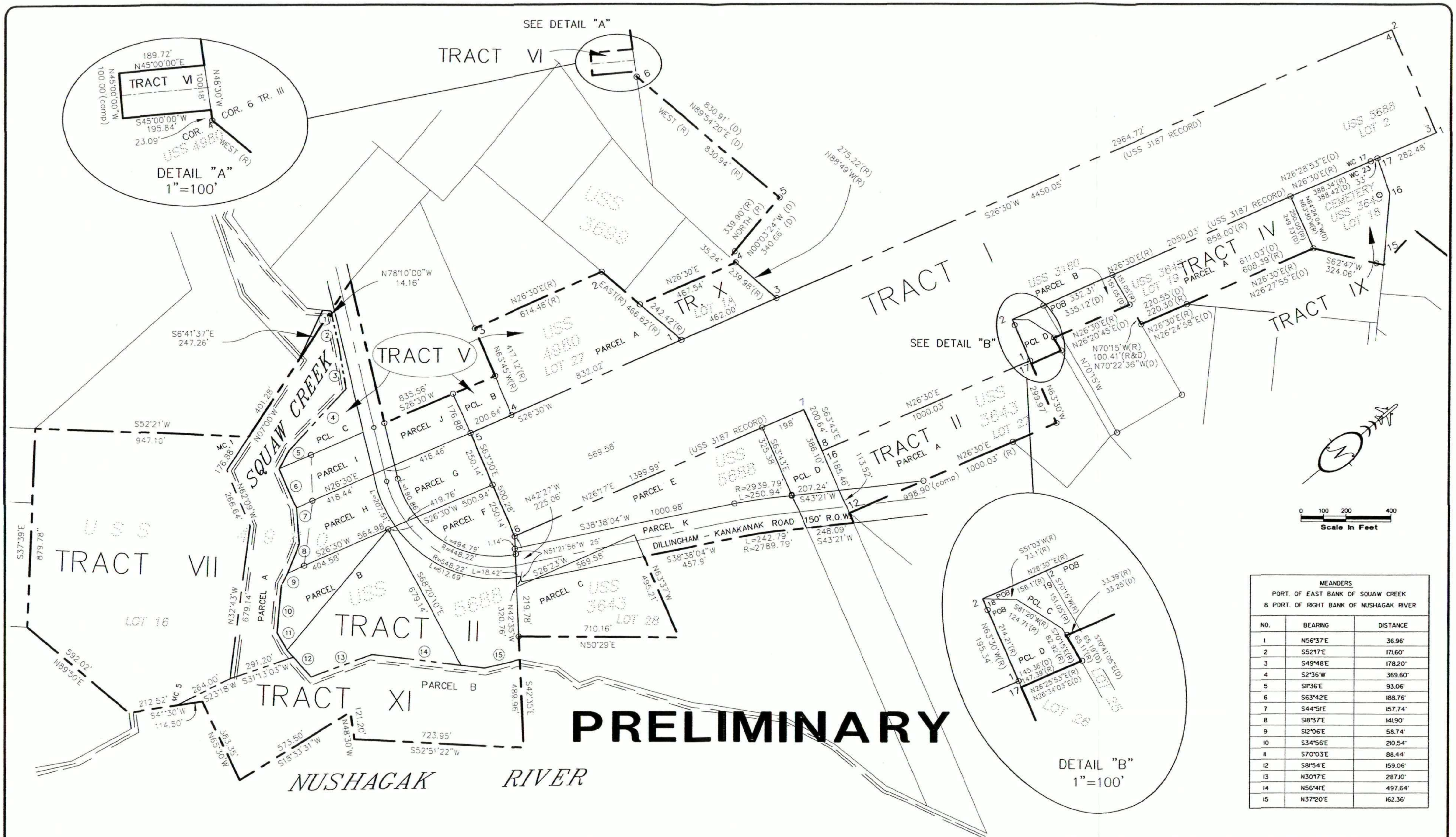
CONSULTANT RIGHT-OF-WAY SURVEYORS CERTIFICATE

0 200 400 800
Scale in Feet

This property plan supersedes Dillingham Airport Property Plan dated 04/15/83.

FILE: 4331v-DillinghamAPP.dwg DATE: 3/30/05	AIRPORT LAYOUT PLAN CONDITIONAL APPROVAL SUBJECT TO ALP APPROVAL LETTER DATED ______ By: ______ DATE: ______ FAA, AIRPORTS DIVISION ALASKAN REGION, AAL-601 F.A.A. AIRSPACE REVIEW NUMBER:	BY / DATE / REVISIONS	STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES CENTRAL REGION APPROVED: STEPHEN M. RYAN, P.E. DESIGN SECTION CHIEF APPROVED: Mark Mayo PROJECT MANAGER

DATE 12/11/03 DESIGN ______ DRAWN JHS CHECKED ______	DILLINGHAM AIRPORT AIRPORT PROPERTY DRAWING	SHEET 10 OF 14



MEANDERS PORT. OF EAST BANK OF SQUAW CREEK & PORT. OF RIGHT BANK OF NUSHAGAK RIVER		
NO.	BEARING	DISTANCE
1	N56°37'E	36.96'
2	S52°17'E	171.60'
3	S49°48'E	178.20'
4	S2°36'W	369.60'
5	S11°36'E	93.06'
6	S63°42'E	188.76'
7	S44°51'E	157.74'
8	S18°37'E	141.90'
9	S12°06'E	58.74'
10	S34°56'E	210.54'
11	S70°03'E	88.44'
12	S81°54'E	159.06'
13	N30°17'E	287.10'
14	N56°41'E	497.64'
15	N37°20'E	162.36'

This property plan supersedes Dillingham Airport Property Plan dated 04/15/83.

FILE: 4331v-DillinghamAPP.dwg
DATE: 3/30/05

AIRPORT LAYOUT PLAN CONDITIONAL APPROVAL
SUBJECT TO ALP APPROVAL LETTER DATED ____________

By: ____________ DATE: ____________
FAA, AIRPORTS DIVISION
ALASKAN REGION, AAL-601

F.A.A. AIRSPACE REVIEW NUMBER:

BY	DATE	REVISIONS

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
CENTRAL REGION

APPROVED: STEPHEN M. RYAN, P.E. — DESIGN SECTION CHIEF
APPROVED: Mark Mayo — PROJECT MANAGER

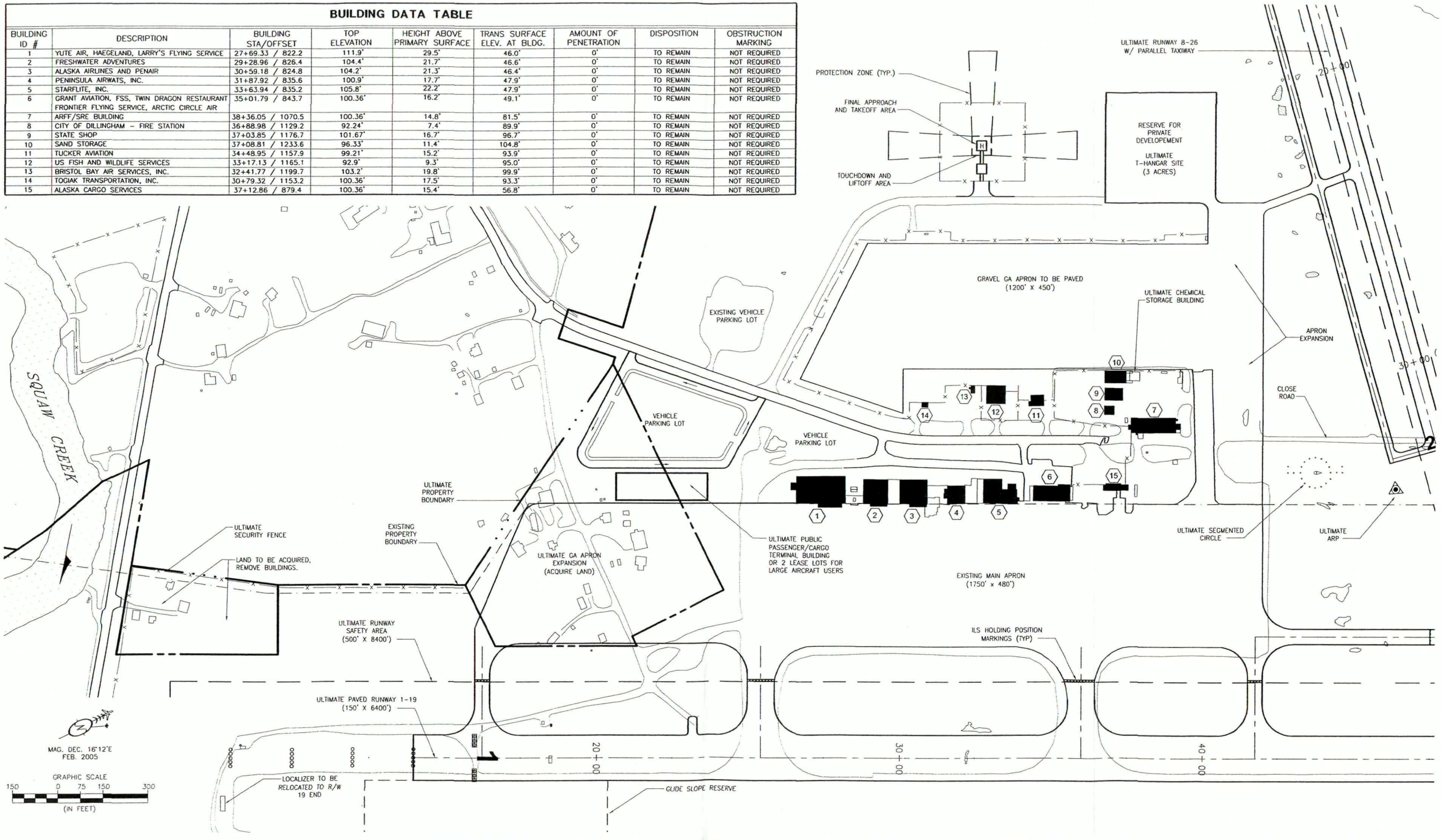
DATE 12/11/03
DESIGN ____
DRAWN JHS
CHECKED ____

DILLINGHAM AIRPORT
AIRPORT PROPERTY DRAWING

SHEET 11 OF 14

BUILDING DATA TABLE

BUILDING ID #	DESCRIPTION	BUILDING STA/OFFSET	TOP ELEVATION	HEIGHT ABOVE PRIMARY SURFACE	TRANS SURFACE ELEV. AT BLDG.	AMOUNT OF PENETRATION	DISPOSITION	OBSTRUCTION MARKING
1	YUTE AIR, HAEGELAND, LARRY'S FLYING SERVICE	27+69.33 / 822.2	111.9'	29.5'	46.0'	0'	TO REMAIN	NOT REQUIRED
2	FRESHWATER ADVENTURES	29+28.96 / 826.4	104.4'	21.7'	46.6'	0'	TO REMAIN	NOT REQUIRED
3	ALASKA AIRLINES AND PENAIR	30+59.18 / 824.8	104.2'	21.3'	46.4'	0'	TO REMAIN	NOT REQUIRED
4	PENINSULA AIRWATS, INC.	31+87.92 / 835.6	100.9'	17.7'	47.9'	0'	TO REMAIN	NOT REQUIRED
5	STARFLITE, INC.	33+63.94 / 835.2	105.8'	22.2'	47.9'	0'	TO REMAIN	NOT REQUIRED
6	GRANT AVIATION, FSS, TWIN DRAGON RESTAURANT FRONTIER FLYING SERVICE, ARCTIC CIRCLE AIR	35+01.79 / 843.7	100.36'	16.2'	49.1'	0'	TO REMAIN	NOT REQUIRED
7	ARFF/SRE BUILDING	38+36.05 / 1070.5	100.36'	14.8'	81.5'	0'	TO REMAIN	NOT REQUIRED
8	CITY OF DILLINGHAM – FIRE STATION	36+88.98 / 1129.2	92.24'	7.4'	89.9'	0'	TO REMAIN	NOT REQUIRED
9	STATE SHOP	37+03.85 / 1176.7	101.67'	16.7'	96.7'	0'	TO REMAIN	NOT REQUIRED
10	SAND STORAGE	37+08.81 / 1233.6	96.33'	11.4'	104.8'	0'	TO REMAIN	NOT REQUIRED
11	TUCKER AVIATION	34+48.95 / 1157.9	99.21'	15.2'	93.9'	0'	TO REMAIN	NOT REQUIRED
12	US FISH AND WILDLIFE SERVICES	33+17.13 / 1165.1	92.9'	9.3'	95.0'	0'	TO REMAIN	NOT REQUIRED
13	BRISTOL BAY AIR SERVICES, INC.	32+41.77 / 1199.7	103.2'	19.8'	99.9'	0'	TO REMAIN	NOT REQUIRED
14	TOGIAK TRANSPORTATION, INC.	30+79.32 / 1153.2	100.36'	17.5'	93.3'	0'	TO REMAIN	NOT REQUIRED
15	ALASKA CARGO SERVICES	37+12.86 / 879.4	100.36'	15.4'	56.8'	0'	TO REMAIN	NOT REQUIRED



AIRPORT LAYOUT PLAN CONDITIONAL APPROVAL
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By: ____________ DATE: ____________
FAA, AIRPORTS DIVISION
ALASKAN REGION, AAL-600

F.A.A. AIRSPACE REVIEW NUMBER: 00-AAL-

FILE: 1110\4331\2005 ALP
DATE: MAY 2005

BY	DATE	REVISIONS

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
CENTRAL REGION

APPROVED: ____________
STEPHEN M. RYAN, P.E. — DESIGN SECTION CHIEF

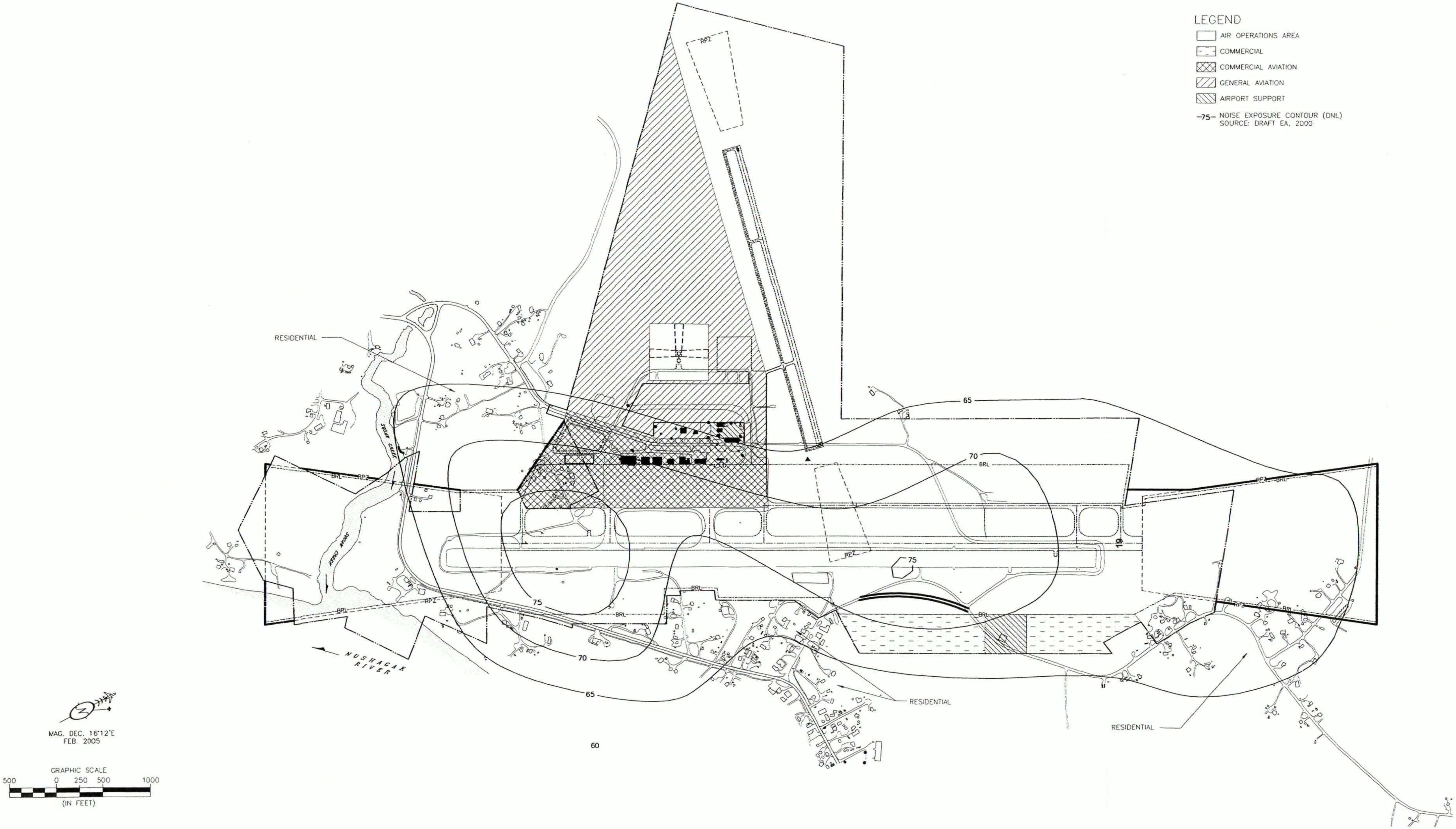
APPROVED: ____________
HARVEY M. DOUTHIT, P.E. — PROJECT MANAGER

DATE ______
DESIGN ______
DRAWN ______
CHECKED ______

DILLINGHAM AIRPORT
AIRPORT LAYOUT PLAN

TERMINAL AREA DRAWING

SHEET 12 OF 14



FILE: 1110\4331\2005 ALP
DATE: MAY 2005

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BY	DATE	REVISIONS

STATE OF ALASKA
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CENTRAL REGION

APPROVED: STEPHEN M. RYAN, P.E. DESIGN SECTION CHIEF
APPROVED: HARVEY M. DOUTHIT, P.E. PROJECT MANAGER

DATE ______
DESIGN ______
DRAWN ______
CHECKED ______

DILLINGHAM AIRPORT
AIRPORT LAYOUT PLAN

FUTURE LAND USE DRAWING

SHEET 13 OF 14

MASTER PLAN UPDATE SUMMARY

THE DILLINGHAM AIRPORT MASTER PLAN UPDATE WAS COORDINATED WITH AIRPORT USERS, MEMBERS OF THE PUBLIC, AND REPRESENTATIVES OF CITY, STATE, AND FEDERAL GOVERNMENT THROUGH NEWSLETTERS AND PUBLIC MEETINGS.

PASSENGER FORECAST

ANNUAL ENPLANED PASSENGERS ARE PROJECTED TO INCREASE OVER THE 20-YEAR PLANNING PERIOD. THE ANNUAL GROWTH RATE OF THE RECOMMENDED FORECAST IS 2.4%. SEE ANNUAL FORECASTS IN THE PEAK DEMAND FORECASTS TABLE.

PASSENGER AIRCRAFT OPERATIONS FORECAST

	2000	2005	2010	2020
AIR CARRIER AIRCRAFT				
Lockheed Electra (6 Passengers per Departure)	410	0	0	0
Boeing 737-200C (23-40 Passengers per Departure)	648	820	860	878
Subtotal Air Carrier Aircraft	1,058	820	860	878
COMMUTER AIRCRAFT				
50-seat (Canadair RJ, DHC-8 Dash 8)	0	512	736	1,584
30-seat Turboprop (Saab 340, DHC-8 Dash 8)	2,528	2,048	2,212	1,780
19-seat Turboprop (Beech 1900)	0	854	738	594
Subtotal Commuter Aircraft	2,528	3,414	3,686	3,958
TOTAL AIRCRAFT OPERATIONS	3,586	4,234	4,546	4,836

CARGO FORECAST

THE FORECAST ANNUAL ENPLANED CARGO GROWTH RATE OVER THE 20-YEAR PLANNING PERIOD IS 1.7%, FROM 2,273 TONS TO 3,199 TONS. SEE ANNUAL CARGO TONNAGE FORCASTS IN THE PEAK DEMAND FORCASTS TABLE.

ALL-CARGO AIRCRAFT OPERATIONS FORECAST

	2000	2005	2010	2020
B 727	371	378	381	270
B 737	0	54	163	539
C-46	106	108	54	0
DC-6	318	270	218	0
L-382	265	270	272	270

BASED AIRCRAFT FORECAST

BASED AIRCRAFT AT DILLINGHAM AIRPORT ARE PROJECTED TO GROW FROM 100 IN 2000 TO 113 IN 2020, AN AVERAGE ANNUAL GROTH RATE OF 0.6%. THE RECOMMENDED FORCAST FOR BASED AIRCRAFT APPLIES THE FAA'S NATIONAL GROWTH RATES BY TYPE OF AIRCRAFT.

BASED AIRCRAFT

YEAR	BASED AIRCRAFT
2000	100
2005	104
2010	107
2020	113

GENERAL AVIATION AND AIR TAXI OPERATIONS

DILLINGHAM AIRPORT HOSTS A MIX OF GENERAL AVIATION INCLUDING BOTH RECREATIONAL AND TRANSIENT OPERATIONS. THE CURRENT SPLIT BETWEEN LOCAL AND ITINERANT OPERATIONS, 84 PERCENT ITINERANT AND 16 PERCENT LOCAL, IS PROJECTED TO CONTINUE THROUGH THE 20-YEAR PLANNING PERIOD. THE PROJECTED ANNUAL GROWTH FOR GENERAL AVIATION IS 0.8%.

MILITARY AIRCRAFT OPERATIONS

MILITARY AIRCRAFT OPERATIONS ARE A LOW OF 12 PER YEAR AT DILLINGHAM AIRPORT. THE FAA'S TERMINAL AREA FORCASTS PROJECT 12 AIRCRAFT OPERATIONS BY MILITARY AIRCRAFT THROUGH 2015, AND THIS NUMBER WAS ASSUMED FOR THE PROJECTION THROUGH 2020. WITH NEARBY KING SALMON AIRPORT PROVIDING A BETTER FACILITY FOR MILITARY AIRCRAFT USE, THERE IS NO REASON FOR PROJECTING AN INCREASE IN THE USE OF DILLINGHAM AIRPORT BY MILITARY AIRCRAFT.

TOTAL AIRCRAFT OPERATIONS

AIRCRAFT OPERATIONS ARE PROJECTED TO GROW AT AN AVERAGE ANNUAL RATE OF 0.8%.

AIRPORT ROLE

THE ROLE OF THE DILLINGHAM AIRPORT IN THE NATIONAL AND STATE AIRPORT SYSTEM IS NOT PROJECTED TO CHANGE OVER THE 20-YEAR PLANNING PERIOD. DILLINGHAM IS CLASSIFIED AS A REGIONAL AIRPORT BY THE ALASKA AVIATION SYSTEM PLAN UPDATE AND IS PROJECTED TO REMAIN A REGIONAL AIRPORT IN THE FUTURE. DILLINGHAM AIRPORT WILL CONTINUE TO BE CLASSIFIED BY THE FAA AS A NON-HUB PRIMARY COMMERCIAL SERVICE AIRPORT, WHICH IS REGULATED UNDER 49 CFR PART 139.

AIRPORT REFERENCE CODE

MAIN RUNWAY 1-19 - CURRENTLY, THE BOEING 737-200 QUALIFIES AS THE DESIGN AIRCRAFT AND THE APPROPRIATE ARC FOR THE AIRPORT IS C-III. WITHIN THE 20-YEAR PLANNING PERIOD, IT IS EXPECTED THAT THE DESIGN AIRCRAFT WILL CONTINUE TO BE THE BOEING 737. SPECIFICATIONS FOR THE BOEING 737-200 INCLUDE AN APPROACH SPEED OF 137 KNOTS, A WINGSPAN OF 94.8 FEET, AND A WEIGHT OF 135,000 LBS.

CROSSWIND GRAVEL RUNWAY 8-26 - THE AIRPORT REFERENCE CODE FOR THE GRAVEL RUNWAY WILL BE A-I AND SHOULD REMAIN A-I THROUGH THE PLANNING PERIOD. THE DESIGN AIRCRAFT IS THE DHC-2 BEAVER. THE APPROACH SPEED, WINGSPAN, AND WEIGHT OF THE DHC-2 BEAVER ARE 50 KNOTS, 48.9 FEET, AND 5,100 LBS., RESPECTIVELY.

AIRCRAFT OPERATIONS FORECAST

	2000	2005	2010	2020
Air Carrier Aircraft				
Passenger	1,058	820	860	878
All-Cargo	1,060	1,079	1,089	1,078
Subtotal Air Carrier Aircraft	2,118	1,899	1,949	1,956
Commuter/Air Taxi Aircraft	2,528	3,414	3,686	3,958
General Aviation				
Air Taxis	24,970	26,153	27,352	29,182
Private General Aviation	24,969	26,153	27,352	29,182
Subtotal General Aviation	49,939	52,306	54,704	58,364
Military	12	12	12	12
Total Itinerant Operations	54,597	57,631	60,351	64,290
Local General Aviation Operations	9,603	9,963	10,420	11,117
TOTAL AIRCRAFT OPERATIONS	64,200	67,594	70,771	75,407

PEAK DEMAND FORECASTS

	2000	2005	2010	2020
ENPLANED PASSENGERS				
Annual	40,647	48,073	53,737	65,065
Peak Month	6,910	8,172	9,135	11,061
Design Day	223	264	295	357
Design Hour	78	90	97	107
ENPLANED CARGO (Tons)				
Annual	2,273	2,535	2,695	3,199
Peak Month	500	558	593	704
Design Day	16	18	19	23
Design Hour	6	6	6	7
AIR CARRIER, COMMUTER, & MILITARY OPERATIONS				
Annual	4,658	5,325	5,647	5,926
Peak Month	559	639	678	711
Design Day	18	21	22	23
Design Hour	5	5	5	6
AIR TAXI AND GENERAL AVIATION AIRCRAFT OPERATIONS				
Annual	59,542	62,269	65,124	69,481
Peak Month	8,336	8,718	9,117	9,727
Design Day	269	281	294	314
Design Hour	34	35	37	39
TOTAL AIRCRAFT OPERATIONS				
Annual	64,200	67,594	70,771	75,407
Peak Month	8,895	9,357	9,795	10,438
Design Day	287	302	316	337
Design Hour	38	40	42	45

AIRPORT DESIGN STANDARDS

AIRPORT DESIGN STANDARDS	RUNWAY 1-19 *EXISTING DIMENSIONS*	RUNWAY 1-19 *REQUIRED DIMENSIONS*
Airport Reference Code	C-III	C-III
Approach Visibility Minimum	1 Mile	< 3/4 Mile
Runway Width	150'	100' **
Runway Shoulder Width	None	20'
Runway Blast Pad	None	140' x 200'
Runway Safety Area Width	200'	500'
Runway Safety Area Length (beyond runway end)	R/W 1 - 288' R/W 19 - 200'	1,000' 1,000'
Obstacle Free Zone*	300' x 6,804'	400' x 6,800'
Runway Object Free Area Width	300'	800'
Runway Object Free Area Length (beyond runway end)	600'	1,000'
Runway Protection Zones	500' x 1010' x 1700'	1,000' x 1,700' x 2,500'

* AN INNER APPROACH OBSTACLE FREE ZONE IS REQUIRED FOR RUNWAYS WITH APPROACH LIGHTS

** RUNWAY 1-19 IS NOW 150 FEET WIDE, WHICH EXCEEDS THE REQUIREMENT FOR THE CURRENT AND FUTURE AIRPORT REFERENCE CODE, C-III. REDUCING THE RUNWAY WIDTH IS NOT RECOMMENDED, HOWEVER, BECAUSE AIRCRAFT THAT NEED 150 FOOT-WIDE RUNWAYS USE THE AIRPORT. THE WIDTH REQUIRED FOR C-III AIRCRAFT THAT WEIGH OVER 150,000 POUNDS, SUCH AS THE BOEING 727 USED BY NORTHERN AIR CARGO, IS 150 FEET. A RUNWAY WIDTH OF 150 FEET IS ALSO REQUIRED FOR AIRPORT REFERENCE CODE C-IV, WHICH INCLUDES THE HERCULES AIRCRAFT USED BY LYNDEN AIR CARGO AND THE MILITARY. THE WIDER THAN STANDARD RUNWAY ALSO HELPS AIRCRAFT LANDING IN STRONG CROSSWIND CONDITIONS. IN ADDITION, 150 FEET IS THE RUNWAY WIDTH AT BETHEL, COLD BAY, AND KODIAK, WHICH ARE ALSO REGIONAL AIRPORTS IN THE CENTRAL REGION OF ADOT&PF.

CAPITAL IMPROVEMENT PROGRAM

CAPITAL IMPROVEMENT PROJECTS IDENTIFIED BY THE MASTER PLAN UPDATE HAVE BEEN SCHEDULED ACCORDING TO THE ANTICIPATED DEMAND AND ALLOCATED TO ONE OF THREE PHASES:

PHASE I	0-5 YEARS	2004 - 2008
PHASE II	6-10 YEARS	2009 - 2013
PHASE III	11-15 YEARS	2014 - 2023

CAPITAL IMPROVEMENT PROJECT COSTS

PHASE	PROJECT	COST ($)
I.	SHORT TERM: 2004 - 2008	
	Parallel Taxiway	5,052,700
	Land Acquisition South of Terminal Area	1,080,000
	Land Acquisition Within Existing & Future RPZ's	6,420,000
	Build Chemical Storage Building	1,386,000
	Expand Vehicle Parking at South End of Terminal Area	647,200
	Build Runway Safety Area (RSA) Embankment	16,511,700
	Subtotal	31,097,600
II.	INTERMEDIATE TERM: 2009 - 2013	
	Relocate Runway, Complete Parallel Taxiway & RSA	6,459,000
	Realign Wood River Road	804,300
	Install MALSR	568,000
	West Apron Expansion	2,154,500
	Build Heliport	49,600
	Pave GA Apron	935,300
	Crosswind Runway Phase I	2,224,900
	Subtotal	13,195,600
III.	LONG TERM: 2014 - 2023	
	South Apron Expansion	2,210,000
	Terminal Road & Parking Improvements	224,800
	Crosswind Runway Phase II	5,524,100
	Subtotal	7,958,900
	TOTAL	52,252,100

Notes: All costs are in 2005 dollars.
Costs Include Allowances For Design And Construction Management.

FILE: 1110\4331\2005 ALP
DATE: MAY 2005

AIRPORT LAYOUT PLAN CONDITIONAL APPROVAL
SUBJECT TO ALP APPROVAL LETTER DATED ______

By: ______ DATE: ______
FAA, AIRPORTS DIVISION
ALASKAN REGION, AAL-600

F.A.A. AIRSPACE REVIEW NUMBER: 00-AAL-

BY	DATE	REVISIONS

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
CENTRAL REGION

APPROVED: STEPHEN M. RYAN, P.E. — DESIGN SECTION CHIEF
APPROVED: HARVEY M. DOUTHIT, P.E. — PROJECT MANAGER

DATE ______
DESIGN ______
DRAWN ______
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DILLINGHAM AIRPORT
AIRPORT LAYOUT PLAN

NARRATIVE REPORT

SHEET 14 OF 14