UNALASKA AIRPORT

MASTER PLAN UPDATE

MARCH 2008



AKSAS project No. 53091 Federal Project No. AIP 3-02-0082-2006

Prepared by

CH2MHILL

in association with

Alaska Biological Research | Brooks & Associates | Canyon Creek Consulting | Cultural Resources Consultants
Green Engineering Services | Keiser Phillips | Ocean Surveys, Inc.

Final Report

Unalaska Airport

Master Plan Update

Prepared for

Alaska Department of Transportation & Public Facilities

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TABLE OF CONTENTS

Appendices

Exhibits **Page**

Tables **Page**

Chapter 1 Inventory

CHAPTER 1

1. Inventory

1.1 Introduction

The 2007 Unalaska Airport Master Plan Update (MPU) is being undertaken by the Alaska Department of Transportation and Public Facilities (DOT&PF) with grant funding from the Federal Aviation Administration (FAA). The purpose of an airport master plan is to analyze the need for improvements and to recommend the best ways to realize the needed improvements within the required timeframe. Two key products of the MPU are the Airport Layout Plan (ALP) and a 20-year projection of aviation demand; both of which are subject to FAA approval.

The existing airport master plan is being updated because the last FAA-accepted plan is over 20 years old and DOT&PF's recent planning (Office Technical Memoranda No. 1 and No. 2, ASCG, Inc., December 2003) focused on accommodating a design aircraft that discontinued service in January 2004, and will not return to Unalaska. As such, a number of deficiencies exist in meeting current FAA airport design standards and accommodating projected aviation demand. The primary deficiencies at Unalaska Airport include:

- Existing Runway Safety Areas (RSA) do not meet FAA standards
- Air service has undergone significant changes at Unalaska Airport. Since 2004, Alaska Airlines no longer provides jet passenger and cargo service to Unalaska. The airport is primarily served by Peninsula Airways (PenAir), which offers turbo-prop passenger service, and Alaska Central Express (ACE), which offers scheduled turbo-prop cargo service
- The runway length is deficient and imposes restrictions on the payload of critical aircraft using the Airport
- Existing buildings, mountainous terrain, moored and transiting ships in Dutch Harbor and Unalaska Bay, and ship cranes on Mount Ballyhoo Road all penetrate airspace.
- Storm waves deposit seabed rocks and other debris onto the runway, RSA, and object free areas. This debris is considered FOD in the airfield environment
- The existing Airport terminal and public parking does not meet existing demand

The first step in the airport master planning process involves gathering information about the airport and its environs. The resulting inventory of existing conditions provides a foundation for the evaluation and resolution of identified deficiencies. This chapter includes a description of airport airside and landside facilities, as well as the history of Unalaska Airport, the social and economic characteristics of the Unalaskan community, community concerns related to the airport, known environmental constraints, and other factors that need to be considered in long-term planning for Unalaska Airport.

1.2 Airport Background and History

An understanding of an airport's geographical location, topography, socioeconomic setting, and history are necessary to facilitate an accurate context for a successful AMP. The following sections overview these important topics. **Exhibit 1-1** and **Exhibit 1-2** depict the vicinity of Unalaska Airport and the surrounding topography, respectively.

1.2.1 Airport Role and Setting

The City of Unalaska (the City) and the Unalaska Airport (the Airport) are located approximately 790 statute miles from Anchorage, Alaska, and 170 statute miles from Cold Bay. The City and the Airport serve as a regional transportation hub for the western Aleutians Islands.

Unalaska Airport is located along the west side of Mount Ballyhoo on Amaknak Island and serves the City of Unalaska, which has a population of approximately 4,300[1]). The airport consists of 105 acres and is owned by the DOT&PF. The runway spans the widest portion of relatively level terrain between upland areas to the north and south, with landside facilities located on the south side of the runway. The airport is physically constrained by Mount Ballyhoo to the north, Dutch Harbor and Iliuliuk Bay to the east, industrial and residential development to the south, and Unalaska Bay to the west. Facilities at the airport include the 4,100 linear foot Runway 12/30, a passenger terminal (owned by the City of Unalaska), short-term and long-term parking, a seaplane ramp, two large aircraft hangars, and airport maintenance and snow removal facilities. **Exhibit 1-3** depicts the Unalaska Airport Project Study Area.

The City of Unalaska occupies two islands. The first, Unalaska Island is the municipal center and residential core of the community. Dutch Harbor, the Unalaska Airport, and other predominantly industrial-use facilities occupy the smaller Amaknak Island. Dutch Harbor supports year-round fisheries of cod, pollock, halibut, sablefish, mackerel, tanner crab, and king crab, and consistently ranks highest nationally for volume of commercial seafood landed and for value of catch. The Unalaska Airport serves a vital role in the success of this segment of the economy, as these fisheries depend greatly on seasonal employees, shipping industrial parts and supplies, support services and fresh seafood shipping.

1.2.2 Terrain

The terrain in the vicinity of the Unalaska Airport is generally hilly to mountainous. This topography is influenced by Amaknak Island's volcanic origin. The most prominent mountain in the vicinity of the airport is Mount Ballyhoo, at 1,680 feet above sea level. It is located along the east side of the runway on Amaknak Island. Mount Ballyhoo's topographic relief rises beginning 200 feet from the runway centerline. On the adjacent Unalaska Island, high peaks in the vicinity of the airport include Mount Coxcomb (1,700 feet), located approximately three miles east of the runway, Mount Newhall (1,599 feet), located approximately three miles to the southeast, Pyramid Peak (2,100 feet) located approximately five miles to the south, an unnamed mountain range to the southwest (2,000 feet) located approximately five miles away, and Tabletop Mountain (2,719 feet), located approximately six miles to the northwest. Makushin Volcano (5,905 feet), which

[1] U.S. Census Bureau, 2000 Census ; City of Unalaska Department of Planning

regularly emits steam from its cone, is located approximately 12 miles to the west. Exhibit 1-2 depicts the topography surrounding the Unalaska Airport.

The topography on Amaknak Island ranges from sea level to 1,680 feet at the top of Mount Ballyhoo. Mount Ballyhoo's flank along the east side of the airport ranges in slope from 15 to 60 percent. Numerous steep slopes and cliffs are also adjacent to the surrounding water; these cliffs are formed by continual erosion from wave action.

The Environmental Overview, found in Appendix B, further describes the existing conditions of the natural and built environment in the Unalaska Airport project study area.

Bathymetry

Bathymetric survey data was collected in the project study area in the fall of 2006 Underwater video of the study area was also collected at this time along approximately 50 foot transects to document seafloor physical and habitat conditions. (Attachment B-1)

- **Unalaska Bay**

  The slopes of the sea floor in Unalaska Bay are approximately 33 percent at the water's edge and then flatten to less that five percent at distances of 200 feet off shore at the north end of the runway. The intertidal zone is largely composed of large to small boulders on moderately steep slopes, although areas of cobble and large gravel exist on less steep slopes.

  The physical character of the area extending from intertidal edge out to 30 feet in depth (about 250 feet offshore) varies. The majority of the shallowest area is comprised of boulders and cobbles. In deeper water (>20 feet), the bottom composition generally transitions into large gravel with some cobble and small boulders. There are some localized areas of sand that are formed into small bars.

  Below 30 feet (from 250 to at least 1,000 feet offshore), the bottom type is mostly gravel and sand with dominance shifting back and forth. The bottom shifts more towards sand and silt as depth increases, indicative of a lower energy environment at greater depths.

- **Dutch Harbor**

  The slope of the sea floor at the south end of the runway varies from 60 percent at the water's edge to less than five percent at distances of 500 feet offshore. The shoreline adjacent to the airport in the intertidal zone is comprised of abruptly steep riprap and boulders.

  The riprap armoring transitions into smaller boulders, then gravel, at a depth of about 20 feet (approximately 150 feet offshore). Gravel and sand also extends throughout the area described in this section.

  At 30 feet in depth (about 250 feet offshore), the bottom character is gravel or gravel/sand in most places. This generally transitions into sand at 40 to 50 feet (about 350 feet offshore) but is shallower or deeper in different locations. The bottom composition changes to silt in the 65 to 75 foot depth range (roughly 450 feet offshore).

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AIP 3-02-012-2006

Vicinity Map

Exhibit 1-1

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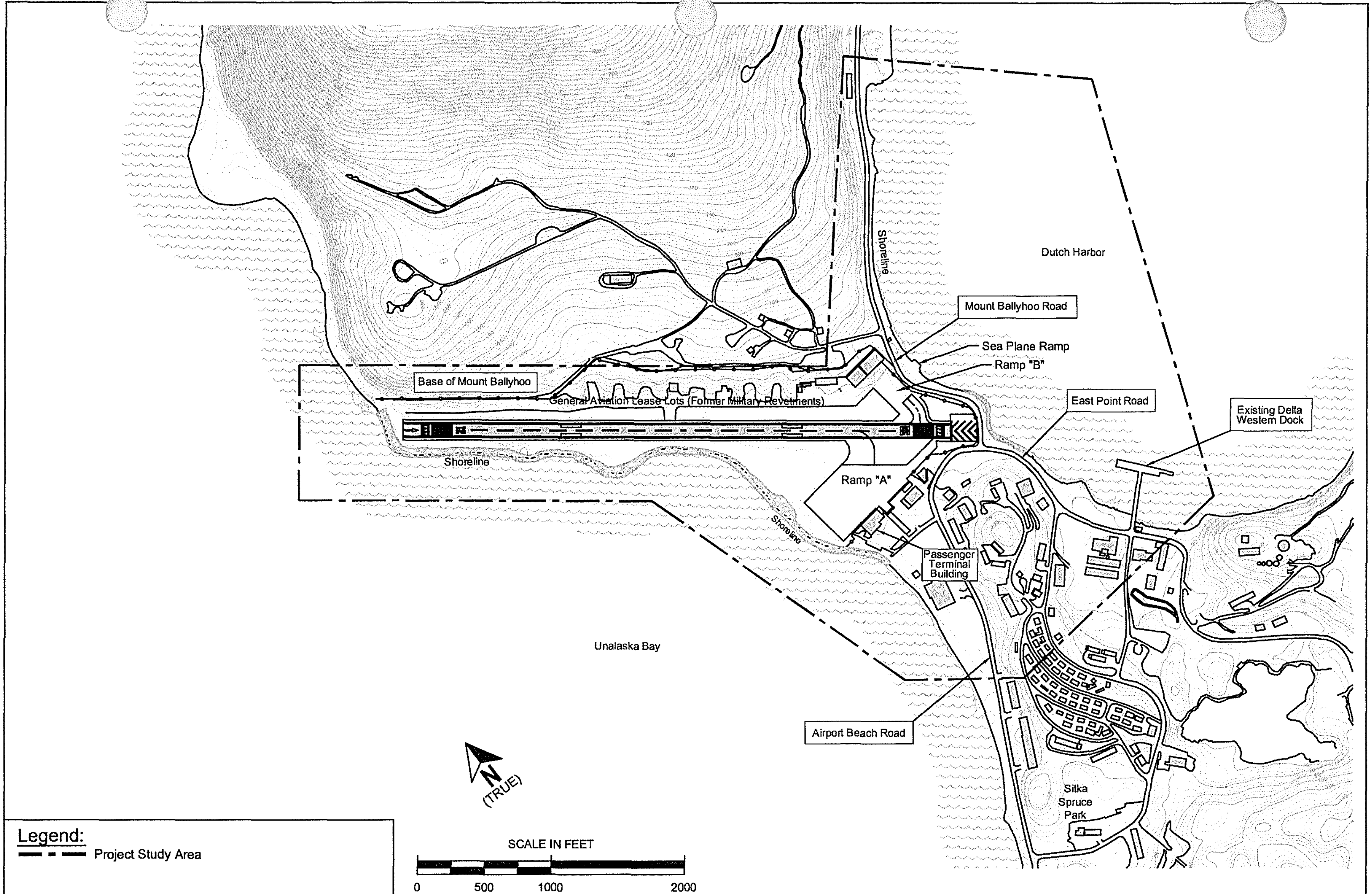
AIP 3-02-012-2006

Topography

Exhibit 1-2



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Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Project Study Area

Exhibit 1-3

Source: AC/150 5300-13 R8, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

May 2007

1.2.3 Soils and Geology

The Aleutian Island chain is located over a large subduction zone and is one of the most seismically active regions in the world. The area has a history of large magnitude earthquakes associated with tectonic movements and is commonly known as "The Ring of Fire".

Soils

Soils in the region are generally thin and derived from glacial episodes, volcanic debris, and the weathering of bedrock. The soils in the vicinity are classified taxonomically as inceptisols. Inceptisols are formed in volcanic ash or pumice, and contain a large percentage of pyroclastic materials.

Organic soils occupy closed depressions where wind and water do not erode them away. On the contrary, bare rock typifies peaks and high ridge tops that have no soil cover.

Geology

The bedrock that underlies most of Amaknak Island is part of the Unalaska Formation. The Unalaska Formation consists primarily of intrusive and extrusive igneous rocks and sedimentary rocks derived from volcanic rocks; plus a mixed variety of andesite dikes, basalt flows, pyroclastic flows, and volcanic breccia.

Lithology may be defined as a rock formation having a particular set of characteristics. Because of the diversity of and inconsistency of the lithology, and varying degrees of alteration and weathering, the rock quality of the Unalaska Formation is considered poor as a construction fill material.

Massive andesite flows are found within the Unalaska Formation. Andesite is defined as a fine-grained igneous rock with a chemical composition between rhyolite and basalt. The andesite is generally considered to produce higher-quality rock fill than the rest of the Unalaska Formation.

In addition to the Unalaska Formation, intrusive bodies of granodiorite are found in the islands. Granodiorite is defined as a plutonic, coarse-grained igneous rock with a composition between granite and diorite. Granodiorite is typically a hard, durable rock that is known to be used for rock fill and armor.

Past glaciations deposited mounds of glacial till and other debris at low altitudes and underwater around the islands. Till is exposed in numerous cut slopes around the island. The till is comprised of cobbles in a matrix of clay and silt. Post-glacial streams have eroded and redeposited the glacial till and volcanic deposits.

Bedrock is exposed throughout the study area, including seaside cliffs and rock cuts along the existing runway. Rock exposed near the runway is fractured, soft, and prone to rapid weathering. This rock mass in the vicinity of the study area is composed of a mixture of breccias, andesites, and pyroclastic materials.

1.2.4 Airport History

Unalaska Airport was built in 1942 by the United States Department of Navy as part of the Dutch Harbor Naval Operating Base. The base and Fort Mears, also on Amaknak Island, played an important role in the Aleutian campaign of World War II. Dutch Harbor Naval Operating Base was decommissioned in 1947, but remained under federal government ownership until 1975, when the US Bureau of Land Management transferred surface rights to the Ounalashka Corporation, the regional native corporation formed under the Alaska Native Claims Settlement Act (ANSCA) in 1971. The Ounalashka Corporation deeded surface estate of the airport to DOT&PF in 1980.

Following the war, population growth was slow and the economy was focused on a few fisheries until the late 1970's when fisheries became more diversified and, in response, the population began growing significantly. There was a boom in king crab demand from approximately 1978 to 1984. During this time, a number of airlines serviced the island, including Reeve Aleutian Airways and Peninsula Airways (PenAir) using turbo-props. Another Alaskan airline, AirPac, began daily jet service using a BAe-146 in 1984. AirPac ended this service in 1987, although MarkAir provided daily jet service using a Boeing 737 from 1985 to 1994, as did Alaska Airlines from 1993 to 2004. No jet service has been offered since. PenAir currently operates under a code-share agreement for Alaska Airlines to provide daily scheduled turbo-prop service. A number of airlines have provided scheduled and unscheduled cargo services on and off over the years as well, including Reeve Aleutian Airways, Alaska Airlines, PenAir, Lynden Air Cargo, Northern Air Cargo, and ERA Aviation.

1.2.5 Community Setting/Background

Unalaska currently serves as the transportation, economic, and service hub for the western Aleutians. The current population and economy is dependant on the fishing industry, which accounts for an estimated 51 percent of jobs (Alaska Department of Labor and Workforce Development, 2005). Jobs are provided directly by fish harvesting and fish processing, as well as indirectly through businesses providing support for this industry, including fueling, repair, and maintenance. Major fish processors located in Dutch Harbor include Alyeska Seafood, Unisea, Icicle Seafood, Royal Aleutian Seafoods, Westward Seafoods, Prime Alaska Seafoods, and Osterman Fish. Other strong employment sectors are government, trade, and services. Although a large percentage of the population remains seasonal, the number of permanent residents has grown as the fishing industry becomes diversified and has been able to provide more year-round jobs. Table 1-1 below lists the major Bering Sea and Aleutian Island (BSAI) commercial fishing seasons and their respective start dates:

TABLE 1-1
2007 Bering Sea/Aleutian Islands Major Fisheries and Seasons

Start Date	Type of Fishing
January 1st.	Pacific Cod Catcher Processor (Hook & Line) 'A' Pacific Cod Catcher Vessel (Hook & Line) 'A' Pacific Cod (Pot) 'A'
January 15th	Eastern Aleutians Bairdi Tanner Crab
January 20th	Pollock AFA Inshore 'A' Pollock Catcher Processor "A' Pollock Mothership 'A' Atka Mackeral Eastern 'A' Atka Mackeral Central 'A' Atka Mackeral Western 'A'

TABLE 1-1
2007 Bering Sea/Aleutian Islands Major Fisheries and Seasons

Start Date	Type of Fishing
	Pacific Cod Catcher Processor (Trawl) 'A' Pacific Cod Catcher Vessel (Trawl) 'A'
February 27th	Sablefish IFQ Halibut IFQ
April 1st	Pacific Cod Catcher Processor (Trawl) 'B' Pacific Cod Catcher Vessel (Trawl) 'B'
April 15th	Pacific Cod Catcher Processor (Hook & Line) 'B' Pacific Cod Catcher Vessel (Hook & Line) 'B'
June 10th	Pollock AFA Inshore 'B' Pollock Catcher Processor 'B' Pollock Mothership 'B' Pacific Cod Catcher Processor (Trawl) 'C' Pacific Cod Catcher Vessel (Trawl) 'C'
July 1st	Gillnet Herring
July 15th	Cod/Bait Herring
August 15th	Aleutian Island Brown King Crab
September 1st	Atka Mackeral Eastern 'B' Atka Mackeral Central 'B' Atka Mackeral Western 'B' Pacific Cod (Pot) 'B'
October 15th	Kodiak Red King Crab Opilio Snow Crab Baridi Tanner Crab Bristol Bay Red King Crab Pribilof Blue King Crab St. Matthew Blue King Crab Pribilof Red King Crab

Source: City of Unalaska, 2007.
Note: Table depicts relevant fisheries. Fishing vessels may be based elsewhere and offload catch to floating processors or land-based facilities on Unalaska or elsewhere

In 2005, 887 million pounds of commercial seafood were landed at Dutch Harbor, with a value of $166 million dollars.[1] The Airport plays an important role in this economy by transporting workers and important supplies to and from Unalaska and Akutan, another nearby community with a strong fishing-based economy, and in exporting fresh and frozen seafood to Anchorage for further distribution.

1.2.6 Community Concerns/Issues

Air service is essential to the community for personal and business related travel. The only other transportation option available to Unalaska residents is the Alaska Marine Highway System ferry, the M/V Tustemena, which stops in Unalaska every two weeks in the summer (May through September) and does not provide service the rest of the year. As the most

[1] Alaska Department of Labor and Workforce Development, January 2007

convenient method of getting to and from Anchorage and beyond, regular airline service is critical to residents and businesses in Unalaska.

Community concerns raised about airport service includes:

- Limited availability of passenger seats for non-seafood company travelers
- Too expensive to fly to and from Anchorage
- Alaska Airlines programs designed to give Unalaska residents more reliable air service are not effective
- Lack of nighttime travel availability
- Priority given to seafood companies
- Non-seafood passengers are regularly placed on standby
- Passenger bags get bumped too often complicating travel
- Limited cargo lift during peak periods and restrictions

1.2.7 History of Studies to Date

Numerous planning studies to improve the airport have been conducted since the initial AMP in 1985 and the ALP in 1987. The 1985 AMP was based on accommodating the Boeing 737 and proposed a 6,000 foot by 150 foot runway, the addition of 19.5 acres of apron and taxiway, and the relocation of the seaplane ramp. These projects were not implemented because they were determined to be cost prohibitive.

Airport master planning was conducted again between 2001 and 2003. This work was documented in a two volume *Office Technical Memorandum No. 1 and No. 2* (ASCG Inc.), and included scoping and identification of ten alternatives, both on and off Amaknak Island, and used the Boeing 737 as the design aircraft. These alternatives were later refined further and ultimately narrowed down to four build alternatives in 2003, based on feasibility and ability to meet FAA standards.

One of these alternatives, C-III airfield design for the Boeing 737, proposed a 5,200 foot runway at a cost of $41 million and would not meet FAA design standards, but was evaluated because of the high cost and physical property constraints associated with meeting FAA standards. The remaining three options proposed a 6,000 foot runway with costs ranging from $140 million to $239 million in 2003 dollars. In addition, an analysis of the feasibility of meeting FAA standards for the RSA was completed. This analysis found the cost of constructing the RSA to full FAA standards (1,000 feet beyond each runway end) for a 4,400 foot runway would cost $118.5 million, while extending the RSA only 500 feet at each end would cost $25.2 million.

Other recommended airport improvements identified at that time included:

- Upgrading Medium Intensity Runway Lights (MIRL) to High Intensity Runway Lights (HIRL)
- Installation of Runway Distance To Go Markers
- Installation of additional anemometers, automated weather reporting, and weather observation facilities at a second story level
- Expansion of apron area from 21,000 square feet to 26,000 square feet
- Development of a dual purpose seaplane ramp/water rescue boat ramp in Unalaska Bay
- Expansion of the passenger terminal from 13,700 square feet to 23,700 square feet

- Paving all parking spaces and adding 60 additional paved parking spaces

The following improvements were also recommended, but would be developed by private or other government entities:

- Expansion of cargo facilities from 5,280 square feet to 13,000 square feet
- Addition of a half acre of general aviation space for lease lot development or T-Hangars
- Addition of 11,000 square feet of tenant hangar space
- Provide on-airport space for fuel storage tank and sales.

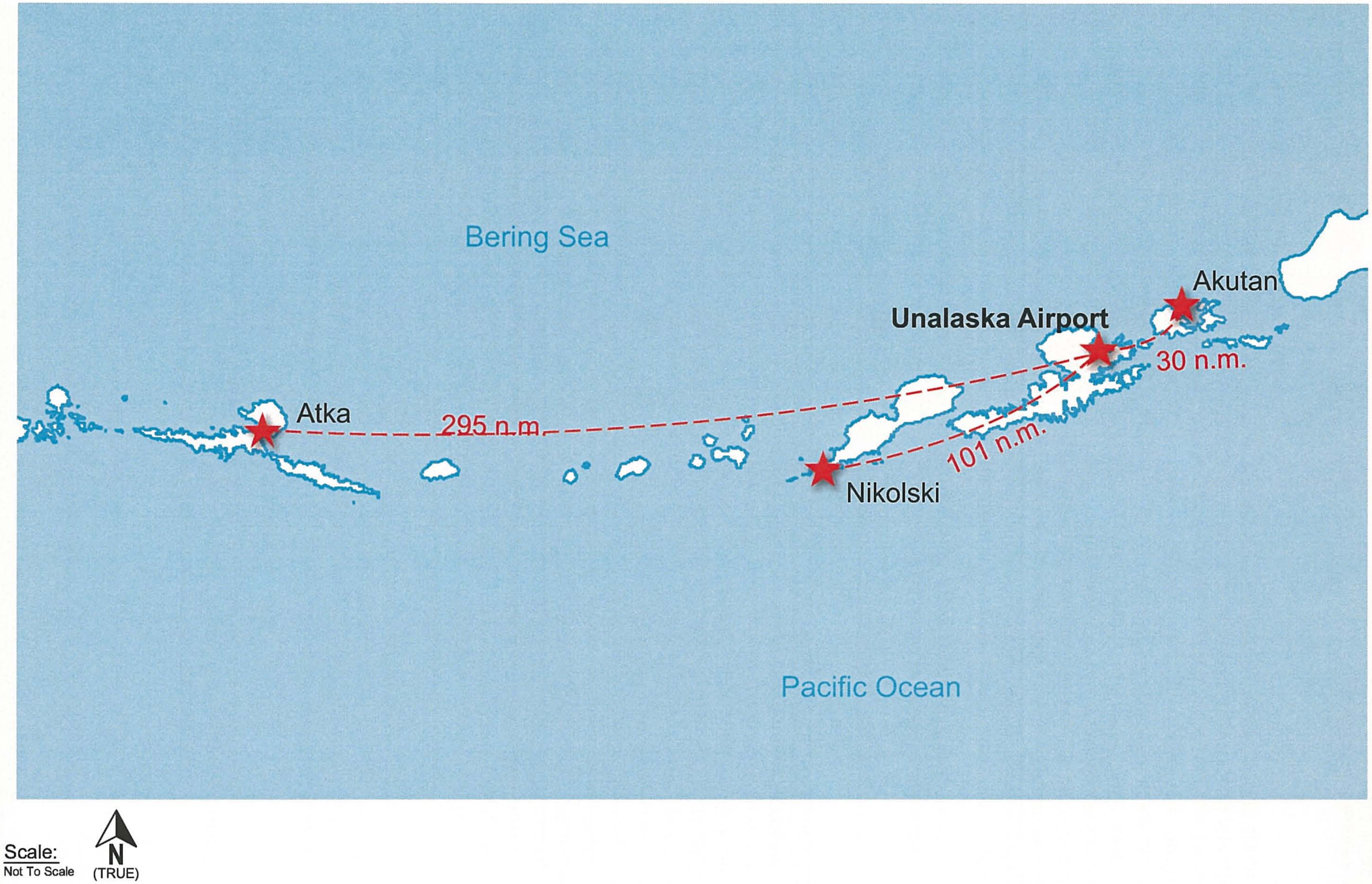
The recommendations of the 2001-2003 planning process were rendered obsolete in January 2004 when Alaska Airlines substituted use of the Boeing 737-200 Advanced Combi jet for PenAir's Saab 340B for passenger service. This change immediately changed the critical aircraft to the Saab 340B. None of the 2001-2003 planning recommendations were implemented.

In October 2004, the Federal Aviation Administration (FAA) and Alaska DOT&PF initiated Project Definition planning to update the airport needs in response to the change of critical aircraft and other changes. FAA and DOT&PF's intent was to complete the Project Definition planning and to initiate an EIS for projects that would enhance the safety, reliability and capability of Unalaska Airport, including runway safety area enhancements. These efforts projected airport needs for the coming 15 years – which coincided with the approximate lifespan of the Saab 340B fleet. In March 2006, the Unalaska City Council adopted a resolution to support changing the Unalaska Airport's ARC designation from B-II to B-III if necessary in order to accommodate a larger critical aircraft (Appendix A). Other changes were also occurring during this time period including further rationalization of various fisheries, changes in FAA requirements, and PenAir's continued research into aircraft for future fleet modernization. Given the lack of support from the City of Unalaska and factors influencing continued change in Unalaskan aviation, FAA and DOT&PF suspended progress of the Project Definition planning in spring of 2006 in lieu of a full AMPU.

1.2.8 Existing Air Service

Air service to Unalaska is critical, as there is no road access to or from the Alaskan mainland. Ferry and barge services are the only alternative modes of transport.

Scheduled passenger air service to Unalaska from Anchorage is provided only by Alaska Airlines (operated by PenAir), with an average three scheduled flights Monday through Saturday, and two scheduled flights on Sundays. In addition, PenAir schedules additional flights to accommodate demand during peak fish harvesting seasons. The aircraft used for the passenger service is the Saab 340B, which is configured to seat 30 passengers and is based in Anchorage. From Unalaska, PenAir provides service to Akutan, Atka, and Nikolski through the Essential Air Service program shown in **Exhibit 1-4**. Two flights are available daily to Akutan in the nine-passenger Grumman Goose. One flight is available four days a week to Atka and one flight is available two days a week to Nikolski via a Piper Navajo. All of these flights include some cargo transport. Table 1-2 presents a summary of aircraft operations in Unalaska in 2006, of which PenAir's scheduled passenger service accounts for 68 percent of all aircraft operations.



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Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Essential Air Service (EAS) Markets

Exhibit 1-4

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TABLE 1-2
Composition of the Aircraft Operations Estimate in 2006

Source of Aircraft Operations	Number of Annual Operations in 2006	Percent of Total Operations
PenAir's scheduled passenger service	4,041	68.1
Scheduled air cargo services	1,600	26.9
Medical Evacuations	200	3.3
GA	50	0.8
Military[1]	50	0.8
Total	5,941	100.0

Source: CH2M HILL research and analysis
[1] Military and GA operations are estimated at 50 operations per year for the forecast period

Scheduled cargo service to and from Anchorage is currently provided by Alaska Central Express (ACE), with two flights Monday through Friday and one flight on Saturdays. The aircraft used for this service is the Raytheon Beech 1900C, based in Anchorage, which has a standard payload of approximately 5,500 pounds. PenAir also provides daily cargo service on a scheduled basis using the cargo compartment (aft hold) of their 30-seat Saab 340B, Piper Cheyenne T-1041, Piper Pa-31 passenger aircraft, and a Metro III. Charter cargo service is used during the peak fishing season, primarily the months of January and February, and provided by Northern Air Cargo, Lynden Air Cargo, and Everts Air Cargo with aircraft based in Anchorage. Northern Air Cargo uses a Douglas DC-6 to serve the Unalaska Airport and has a standard payload of approximately 28,000 pounds. Lynden Air Cargo operates a Lockheed L-382 Hercules for charter cargo service, which can carry payloads of up to 48,000 pounds. Everts Air Cargo operates a Curtiss C-46 and a DC-6 out of Anchorage as well.

Guardian Flight provides aircraft medevac transportation services, and recently established Dutch Harbor as a hub for operations in the Aleutians. Guardian primarily uses a Beech King Air 200 for medevac services out of Unalaska Airport.

Aircraft enplanements at Unalaska Airport have fluctuated since 1990, from a low of 28,135 enplanements in 2004 to a high of 47,188 enplanements in 1992. A more detailed analysis of aircraft operations data is found in Chapter 2, Projected Aviation Demand.

1.3 Existing Airside Facilities

Airside facilities at Unalaska Airport include the Runway 12/30, taxiways, aprons, lighting, markings, and navigational aids and are depicted in **Exhibit 1-5**.

1.3.1 Runway

The runway pavement at Unalaska Airport, Runway 12/30, is 4,100 feet long, 100 feet wide, and consists of a grooved asphalt surface. Runway 30 utilizes a 100 foot displaced threshold while Runway 12 utilizes a 200 foot displaced threshold. The runway safety areas (RSA) are 150 feet by 200 feet off Runway end 12 and 150 feet by 250 feet off Runway end 30[1].

The FAA has determined that certain distances are available for departure and arrival operations when the entire length of a given runway is not usable as a result of one or more obstructions or because a safety standard is not met. Such is the case for Unalaska Airport. These available runway lengths are known as "declared distances" and are necessary to allow the airport to continue to operate in a safe manner. The declared distances at Unalaska Airport result in the full runway length available for takeoff (4,100 feet) and an available landing distance of 3,800 feet in both runway directions.

Table 1-3 depicts the published declared distances figures for Runway 12/30. These figures were added to the ALP in tabular format and approved in 2005.[2]

TABLE 1-3
Published Runway 12/30 Declared Distances

	Runway 12	Runway 30
Takeoff Runway Available (TORA)	4,100 feet	4,100 feet
Takeoff Distance Available (TODA)	4,100 feet	4,100 feet
Accelerate Stop Distance Available (ASDA)	4,000 feet	3,900 feet
Landing Distance Available (LDA)	3,800 feet	3,800 feet

Source: 1987 Unalaska Airport Layout Plan (revised in 2005 to reflect declared distances).

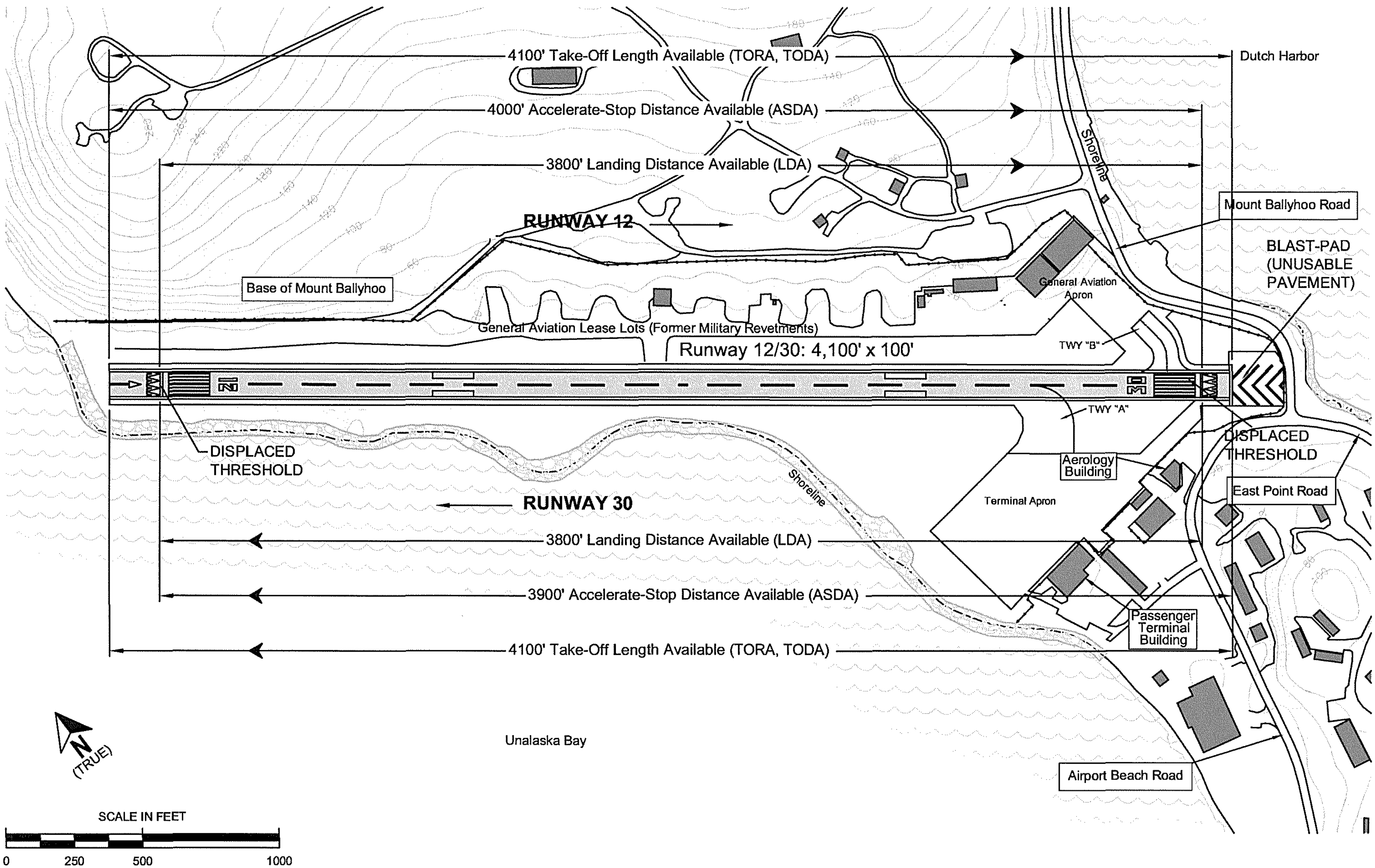
The runway was first paved in 1987 and was most recently resurfaced in 1998. Pursuant to recommendations noted in the *2004 Unalaska Airport Pavement Condition Report* commissioned by DOT&PF, airport staff regularly performs preventative and corrective maintenance in the form of crack seal and patching to maintain runway serviceability.

Based on the current aircraft fleet mix, the runway is subject to FAA ARC B-II design standards. The standard runway width for an ARC B-II runway is 75 feet. The current width of Runway 12/30 is 100 feet and contains an additional 25 feet of paved shoulder on each side of the runway edge.

Runway 12/30 does not meet ARC B-II airfield design standards for Runway Safety Areas (RSA), Object Free Areas (OFA), and Obstacle Free Zones (OFZ), and there are also numerous penetrations to Part 77 imaginary surface areas. To alleviate these deficiencies as much as practical, Runway 12/30 utilizes displaced thresholds. Mount Ballyhoo Road and Airport Beach Road exist in close proximity to the Runway 30 approach end and warrant the 100 foot threshold displacement.

[1] 1987 Unalaska Airport Layout Plan, Revised in 2005

[2] Surveyed actual declared distances vary slightly from the published figures and are addressed in the Airfield Alternatives chapter.



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AIP 3-02-012-2006

Existing Conditions

Exhibit 1-5

Source: 1987 Unalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetic Data (January 2007).

May 2007

1.3.2 Taxiways

Runway 12/30 has two taxiways at the southeast end of the airport. Taxiway A connects the runway to the terminal apron, also known as Ramp A, and the terminal building on the south side. Taxiway B connects to the GA apron, also known as Ramp B, and GA hangars on the north side. There are no parallel taxiways. Both Taxiway A and B connect to the Runway 30 end. Taxiway A's surface is asphalt, while Taxiway B's is concrete. Both taxiways were last resurfaced in 1998.

1.3.3 Aprons

Ramp A is located adjacent to Dutch Harbor on the east side of the airport, south of the runway. The terminal apron is approximately 30,000 square yards, of which 15,000 square yards are usable for aircraft parking due to Federal Aviation Regulations (FAR) Part 77 surface limitations. Ramp A was last paved with asphalt in 1998. Ramp A has one vehicle stop-gate located on the eastern half of apron along the southern edge.

Ramp B is located adjacent to Dutch Harbor on the east side of the airport, north of the runway. Ramp B is constructed of concrete and is approximately 6,700 square yards in area. As a result of FAR Part 77 penetrations, 4,000 square yards are usable for aircraft parking.

A seaplane ramp is located east of Ramp B approximately half way between the northern and southern edges of the ramp. The seaplane ramp was reconstructed in 1992 after the concrete planks were undermined by wave action.

Ramp B provides access to the seaplane ramp via a seaplane stop-gate system. The stop-gate is located approximately half way between the northern and southern edges of the ramp. Seaplanes using the water must cross Mount Ballyhoo Drive for access to Ramp B or the seaplane ramp. Ramp B also has one vehicle stop-gate located to the north of the seaplane stop-gate, on the eastern edge.

1.3.4 Fencing

An eight-foot security fence with barbed wire at the top surrounds much of the airfield and aprons. Frangible orange posts approximately three feet in height are located on the Runway 30 end, east of the blast pad. These posts take the place of fencing in an area the width of the runway and are used to assist in visually delineating the runway from adjacent Mount Ballyhoo Road, located just outside and east of the security fence.

1.3.5 Lighting/Markings

Visual aids used for navigation at Unalaska Airport include Visual Approach Slope Indicators (VASI), Medium Intensity Runway Lights (MIRL), and Runway End Identifier Lights (REIL). All of this equipment is pilot activated through radio communication. In addition, both runway ends have VASI equipment aligned at a three degree glide angle, and each runway is striped with non-precision runway markings and equipped with REILs.

1.3.6 Airspace/Obstructions

Airspace in the U.S. is generally classified as controlled, uncontrolled, or special use, with seven categories: Classes A, B, C, D, E and G, and Special Use Airspace. Classes A through E are controlled airspace classes, Class G in uncontrolled airspace, and Special Use Airspace is restricted for specific uses. Unalaska Airport is classified as having Class E airspace, which is a general category for controlled airspace for non-towered airports, airspace transition areas, and Federal airways. Designated Class E airspace for Unalaska Airport has a 700 foot floor and a 1,200 foot ceiling.

Federal Aviation Regulation (FAR) Part 77 includes standards for determining obstructions in navigable airspace, which apply to existing and manufactured objects, objects of natural growth (trees), and terrain. Under Part 77, the airport operator (DOT&PF in the case of Unalaska Airport) is responsible for clearing and protecting the runway approaches, and is encouraged to impose reasonable restrictions on land uses in the immediate vicinity of the airport. Common restriction measures include adoption of zoning ordinances through the local jurisdiction, and marine vessel channel restrictions. If an object is an obstruction to Part 77 surfaces it should be removed, but this is not always achievable or feasible. Part 77 obstructions that cannot be removed are subject to FAA analysis under the *U.S. Standard for Terminal Procedures Order 7400.2* (TERPS) to determine if the object is a hazard to air navigation, the most severe type of penetration. Hazards that cannot be removed usually result in restrictions on the instrument approach procedures at an airport.

Part 77 surfaces (also commonly called imaginary surfaces) are sized to the type of approach and weight of the aircraft that is forecast to utilize the runway. The dimensions for the imaginary surfaces related to Unalaska's Runway 12/30 are based on a non-precision instrument approach and aircraft that weigh more than 12,500 pounds. Numerous Part 77 obstructions exist at Unalaska Airport as shown in **Exhibit 1-6**; these will be described in detail in Chapter 3, Demand/Capacity and Facility Requirements.

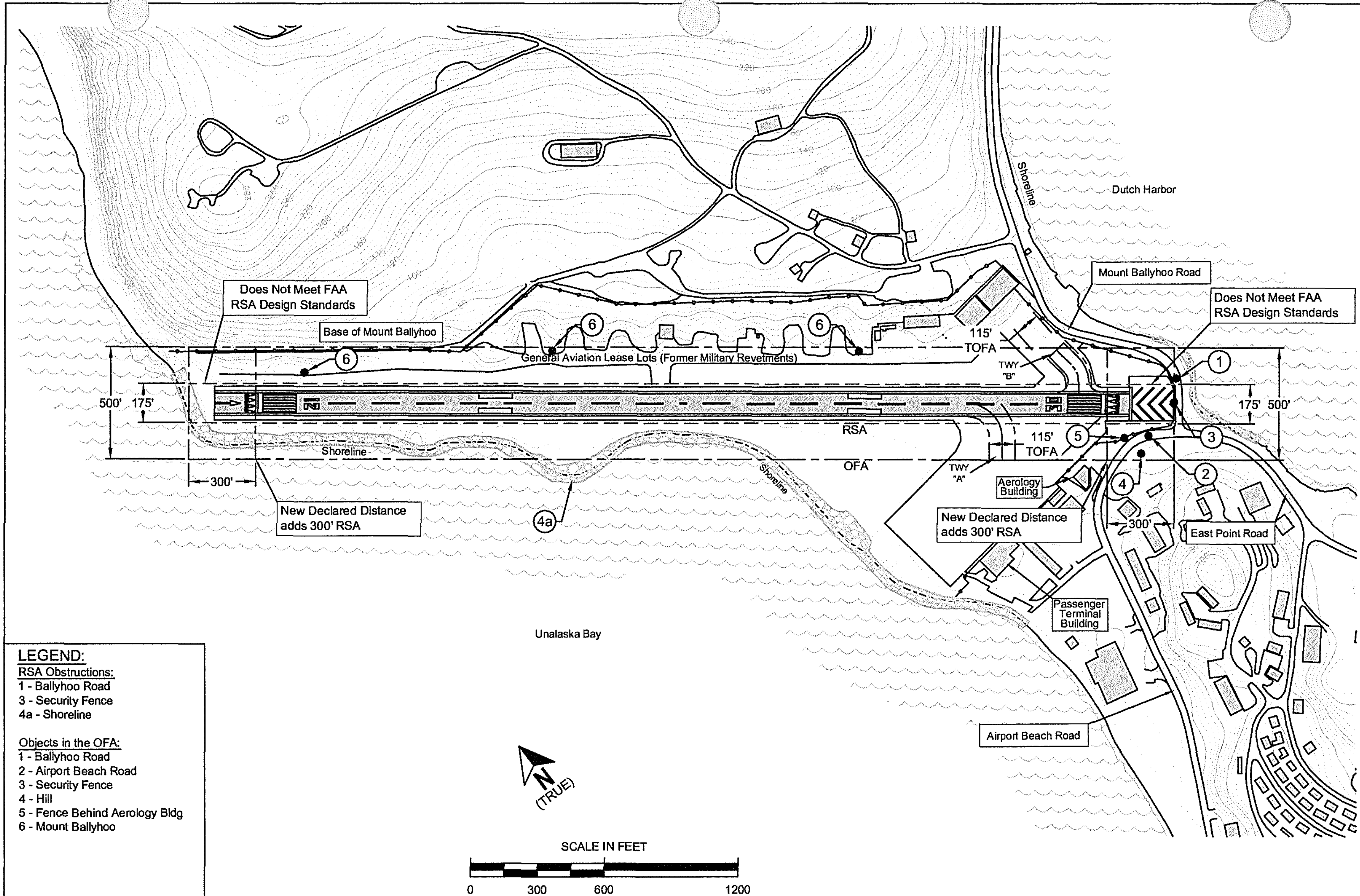
1.3.7 Meteorological Considerations

Climate

Unalaska experiences an Alaskan maritime climate with mild temperatures. Ice-free waters are present year-round. Unalaska is situated in the path of frequent west-to-east storm tracks of the North Pacific, particularly in winter. The mean summer temperature is between 43 and 53 degrees Fahrenheit, and the mean winter temperature is between 25 and 35 degrees. The average annual precipitation is 57.7 inches, with mean wind speeds of 15 knots (Aleutians West Coastal Resource Service Area 2006). Annual snowfalls average 88.8 inches, and January sees the most snow on average, with 23 inches (Western Regional Climate Center, 2007).

Visibility

Seventy-four percent of the time, visibility is equal or greater than three miles with a cloud ceiling height equal to or greater than 1,800 feet. Ninety-two percent of the time visibility is greater or equal to three miles with a ceiling height greater than or equal to 700 feet. On the lower end, cloud ceilings greater than or equal to 700 feet and visibility equal to or greater than a mile and one-half occur 95 percent of the time. The frequency of fog occurrence ranges from a low of two percent in November to a high of 22 percent in July. Terrain in the area requires a 2,200 foot decision height for making an instrument-guided landing, and the high visibility minimums results in many airport closures due to low cloud cover.



CH2MHILL

Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Existing Obstructions

Exhibit 1-6

Source: AC 150/5300-13, "Airport Design," Change 10; CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2005 to reflect declared distances); Photogrammetric Data (January 2007)

May 2007

PLOT DATE: 18-May-07 PLOT TIME: 2:59:31 PM FILENAME: C:\DOCUMENTS AND SETTINGS\CJOLE\MY DOCUMENTS\NDM\PROJ\322651 - DUTCH HARBOR UNALASKA\EXH 1-06 - EXISTING OBSTRUCTIONS.DWG USER: CJOLE TAB: LAYOUT1

Wind Coverage and Data

The maximum acceptable crosswind speed for the current B-II aircraft fleet mix is 13 knots. The FAA required wind coverage for a runway is 95 percent, which means the crosswind at an airport can only exceed the crosswind speed threshold a maximum of five percent of the time. The National Climatic Data Center does not collect this data for Unalaska. Because of the effect on wind speeds and directions resulting from the unusual terrain surrounding the airport, data collected from nearby sites do not adequately represent actual wind conditions at the airport. Thus, a wind coverage analysis cannot be conducted. The most recently approved ALP indicates that Runway 12/30 experiences 90 percent wind coverage. Even when crosswinds do meet FAA criteria, pilots report significant wind changes northeast of Rocky Point at the threshold of Runway 30, where pilots experience approximately 300-foot air pockets (ASCG 2001).

The Unalaska Airport currently has a subcategory III Automated Weather Observation Station (AWOS), and can be reached via telephone or radio channel 125.8 MHz. The AWOS III collects information on wind speed, wind gust, wind direction, variable wind direction, temperature, dew point, altimeter setting, density altitude, visibility, variable visibility, sky condition, and cloud height and type. The AWOS is located approximately 400 feet south of the Runway 12/30 centerline and approximately 250 feet west of Ramp A.

1.3.8 Navigational Aids

Navigational Aids (NAVAIDs) are defined as "any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight." This definition includes instrument approach components such as non-directional radio beacons (NDB) and satellite navigation systems, as well as airfield lighting and striping.

When navigating, pilots use either visual flight rules (VFR), if weather permits, or instrument flight rules (IFR) if visibility is impaired. Instrument approaches are designed to enhance airport access by allowing inbound aircraft to land in weather conditions that are below VFR standards. VFR standards at Unalaska Airport require the pilot to have three miles visibility and remain 500 feet below, 1,000 feet above, or 2,000 feet horizontally from all clouds. Three types of approaches use NAVAIDS: precision instrument, non-precision instrument, and visual. The distinction between precision and non-precision instrument approaches is that the former provides information concerning vertical and horizontal alignment and often distance from the runway, whereas the latter does not provide the pilot with electronic information concerning vertical relationship to the runway. A visual approach, as the name implies, does not rely on any electronic guidance. An airport is equipped with either precision or non-precision approach capability based on airport operational needs, weather conditions, and airport environs, such as terrain. If the airport is not supported by instrument approach guidance, pilots use visual guidance to land during acceptable weather conditions.

Unalaska Airport has no air traffic control tower. The Airport is currently supported by two published instrument approach procedures including Global Positioning System (GPS) and Non-directional Beacon (NDB) to be used by the general public, and four unpublished "special" procedures developed for use only by air carriers and pilots otherwise authorized by FAA to fly the procedure. Table 1-4 displays these approaches and their required minimums. All six instrument approach procedures are authorized for daytime use only as nighttime operations at Unalaska Airport are prohibited. Due to the mountainous terrain, the airport has instrument departures as well.

Table 1-4 depicts visibility minimums for instrument approaches serving Unalaska Airport.

TABLE 1-4
Instrument Approach Minimums

	Category A Aircraft		Category B Aircraft	
Approach Identifier[a]	**Descent Minimum (ft MSL)**	**Visibility Minimum (miles)**	**Descent Minimum (ft MSL)**	**Visibility Minimum (miles)**
Public				
NDB-A[b]	1820	3	1820	3
GPS–E[b]	2200	1.25	2200	1.5
Special				
GPS RWY 30[b]	500	NA	500	NA
GPS RWY 12[b]	500	NA	500	NA
NDB DME or GPS C[b]	620	3	620	3
NDB DME or GPS D[b]	620	3	620	3

Source: FAA
[a] Published approaches were developed to be used by the public, whereas special approaches were developed for use by approved carriers and pilots.
[b] Not authorized at night

There are three wind socks at the Unalaska Airport, one of which also has a segmented circle. The wind sock with the segmented circle is located approximately 300 feet south of the Runway 12/30 centerline and 450 feet west of Ramp A. Another wind sock is located near the Runway 12 end, 200 feet north of the runway centerline and approximately 300 feet west of the Runway 12 threshold. The third wind cone is located 250 feet north of the runway centerline, almost in line with the Runway 30 threshold.

1.4 Existing Landside Facilities

The 'landside' at an airport is any non-airfield portion of the airport. Landside facilities of Unalaska Airport consist of the airport terminal, lease lots, cargo facilities, parking facilities, hangars, and other airport support facilities.

1.4.1 Terminal

The existing two-story passenger terminal includes ticket and check-in counters, a restaurant, rental car agents, travel agents, administrative offices, communications storage, passenger boarding area, and baggage claim. The total area of the terminal is 13,700 square feet, with the upper story used as the terminal and the lower story used for storage. A new roof was installed on the terminal building in April 2005. Individual features include:

- **Baggage Claim Area**—The existing baggage claim area is estimated at 900 square feet with a single baggage claim unit. The area is inadequate during peak passenger demand periods.
- **Passenger Hold Room**—The existing passenger hold room area is roughly 1,100 square feet and capable of accommodating about 60 passengers, or two full flights of passengers boarding the Saab 340B aircraft. The passenger hold room is insufficient to accommodate all the passengers, baggage, and meeters/greeters that assemble in the area during peak period demand.
- **Concourse and Lobby**—The existing concourse and lobby area, at 3,450 square feet, is overcrowded during peak passenger demand periods.
- **Airline Space**—Airline terminal space includes airline ticketing, airline office, and baggage hold rooms. There is 2,500 square feet of terminal space available for these functions.
- **Restrooms**—The men's and women's restrooms are a combined 450 square feet. These facilities are the only restrooms in the terminal building and do not meet the current needs of the traveling public and employees.
- **Restaurant**—The restaurant and bar measures 2,150 square feet. These facilities do not meet demand during peak hour travel periods and are adequate during other periods.
- **Miscellaneous Aviation Support Areas**—The City of Unalaska offers lease space in the terminal facility for airport-related businesses, including rental car and travel agencies. Lease areas currently encompass 850 square feet.

1.4.2 Cargo Facilities

DOT&PF owns two air cargo buildings at Unalaska Airport. One building is located next to the terminal on the east side. This cargo facility is approximately 8,000 square feet in area and PenAir occupies approximately 4,000 square feet for cargo purposes. The building also houses a shipping company and a car rental business. The other cargo building is located further east of the terminal building, north of the Torpedo building. This cargo facility is approximately 2,500 square feet in area and is leased by ACE Air Cargo.

1.4.3 Parking Facilities

The short-term parking area is leased by the City of Unalaska and is located to the south of the terminal building. This lot measures approximately 100 feet by 200 feet, and offers free parking. It includes 80 short-term (4-hour) public spaces and 40 spaces for rental car return. An additional 25 long-term (seven days) public spaces are available near the PenAir cargo facility, for a total of 145 spaces. The parking area was last paved in 1995.

1.4.4 Airport Access

Access to Unalaska Airport is provided from the City of Unalaska via Airport Beach Road to the south and from Dutch Harbor via Mount Ballyhoo Road from the northeast. Airport Beach Road is a two-lane, paved road that also provides access to short and long-term parking facilities. Mount Ballyhoo Road is a two-lane road. Both Airport Beach Road and Mount Ballyhoo Road are scheduled for rehabilitation by DOT&PF.

1.4.5 Support Facilities

Two General Aviation hangars are located on the north side of Ramp B. The hangar to the west has an approximate area of 12,200 square feet, while the second GA hangar to the east measures approximately 16,700 square feet.

Also located in this area is the DOT&PF maintenance building, which includes heated storage for equipment such as a motor grader, loader, sweepers, and liquid deicing equipment. Maintenance activities conducted at the airport include snow removal, pavement repair, lighting maintenance, fence/gate repair, striping equipment, and mowing safety areas. The approximate square footage of this building is 7,900.

The current Airport Rescue and Firefighting (ARFF) facility is located north of the Runway 30 threshold at the base of Mount Ballyhoo and accommodates additional airport administrative offices and maintenance storage facilities. The Airport owns one Aircraft Rescue and Firefighting vehicle, acquired in 2002, which has a 1,500 gallon capacity required under ARFF Index B standards, and is stored and maintained in the ARFF facility.

Jet A and Avgas fuel storage facilities are currently maintained off airport property. As such, single-point aircraft fueling takes place via fuel-tanker trucks owned and operated by a private firm, Delta Western, Inc. All fuel is transported by tanker trucks to the airport as needed.

A Rescue Boat owned by the City to be used in the event of a disabled aircraft in Unalaska Bay is stored at the Unalaska small boat harbor.

1.4.6 Other Facilities/ Buildings

Other buildings within the airport boundary not associated with the airport or currently used for airport purposes include the Aerology Building and the Torpedo Building. These are located on Lease Lots 6A, 6B, and 7. These buildings date from World War II and are considered contributing structures to the Dutch Harbor Naval Operating Base & Fort Mears National Historic Landmark. The southwest end of the Aerology Building fronts the terminal apron, and is inside the runway OFA. After the war, this building served as the airport terminal until the construction of the current terminal. It was renovated beginning in 2000, and opened as the Aleutian World War II Visitor Center in 2002. This center is part of the Aleutian World War II National Historic Area, is owned and operated by the Ounalashka Corporation, and is affiliated with the National Park Service. The Torpedo Building, also known as the Torpedo Bombsight and Utility Shop, is owned by Alaska DOT&PF. This building has been used since World War II for storage of various items, and in 2003 DOT&PF completed a hazardous materials clean-up to remove solid waste, petroleum based material, and lead-impacted sediment. This structure has deteriorated due to age and is a hazard due to flying debris during storms.

Chapter 2 Projected Aviation Demand

CHAPTER 2

2. Projected Aviation Demand

2.1 Introduction

Unalaska Airport facility planning begins by defining the projected aviation demand that may reasonably be expected to occur over the coming 20 years. This forecast of aviation demand provides a basis for determining the type, size, and timing of aviation facility development and consequently influences virtually all phases of the planning process.[1]

The base year for this forecast is 2006 and future levels of aviation demand are projected for the years 2011, 2016, 2021, and 2026. The last forecast approved by the FAA was prepared in 2004 as part of the first phase of the Unalaska Airport EIS[2]. This EIS effort was suspended short of completion in order to take a broader 20-year look typical of a master plan.

2.2 Key Findings

- Enplaned passengers[3] are expected to increase annually by over three percent for most years resulting in a 20-year growth rate of approximately 83 percent.
- Enplaned connecting passenger traffic is expected to grow at almost four percent annually in the years after the loss of the Akutan connecting passenger market in 2010.
- Cargo volume is expected to grow 2.7 percent annually or approximately 70 percent total over the planning horizon. Outbound cargo lift consistently remains available for most of the year, reflecting that demand is being met.
- Peninsula Airways' (PenAir) Saab 340B fleet will be at the end of its useful life within 15 years.
- In approximately ten years (2016), PenAir expects to phase in two Bombardier Q400 (Q400) resulting in more than 700 annual operations that year. As such, the associated airport reference code for Unalaska Airport is B-III, starting in 2016.
- Passenger jet service is not expected to return to Unalaska.

2.3 Sources of Data

The following sources of data and information were used in the preparation of this forecast:

- T-100 Reports, U.S. DOT Bureau of Transportation Statistics,
- *Aerospace Forecast*, Fiscal Years 2006-2017, FAA
- *2006 Unalaska Terminal Area Forecast*, FAA
- *2000 Census*, U.S. Census Bureau
- U.S. Office of Management and Budget (OMB)

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[1] The FAA granted concurrence with this forecast of aviation activity on April 9, 2007.

[2] 2004 Unalaska Airport Environmental Impact Statement: Phase 1.

[3] An enplanement is one boarded passenger

- University of Alaska, Anchorage Institute of Social and Economic Research (ISER)
- National Marine Fisheries Service, Fisheries Statistics Division
- *World Air Cargo Forecast 2004/2005,* Boeing
- Alaska Department of Fish and Game, Division of Commercial Fisheries
- Alaska Department of Labor and Workforce Development
- *Alaska Economic Trends* provided by Alaska Department of Labor and Workforce Development
- Airport enplanement records, City of Unalaska/Port of Dutch Harbor
- Interviews with the Port of Dutch Harbor, City Planning Department, Unalaska City Manager, Unalaska Conventions and Visitors Bureau, passenger and air cargo carriers, various fishing industry stakeholders, and The Grand Aleutian Unisea Inn hotel management
- Unalaska Air Transportation Survey: Personal Travel and Business Travel, 2004
- *Unalaska Airport Environmental Impact Statement*: Phase 1, CH2M HILL 2004
- *Advisor Circular 150/5300-13, Change 10, Airport Design Standards,* FAA
- *Technical Memorandum #1 and 2,* Unalaska Airport Master Plan Update, ASCG Incorporated, November 2001.
- *The Aleutians Aviation System Plan,* Aries Consultants, November 2003
- *Technical Memorandum: Port and Harbor Ten-Year Development Plan,* Northern Economics Inc., April 2004
- *Unalaska Air Transportation Study,* HDR Alaska Inc., April 2006

2.4 Background

Unalaska is the Aleutian region's transportation hub, connecting residents to Anchorage and other Aleutian communities via Unalaska Airport and the Port of Dutch Harbor. It is also the center of the area's population and economic activity, which is heavily reliant on the health and stability of the commercial fishing and seafood processing industries. As an economic engine benefiting Alaska and the nation, transportation facilities in Unalaska are critical. As such, reliable and adequately-sized aviation facilities are vital to meeting the direct and indirect travel demands of the commercial fishing industry, local commerce, and other critical support services, such as medical and government services.

This section provides industry economic background, Alaskan and local fishing trends, and insight to the challenges in the fishing industry. This information is intended to frame the local environment as a basis to the forecast projections. Unalaska is a mature fishing market and is currently the number one fishing port in the United States in terms of volume and number two in terms of value. Overall the economic outlook is positive and this translates to a positive outlook in terms of passenger and cargo growth at the airport over the planning period.

As such, these forecasts reflect the importance of the fishing industry to the community of Unalaska by taking a comprehensive look at the components that drive travel demand. As with any forecast of future activity, actual future traffic levels may differ from the projected levels because of unforeseen or unrealized events and free market forces.

2.4.1 The Economic Climate

Global, national, and local economic trends will influence the economy of Unalaska. Historical trends show that prospects for overall growth in the passenger and air freight industries are closely tied to the growth of the overall economy and to changes in transportation costs. Typically, if the economy is in a period of expansion, demand for passenger travel and air freight shipments increase as do other modes (Unalaska is unique because it is not accessible by rail or truck). Conversely, in a recession, passenger and freight demand levels reflect a trend downward.

2.4.2 U.S. Economic Forecast

The US Office of Management and Budget (OMB) economic forecasts call for continued growth in the US Gross Domestic Product (GDP). Over the next ten to 12 years, US expansion is expected to remain strong with growth rates tapering slightly from 3.6 percent in 2005 to 3.0 percent in 2013. Continued growth in economic productivity is predicted to fuel the expansion. A risk to continued US economic growth is the upward pressures on worldwide commodity prices, including the price of oil. These inflationary pressures, if unchecked, could increase inflation and bond yield, reducing domestic demand.

High jet fuel prices hurt the financial performance of US and world passenger and cargo airlines in 2005 and 2006. However, the demand for passenger travel and air cargo services was only minimally affected as the strong economy offset the impact of higher fares as carriers increased fuel surcharges to shippers and the traveling public.

2.4.3 Alaskan Economic Outlook

According to the Alaska Department of Labor and Workforce Development, 2006 Alaskan international exports totaled more than $4 billion (a 12.6 percent increase over 2005 totals). Although Alaska's export market comprises only about 0.4 percent of the U.S. total, international trade is one of the cornerstones of the Alaskan economy. Alaskan international exports have been steadily climbing since 2001. In 2006, exports increased by approximately $400 million over 2005, almost 50 percent more than 2001 levels.

Alaska's top 25 commodities together make up almost 95 percent of the state's export value. Improvements in seafood values and sales are responsible for a majority of the recent gains. For example, in 2006, Alaska exported approximately $2.0 billion in seafood internationally. Asian markets accounted for $1.5 billion of Alaska's seafood export value while Europe accounted for $461 million. As a result, seafood comprised almost 55 percent of Alaskan exports in 2006.[3]

According to the University of Alaska's Institute of Social and Economic Research[4] (ISER), dependence on commodity-producing industries means that cycles in the fishing, petroleum, timber, and mining sectors will continue to generate business cycles at the state and regional levels. The large federal and state government presence in the Alaskan

[3] Alaska Department of Labor & Workforce Development, Research and Analysis Section

[4] *Economic Projections for Alaska and the Southern Railbelt 2005-2030, Institute of Social and Economic Research*, University of Alaska, Anchorage

economy means that political decisions made in Washington and Juneau will also continue to exert a strong influence on the economy and also potentially generate cycles.

The most likely Alaska base-case rate of wage and salary employment growth, the best measure of the size of the economy, is projected by ISER to gradually rise, resulting in a 30-year average (through 2030) of 0.94 percent.

2.4.4 Unalaska Area

Unalaska's Port of Dutch Harbor is the number one fishing port in the United States by volume[5], and only second to New Bedford, MA in terms of value. Salmon, crab, pollock, halibut, black cod, rockfish, and other species are harvested by both local and non-resident fishermen and processed at shore-based plants as well as aboard floating processors. The region's pollock fishery is the largest in the world in terms of volume. Much of the pollock harvest is converted to a bulk product, surimi, and marketed as imitation crab. A trend toward diversification of international seafood markets has emerged and pollock is becoming a major product form, resulting in rapidly increasing sales in Europe and Asia. As such, seafood processing jobs often account for over 60 percent of the City's private sector wage and salary employment.

The historical value of commercial fisheries landings at the Port of Dutch Harbor is provided in Table 2-1.

TABLE 2-1
Historical Value of Commercial Fisheries Landings at the Port of Dutch Harbor

Year	Weight (lbs)	% Change	Value	% Change
1990	509,900,000		$126,200,000	
1991	731,700,000	43.50%	$130,600,000	3.49%
1992	740,400,000	1.19%	$197,900,000	51.53%
1993	793,900,000	7.23%	$161,200,000	-18.54%
1994	699,600,000	-11.88%	$224,100,000	39.02%
1995	684,600,000	-2.14%	$146,200,000	-34.76%
1996	579,600,000	-15.34%	$118,700,000	-18.81%
1997	587,800,000	1.41%	$122,600,000	3.29%
1998	597,100,000	1.58%	$110,000,000	-10.28%
1999	678,300,000	13.60%	$140,800,000	28.00%
2000	699,800,000	3.17%	$124,900,000	-11.29%
2001	834,500,000	19.25%	$129,400,000	3.60%
2002	908,100,000	8.82%	$136,100,000	5.18%
2003	908,700,000	0.07%	$156,900,000	15.28%
2004	886,800,000	-2.41%	$167,400,000	6.69%
2005	887,600,000	0.09%	$166,100,000	-0.78%

Source: Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD

[5] National Oceanic & Atmospheric Administration Memo, February 2, 2007

2.4.5 Alaskan Fisheries Industry

The core of the Alaskan commercial fisheries industry is comprised of pollock, salmon, cod, halibut, sablefish, herring, and crab. Commercial fishers also harvest sea urchins, sea cucumbers, octopus, squid, cod milt (a cod by-product), and pollock roe.

Within the Alaskan fishing industry, there is a wide variation between weight and value. Pollock constitutes the core of the north pacific groundfish fishery, with almost five times the volume of landings of the next most landed species (Pacific cod). In terms of value, however, the contribution of pollock to total statewide landings is modest, accounting for only 16.8 percent. By contrast, sockeye salmon, with only one-tenth of the volume of pollock, contributes a nearly equal monetary value. Two other species, king crab and snow crab, have relatively low landings by weight, but generally are included in the top ten list of landings by value because of their high value-per-unit price. As a baseline gauge of commercial fishing trends in the Bering Sea and Aleutian Islands (BSAI) region, the annual catch in weight for groundfish, Alaska king crab, and salmon is presented in Table 2-2.

TABLE 2-2
Annual Commercial Catches of Select Fish Species

Year	BSAI Groundfish Catch (Metric tonnes)	% Change	Alaska King Crab Catch (lbs)	% Change	BSAI Salmon Catch (lbs)	% Change
1995	1,830,295	-	6,430,000	-	108,670,000	-
1996	1,755,872	-4.07%	16,110,000	150.54%	35,649,000	-67.12%
1997	1,740,663	-0.87%	20,500,000	27.25%	40,970,000	68.64%
1998	1,530,823	-12.06%	25,000,000	21.95%	54,990,000	-9.05%
1999	1,302,967	-14.88%	18,130,000	-27.48%	58,900,000	36.61%
2000	1,470,457	12.85%	12,730,000	-29.78%	45,060,000	-34.86%
2001	1,652,802	12.40%	15,650,000	22.94%	34,400,000	-62.02%
2002	1,761,866	6.60%	11,460,000	-26.77%	29,629,000	0.39%
2003	1,794,842	1.87%	23,200,000	102.44%	37,682,000	22.21%
2004	1,796,432	0.09%	22,580,000	-2.67%	58,014,000	75.08%
2005	1,798,006	0.09%	24,080,000	6.64%	70,335,000	43.93%

Sources: Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD and Alaska Department of Fish and Game, Division of Commercial Fisheries

2.4.6 Employment Trends in Commercial Fishing

Total seafood earnings, employment, and exports have all increased over the past two years throughout Alaska. Over four billion pounds of seafood were harvested in 2005, worth $1.3 billion in gross earnings to fishermen, and employing more than 6,700 people. This is the highest value paid to commercial fishermen since 1999 and second highest value since 1995.[6]

Alaska's fish harvesting employment increased slightly in 2005, adding 127 jobs. This 1.7 percent gain over 2004 nearly equaled the 1.9 percent growth rate of the state's wage and salary employment.[6] In recent years, total fish harvesting employment has shown two distinct trend lines: from 2000 to 2002, employment numbers fell at a dramatic rate; then from 2002 to 2005, total employment stabilized and managed to recover a small amount of the lost ground.

Employment growth has not been shared evenly among the fisheries in Alaska. The salmon fisheries added 291 jobs in 2006 for an 8.3 percent increase over 2005, and have added a total of 744 jobs since their low point in 2002. However, the combined total for all other fisheries fell by 166 jobs in 2005, a 4.4 percent decline, and have lost a combined total of 772 jobs since 2000.[7]

Employment in the crab harvest has followed a different pattern than most fisheries over the past six years. The number of jobs increased from 2000 to 2002 then declined through 2004 and may be mostly due to season timing, particularly in the Bering Sea and Aleutian Islands' early opilio season. The employment changes from 2004 to 2005 are considerably more complex. The effects of the newly implemented Bering Sea and Aleutian Islands (BSAI) crab fisheries rationalization program, which created a quota-based fishery, and the associated fishing vessel buyback, began to emerge in 2005. The fishery shed 74 jobs in 2005, which amounted to a 14.3 percent decline, but because the program was not implemented until August 15 of that year, the preceding January's opilio crab harvesting employment was unaffected. The September 2005 through December 2005 employment numbers, which are largely based on the BSAI red king crab fisheries, serve as a better indicator of the changes taking place as a result of rationalization.[7]

Predictably, rationalizing the crab fishery lowered 2005 employment dramatically in the peak month of October and raised employment levels in November and December of that year as harvesters with quota shares were no longer in a race to harvest the available catch and took longer to harvest their respective quotas. The net effect, however, was a significantly smaller average job count from September 2005 through December 2005. In the five years immediately preceding rationalization, the BSAI crab fishery averaged 479 jobs monthly over those four months. The 2005 fishery, under rationalization, produced a monthly average of 303 jobs.[7]

Salmon generates more harvesting jobs than any other fishery, but in terms of both volume and value, the state's largest fishery is groundfish. Groundfish fisheries require a relatively small number of large boats that catch huge quantities of fish, predominantly pollock, without requiring proportionate increases in manpower. But the groundfish category is a rather eclectic collection of fisheries. While the BSAI Pollock trawl fishery is by far Alaska's and the nation's largest fishery in terms of volume, there are many smaller boat fisheries included in this grouping. Longliner, jig and pot fishermen, who target everything from rockfish to Pacific cod, greatly outnumber the better-known trawlers.

[6] Alaska Department of Labor & Workforce Development, Research and Analysis Section

[7] Alaska Department of Labor & Workforce Development, Research and Analysis Section

Groundfish employment has been suffering slow erosion. While the 59 jobs lost in 2005 seem insignificant in relation to that year's employment of 1,132, it represents a five percent decline and continues a five-year trend of job losses. Since 2000, the groundfish fisheries have shed a total of 443 jobs, a decline of 28 percent.[8] The losses in groundfish employment are not evenly divided among the three large fishing regions. While the BSAI trawl fisheries in the Southwest Alaskan region have seen a small contraction, most of the groundfish employment declines since 2000 are attributable to a much-reduced effort among rockfish long liners. This has had some impact on all three regions, but the Gulf Coast region – Kodiak in particular – seems to have suffered the greatest losses over this period. Many of the job fluctuations local to Unalaska are due to the fact the fishing companies in general need employees to stay on-site longer, which has lead to fewer jobs overall. However, as shown in the following sections, this is not anticipated to decrease the total number of enplanements as these employees are traveling more.

Alaska's halibut fishery shows an employment trend similar to groundfish: small losses in 2005 that continue a recent history of consistent, incremental job erosion. The 37 fewer jobs in 2005 represent a 2.9 percent decline, and the five consecutive years of losses from 2000 to 2005 add up to a total loss of 171 jobs and a 12 percent overall decline.[8]

According to the Alaska Department of Labor & Workforce Development, Research and Analysis Section, the continuing fall in employment contrasts with an ongoing trend of higher earnings. In effect, fewer jobs are being generated by a fishery that has experienced significant economic gains over the 2000-2005 period.

Another key factor in the Alaskan fishing industry is that fishing regulations and state and national government management practices limit the pool of available fisheries in a way that restrains and ultimately caps industry growth. To participate in one of the state's limited-entry fisheries, such as salmon or crab, a person must hold a permit. The permits can be bought and sold, but the total number of permits does not generally change in an established fishery. When economic conditions are favorable, most permit holders will fish and in so doing generate jobs and income for themselves and their crew members. Conversely, when costs rise or the value of the catch falls, as happened in the 1990s when farmed salmon entered the market and depressed prices, the percentage of permit holders who fish declines.

2.4.7 Fishing Industry Forecasts

According to *Fish as Food: Projections to 2020*[9], global production of food fish is projected to rise by 1.5 percent annually through 2020; with two-thirds of this from aquaculture, whose share in total food fish production will rise to 41 percent. Growth of US fish production, including from aquaculture, is projected to grow at 0.5 percent per year. However, Unalaska and the Port of Dutch Harbor continues to enjoy annual increases in fish production with 2006 seafood exports topping $2 billion, or nearly three percent over 2005 totals.[10]

[8] Alaska Department of Labor & Workforce Development, Research and Analysis Section

[9] *Fish as Food: Projections to 2020* Christopher Delgado, et al., a paper presented at the Biennial Meeting of International Institute for Fisheries Economics, held on 19-23 August 2002, Wellington, New Zealand

[10] Alaska Department of Labor & Workforce Development, Research and Analysis Section

2.4.8 Challenges for the Fishing Industry

According to the *Alaska Economic Performance Report 2005*[11], Alaska's seafood industry is under competitive pressure from other wild capture sources and large increases in aquaculture products in the world. The Alaska seafood industry must continue to make technical advances in commercial fish harvesting and seafood processing to maintain and improve its global market position. Alaska's commercial harvests have remained fairly constant in recent years, while the value of the catch is growing. This is due in large part, to improved handling and product recognition resulting in greater demand by consumers.

2.5 Passenger Demand

This section describes the passenger forecast elements for Unalaska Airport.

2.5.1 Passenger Enplanement Projection Methodologies

Projections of aviation activity are typically based on a historical, time-series database. These data allow for forecasting models to be used or trend extrapolation techniques to be applied. However, a review of the historical enplanement data at Unalaska does not reveal a statistical correlation. Passenger enplanements at Unalaska have experienced an overall downward trend since 1992. However, enplanements increased by approximately six percent total from 2004 since PenAir has assumed the scheduled airline service between Anchorage and Unalaska (under a code share agreement with Alaska Airlines). Given the overall downward growth trend and the unique market in Unalaska, a context-specific forecast approach was therefore developed.

Specifically, rather than projecting total enplanements, this analysis defines several segments of demand that have different drivers and each segment is projected separately. The following demand components were defined and analyzed:

- **Unalaska Residents:** Includes travel demand from Unalaska residents including travel for work, school, and pleasure. Historical population data and census population projections for both the state and the Aleutian West Census Area were used to project Unalaska resident travel demand. Additionally, the ratio of trips made annually per Unalaska resident was analyzed in an attempt to account for unmet demand.
- **Commercial Fishing:** Includes travel demand from the commercial fishing industry and the fishing-related transient population. The commercial fishing demand component was developed by estimating the number of enplanements generated by the major seafood employers during the fish harvesting seasons.
- **Connecting Traffic:** Includes travel demand from air passengers who stop in Unalaska for the purpose of departing to other destinations. This demand component includes all enplanements from Unalaska to markets such as Akutan, Atka, and Nikolski. The connecting traffic component was developed by analyzing the historical trends of Essential Air Service[12] routes and other connecting markets.

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[11] *Alaska Economic Performance Report 2005*, prepared by the State of Alaska Department of Commerce, Community and Economic Development

[12] Essential Air Service denotes a program of low-traffic, government-subsidized air transportation routes

- **Visitors and Tourists:** Represents travel demand from air passengers whose primary purpose for coming to Unalaska is visiting or tourism related. The projections of visitor and tourist demand levels were developed by estimating the passenger enplanements for specific subcomponents including:
  - World War II history, cultural and natural history
  - Sport fishing
  - Sightseeing
  - Bird Watching
  - Ecotourism
  - Conventions, executive retreats and meetings

Enplanements for 2006 were estimated for each of the above demand components based on records kept by the Port of Dutch Harbor, data corroborated through interviews, and other historical data to the extent possible. Each component was projected over the demand years at different rates based on a variety of factors.

In addition, the forecast was adjusted to account for:

- Akutan Enplanements: ADOT&PF is planning a runway for Akutan, and is projected to open in 2010. At that time, PenAir expects to start operating direct service to Akutan from Anchorage. As such, Unalaska connecting enplanements associated with the Akutan market are projected only through 2009.
- Small Boat Harbor: Based on interviews with City officials and for planning purposes, the new small boat harbor is assumed to open in 2011. At that time, it is anticipated that select visitor and tourist segments will generate more enplanements.
- "Large aircraft factor": Typically, when a larger aircraft with more seats enters a market, some small measure of travel demand results from the customer's perception of improved service. As such, the forecast reflects an increase in enplanements to coincide with PenAir's planned shift from the Saab 340B to the much larger Bombardier Q400 (a DeHavilland Dash 8 derivative aircraft), beginning with two aircraft in 2016. Additionally, when new seats are added to a market, carriers typically provide fare incentives or others promotions to ensure load factors are achieved.

2.5.2 Historical Enplanements

Unalaska Airport is not served by an air traffic control tower; therefore, no accurate aircraft activity or enplanement data is available from the FAA. As such, the City of Unalaska's Port of Dutch Harbor maintains historical enplanement data for Unalaska Airport and is considered the best information available. (This data was crosschecked with proprietary data provided by PenAir) These data are used as the historical record for Unalaska Airport from 1999 to 2006 and is depicted in Table 2-3 below, which illustrates enplaned passenger volumes at Unalaska Airport from 1990-2006.

TABLE 2-3
Historical Enplaned Passenger Volumes at Unalaska Airport – 1990-2006

Year	Enplanements		Notes
1990	44,127	1	
1991	45,231	1	
1992	47,188	1	AS takes over 737-200 service from MarkAir
1993	39,905	1	
1994	40,446	1	
1995	37,711	1	BSAI salmon harvest at 20-year peak, 1995-2005
1996	36,273	1	
1997	33,553	1	
1998	33,417	1	Crab harvest at 20-year peak, 1995-2005
1999	30,442	2	
2000	30,916	2	
2001	28,783	2	
2002	29,995	2	
2003	28,858	2	
2004	28,135	2	PenAir/AS Saab's replace AS jet service
2005	30,525	2	Selendang Ayu emergency response
2006	29,830	2	

Sources:
[1] 2006 FAA Terminal Area Forecast Data
[2] Port of Dutch Harbor

As shown in Table 2-3, enplanements have decreased for ten out of the last 16 years, for a decrease of 17,358 passengers, or 63.2 percent since 1992.

2.5.3 Demand Component: Residents

Unalaska residents are defined here to include full time employees of the seafood processors, homeport fishing boat crews, support service personnel, the Native population, and government social services, education, medical, and police personnel. Over the past 16 years, the population in Unalaska has steadily increased at an annual average growth rate of approximately two percent from 3,089 residents in 1990 to an estimated 4,300 residents in 2006[13].

The City of Unalaska's unofficial 2004 Air Transportation Survey found that the responding residents would prefer to travel an average of 3.5 air trips per person per year. Samples from the interviews conducted as part of this analysis reveal that some segments of the population routinely travel more often than this. In 2006, an informal conversation with high school students revealed that the majority of those interviewed travel on average five times per year while some travel ten to twelve times a year in association with sports, school activities, and other family trips. Considering also the total number of enplanements and accounting for the other demand components, it is estimated that this travel segment

[13] U.S. Census Bureau, 2000 Census ; City of Unalaska Department of Planning

generated 12,900 of the total 29,830 enplanements in 2006, resulting in approximately three trips per resident.

In order to project this number across the planning period, a combined technique of evaluating the trips-per-resident compared to national average growth rates was used. The population growth projections for the state of Alaska as well as the West Aleutians Census Track, which includes the City of Unalaska, are projected to increase less than one percent annually over the 20 year planning period (less than half of the historical growth rate). A one percent increase in enplanements for this segment would result in less than 16,000 enplanements in 2026 and keeps the travel per passenger flat at three trips each. This flat rate would not be reasonable considering that the FAA Aerospace Forecast projects air travel demand to increase by over four percent annually from fiscal year 2006-2017[14]. Therefore, in addition to these trends, the variable of unmet demand was also accounted for. However, unmet demand is difficult to define.

2.5.4 Unmet Passenger Demand

For the purpose of this analysis, unmet demand is defined from the perspective of the Unalaskan resident. This type of demand represents air trips residents would like to have made but did not for various reasons including:

- Unpredictable availability of seats (especially during the peak winter fishing season)
- High air fare (ticket prices)
- Reliability of air service (flight completion & on-time performance)
- Past negative experiences
- Bumped baggage
- Inconvenient schedule due to seasonal daylight restriction
- Preference for a larger, faster aircraft such as the B737-200 used by Alaska Airlines until 2004

In general, airlines will accommodate demand by adding flights to a route (or market) because this translates into additional revenue. On the other hand, the airlines also weigh the added cost of carrying additional passengers. During the fish harvesting and processing seasons, fishing company customers are provided priority reservation arrangements. During those times, seat availability is extremely limited for residents and others not associated with the fishing industry. Based on discussions with the City, most residents choose not to travel during this time because of the unpredictability and difficulty of getting a seat.

In the last three years that PenAir has exclusively served the scheduled passenger market, enplanements have increased by approximately eight percent (over 2004 enplanement numbers). A portion of this increase can attributed to the significant improvement in reliability and amount of service provided by PenAir using the Saab 340B. PenAir has added seats to the Unalaskan market and operates at a completion rate of approximately 95 percent (compared to 74 percent under Alaska Airlines jet service). Responding to customer feedback regarding unmet demand, PenAir added additional flights to Anchorage in 2006. These flights flew mostly empty, however, and PenAir cancelled the service for economic reasons after five months. This does not mean that all of the demand has

[14] FAA Aerospace Forecast, Fiscal Years 2006-2017, Table 24, U.S Regional Carriers Scheduled Passenger Traffic

necessarily been met in Unalaska (especially during the peak winter fishing season), but other factors such as ticket prices, connecting ability, time of day, and time of year may have deterred people from taking advantage of the extra flight segments. In the future, it is reasonable to assume that some portion of any residual unmet demand will be served with fleet changes to larger aircraft. Furthermore, the larger aircraft will have the capacity to carry all checked baggage eliminating the need to bump baggage.

As such, in an effort to reflect the unmet demand, Unalaska resident travel is expected to increase annually at three percent through 2016 when the first Saab 340s are replaced by the Q400. This assumes that over time, the average flights per resident will continue to rise throughout the planning period. In addition, once the Q400 begins serving the Unalaskan market, it is anticipated that some additional demand will be generated by the "large aircraft factor". The Q400 offers 66 seats, more than double the number of seats on the Saab 340B that currently serves the passenger market. It is assumed that the passenger airlines will be able to accommodate more residential travel during the peak winter fishing season with this aircraft change. In addition, passenger carriers commonly provide fare incentives or others promotions to ensure load factors are achieved. As such, for the five years following the Q400's introduction in 2016, resident travel is expected to increase annually at four percent to account for these factors before settling back to 3.75 percent through the remaining years of the planning period. This translates to an increase from 12,900 enplanements and approximately three flights per resident in 2006 to 25,355 enplanements and five flights per resident in 2026.

2.5.5 Demand Component: Transient Workforce

The transient workforce consists of non-local fishing industry and industry-related workers. For every ten fish processor employees flown in, it is estimated that three supporting service workers are fly in to serve as crew on fishing boats, provide fuel, work for transportation companies, provide repair and maintenance services, or provide government oversight for State of Alaska and U.S. Federal Government. In 2004, Northern Economics Inc. estimated that the population of Unalaska increases from a base population of approximately 4,000 to over 10,000 during the peak processing periods[15].

As noted previously, the Bering Sea and Aleutian Islands (BSAI) fisheries rationalization program created a quota-based fishery in 2000 which limits the number of available fishing permits and allocates fish resources evenly among permit holders. This program effectively ended the derby-style race for fish, thereby reducing the peaking characteristics of the respective fishing seasons. This program has had a stabilizing effect on transient workforce travel by spreading demand more evenly across the fish harvesting seasons.

The 2006 number of enplanements related to the fish harvesting transient workforce in Unalaska is estimated at 13,024, or approximately 44 percent of the 29,830 total enplanements. The transient workforce demand component is projected to grow at 3.25 percent annually throughout the planning period resulting in 24,691 enplanements by 2026. The 13,024 annual enplanement estimate does not include the 2,050 seafood processing

[15] Northern Economics Inc. ***Technical Memorandum: Port and Harbor Ten-Year Development Plan***, prepared for the City of Unalaska, April 2004, p. 8.

plant-related travelers connecting to Akutan, as these passengers are considered under the connecting passenger market.

2.5.6 Demand Component: Connecting Passengers

A connecting passenger is generally defined as a passenger traveling to an airport with the intention of traveling (connecting) to a different city. These travelers are still counted as enplaned passengers of the visiting airport since the new departure event originates at the connected city. Unalaska, on the other hand is unique as it generally is served by a single source market (Anchorage). Most connecting events occur the next day or later in the week. Therefore, for the purposes of this analysis, connecting traffic is defined as enplanements to the Essential Air Service (EAS) subsidy program[16] markets of Akutan, Atka, and Nikolski, as well as the unscheduled air service that is operated from the Unalaska Airport but not bound for Anchorage. PenAir operates four EAS departures per week to Atka, two departures per week to Nikolski, and daily service to Akutan.

Table 2-4 shows the destinations and total number of enplaned passengers to the connecting markets estimated for 2006. This enplanement data is reported in the U.S. Department of Transportation Bureau of Transportation Statistic T-100 Reports. At the time this forecast analysis was developed, data through September 2006 was available. An analysis was conducted that evaluated the previous years and the percent of enplanements destined for each market to estimate the enplanements for the remaining months. As shown in Table 2-4, 88.6 percent of the enplaned passengers are flying to Anchorage, 6.9 percent of the enplaned passengers are flying to three EAS markets, and the remaining five percent of the enplaned passengers are flying to other markets not served by scheduled air service from Unalaska.

TABLE 2-4
Passengers Enplaned in Unalaska by Destination Airport in 2006

AK Destination	Distance from Unalaska (SM)	Enplaned Passengers	Percent of Total (%)
Adak Island	445	3	<1
Akutan	35	2050	6.9
Anchorage	792	26444	88.6
Atka	340	269	<1
Beaver Inlet	12	55	<1
Chignik	0	0	0
Cold Bay	178	216	<1
Dillingham	470	0	0
Egegik	470	0	0
False Pass	142	4	<1
Fort Glenn	66	7	<1
King Cove	188	5	<1
King Salmon	503	495	1.7

[16] The Essential Air Service program is administered by the U.S. Department of Transportation to ensure that smaller communities retain a link to the national air transportation system, with Federal subsidy where necessary. Under this program, the Department determines the minimum level of service required at each eligible community by specifying a hub through which the community is linked to the national network.

TABLE 2-4
Passengers Enplaned in Unalaska by Destination Airport in 2006

AK Destination	Distance from Unalaska (SM)	Enplaned Passengers	Percent of Total (%)
Kodiak	605	0	0
Nelson Lagoon	258	0	0
Nikolski	116	246	<1
Port Heiden	0	0	0
Sandpoint	261	30	<1
St. George Island	222	1	<1
St. Paul	268	5	<1
Grand Total		**29830**	**100**

Source: U. S. Department of Transportation, Bureau of Transportation Statistics T-100 Reports, 2006

This demand component is projected to grow by 3.75 percent annually over the planning period. However, in 2010, the estimated 2,050 enplanements to Akutan are expected to be served directly from Anchorage due to the anticipated opening of the new runway for Akutan. As such, these enplanements will no longer occur from Unalaska starting in 2010 and any unscheduled service that would happen to occur from Unalaska is assumed as part of the growth in other unscheduled markets. Subtracting the Akutan enplanements in 2010 yields an overall negative average annual growth rate over the planning period for this demand component. The total number of enplanements for connecting traffic is projected to decrease from a total of 3,386 enplanements in 2006 to 2,790 enplanements in 2026.

2.5.7 Demand Component: Visitors and Tourists

Visitors and tourists are passengers traveling to Unalaska exclusively for tourist related purposes. As such, these travelers exclude all Unalaska residents, fisheries industry related travelers and connecting passengers. The following sub-components were developed to most accurately reflect these passengers:

- World War II history, cultural and natural history
- Sport fishing
- Sightseeing
- Bird Watching
- Ecotourism
- Conventions, executive retreats and business meetings

World War II, Cultural, and Natural History

The number of World War II, cultural, and natural history visitors is difficult to estimate because many visitors enjoy these activities in their free time while on the islands as part of a business trip or other purpose. An estimate for 2006 revealed that 140 people visited Unalaska specifically for these purposes. This estimate accounted for over a 350 percent increase from 2004 because, in 2005, the Qawalangan Tribe began hosting an annual culture camp. It is estimated that 90 people came for culture camp while another 50 people (totaling

140) came for World War II and natural history reasons. Based on conversations with the Unalaska Convention and Visitors Bureau, this segment has the potential to grow by 400 percent over the planning period. Therefore, this component is expected to grow at an annual rate of 8.5 percent throughout the planning period, resulting in 716 passengers in 2026.

Sport Fishing

Sport fishing charters out of Unalaska are currently offered by *Aleutian Island Outfitters* and David Magone. It is estimated that these companies generated 100 enplanements in 2006. The Unalaska Convention and Visitors Bureau reports that there is a larger market for sport fishing helped by recent exposure from National Geographic and the "Deadliest Catch" series on the Discovery Channel. However, this market is currently constrained and has experienced limited growth due to the lack of boat space at the small boat harbor and passenger inconvenience (equipment/bags being bumped). It is estimated that this demand component would triple over the planning period with the City's development of a new small boat harbor and if a significant reduction in bumped equipment is achieved. Based on interviews with the Unalaska Port of Dutch Harbor and the Convention and Visitors Bureau, it is estimated that the new small boat harbor will be operational by 2011.

It is projected that this demand component will grow at a four percent annual rate until the harbor is opened and a new charter boat is added to the market, adding an additional 25 people to the market. This component will continue to grow at a four percent annual rate to fill out the existing boats in the market over the planning period. In addition, it is estimated that every five years a new boat will be added to the market, adding an additional 25 passengers every fifth year. As a result, this demand component is projected to triple to 302 passengers by 2026.

Birding

The Unalaska Convention and Visitors Bureau estimated that the birding visitors would double from an estimated 50 visitors in 2004 to 100 in 2006, as a result of recent marketing efforts. However, this growth was not realized and an estimated 50 visitors traveled to Unalaska in 2006. One of the factors limiting growth of this demand component is the availability of seats and the airfare price to the region. The peak birding season is in June and coincides with the second peak fishing season (B season). It is estimated that this demand component will grow at a five percent rate per year, resulting in 133 enplaned passengers in 2026.

Ecotourism

The Unalaska Convention and Visitors Bureau estimated that this demand component would double from an estimated 60 visitors in 2004 to 120 in 2006, as a result of recently initiated marketing efforts. Unalaska saw an increase in this market over this period but most of the increase was realized through a ferry service provided out of Homer. Previously, this ferry service visited Unalaska once a month requiring passengers to stay in Unalaska for a month before returning. With the change in ferry service, visitors can now choose to stay in Unalaska for two weeks. Given the ferry cost of only 220 dollars from the city of Homer, it is projected that the air passenger component of the ecotourism market will grow at a slower rate over the planning period. This market segment is estimated to have generated 60 enplanements in 2006 and is expected to grow at rate of five percent a year, resulting in 159 enplanements in 2026.

Sightseeing

The majority of sightseers visit Unalaska on a cruise ship or are already in Unalaska for other business or personal reasons and use their remaining spare time to sight-see (and are counted under another category). Even though this is the smallest sub-demand component of all visitors with an estimated 20 generated enplanements in 2006, it is a market with high growth potential. Given the exposure from National Geographic and the "Deadliest Catch" series on the Discovery Channel, the Unalaska Convention and Visitor Bureau receives strong interest from prospective visitors. Therefore, this market is expected to grow ten percent annually throughout the planning period, resulting in 135 enplanements in 2026.

Conventions/Executive Retreats/ Business Meetings

This segment includes all conventions, executive retreats and passengers visiting Unalaska for other general business purposes or meetings not covered by any of the other demand components. Based on interviews with the Unalaska Convention and Visitors Bureau, it is understood that large events in Unalaska are problematic due to the lack of available seats and conference space. In addition, high passenger fares contribute to the lack of conventions being held in the community. Due to the dynamic of a conference or meeting event, most of the people arrive within a day of the conference beginning and wish to leave within a day of the conference completion. Given the limitations in the availability of blocks of seats, at least one direction of that travel would experience enough of an inconvenience to the extent that few conferences are attempted. The largest regular event is held by the North Pacific Fisheries Council which typically attracts 150 visitors every two to three years. For smaller events, the Grand Aleutian hotel has smaller conference rooms that adequately serve the demand for management, training, or similar meetings.

Based on the interviews and on annualizing the demand figures from the North Pacific Fisheries Council, it was estimated that this market segment generated approximately 150 enplanements in 2006. Even with the many logistical difficulties of getting large groups of people to Unalaska, it is anticipated that this segment will triple over the planning period because of the exotic nature of Unalaska, growing at an annual rate of 5.7 percent and resulting in 450 enplanements in 2026.

2.5.8 Total Estimated Visitor and Tourist Related Air Passenger Traffic Volumes

Table 2-5 depicts the estimated tourism-related enplaned passengers for 2006 for each of the above demand components and the average annual growth rate.

TABLE 2-5
Total Estimated Visitor and Tourist Related Air Passenger Traffic Volumes

Traffic Demand Sub-segment	Enplaned Passengers in 2006 (Estimated)[1]	Annual Increase (%)	Enplaned Passenger Forecast for 2026
History, Culture & Natural History	140	8.50%	716
Sport Fishing	100	5.69%	302
Sightseeing	20	10.00%	135

TABLE 2-5
Total Estimated Visitor and Tourist Related Air Passenger Traffic Volumes

Traffic Demand Sub-segment	Enplaned Passengers in 2006 (Estimated)[1]	Annual Increase (%)	Enplaned Passenger Forecast for 2026
Conventions/Executive Retreats	150	5.65%	450
Bird Watching	50	5.00%	133
Ecotourism	60	5.00%	159
Total Visitor and Tour Related	**520**	**6.68%**	**1895**

As depicted, the visitor and tourist related air passengers are expected to increase 6.7 percent annually, resulting in 1,895 enplaned passengers in 2026.

2.5.9 Summary of Enplanements Forecasts

The total enplanements by traffic demand component are summarized in Table 2-6. The two largest components are the fishing industry transient workforce and the Unalaska residents which together make up approximately 87 percent of the total enplanements in 2006 and 91 percent of the total enplanements in 2026. This change represents the loss of Akutan traffic from Unalaska in 2010. The enplanements are projected to increase annually by 2.9 percent over the planning period, resulting in 54,731 enplanements by 2026.

TABLE 2-6
Forecast of Enplanements for Unalaska Airport - 2006 to 2026

	Estimated	Ave Annual		Ave Annual		Ave Annual		Ave Annual	
Traffic Demand Segment	**2006**	**Inc (%)**	**2011**	**Inc (%)**	**2016**	**Inc (%)**	**2021**	**Inc (%)**	**2026**
Fishing Industry Transient Workforce	13,024	3.25%	15,283	3.25%	17,933	3.25%	21,042	3.25%	24,691
Unalaska Residents	12,900	3.00%	14,955	3.25%	17,337	4.00%	21,093	3.75%	25,355
Connecting Traffic	3,386	-13.86%	1,606	3.75%	1,931	3.75%	2,321	3.75%	2,790
Visitors and Tourists	520	6.80%	723	6.69%	999	6.67%	1,379	6.56%	1,895
Total Enplanements	**29,830**		**32,566**		**38,198**		**45,835**		**54,731**

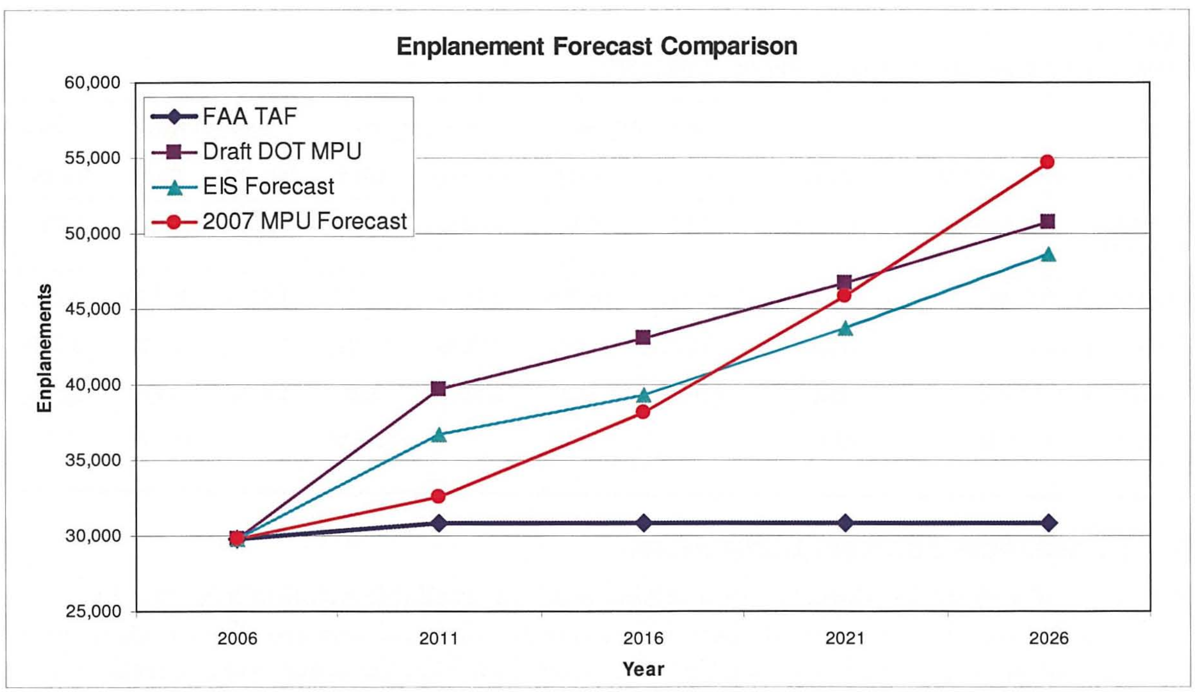
2.5.10 Passenger Forecast Comparison

Table 2-7 and Exhibit 2-1 depict a comparison of all the available aviation forecasts for Unalaska. In order to compare numbers for each of the demand years for the comparison forecasts, interpolation and extrapolation was used. The FAA Terminal Area Forecast (TAF) consists of an assumption of flat traffic at 30,856 annual enplanements and is not an actual forecast, and therefore, is not valid for comparison purposes. The Master Plan Forecast is lower than the previous DOT&PF and EIS forecasts through 2016 at 38,198 enplanements. By the end of the planning period, the airport master plan forecast of 54,731 enplanements in 2026 projects 8.7 percent more enplanements than the EIS and DOT&PF forecast.

TABLE 2-7
Enplanement Forecasts For Unalaska Airport

Year	FAA TAF	Draft DOT MPU	EIS Forecast	2007 MPU Forecast
2006	**30,856**	**36,468**	**31,828**	**29,830**
Ave Annual Inc %	0.0%	1.7%	2.9%	1.8%
2011	**30,856**	**39,695**	**36,762**	**32,566**
Ave Annual Inc %	0.0%	1.7%	1.4%	3.2%
2016	**30,856**	**43,083**	**39,331**	**38,198**
Ave Annual Inc %	0.0%	1.7%	2.2%	3.7%
2021	**30,856**	**46,760**	**43,765**	**45,835**
Ave Annual Inc %	0.0%	1.7%	2.2%	3.6%
2026	**30,856**	**50,750**	**48,699**	**54,731**

EXHIBIT 2-1
Enplanement Forecast Comparison



2.5.11 Air Carrier Fleet Mix

Unalaska is served by one passenger airline; PenAir, flying as Alaska Airlines, which operates three aircraft types in this market:

- Saab 340B – The Saab 340B's date from the 1980's and have fewer than 15 years left on their airframes. Over the past two years, PenAir has evaluated replacement aircraft for its Saab fleet, including the Saab 2000, the ATR 42/72, and the Bombardier Q400. PenAir has concluded that the best aircraft to serve the Unalaska market is the Q400. Specifically, PenAir is planning to phase-in two Q400s in 2016 and replace the remaining Saab fleet prior to obsolescence by 2021. (Appendix C, Correspondence from PenAir)
- Grumman Goose – The Goose is an amphibious aircraft. It currently serves a unique role in the market as it is used to serve the community of Akutan and the fish processing plant located on this island without an airport. The Goose has up to five years of practical use left on its airframe. Upon completion of the runway, planned for 2010, PenAir will serve these passengers directly from Anchorage. At that time, the old Goose aircraft will be retired from the PenAir fleet, and PenAir plans to operate a Twin Otter to serve these markets.
- Piper Navajo – PenAir currently serves Atka and Nikolski with the Navajo but expects to phase out this aircraft next year. PenAir plans to serve these markets with a Twin Otter aircraft.

2.6 Air Cargo Demand

2.6.1 Introduction

Similar to passenger forecasts, air cargo forecasts provide a basis for determining the type, size, and timing of airside and landside cargo facilities and consequently influence many phases of the airport planning process. The focus of this effort is to provide an estimate of air cargo tonnage and freighter operations over the 20 year planning horizon.

Cargo data are less reliable than passenger data. US DOT reporting requirements for air cargo are not as comprehensive as passenger reporting requirements and very little information is available from government sources. Historical cargo volume estimates at Unalaska Airport used in this forecast came primarily from USDOT T-100 air carrier reporting forms and interviews with individual carriers, freight forwarders, and shippers.

Factors Affecting Cargo Industry Growth

The air cargo industry, like most industrial sectors, is dependent upon population growth, gains in the economy, and growth in international trade. The volume of freight shipped by air will also be sensitive to the shipping rates of other modes of transportation, primarily barge or ferry service. In addition to the primary influence of economic activity, many other factors can influence the levels of world air cargo, particularly the express and small package carriers. These factors include changing inventory management techniques, deregulation, liberalization of trade, and national development programs.

At the local and regional level, such as in Unalaska, many of these same factors apply. However, extreme change in freight volumes may result from supply-side changes, such as the initiation of new carriers or services, than from overall industry sector demand growth or decline.

Other Cargo Industry Growth Factors

Prospects for growth in the traditional air freight industry are generally linked to the growth of the overall economy and to changes in transportation costs. The trend toward the use of air cargo for a wide variety of commodities has expanded in scope with the globalization of the economy, e-commerce, transnational alliances/code sharing, increased number of "Open Skies" agreements, and the development of sophisticated logistics models. Today, the emphasis is on the total cost of distribution rather than the cost of each individual mode of transport. Locally, due to crab rationalization and changes in processing, more fresh and frozen crab as well as more unfrozen fresh fillets of cod and pollock are being transported by air freight.

Inhibitors to Cargo Industry Growth

While certain factors mentioned above have increased air cargo activity faster than GDP in some markets, other factors have come into play that have caused air cargo volumes to drop at many airports. Among these factors are:

- FAA/TSA security directives
- Large increases in the cost of oil/fuel
- Modal shift from air to other modes
- The downsizing of passenger aircraft fleet.

In October 2001, the FAA issued a new security directive under 14 CFR Part 108 to strengthen security standards for transporting cargo on passenger flights. The directive, which exempts all-cargo flights at this time, was in response to the September 2001 terrorist attacks. This significantly impacted air cargo activity in 2002, including a shift of freight from passenger carriers to all-cargo carriers. However, these factors will not constrain cargo demand at Unalaska Airport, and the effects on facilities and procedures will be considered elsewhere in the study.

2.6.2 The Air Cargo Industry

In its simplest form, the air cargo market is made up of freight and mail. Air mail delivery is outsourced by the US Postal Service (USPS) and travels in the lower deck or baggage/cargo compartments (belly cargo) of commercial passenger aircraft and on freighters operated by contractors. Air freight refers to all-cargo other than mail and passenger baggage. Air freight activity consists of a number of components: that conducted by the passenger airlines, the traditional all-cargo carriers, and the service-oriented integrated all-cargo carriers.

The passenger airlines and traditional all-cargo airlines provide similar types of service such as inexpensive transport and little through-service, although at different scales. The passenger airlines, such as Alaska Airlines and PenAir, emphasize the use of displaced bulkhead cargo compartments on their scheduled passenger aircraft, while the traditional air cargo airlines, such as Lynden Air Cargo and Northern Air Cargo, have entire fleets dedicated to air cargo and have few limits on cargo size or type.

Passenger carriers and the traditional all-cargo carriers are often dependent on an established support infrastructure of freight forwarders and consolidators who arrange for most of the shipments. This is the case in Unalaska where most of the peak season and routine non-peak outbound fish shipments are arranged by large forwarders and buyers.

2.6.3 Overview of Air Cargo Activity at Unalaska Airport

Air cargo at Unalaska is characterized by a large volume of small inbound shipments (deplaned cargo) of mail and supplies in support of the local community and regional fishing fleet, and by a lower volume of outbound shipments (enplaned cargo) primarily of mail and fresh fish and fish products.

Over the years, Unalaska Airport and the community of Unalaska have been served by a variety of air carriers using a range of aircraft types. A major change in air service at Unalaska Airport came in early 2004, when Alaska Airlines eliminated daily jet service in favor of a code share arrangement with PenAir. Alaska Airlines flew a B 737-200 Advanced Combi.

Air cargo service at Unalaska Airport today is provided on a daily scheduled basis by PenAir and Alaska Central Express (ACE). PenAir uses the cargo compartment (aft hold) of their 30-seat Saab 340, Piper T-1041, and Piper Pa-31 passenger aircraft and a Metro III freighter for cargo operations at Unalaska. PenAir also utilizes a Grumman G-21a Goose seaplane for short passenger transfer flights to Akutan. ACE, an all-cargo airline, utilizes a Beech 1900C freighter aircraft. Frequency of air cargo service varies on seasonal demand. Unscheduled charter air cargo service is provided seasonally by Lynden Air Freight using a Hercules L382 and Everts Air and Northern Air Cargo using DC-6 freighters, in addition to service increases by PenAir and ACE in response to demand.

Historical air cargo activity at Unalaska Airport is reported below in Table 2-8.

TABLE 2-8
Unalaska Airport Historic Air Cargo Volumes (lbs) (Freight and Mail)

Year	Enplaned Cargo	Deplaned Cargo	Total Air Cargo	% Change
1995	2,264,687	1,897,443	4,162,130	-
1996	2,691,107	2,469,494	5,160,601	23.99%
1997	1,613,062	2,094,359	3,707,421	-28.16%
1998	1,830,381	2,176,681	4,007,062	8.08%
1999	1,223,081	1,852,410	3,075,491	-23.25%
2000	1,255,721	1,456,658	2,712,379	-11.81%
2001	967,732	1,145,268	2,113,000	-22.10%
2002	1,551,188	2,199,545	3,750,733	77.51%
2003	2,247,878	1,958,464	4,206,342	12.15%
2004	2,780,125	2,265,400	5,045,525	19.95%
2005	2,996,054	2,351,511	5,347,565	5.99%

Source: US DOT Air Carrier Statistics T-100 Domestic Market Data forms 1995-2005

Air cargo volumes at Unalaska Airport have averaged approximately one half of one percent (0.54 percent) of growth per year over the past 15 years, although over the past five years air cargo growth has average approximately 2.54 percent per year.

As can be seen in Table 2-8, the volume of air cargo has fluctuated greatly from year to year, with no real discernable pattern. Over the past ten years, the ratio of enplaned to deplaned cargo has been fairly even with deplaned cargo slightly exceeding enplaned cargo. The ratio of freight to mail has averaged about 80:20 since 1995.

As discussed previously, the key economic driver in the Unalaska region is the fishing industry. In the past, this industry was highly seasonal based upon regulated seasons for a particular species. This fact has most likely contributed to the cyclical trend reflected in the historical air cargo statistics. With the introduction of rationalization to the fishing industry in 1998, and its application to more types of species, a more stable pattern of cargo volumes appears to be developing since 2005.

2.6.4 Air Freight Analysis

As discussed in a previous section, Unalaska is the number one fishing port in the United States by volume, and second largest in terms of value. Similar to passenger demand, the primary driver for air freight demand at Unalaska is the fishing industry, with secondary demand associated with the community of Unalaska. According to interviews with the air carriers, inbound (deplaned) freight tends to be comprised of repair parts, maintenance supplies and consumer goods, while the outbound (deplaned) freight is primarily high-value fish products, such as live/fresh crab and cod milt. Most outbound shipments of fish and fish products are packaged in 25 to 60 pound "wet boxes".

The ten year historical air freight trends for Unalaska are shown below in Table 2-9.

TABLE 2-9
Unalaska Airport Historical Freight (lbs)

Year	Enplaned	Deplaned	Total Freight	% Change	% Enplaned	% Deplaned
1995	1,935,048	1,286,974	3,222,022	-	60.06%	39.94%
1996	2,346,608	1,644,715	3,991,323	23.88%	58.79%	41.21%
1997	1,332,017	1,352,887	2,684,904	-32.73%	49.61%	50.39%
1998	1,519,747	1,361,555	2,881,302	7.31%	52.75%	47.25%
1999	923,274	1,183,113	2,106,387	-26.89%	43.83%	56.17%
2000	981,450	1,062,686	2,044,136	-2.96%	48.01%	51.99%
2001	696,157	942,090	1,638,247	-19.86%	42.49%	57.51%
2002	961,374	1,310,795	2,272,169	38.70%	42.31%	57.69%
2003	1,695,383	1,147,431	2,842,814	25.11%	59.64%	40.36%
2004	2,198,020	1,412,495	3,610,515	27.00%	60.88%	39.12%
2005	2,397,416	1,469,630	3,867,046	7.11%	62.00%	38.00%

Source: US DOT Air Carrier Statistics T-100 Domestic Market Data forms 1995-2005

Reflecting the fishing industry, the cyclical nature of changing product lines and the desire to transport these products via air freight, enplaned and deplaned air freight at Unalaska Airport has experienced steep peaks and valleys from year to year. The average annual growth rate for air freight at Unalaska Airport from 1995 to 2000 averaged a negative 8.70 percent. The average annual growth rate was 13.60 percent from 2000 to 2005 resulting in a ten year average annual growth rate of 1.84 percent. As to be expected, inbound freight to Unalaska has shown somewhat more consistency than fishing industry driven outbound enplaned freight.

Not evident in Table 2-9 is the seasonality and directional imbalance of the Unalaska air freight market. The peak months for outbound freight generally coincide with the crab and cod milt seasons that begin in mid-January and end about mid-March. During this three month period, almost half of all of the annual air cargo demand at Unalaska is generated. During the rest of the year, demand for air freight service drops significantly until the beginning of the next fishing season.

Directional imbalance between inbound to outbound freight is fairly even on an annualized basis. Over the course of a year, enplaned freight represents approximately 56 percent of the total freight. However, for eight months of the year, deplaned freight typically exceeds enplaned freight by approximately 25 percent. In other words, with the exception of the three month peak fishing season, there is significantly more freight being flown into Unalaska than being flown out.

This seasonal and directional imbalance of air freight at Unalaska is difficult for the scheduled air service providers to accommodate on a profitable basis, which is reflected by the high number of air carriers entering and exiting the market. While significant outbound demand exists during the three month peak season, there is not enough demand during the remainder of the year to support a high level of all-cargo service.

Over the past few years, local air carriers, most notably PenAir and Alaska Central Express, have adapted to the market conditions by providing flexible levels of service during throughout the year. PenAir, in addition to the cargo capacity of their three times daily passenger aircraft and once-daily freighter service, adds additional freighter service to the market during peak periods. Alaska Central Express, which provides twice daily service for most of the year, also adds an additional scheduled flight during the peak season. Demand in excess of scheduled service is accommodated by charter aircraft provided by Northern Air Cargo, Lynden Air Cargo and Everts Air Cargo. Similar to passenger operations, if there is demand for cargo lift into or out of Unalaska, the commercial cargo hauling carriers will increase their service to earn the available revenue.

2.6.5 Air Freight Carriers

Alaska Central Express and PenAir dominate the cargo market. Northern Air Cargo, Everts Air Cargo, and Lynden Air Cargo are only active during the peak cod milt, halibut, fillet, fresh halibut and crab seasons as air charter operators.

The 2005 air freight volumes at Unalaska Airport by carrier are presented in Table 2-10.

TABLE 2-10
Unalaska Airport 2005 Air Freight Volumes by Carrier (lbs)

Carrier Name	Enplaned	Deplaned	Total Freight	Market Share
Alaska Central Express	1,045,669	498,591	1,544,260	39.93%
Peninsula Airways Inc.	709,010	772,492	1,481,502	38.31%
Northern Air Cargo Inc.	409,264	155,658	564,922	14.61%
Everts Air Cargo	192,473	6,045	198,518	5.13%
Lynden Air Cargo Airlines	41,000	36,844	77,844	2.01%
Grand Total	2,397,416	1,469,630	3,867,046	100.00%

2.6.6 Air Mail Analyses

Air mail transport is outsourced by the US Postal Service (USPS) and travels in the lower deck or baggage/cargo compartments of commercial passenger aircraft and on freighters operated by contractors. Since 2003, the USPS has made substantial changes in the way it contracts air mail services (Rural Service Improvement Act of 2002). Prior to 2003, air mail was distributed equally among all air carriers on a formula basis. Since 2003, passenger carriers have priority in the delivery of air mail. (None of the air mail enplaned or deplaned in Unalaska is "bypass mail", a unique Alaskan USPS designation for mail that is pre-palletized in 2,000 pound units.) Historical air mail volumes at Unalaska Airport are presented in Table 2-11.

TABLE 2-11
Historical Air Mail Volumes for Unalaska Airport (lbs)

Year	Deplaned Mail	Enplaned Mail	Total Mail	Percent Change
1995	610,469	329,639	940,108	-
1996	824,779	344,499	1,169,278	24.38%
1997	741,472	281,045	1,022,517	-12.55%
1998	815,126	310,634	1,125,760	10.10%
1999	669,297	299,807	969,104	-13.92%
2000	393,972	274,271	668,243	-31.05%
2001	203,178	271,575	474,753	-28.96%
2002	888,750	589,814	1,478,564	211.44%
2003	811,033	552,495	1,363,528	-7.78%
2004	852,905	582,105	1,435,010	5.24%
2005	881,881	598,638	1,480,519	3.17%

Source: US DOT Air Carrier Statistics T-100 Domestic Market Data forms 1995-2005

Over the past ten years, Unalaskan air mail has grown an average of 4.65 percent per year, or almost 2.6 percent more per year than freight. There was a substantial drop in mail beginning 1999, corresponding with a decline of the fishing industry in 1998 and spike in mail in year 2002. Historically, inbound (deplaned) mail comprises 63 percent of the total mail. Air mail volumes by carrier for 2005 are shown in Table 2-12.

TABLE 2-12
Year 2005 Air Mail by Carrier for Unalaska Airport (lbs)

Carrier Name	Enplaned Mail	Deplaned Mail	Total	Market Share
Alaska Central Express	150,764	238,495	389,259	26.29%
Peninsula Airways Inc.	447,874	643,386	1,091,260	73.71%
Grand Total	598,638	881,881	1,480,519	100.00%

Source: US DOT Air Carrier Statistics T-100 Domestic Market Data forms 1995-2005

The dominant carrier for air mail in and out of Unalaska in 2005 was PenAir with a 74 percent share of the air mail market. Air mail volumes are fairly evenly distributed throughout the year with the peak month representing approximately nine percent of the total and occurring during the months of August and September. This is in contrast to freight, in which the peak month represents 27 percent of the year, and occurs during the month of February.

2.6.7 Air Cargo by Fleet Mix

Historical data on cargo carried by passenger airplanes (belly cargo) versus freighter aircraft are difficult to obtain. Based upon data for calendar year 2005, supplied by existing cargo service providers, freighters accounted for 3,826,788 pounds of cargo, or 72 percent of the total enplaned and deplaned air cargo at Unalaska. Most of the cargo carried in passenger aircraft, 62 percent, was freight as opposed to mail. A break out of cargo carried on passenger aircraft and freighters is provided in Table 2-13.

TABLE 2-13
Breakout of Belly Cargo vs. Freighters at Unalaska Airport 2006 (lbs)

	Freight		Mail		All Cargo	
	Belly	Freighter	Belly	Freighter	Belly	Freighter
2006*	959,546	3,019,985	581,630	943,020	1,541,176	3,963,005

*Interpolated based on 2005-2011 Growth Rate

2.6.8 Freighter Aircraft Operations

Annual 2005 all-cargo freighter operations for Unalaska are shown in Table 2-14.

TABLE 2-14
Freighter Aircraft Operations for Unalaska Airport 2005

Carrier Name	Freighter Operations	Percent of Operations
Alaska Central Express	1,150	75.51%
Lynden Air Cargo Airlines	3	0.20%
Northern Air Cargo Inc.	30	1.97%
Peninsula Airways Inc.	330	21.67%
Tatonduk Flying Service (Everts Air Cargo)	10	0.66%
Grand Total	**1,523**	**100.00%**

Source: US DOT Air Carrier Statistics T-100 Domestic Market Data forms 1995-2005

The average payload per freighter aircraft operation in 2005 was 2,513 pounds.

2.6.9 Freighter Fleet Mix

PenAir operates a Metro III freighter (4,320 pound cargo capacity) at Unalaska. Alaska Central Express (ACE), an all-cargo airline, operates a Beech 1900C freighter aircraft. Frequency of air cargo service varies on a seasonal basis. Northern Air Cargo and Everts Air Cargo utilize a DC-6 aircraft and Lynden utilizes their Hercules L382 (a civilian version of the C-130). The Unalaska freighter fleet mix for 2005 is reported in Table 2-15.

TABLE 2-15
Unalaska Airport Freighter Fleet Mix 2005

Aircraft	FAA Airport Reference Code	Standard Aircraft Payload (lbs)	2005 DUT Operations	Percent of Operations
Beech 1900C	B-II	5,579	1,150	76%
Swearingen Metro III	B-I	3,789	330	22%
Douglas DC-6	B-III	26,880	40	03%
Lockheed L-382e	C-IV	47,000	03	<01%

The two largest freighter aircraft to utilize Unalaska Airport are the Lockheed Hercules L382e and the McDonald Douglas DC-6. The Lockheed Hercules L-382 can carry payloads of up to 48,000 pounds of palletized or break-bulk freight. According to conversations with Northern Air Cargo, the DC-6 has a payload of up to 28,000 pounds and requires a 3,500 foot runway for maximum payload. Therefore, these old aircraft are projected to stay in the fleet through the planning horizon.[17]

[17] Northern Air Cargo recently bought B737-200 aircraft, but these would most likely either not operate at DUT, or only do so occasionally.

2.6.10 Unalaska Airport Air Cargo Forecast

The purpose of this section is to provide a baseline forecast of air cargo volumes and freighter aircraft operations for a 20 year planning horizon for Unalaska Airport. The base year is 2006 and projections are made for 2011, 2011, and 2026. Demand elements addressed in this forecast include:

- Freight Volume
- Mail Volume
- Freighter Operations
- Peak Activity
- Critical Cargo Aircraft

2.6.11 Methodology

The development of the air cargo demand forecasts involves both quantitative analysis and judgment. In general, past air cargo activity data are examined in anticipation of identifying past trends that will give an indication of future activity levels.

Typically, the most reliable approach to estimating aviation demand is through the use of more than one analytical technique. Methodologies considered for forecasting generally include both a bottom-up and top-down approach using regression analysis, time-series extrapolation, and market share analysis.

The basic premise for forecasting air freight operations assumes that a relationship exists between the amount of freight handled and the number of operations. Other assumptions include an increased efficiency (payload) of aircraft over time, and an increasing amount of air cargo carried on freighters as opposed to the belly holds of passenger aircraft.

While many airport requirements can be adequately addressed using annual demand levels, others are particularly sensitive to peak period demand.

It is important to note that neither the design day nor the design hour are the absolute peaks that will occur within a given year. Design day activity will be exceeded at least fifteen days out of the peak month based on its definition. Likewise, design hour activity will be exceeded numerous times due to its calculation technique. The purpose of the indices is to produce reasonable development standards that do not result in over building or overly restrictive facility requirements.

2.6.12 Forecast of Freight

Freight volumes passing through Unalaska Airport are, for the most part, related to the cyclical nature of the commercial fishing industry. Factors that will have the most impact on freight volumes at Unalaska are wage and salary employment growth rates, national and world fish market demand fluctuations, and political and regulatory decisions made in Washington and Juneau.

Freight projections are presented in Table 2-16. Projections were generated by time-series analysis, growth-rate models, and from interviews with individual carriers, freight forwarders, and shippers.

TABLE 2-16
Forecast Unalaska Airport Air Freight Volumes

	10 Year Time Series	Percent Change	Alaska Economic Growth Rate	Percent Change	DUT 10 Year Growth Rate	Percent Change	FAA Growth Rate	Percent Change	Preferred Projection	Percent Change
Forecast *										
2011	2,882,000	0.15%	3,959,000	0.47%	4,236,000	1.84%	4,505,000	3.10%	4,593,000	2.98%
2016	2,904,000	0.15%	4,053,000	0.47%	4,640,000	1.84%	5,248,000	3.10%	5,133,000	2.25%
2021	2,926,000	0.15%	4,149,000	0.47%	5,083,000	1.84%	6,113,000	3.10%	6,023,000	3.25%
2026	2,948,000	0.15%	4,247,000	0.47%	5,569,000	1.84%	7,121,000	3.10%	6,598,000	1.84%

Source: Keiser Phillips Associates, 2006
*Rounded

Several projection models were developed using trend and correlation analysis. The trends of historical Unalaska Airport air freight volumes from 1995 through 2005 were evaluated and the projection of these relationships through the year 2026 were calculated using least squares extrapolation. As can be seen in Table 2-16, this time-series method projects air freight to decline from 3.8 million pounds in 2005 to 2.8 million pounds in 2011 and then increase to 2.9 million pounds by 2026. Due to the low 0.02 correlation of the data, the time-series projection is not usable.

Projection models attempting to correlate freight trends at Unalaska Airport with various economic indicators, such as the historical value of commercial fisheries landings at the Port of Dutch Harbor, the Alaska Peninsula/Aleutian Island salmon catch, the BSAI groundfish catch, and the fishing industry employment figures were developed. However, as with passenger data, there is no meaningful statistical relationship between these known demand-influencing factors, and the corresponding level of air freight at Unalaska. Therefore, these models were not used.

To overcome the lack of success in the use of correlation models, three projections of future freight demand were also generated using growth rate models. The most conservative projection was based on the average wage and salary employment growth rate of 0.47 percent as projected by ISER for the State of Alaska for 2005 to 2030. The second most conservative approach was a projection based on the 15 year historical growth rate of 1.8 percent for Unalaska freight. The most optimistic projection is based on the FAA's *Aerospace Forecast for 2006 to 2017* of domestic US freight of 3.1 percent.

Due to the lack of a valid statistically-based methodology for projecting the 20 year freight demand at Unalaska Airport, a preferred forecast was selected that predicts freight increasing at three percent (slightly lower than the historical two year growth rate at Unalaska) over the next five years, and then slowing to 2.25 percent annually until the Q400 begins serving the Unalaskan market. For the five years following the Q400's introduction in 2016, freight demand is expected to increase annually at 3.25 percent before settling back to 1.84 percent (consistent with the 15 year historical growth rate for Unalaska freight) through the remaining years of the planning period. Using this methodology results in an overall growth rate of 70 percent, and a projected demand of 6,598,000 pounds of freight for Unalaska Airport in 2026.

2.6.13 Forecast of Mail

According to the Boeing Company *World Air Cargo Forecast 2006/2007* (WACF) scheduled air mail accounted for 15 percent of scheduled world cargo market and 4.4 percent of the charter market. The Boeing WACF indicates that air mail volumes in North America declined during 2004 by 3.5 percent and in 2005 by 1.2 percent. Over the past ten years domestic US air mail has averaged 1.2 percent growth per year. The Boeing WACF forecasts world airmail to grow at 2.5 percent per year over the next 20 years.

In contrast to Boeing's WACF findings, air mail in Unalaska increased 5.24 percent in 2004 and 3.17 percent in 2005. Over the past ten years air mail has increased at an average annual rate of 4.65 percent at Unalaska Airport. However, a review of air mail volumes year by year: over the past ten years, shows, that similar to freight volumes, dramatic increases and decreases each year of sometimes over 200 percent. Statistical analysis shows no correlation between mail and freight trends. Selected projections for air mail at Unalaska Airport are shown in Table 2-17.

TABLE 2-17
Forecast of Unalaska Airport Air Mail

	Boeing Mail Forecast	10 Year Time Series	DUT Static Growth Rate	DUT 10 Year Growth Rate (4.65 %)
2006**	1,549,307	1,549,307	1,549,307	1,549,307
Forecast*				
2011	1,675,000	1,602,000	1,731,000	1,858,000
2016	1,895,000	1,830,000	2,023,000	2,332,000
2021	2,144,000	2,057,000	2,364,000	2,928,000
2026	2,426,000	2,284,000	2,764,000	3,675,000

Source: Keiser Phillips Associates

*Rounded

**Interpolated based on 4.65 percent Growth Rate

As with air freight, a variety of projection models were developed for air mail using trend and correlation analysis. The trends of historical Unalaska Airport air mail volumes from 1995 through 2005 were evaluated and the projection of these relationships through the year 2026 were calculated using least squares extrapolation. As can be seen in Exhibit 4-2, the time-series method projects air mail to increase from 1.4 million pounds in 2005 to 2.3 million pounds by 2026. Due to the low 0.45 correlation of the data, the times-series projection is not considered statistically valid.

Projection models attempting to correlate mail trends at Unalaska Airport with various socioeconomic indicators, such as the historical value of commercial fisheries landings at the Port of Dutch Harbor, the Aleutians West Census Area population trends, and industry employment figures, were attempted. However, similar to freight, there was no success in establishing a statistical relationship between these known demand influencing factors and the corresponding level of air freight at Unalaska and the attempt was abandoned.

For lack of any discernable direct correlations behind the trends in mail volumes at Unalaska Airport, a forecast was developed by applying the 2004-2005 growth rate of 3.17 percent to the 2005 volume of mail at Unalaska Airport. As shown in Table 2-17, this method resulted in mail totaling approximately 2.8 million pounds in 2026.

2.6.14 Total Airport Air Cargo Activity

Presented in Table 2-18 is the preferred air cargo forecast for Unalaska Airport for the 20 year forecast period. Overall, air cargo is forecast to increase at an average annual growth rate of 2.7 percent.

TABLE 2-18
Forecast of Unalaska Airport Air Cargo Volume

	Freight	Mail	Total Cargo Volumes (lbs)
2006*	3,979,531	1,524,650	5,504,181
Forecast			
2011	4,593,000	1,731,000	6,324,000
2016	5,133,000	2,023,000	7,156,000
2021	6,023,000	2,364,000	8,387,000
2026	6,598,000	2,764,000	9,362,000

Source: Keiser Phillips Associates

*Interpolation Based on 2005-2011 Growth Rate

2.6.15 Forecast of Cargo by Carrier Type

Belly cargo volumes accounts for approximately 72 percent of the total cargo handled at Unalaska Airport in 2005. Most of the cargo carried in passenger aircraft, 62 percent, was freight as opposed to mail. It is assumed that this ratio will remain approximately the same during the forecast period.

Table 2-19 presents the forecast of cargo for Unalaska by carrier type.

TABLE 2-19
Forecast of Unalaska Airport Air Cargo by Carrier Type

	Freight		Mail		All Cargo	
Year	Belly	Freighter	Belly	Freighter	Belly	Freighter
2006**	959,546	3,019,985	581,630	943,020	1,541,176	3,963,005
Forecast*						
2011	1,102,000	3,491,000	658,000	1,073,000	1,760,000	4,564,000
2016	1,232,000	3,901,000	769,000	1,254,000	2,001,000	5,155,000
2021	1,446,000	4,577,000	898,000	1,466,000	2,344,000	6,043,000
2026	1,584,000	5,014,000	1,050,000	1,714,000	2,634,000	6,728,000

Source: Keiser Phillips Associates

*Rounded

**Interpolation based on 2005-2011 Growth Rate

The significance of this evaluation is that since belly cargo is carried on passenger aircraft, no additional aircraft operations will result from an increase in belly cargo. The ratio of belly cargo to freighter cargo could, however, increase in future years as the size of passenger aircraft used to serve the airport increases.

2.6.16 Air Cargo Fleet Mix

The air cargo freighter fleet mix forecast for Unalaska is shown in Table 2-20.

TABLE 2-20
Forecast of Unalaska Airport Air Cargo Freighter Fleet Mix

Aircraft	Average Capacity (lbs)	Existing 2006	2011	2016	2021	2026
Beech 1900C	5,579	76%	76%	76%	76%	76%
Metro III	3,789	22%	22%	22%	22%	22%
Douglas DC-6	26,880	3%	3%	3%	3%	3%
Lockheed L-382e	47,000	<01%	<01%	<01%	<01%	<01%

The composition of the future air cargo fleet mix at Unalaska is not projected to change over the planning period.

2.7 Aircraft Operations Forecast

2.7.1 Overview

The next step in the forecasting process is to project the future aircraft operations.

To develop passenger aircraft operations, the forecast of passenger enplanements is used as a basis. This process involves the evaluation of the type of passenger aircraft that currently serve the airport and a projection of the types of aircraft that will be used to serve the airport in the future. With the types of passenger aircraft known, available seating capacity and load factors are formulated, and are then equated to a quantity of aircraft operations that will be needed to accommodate forecast enplanement demand. The relationship between these factors is illustrated in the following equation:

$$\text{Operations} = \frac{\text{Total Enplanements}}{\text{Average Load Factor} * \text{Number of Seats Per Operation}}$$

In addition to passenger aircraft operations, air cargo, general aviation, and military operations are taken into consideration when projecting future aircraft activity. Air cargo operations forecasts are calculated based on forecast cargo volumes, average aircraft capacity and average available payload. The relationship between these factors is illustrated in the equation below:

$$\text{Operations} = \frac{\text{Total Cargo Tonnage}}{\text{Average Freight Load Factor} * \text{Average Aircraft Capacity}}$$

2.7.2 Aircraft Operations Forecast - 2006 to 2026

Aircraft operations forecasts for Unalaska Airport were developed by performing an analysis of the subcomponents that comprise the overall activity at the Airport including:

- Anchorage Passenger Traffic
- Connecting Traffic
- Air Cargo
- Medical Evacuation
- General Aviation
- Military/Coast Guard

2.7.3 Anchorage Passenger Traffic

This subcomponent consists primarily of those traveling to and from Anchorage, but is not inclusive of passengers connecting in Unalaska to other destinations. In 2006, approximately 86 percent of passenger traffic originated in Anchorage, resulting in 26,444 enplaned passengers. Some 2,518 aircraft operations at Unalaska Airport carried these passengers that year. Due to the unique market demand, PenAir regularly operates its aircraft at 100 percent load factors in one direction. This is especially true when additional flights are operated during peak seasons as the traffic is generally uni-directional. As such, PenAir experiences 100 percent payloads one way and near 0 percent payloads on the return trip, resulting in an overall payload of approximately 50 percent. However, with the regular scheduled service throughout the rest of the year, PenAir realizes an overall load factor not lower than 70 percent. As such, for planning purposes, this load factor was used for the calculation of operations for this sub-component. Passenger enplanements for this sub-component are expected to increase at an average annual growth rate of approximately 3.2 percent through the 2026 planning horizon. It is expected that PenAir will phase out two of its Saab 340B aircraft and replace with the Q400 in 2016. While passenger enplanements are expected to increase annually, the Q400 will increase the number of passenger seats available and, assuming similar load factors, therefore decrease the number of aircraft operations needed to serve demand, resulting in an approximate six percent decrease in the total aircraft operations beginning in 2016. As more Q400 aircraft are integrated into PenAir's fleet, aircraft operations are projected to decrease approximately three percent through 2021 before increasing by 3.2 percent in 2026.

2.7.4 Connecting Traffic

Unalaska is unique as it primarily is served by a single market originating in Anchorage. Therefore, connecting traffic is defined as enplanements to the EAS markets of Akutan, Atka, or Nikolski, as well as unscheduled charter air service that is operated from Unalaska Airport, but not bound for Anchorage. In 2006, approximately 14 percent of the total passenger enplanements at Unalaska were connecting flights to other markets, resulting in 3,386 enplaned passengers. Under the terms of the EAS program, operators' subsidies are earned per completed flight, regardless of how few passengers may be on board, and some flights are typically flown with very few passengers. In addition, many of these flights are operated at 100 percent payload to the destination but return empty, which results in payloads no greater than 50 percent for these markets. Therefore, reduced load factors for this sub-component are calculated using 60 percent for Akutan and 50 percent for all other connecting markets. These factors translate into 1,522 total connecting aircraft operations at

Unalaska Airport in 2006. Connecting traffic is projected to increase at an average annual growth rate of 3.75 percent through 2009. In 2010, a new runway is expected to open in Akutan and all passenger traffic to this market will then be serviced direct from Anchorage. This direct service equates to a loss of 2,289 enplaned passengers, or 954 aircraft operations at Unalaska Airport in 2010. The remaining connecting traffic markets are projected to increase annually by 3.75 percent to a total of 1,395 aircraft operations through the 2026 planning horizon.

2.7.5 Air Cargo

Cargo operations forecasts were derived directly from cargo enplanement forecasts and an analysis of the projected fleet mix of air cargo carriers operating at Unalaska Airport.

Because frequency of air cargo service varies seasonally, PenAir also utilizes the cargo compartment (aft hold) of their 30 seat Saab 340, Piper T-1041 and Piper Pa-31 passenger aircraft to support cargo operations and is previously accounted for in the passenger traffic portion of this section.

In 2006, 3,979,531 pounds of freight and mail were enplaned on all-cargo freighter aircraft at Unalaska Airport. With an average payload of 2,513 pounds per operation, this translates into approximately 1,600 freighter aircraft operations for that year. Total enplaned air cargo carried on freighter aircraft is projected to increase at an average annual growth rate of 2.7 percent. This results in 6,598,000 pounds of enplaned freight, or 2,626 aircraft operations through the 2026 planning horizon.

It is expected that as air cargo volumes at Unalaska Airport increase, the average payload per freighter aircraft will remain flat at 2,513 pounds per operation. The forecast for air cargo freighter operations is shown in Table 2-21.

TABLE 2-21
Forecast of Unalaska Airport Freighter Aircraft Operations

	Freighter Volumes (lbs)	Aircraft Operations	Payload Per Operation (lbs)
2006*	3,979,531	1,600	2,513
Forecast			
2011	4,593,000	1,828	2,513
2016	5,133,000	2,043	2,513
2021	6,023,000	2,397	2,513
2026	6,598,000	2,626	2,513

*Interpolated based on 2005-2011

2.7.6 Medical Evacuations

Medical evacuation services are currently being provided by Guardian Flight, Inc., which established a regional hub at Unalaska Airport in the fourth quarter of 2006. By basing a Beech King Air 200 turbo-prop aircraft at the Airport, Guardian has been able to reduce response times along the Aleutian Island chain and undertook approximately 200 operations in 2006. Based on telephone interviews with Guardian, this segment is expected to experience rapid growth over the next several years. This trend is consistent with the trends they have experienced at Guardian's main base in Fairbanks, covering interior Alaska, and satellite base in Ketchikan. For this market, the company is looking to acquire a Very Light Jet (VLJ) aircraft, Pilatus PC-12, or a King Air 350 to replace its current King Air 200 fleet.

Based on Guardian's aggressive outlook for its new satellite hub at Unalaska, medical evacuation operations are projected to increase annually at 25 percent through 2011, and ten percent for the following five years through 2016. Following 2016, demand is expected level off at an average annual growth rate of five percent throughout the planning period, resulting in 1,528 operations in 2026.

2.7.7 General Aviation

General Aviation (GA) operations are very limited at Unalaska Airport due to frequently inclement weather and long distances between airports and fuel. In addition, the airport is not supported by a fixed base operator (FBO) and fuel services are limited for itinerant general aviation aircraft. Therefore, the 2006 FAA Terminal Area Forecast estimate of a flat 50 GA operations per year is suitable for the purposes of this forecast.

2.7.8 Military/Coast Guard

The FAA's TAF has reported zero military operations at Unalaska since 1976 and remains flat through 2025. Given the harsh environment and the nature of work associated with the commercial fishing industry, the Unalaska region periodically experiences events requiring emergency response in the form of U.S. Coast Guard (USCG) rescue and recovery. As such the community of Unalaska is regularly host to the emergency response teams. The Unalaska airport is a vital link to the timely response to these events supporting the Coast Guard operations. In response to the freighter Selendang Ayu grounding and oil spill and the associated rescue, recovery, and clean-up operations from December 2004 until spring 2005, the Coast Guard's helicopters performed an estimated 200 operations at Unalaska Airport in 2004. As these events do not typically occur annually, for the purposes of this forecast, an attempt was made to annualize the operations in this segment. Therefore, for planning purposes, an estimated 50 military operations per year was projected to capture the USCG operations and the occasional itinerant military flight.

A summary of total aircraft operations for Unalaska Airport is shown in Table 2-22.

TABLE 2-22
Forecast of Operations for Unalaska Airport - 2006 to 2026

Segment	2006	Ave Annual Inc (%)	2011	Ave Annual Inc (%)	2016	Ave Annual Inc (%)	2021	Ave Annual Inc (%)	2026
O&D Traffic	2,518	3.20%	2,949	-6.04%	2,159	-2,69%	1,884	3.60%	2,249
Connecting Traffic (Akutan)	854	N/A	0	N/A	0	N/A	0	N/A	0
Connecting Traffic (Others)	668	3.75%	803	3.75%	965	3.75%	1,160	3.75%	1,395
Air Cargo	1,600	2.70%	1,828	2.25%	2,043	3.25%	2,397	1.84%	2,626
Medical Evacuations	200	25.00%	610	8.98%	938	5.00%	1,198	5.00%	1,528
General Aviation	50	0.00%	50	0.00%	50	0.00%	50	0.00%	50
Military/Coast Guard	50	0.00%	50	0.00%	50	0.00%	50	0.00%	50
Total Operations	**5,941**	1.15%	**6,290**	-0.27%	**6,205**	1.66%	**6,738**	3.23%	**7,897**

2.8 Forecast of Peak Period Demand

Passenger operations at Unalaska are projected to remain fairly flat throughout the planning period. This is due to the fact that the Akutan connecting operations will leave the Unalaska market in 2010 and that PenAir is expected to switch to the Q400 in the year 2016, which has more than twice the capacity of the Saab. Throughout the planning period, it is anticipated that PenAir will regularly offer the same number of weekly flights to Anchorage and the EAS markets year-round as in 2006.

During the start of each fishing season, the percentage of full flights increases causing severe directional imbalances and peaks in passenger traffic. These peaking characteristics generally occur during the A fishing season, which typically takes place during the months of December through February. During the peak fishing seasons, and periodically throughout the year, additional flights are offered to meet fluctuating demand. This trend is expected to continue over the planning period. Based on PenAir's regular scheduled service and additional flights flown during peaks, it is estimated that the peak month represents ten percent of the total annual passenger aircraft operations. The average day of the peak month was estimated to be approximately 13 aircraft in 2006. Peak hour was estimated to be 25 percent of the peak day. Projected peaking activity is shown in Table 2-23.

TABLE 2-23
Forecast of Passenger Operational Peaking

	Annual Passenger Operations	Peak Month	Peak Month Average Day	Peak Hour
2006	4,041	404	13	4
Forecast				
2011	3,752	375	12	4
2016	3,124	312	10	3
2021	3,044	304	10	3
2026	3,643	364	12	3

Source: CH2M HILL

The peak month for freighter operations at Unalaska Airport is February, which represents 12 percent of total annual freighter aircraft operations. The average day of the peak month was estimated to be approximately seven aircraft in 2006. The peak hour was estimated to be 25 percent of the peak month average day. Projected peaking activity is shown in Table 2-24.

TABLE 2-24
Forecast of Freighter Operational Peaking

	Annual Freighter Operations	Peak Month	Peak Month Average Day	Peak Hour
2006	1,600	192	7	2
Forecast				
2011	1,828	219	8	2
2016	2,043	245	9	3
2021	2,397	288	10	3
2026	2,626	315	11	3

Source: Keiser Phillips Associates

2.9 Critical/ Design Aircraft

The critical/design aircraft is the aircraft type(s) selected for the basis of the applicable FAA planning and design standards at an airport. For airport design purposes, the design aircraft is the largest aircraft that regularly operates at the airport. The FAA defines this as aircraft in the same design group that operate more than 500 annual operations (250 arrivals and 250 departures). In the case where more than one aircraft type conducts 500 or more annual operations at an airport, the design aircraft is the aircraft with the most demanding operational requirements (largest wingspan, tallest tail heights, fastest approach speed, etc.).

Finally, the FAA categorizes the design aircraft by the Airport Reference Code (ARC). The ARC is a coding system used by the FAA to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport. The ARC has two components: aircraft approach, speed depicted by a letter, and wingspan/tail height, which is depicted by a roman numeral. Tables 2-25 and 2-26 depict these criteria.

TABLE 2-25
Aircraft Design Group and Dimensions

Aircraft Design Group	Aircraft Wingspan (feet)	Aircraft Tail Height (feet)	Typical Aircraft
I	<49	<20	Beechcraft King Air B100, Dhc-2 Beaver
II	49 - <79	20 - <30	Beechcraft 1900C , Dhc-6-300 Twin Otter, Saab 340B
III	79 - <118	30 - <45	Boeing 737-200, ATR 42/72,BAE146-300 Dhc Dash 8-300, Q400
IV	118 - <171	45 - <60	Lockheed Hercules L100-30, Boeing 757, DC 8-62
V	171 - <214	57 - <66	Boeing 747-200

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

TABLE 2-26
Aircraft Approach Category and Approach Speeds

Aircraft Approach Category	Approach Speed (knots)	Typical Aircraft
A	<91	Dhc-2 Beaver , Dhc-8-300, Beechcraft B-55 Baron
B	91 - <121	Beechcraft 1900C, Beechcraft Kingair B100, Convair 580
C	121 - <141	Boeing 737-200, Lockheed Hercules L-100-30, BAE 146-300
D	141 - <166	Boeing 747-200, Gates Learjet 35

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

Unalaska is currently served by a variety of large aircraft, such as the Hercules and the DC-6, (both ARC C-III) as well as a variety of smaller aircraft such as the Saab 340B and Metro III, (both ARC B-II). It is estimated that both the Hercules and the DC-6 will conduct fewer than 100 operations a year at the airport throughout the planning period. As such, these aircraft do not operate in sufficient numbers to be considered the design aircraft. Currently, the majority of the operations at Unalaska Airport are considered ARC B-II (Saab 340B, Metro III, Beechcraft 1900C). As previously discussed, the aircraft serving air cargo are not anticipated to change over the planning period. Therefore, the only aircraft design group change over the planning period at the airport will be realized on the passenger side. As the Saab 340Bs have less than 15 years of useful life remaining on their airframes, PenAir plans to replace two of these aircraft in 2016 with the Q400 as an initial replacement phase-in. PenAir will continue to replace its entire Saab fleet with the Q400 over the following five years ending by 2021. When the Q400 first enters service in 2016, it is projected to generate a minimum of 700 operations its first year at Unalaska. As such, the design aircraft will be an ARC B-III starting in year 2016.

To summarize, the design aircraft will change over the planning period:

- Through year 2015: ARC B-II (Saab 340B, Metro III, Beechcraft 1900C)
- Year 2016-2026: ARC B-III (Q400 or similar aircraft like the ATR 42/72)
- ARC C-III aircraft (Hercules and DC-6) will continue to use the airport throughout the planning period. However, their numbers will not be sufficient enough to be considered the design aircraft.

2.10 Sensitivity Analysis

The primary purpose for conducting a sensitivity analysis on the aviation activity forecasts is to determine if the forecast results change dramatically if there is some variation in actual activity. In this context, this refers to the choice of critical/design aircraft and the impact that choice has on the airport's and runway's planning and design criteria. The application of sensitivity analysis is an acknowledgement that forecasting is not a precise science, but an art. Even the most careful, competent and thorough forecaster is dealing with relatively unpredictable social trends, travel propensities, and growth cycles over the 20 year planning period. While the uncertainties can't be eliminated, the potential impact of uncertainty can be measured by using a range for the air traffic forecasts, the potential impact of uncertainty can be measured.

Where good statistical correlations exist, often three growth scenarios of forecasts, the low, baseline and high approach, are developed. The low and high forecasts can then be used as measures of the sensitivity of the base forecast, which is usually the recommended forecast. When only one forecast is developed, say a time series model, forecasters can use a single standard error on either side of the forecast as the low and high, for sensitivity analysis purposes. In Unalaska's case, one most likely growth scenario was developed. For sensitivity purposes, any increase to the forecast would not impact the choice of the critical/design aircraft and therefore was not evaluated in detail. However, interviews conducted by the City of Unalaska after review with the airlines and seafood processors/shippers indicated an additional need for cargo space, especially during the peak winter season[18]. This was confirmed through separate interviews with several of the

[18] Frank Kelty, Resource Analyst. **Memorandum:** ***Unalaska Airport comments on movement of seafood cargo from Unalaska to Anchorage***, March 13, 2007.

processors/shippers. To account for potential variations in demand, the next chapter, *facility requirements* will assume that additional cargo space will be provided over the planning period to accommodate new space for a potential third air cargo airline or existing carrier. For sensitivity purposes, a 25 percent reduction from the baseline forecast was applied and represents a low forecast. This results in nearly 29,000 enplanements in 2016 and 41,000 enplanements in 2026. Based on the low forecast, even if the enplanements are reduced by 25 percent and a low baseline forecast is used, the critical/design aircraft will still remain the Q400 in year 2016.

PenAir intends to phase-in two Q400s in year 2016 and is projected to fly over 700 operations that year. If however, PenAir only phases-in one Q400, they still have a need to operate daily flights with this aircraft to the Unalaska market. PenAir currently operates a minimum of three flights per day to Unalaska. If a minimum of five departures a week are operated by the Q400 would still be the most demanding aircraft at 520 operations that year. In addition, the DC-6 and the Hercules which are both ARC C-III are anticipated to generate approximately 100 operations a year throughout the planning period. Therefore, the minimum ARC B-III or larger operations is projected to be between 600-900 operations in year 2016.

In the event that the Unalaska market was to be served by a different airline in 2016, it is anticipated that aircraft would be the Q400 or similar like the ATR-72, which are also ARC B-III aircraft. Group B aircraft have lower approach speeds than passenger jets and as demonstrated by the Saab 340B, have a higher completion rate into Unalaska. However, as the enplanements increase, this market will need to be served by a larger aircraft that accommodates more passengers. As PenAir found in its research and analysis, the ARC B-III aircraft have the flexibility of lower approach speeds, which are ideal for landing in Unalaska, and accommodate more than double the passengers of the existing aircraft in operation today.

Chapter 3 Demand Capacity and Required Facilities

CHAPTER 3

3. Demand Capacity and Required Facilities

3.1 Introduction/Overview

In the previous chapter, Projected Aviation Demand, aviation activity demand forecasts were presented for Unalaska Airport through 2026. These forecasts include projections of passenger enplanements, air cargo volume, aircraft operations, aircraft fleet mix, and seasonal peaking characteristics. Federal Aviations Regulations (FAR) Part 139, *Airport Certification,* governs the certification and operation of federally funded airports served by scheduled and unscheduled air carrier aircraft, such as Unalaska Airport. These regulations specifically address aircraft rescue and firefighting operations, aircraft refueling, snow and ice control, pavement maintenance, and required runway and taxiway marking, signage, and lighting. In addition to FAR Part 139 requirements, this chapter incorporates FAA Advisory Circular 150/5300-13, *Airport Design*, Alaska state aviation planning guidelines, and industry practices specific to Unalaska Airport, including the airfield, surrounding airspace, terminal facilities, air cargo facilities, and ground access to determine existing facility deficiencies and to identify the facilities required to accommodate the forecast demand. Options available to remedy these deficiencies will be considered in the next chapter; Airfield Alternatives.

3.2 Key Facility Requirements

A summary of facility requirements includes the below findings:

Runway Length— The Bombardier Q400 aircraft, to be phased in by 2016 and will become the design aircraft, requires 4,200 feet of runway for departure. The current runway is approximately 100 feet short of this requirement.

Runway Safety Area—The RSA for both runway ends do not meet current FAA design standards. Beginning in 2016, ARC B-III RSA dimensions will apply and will need to increase to 300 feet wide and extend 600 feet beyond the runway end.

Part 77 Imaginary Surfaces — Due to the area's steep terrain, numerous violations exist, some of which may be resolved, and others such as Mount Ballyhoo, which cannot be improved or resolved.

Runway Object Free Area (OFA) - Beginning in 2016, ARC B-III OFA dimensions will apply and will need to increase to 800 feet wide and extend 600 feet beyond the runway end.

Navigational Aids (NAVAIDS) - While the National Airspace System will be modernized over the planning period, the FAA has determined that no improvements are possible due to steep terrain, weather minimums, and prohibition of nighttime operations at Unalaska Airport.

Runway Protection Zones (RPZ) —The RPZ extends from the runway ends off airport property and over the water. DOT&PF does not have control over the runway protection zones, as is recommended by the FAA design standards.

Terminal Apron— The terminal apron has the capacity to accommodate projected aviation activity through 2016. Beyond 2016, the Airport will require additional apron space to accommodate 12 aircraft over the planning period.

Landside Facilities— The airport terminal building, parking facilities, and airport access roadways are insufficient to meet projected aviation demand through 2026.

3.3 Applicable Airport Design Standards

The State of Alaska maintains comprehensive airport planning guidelines that identify regional trends in aviation and the facilities needed to meet the air transportation needs of the State. Both the Alaska Aviation System Plan (AASP)[1] and the Southwest Alaska Transportation Plan[2] identifies processes for meeting these needs and is used to guide the planning decisions of DOT&PF. The AASP identifies Unalaska Airport as a "Regional Airport", which provides primary or secondary hub access for passenger, air cargo, and charter air traffic, provides primary access to populations greater than 1,000 people, and supports economic activities of regional or statewide significance. Given its population, passenger and air cargo activity, and economic status due to the fish harvesting industry, Unalaska Airport meets these criteria. The Southwest Alaska Transportation Plan examines the strengths and weaknesses of the aviation system in communities such as Unalaska, and recognizes the need for ongoing improvements to airports with sub-standard aviation facilities. Both the AASP and the Southwest Alaska Transportation Plan provides recommendations for airport design standards, including minimum runway lengths of 3,300 feet, design aircraft selection criteria, and increased airport capacity through longer runways, which are all applicable to Unalaska Airport. As such, this analysis reflects the recommendations found in the Alaska state aviation planning guidelines, as well as those of FAR Part 139, *Airport Certification*, and FAA Advisory Circular 150/5300-13, *Airport Design.*

A number of planning efforts have occurred for the Unalaska Airport, starting with the FAA-approved Airport Master Plan in 1985 and Airport Layout Plan (ALP) in 1987. The 1985 master plan was based on accommodating the Boeing 737-200 design aircraft, which was operated in the Unalaska market by Reeves Aleutian Airways, MarkAir, and/or Alaska Airlines from 1985 to 2004. As such, FAA Airport Reference Code (ARC) C-III airfield design standards were used to establish future runway, taxiway, and safety area dimensions in the 1985 master plan and subsequent 1987 ALP.

In January 2004, scheduled airline service changed from Boeing 737-200 jet service operated by Alaska Airlines to Saab 340B turboprop service ticketed by Alaska Airlines and operated by PenAir. As such, an Environmental Impact Statement (EIS) was initiated in 2004 to determine projected aviation demand, required facilities, and changes needed to the airfield safety area dimensions. It was determined that ARC B-II airfield design standards would be required based on the then-projected fleet mix.

Because it dates to 1987, when jet service was projected to continue, the ALP reflects ARC C-III design standards. These standards are no longer applicable, and the ALP that will be

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1 Alaska Aviation System Plan Update, Prepared by TRABV Airport Consulting, March 1996

2 Southwest Alaska Transportation Plan, Prepared for DOT&PF by PB Consult Inc., November 2002

prepared as part of this study will reflect ARC B-II and B-III standards for the 20-year planning period. These design standards are illustrated in **Exhibit 3-1** and **Exhibit 3-2**, respectively.

3.4 Demand/Capacity Analysis

The purpose of this section is to determine the airport's ability to accommodate the forecast aviation demand and to identify the facilities that will be required to meet forecast demand through the 2026 planning period. The forecast presented in the previous chapter, Projected Aviation Demand, reflects a considerable increase in most segments of activity at the Unalaska Airport. To meet current industry and FAA standards and to accommodate these projected increases, deficiencies are identified for the following functional areas:

- Runway
- Taxiway
- Airfield Design Standards
- FAR Part 77 Imaginary Surfaces
- Navigational Aids (NAVAID)
- Airport Security

As detailed in the previous chapter, the airfield at Unalaska Airport will maintain the current Airport Reference Code (ARC) B-II design standards through 2015 and will be subject to ARC B-III design standards to accommodate the design aircraft (Bombardier Q400) starting in 2016.[3]

3.4.1 Airfield Capacity

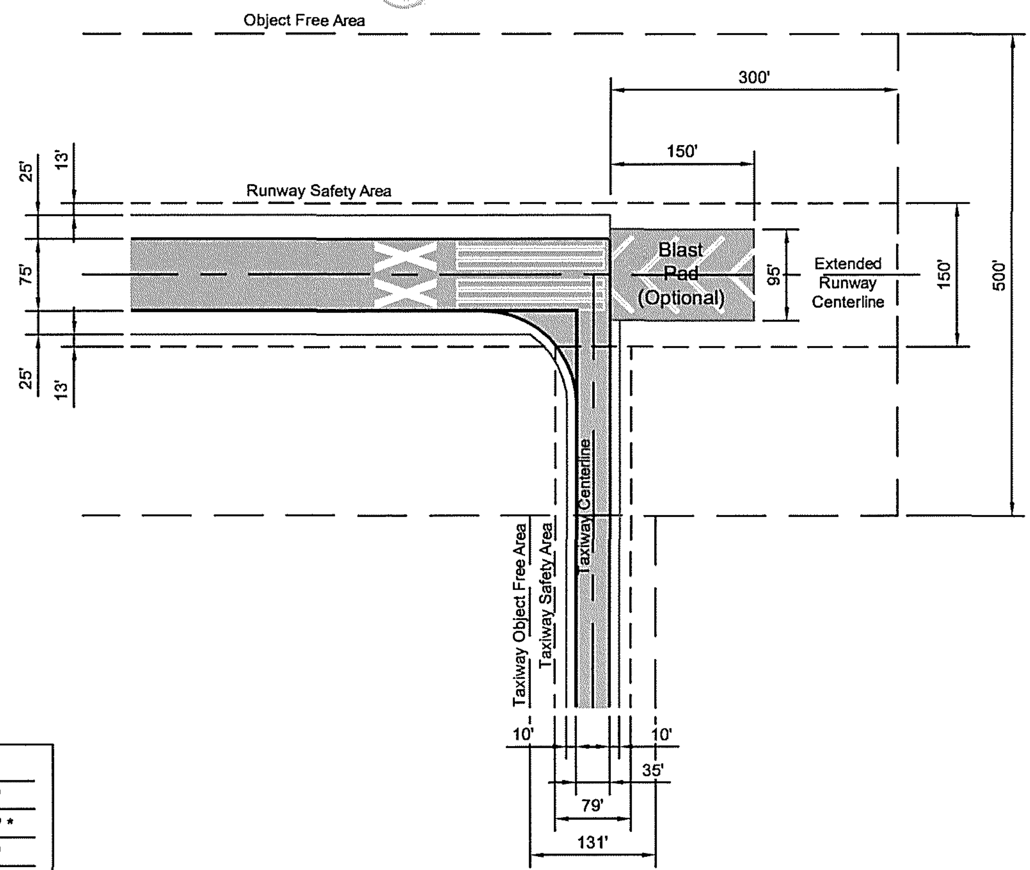
The purpose of this analysis is to determine the level of aviation activity that can be accommodated by the existing airfield system. Table 3-1 summarizes peak daily airfield demand and capacity for Unalaska Airport through the 2026 planning horizon.

TABLE 3-1
Peak Daily Demand and Capacity

Year	Annual Operations	Total Peak Month Demand	Peak Day Demand	Peak Day Capacity[1]	Peak Day Demand/Capacity Ratio
2006	5,941	626	21.0	37.00	57%
2011	6,278	664	22.0	37.00	59%
2016	6,183	659	22.0	37.00	59%
2021	6,559	701	23.0	37.00	62%
2026	7,703	820	27.0	37.00	73%

1 Peak day capacity is based on the amount of available daylight during peak winter conditions multiplied by the maximum number of operations per hour based on the existing approach/departure procedures.

[3] The ARC is a coding system used by the FAA to relate design criteria to the operational and physical characteristics of the aircraft intended to operate at the airport. The ARC has two components relating to the airport design aircraft. The first depicted by a letter relates to the aircraft approach speed. The second depicted by a Roman numeral is the airplane design group and relates to the aircraft wingspan and is referred to as group. For non-runway related facilities, such as aircraft parking aprons, the group number serves as the only design criteria.



Typical Runway Layout

Applicable Design Standards	
Runway Width	75'
Runway Shoulder Width	10' *
Runway Blast Pad Width	95'
Runway Blast Pad Length	150'
Runway Safety Area Width	150'
Runway Safety Area Length Beyond Runway End	300'
Runway Object Free Area Width	500'
Runway Object Free Area Length Beyond Runway End	300'
Taxiway Width	35'
Taxiway Shoulder	10'
Taxiway Safety Area Width	79'
Taxiway Object Free Area Width	131'
Taxilane Object Free Area Width	115'

* ARC B-II Standard runway shoulder width is 10'.
The Unalaska Airport currently has a 25' shoulder width and this dimension will be maintained.

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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Applicable Design Standards (ARC B-II)

Exhibit 3-1

Source: Applicable dimensions and design standard derived from FAA Advisory Circular 150/5300-13, "Airport Design," Change 10

May 2007

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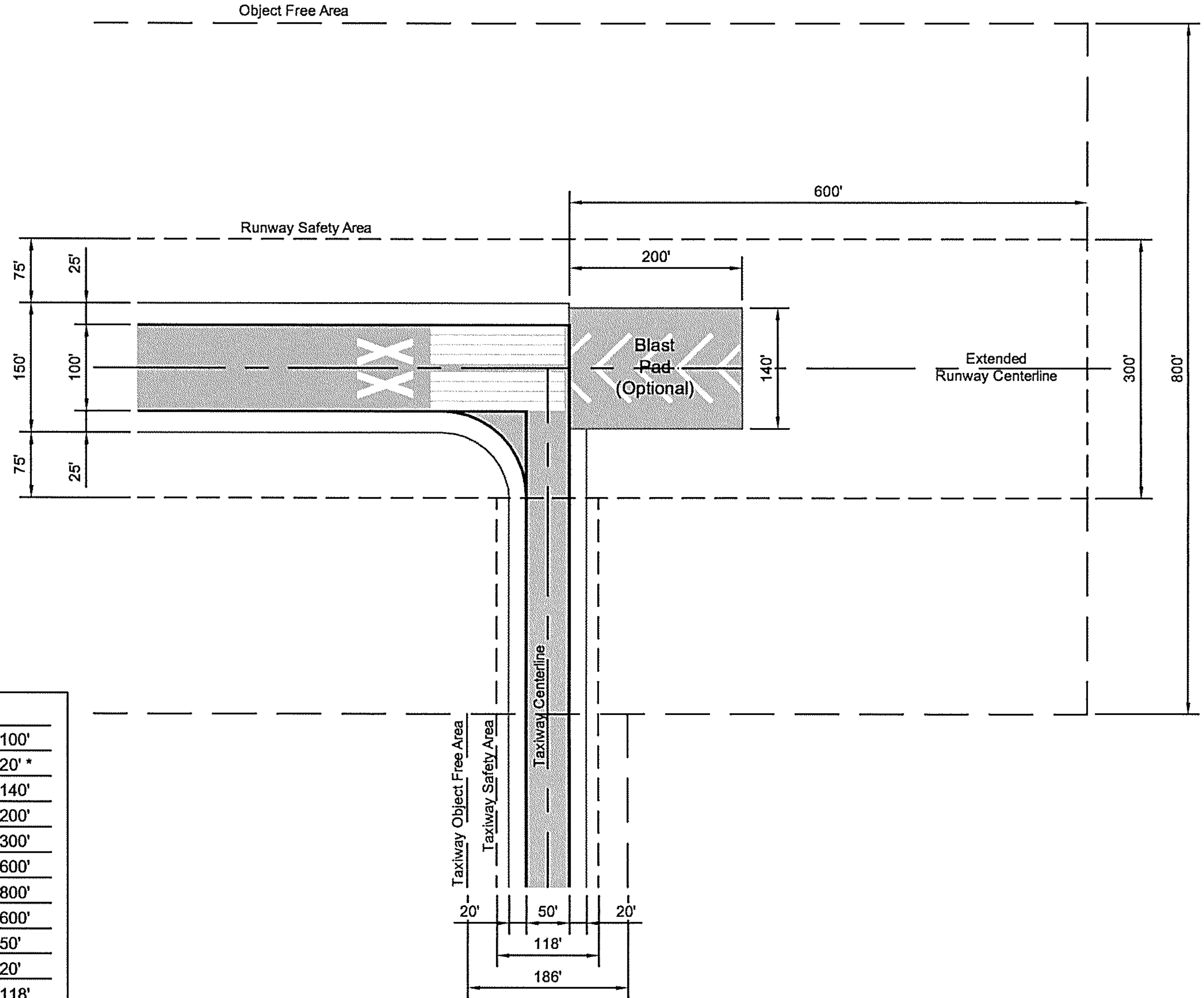

Typical Runway Layout

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Applicable Design Standards

Runway Width	100'
Runway Shoulder Width	20' *
Runway Blast Pad Width	140'
Runway Blast Pad Length	200'
Runway Safety Area Width	300'
Runway Safety Area Length Beyond Runway End	600'
Runway Object Free Area Width	800'
Runway Object Free Area Length Beyond Runway End	600'
Taxiway Width	50'
Taxiway Shoulder	20'
Taxiway Safety Area Width	118'
Taxiway Object Free Area Width	186'
Taxilane Object Free Area Width	162'

* ARC B-III Standard runway shoulder width is 20'.
The Unalaska Airport currently has a 25' shoulder width and this dimension will be maintained.

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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Applicable Design Standards (ARC B-III)

Exhibit 3-2

Source: Applicable dimensions and design standard derived from FAA Advisory Circular 150/5300-13, "Airport Design," Change 10

May 2007

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Methodology

There are various methodologies available to determine airfield capacity. For Unalaska Airport, FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, and the FAA's Airport Capacity Model are used to analyze the airfield requirements by computing hourly capacity, annual service volume, and average delays. The FAA Capacity Model uses gross assumptions for the purposes of computing hourly capacity and average delays including: (1) arrivals equals departures, (2) percent of touch-and-go operations are less than 40 percent, (3) there is a full-length parallel taxiway, (4) ample runway entrance/exit taxiways, (5) IFR weather occurs approximately ten percent of the time, (6) roughly 80 percent of the time the airport is operated with the runway-use configuration which produces the greatest hourly capacity, and (7) the airspace is otherwise not constrained.

Steep terrain in the area, which constrains the airspace surrounding Unalaska Airport, the lack of a full-length parallel taxiway, unusual weather conditions, and the lack of a control tower, prevents the use of the FAA Airport Capacity Model to provide accurate daily and hourly capacity at the Unalaska Airport. From an annual service volume (ASV) perspective, however, the FAA Capacity Model found that airfield capacity was more than sufficient to meet projected aviation demand through 2026. [4]

In addition to the FAA Capacity Model and FAA AC 150/5060-5, *Airport Capacity and Delay*, a third method was developed taking into consideration the special instrument approach procedures and the number of useable daylight hours to account for local conditions and to analyze and develop realistic hourly and daily capacity of the airfield.

3.4.2 Factors Impacting Capacity at Unalaska Airport

Instrument Approach Procedures

Unalaska Airport is currently supported by two published instrument approach procedures available to the general public, and four unpublished so-called "special" procedures developed for use only by air carriers and pilots authorized by the FAA to fly the procedure. All six instrument approach procedures are authorized for daytime use only.

The steep terrain in the vicinity of the airport has necessitated the development of special instrument approach procedures with relatively high weather minimums. These special instrument approach procedures permit only one aircraft beyond the Initial Approach Fix, ROFZU, to landing at a time. This fix is approximately 25 nautical miles from the airport. The airlines have estimated that, under Instrument Flight Rules (IFR), one operation takes approximately 12-14 minutes from the Initial Approach Fix to landing at Unalaska Airport. This equates to approximately 4-5 aircraft operations per hour under these conditions. Under Visual Flight Rules (VFR), aircraft operators can see traffic and do not need to maintain one aircraft beyond the Initial Approach Fix. PenAir regularly operates departing aircraft while an inbound aircraft is past the Initial Approach Fix under these conditions. As such, aircraft operations per hour may increase when weather and visibility conditions permit.

Appendix D depicts the instrument approach procedures for Unalaska Airport.

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[4] Annual Service Volume (ASV) is a reasonable estimate of an airport's annual capacity

Runway and Configuration

Runway 12/30 at Unalaska Airport is not served by a full-length parallel taxiway system. As a result, aircraft back-taxi for takeoff and landing on both runways. Generally, back-taxiing increases the runway occupancy time and reduces the available capacity of the runway system. However, in the case of Unalaska Airport, runway occupancy time is not a capacity-limiting factor because operations occur minutes apart, as described earlier.

Daylight Hours

The Airport only operates during daylight hours. Unalaska is situated at 53 degrees latitude and daylight hours, defined as sunrise to sunset, can be as short as 7.4 hours per day during the peak winter fishing season, according to the U.S. Naval Observatory, Astronomical Applications Department. However, air carriers generally operate on the basis of "civil twilight", which begins before sunrise when the center of the sun is less than six degrees below the horizon, and ends when the center of the sun is approximately six degrees below the horizon. During the peak winter fishing season, civil twilight hours are approximately nine hours per day according to the U.S. Naval Observatory.

Actual daylight hours experienced by aircraft operators and Unalaska residents during sunset/sunrise and civil twilight may seem different than the figures documented by the U.S. Naval Observatory due to steep terrain surrounding Unalaska Airport. Because pilots are conservative when making operating decisions, a conservative 7.4 hours was used to represent the maximum useable daylight during the peak winter fishing seasons to calculate the daily and hourly capacity of Unalaska Airport.

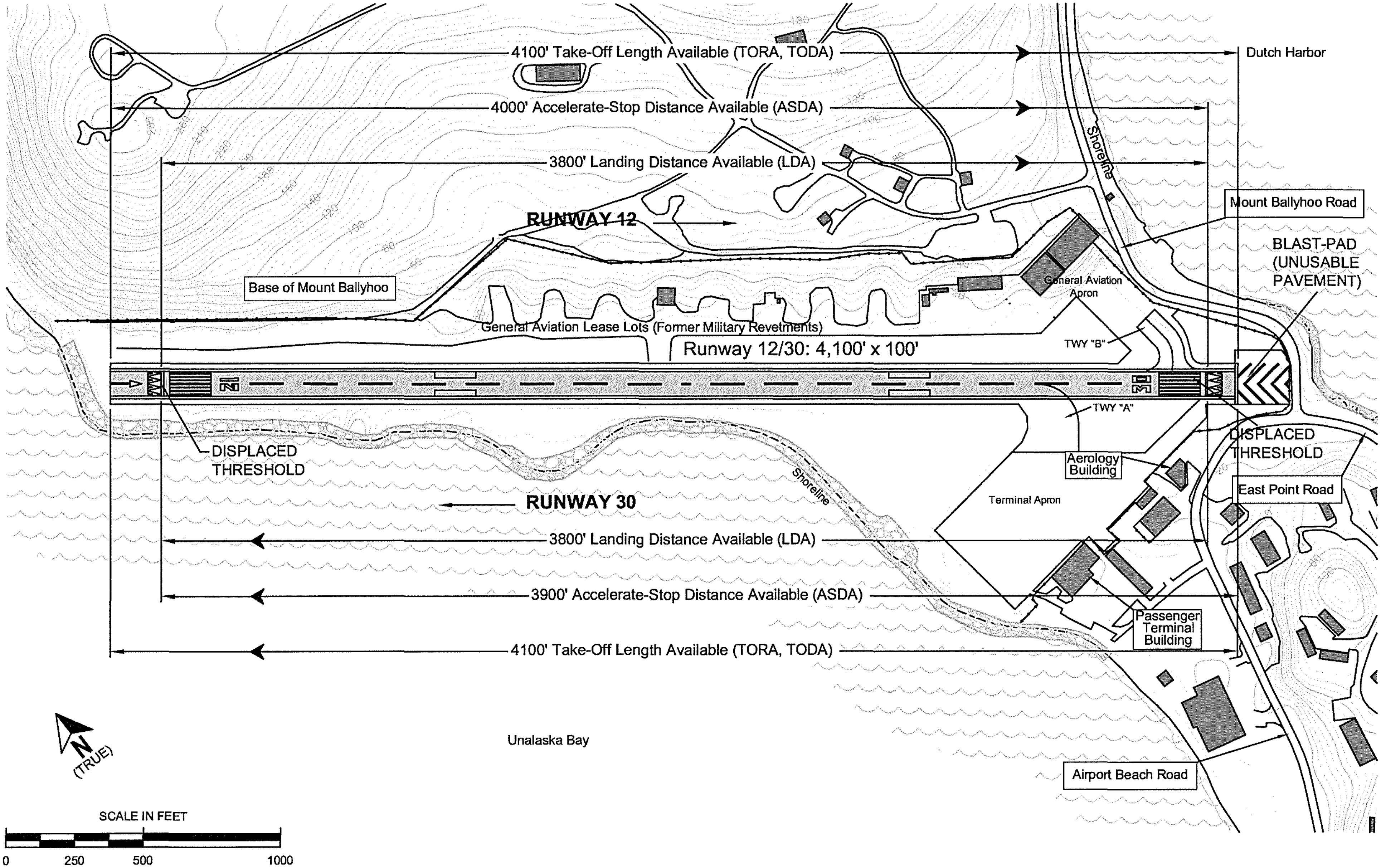
3.4.3 Demand/Capacity Summary

- Peak daily demand is estimated at 21 aircraft operations in 2006 and is projected to increase to 27 operations in 2026
- The peak daily capacity is estimated at 37 aircraft operations based on the amount of daylight available during the peak winter fishing seasons and operating procedures limited by the initial approach fix
- Airfield will be at 73 percent of capacity through the 2026 planning period due to a de facto slot system
- Airfield meets future aviation demand levels through 2026 from an annual capacity perspective
- Passenger and airline scheduling inconveniences remain prevalent during the peak winter months

3.5 Airside Facility Requirements

3.5.1 Runway Requirements

Existing ARC B-II runway length, width, and shoulder dimensions at Unalaska Airport were compared to the requirements for the critical aircraft and an ARC B-III airfield. **Exhibit 3-3** depicts the existing runway dimensions for Unalaska Airport.



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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Existing Runway Dimensions

Exhibit 3-3

Source: 1987 Unalaska Airport Airport Layout Plan (revised in 2005 to reflect declared distances); Photogrammetic Data (January 2007).

May 2007

Existing Conditions

Runway 12/30 is grooved asphalt, 100 feet wide, and 4,100 feet long from runway end to runway end. Because of obstructions in the approach path and an inadequate Runway Safety Area, the approach end of Runway 30 includes a 100-foot displaced threshold, shortening the runway available for landing aircraft by 100 feet.[5] Because of the threshold displacements and non-standard RSAs, the FAA has determined that certain distances are available for departure and arrival operations. These available runway lengths are known as "declared distances" and result in the full availability of Runway 30 for takeoff (4,100 feet) and an available landing distance of 3,800 feet.

The approach end of Runway 30 is also supported by a 200-foot-long by 150-foot-wide blast pad which may not be used for landing, but may be used for takeoff and is not considered part of the declared distance calculations. The approach-end of Runway 12 features a 200-foot displaced threshold and is not supported by a blast pad. For Runway 12, the declared takeoff distance available is the entire length of 4,100 feet, and 3,800 feet is available for landing.

Table 3-2 below summarizes existing runway lengths and available takeoff and landing distances at Unalaska Airport.

TABLE 3-2
Existing Runway Length and Available Distances

	Takeoff Run Available (TORA)	Takeoff Distance Available (TODA)	Accelerate Stop Distance Available (ASDA)	Landing Distance Available (LDA)
Runway 12	4,100'	4,100'	4,000'	3,800'
Runway 30	4,100'	4,100'	3,900'	3,800'

Source: 1987 FAA Approved Unalaska Airport ALP Revised in 2005

Runway Orientation

The optimal runway orientation is determined by local wind coverage, defined as the percentage of time crosswinds are below maximum acceptable velocity as defined by the FAA[6]. The maximum acceptable wind speed for the current aircraft fleet mix at Unalaska Airport is 13 knots. The FAA-required wind coverage for a runway is 95 percent, based on the total wind observations. In other words, the crosswind at an airport can only exceed the crosswind speed threshold a maximum of five percent of the time. The National Climatic Data Center does not collect these data for Unalaska Airport. Because of the effect on wind speeds and directions resulting from the steep terrain surrounding the airport, data collected from nearby sites do not adequately represent actual wind conditions at the airport; thus, a wind coverage analysis could not be conducted. The most recently FAA-approved ALP (9-16-87, revised in April 2005 to reflect existing Declared Distances) indicates that Runway 12/30 experiences 90.0 percent wind coverage. The November 2001

[5] Obstructions located in the airport environment are identified in subsequent sections

[6] FAA Advisory Circular 150/5300-13, Change 10.

Unalaska Airport Master Plan Update—*Office Technical Memorandum #1*[7]- states the runway experiences 90.23 percent wind coverage.

The recommended solution for a runway system that does not meet wind coverage requirements is to reorient the runway or to establish a crosswind runway. In the case of the Unalaska Airport, previous planning efforts determined that runway reorientation or the addition of a crosswind runway is impracticable, and will not be considered in the Airfield Alternatives analysis.

Runway Pavement

DOT&PF conducted a pavement survey for Unalaska Airport on May 28, 2003, and published results in the *2004 Alaska Airport Pavement Condition Report for Unalaska Airport*. The survey found that the existing airport pavement conditions are generally fair on the Terminal Apron, Taxiway A and B, and a portion of runway closest to the Runway 30 threshold. Overall, the Pavement Condition Index recommends preventative and corrective maintenance in the form of crack seal and patching to maintain serviceability through 2008. This is consistent with information from airport maintenance personnel, who frequently perform crack sealing and patching of the runway. Beyond 2008, the report found that the entire runway, taxiway, and ramp pavement areas will need to be rehabilitated or reconstructed. Therefore, it is assumed that these improvements will be made over the 2026 planning period.

Runway Shoulders

The existing runways shoulders are paved and approximately 25 feet wide at Unalaska Airport. ARC B-III standards require runway shoulders to be a minimum 20 feet wide. Therefore, the runway shoulder dimensions for Runway 12/30 exceed the applicable design standards. It is recommended that the additional five feet of runway shoulder be maintained through the planning period as an additional safety measure.

3.5.2 Airfield Requirements

Runway Length

Existing useable runway lengths are used to determine runway suitability for meeting the takeoff and landing length requirements of the design aircraft, which will become the Bombardier Q400 in 2016. Runway length requirements depend on such factors as aircraft configuration and power setting, air temperature, elevation, wind, runway slope, and whether the runway pavement is grooved. Runway length requirements at Unalaska Airport were computed using the following operational assumptions: the average daily high temperature of the hottest month (56°F), sea-level pressure, calm winds, zero runway gradient, grooved pavements, and the aircraft configured for maximum performance.[8]

Aircraft departure weight is a major factor in determining the runway length required to accommodate the departure of aircraft under given conditions. At its maximum takeoff weight of 64,500 lbs., the Q400 requires 4,650 feet of runway for takeoff under standard day conditions. However, it is not reasonable to plan for 100 percent load factors. This analysis uses a commonly accepted runway planning standard of 95 percent load factor, as well as

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[7] *Office Technical Memorandum #1*, ASCG Inc., November 2001

[8] Although winds are rarely calm at Unalaska Airport, the calculations were computed in this fashion to provide for the most demanding scenario. Head winds reduce take off and landing length.

PenAir's operational and economic requirements to derive a reasonable runway length for the Q400.

PenAir plans to operate the Q400 with a maximum of 59 passengers. Accounting for passenger baggage, fuel, and additional cargo, the expected operational maximum takeoff weight is estimated to equal 61,275 lbs., or approximately 95 percent of the maximum takeoff weight. The required takeoff runway length at 95 percent of maximum take-off weight for the Q400 is 4,200 feet. The 4,200-foot takeoff length requirement indicates that the current runway is approximately 100 feet too short to accommodate the Q400 critical aircraft without payload penalties. For landing, the Q400 requires 3,700 feet of usable pavement at maximum landing weight, which can be achieved on the existing runway.

Runway takeoff and landing requirements for similar ARC B-III aircraft are approximately equivalent to that of the Q400. Therefore, the runway length requirements evaluated in this section are sufficient should other air carriers begin service at Unalaska Airport using comparable ARC B-III aircraft through the 2026 planning period.

Runway Safety Area

The RSA is the FAA's most restrictive protection surface associated with the runway and is defined as land surrounding the runway that serves to reduce the risk of death or injury to aircraft occupants in the event of an undershoot, overshoot, or excursion from the runway. The RSA is centered on the runway centerline and must be:

- Capable of supporting airport rescue and firefighting equipment, snow removal equipment, and aircraft under dry conditions
- Free of objects, except those fixed by function and mounted on low-impact-resistant supports
- Cleared, graded, and free of hazardous surface violations
- Properly drained

FAA Order 5200.8, "*Runway Safety Area Program*", established the objective that all federally obligated and Part 139 certificated[9] airports (such as Unalaska Airport) shall have RSAs that conform to the standards contained in Advisory Circular (AC) 150/5300-13, *Airport Design* to the extent practicable. Furthermore, by Federal statute no Alaskan runway can be shortened in an attempt to create sufficient space for an RSA unless the sponsor does so willingly[10].

The current ARC B-II designation at Unalaska Airport requires that the RSA must be 150 feet wide (75 feet from centerline) and must extend 300 feet beyond the runway ends. The RSA for both runways at Unalaska Airport are currently deficient for ARC B-II airport design standards; therefore, declared distances are currently used to minimize RSA deficiencies to the extent possible. Beginning in 2016, ARC B-III RSA dimensions will be required to meet ARC B-III runway design standards, which require the RSA to be 300 feet wide (150 feet from centerline) and must extend 600 feet beyond the runway ends.

Several objects protrude into the current ARC B-II and future ARC B-III RSA at Unalaska Airport, including the shoreline, security fence, Mount Ballyhoo Road, Airport Beach Road,

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[9] 14CFR Part 139, *Airport Certification*, establishes certification requirements for airports serving scheduled air carrier operations.

[10] DOT & PF, as the sponsor of the airport, has indicated it is not interested in shortening the already short runway.

and the toe of Mount Ballyhoo. **Exhibit 3-4** and **Exhibit 3-5** shows ARC B-II and B-III RSA deficiencies, respectively. Objects within the RSA will be resolved in the airfield planning alternatives analysis, to the extent practicable.

Runway Object Free Area (OFA)

The purpose of the OFA is to enhance the safety of aircraft operations by maintaining the area free of objects. The OFA is centered on the runway centerline and must be cleared of all above-ground objects, except those fixed by function (such as taxiway signs, aircraft in movement) that protrude above the OFA edge elevation. Unlike the RSA, the OFA is a plane and may overlie open water or rough terrain and need not be able to support the weight of an aircraft or other airport vehicles. Under the current ARC B-II standards, the Unalaska Airport OFA must measure 500 feet wide and extend 300 feet beyond the runway end (through 2015). Currently, the OFA dimensions for Runway 12/30 measure 500 feet in width (250 feet from runway centerline) and extend 250 feet beyond the runway end (a 50 foot deficiency to ARC B-II design standards). Beginning in 2016, ARC B-III OFA dimensions will become applicable and the requirement increases to 800 feet wide and extending 600 feet beyond the runway end.

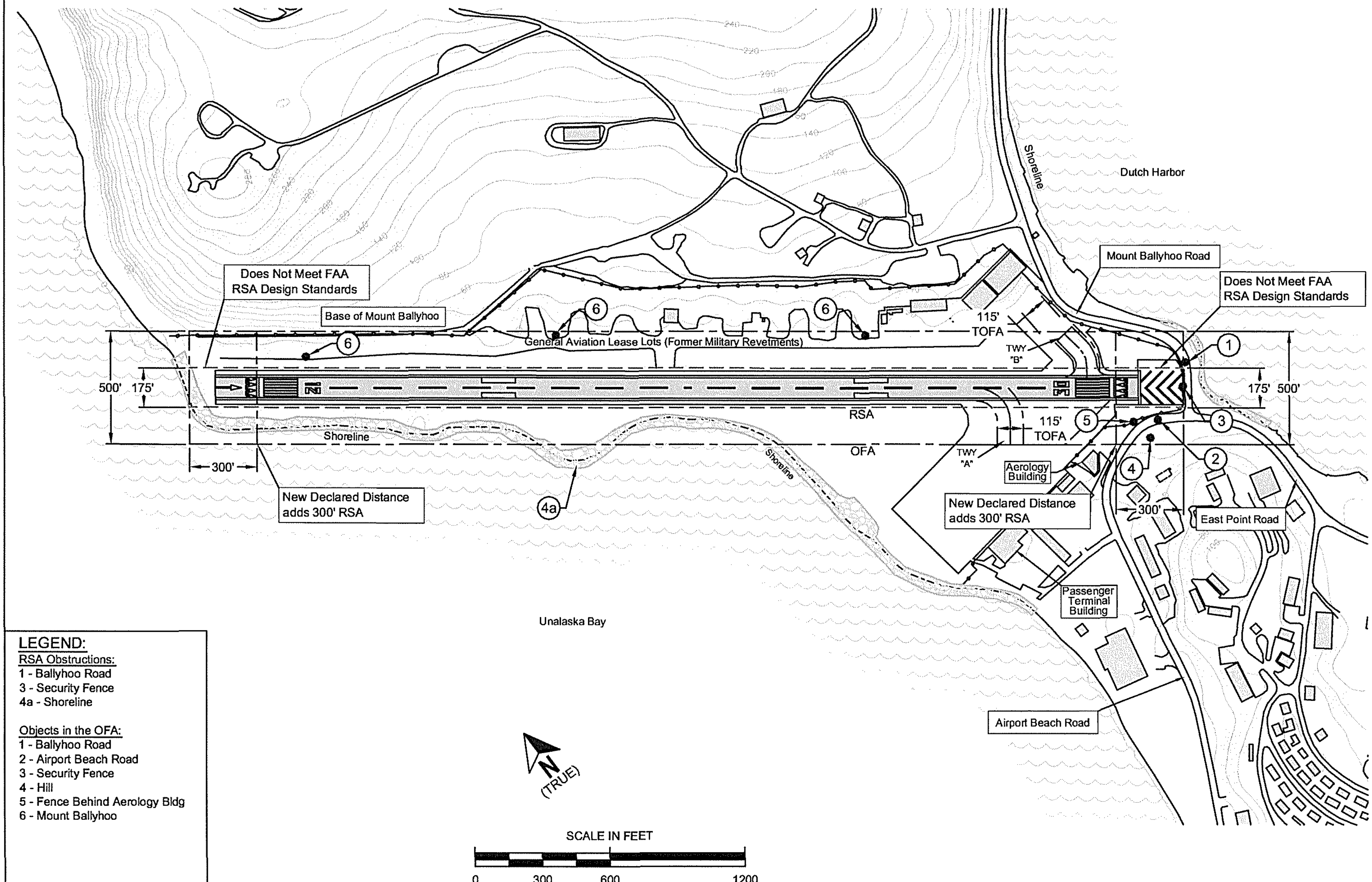
Several objects protrude into the current ARC B-II and future ARC B-III OFA at Unalaska Airport, including buildings adjacent to the Taxiway B apron, Aerology building, the cargo building adjacent to the Torpedo building, Mount Ballyhoo and Airport Roads, an abandoned hangar in the revetments of Mount Ballyhoo, the hill southeast of the Runway 30 threshold, and the toe of Mount Ballyhoo. Exhibit 3-4 and Exhibit 3-5 shows ARC B-II and B-III OFA deficiencies, respectively. Objects within the OFA will be resolved in the airfield planning alternatives analysis, to the extent practicable.

Runway Protection Zone (RPZ)

The RPZ is an area on the ground or the surface of water that is trapezoidal in shape and centered on the extended runway centerline. The purpose of the RPZ is to enhance the protection of people and property on the ground and should be free of land uses that would house or attract large numbers of people within its boundaries such as ships. The RPZs at Unalaska Airport are clear of such incompatible land uses. Since most of the RPZ areas are located over water, however, temporary incompatible uses could be in the form of ships. While anchoring is restricted in the RPZ, DOT & PF does not exercise control over the vessels in the RPZ as is recommended by the FAA.

RPZ dimensions are contingent on the size of the design aircraft (currently ARC B-II/future B-III) as well as the type of approach capability of the runway. Unalaska Airport currently offers non-precision instrument approach capability with visibility minimums >1 mile. Generally, as aircraft size increases and approach minimums decrease, the dimensions of the RPZ increase. The RPZs for both ARC B-II and B-III standards begin 200 feet beyond the end of the pavement usable for takeoff and landing, and start at a width of 500 feet, widening to 700 feet over a length of 1,000 feet. The RPZ dimensions do not change because no significant change in instrument approach minimums is expected.

Exhibit 3-6 shows RPZ dimensions for Runway 12/30 at Unalaska Airport.



LEGEND:

RSA Obstructions:
1 - Ballyhoo Road
3 - Security Fence
4a - Shoreline

Objects in the OFA:
1 - Ballyhoo Road
2 - Airport Beach Road
3 - Security Fence
4 - Hill
5 - Fence Behind Aerology Bldg
6 - Mount Ballyhoo

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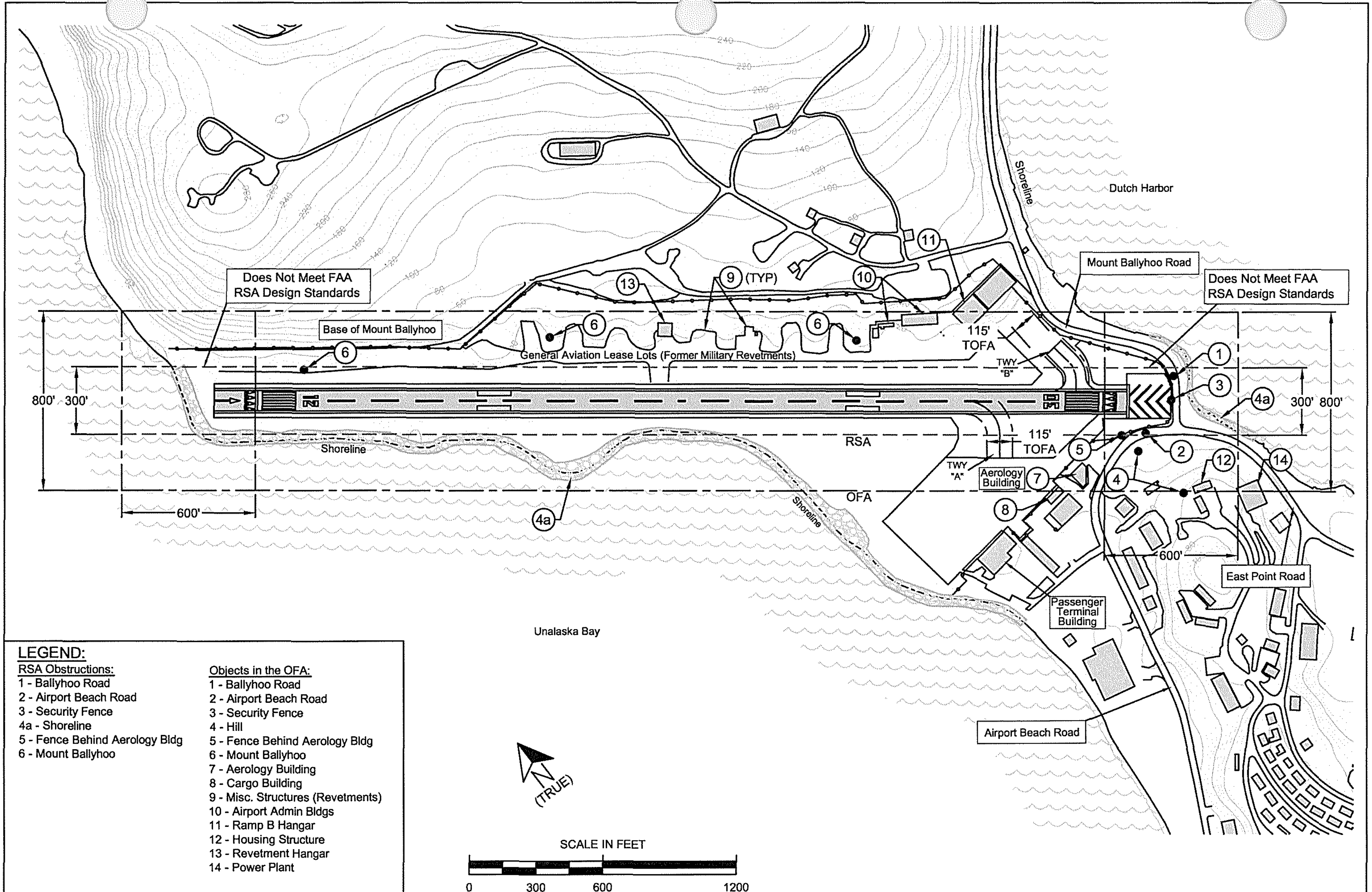
Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

ARC B-II RSA and OFA Deficiencies
(Declared Distance Conditions)

Exhibit 3-4

Source: AC 150/5300-13, "Airport Design," Change 10; CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2005 to reflect declared distances); Photogrammetric Data (January 2007)

May 2007



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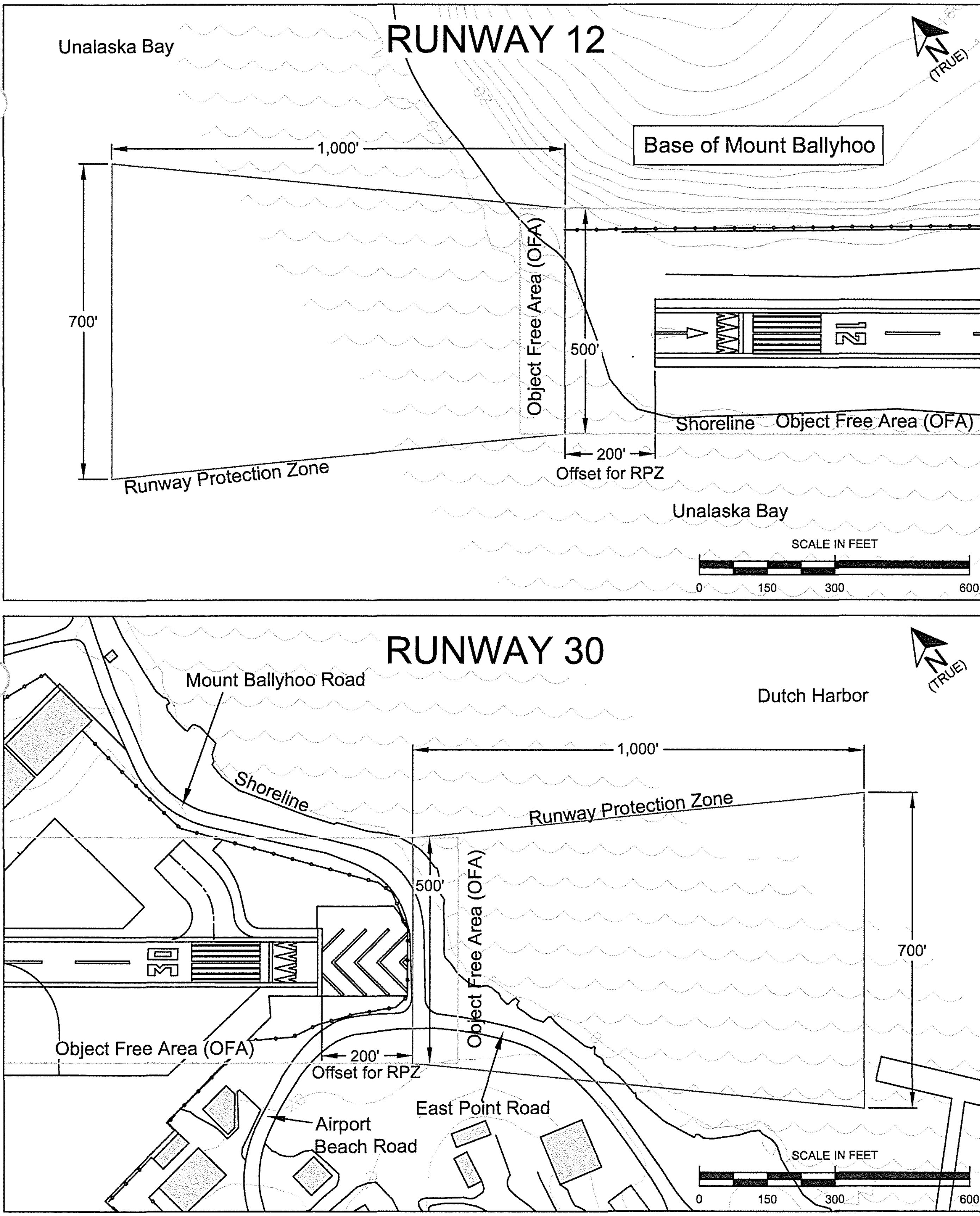
AIP 3-02-012-2006

ARC B-III RSA and OFA Deficiencies
(Declared Distance Conditions)

Exhibit 3-5

Source: AC 150/5300-13, "Airport Design," Change 10; CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2005 to reflect declared distances); Photogrammetric Data (January 2007)

July 2007



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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Runway Protection Zone (RPZ) Dimensions

Exhibit 3-6

Source: AC 150/5300-13, "Airport Design," Change 10

May 2007

Runway Obstacle Free Zone (OFZ)

The OFZ is the volume of airspace along the runway and the extended runway centerline that is required to be clear of objects in order to provide clearance protection for aircraft takeoff and landing. The OFZ clearing standards preclude taxiing and parked airplanes and object penetrations, except for frangible NAVAIDs that are fixed by function. Dimensions of the OFZ are dependent on the size and approach speed of the critical aircraft. For Unalaska Airport, serving ARC B-II (and future B-III) aircraft, the OFZ extends 200 feet beyond each runway end and is 400 feet in width. Other elements of the obstacle free zone include the inner-approach OFZ, inner-transitional OFZ, and precision OFZ. These elements are only applicable when an approach lighting system is available, approach visibility minimums are lower than ¾ statute-mile, and a vertically guided precision approach is available, respectively. None of these elements are currently applicable to Unalaska Airport. The FAA Anchorage Flight Procedures Office (FPO) has determined that precision approach capability is not feasible at the Unalaska Airport due to terrain, nor can the visibility minimums of the existing approaches be improved in the foreseeable future. As such, the runway OFZ for Unalaska Airport is adequate and its dimensions will remain unchanged through the 2026 planning period.

3.5.3 Taxiway Requirements

Runway 12/30 is supported by Taxiways A and B (see **Exhibit 3-3**). Although back-taxiing is required for most operations, sufficient access is provided via Taxiway A, which provides access between the runway and the terminal apron area, and Taxiway B, which provides access between the runway and the general aviation and aircraft parking area. While a full-length parallel taxiway would be convenient, given the airport's relatively low activity level and constrained setting, one is not warranted. FAA design standards for ARC B-III aircraft require a minimum taxiway width of 50 feet. Taxiway A, at its narrowest point is 500 feet wide, and Taxiway B, at its narrowest point, is 90 feet wide. As such, both taxiways exceed the width requirements for ARC B-III taxiway dimensions.

Taxiway Safety Area

The main function of the taxiway safety area is to support airport rescue, fire fighting, and snow removal equipment, and the occasional passage of aircraft, without causing structural damage. Similar to the RSA, the taxiway safety area must be:

- Cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface violations
- Drained by grading or storm sewers to prevent accumulation of water
- Free of objects not fixed by function

The existing taxiways, A and B, measure 500 and 90 feet, respectively, at the narrowest point. Based on ARC B-III design standards, the taxiway safety area width requirement for both taxiways at Unalaska Airport is 118 feet (59 feet from the taxiway centerline). Because of the exceptionally wide taxiway pavement, both taxiway safety areas meet current ARC B-II standards, as well as ARC B-III design criteria required beyond 2016.

Taxiway Object Free Area

Taxiway and taxilane OFA clearing standards prohibit service vehicle roads, parked airplanes, and above-ground objects, except those fixed by function, within its parameters.

According to ARC B-III standards, the OFA for Taxiways A and B must be 186 feet in width (57.5 feet from centerline). As with the taxiway safety areas, the existing taxiway OFAs at Unalaska Airport are exceptionally wide and do not contain obstructions that fall inside the identified parameters. Therefore, the existing taxiway and taxilane OFAs are sufficient and meet the ARC B-III design criteria required beyond 2016.

3.5.4 Aircraft Aprons

The terminal (Ramp A) and General Aviation (Ramp B) aprons accommodate itinerant and based aircraft at Unalaska Airport (**Exhibit 3-7**). The General Aviation apron provides approximately 6,700 square yards of total apron space. However, due to Federal Aviation Regulations (FAR) Part 77 surface limitations, only 4,000 square yards are usable for aircraft parking. Discussions with airport management indicate that the apron is of adequate size to meet the airport's current and future needs. In addition, projected aviation demand presented in the last chapter does not project growth in general aviation or based aircraft activity. Therefore, the GA apron will not need to be enlarged during the planning period. The current terminal apron measures approximately 30,000 square yards. However, due to Part 77 and OFA restrictions, only 15,000 square yards of the apron are useable for aircraft parking[11]. As such, the current apron configuration is capable of handling approximately ten B-II aircraft or seven B-III aircraft. A review of airline schedules and air cargo activity, and confirmed through discussions with airport and airline management, indicates that up to nine large aircraft use the terminal apron at one time during peak periods. This occurs up to three times a day for a one to two week period at the open and close of each of the four main peak fishing seasons. Beginning in 2016, the existing terminal apron will require additional space to accommodate six B-II aircraft and six B-III aircraft using a partial pull-in/tug back parking configuration and a single taxilane system. To accommodate the projected growth in size and operations of aircraft seeking to use the terminal apron, an additional 21,000 square yards of terminal apron space, totaling approximately 36,000 square yards, will be required through the 2026 planning period.

3.5.5 FAR Part 77 – Objects Affecting Navigable Airspace

FAR Part 77 establishes standards for determining obstructions to navigable airspace, sets forth the requirements for notice to the FAA for certain proposed construction or alteration activities, and provides for the identification of obstructions to air navigation. These standards apply to existing and manufactured objects, objects of natural growth (trees), and terrain. If an object is an obstruction to Part 77 it should be removed, but this is not always achievable or feasible. Part 77 obstructions that cannot be removed are subject to an FAA airspace study under the *Terminal Procedures Order* (TERPS) to determine if the object is a Hazard to Air Navigation and the appropriate action to be taken. Hazards that cannot be removed usually are lighted and sometimes result in restrictions on the instrument approach procedures at an airport. As the airport operator, DOT&PF has the responsibility of clearing and protecting the runway approaches, as well as placing reasonable restrictions on the land uses in the immediate vicinity of the airport through the use of such measures as the adoption of zoning ordinances or ship channel restrictions.

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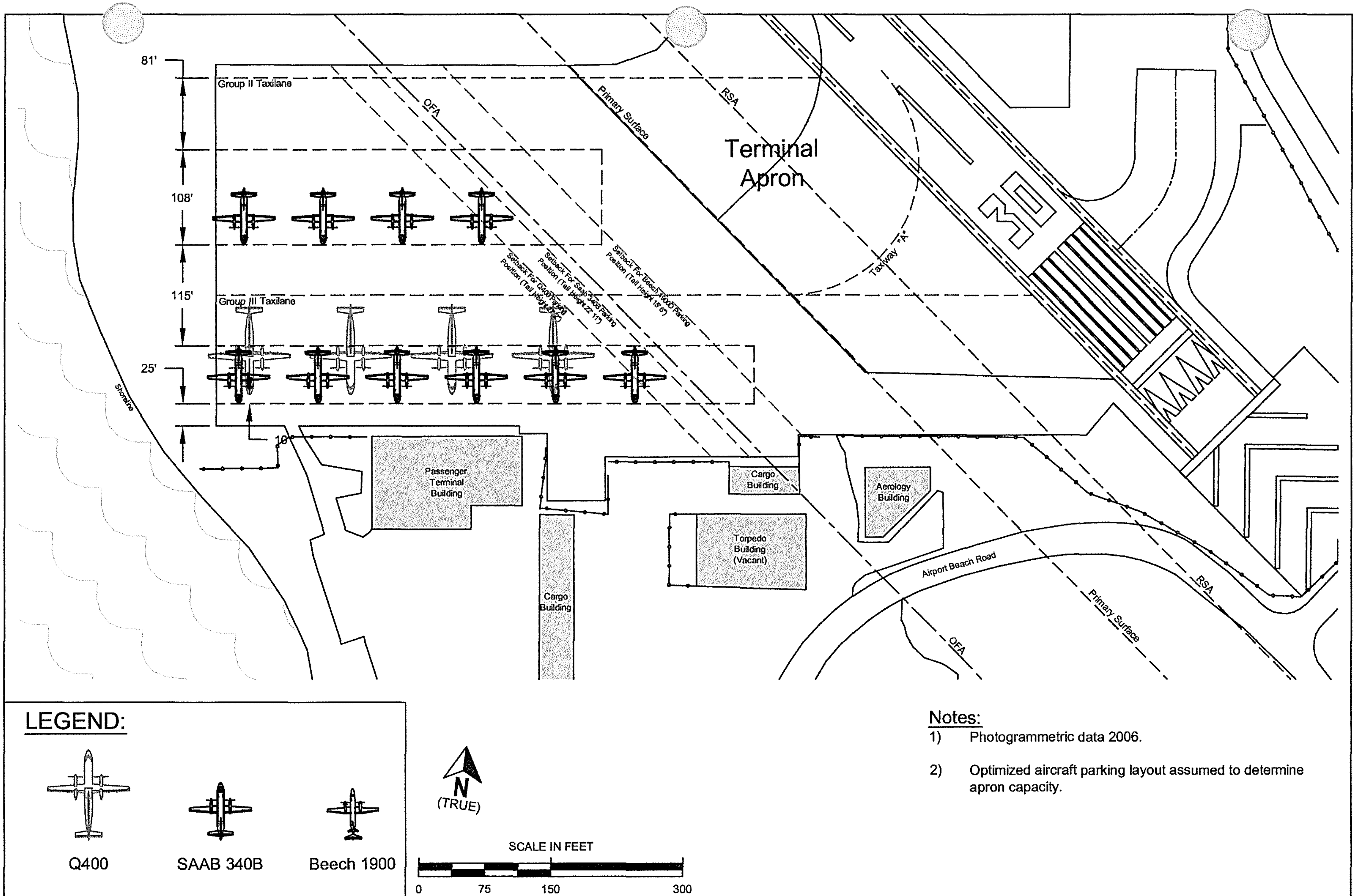
[11] Total space is pavement located outside the OFA. Usable parking space is ramp space with 15.5 feet (height of Beech 1900) of clearance between the ground and the transitional surface. Note: FAR Part 77 surfaces are dependant upon actual obstructions, not the airport reference code.



Notes:
1) Photogrammetric data 2006.
2) Optimized aircraft parking layout assumed to determine apron capacity.

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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Existing Terminal Apron

Exhibit 3-7

Source: CH2M Hill, FAR Part 77

May 2007

Several "imaginary" surfaces are established under Part 77 with relation to the airport and to each end of a runway to help determine whether an object is a potential obstruction to air navigation. These include the primary, horizontal, conical, approach, and transitional surfaces, all of which are depicted in **Exhibit 3-8**. The dimensions of these imaginary surfaces are relative to the type of approach and weight of the aircraft that is forecast to use the runway.[12] The dimensions for the imaginary surfaces related to Runway 12/30 at Unalaska Airport are based on a non-precision instrument approach with visibility minimums greater than ¾ statute mile, and aircraft that are heavier than 12,500 pounds. In order of importance, descriptions of each Part 77 surface include:

Primary Surface: The primary surface is the most restrictive surface and exists on the ground that surrounds a runway. The primary surface at Unalaska Airport measures 500 feet in width (250 feet from the runway centerline) and extends 200 feet beyond the runway ends.

Approach Surface: The approach surfaces begin off the ends of the runway where the primary surfaces end. The inner width is the same width as the primary surface and increases to 3,500 feet wide at an upward slope of 20 to 1 as it extends for 5,000 feet along the extended runway centerline.

Transitional Surface: The transitional surface extends outward and upward along the side of the runway starting at the edge of the primary and approach surfaces at a slope of 7 to 1 up to the horizontal surface.

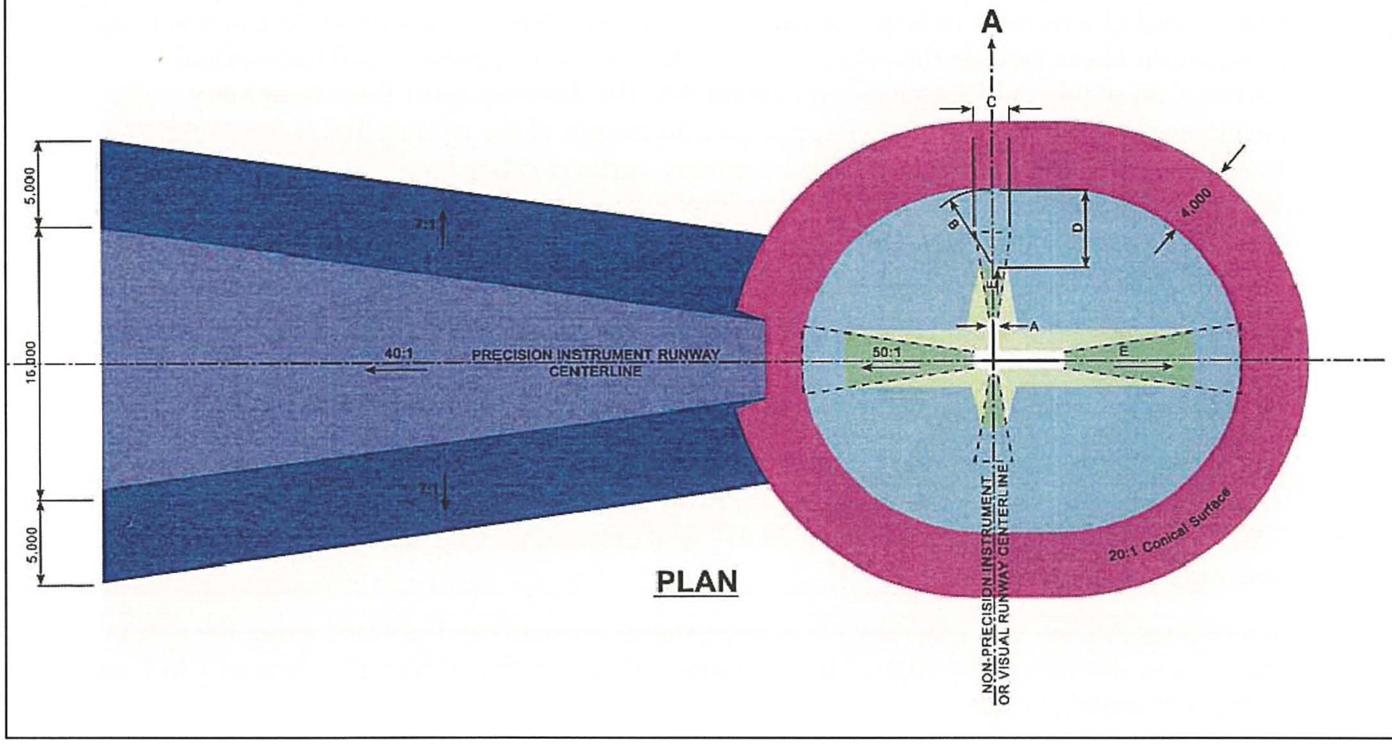
Horizontal Surface: The horizontal surface is an imaginary plane that overlies the airport at 150 feet. The perimeter of the horizontal surface is constructed by swinging arcs from the end of the primary surface of each runway, and connecting each arc by lines tangent to them.

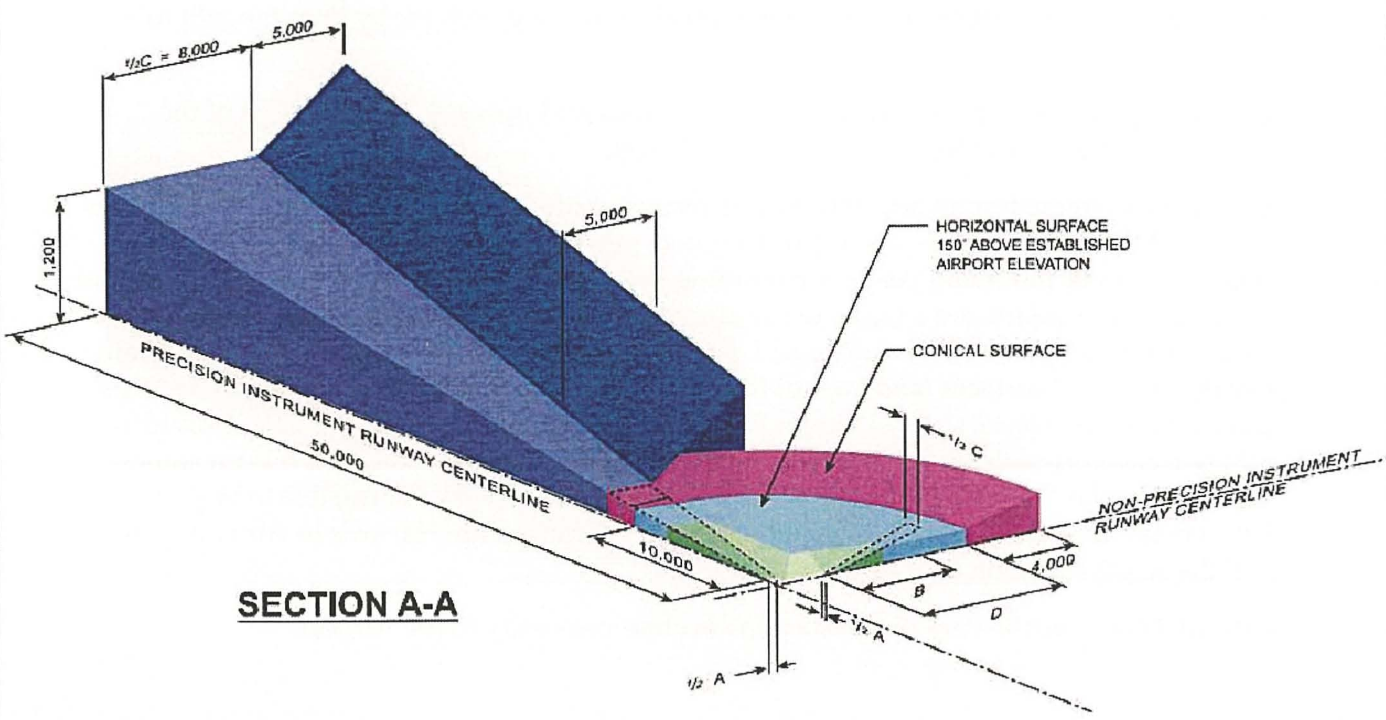
Conical Surface: The conical surface extends outward and upward from the edge of the horizontal surface at a slope of 20 to 1 for 4,000 feet.

Due to the extreme terrain and constrained airport setting, there are numerous penetrations to several Part 77 surfaces, such as Mt. Ballyhoo, which is in the transitional surface to the north, and other mountain peaks surrounding the airport within the Horizontal and Conical surfaces. These objects are a factor to the airport's setting and cannot feasibly be removed, while others can and must be addressed. In addition, there are obstructions that technically penetrate Part 77 surfaces (and are not RSA or OFA violations), but are shadowed by larger, more obtrusive objects, such as Mount Ballyhoo. These obstructions are therefore divided into two categories: those that are obstructions to Part 77 surface areas and it is presumed that they can be improved or resolved, and those objects that are not feasible to improve. Ultimately, the FAA decides which objects and penetrations are Hazards to Air Navigation and the required action.

Exhibit 3-9 shows the Part 77 obstructions in close proximity to the Airport.

[12] Note: Part 77 is not associated with AC 150/5300-13, Change 10 and therefore does not use the ARC system to identify standards.





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Unalaska Airport Master Plan Update

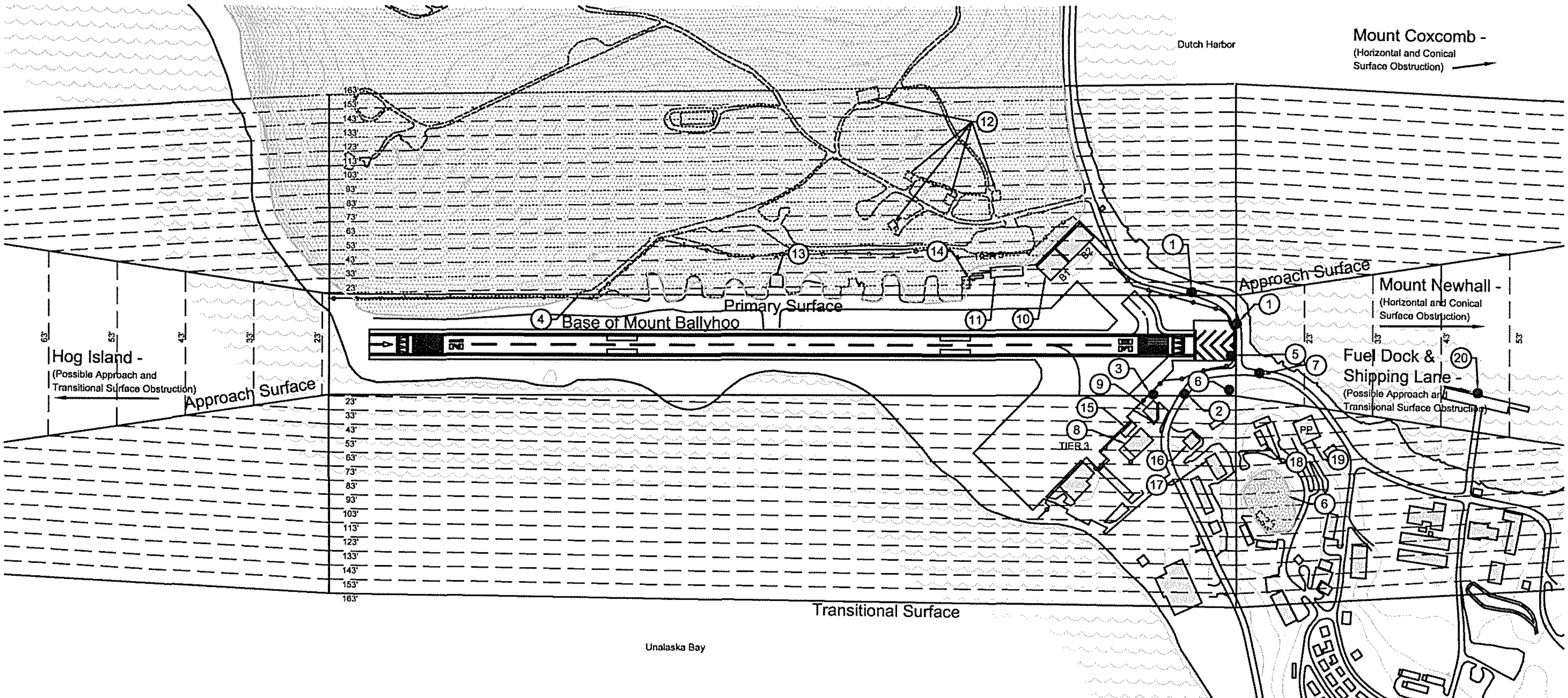
Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Part 77 Surfaces

Exhibit 3-8

Source: AC 150/5300-13, "Airport Design," Change 10

May 2007



LEGEND:

Primary Surface Obstructions:
1 - Mt. Ballyhoo Road
2 - Airport Beach Road
3 - Aerology Building Fence (Airside)
4 - Mt. Ballyhoo
5 - Security Fence
6 - Hill

Approach Surface Obstructions:
1 - Mt. Ballyhoo Road
7 - East Point Road
20 - Ships Berthed at Fuel Dock*

Transitional Surface Obstructions:
1 - Mt. Ballyhoo Road
2 - Airport Beach Road
5 - Mt. Ballyhoo
6 - Hill
8 - Torpedo Building
9 - Aerology Building
10 - Ramp B Hangar 1/2
11 - Airport Admin Bldgs/ARFF
12 - WWII Structures
13 - Revetment Hangar
14 - Airport Staff Housing 1/2
15 - Cargo Building
16 - Firehouse
17 - Misc Bldg 1
18 - Housing Unit 1/2
19 - Power Plant

*Fuel Dock in Dutch Harbor is located directly in the approach to Runway 30. Ships berthed at the dock exceeding 55 feet in height are penetrations to the approach surface.

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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Penetrations to FAR Part 77 (Airport Proximity Only)

Exhibit 3-9

Source: FAR Part 77, FAA Form 5010; Photogrammetric Data (January 2007)

July 2007

Obstructions to the Primary Surface

The Primary Surface is Part 77's most restrictive surface and the removal or relocation of penetrations to this plane is high priority. Six objects have been identified as obstructions within the Primary surface, all of which must be resolved in the planning alternatives:

- Vehicles on Mount Ballyhoo Road penetrate the Runway 30 primary surface by approximately 12 feet(based on a height of 15 feet per FAR Part 77)
- Vehicles on Airport Beach Road penetrate the Runway 30 primary surface by approximately 17 feet (based on a height of 15 feet per FAR Part 77)
- Property fence north of the Aerology building and continuing around the approach end of Runway 30 penetrates primary surface by eight feet
- Revetments in the base of Mount Ballyhoo penetrate the primary surface by varying amounts, with the most extreme penetration being 45 feet

Obstructions to the Approach Surface

The approach surface is the second most restrictive of the Part 77 imaginary surfaces and the removal or relocation of penetrations to this plane is high priority. Obstructions to the 20 to 1 approach surface include:

- Vehicles on East Point Road penetrate the Runway 30 approach surface by approximately 15 feet (based on height of 15 feet per FAR Part 77)
- Fuel Dock in Dutch Harbor is located directly in the approach to Runway 30. Boats berthed at the dock exceeding 55 feet in height are penetrations to the approach surface
- Hill to the southeast of the Runway 30 threshold penetrates the approach surface by 28 feet

Obstructions to the Transitional Surface

Objects that penetrate the 7 to 1 Transitional Surface include:

- Airport Beach Road penetrates in the area where the primary surface ends and the transitional surface begins near the approach end of Runway 30 when vehicles are present (based on height of 15 feet per FAR Part 77)
- Mount Ballyhoo Road penetrates in the area where the primary surface ends and the transitional surface begins near the approach end of Runway 30 when vehicles are present (based on height of 15 feet per FAR Part 77)
- Mount Ballyhoo penetrates the transitional surface along the northern edge of the runway
- Torpedo Building penetrates the transitional surface by approximately nine feet
- Aerology Building penetrates the transitional surface by approximately 24 feet (and is in the OFA)
- Mount Ballyhoo is a penetration in its entirety; WWII building structures situated on Mount Ballyhoo penetrate the transitional surface

- Hangars 1 and 2 located on Ramp B penetrate the transitional surface by approximately 35 and 32 feet, respectively, but are shielded by the toe of Mount Ballyhoo which is a more significant obstruction to the transitional surface
- Airport ARFF/Administrative buildings penetrate the transitional surface by approximately 27 feet at its tallest point but are shielded by the toe of Mount Ballyhoo
- An abandoned hangar situated inside a revetment at the base of Mount Ballyhoo penetrates the transitional surface by approximately 39 feet
- Airport Staff housing structures penetrate the transitional surface by approximately 11 feet at the highest point and are shielded by the toe of Mount Ballyhoo
- PenAir cargo building in front of the Torpedo building penetrates the transitional surface by approximately three feet (and is in the OFA)
- Firehouse building across Airport Beach Road penetrates the transitional surface by approximately three feet
- Miscellaneous warehouse south of the Firehouse penetrates the transitional surface by approximately eight feet
- Hill southeast of the Runway 30 threshold has a peak of 120 feet AGL and penetrates the transitional surface by approximately 40 feet; Housing Units 1 and 2 located on the hill penetrate the transitional surface by approximately 62 and 52 feet, respectively
- Power plant stacks located southeast of the Runway 30 threshold penetrates the transitional surface by approximately 84 feet

Obstructions to the Horizontal and Conical Surface

Two obstructions to the Horizontal and Conical surfaces exist including:

- Hog Island to the west is an obstruction to the Horizontal and Conical surfaces for Runway 30
- There are various other peaks on Amaknak and Unalaska Islands that penetrate the Horizontal and Conical surfaces.

Obstructions That are Not Feasible to Improve

There are numerous FAR Part 77 obstructions in and around Unalaska Airport that cannot feasibly be improved or relocated. Additionally, due to the steep terrain, there are numerous objects around the airport (including many outside the RSA and/or OFA) that are shadowed by larger Part 77 ground obstructions such as Mount Ballyhoo and the large hill to the southeast of the Runway 30 threshold. The following chapter, Airfield Alternatives, will evaluate and recommend where improvements can be made in the near-term planning phase (beyond RSA and OFA improvements mentioned in earlier sections) with priority being given to the FAR Part 77 Primary and Approach surfaces. For the remainder of the planning period, removal of the objects that penetrate these surfaces should be evaluated. However, it is unlikely that Unalaska Airport will ever achieve Part 77 surface areas that are completely clear of obstructions due to steep terrain in vicinity of the airport.

3.6 Navigational Aids (NAVAIDS)

NAVAIDs are aids to navigation, defined as any visual or electronic device, airborne or on the surface, which provides point-to-point guidance information or position data to aircraft in flight. This definition includes instrument approach components such as non-directional radio beacon (NDB), distance measuring equipment (DME), and satellite navigation systems (GPS), as well as airfield lighting and striping.

The purpose of an instrument approach is to enhance airport access by allowing inbound aircraft to land in weather conditions that are below visual flight rule conditions.[13] An airport is equipped with either precision or non-precision approach capability based on airport operational needs, weather conditions, and airport environs, such as terrain. If the airport is not supported by instrument approach guidance, pilots use visual guidance to land during acceptable weather conditions.

Unalaska Airport offers two published instrument approach procedures to be used by the general public, and four unpublished so-called "special" procedures developed for use only by air carriers and pilots authorized by the FAA to fly the procedure (Appendix D). All six instrument approach procedures are authorized for daytime use only. The FAA Anchorage Flight Procedures Office (FPO) has determined that even with the application of new and emerging approach technologies, a precision approach is not feasible at the Unalaska Airport due to terrain, nor can the weather minimums of the existing approaches be improved in the foreseeable future. (Appendix D)

However, new navigational technologies that may be beneficial to Unalaska Airport are continuously being developed, including enhancements to instrument approach procedures using Global Positioning System (GPS). These enhancements include Wide Area Augmentation Systems (WAAS) and Local Area Augmentation Systems (LAAS), which use a network of precisely surveyed ground reference stations strategically positioned across the country, including Alaska, to collect GPS satellite data. Both WAAS and LAAS are designed to provide enhanced navigation signals for GPS approach capability with levels of accuracy nearly equal to that of a precision Instrument Landing System (ILS), which is beneficial to airports that often experience low visibility conditions. Since August 2006, WAAS capability has been expanded throughout most of Alaska, with new stations placed in Bethel, Barrow, Fairbanks, and Kotzebue, and is expected to have statewide coverage over the planning period. This emerging technology is particularly beneficial to communities, such as Unalaska, where air transportation is the only practical mode of transportation. Other new approach technologies, such as Required Navigational Performance (RNP), provide onboard satellite guidance that allows aircraft to perform approach and departure procedures around inclement weather and natural or manmade obstacles. RNP was developed by Alaska Airlines and has been in use at Juneau International Airport since February of 1996. These and other new technological developments are of particular importance to airports that are limited to non-precision approach capability due to terrain and other obstacle issues, such as Unalaska Airport, and will be evaluated for feasibility in the following chapter, Airfield Alternatives.

[13] For practical purposes, the VFR standards for DUT are: The pilot must have 3 miles visibility and remain 500 feet below, 1,000 feet above, and 2,000 feet horizontally from all clouds.

With regard to airfield lighting, the airport is equipped with medium intensity runway lighting (MIRL), runway end identifier lights (REIL), visual approach slope indicators (VASI), and a rotating beacon. Additionally, the runway is striped for non-precision instrument approach capability. At this time, the airport is adequately supported by NAVAIDS, and thus requires no improvements over the 2026 planning period.

Table 3-3 below depicts the known discrepancies between published and surveyed actual runway length, threshold, and declared distances information.

TABLE 3-3
Unalaska Airport Surveyed Actual Runway Information
Runway 12/30

	Runway Length (ft) Published 12/30	Runway Thresholds (ft) Published 12/30
Surveyed Actual	4,110	185/110
1987 ALP*		
- Takeoff	4,100	
- Landing	3,800	200/100
Approach Procedures**		
- Takeoff	3,900	
- Landing	3,800	Not Specified
Airport 5010		
- Takeoff	3,900	
- Landing	Not Specified	100/100
AirNav.com		
- Takeoff	3,900	
- Landing	Not specified	100/100

* 1987 Unalaska Airport ALP Revised in 2005
** Public NDB-A and GPS-E approach procedures

3.7 Airfield Security

Airports certified under FAR Part 139, *Airport Certification*, are required to have an airport security program, which is governed by Transportation Safety Administration (TSA) CFR 1542, *Airport Security*. TSA 1542 establishes the requirement for perimeter fencing for the purpose of protecting against unauthorized entry into the airfield operations area (AOA). Perimeter fencing is in place to control entry into the AOA at Unalaska Airport. However, a section of 4-foot-tall frangible plastic posts that exist in the Runway 30 RSA are not adequate per FAR Part 139/TSA 1542 standards. The preferred alternative must include full perimeter fencing to bring Unalaska Airport into compliance with FAA/TSA regulations.

3.8 Landside Facility Requirements

This section identifies the landside facilities required to adequately accommodate future aviation demand at Unalaska Airport and outlines these needs over time. These required facilities are evaluated in the Airfield Alternatives chapter and include the passenger terminal, air cargo, airport access, and airport parking, and are illustrated in **Exhibit 3-10**.

3.8.1 Passenger Terminal

General requirements for the airport passenger terminal were derived from the forecast growth in peak hour passenger demand and reviews of PenAir flight schedules, interviews with airport and airline management, and field observations. Future facility requirements are projected in the following sections and summarized in Table 3-4.

Baggage Claim Area

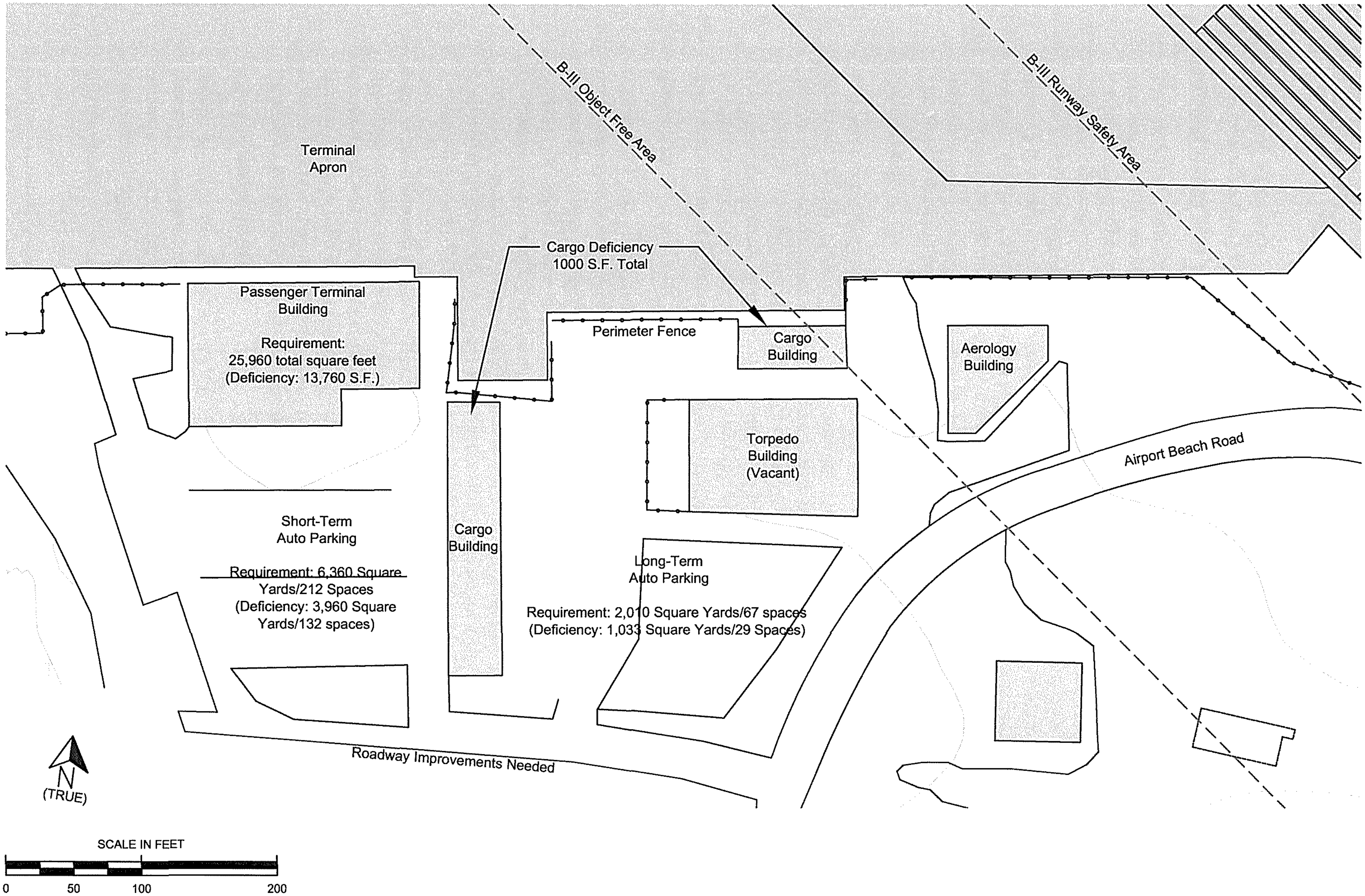
The existing baggage claim area at Unalaska Airport measures approximately 900 square feet and is inefficient due to lack of frontage and undersized to meet current passenger baggage demand. An additional approximately 900 square feet is needed to make up the current deficiency in the existing layout of linear frontage available for baggage pick-up according to discussions with airport management and field observations. Based on the forecast of enplaned passengers through 2026 and accounting for the increased size of aircraft using the airport starting in 2016, it is estimated that 2,700 square feet of baggage claim facilities will be needed to meet projected demand through the 2026 planning period.

Passenger Hold Area

Two passenger hold rooms exist in the terminal building which together encompass approximately 1, 100 square feet of total space and contain approximately 94 seats. There are 16 additional seats placed in various locations throughout the terminal. Passengers traveling through Unalaska Airport frequently travel with oversized baggage, thereby reducing the overall space available for passenger seating in the hold areas. As such, these hold areas are insufficient to accommodate well-wishers, oversized baggage, and additional passengers who are in the terminal for bush flights or as a result of delayed or cancelled flights. Due to the projected growth in passenger demand and increased size of passenger aircraft using the terminal starting in 2016, it is estimated that approximately 4,000 square feet will be required to accommodate passenger demand through the 2026 planning period. This additional square footage will accommodate 180 people, or enough to fill three Q400 aircraft during peak hour demand at Unalaska Airport.

Ticketing Area and Lobby

The ticketing and lobby area at Unalaska Airport is approximately 4,250 square feet including the recently converted former weather observation area, which created an additional 800 square feet of lobby space and an additional 23 seats for overflow seating upon completion. The current space available for the terminal lobby and airline ticketing is sufficient to meet existing passenger demand. However, the passenger queue area for ticketing results in frequent congestion due to bad layout of the terminal. Beginning in 2016, the addition of the Q400 to the Unalaska market will require a total of approximately 6,000 square feet of ticketing queue and lobby space to accommodate additional passengers and greeters/well-wishers through the 2026 planning period.



CH2MHILL

Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Landside Requirements

Exhibit 3-10

Source: AC 150/5300-13, "Airport Design," Change 10; CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2005 to reflect declared distances); Photogrammetric Data (January 2007)

July 2007

Airline Space

The existing airline space at Unalaska Airport is approximately 2,500 square feet and consists of airline ticketing, administrative offices, and baggage make-up areas. This existing space is more than double the amount of area required to meet current passenger demand levels. As such, no additional airline space is required through the 2026 planning period.

TSA Passenger Screening

Passenger screening requires significant additional space and, as such, is a major factor to consider when evaluating passenger terminal space requirements. At this time, Unalaska Airport is only required to randomly screen a sample of passengers at the boarding gate under an agreement with the Transportation Security Administration (TSA). Currently, there are no passenger screening checkpoints, associated passenger queuing areas, or TSA personnel stationed at the Airport.

Passenger screening requirements are more stringent for passengers who travel on aircraft with a seating capacity of 60 or more passengers, such as the Q400, under TSA 1542, *Civil Aviation Security* regulations. Beginning in 2016, Unalaska Airport's terminal will therefore require approximately 2,500 square feet of additional space for passenger screening facilities based on a requirement of nine square feet per screened passenger and projected peak hour passenger demand of 180 passengers (three full Q400s). This additional space is required to accommodate passenger queuing, passenger and baggage screening equipment, hold rooms, and breakroom facilities for TSA personnel.

Restrooms

The existing restroom area at Unalaska Airport totals approximately 450 square feet. These facilities are the only restrooms in the airport terminal building, are regularly overcrowded, and do not currently meet passenger demand levels. The existing deficit is approximately 900 square feet, and as peak hour passenger demand increases in 2016, it is estimated that a total of 1,575 square feet will be required to meet passenger demand through the 2026 planning period. This will also accommodate the addition of a separate employee restroom of approximately 225 square feet.

Concessions

The largest existing concession space in the Unalaska Airport terminal building consists of a restaurant and bar (Airport Restaurant) occupying approximately 2,150 square feet. This facility is currently undersized by approximately 375 square feet, which represents a baseline need of 2,525 square feet to adequately serve current passenger demand levels. Beyond this requirement, it is anticipated that an additional 1,000 square feet of concession space to will be added to ensure the flexibility of available revenue-generating lease space, and to accommodate one additional peak hour flight of 60 passengers due to the addition of the larger Q400 aircraft in 2016. As such, it is estimated that approximately 3, 525 square feet of concession space will be required to accommodate passenger demand levels through the 2026 planning period.

Miscellaneous Lease Areas

The existing miscellaneous lease areas inside the airport terminal building are currently occupied by two car rental and two travel agencies and total approximately 850 square feet.

This existing area meets current demand requirements for leased space, but it is assumed that the City will look for opportunities to the increase the total amount of lease space available within the terminal over the planning period(In the past the Airport had a gift shop). Based on the projected levels of passenger demand, it is estimated that miscellaneous lease space demand will double to 1,700 square feet.

Other Areas

Other areas of the airport terminal building include entrance vestibules, HVAC, weather station, and internal support infrastructure. These facilities encompass an area of approximately 800 square feet and are expected to increase to 1,500 square feet to correspond with the expansion of the terminal building. This will ensure the flexibility to respond to operational changes throughout the 2026 planning period. The terminal building also comprises a lower level that is currently used for storage and is adequate for such purposes over the planning horizon.

3.8.2 Summary

TABLE 3-4
Terminal Facility Requirements

Area of Consideration	Capacity Existing (sq. ft.)	Existing Surplus/Deficit: 2006 Demand (sq. ft.)	Existing Surplus/Deficit: Surplus/ (Deficit) (sq. ft.)	Demand: 2026 Demand (sq. ft.)
Baggage Claim Area	900	1,800	(900)	2,700
Passenger Hold Area	1,100	1,320	(220)	4,000
Ticketing and Lobby	4,250	4,250	0	6,000
Airline Space	2,500	1,250	1,250	2,500
Restrooms	450	1,350	(900)	1,575
Concessions	2,150	2,525	(375)	3,525
Passenger/Baggage Screening	0	0	0	2,500
Miscellaneous Lease Areas	850	850	0	1,700
Other Areas	800	800	0	1,500
Total	**13,000**	14,145	(1,145)	**26,000**

Sources: Existing Airport Terminal Plans (USKH Inc. April 2005), site visits, TSA interviews, FAA AC 150/5360-13, Planning and Design Guidelines for Airport Terminal Facilities

3.9 Air Cargo

The Alaska DOT&PF owns two air cargo buildings at Unalaska Airport. Building 429 is located adjacent to the passenger terminal to the east and is approximately 8,000 square feet in area. ACE Air Cargo occupies approximately 4,000 square feet for air cargo processing and storage. The building also houses a shipping company and a car rental business. The other cargo facility, Building 421, is located further east of the passenger terminal and north of the Torpedo building. This cargo facility is approximately 1,925 square feet in area and is leased by PenAir. Much of the air cargo shipped from Unalaska Airport is time sensitive and requires a high level of quality control, such as direct-to-market fresh seafood. As such, highly perishable outbound freight is loaded from refrigerated trucks directly onto the aircraft by shippers and often does not require use of the Airport's cargo facilities. In addition, inbound air freight largely consists of mail and must be delivered to the Postmaster within 45 minutes of the airplane's arrival; therefore, mail is usually deplaned directly onto trucks and also bypasses the cargo buildings. Non-perishable air freight is stored in either of the cargo facilities in the event of aircraft delays.

It is typical that one square foot of cargo warehouse space is required to accommodate one annual ton of cargo, and this ratio holds true for Unalaska Airport. Using this ratio and projected air cargo tonnages through 2026, Unalaska Airport will require 4,400 square feet of air cargo space, resulting in no additional need for additional cargo facilities over the planning period. If the building allocations remain as-is, then PenAir is expected to utilize approximately 50 percent of its total air cargo space, while ACE is expected to utilize up to 90 percent of its available space over the planning horizon. However, building age and condition may warrant replacement through 2026. To provide for additional flexibility in the volatile air cargo market, an additional 1,000 square feet of air cargo facilities may be needed to accommodate cargo carriers or other tenants over the planning period.

Table 3-5 below provides a summary of air cargo facility requirements through 2026.

TABLE 3-5
Air Cargo Facility Requirements

Year	Total Freight (lbs.)	Demand1 (sq. ft.)	Capacity (sq. ft.)	Surplus/ (Deficit)	Utilization
2006	5,504,181	2,753	5,920	3,167	47%
2011	6,324,100	3,163	5,920	2,757	53%
2016	7,054,000	3,527	5,920	2,393	60%
2021	7,875,000	3,938	5,920	1,982	67%
2026	8,801,000	4,401	5,920	1,519	74%

1. Future air cargo facility requirement is based on a ratio of one square foot of building space required per annual ton of cargo.

Air cargo aircraft apron requirements are discussed in conjunction with the terminal apron requirements in a previous section of this chapter.

3.10 Airport Access and Parking

General capacity requirements for the airport access road and parking lots were derived from reviews of PenAir flight schedules, interviews with airport and airline management, and field observations. Future facility requirements are based on applying usage ratios to the estimated growth in peak hour passenger demand and are projected in the following subcategories:

3.10.1 Access Road

Access to Unalaska Airport is via Airport Beach Road to the south and from Dutch Harbor via Mount Ballyhoo Road from the northeast. These two-lane roads also provide access to the short- and long-term parking facilities. Interviews with airport management and field observations confirm that the road pavement is in very poor condition (sub-grade failure) and in need of reconstruction. The road is congested during the increased passenger flows surrounding the four peak fishing seasons. Arriving and departing passengers park their vehicles on the access road when loading and unloading, which restricts circulation. Both Airport Beach Road and Mount Ballyhoo Road are scheduled for rehabilitation by DOT&PF.

Short-Term Parking

The existing short-term parking lot measures approximately 2,400 square yards and totals 80 parking spaces. This facility is estimated to currently be undersized by approximately 50 percent, or requiring an additional 40 spaces based on current passenger demand. In 2006, there were 29,830 passenger enplanements at Unalaska Airport. This translates to a ratio of one parking space per 250 enplanements to meet existing need. Using this constant ratio over the planning period, 6,360 square yards, or 212 parking spaces, are required to meet passenger parking demand through the 2026 planning period.

Table 3-6 summarizes short-term parking requirements for Unalaska Airport through 2026:

TABLE 3-6
Short-Term Public Parking Requirements

	Short-Term Public Parking (spaces)				
Year	Annual Enplanements	Demand[1]	Capacity	Surplus/ (Deficit)	Sq. Yards
2006	29,830	120	80	(40)	2,406
2011	32,566	131	80	(51)	3,930
2016	38,198	153	80	(73)	4,590
2021	45,085	181	80	(101)	5,430
2026	52,959	212	80	(132)	6,360

1. Future short-term parking demand is based on a ratio of one parking space per 250 enplanements

Long-Term Parking

The existing long-term parking lot measures approximately 977 square yards and contains approximately 25 parking spaces. This facility is estimated to currently be undersized by approximately 50 percent, or requiring an additional 13 spaces. In 2006, there were 29,830 passenger enplanements at Unalaska Airport. This translates to a ratio of one parking space per 800 enplanements to meet existing need. Using this constant ratio over the planning period, 2,010 square yards, or 67 parking spaces, are required to meet passenger parking demand through the 2026 planning period.

Table 3-7 summarizes long term parking requirements for Unalaska Airport through 2026:

TABLE 3-7
Long-Term Public Parking Requirements

	Long-Term Public Parking (spaces)				
Year	**Annual Enplanements**	**Demand[1]**	**Capacity**	**Surplus/ (Deficit)**	**Sq. Yards**
2006	29,830	38	25	(13)	977
2011	32,566	41	25	(16)	1,230
2016	38,198	48	25	(23)	1,440
2021	45,085	57	25	(32)	1,710
2026	52,959	67	25	(42)	2,010

1. Future long-term parking demand is based on a ratio of one parking space per 800 enplanements.

Additionally, automobile parking setback is expected to be required as PenAir changes its fleet from the Saab 340 to the Q400 in 2016 for Unalaska Airport.

3.11 Support Facilities

Airport support facilities play a vital role in the operations and maintenance of Unalaska Airport. General capacity requirements for the support facilities were derived from interviews with airport officials, airline management, and through field observations.

3.11.1 Airport Rescue and Firefighting (ARFF)

Requirements for aircraft rescue and firefighting (ARFF) services at an airport are established under Federal Aviation Regulations (FAR) Part 139, under which Unalaska Airport is certificated. Paragraph 139.315 establishes ARFF index ratings based on the length of the largest aircraft with an average of five or more daily departures.

The previous design aircraft for Unalaska Airport was the Boeing 737-200, which required ARFF Index B rescue and firefighting capability. Currently, the Saab 340B is used as the basis for ARFF index determination at Unalaska Airport. The Saab 340B also falls within the parameters of ARFF Index B (More than 90′ but less than 126′) and requires that the airport provide at least one vehicle carrying a minimum 500 pounds of a sodium-based dry chemical, Halon 1211, or clean agent and 1,500 gallons of water for foam production. Unalaska Airport continues to maintain the fire extinguishing and rescue capabilities required for ARFF Index B. The Bombardier Q400, which will be phased into air passenger service beginning in 2016, also falls within the parameters of ARFF Index B and will not require any additional ARFF capabilities at Unalaska Airport.

The ARFF facility measures approximately 7,900 square feet and is adequate to serve the aircraft rescue and firefighting needs of Unalaska Airport through the planning horizon.

3.11.2 Airport Administrative Buildings

Airport administrative buildings are situated within the ARFF building north of the Runway 30 threshold at the base of Mount Ballyhoo. The portion of this structure dedicated to administrative offices provides adequate space through the 2026 planning period.

3.11.3 Airport Maintenance and Storage

Airport maintenance equipment and storage facilities are co-located with the ARFF function north of the Runway 30 threshold at the base of Mount Ballyhoo. The portion of this structure dedicated to maintenance equipment storage provides adequate storage capability through the 2026 planning period. However, airport improvements may necessitate facility and equipment modifications and additions such as a drive-through vehicle service bay and chemical storage facility over the planning period.

3.11.4 Maintenance Equipment

Unalaska Airport maintains and operates a variety of airfield equipment including a grader, loader, tow-behind broom, dump truck, deicer truck, and several snow plows in order to perform a full-range of runway and taxiway maintenance duties. Airport maintenance equipment is sufficient through the 2026 planning horizon based on the current airport configuration.

3.11.5 Fuel Storage

Jet A and Avgas fuel storage facilities are currently maintained off airport property. As such, aircraft fueling takes place from fuel-tanker trucks owned and operated by Delta Western, Inc. All fuel is transported by tanker trucks to the airport as needed. Interviews with airport and airline management have determined that current fueling facilities and operations are sufficient to meet demand through the 2026 planning horizon.

3.11.6 Water Rescue Facilities

To support water rescue operations in the event of a disabled aircraft, a minimum of two water rescue boat ramps are needed to facilitate quick response times. Ideal locations include locating one ramp west of the runway in Unalaska Bay and another ramp southeast of the runway in Dutch Harbor. Additional boat storage facilities are needed as well. Water rescue facilities will be addressed later in the Airfield Alternatives chapter of this study.

3.11.7 Aircraft Hangar Facilities

Two large aircraft hangars are located on the north side of the runway adjacent to Ramp B. The newer hangar to the west has an approximate area of 12,200 square feet. The older hangar to the east measures approximately 16,700 square feet. Discussions with airport management indicate that the aircraft hangar facilities are adequate to meet the airport's current and future needs. In addition, the Forecast does not project growth in based aircraft or general aviation activity. Therefore, no additional aircraft hangar facilities will be required during the planning period.

Chapter 4 Alternatives Analysis

CHAPTER 4

4. Alternatives Analysis

4.1 Overview and Summary

4.1.1 Overview

This chapter identifies and evaluates feasible airport development options that will allow the Unalaska Airport to accommodate projected aviation demand through 2026. Airside and landside needs and deficiencies were determined in the previous chapter, *Demand Capacity and Required Facilities*, based on the findings of the *Projected Aviation Demand* forecast chapter, approved by the FAA on April 9, 2007.

This chapter evaluates development options for airfield improvements including runway relocation or extension, terminal and apron expansion, obstruction removal, airport access improvements, and full standard RSA construction feasibility.

4.1.2 Summary of Alternatives

This Alternatives Analysis considers planning alternatives that will address the needs of Unalaska Airport through 2026, as identified in the previous chapter, *Demand/Capacity and Required Facilities.*

The following airport components were evaluated based on the amount of land required to accommodate them in order of priority. Therefore, the airfield was considered first, then the roadway alternatives, then finally the passenger terminal area. The key findings of the alternatives analysis include:

Airfield

- After considering a full range of options, four airfield alternatives using displaced thresholds along the existing runway centerline were found to be feasible and carried forward into analysis for further evaluation.
- Of the declared distance alternatives, Airfield Alternative 3, which maximizes the use of the existing runway configuration and makes no existing condition worse, is the recommended alternative for meeting the airfield needs at Unalaska Airport.
- Because the RSA portion of construction costs would exceed the maximum allowable $25 million financial feasibility threshold for Unalaska Airport, the RSA was refined to meet this threshold. This analysis found that the highest degree of safety would be provided by narrowing the ends of the RSA.

Roadway Alternative

- Airport Beach Road must be closed near the fire station. Existing East Point Road will provide access to Mt. Ballyhoo Road for routine traffic.
- Mount Ballyhoo Realignment around Runway 30 is the recommended alternative for maintaining access to the port area.

Passenger Terminal Area

- The passenger terminal area needs cannot be accommodated within the existing property and requires either the used of adjacent land or expansion into Unalaska Bay.
- Terminal Area Alternative 3 meets the apron and landside needs efficiently and provides the most opportunity for revenue-generating lease lot development. As such, this alternative is the recommended alternative for meeting the terminal area needs at the Airport.

Alternative Phasing

In order to meet the near- and long-term needs of the Airport, the preferred alternative should be implemented in two phases:

Phase I - Projects Complete by 2016:

- Runway extension and RSA enhancement to achieve a 4,200-foot departure length runway and an RSA enhancement that meets the $25 million RSA limit (Refined Preferred Alternative 3).
- Reorientation and build-out of the terminal area including the terminal and cargo buildings, apron area, parking and access.
- Closure of Airport Beach Road near the fire station and realignment of Mount Ballyhoo Road around Runway 30 (maintaining fire and rescue access to the airfield area by way of a crash gate in the fence).

Phase II - Projects Complete by 2026:

OFA will be cleared of violations including further realignment of Mount Ballyhoo Road around Runway 30, removal of earth and rock material from the toe of Mount Ballyhoo and Utility Hill, and relocation of the airport facilities located on either side of the airfield.

4.1.3 Recap of Key Airport Deficiencies and Needs

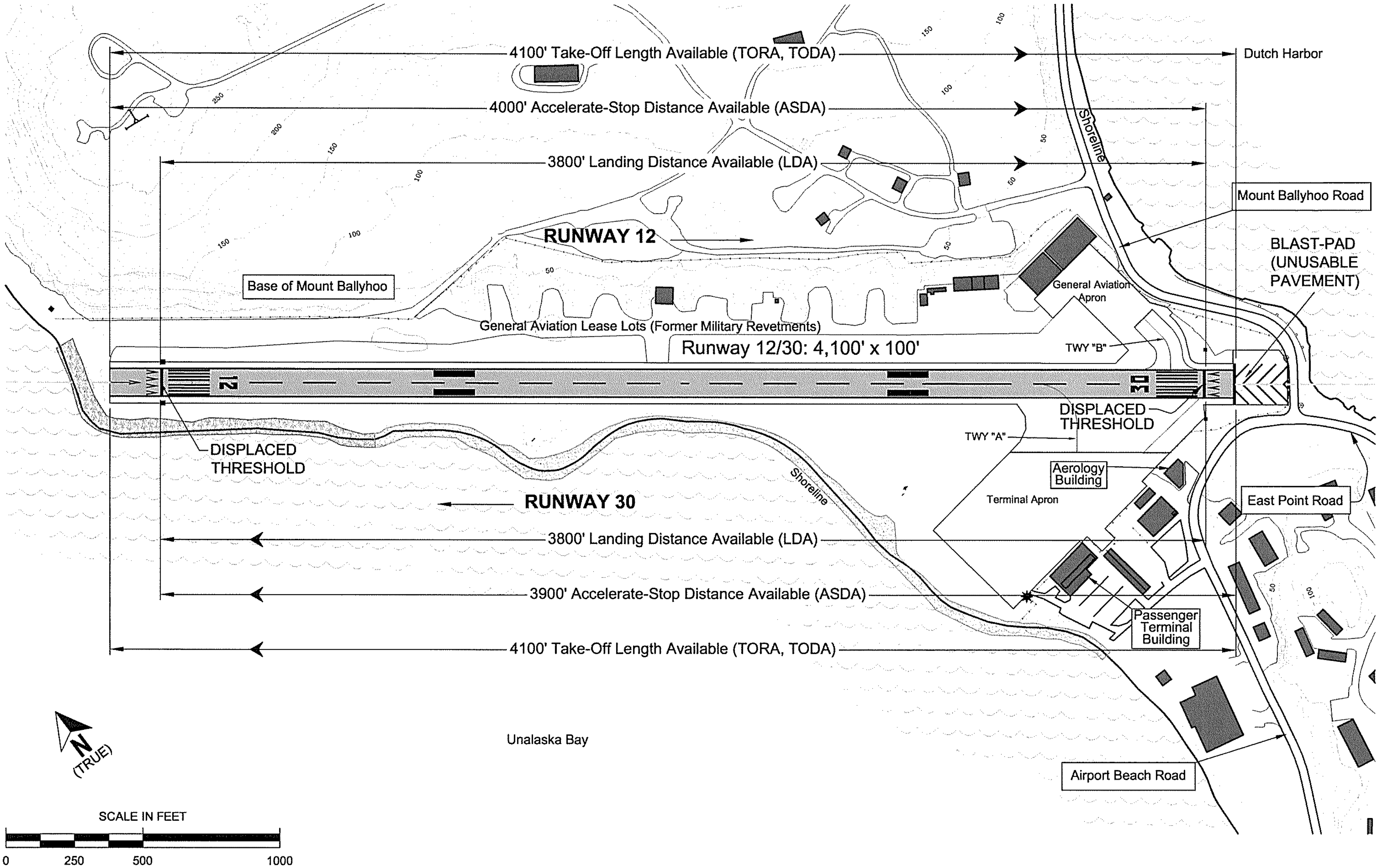
The following facility needs and deficiencies, identified and fully described in the previous chapter, are accommodated in the alternatives analysis:

4.1.4 Airfield Facilities

Runway Length—The Bombardier Q400 will replace the Saab 340B beginning in 2016 and will become the critical aircraft for runway length purposes. The Q400 requires 4,200 feet for takeoff and 3,700 feet for landing at a 95 percent load factor. Runway 12/30, currently measures 4,100 feet long and is 100 feet short of meeting the take-off length requirement.

FAA Design Standards - Airport design standards are driven by the most demanding aircraft projected to regularly operate at Unalaska Airport. Whereas the current standards are ARC B-II because of the Saab 340B, by 2016 standards will change to B-III due to the introduction of the Q400 aircraft. These standards are as follows:

- **Runway Safety Area (RSA)** —The RSA must be upgraded to 300 feet in width and must extend 600 feet beyond the runway ends to satisfy FAA ARC B-III design standards. The RSA is the FAA's most stringent planning standard and must be kept clear of objects and able to support an aircraft.



CH2MHILL

Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-2006 AKAS Project No.: 53091

Existing Runway Dimensions

Exhibit 4-1

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008

4.2 Range of Alternatives Considered

4.2.1 Alternatives Eliminated from Consideration

Several development concepts were considered to create a full range of planning scenarios prior to the alternatives development process. These concepts, as well as their reasons for consideration or elimination, are summarized in this section.

Close Airport

This alternative considers closing the Unalaska Airport. Because personal travel and the transport of cargo and supplies to and from this island community is limited to air and maritime transportation and is vital to the local economy, this concept was eliminated from further consideration.

Use of Other Airports as a Connecting Hub

This concept consists of using other airports, such as Cold Bay, as an airline hub airport with connecting service to Unalaska Airport and other airports in the Aleutian and Pribilof Islands. The use of Cold Bay as a hub has been suggested because of the excellent runway and instrument approach facilities as well as the open and relatively flat terrain surrounding the airport. The runway is 10,414 feet long, 150 feet wide, and is supported by 10 instrument approaches, including a precision instrument approach with low weather minimums.

The potential benefit of this alternative lies in the assumed change in airline operations: large and fast aircraft (assumed to be jets) would be used to transport passengers and cargo from Anchorage to Cold Bay and from there, smaller turboprop aircraft, such as the Saab 340B would connect passengers throughout the Aleutian Islands to such airports as Unalaska (the largest City and airline market in the Aleutians), Sand Point, St. George, Akutan, and Adak. This airline connecting hub concept is common in the industry and in certain circumstances allows efficient use of aircraft while providing passengers with maximum destination flight opportunities. Additionally, the use of the faster jet aircraft between Anchorage and Cold Bay would reduce time and increase passenger comfort of that flight.

This alternative could physically be made to work but is probably not commercially viable because Cold Bay has virtually no local base of demand, which is an important component of airline hubs. The airport's location and facilities make it a logical alternate airport or stop over point, but it is already used as such by PenAir. From a passenger convenience standpoint, the requirement for passengers to connect from multiple flights onto the flight to Anchorage would in many cases consume more time than the speed of the jet aircraft would save, resulting in a longer overall passenger trip. Although this concept would provide jet service for part of the flight, the Unalaska passengers would still fly a turboprop aircraft between Cold Bay and Unalaska Airport.

Even if this alternative were to be implemented by an airline, it would not do away with or materially change the aviation needs at Unalaska Airport. Unalaska Airport would still accommodate turboprop aircraft, such as the Bombardier Q400, and would therefore still be required to meet ARC B-III standards. The use of other airports as a connecting hub concept is therefore eliminated from further consideration.

Relocate Unalaska Airport

The option of relocating the airport to an area on Amaknak or Unalaska Island with fewer site constraints has been considered previously and was most recently analyzed in DOT&PF's *Technical Memorandum #2, December 2003,* as well as the *Unalaska Air Transportation Study* completed by HDR Alaska, Inc. in April 2006. Both the Memorandum and the Study analyzed several alternate sites and found that none was feasible or better than the existing site because of terrain, and access issues. As a part of this Master Plan Update, a review confirmed the previous studies' conclusions; therefore, this concept is eliminated from further consideration.

Reorient Existing Runway 12/30

The option of reorienting Runway 12/30 or adding a runway has been considered previously and was most recently analyzed in DOT&PF's *Technical Memorandum #2, December 2003,* as well as the *Unalaska Air Transportation Study* performed by HDR Alaska, Inc. in April 2006. This concept was found to be cost prohibitive ($239 million in 2003 dollars) due to the extensive Mount Ballyhoo terrain removal and building relocation that would be required. This concept was therefore eliminated from further consideration.

4.2.2 Summary

These alternative concepts were considered as part of the full range of airfield alternative concepts and ultimately were eliminated from further consideration due to overall infeasibility, including high costs, surrounding terrain constraints, and a general lack of developable land. As such, the remaining alternative concepts consist of shifting or extending the existing Runway 12/30 along its existing centerline.

4.2.3 Airfield Alternatives Along the Existing Runway 12/30 Centerline

Due to the surrounding terrain constraints and overall lack of developable land, the remaining development options consist of shifting or extending the existing Runway 12/30 along its existing alignment.

Full Standard Runway Safety Areas

This alternative would provide a full runway length of 4,200 feet for both takeoff and landing. Additionally, this concept incorporates full Runway Safety Areas which, for ARC B-III standards, are 300 feet wide and extend 600 feet beyond each runway end. This unconstrained configuration results in a total runway and RSA envelope of 5,400 feet. A runway length analysis performed in the previous chapter, *Demand Capacity and Required Facilities,* determined that the Bombardier Q400 requires 4,200 feet for takeoff and 3,700 feet for landing. Construction costs and funding limits are particularly important at Unalaska Airport where the extremely constrained setting quickly escalates costs to the point of being cost prohibitive. As such, the extensive rock fill and armoring into Dutch Harbor and Unalaska Bay that would be required to implement a 5,400 foot runway and RSA envelope would be too costly and therefore, eliminated from further consideration.

Standard Dimension Engineered Materials Arresting System (EMAS)

EMAS uses materials of defined strength and density placed at the end of a runway to stop or greatly slow an aircraft that overruns the runway. The EMAS technology provides safety benefits in cases where land is not available, where it would be very expensive for the airport sponsor to buy the land off the end of the runway, or where it is otherwise not possible to have FAA-mandated full standard Runway Safety Areas.

FAA Order 5200.9 states that a standard EMAS installation provides a level of safety that is generally equivalent to a full RSA constructed to the standards of FAA AC 150/5300-13, Change 11, *Airport Design.* Therefore, a standard EMAS installation must be considered and is required to meet the following conditions:

- The EMAS is constructed in accordance with AC 150/5220-22, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns.*
- The EMAS bed must be sufficient in length to be capable of safely stopping the design aircraft leaving the runway traveling at 70 knots.
- The resulting RSA must provide adequate protection for aircraft that touch-down prior to the runway threshold (undershoot) through vertical guidance, full RSA standard lengths, or displaced thresholds for landings.

The advantage of EMAS is most evident on airfields for which it was developed; those with a fleet mix that require RSA standards of 1,000 feet beyond the runway end. In these situations, a standard EMAS RSA length of 600 feet can potentially save up to 800 feet (400 on each runway end) of required total RSA length and still provide adequate protection for overshoots and undershoots, based on RSA standards provided by FAA AC 150/5300-13, *Airport Design,* Change 11.

The 600-foot standard EMAS RSA equals the length of the standard RSA for ARC B-III runways, resulting in a total runway and RSA envelope of 5,400 feet without displaced thresholds (4,200′ runway + 600′ + 600′ RSA). [EMAS refinements specific to Unalaska Airport are discussed in subsequent sections] Therefore this option offers no additional economic or safety benefit for Unalaska Airport, and is not considered further.

Declared Distances

Declared distances are intended for constrained airports where it is impracticable to provide Runway Safety Areas in accordance with FAA Advisory Circular 150/5300-13, *Airport Design,* Change 11. Generally, when ample land is available, airfield requirements are accommodated by providing the required runway takeoff length with full RSAs beyond each runway end, thus occupying a large area.

The four components of declared distances include:

- **Takeoff Run Available (TORA)** – The distance to accelerate from brake release to lift-off, generally restricted by the total pavement useable for takeoff.
- **Takeoff Distance Available (TODA)** – The distance to accelerate from break release past lift-off to start of takeoff climb, generally restricted by the total pavement useable for takeoff.
- **Accelerate Stop Distance Available (ASDA)** – The distance to accelerate from brake release to V_1 and then decelerate to a stop.

- **Landing Distance Available (LDA)** – The distance from the threshold to complete the approach, touchdown, and decelerate to a stop.

Because of the constrained nature of the Airport environs, and the high cost of expansion into Unalaska Bay and Dutch Harbor, the physical airfield environment required to accommodate the runway extension and full RSA at Unalaska Airport could be minimized through the use of declared distances. This design/operating method allows the Airport's existing ARC B-II (and future ARC B-III) standards to be met through select "substitution" of runway pavement for RSA, while allowing aircraft operational needs and RSA requirements to be met in minimal space. As determined in the previous chapter, *Demand Capacity and Required Facilities,* the Bombardier Q400 requires 4,200 feet for takeoff and 3,700 feet for landing. Using declared distances, a 250-foot displaced threshold is provided at each runway end in order to accommodate the required RSAs for arriving and departing aircraft in the smallest runway envelope possible. Additionally, the use of declared distances allows the 250 feet of runway between the displaced threshold and the runway end to be used as runway for takeoff and during landings or operations in the other direction, and counts as part of the ARC B-III RSA, which extends 600 feet beyond the displaced threshold. As such, full ARC B-III RSAs can be achieved with only 350 feet needed beyond the runway pavement while still meeting the takeoff and landing operational requirements of the Q400. This configuration reduces the overall runway and RSA envelope to 4,900 feet (4,200′+ 350′+ 350′).

The declared distance planning concept is the most viable of the considered options due to the ability to create full standard RSAs while meeting the operational requirements of the Q400 aircraft in the smallest runway envelope possible. Therefore, declared distances are considered in each of the following airfield alternative concepts. Additionally, roadway access and improvement options are directly associated with airfield improvement alternatives and are discussed separately in subsequent sections.

4.3 Airfield Alternative Concepts

4.3.1 Methodology

Four airfield concepts were developed to accommodate the critical aircraft (Bombardier Q400) and FAA-required full standard Runway Safety Areas. This analysis evaluates airfield alternatives using the RSA solution that creates the smallest runway envelope with declared distances. By declaring a portion of the runway as RSA, this planning approach meets ARC B-III RSA requirements while minimizing the amount of physical space needed to extend the RSA beyond the runway ends, as described in the previous section. Each airfield alternative concept equally fulfills the operational requirements of the Bombardier Q400 aircraft.

4.3.2 Alternative 1: Northwest Extension- Runway 30 End Shift

The design concept for Alternative 1, presented in **Exhibit 4-2,** was achieved by shifting Runway 30 and its associated RSA/OFA northwest, and extending the approach end of Runway 12 into Unalaska Bay. This alternative provides 4,200 feet of takeoff and 3,700 feet of landing length in both directions using declared distances. Alternative 1 involves the least amount of rock fill and armoring in Dutch Harbor, but a includes the highest amount of rock fill and armoring in Unalaska Bay due to the expanded reach of the runway and RSA expansion.

- **Runway Object Free Area (OFA)** - The runway OFA must be upgraded to 800 feet wide and must extend 600 feet past the runway ends to satisfy FAA ARC B-III design standards beyond 2016. The OFA is provided to enhance the safety of aircraft operations and is required to be clear of all objects, except for objects which need to be located in the OFA for air navigation purposes.

- **Part 77 Imaginary Surfaces** —Due to the area's mountainous terrain there are numerous obstructions to the FAR Part 77 Imaginary Surfaces. Ideally, all obstructions would be remedied; in practice this will not be possible at Unalaska Airport due to terrain constraints.

- **Runway Protection Zones (RPZ)** — The RPZ functions to enhance the protection of people and property on the ground, and is achieved through positive control of incompatible objects and activities. The controlled activity area of the RPZ begins 200 feet from the runway ends and extends outward over the water. DOT&PF currently exercises informal coordination with maneuvering or anchoring ships, but does not have formal control over the RPZs, as is recommended by FAA design standards.

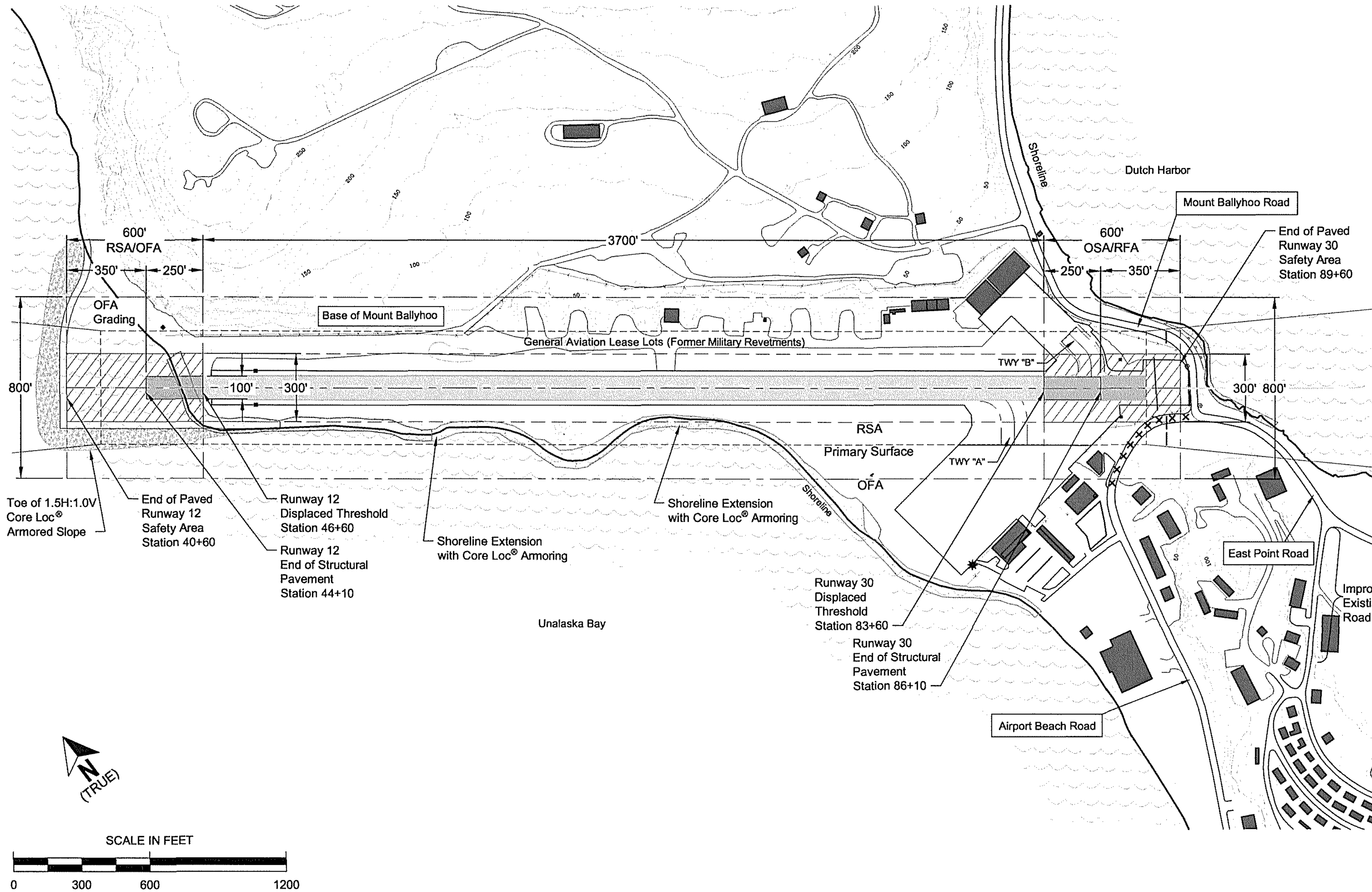
4.1.5 Passenger Terminal Area

Aircraft Apron—parking positions for a mix of up to 12 aircraft will be required by 2026. The existing apron capacity falls short by approximately five aircraft parking positions.

Terminal Building—by 2026, the terminal building will be undersized by approximately 13,000 square feet and automobile parking inadequate by approximately 4,731 square yards, or 121 parking spaces. In addition, airport access roadways are insufficient to meet projected aviation demand through the planning period.

Navigational Aids (NAVAIDs)—the current NAVAID facilities are somewhat less than desirable, but adequate for visual and nonprecision instrument approach capability at Unalaska Airport. The FAA has determined that using today's and planned future technologies, instrument approach improvements, such as reduced weather minimums and night time access, are not possible due to steep terrain. However, the publishing of additional approaches using new technologies such as WAAS-enabled localizer performance with vertical guidance (LPV) will provide pilots with additional choices during IFR. Additionally, the pace of technological development of more accurate approach capabilities is high and it is likely that technologies such as Heads Up Display (HUD)-assisted approaches will become available and cost effective for use at Unalaska Airport.

Exhibit 4-1 below provides a summary existing runway conditions.



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Alternative 1
Northwest Extension

Retain Existing Mt. Ballyhoo Road Alignment

Exhibit 4-2

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008

PLOT DATE: 15-Feb-08 PLOT TIME: 2:52:00 PM FILENAME: P:\AIRPORTS\DUT-UNALASKA\MASTER PLAN\WORKING\DOCS\04ALTS\EXHIBITS\CAD DEC 2007\ALT 1 RUNWAY LAYOUT.DWG USER: TSARR TAB: LAYOUT1

Key attributes of Alternative 1 include:

- The Runway 30 landing threshold is displaced 250 feet to allow for adequate threshold siting surface clearance to the adjacent hill, and to allow for the development of full standard ARC B-III RSAs using declared distances.
- The Runway 12 landing threshold is displaced 250 feet in to allow for the development of full standard ARC B-III RSAs using declared distances.
- Provides full-standard RSAs and results in an overall 4,900-foot runway and RSA envelope.
- Due to the runway shift to the northwest, Mt. Ballyhoo Road maintains its current alignment and is no longer a penetration to the RSA or Primary Surface.
- Airfield construction costs for this alternative total approximately $85 million.

4.3.3 Alternative 2: Northwest Extension- Retaining Existing Runway 30 End

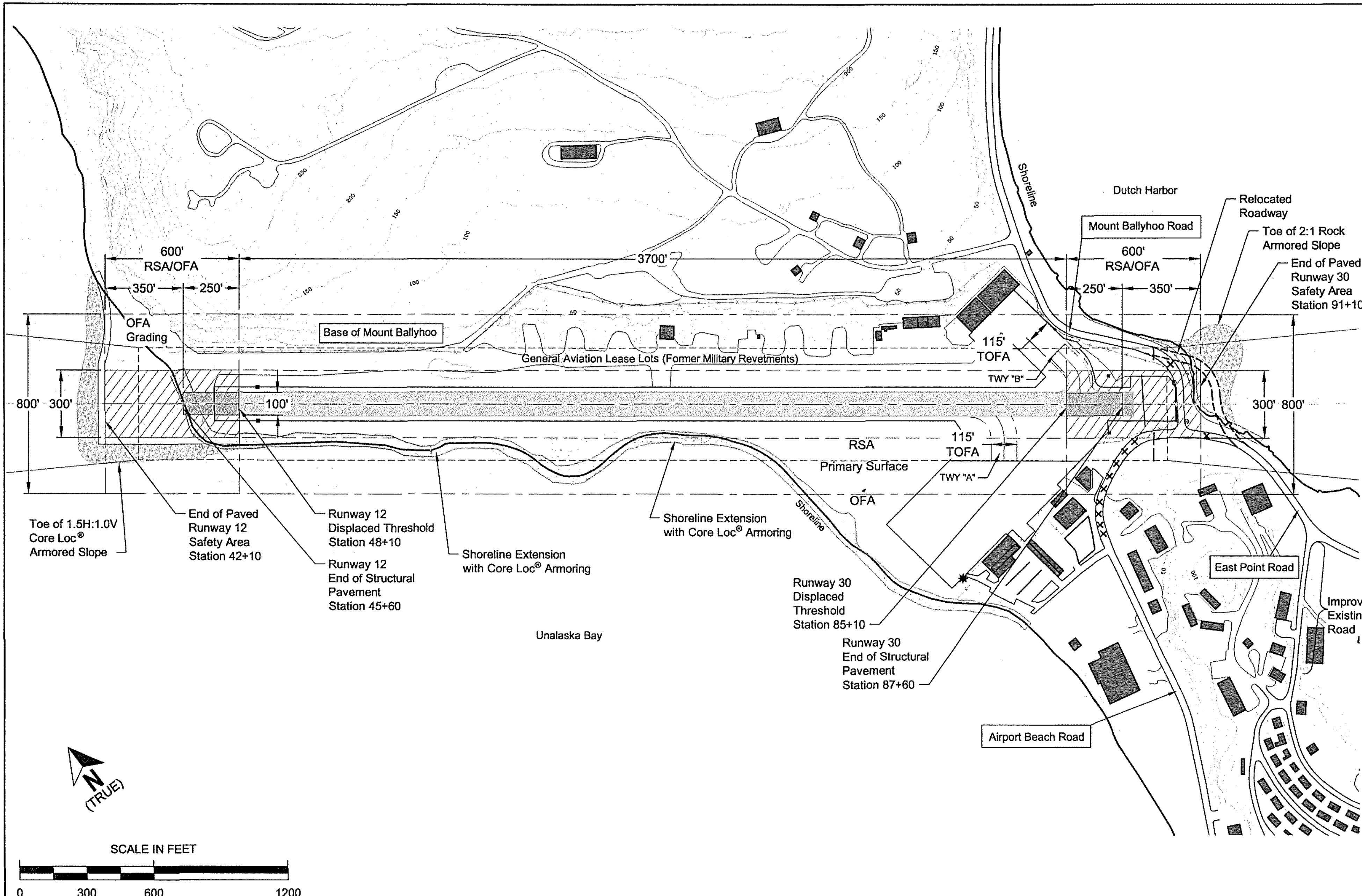
Alternative 2, presented in **Exhibit 4-3**, retains the existing Runway 30 approach end while extending the runway to the northwest along the centerline. This alternative provides 4,200 feet of take-off length and a landing distance of 3,700 feet in both directions. Alternative 2 entails extensive rock fill and armoring in Dutch Harbor and Unalaska Bay to accommodate the RSA.

The key attributes of Alternative 2 include:

- The Runway 12 approach end is extended to the northwest into Unalaska Bay, resulting in a 4,200-foot runway using displaced thresholds and declared distances.
- The Runway 30 landing threshold is displaced 250 feet to allow for adequate threshold siting surface clearance to the adjacent hill, and to allow for the development of full standard RSAs using declared distances.
- The Runway 12 landing threshold is displaced 250 feet in order to allow for the development of full standard RSAs using declared distances.
- This concept provides full-standard RSAs and results in an overall 4,900-foot runway and RSA envelope.
- Airfield construction costs for this alternative total approximately $80 million.

4.3.4 Alternative 3: Southeast Extension— Maximize Use of Existing Configuration

The design concept for Alternative 3, presented in **Exhibit 4-4**, maximizes the use of the existing runway configuration by providing the entire runway shift on the Runway 30 end while retaining the current Runway 30 landing threshold. The purpose for this approach is to minimize costs by building more into Dutch Harbor and less into Unalaska Bay, as the latter requires additional rock fill and armoring for wave protection. As with the previous alternatives, Alternative 3 provides 4,200 feet of take-off length and a landing distance of 3,700 feet in both directions. Alternative 3 also entails rock fill and armoring in Dutch Harbor and Unalaska Bay to accommodate runway and RSA expansion.



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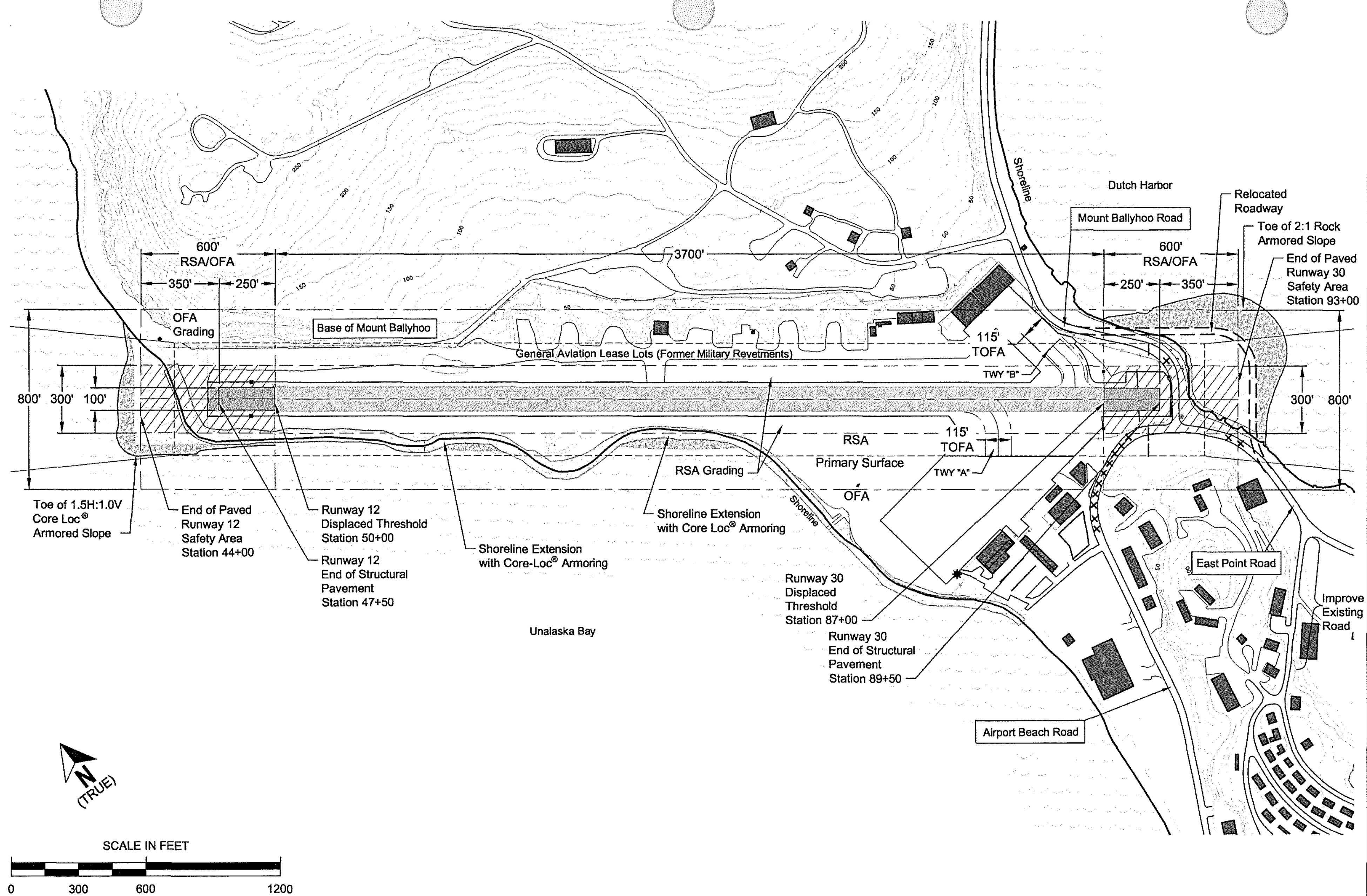
Alternative 2
Northwest Extension
Retain Existing Runway 30 End

Exhibit 4-3

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008



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Alternative 3
Maximize Use of Existing Runway Area

Retain Existing Runway 30 Arrival Threshold

Exhibit 4-4

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008

Key attributes of Alternative 3 include:

- Runway 30 is extended southeast towards Dutch Harbor, resulting in a 4,200-foot runway using displaced thresholds and declared distances.
- The landing threshold of the extended Runway 30 is displaced 250 feet to the northwest, retaining its current position, to allow for adequate threshold siting surface clearance to the adjacent hill, and to allow for the development of full standard RSAs using declared distances.
- The Runway 12 landing threshold is displaced 250 feet in order to allow for the development of full standard RSAs using declared distances.
- Airfield construction costs for this alternative total approximately $80 million.

4.3.5 Alternative 4: Southeast Extension- Minimal Northwest Shoreline Change

The design concept for Alternative 4, presented in **Exhibit 4-5**, retains the existing Runway 12 approach end while extending the runway southeast towards Dutch Harbor. Alternative 4 provides 4,200 feet of take-off length and a landing distance of 3,700 feet in both directions. Alternative 4 involves a relatively minor amount of rock fill and armoring in Unalaska Bay, but a significantly increased amount of rock fill and armoring in Dutch Harbor due to the expanded reach of the runway and RSA expansion.

Key attributes of Alternative 4 are as follows:

- The Runway 30 approach end is shifted towards Dutch Harbor and the landing threshold is displaced 250 feet. The proximity of the threshold to the existing fuel dock located in Dutch Harbor increases the obstruction to navigation, relative to the 20:1 approach surface, while ships are berthed at the dock.
- The Runway 12 landing threshold s displaced 250 feet in order to allow for the development of full standard RSAs using declared distances.
- Airfield construction costs for this alternative total approximately $71million.

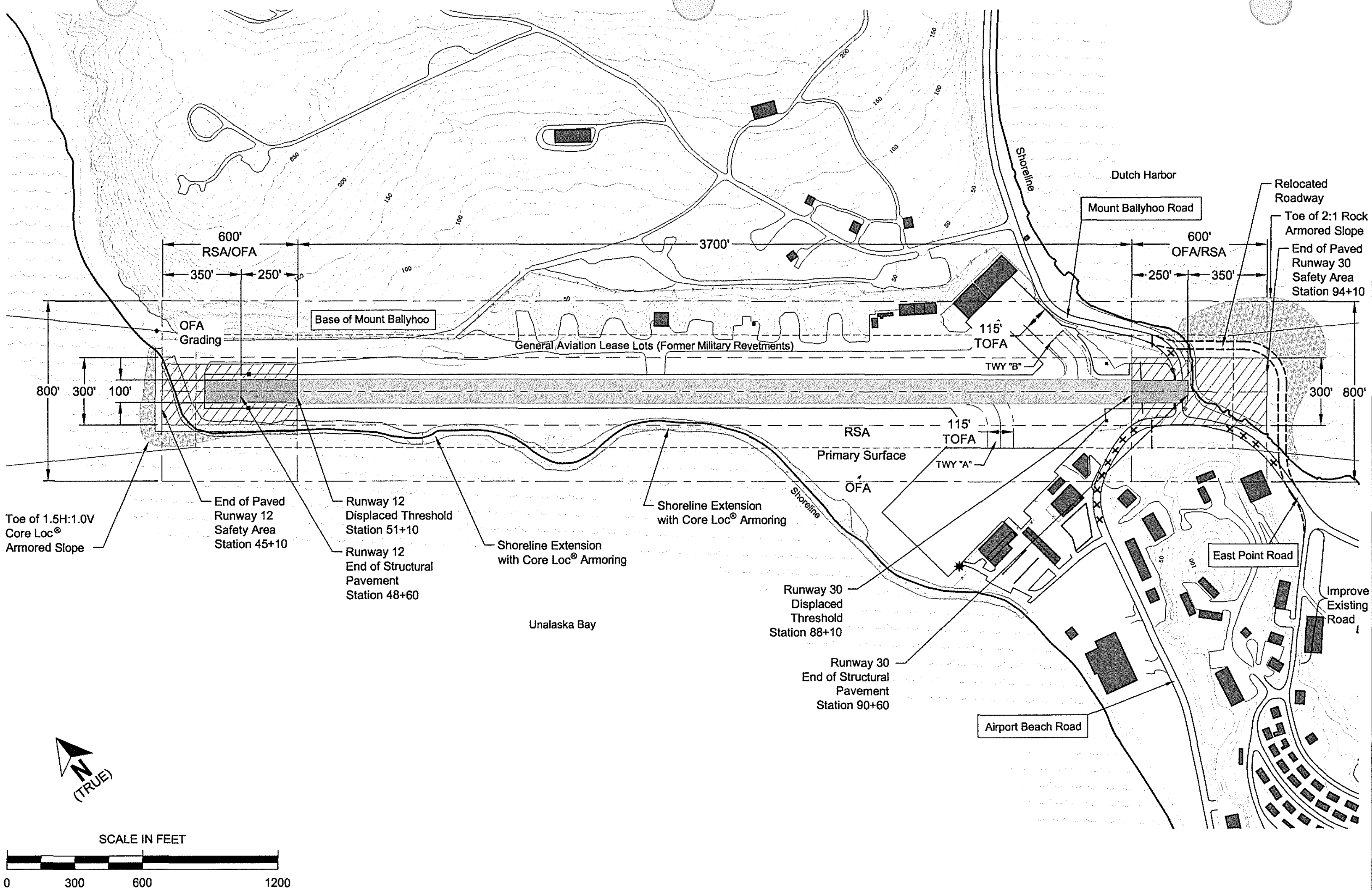
Exhibit 4-6 below shows how declared distances can be used to achieve standard RSAs for each airfield alternative concept.

4.4 Airfield Alternatives Evaluation

4.4.1 Airfield Evaluation Criteria

Several criteria were developed and applied to compare the performance of each alternative, including:

- *Ability to meet the need*—Each alternative must provide the required minimum departure runway length of 4,200 feet and the required landing length of 3,700 feet, meet airfield design standards to the extent possible, make no condition worse, and must provide full standard RSAs to the extent practicable.
- *Construction Cost*-- This criterion compares the relative development cost of each alternative. Order of magnitude cost estimates were developed for construction of each alternative. Estimates for construction into the water are based on current bathymetric survey information and protection from storm waves is assumed similar to today's conditions. Roadway components conform to DOT&PF's Preconstruction Manual.



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Alternative 4
Southeast Extension
Minimal Northwest Shoreline Change

Exhibit 4-5

Source: AC/150 5300-13 Chg 11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

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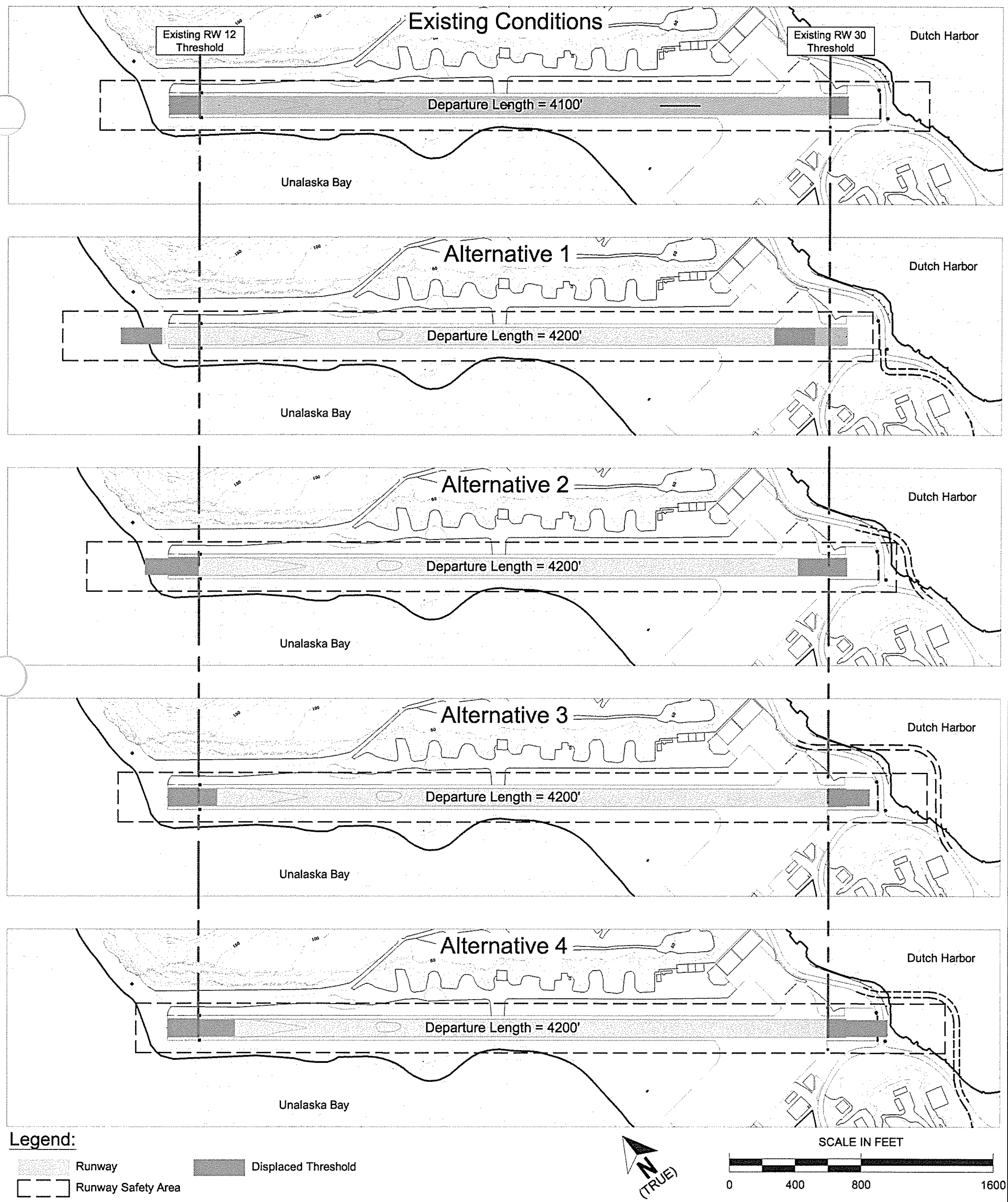

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Federal Project No.: AIP 3-02-0082-2006 AKAS Project No.: 53091

Summary of Declared Distance Alternatives

Exhibit 4-6

December 2007

Because the terminal and automobile parking lot expansion are constants between alternatives, they are not included in the airfield construction costs and are evaluated separately in this chapter.

- *Constructability/Phasing*—this criterion reflects how challenging an alternative is to implement. While cost to a large extent reflects constructability, it is considered separately to highlight the complexity of implementing alternatives. For example, deep water construction using floating cranes is more complicated than construction on land.
- *Airspace/Operational Constraints*- This criterion considers impacts to Part 77 and the threshold siting surface. The airport has numerous Part 77 penetrations, most of which cannot be resolved, such as Mount Ballyhoo in the transitional surface. Each alternative was developed to improve on, or at least make no worse, the airspace issues. The focus of this criterion is on the Part 77 Primary and Approach Surfaces, as well as the Threshold Siting Surface. Due to the Airport's high instrument approach weather minimums, FAA Order 8260.3B, Change 19, *U.S. Standard for Terminal Instrument Procedures (TERPS)* does not apply close-in to the airport and therefore is not used in the evaluation. Additionally, the FAA's determination that no better approach minimums can be attained at Unalaska Airport, limits the consideration of instrument approaches to factors that might make the minimums worse.
- *Environmental Considerations*—this criterion identifies obvious potential for significant impacts to known major environmental resources. Alternatives that avoid known major environmental resources are more likely to withstand scrutiny with less significant revision as projects advance from planning to preliminary design and detailed environmental impact assessment. Environmental constraints are considered in this master plan in order to reduce the possibility of conceptual planning proposing impacts later proven avoidable.
- *Other Considerations*- Beyond meeting the stated factors, alternatives may offer other unique advantages. While advantages unique to each alternative do not factor into the evaluation, if all else is equal, they make a difference and should be considered in final decision making.

4.5 Airfield Evaluation Analysis

The four airfield alternatives were developed to meet the airport needs fully, and were analyzed by taking into account cost, constructability, airspace constraints (Part 77 Surface), and environmental fatal flaws. As is explained in the following points, each of the four alternatives equally meets the need, has essentially equal constructability, airspace, and environmental issues, and thus is only differentiated by cost.

- *Ability to Meet the Need*- All alternatives meet the need fully, and thus rate equally.
- *Airfield Construction Cost*- Construction costs are summarized in Table 4-1 below.

TABLE 4-1
Airfield Alternatives Construction Costs[1,2]

Alternative 1 Northwest Ext	Alternative 2 Northwest Ext	Alternative 3 Southeast Ext	Alternative 4 Southeast Ext
$85M	$80M	$80M	$71M

[1] Rounded to nearest million

[2] Includes mobilization, design, contingency

- *Constructability*—the most challenging construction will be on the Unalaska Bay shoreline, where more extensive armoring is needed for wave protection. Installation and staging of the large Core Loc units and armoring stone will require large cranes, and barge-mounted equipment. Equipment must be clear of the active approach so most of the construction would occur at night when the airport is closed.

- *Airspace(Part 77 Surfaces)*— The Part 77 Approach Surface, oriented along the runway centerline, starts 200 feet beyond the runway pavement end; therefore, the Approach Surface starting point moves with the various runway extensions. In Alternatives 1 and 2, the Approach Surface moves northwest and towards Hog Island. A topographical analysis has determined that the proposed displaced threshold and the associated threshold siting surface do not maintain adequate clearance for approaching aircraft. In Alternative 4, the Approach Surface shifts with the runway end to the southeast, toward the ship fueling dock in Dutch Harbor. However, the threshold siting surface does not maintain appropriate clearance standards for approaching aircraft. Therefore, aircraft arrival paths over ships berthed at the fuel dock are lower than they are using the existing runway configuration.

  The Approach Surface also serves to provide protection for aircraft departing from the other end of the runway. With the northwestern extensions, penetrations of the Runway 12 Transitional Surface may get slightly worse over Hog Island, while extensions to the southeast have a worse Approach Surface over the fuel dock. However, in all cases the additional runway length improves the departures and offsets these issues. The alternatives are therefore considered equivalent.

- *Environmental Considerations*— all alternatives involve some degree of impact to coastal and marine resources, historic and archaeological resources, and probable subsurface contamination. While these impacts may be significant, they are not fatal flaws because to meet the need, these impacts are unavoidable and can be mitigated (and thus permitting is anticipated feasible). None of the alternatives present an environmental fatal flaw.

Table 4-2 below summarizes the evaluation of airfield alternatives to improvements at Unalaska Airport.

TABLE 4-2
Airfield Alternatives Evaluation Summary

	Alternative 1 Northwest Ext	Alternative 2 Northwest Ext	Alternative 3 Southeast Ext	Alternative 4 Southeast Ext
Ability to Meet Need	✓	✓	✓	✓
Construction Cost*	3 - $85M	2- $80	**2- $80**	1-71

TABLE 4-2
Airfield Alternatives Evaluation Summary

	Alternative 1 Northwest Ext	Alternative 2 Northwest Ext	Alternative 3 Southeast Ext	Alternative 4 Southeast Ext
Ability to Meet Need	✓	✓	✓	✓
Construction Cost*	3 - $85M	2- $80	**2- $80**	1-71
Constructability	4	3	**1**	2
Airspace (Part 77 Surfaces)	4	3	**1**	2
Environmental Fatal Flaws	None	None	**None**	None

1=best, 4=worst

*- Includes mobilization, design, contingency

4.5.1 Preferred Airfield Alternative

All of the alternatives evaluated meet the need for airfield improvements for the Unalaska Airport and are generally constructible. Alternative 3, which maximizes the use of the existing runway configuration and makes no existing condition worse, is the recommended alternative for meeting the airfield needs at Unalaska Airport.

4.6 Roadway Alternatives

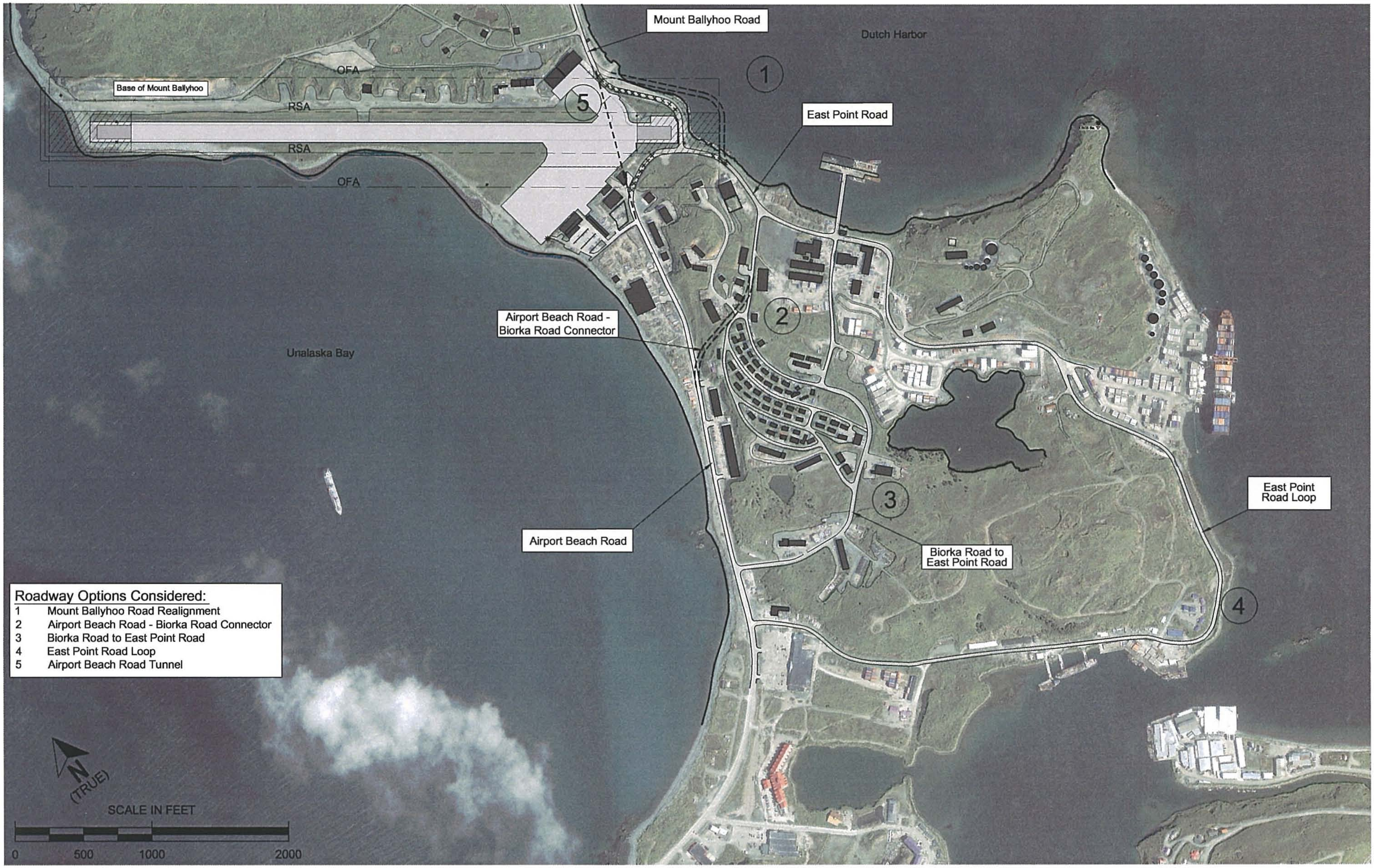
Vehicles traveling on Mt. Ballyhoo Road will penetrate the Primary Surface and OFA under ARC B-III airfield alternative concepts described in the previous section. Alternative roadway options were analyzed by function, including airport access and airport bypass. **Exhibit 4-7** illustrates the following roadway alternatives.

4.6.1 Airport Access Roadway Options

Airport Beach Road Closure

This option closes the portion of Airport Beach Road inside the Part 77 Primary Surface, adjacent to the fire station, cutting off access to Mt. Ballyhoo Road, and therefore requiring through traffic to use East Point Road to destinations north of the Airport. , Closure is necessary to fulfill FAA regulations governing obstructions inside the Primary Surface, as well as the ARC B-III RSA and OFA. As such, this option directly corresponds to planned airfield improvements and is common to all airfield planning alternatives.

The closure of a portion Airport Beach Road will require the use of the existing roadway system to access the Airport. The existing roadway system south of the Airport consists of the remainder of Airport Beach Road, Biorka Road, East Point Road, and other smaller neighborhood streets. Biorka Road runs northeast and connects to East Point Road, and East Point Road, in its entirety, creates a large loop that ultimately reconnects with Airport Beach Road south of the Airport. To the north, Mt. Ballyhoo Road connects to East Point Road south and east of Runway 30. Although traffic may slightly increase within the residential areas along Biorka Road due to the closure of a portion of Airport Beach Road, commercial truck traffic is largely concentrated along East Point Road southeast of the Airport and is not expected to impact residential neighborhood traffic. As such, the use of existing roadways creates the least amount of disruption to daily traffic flow. Cost: $0 (minimal cost would be associated with striping and signage)



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Roadway Alternatives Considered

Exhibit 4-7

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008

Airport Beach Road/Biorka Road Connector

This option constructs a new road to provide access from Airport Beach Road to the relocated Mount Ballyhoo Road, via Biorka and East Point Roads. This concept would require a cut through the hill south of East Point Road, a bridge connection to existing roads, and a substantial number of buildings would require demolition or relocation. Although this option would create a direct connection from Airport Beach Road to East Point Road, the replacement of displaced buildings and high costs (approximately $8 million) associated with construction therefore eliminate this option from consideration.

4.6.2 Bypass Roadway Options

Mt. Ballyhoo Road Alignment

This option realigns Mt. Ballyhoo Road to clear the FAR Part 77 Primary Surface, as well as the ARC B-III RSA for Runway 30. In order to circumnavigate these, Mt. Ballyhoo Road will be realigned into Dutch Harbor, requiring extensive rock fill and armoring, and will re-connect to East Point Road south of the Airport. As such, this option directly corresponds to planned airfield improvements and is common to all airfield planning alternatives. Costs would be up to $7 million, depending on the airfield alternative.

Airport Tunnel

This option considers the construction of a roadway tunnel under Runway 30. This concept, while convenient for users, presents a number of severe and cost-prohibitive construction challenges and would result in expensive annual operation and maintenance costs for DOT&PF upon completion,. The airport tunnel concept would cost more than $20 million, not including maintenance and operation costs, and therefore is not considered a feasible option (no engineering cost estimate was prepared for this option due to the cost-prohibitiveness of its construction and operation).

4.6.3 Preferred Roadway Options

The closure of Airport Beach Road near the fire station and the realignment of Mt. Ballyhoo Road are necessitated by FAA regulations requiring a clear RSA and OFA. As such, these two roadway options are a required component of each of the airfield planning alternatives. Given the extremely constrained setting and lack of developable land, alternative roadway construction options are limited, and any attempt to create new thoroughfares is likely to impact traffic flow, no matter the location. As such, the Use of Existing Roadways alternative is the least disruptive and most cost-effective option, and therefore is the preferred roadway alternative (for fire and rescue purposes, access to the airfield area would be maintained with a crash gate in the security fence).

4.7 Passenger Terminal Area Alternative Concepts

4.7.1 Methodology

The landside alternatives concepts were developed by means of accommodating the required ARC B-III airfield improvements while making the best use of limited developable land. The existing landside and apron facilities are positioned at an angle approximately 35 degrees southwest of the runway centerline. This layout constrains future apron and landside expansion possibilities due to the runway safety surfaces, such as the OFA, being delineated by boundaries that are parallel to the runway centerline. The planned upgrade to ARC B-III runway facilities requires that the OFA have a width of 400 feet on either side of the runway centerline. This increased OFA width substantially encroaches upon the current aircraft apron, and therefore reduces the amount of apron space available for parking the larger ARC B-III Q400 aircraft.

As determined in the previous chapter, *Demand Capacity and Required Facilities,* the current apron configuration is capable of handling approximately ten B-II aircraft or seven B-III aircraft. Currently, up to nine large aircraft use the terminal apron at one time during peak periods.

Four terminal area alternatives were developed to accommodate a projected increase in traffic as determined in the *Projected Aviation Demand* chapter. Each alternative consists of demolishing and relocating the terminal and cargo facilities, as well as an expanded or reconfigured aircraft apron. However, the land in which the terminal area facilities are currently situated is not capable of accommodating the proposed facility improvements. As a result, the development footprint will need to be enlarged and each alternative concept assumes the use of available lease land south of the current landside facilities. All alternatives require the demolition of the Torpedo Building but allow the Aerology Building to remain through the 2016 implementation phase. In the long term implementation timeframe (discussed further at the end of this chapter), the clearing of the OFA would also require its relocation.

4.7.2 Range of Passenger Terminal Area Concepts

Passenger Terminal Area Alternative 1

This alternative, presented in **Exhibit 4-8**, rotates the current apron configuration to a position parallel with the ARC B-III OFA boundary expanding eastward towards Airport Beach Road, and relocates the terminal and cargo processing facilities.

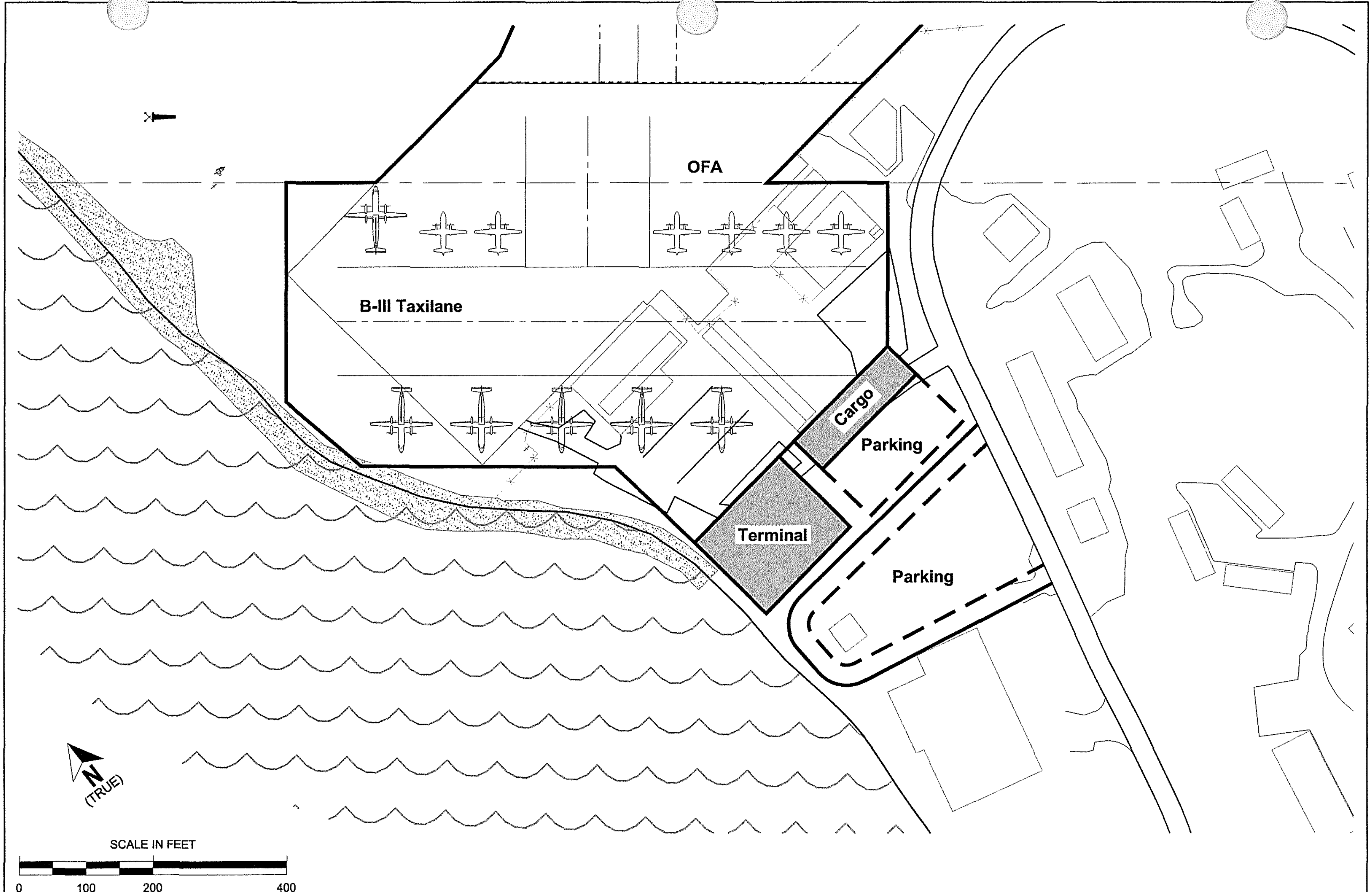
Key attributes of Alternative 1 include:

- Allows an ARC B-III taxi lane to be positioned lengthwise running east to west, enabling approximately 6 B-III and 5 B-II aircraft to park on either side of the taxi lane along the apron perimeter and/or OFA boundary
- A new passenger terminal and cargo processing facility is constructed along the reconfigured ramp frontage
- New short- and long-term parking is established within the leased property south of the passenger terminal
- Access to the Airport from Airport Beach Road is improved.

Construction costs for this alternative total $ 29 million.

Passenger Terminal Area Alternative 2

This alternative, presented in **Exhibit 4-9**, maintains the current apron configuration, relocates the terminal and cargo processing facilities, and adds a centrally located ARC B-III taxi lane running southwest from the runway exit (Taxiway A) to the far reaches of the apron adjacent to Unalaska Bay.



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Unalaska Airport Master Plan Update

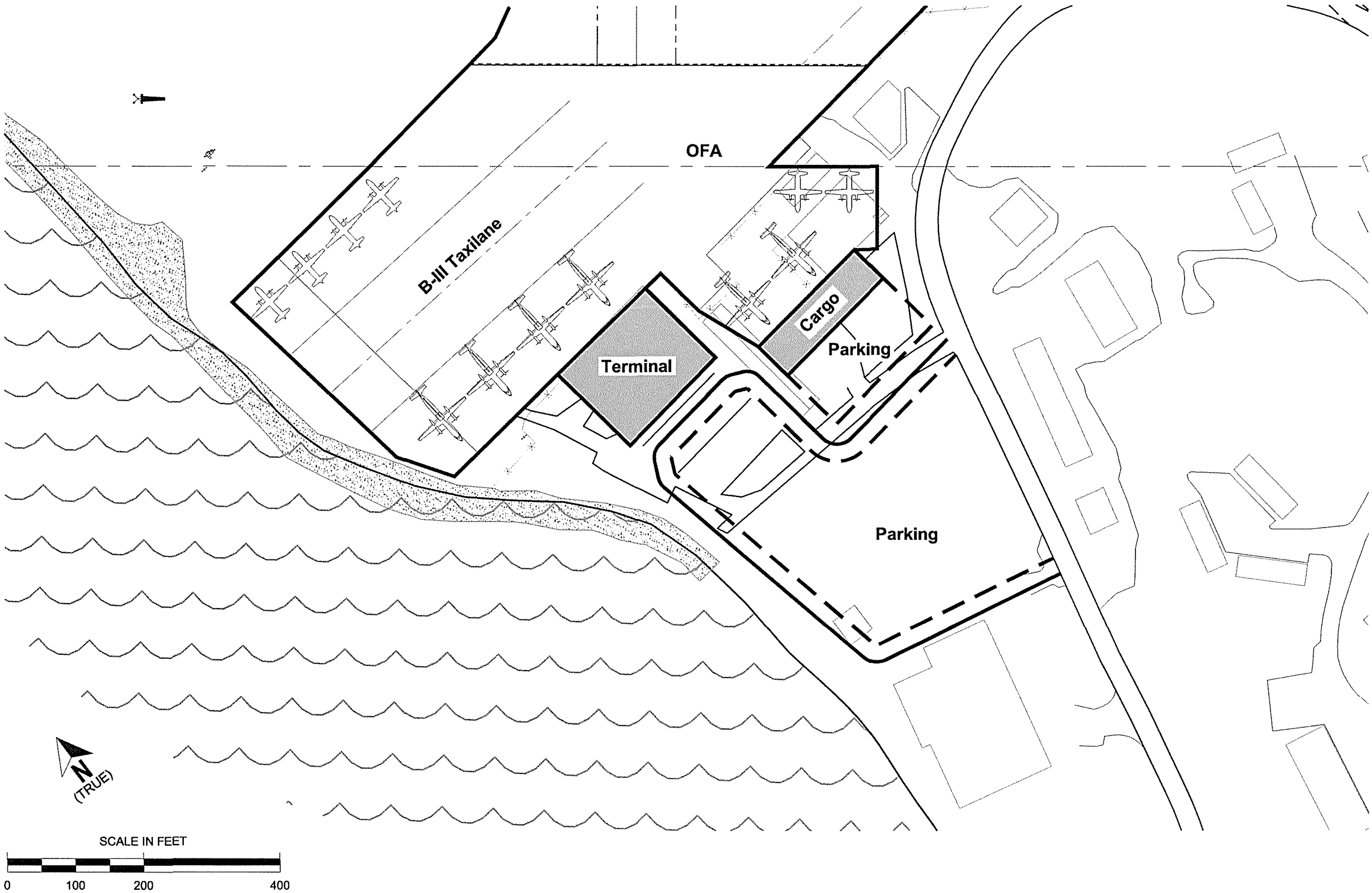
Federal Project No.: AIP 3-02-0082-2006 AKAS Project No.: 53091

Terminal/Apron/Landside Layout Alternative 1

Exhibit 4-8

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008



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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-2006 AKAS Project No.: 53091

Terminal/Apron/Landside Layout Alternative 2

Exhibit 4-9

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

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Key attributes of Alternative 2 include:

- A new passenger terminal is constructed along the existing apron frontage and a new cargo processing facility is constructed in a newly configured recessed apron area northeast of the terminal.
- This concept allows approximately 4 B-III passenger aircraft direct parking access to the passenger terminal, and 2 additional B-III aircraft will have parking access to the new cargo facility.
- This layout allows 5 B-II aircraft to park north of the taxi lane along the apron perimeter, and two more north of the cargo facilities adjacent to the OFA boundary.
- New short- and long-term parking is established within the leased property south of the passenger terminal and cargo facilities and access to the Airport from Airport Beach Road is improved.

Construction costs for this alternative total $ 24 million.

Passenger Terminal Area Alternative 3

This alternative, presented in **Exhibit 4-10**, rotates the current apron configuration to a position parallel with the ARC B-III OFA boundary extending west to Unalaska Bay and east towards Airport Beach Road, relocates the terminal and cargo processing facilities, and adds an ARC B-III taxi lane positioned lengthwise running east to west adjacent to the OFA boundary.

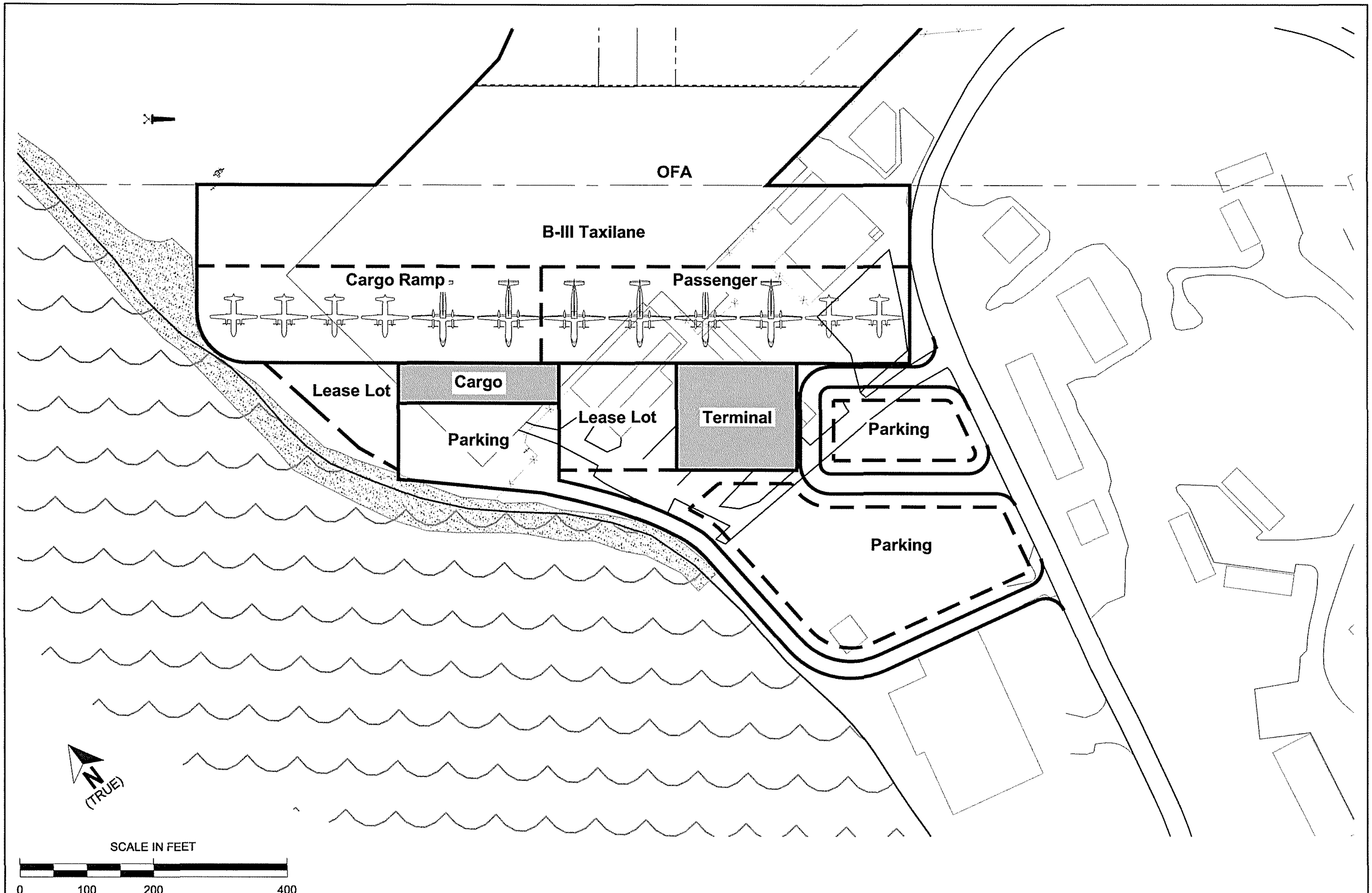
Key attributes of Alternative 3 include:

- Unique to this alternative layout is the creation of two additional revenue-generating lease lots situated adjacent to the new passenger terminal and cargo facility.
- A new passenger terminal and cargo processing facility is constructed along the reconfigured ramp frontage.
- Reconfigured apron allows for approximately 6 B-III and 5 B-II aircraft to park south of the taxi lane along the apron perimeter.
- New short- and long-term parking is established within the leased property south and east of the passenger terminal and south of the new cargo facility, and access to the Airport from Airport Beach Road is improved.

Construction costs for this alternative total $29 million.

Terminal Area/Landside Alternative 4

This alternative, presented in **Exhibit 4-11**, rotates the current apron configuration to a position that utilizes all existing available land adjacent to Unalaska Bay parallel to the ARC B-III OFA boundary, and constructs a new terminal and cargo processing facility.



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Federal Project No.: AIP 3-02-0082-2006 AKAS Project No.: 53091

Terminal/Apron/Landside Layout Alternative 3

Exhibit 4-10

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008

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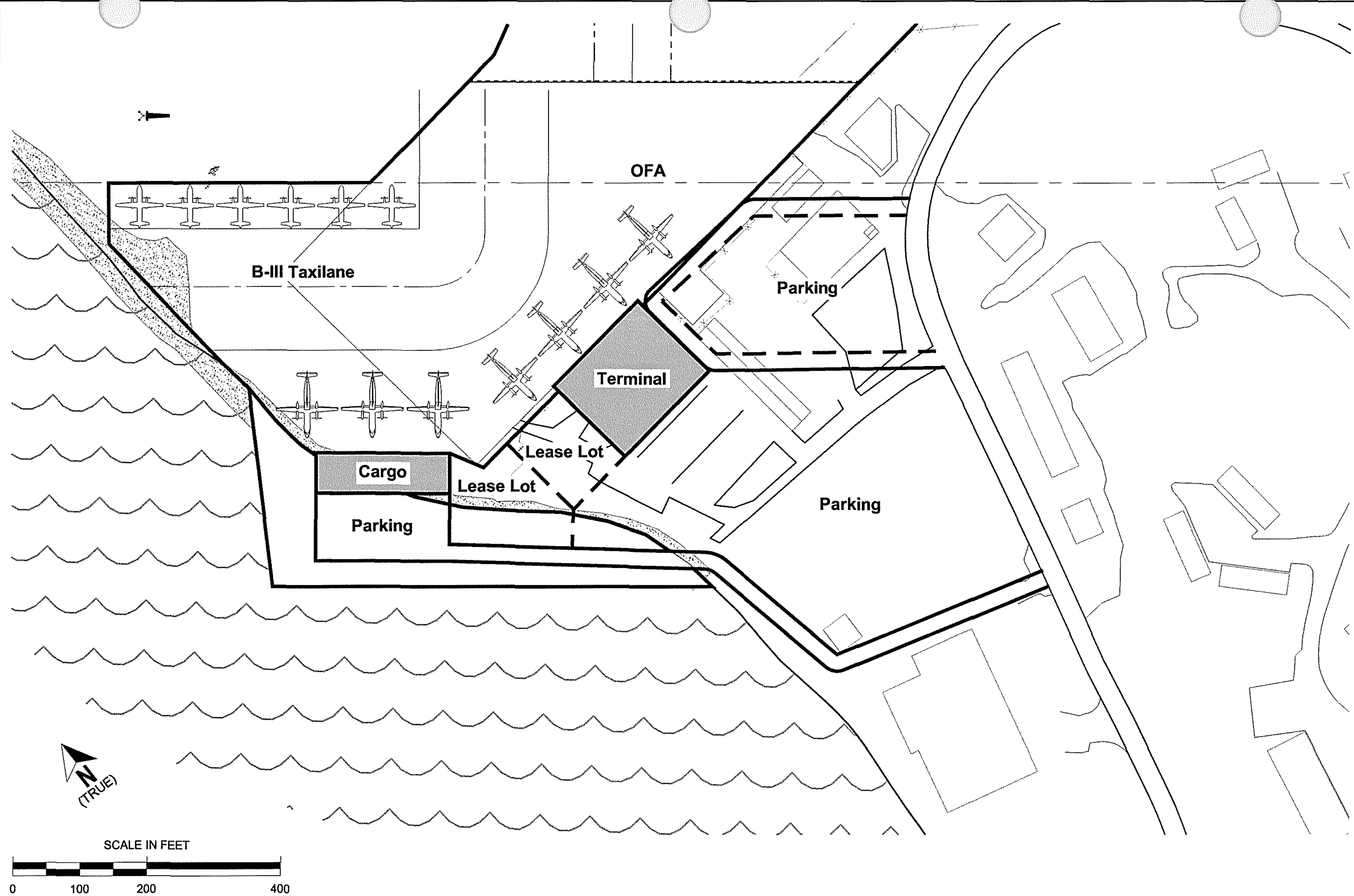

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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-2006 AKAS Project No.: 53091

Terminal/Apron/Landside Layout
Alternative 4

Exhibit 4-11

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008

Key attributes of Alternative 4 include:

- Allows an ARC B-III taxi lane to be positioned lengthwise running east to west and connects with the runway exit (Taxiway A).
- Allows approximately 6 B-II aircraft to park along the OFA boundary north of the taxi lane, and 7 B-III aircraft to park south and east the taxi lane with direct access to a new passenger terminal and cargo processing facility.
- New short- and long-term parking is established within the leased property northeast of the passenger terminal and south of the cargo facility.
- Access to the Airport from Airport Beach Road is improved.

Construction costs for this alternative total $32 million.

4.7.3 Passenger Terminal Area Evaluation

- *Ability to meet the need* - Landside and terminal alternatives must provide ample parking space for ARC B-II and B-III aircraft during peak period demand, as well as accommodate new terminal, air cargo, and automobile parking facilities. Each of the four passenger terminal area alternatives meets terminal, cargo, aircraft parking, and automobile parking requirements through the 2026 planning period. Alternatives 1 and 2 are flawed in that they do not provide sufficient auto parking. Additionally, while they accommodate the need aircraft parking spaces, the apron layouts do not include sufficient terminal and cargo building frontage. Alternative 3 provides sufficient auto parking and terminal and cargo building frontage. The aircraft parking layout is the most operationally efficient and flexible of the alternatives. Alternative 4 meets all the needs and is as efficient as Alternative 3.
- *Construction Costs* – This criterion compares the relative development cost of the landside/terminal alternatives. Order of magnitude cost estimates were developed for construction of each alternative. Alternative costs fall within an $8 million range, specifically: Alternative 1 would cost approximately $29 million, Alternative 2 $24 million, Alternative 3 $29 million, and Alternative 4 $32 million, respectively.
- *Constructability/Phasing* – The complexity of construction of each of the alternatives was estimated to be similar. All options require construction in an existing parking, terminal building area, and aircraft apron. While implementation of each alternative would be different, all would be similarly complex to construct. This factor is therefore a constant between alternatives.

Environmental Considerations – This criterion will identify obvious potential for avoidable significant impacts to known major environmental resources. Alternatives that avoid known major environmental resources are more likely to withstand scrutiny with less significant revision as projects advance from planning to preliminary design and detailed environmental impact assessment. Furthermore, consideration of environmental constraints at the planning stage reduces the possibility of conceptual planning proposing impacts later proven avoidable. Alternative 4 includes construction of fill in Unalaska Bay, adding both cost and environmental impact. Because viable alternatives exist without construction in the Bay, it is unlikely that this impact would be acceptable.

Table 4-3 below summarizes the evaluation of terminal area alternatives to improvements at Unalaska Airport.

TABLE 4-3
Terminal Area Alternatives Evaluation Summary

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Ability to Meet Need	No	No	***Yes***	*Yes*
Construction Cost*	2 - $29M	1 - $24M	**2 - $29M**	3 -$32M
Environmental Fatal Flaws	None	None	**None**	Yes- Unavoidable Construction in Waters of the U.S.

1=best, 3=worst

*- Includes mobilization, design, contingency

4.7.4 Landside/GA Area Evaluation

General aviation facilities are located north of the runway, and consist of two aircraft hangars, ARFF facilities, maintenance storage facilities, and airport administrative buildings. Airport staff housing is also located in this area. Currently, the Airport ARFF, administrative, and maintenance buildings penetrate the FAA Part 77 transitional surface, but are shielded by the toe of Mount Ballyhoo, and remain outside of the existing ARC B-II RSA/OFA. Future ARC B-III airport design standards will require the RSA and OFA to be expanded and will encompass these facilities. As such, GA, ARFF administrative, and maintenance facilities will require relocation to an area beyond the expanded ARC B-III airfield RSA and OFA in the future.

4.7.5 Preferred Terminal Area/Landside Alternative

Alternatives 3 and 4 meet all the identified aviation requirements (needs). Alternative 4 is environmentally fatally flawed because of the construction in the bay. Alternative 3 ranks in the middle of the range of costs, and offers the most efficient and flexible flight line-- supporting up to 6 B-III and 5 B-II aircraft. Lastly, a benefit of this alternative is that it provides revenue-generating lease lots beyond the minimum requirement. Alternative 3 is the recommended alternative for meeting the terminal area needs at Unalaska Airport.

4.8 Preferred Airfield Alternative Refinement

4.8.1 Introduction and Background

This analysis refines the preferred alternative (Airfield Alternative 3) to achieve the highest degree of safety within the FAA's RSA funding limits ($25 million) and recommends cost-effective solutions for improving the Runway Safety Areas (RSAs) for Unalaska Airport through refinements of Preferred Airfield Alternative 3. The determination of the safest practicable RSA solution for Unalaska Airport is based on the results of this evaluation.

The existing Runway 12/30 RSA does not the meet design standards provided in FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, Change 11. The AC defines the RSA as a "surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway". RSAs also provide greater accessibility to fire fighting and rescue vehicles. The RSA Program was established in FAA Order 5200.8, *Runway Safety Program,* to further require that RSAs at federally-obligated airports comply with the design standards[1]. Because Unalaska Airport is certificated under Federal Aviation Regulation (FAR) Part 139, *Airport Certification*, the airport sponsor (DOT&PF) must comply with these standards.

Non-standard RSAs cannot be waived through FAA's issuance of *Modifications to Standards*. Instead, the FAA is required to issue and maintain a written determination of the most practicable alternative for improving the margin of safety provided by the RSA. Incremental improvements to an inadequate RSA may be considered in the FAA's determination if they are practicable and enhance the margin of safety.

FAA Order 5200.9, *Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Material Arresting Systems* (EMAS), provides additional RSA determination guidance. This order establishes the cost range for the financial feasibility of RSA improvement and permits consideration of EMAS early in the planning process as an acceptable solution to RSA compliance. For EMAS alternatives, the system's lifecycle cost is considered in the evaluation of RSA practicability. The Regional Airports Division Manager notified DOT&PF on August 24, 2004 that the maximum feasible RSA improvement cost for Unalaska Airport is $25 million[2], and is a figure that is still valid and used as guidance for future RSA feasibility in the current ongoing Airport Master Plan Update.

4.8.2 Methodology and Evaluation Criteria

In addition to standard RSAs, the FAA is required to consider the practicability of relocating, shifting, and applying declared distances to the runway and RSA in question. Factors that affect the practicability of the potential RSA enhancement options include environmental considerations, cost, constructability, and degree of safety enhancement achieved. A factor complicating the Unalaska Airport RSA improvement process is the established concurrent need for additional runway length. Airfield planning alternatives described earlier provide a benchmark for comparing potential runway length alternatives with full standard RSAs. The order of magnitude difference in construction cost between these alternatives will allow FAA to decide on the financial feasibility of the potential RSA solutions.

This analysis therefore considers relocation and reorientation options, shifting the runway, and standard and non-standard EMAS applications. The options are evaluated by comparing construction and life-cycle costs and degree of safety attained.

4.8.3 RSA Design Alternatives

Numerous combinations of runway shifting options can be developed to provide full RSAs, but the construction of full standard RSAs exceeds the FAA's $25 million financial feasibility threshold. Construction into Unalaska Bay is particularly expensive, and any option that involves significant shoreline extension into the bay exceeds the financial feasibility threshold.

[1] Federally obligated applies to airports or airport sponsors who have accepted FAA grant funds.

[2] Please refer to Appendix F, August 24, 2004 letter from FAA Alaskan Region, Airports Division Manager Byron Huffman to ADOT&PF Deputy Commissioner of Aviation, Knip Knudson.

The following RSA enhancement alternatives were developed as refinements to Preferred Airfield Alternative 3, which uses declared distances and displaced thresholds, and extends the runway to the southeast while maintaining the existing Runway 30 threshold, to achieve an ARC B-III RSA at Unalaska Airport. Consistent with FAA Orders 5200.8 and 5200.9, this analysis evaluates:

- Reducing Runway Length
- Standard Engineered Materials Arresting System (EMAS)
- Nonstandard EMAS
- Reduced RSA Using Declared Distances

Reducing Runway Length

The *2005 Century of Aviation Reauthorization Act*, known as *Vision 100*, includes a provision regarding RSAs in Alaska. Specifically, Title V, *Aviation Safety*, Section 502 states that Alaskan airports "are not required to adopt an RSA solution that would effectively reduce runway length to be shorter than actual pavement length". Unalaska Airport's runway pavement length is currently 100 feet short of the 4,200 feet required to support the Q400 without payload penalties. Therefore, further runway length reduction is not a practicable solution for attaining RSAs.

Engineered Materials Arresting System (EMAS)

EMAS is an FAA-approved aircraft arresting system intended for use where it is impractical to obtain standard RSAs, and where other alternatives are not feasible. EMAS consists of a bed of cellular concrete material blocks of strength appropriate for the airport fleet mix. The material will crush under the weight of an aircraft and bring it to a controlled stop in a very short distance. Located in the RSA area beyond the runway ends, EMAS is designed to decelerate to a stop aircraft that overrun the runway at exit speeds up to 70 knots. EMAS is not used for aircraft landing short of the runway.

FAA Order 5200.9, *Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Material Arresting Systems (EMAS)*, provides additional RSA determination guidance as it establishes the cost range for RSA financial feasibility as well as permits consideration of EMAS early in the planning process. Two applications of EMAS were considered as part of this preferred alternative refinement, a standard and non-standard system, neither of which provides adequate safety enhancements or significant cost savings potential for Unalaska Airport.

Airport Specific Standard EMAS

FAA Order 5200.9 states that a standard EMAS installation provides a level of safety that is generally equivalent to a full RSA constructed to the standards of FAA AC 150/5300-13, Change 11, *Airport Design*. A standard EMAS installation must meet the following conditions:

- The EMAS is constructed in accordance with AC 150/5220-22, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns.*

- The EMAS bed must be sufficient in length to be capable of safely stopping the design aircraft leaving the runway traveling at 70 knots.

- The resulting RSA must provide adequate protection for aircraft that touch-down prior to the runway threshold (undershoot) through vertical guidance, full RSA standard lengths, or displaced thresholds for landings.

The advantage of EMAS is most evident on airfields for which it was developed, those with a fleet mix that require more stringent RSA standards of 1,000 feet beyond the runway end. In these situations, a standard EMAS RSA length of 600 feet can potentially save up to 800 feet (400 on each runway end) of required total RSA length and still provide adequate protection for overshoots and undershoots, based on approach RSA standards shown in FAA AC 150/5300-13, Change 11.

Based on the August 2007 guidance provided by ESCO, manufacturers of EMAS, the standard EMAS installation requirement for the Bombardier Q400 leaving the runway at 70 knots would require an EMAS bed length of 315 feet and a setback from the runway end of 35 feet, totaling an EMAS RSA length of 350 feet on each runway end.

While this airport-specific standard EMAS estimate may generally provide safety margins equivalent to that of a full RSA, very expensive EMAS RSA site preparation costs, in addition to the actual costs of the EMAS materials and installation ($3.4 million per system – materials only), exceeds the $25 million feasibility limit and therefore, defeats the purpose of providing a cost effective alternative to a full RSA.

Non-Standard EMAS

According to FAA Order 5200.9, in situations where it is impracticable to provide either standard RSAs or a standard EMAS installation, a non-standard EMAS installation may be considered. A non-standard EMAS must at a minimum be designed to stop the Design Aircraft at runway exit speeds of at least 40 knots.

Based on guidance from ESCO in August 2007, the non-standard EMAS installation requirement for the Design Aircraft (Bombardier Q400) leaving the runway in the low 40 knots would be an EMAS bed length of 185 feet and a setback from the runway end of 35 feet, totaling a RSA length of 220 feet on each runway end. This requirement is 380 feet less than the standard 600-foot RSA total for ARC B-III criteria.

Construction costs for Runways 12 and 30 vary due to differences in water depth and wave protection requirements. Additionally, the typical EMAS system cost does not include an allowance for costs associated with EMAS block transportation, handling, or site prep. ESCO estimates that an installed non-standard EMAS bed with a length of 185 feet and width of 120 feet would cost $2.0 million (2007 dollars) per runway, or $4.0 million for both runway ends. FAA Order 5200.9 provides a formula to derive the life cycle cost of an EMAS installation over a 20-year period. It consists of the present value of the EMAS installation; plus the present value of the assumed replacement of the EMAS bed after 10 years, and the present value of the annual maintenance and inspection. It should be noted that the Order 5200.9 assumes a maintenance cost of $3 per square foot for a typical airport. At Unalaska, this estimate would probably be low, and therefore a still-conservative cost of $4.50 per square foot is assumed.

A non-standard EMAS installation on both Runway 12 and 30 would cost approximately $24 million, including site development and preparation costs. As described above, this estimate is probably somewhat low due to the assumed standard EMAS installation cost. This alternative falls very close to the feasibility threshold and presents DOT&PF with a more complicated airfield to maintain and increases annual operational and maintenance costs. A non-standard EMAS installation on both runways does not provide enhanced safety over the provision of full RSAs through other means, such as declared distances, and is therefore not practicable.

Reduction in RSA with Declared Distances

This RSA design refinement considers the option of reducing the dimensions of the RSA in order to stay within the $25 million maximum feasible RSA improvement cost for Unalaska Airport while providing the highest degree of runway safety. Three options were considered for reducing RSA dimensions, including reducing the RSA length beyond the runway ends, reducing the RSA width beyond the runway ends, and reducing the amount of armoring and fill in the four corners of the RSA, and are discussed in the following:

Reduced RSA Length

This option considers reducing the RSA length beyond the runway ends, but is incompatible with the Preferred Alternative 3, which provides for the use of declared distances and displaced thresholds. Using declared distances, a portion of the runway pavement is "substituted" for RSA allowing aircraft operational needs and RSA requirements to be met in minimal space. For every foot of reduced RSA length, an equidistant amount of useable runway is reduced, thereby shortening the amount of runway available for takeoff and landing. Although the FAA could declare the full landing length to be available to meet the operational needs of the Q400, the actual RSA length and therefore degree of safety would be reduced. Therefore, this refinement option is eliminated from further consideration.

Reduced RSA Width – Recommended Refinement

This refinement option considers reducing the RSA width along its entire length. During this analysis it became clear that certain areas where disproportionately costly to construct. Therefore, reduction was isolated to the highest cost areas, specifically, the northwest corner of Runway 12 and east of Runway 30. Additionally, widening the eroded RSA sideline was excluded. The resulting refinement provides the full 600-foot RSA along the centerline and was found to provide the highest degree of safety for the $25 million feasibility threshold.

4.9 Recommended Plan

The preferred 2026 alternative consists of multiple projects that will be accomplished in a phased construction. Described below is the 2026 plan, followed by a first phase of projects to be accomplished by 2016.

2026 Preferred Alternative

The recommended long-term buildout, depicted in **Exhibit 4-12** consists of the following components:

- Airfield- the recommended airfield configuration is Airfield Alternative 3, which extends the runway and RSA envelope mostly to the south, and maintains the existing arrival threshold. This alternative achieves almost full RSAs through the use of declared distances. The full RSA length of 600 feet past the threshold is achieved in both directions, and in order to limit the RSA cost to $25 million, small RSA reductions were made along the side of the RSA ends, and along the existing sideline deficient area.

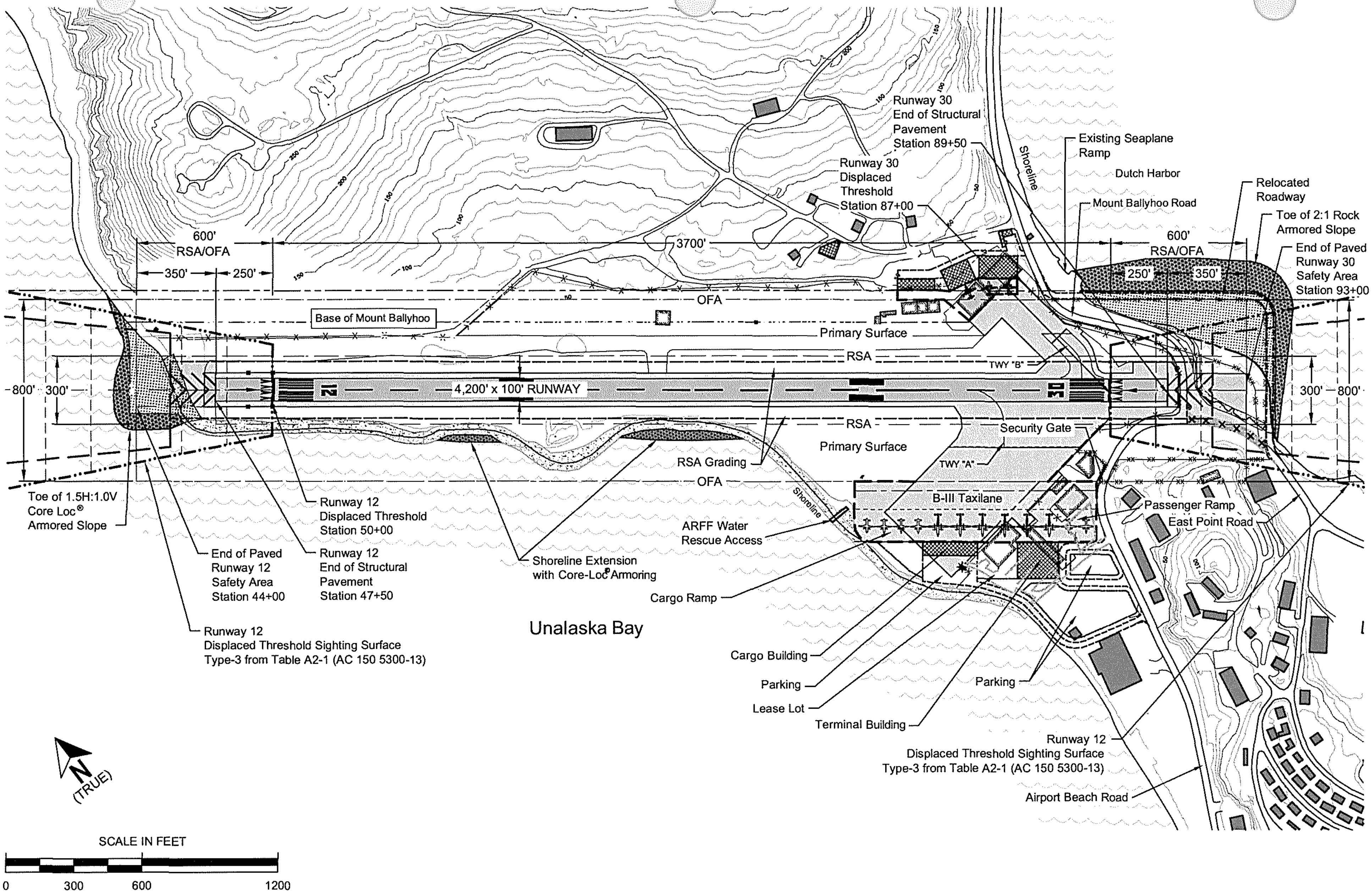
- Passenger Terminal Area- the recommended Passenger Terminal Area alternative is Alternative 3, which uses adjacent property to accommodate the needed passenger terminal area, and relocates the terminal along a reconfigured aircraft apron capable of supporting up to 6 B-III and 5 B-II aircraft in an operationally efficient layout. Alternative 3 also includes a new cargo processing facility, increased automobile parking capacity, and additional revenue-generating lease lots.
- Roadways— because of the required closure of Airport Beach Road near the fire station, the preferred roadway alternative are the use of existing roadways. This is the least disruptive and most cost-effective roadway option for preserving access to Ballyhoo Road. Options for Mount Ballyhoo Road are limited as it is required that the road be realigned and extended around the future runway OFA (Fire and rescue access would be maintained through the use of a crash gate in the security fence).
- Other—in order to clear the OFA, the existing airport maintenance buildings and hangar will be moved farther away from the runway, made possible through removal of material from the toe of Mount Ballyhoo. Rescue water access ramps will be provided near the existing location, and of the new aircraft apron. Instrument approach minimums may be reduced somewhat through the use of future technology.
- Cost—total project cost would be approximately $191 million

First Phase of Development (2016)

The first phase of development is defined to be completed in time for the change in design aircraft from the ARC B-II Saab 340-B to the B-III Bombardier Q400. This timeframe will allow sufficient time for required NEPA processing (most likely in the form of an EIS), permitting, lease negotiations, final design, and construction. The first phase of development will consist of the same airfield alternative and passenger terminal area alternative, but does not include:

- Ballyhoo Road will be in an interim location that clears the RSA, but is within the OFA.
- The toe of Mount Ballyhoo will not be cut back to the OFA.
- The Airport maintenance building and general aviation hangar will remain in their existing location, inside the OFA.
- A higher degree of engineering was developed for the preferred alternative (approximately 30% design, versus the 15% used for alternatives evaluation purposes) Total refined 2016 development cost is estimated at $69 million, of which approximately $25 million is attributable to RSA improvements.

Exhibit 4-13 below depicts the first phase of development for Unalaska Airport.



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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-2006 AKAS Project No.: 53091

Preferred Alternative (Airfield Alternative 3) 2026 Buildout

Exhibit 4-12

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

July 2008

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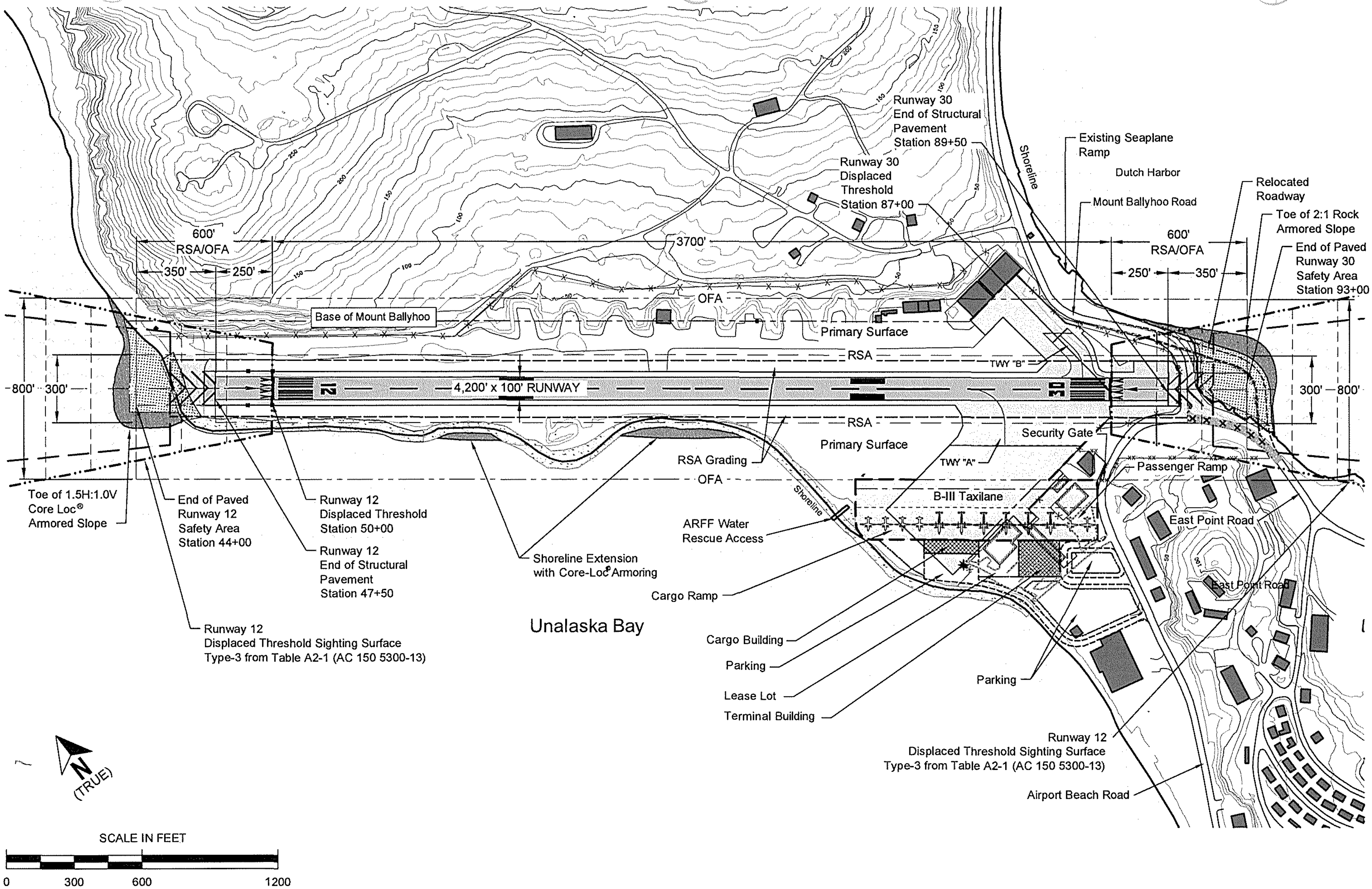

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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-2006 AKAS Project No.: 53091

Preferred Alternative (Airfield Alternative 3) 2016 Buildout

Exhibit 4-13

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

July 2008

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Chapter 5 Implementation and Finance Plan

CHAPTER 5

5. Implementation and Finance Plan

5.1 Introduction

The purpose of this chapter is to identify the annual implementation costs and to evaluate the available financing options to fund the Master Plan Capital Improvement Program (CIP) for the Phase I (2016) and Phase II (2026) planning periods. This analysis matches the amounts and timing of estimated capital costs with projected capital funding sources, including order-of-magnitude cost estimates for each project phase and potential levels of funding from the Federal Aviation Administration (FAA), DOT&PF, and other sources. Lastly, to aid the preparation of a Benefit Cost Analysis, which is required to justify federal funding, this chapter concludes by listing known benefits of the proposed improvements to Unalaska Airport. The goal of the Implementation and Finance Plan is to ensure an efficient transition from the Master Plan Update to the development of the Unalaska Airport EIS.

5.1.1 Summary

- Implementation costs approximately $69M through 2016 to correct the RSAs, extend the runway, and replace the terminal; approximately $121M is required through 2026[1]
- 2016 funding will total approximately $66M federal AIP share, and approximately $3M state/local share
- 2026 funding will total approximately $115M federal AIP share, and approximately $6M state/local share
- Preliminary benefit-cost comparison indicates that project benefits outweigh project costs
- The FAAs current funding levels would be insufficient for funding the project over three years. DOT&PF and FAA will need to reach agreement on the best approach to increase revenues toward funding including the possible implementation of PFC's and/or parking fees

5.2 Summary of Unalaska Airport Development Needs

Beginning in 2016, the Bombardier Q400 will replace the Saab 340B will require additional runway length. As such, airfield design standards will increase from ARC B-II to ARC B-III dimensions, requiring a substantially larger Runway Safety Area (RSA) and Obstacle Free Area (OFA). Additionally, passenger emplanements are forecast to increase by approximately 83 percent over the 20-year planning horizon, necessitating the need for larger terminal in a new location, a reconfigured aircraft apron, and additional automobile parking facilities. Despite the use of declared distances, an extension of the RSA and runway into Unalaska Bay and Dutch Harbor is required. In order to stay within the FAA-mandated

[1] All costs are in 2007 dollars and are not escalated to account for future inflation

$25M limit on RSA improvements, the preferred alternative was refined by narrowing the outer ends of the full-length RSA, and leaving substandard RSA areas along the existing shoreline.

5.2.1 Proposed 20-year Implementation Plan

The preferred 2026 alternative consists of multiple projects that will be accomplished in a phased construction. The 2026 plan is described below, followed by a first phase of projects to be accomplished by 2016.

5.2.2 2026 Long-term Development

The recommended 2026 long-term buildout consists of the following components:

Airfield/RSA/OFA

The preferred alternative, Airfield Alternative 3, maximizes the use of the existing runway configuration by providing for a runway shift on the Runway 30 end while retaining the current Runway 30 landing threshold. This entails rock fill and armoring in Dutch Harbor and Unalaska Bay to accommodate a required increase in runway length and the ARC B-III RSA/OFA expansion. Fill into Dutch Harbor is needed to accommodate the RSA, OFA, and Mount Ballyhoo Road realignment. Preferred Alternative 3 minimizes costs and impacts by building more into Dutch Harbor and less into Unalaska Bay, as the latter requires additional rock fill and armoring due to stronger wave action. Additionally, Alternative 3 achieves a full ARC B-III RSA length of 600 feet past both thresholds, but includes small RSA reductions along the width of the RSA in isolated high-cost areas and along the existing sideline length area. To accommodate ARC B-III dimensions, this long-term development also clears the OFA of all obstructions, including removal of portions of the toe of Mount Ballyhoo.

Passenger Terminal Area

The recommended Passenger Terminal Area option, Alternative 3, uses adjacent property to accommodate the required larger passenger terminal area, and relocates the terminal building along a reconfigured aircraft apron capable of supporting up to 6 B-III and 5 B-II aircraft. The Torpedo Building and existing cargo buildings will be removed by 2016 and, by 2026, the existing airport maintenance buildings, ARFF facilities, and Ramp B hangars will be relocated farther away from the runway in order to clear the ARC B-III OFA. This will require excavation of material from the toe of Mount Ballyhoo. Additionally, water-rescue access ramps will be provided adjacent to the new aircraft apron, and a new cargo handling facility, increased automobile parking capacity, and additional revenue-generating lease lots will be constructed adjacent to the new terminal facility.

Roadways

Access and local roads in the vicinity of Unalaska Airport provide multiple obstruction issues. Currently, two thoroughfares, Airport Beach Road and Mt. Ballyhoo Road, constitute obstructions to the FAR Part 77 Primary Surface, and future ARC B-III RSA/OFA. As such, roadway improvements include closing a portion of Airport Beach Road inside the Part 77 Primary Surface, as well as realigning Mt. Ballyhoo Road into Dutch Harbor to clear the future ARC B-III RSA (by 2016) and OFA (by 2026) for Runway 30. This is the least disruptive and most cost-effective roadway option for preserving access to Mt. Ballyhoo Road.

5.2.3 First Phase of Development (2016)

The first phase of development is to be completed in time for the change in design aircraft from the ARC B-II Saab 340-B to the B-III Bombardier Q400. This timeframe will allow sufficient time for required NEPA processing (in the form of an EIS), permitting, lease negotiations, final design, and construction. The first phase of development will consist of the same airfield alternative and passenger terminal area alternative, Preferred Alternative 3, with the exception of:

- Mount Ballyhoo Road will be in an interim location that clears the RSA, but is within the OFA.
- The toe of Mount Ballyhoo will not be cut back to clear the OFA.
- The Airport maintenance building, staff housing, and general aviation hangars will remain in their existing location, inside the OFA.
- The Aerology Building will remain in its current location

A higher degree of engineering was developed for the preferred alternative (approximately 30% design, versus the 15% used for alternatives evaluation purposes). Total refined 2016 development cost is estimated at $69 million, of which approximately $25 million is attributable to RSA improvements.

5.3 Phase I (2016) Implementation Plan

5.3.1 2016 Implementation Assumptions

Basic Assumptions

- Airfield improvements will be constructed under one bid package.
- Terminal area improvements will be constructed under a separate bid package.
- The planning alternatives were evaluated based on a design completion of approximately 15 percent or, more specifically to a level consistent with a Class Four Estimate as defined by the Association for the Advancement of Cost Engineering (AACE).
- Once the preferred alternative was selected, design of the preferred airfield alternate was furthered to approximately 30 percent complete (corresponding with an AACE Class Three Estimate) to determine the optimal amount of RSA that could be achieved within the $25M feasibility threshold.

Airfield

- Federal funding to improve the RSAs is limited to $25 million by statute.
- The full RSA will extend 300′ wide by 600′ beyond the displaced thresholds (rather than the runway end). The estimates assume that the RSA will be paved to withstand weather conditions and snow removal with minimal maintenance.

- Given that the federal funding limits do not allow for a full RSA, the cost of which would exceed $25M, a planning judgment was made in consultation between DOT&PF and FAA to determine the maximum degree of safety that could be provided. DOT&PF and FAA conceded that a full-length narrowed at the ends provides the higher degree of safety compared to a full-width but shortened RSA and other options.
- The Unalaska Bay wave action requires heavy armoring (estimated 32-foot top width) at the northwesterly (Runway 12) end of the runway. In addition to this armoring, a 30-foot wide "splash" zone (allowing wave-caused air movement and water movement to vent) will be required to allow the RSA to be reasonably maintainable. Estimates therefore assumed that armoring top width and "splash" zones were outside of the limits of the RSA.
- Armoring material at the northerly end of Runway 12 and along the side of the runway was assumed to be pre-cast, reinforced concrete units, with approximately 8 to 10 ton units required along the northerly runway end and side, transitioning to 3 to 4 ton units along the side of the runway. Layers below the armor units were assumed to be locally quarried stone (Ugadaga Pit)
- At the southeasterly end of Runway 30, the wave action in Dutch Harbor is much less severe. A 20-foot wide, dual-function "splash" zone and roadway safety zone are assumed. Armoring and under layer are assumed to have a top width of about 5 feet. Locally quarried armoring stones and under layers were assumed.
- The relocated Mt. Ballyhoo Road is assumed to be surfaced 30-feet wide. Road centerline was assumed to be 40-feet beyond the RSA corner. A guardrail between the relocated Mt. Ballyhoo Road and the bay was assumed.
- Costs of construction were estimated for the full RSA, in 2007 dollars (9/25/2007 estimate date). Common costs will not change much, even if direct construction costs vary significantly.
- Cost estimates assumed savings due to the salvage and re-use of 90 percent of existing dolos and/or Core Loc® armoring units (above the waterline) where they are affected by planned improvements. There is risk that the existing units may not be salvageable or re-usable at the estimated 90 percent rate. It is recommended that contract documents allow the bidders options of bidding the work either reusing the existing armor units or importing new units; and allowing the contractor to estimate the amount that it can salvage and reuse. There is also a risk of storm damage during construction while areas are without armoring.
- A means to positively control vehicles from crossing under the Runway 30 approach during flight operations was assumed. Modified railroad crossing signals - one at each side of the RSA or primary surface (with drop arms and warning lights) operated by aircraft radio control is assumed to be possible and acceptable to FAA. This device and associated detection of vehicles within the RSA (and warning indication to pilots) would be "one of a kind" with attendant research, development and design costs.
- Construction project soft costs (including pre-design services, design and contract document preparation, services during construction, and project

management/coordination, but excluding airport master plan update, environmental impact statement, and permit preparation) were estimated at 25 percent of estimated direct and common/miscellaneous costs.

- To minimize air service disruptions, construction work will be limited to night time hours, when the airport is closed to operations.
- Airfield improvements will be packaged into one construction contract.
- Estimates assumed that 3 construction seasons will be required to complete the airfield improvements. One season to develop quarries and produce armor stone and underlying stone, and two seasons of construction at the airport.
- Estimates assume using the Ugadaga quarry for armor stone and high quality stone under layers because it is a proven source of good quality stone.
- Estimates assume drilling/blasting and coarse screening for separation quality Mt. Ballyhoo material to be used in the core of fills in the Bay and Harbor for the fills below water while using the lesser quality Mt. Ballyhoo materials for core fills above water.
- Estimates assumed rehabilitation of city streets at the conclusion of the project, to repair damage expected as a result of hauling armor stone and under-layer stone to the Airport.
- Construction materials and equipment will be mobilized to the project via barge. Cost estimates assume that equipment and new pre-cast concrete armor units will be barged from Washington.
- Designers will need to confirm sizing (width) for the wave action zone for the future final design phase. We expect at least 3 zones – in Unalaska Bay, off the end of runway 12 and along the side of the runway part way toward the terminal; along the runway near the terminal area; and near Runway 30 in Dutch Harbor.
- Environmental documentation will address the potential for full build out of the RSA and relocation of Mt. Ballyhoo Road outside of the primary surface in 2016. Doing so will leave the option open to complete the 2026 build-out by 2016 if funding becomes available.
- Petroleum is known to contaminate the soils in the area near the southeasterly end of the runway. Soil remediation costs have not been estimated or factored into these estimates.
- Certain royalty assumptions were made for costing purposes in consultation with the Ounalashka Corporation. Actual royalties will be negotiated at the time and may likely differ.

Terminal Area

- The City of Unalaska will construct the terminal on land leased from DOT&PF. Terminal facilities will be constructed to satisfy the projected year 2026 space needs when they are constructed in 2016 to avoid future expansion costs and re-mobilization costs prior to 2026.

5.3.2 2016 Implementation Schedule

Preparation of the Environmental Impact Statement (EIS) will begin following completion of the Unalaska Master Plan Update and its approval by the FAA. Required environmental permitting for construction of planned improvements should run in parallel with the development of the EIS to reduce agency coordination burden and shorten the schedule. Design development engineering will support both the EIS and environmental permitting efforts. The planned schedule for implementation of the 2016 improvements and the estimated time distribution of estimated costs is shown in the attached Figure 5-1, 2016 Implementation Plan.

Airfield and terminal area improvements identified for completion by 2016 are planned to coincide with the Q400 aircraft service to Unalaska in that year. Construction of the improvements is assumed to be packaged into the following construction contracts:

- The first contract package includes the grading associated with airfield improvements and the relocation of Mt. Ballyhoo Road
- The second contract package includes terminal area improvements and all paving (airfield, Runway Safety Area (RSA), taxiway, apron, roads, and parking lots)

Design completion and preparation of contract documents is estimated to require approximately one year, with the grading contract package starting soon after the Record of Decision (ROD) on the EIS and permit approvals, and the terminal area contract package following one year later. Prerequisite work such as design civil surveys, geotechnical investigations, utility investigations, conceptual design, etc. may begin earlier.

Airfield Grading Contract

The airfield grading contract includes cutting into Mt. Ballyhoo to widen the obstacle free area. The excavated materials from this project are assumed to be used in the core of the fills into Unalaska Bay and Dutch Harbor which will support the runway extensions and runway safety area improvements on each end. This material will also create the platform for the relocation of Mt. Ballyhoo Road farther away from the runway. Preliminary geotechnical investigations indicate that these fills should be allowed to settle and will need to be monitored stabilized, which is expected to occur over the course of at least one year (based on other similar experiences in the Aleutians). Monitoring of fill settlement will confirm when it has stabilized. Paving on the airfield and the relocated Mt. Ballyhoo Road is assumed to be completed in the terminal area contract package, so that close-out of the grading package will not be delayed. This approach will also avoid two separate mobilizations of paving plants and equipment (one in each contract).

The existing Mt. Ballyhoo Road will continue to serve the community until the relocated Mt. Ballyhoo Road will have been paved.

Terminal Area Improvements and Paving Contract

The terminal area and paving contract package consists primarily of:

- Construction of the new airport terminal building; demolition of the old terminal
- Construction of the new air cargo building; demolition of the old cargo facilities

- Demolition of the Torpedo Building
- Construction of utilities, underground site improvements, and pavements to support the terminal and air cargo building
- Paving runway extensions
- Paving full width and length of the new RSAs
- Taxiway and apron improvement construction and paving
- Landside pavements including the relocated Mt. Ballyhoo Road, terminal area access roads, and parking lots

Airfield pavements are scheduled for construction approximately 18 months after completion of airfield and Mt. Ballyhoo Road relocation grading. The schedule assumes that the new terminal and cargo buildings will be completed, and that operations must be moved out of the existing buildings, before the existing building can be demolished. Contract documents will need to require close coordination between the construction contractor and ongoing operations to minimize the disruption and safety hazards that could occur in the area between the new terminal building and cargo building and the existing apron; while the existing buildings are demolished and the pavements are extended to the new buildings. Similar coordination will be required to safely accomplish the landside development. The schedule assumes that utility and underground site improvements construction will begin with the building construction and be substantially complete when the buildings are complete, however, some utility and underground work will likely continue while the existing buildings are demolished and the pavements are completed around the terminal area. Estimates assume that existing utility services to the vicinity of the terminal area are adequate for the new buildings.

5.4 Phase II (2026) Implementation Plan

5.4.1 Implementation Schedule

The planned schedule for implementation of the 2026 improvements and the planned time distribution of estimated costs is shown in the attached Figure 5-2, 2026 Implementation Plan.

A separate EIS and permitting will be required prior to implementation of the 2026 improvements. Environmental permitting required for construction of the planned improvements should run in parallel with the development of the EIS. Design development engineering will support both the EIS and environmental permitting efforts.

Construction of the improvements is assumed to be packaged into the following two construction contracts, which include significantly different types of work:

- The first contract package is the grading associated with airfield improvements and the relocation of Mt. Ballyhoo Road to clear the OFA
- The second contract package is for construction to replace buildings that must be removed to clear the OFA, and paving

Design completion and preparation of contract documents is estimated to require about one year, with the grading contract package starting soon after the record of decision on the EIS and permitting. The terminal area contract package should follow one year later. Prerequisite work like design surveys, geotechnical investigations, utility investigations, conceptual design, etc. should begin earlier.

Airfield Grading Contract

The grading contract is expected to include cutting into Mt. Ballyhoo to clear the OFA, and using the excavated materials in the core of the fills into Dutch Harbor, will support the relocation of Mt. Ballyhoo Road outside of the OFA beyond the runway end. Preliminary geotechnical investigations indicate that these fills should be allowed to settle until they have stabilized, which is expected to occur. Monitoring of fill settlement will confirm when it has stabilized. Paving is included in the building and paving contract package, so that close-out of the grading package is not delayed and to avoid two mobilizations of paving plants and equipment.

The Mt. Ballyhoo Road existing at that time will continue to serve the community until the relocated Mt. Ballyhoo Road is paved.

Terminal Area Improvements and Paving Contract

The building and paving contract package consists primarily of:

- Construction of new DOT&PF facilities (equipment storage, materials storage, shop), residence, and hangar on the northerly side of the runway, to clear the OFA
- Relocation of the Aerology building from the southerly side of the runway to clear the OFA
- Replacement of the two apartment buildings on utility hill to clear the OFA
- Construction of new pavements and utilities to support the changes are assumed.

Pavements are scheduled for placement approximately 18 months after completion of fills into Dutch Harbor. The schedule assumes that the new buildings are completed and occupied prior to demolition of the existing structures. The schedule assumes that utility and underground site improvements construction will begin with the building construction and will be substantially complete when the buildings are complete, however, some utility and underground work will likely continue while the existing buildings are demolished and the pavements are completed. Estimates assume that existing utility services to the vicinity of the terminal area are adequate for the new buildings.

Figure 5-1

2016 Implementation Pian
Unalaska Airport (DUT)
Unalaska, Alaska

Activity	2008	2009	2010	2011	2012	2013	2014	2015	2016	20017	Total
Environmental Impact Statement											
Estimated Amount, $ millions	$1.00	$1.50	$1.25	$0.75							$4.50
Environmental Permitting											
Negotiate Lease (3 acres in terminal area)											
Airfield/Mt. Ballyhoo Rd Grading Contract Package											
Engineering											
Contract Document Preparation											
Bid Assistance & Construction Support											
Bid & Award											
Airfield Construction											
Mobilization/Develop Sources/Stockpile Materials											
Fill/Armor - Dutch Harbor											
Fill/Armor - Unalaska Bay											
Close-out											
Quantities/Costs/Changes											
Record Drawings/Final Report											
ALP Update											
Estimated Contract Package Amount, $ millions				$0.69	$2.40	$15.11	$15.11	$1.03			$34.34
Terminal Area/Paving Contract Package											
Engineering/Architecture											
Contract Document Preparation											
Buildings Construction (terminal/cargo)											
Demolition (buildings, pavement, utilities)											
Utilities & Underground Site Work											
Paving (RSA/airfield, apron, roads, parking)											
Bid Assistance & Construction Support											
Bid & Award											
Construction											
Terminal & Cargo Building Construction											
Utilities & Underground Site Work											
Demolition (buildings, pavement, utilities)											
Paving (RSA/airfield, apron, roads, parking)											
Close-out											
Quantities/Costs/Changes											
Record Drawings/Final Report											
ALP Update											
Estimated Contract Package Amount, $ millions						$2.15	$14.29	$14.99	$3.02	$0.46	$34.92
Estimated Program Amounts, by year	$1.00	$1.50	$1.25	$1.44	$2.40	$17.26	$29.40	$16.02	$3.02	$0.46	$73.76

Assumptions:
1. EIS & Environmental Permitting costs are $4.5M.
1. Design costs will be about 10 of the 25 percentage points (about 40% of the amount budgeted for design, CA, & management.) This is spread evenly over the design period.
2. Bidding, construction services and management period will use the remaining 15 of the 25 percentage points, or 60% of the total. It is spread evenly over the duration of those services.
3. Airfield contract package construction costs are spread evenly over their 8 quarter duration
4. In the terminal area package, terminal building and cargo building construction are spread evenly their 6 calendar quarter duration.
5. In the terminal area contract package, all other construction costs are spread evenly over their 10 calendar quarter duration.
6. All paving, for both terminal area (apron, parking, access roads) and airfield (runway extensions, RSA, Mt. Ballyhoo Road) is included in the terminal area package.
7. Costs of leases or lease negotiations are not know, and so are not included here.

Legend
Ongoing activity
Lease acquisition
intermittent activity

Figure 5-2

2026 Implementation Plan
Unalaska Airport (DUT)
Unalaska, Alaska

Activity	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total, millions
Quarter	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	
Environmental Impact Statement											
Estimated Amount, $ millions	$0.75	$1.50	$1.25	$0.75							$4.25
Environmental Permitting											
Grading Contract Package											
Engineering											
Contract Document Preparation											
Bid Assistance & Construction Support											
Bid & Award											
Airfield Construction											
Mobilization/Develop Sources/Stockpile Materials											
Fill/Armor - Dutch Harbor											
Load, haul to upland site, place/dispose											
Close-out											
Estimated Contract Package Amount, $ millions				$1.88	$6.57	$41.29	$41.29	$2.82			$93.85
Building & Paving Contract Package											
Engineering/Architecture											
Contract Document Preparation											
Bid Assistance & Construction Support											
Bid & Award											
Construction											
Building Construction											
Utilities & Underground Site Work											
Demolition (buildings, pavement, utilities)											
Paving (apron, taxiways, roads, parking)											
Close-out											
Estimated Contract Package Amount, $ millions						$2.20	$7.55	$9.75	$7.55	$0.47	$27.53
Estimated Program Amounts, by year	$0.75	$1.50	$1.25	$2.63	$6.57	$43.50	$48.84	$12.57	$7.55	$0.47	$125.62

Assumptions:
1. EIS & Environmental Permitting costs are $4.2M.
1. Design costs will be about 10 of the 25 percentage points (about 40% of the amount budgeted for design, CA, & management.) This is spread evenly over the design period.
2. Bidding, construction services and management will use the remaining 15 of the 25 percentage points, or 60% of the total. It is spread evenly over the duration of those services.
3. Airfield contract package construction costs are spread evenly over their 8 quarter duration
4. In the buildings contract all costs are spread evenly over their 10 calendar quarter duration.
5. All paving is included in the buildings contract package to allow the fills in Dutch Harbor to settle before paving the relocated Mt. Ballyhoo Road.
6. All costes are estimated in 2007 dollars.
7. Mt. Ballyhoo will be excavated beyond the OFA line to create space to "catch" falling rock.
8. Fills in Dutch Harbor will create a platform to support the relocated Mt. Ballyhoo Road.
9. Mt. Bally Road will be relocated outside of the OFA and so that vehicles on it do not penetrate the approach surface.

Legend
Ongoing activity
Lease acquistion
intermittent activity

5.5 Capital Improvement Program (CIP)

5.5.1 Overview

The Alaskan airport system is comprised of two separate divisions: the Alaska International Airport System, which includes Anchorage and Fairbanks International Airports, and the Rural Aviation program consisting of 256 rural airports owned and operated by Alaska DOT&PF, such as Unalaska Airport. Alaska DOT&PFs Division of Statewide Aviation prepares policies, procedures, and programs to develop, operate, and manage these rural public airports, and allocates funding resources separately from the International Airport System. Currently, 260 Alaskan airports are listed in the National Plan of Integrated Airports System (NPIAS) and are eligible for federal funding. These 260 airports are further divided into primary, commercial service, and general aviation airports. Primary airports are large hub, medium hub, small hub, or non-hub airports. For capital improvement funding purposes, Unalaska Airport is classified in the NPIAS as a Primary, non-hub airport.

Evaluating the funding requirements of the Unalaska Airport Master Plan Capital Improvement Program (CIP) is an essential component of the overall planning process. The objective of this analysis is to identify the amounts and timing of estimated capital costs with projected capital funding sources.

The prioritization of projects included in the proposed CIP incorporates two basic considerations:

- Increasing operational standards and enhancing safety standards through the implementation of standard Runway Safety Areas
- Timing the need for expanded facilities relative to the introduction of a ARC B-III design aircraft, the Bombardier Q400

The 20-year development program for Unalaska Airport is divided into two phases: Phase I covers airfield and terminal improvements through 2016 including the RSAs, while Phase II includes projects through 2026, and is driven by the long term need to clear the OFA. Airport improvements over the 20-year planning period total approximately $191M; Phase I accounts for approximately $69M including $25M for RSA improvements, and Phase II accounts for approximately $121M.

The preliminary project cost estimates, depicted in Tables 5-2 and 5-3, are order-of-magnitude costs developed for programming and comparison purposes. Actual costs may differ because of changes to project design, labor and material costs, and competitive market conditions during the bidding and construction period. All costs are in 2007 dollars and are not escalated to account for future inflation. Cost estimates in the Unalaska Airport CIP include:

- Direct Construction Costs
- Common and Miscellaneous Construction Costs
- Design, Contract, and Administration Costs
- Markups

5.5.2 Sources of Capital Funding

The principal funding sources available for financing airport capital improvement projects are federal grants-in-aid, state grants-in-aid, and local revenue sources. Projected funding sources for airport improvement projects for Unalaska Airport are outlined in the following sections.

Federal Funding Sources

Airports obtain federal funding through the Airport Improvement Program (AIP), which was created by the Airport and Airway Improvement Act of 1982 to provide financial assistance for the development of a nationwide system of public-use airports adequate to meet the projected growth of civil aviation. Funds from this program are derived from the Airport and Airway Trust Fund. The Trust Fund guarantees a stable funding source whereby users pay for the services they receive in the form of user fees such as ticket taxes.

FAA Order 5100.38C, *AIP Handbook* sets forth the policies and procedures to be used for airport funding, and provides that AIP funds be allocated to airports as entitlement and discretionary funds. Federal entitlement funds are awarded based on activity (enplanements or cargo landed weight) at respective airports. Discretionary funds are awarded based on needs as determined by priorities of the FAA with safety projects ranking highest. Examples of eligible projects include airport planning, airport capacity enhancement, noise compatibility programs, and airfield improvement projects.

Congress controls the distribution of AIP funds, which may only be appropriated to airports included in the National Plan of Integrated Airport Systems (NPIAS), such as Unalaska Airport. The NPIAS identifies more than 3,300 commercial service, reliever, cargo service, and selected general aviation airports that are significant to national air transportation and therefore eligible for AIP grant funds. It also includes estimates of the amount of AIP money needed to fund infrastructure development projects that will bring these airports up to current design standards and add capacity to congested airports. AIP funds for NPIAS airports are distributed through grants administered by the FAA using a 90%-10% matching formula in all states except Alaska. In Alaska, the federal AIP share of the eligible project cost is 95 percent.[2]

As a Primary airport (a commercial service airport which enplanes more than 10,000 passengers annually), Unalaska Airport also receives passenger entitlement funds. The passenger entitlement apportionment is based on $7.80 for the first 50,000 passengers, $4.80 for the next 50,000 passengers, $2.60 for the next 400,000, $0.65 for the next 500,000, and $0.50 for each passenger boarding in excess of 1 million. In 2006, Unalaska Airport had an estimated 29,830 passenger enplanements and is projected to achieve 54,731 enplanements through the 2026 planning period.

State Funding Sources

While the principal source of funding for AIP-eligible projects is federal entitlement and discretionary funds, secondary funding is required from other state and local sources. The Alaska DOT&PF participates in the cost-sharing of federal projects by providing all or a portion of the local funding requirement. The FAA's AIP provides 95 percent funding of the eligible airport development costs in Alaska, while DOT&PF provides the remaining 5 percent (sponsor match). Other than sponsor match, virtually the entire Alaskan Airport

Capital Improvement Program is AIP funded.[2] In Federal FY06, the state obtained $197.4 million in AIP funding to improve state-owned airports.[2] Approximately $24 million annually is used for the DOT's seven primary airports, including Unalaska Airport. The State of Alaska also awards state entitlement and discretionary funds through its own Airport Improvement Program. Similar to the federal AIP, state entitlement funds are allocated to airports with scheduled air carrier service, such as Unalaska Airport, while any air carrier, reliever, or general aviation airport sponsor is eligible for state discretionary funds.

The State's project priority evaluation is based on project type, facility usage, and sponsor responsibility. DOT&PF scores improvement projects based on aviation criteria and guidance, and prepares detailed project nomination sheets and estimates for each project. Criteria include safety, health and quality of life, economic development, maintenance and operations issues, local capital contribution to project cost, and others. The project nomination goes through a regional screening and then is evaluated by the Aviation Project Evaluation Board (APEB), which is comprised of the three DOT&PF Regional Directors, Director of Statewide Aviation, and the Statewide Maintenance Director. This board scores project nominations from all around the state. The highest scoring projects are then ranked competitively in the Aviation Improvement Program schedule.[3]

Table 5-1 below depicts the most recent Alaska DOT&PF AIP spending plan for Unalaska Airport for FY03-09.

Table 5-1

Alaska Department of Transportation Public Facilities
Draft FFY '03-'09 Rural Airports AIP Spending Plan - Unalaska Airport

Airport Projects[1]	APEB score	Ph	FY'03	FY'04	FY'05	FY'06	FY'07	FY'08	FY'09	After FY'09
Unalaska Airport Env. Analysis --Stg 1	N/A	8	$1,000,000							
Unalaska Airport Env. Analysis --Stg 2	N/A	8						1,000,000		
Unalaska Airport Env. Analysis --Stg 3	N/A	8							1,000,000	
Unalaska Airport Terminal Master Plan	N/A	8			500,000					
Unalaska Airport Master Plan - Stg 2	N/A	8				1,418,682				
Unalaska Torpedo Bld Demolition & Clean Up	85	2,4								1,150,000
Unalaska Chemical Storage Building	54	2,4							1,500,000	
Unalaska: Snowblower and Push Boom Head	50	4						400,000		
Unalaska Mower (replace existing)	99	4								105,000
Unalaska Grader	49	4				278,538				
Unalaska ARFF Vehicle	50	4	624,000							

1. Source http://dot.alaska.gov/stwdav/forms/03-09RuralAirportsAIPSpendingPlan12.17.07.pdf

2 http://dot.alaska.gov/stwdav/forms/APEB_Process_Overview_Dec_2006.pdf

3 http://www.dot.state.ak.us/nreg/planning/aip.shtml

Local Funding Sources

DOT&PF serves as the primary contact point between the Airport and the FAA, and is responsible for maximizing the amount of federal Airport Improvement Program funding available. DOT&PF also manages the evaluation of capital improvement needs for Unalaska Airport, and develops a multi-year spending plan to fund the highest priority needs.

Sources of local funds typically include airport revenues, bond proceeds, and passenger facility charges (PFC). For Unalaska Airport, revenues include fees received from lease agreements including the passenger terminal, hangar rentals, fuel sales, and other fees imposed by DOT&PF. Currently, none of DOT&PF's primary non-hub airports participate in the PFC program. PFCs collected by DOT&PF at Anchorage International and Fairbanks are restricted from being used at other system airports.

Other Revenue Sources

Alaska DOT&PF currently has several lease agreements with the City of Unalaska, including a lease for the Airport terminal building. Revenues generated from lease arrangements are currently .076 cents per square foot/per year for aviation uses, and .109 cents per square foot,/per year for non-aviation uses. Lease rates are expected to increase to .65 cents per square foot/per year for both aviation and non-aviation uses, beginning in early 2008.

5.5.3 Phase I Project Components and Funding Elements

Federal funding participation is based on the AIP and assumes continued participation throughout the 20-year planning horizon. Under current FAA AIP guidelines, Unalaska Airport is classified as a non-hub, Primary[4] airport for funding eligibility purposes. As such, for FY2008 and beyond, eligible Phase I development projects may be 95 percent funded through the federal AIP program.[5] The remaining 5 percent share is subsidized via local and/or DOT&PF funds.

Runway Safety Areas

The FAA has placed a high priority on improving RSAs at FAR Part 139 commercial service airports. In accordance with FAA Order 5200.8, *Runway Safety Program*, new runway projects involving construction, reconstruction, or significant expansion shall also provide for improving the RSA. Reconstruction and significant expansion are considered as any project that results in changing the capability of the airport or the load-bearing strength of the pavement, restores the original design life of the pavement, or changes the actual or potential design aircraft use (as is the case for Unalaska Airport). The requirement to upgrade the RSA is applicable at all federally-obligated Part 139 airports, regardless of the potential funding source.

Beginning in 2016, dimensions of the already substandard RSA at Unalaska Airport will increase to accommodate the larger ARC B-III design aircraft. Preferred Airfield Alternative 3 remedies these and other safety and operational deficiencies, including providing full length ARC B-III RSAs beyond the runway thresholds and reduced RSA widths along isolated high-

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[4] NPIAS classification determines AIP funding eligibility

[5] FAA, Airport Improvement Program (AIP) Handbook, June 28, 2005

cost areas. This option was found to provide the highest degree of safety for the $25 million financial feasibility threshold determined by the FAA.

The RSA improvements in Preferred Alternative 3 are eligible for federal funding. The federal share for the required RSA improvement projects for Unalaska Airport is 95%[6], and the remaining 5% share will also be provided by the FAA.

Airfield Improvements (Non-RSA related)

The FAA's AIP Handbook sets forth the policies and procedures to be used to fund eligible airfield projects, including those improvements related to enhancing airport safety, capacity, security, and environmental concerns. In general, sponsors may apply for AIP funds on most airfield capital improvements or repairs except for revenue-generating development, such as the Unalaska Airport passenger terminal, or non-aviation development. Eligible airfield improvements include runway/taxiway construction and rehabilitation, apron construction/rehabilitation, airfield lighting, airfield signage, airfield drainage, land acquisition, etc.

Phase I airfield improvements for Unalaska Airport are safety and design standard related, and are eligible for 95 percent AIP federal funding, with the remaining 5 percent of costs to be funded by the DOT&PF.

Terminal Area Improvements

The Preferred Terminal Area Alternative, Alternative 3, was developed to accommodate a projected 83 percent increase in enplanements and 33 percent increase in aircraft operations through 2026. This option consists of demolishing and relocating the terminal and cargo facilities, as well as expanding and reconfiguring the terminal aircraft apron. Terminal relocation is necessary because of the need to enlarge the apron to accommodate the future B-III design aircraft (Q400). The land in which the terminal area facilities are currently situated is not capable of accommodating the proposed facility improvements. As a result, the development footprint will need to be enlarged and will require the use of approximately 3 acres of land south of the current landside facilities

DOT&PF intends to sublease the land for the terminal and parking to the City of Unalaska, who would build and operate the terminal and vehicle parking facilities. Building rent, concession revenues, and any other fees, such as potential parking fees, would offset the City's investment.

Roadways

The proposed access and bypass roadway projects in the vicinity of Unalaska Airport resolve violations of FAA standards and are eligible for 95% funding. Currently, two thoroughfares, Airport Beach Road and Mt. Ballyhoo Road, constitute obstructions to the FAR Part 77 Primary Surface, and future ARC B-III RSA/OFA. As such, Phase I roadway improvements include closing a portion of Airport Beach Road inside the Part 77 Primary Surface, as well as realigning Mt. Ballyhoo Road to clear the future ARC B-III RSA for Runway 30.

Table 5-2 below depicts the Capital Improvement Projects (CIP) for Phase I airfield improvements at Unalaska Airport.

[6] FAA, Airport Improvement Program (AIP) Handbook, June 28, 2005

Table 5-2
Unalaska Airport Capital Improvement Projects (CIP) - Phase I (2016)

Year(s)	Project Description	Total Cost	Federal/AIP Share	State Share	Third Party Share
			95%	5%	100%
	Airfield Improvements				
	Runway Safety Area Allocation				
2013-2014	Expand Runway 12 RSA	$4,839,841	$4,597,849	$241,992	
2013-2014	Expand Runway 30 RSA	$21,239,878	$20,177,884	$1,061,994	$0
	RSA Allocation Total	$26,079,719	$24,775,733	$1,303,986	**$0**
	Airfield Allocation				
2013-2014	Airfield Earthwork/Construction	$8,300,000	$7,885,000	$415,000	$0
	Airfield Improvements Total	**$34,379,719**	**$32,660,733**	**$1,718,986**	**$0**
	Roadway Improvements				
2013-2014	Mt. Ballyhoo Road Realignment	**$180,926**	**$171,880**	**$9,046**	**$0**
	Terminal Area Improvements*				
	Construction				
2014-2015	Terminal Building	$21,371,540	$0	$0	$21,371,540
2014-2015	Cargo Building	$2,516,839	$0	$0	$2,516,839
2014-2015	Apron	$3,661,126	$3,478,070	$183,056	$0
2014-2015	Parking	$2,724,780	$0	$0	$2,724,780
2014-2015	Access Road	$2,332,134	$2,215,527	$116,607	$0
2014-2015	Misc. Site Improvements	$1,452,581	$1,379,952	$72,629	$0
	Demolition				
2015-2016	Terminal, Torpedo, Cargo Buildings	$861,399	$818,329	$43,070	$0
	Terminal Area Improvements Total	**$34,920,399**	**$7,891,878**	**$415,362**	**$26,613,159**
2016	**Phase I Project Totals**	**$69,481,044**	**$40,724,491**	**$2,143,394**	**$26,613,159**

*Includes Design/Contract Admin/Management costs

5.6 Phase II Project Components and Funding Elements

Phase II airport improvements are expected to be accomplished by the end of the 2026 planning period. The primary goal of Phase II is to further bring the Airport into compliance with FAA standards, specifically, to clear the ARC B-III OFA of objects non-essential for air or ground navigation.

5.6.1 Airfield/Roadways

Phase II airfield improvements consist of cutting into the toe of Mt. Ballyhoo to clear the ARC B-III OFA, and the excavated material will be used to fill Dutch Harbor to support the realignment of Mt. Ballyhoo Road outside of the OFA beyond the runway end. Additionally, the revetment hangar will be demolished, and Airport staff housing, ARFF/maintenance/administration facilities, and Ramp B hangars will be demolished and relocated farther away from the runway in order to clear the ARC B-III OFA north of the Airport.

Other Facilities

Other long-term 2026 OFA improvements include the relocation of the Aerology building from its current location to a location outside of Airport property, demolition and relocation of two housing units on utility hill, and building modifications to the power plant southeast of the Airport.

According to the AIP Handbook, the costs of removal and relocation of non-AIP eligible facilities constituting airport hazards, or those facilities that must be moved to carry out an

AIP project, are allowable up to the appraised value. The market value and the costs associated with demolition and removal are eligible, minus any salvage value. The relocation of a structure or facility to another location on the airport in lieu of purchase is also eligible up to the market value of the facility, and nominal incidental costs of the relocation, e.g. extinguishing a lease, may be included. Multiple objects exist inside the OFA at Unalaska Airport and will be removed upon the completion of the Phase II improvements. As such, Unalaska Airport is eligible for 95 percent federal AIP funding, with the remaining 5 percent of costs to be allocated among state and local resources.

Table 5-3 below depicts the Capital Improvement Projects (CIP) for Phase II airfield improvements at Unalaska Airport.

Table 5-3
Unalaska Airport Capital Improvement Projects (CIP) - Phase II (2026)

Year(s)	Project Description	Total Cost	Federal/ AIP Share	State Share	Third Party Share
			95%	5%	100%
	Airfield/Roadways				
2023-2024	Hangar/Building Excavation/Clear OFA	$2,459,200	$2,336,240	$122,960	$0
2023-2024	Excavation of Mt. Ballyhoo/Clear OFA	$10,345,600	$9,828,320	$517,280	$0
2023-2024	Excavation of Utility Hill/Clear OFA	$958,240	$910,328	$47,912	$0
2023-2024	Mt. Ballyhoo Road Realignment	$61,314,937	$58,249,190	$3,065,747	$0
	Airfield/Roadways Total	**$75,077,977**	**$71,324,078**	**$3,753,899**	**$0**
	Buildings				
	Demolition to Clear OFA				
2024-2025	Utility Hill Housing Unit 1	$24,123	$22,917	$1,206	$0
2024-2025	Utility Hill Housing Unit 2	$22,027	$20,926	$1,101	$0
2024-2025	Airport Staff Housing	$12,236	$11,624	$612	$0
2024-2025	Revetment Hangar	$72,169	$68,561	$3,608	$0
2024-2025	ARFF/Admin/Maint. Building	$323,207	$307,047	$16,160	$0
2024-2025	Hangar 1 B Ramp	$230,953	$219,405	$11,548	$0
2024-2025	Hangar 2 B Ramp	$358,021	$340,120	$17,901	$0
	Demolition Total	**$1,042,736**	**$990,599**	**$52,137**	**$0**
	Relocate/Modify Facilities to Clear OFA				
2024-2025	Aerology Building Relocation	$1,112,176	$1,056,567	$55,609	$0
2024-2025	Electric Plant Modification	$500,000	$475,000	$25,000	$0
	Relocation/Modify Total	**$1,612,176**	**$1,531,567**	**$80,609**	**$0**
	Contruction				
2025-2026	Utility Hill Housing (2 Units)	$3,413,448	$3,242,776	$170,672	$0
2025-2026	Airport Staff Housing	$1,904,995	$1,809,745	$95,250	$0
2025-2026	ARFF/Admin/Maint. Building	$21,657,140	$20,574,283	$1,082,857	$0
2025-2026	Hangar 1 B Ramp	$5,645,503	$5,363,228	$282,275	$0
2025-2026	Hangar 2 B Ramp	$11,020,036	$10,469,034	$551,002	$0
	Construction Total*	**$43,641,122**	**$41,459,066**	**$2,182,056**	**$0**
2026	**Phase II Project Totals**	**$121,374,011**	**$115,305,310**	**$6,068,701**	**$0**

*Includes Design/Contract Admin/Management costs

5.7 Preliminary Comparison of Cost and Benefits

5.7.1 Project Purpose

The purpose of this section is to compare the projected costs of the first phase (2016) operational improvements of the preferred 2026 plan to the expected benefits to Unalaska Airport and the community of Unalaska. The results of this evaluation provides a preliminary order-of-magnitude comparison of project benefits and costs, and identifies issues that will require additional evaluation in the full Benefit-Cost Analysis (BCA) following the Unalaska Airport EIS.

The preferred 2026 plan consists of multiple projects that will be accomplished in a phased construction. For the purposes of this evaluation, benefit-cost consideration was given only to Phase I (2016) improvements that directly benefit users of Unalaska Airport, and reflects only the runway expansion, roadway/access enhancements, and terminal apron improvement projects. Other Phase I projects, such as the required RSA improvements (and associated $25M RSA funding allocation), are safety-mandated and are not considered in this preliminary benefit-cost evaluation, as they will not be considered toward the Benefit-Cost ratio in the formal BCA that is required prior to federal funding. Additionally, revenue-generating leased property operated by third-party tenants (i.e. City of Unalaska), such as the new airport terminal, parking, and air cargo facilities, are not considered for public funding and therefore are excluded from this analysis as well.

5.7.2 Project Description

Phase I airport improvement components included in this preliminary evaluation, and the general benefits of each, are described in the following project description summary.

Runway Extension

The planned runway extension at Unalaska Airport is intended primarily to accommodate faster, larger, more modern and efficient ARC B-III aircraft, currently assumed to be the Bombardier Q400. The extended runway will allow ARC B-III aircraft to fly nonstop to distant locations such as Anchorage, eliminate fueling stops, and carry more passengers, luggage, and cargo by allowing near-maximum takeoff weights with minimal payload restrictions. Passengers will also experience shorter flight times due to higher cruise speeds and improved comfort.

Terminal Apron Improvements

Phase I terminal apron improvements will replace apron lost due to the increase in ARC from B-II to B-III, and enable the Airport to accommodate the current and projected aircraft volumes. Peak period demand also includes added cargo flights and charter activity, all of which is accommodated on the improved aircraft apron. Air cargo operators will benefit from more expedient cargo enplaning, deplaning, and delivery operations.

Airport Access Improvements

Phase I projects include improving access to the Airport terminal area via Airport Beach Road, as well as enhanced curbside passenger pick-up and drop-off areas. These improvements will yield important benefits such as reduced landside delay for passengers, meeters/greeters, and airport employees attempting to get to and from Unalaska Airport. Airport access is also enhanced by improvements to Mt. Ballyhoo Road southeast of the Airport.

5.7.3 Assumptions

Assumptions that affect costs will vary with market conditions and fuel prices, and will be determined at the time of the BCA. For the purpose of this comparison, the following assumptions were made:

- Base Case –The base case focuses on the ARC B-III runway expansion and a reconfigured terminal apron to accommodate larger ARC B-III critical aircraft. Airport-area roadway improvements to enhance airport access are included in the base case as well. No additional scenarios are considered.

- Period of analysis assumes improvements will be implemented by 2016
- All values are expressed in 2007Constant Dollars
- Passenger service fleet currently consists of the ARC B-II Saab 340B and will be replaced by a larger ARC B-III critical aircraft beginning in 2016
- Total aircraft block operating costs for Alaskan air carriers operating turboprop aircraft with 20 or more seats average $1,132[7] per flight hour. For this analysis, PenAir block operating costs of approximately $1500 per flight hour for the Saab 340B was used[8]
- The value of passenger time saved as a result of airport improvements is calculated at $40.10 per hour

5.7.4 Estimate of Costs

Project costs refer to the capital resources required to carry out Phase I airport improvements. For the purposes of this estimate, only costs associated with the runway extension, terminal apron expansion, and roadway improvements are considered. These costs are projected to total approximately $11M (of the $69M total) through the 2016 planning period, excluding operations and maintenance costs. The extension of Runway 12/30 requires approximately $8M in capital costs, to be incurred incrementally in 2013 and 2014. Terminal apron and access/roadway improvements total approximately $2M and $430K, respectively, and are expected to be incurred in 2013 as well. All costs are in 2007 constant dollars and are not escalated to account for future inflation. Cost estimates in this preliminary evaluation include:

- Direct Construction Costs
- Common and Miscellaneous Construction Costs
- Design, Contract, and Administration Costs
- Markups

Table 5-4 below summarizes the capital costs of Phase I airport improvements.

Table 5-4
Capital Costs for Phase I Preliminary Benefits-Cost Comparison

Improvement Project	Phase I Capital Cost
Airfield	
Runway Expansion	**$8,300,000**
Terminal Area/Roadways	
Apron	**$2,177,460**
Access/Road Improvements	**$435,957**
TOTALS	**$10,913,417**

Source: CH2M HILL, February 2008

7 *ECONOMIC VALUES FOR FAA INVESTMENT AND REGULATORY DECISIONS*, GRA Incorporated (For FAA), 2004

8 Interview with Danny Seybert and Brian Carricaburu of PenAir, February 2008

5.7.5 Estimate of Benefits

Estimation of the total quantitative and qualitative benefits attributable to Phase I improvements at Unalaska Airport is accomplished through a brief evaluation of aircraft operating costs, passenger value of time, convenience, and airport operational efficiencies.

5.7.6 Phase I Quantitative Benefits

Unalaska Airport is more than just a significant economic asset to the community of Unalaska: without the Airport, the fishing-industry-based economy of Unalaska could not exist. Given that Unalaska is the biggest U.S. fishing port in terms of landed weight, this economic value goes well beyond the region. The below quantitative benefits of Phase I airport improvements are expressed in terms of expected value to the users of the Airport.

- Approximately 700 Unalaska-bound flights per year require a refueling stop, consuming an estimated 37 additional minutes per flight. By eliminating the additional refueling stop, passengers will save an additional 432 hours annually, equating to approximately $17,323 per passenger in gained productivity

$$\frac{\text{37 minutes X 700 refueling stops}}{\text{60 minutes}} = \text{432 hours total time per passenger}$$

432 hours X $40.10/hour passenger value of time = $17,323 per passenger

- Approximately 38,198 enplanements are forecast for Unalaska Airport in 2016. By eliminating the refueling stop and assuming an average 90% load factor for Unalaska-bound flights, passengers will collectively realize approximately 21,200 hours, or an estimated $850,120, in accrued productivity benefits annually

$$\frac{\text{38,198 enplanements X .9 Load Factor X 37 minutes}}{\text{60 minutes}} = \text{21,200 hours}$$

21,200 hours X $40.10 passenger value of time = $850,120

- Elimination of the refueling stop will decrease aircraft block operating costs for inbound Unalaska flights, primarily due to time and fuel savings. Assuming costs of $1,500/flight hour for 432 hours, PenAir will realize approximately $648K savings in annual operating costs

The following quantitative benefits do not have an assigned numerical value due to a lack of quantifiable data available at the time of this evaluation. However, it is reasonable to assume that the following benefits provide significant economic benefits to the users of Unalaska Airport and will need to be quantified at the time of the BCA:

- ARC B-III aircraft will eliminate the need to substitute passenger baggage with revenue-generating air cargo. This will benefit passengers by decreasing the level of inconvenience associated with delayed bags. Air carriers will benefit through reduced costs associated with returning delayed bags to passengers.
- A new apron with increased capacity will a avoid loss of capacity and revenue benefits associated with apron facility failure

- Passengers, meeter/greeters, and airport and airline employees will realize reduced delays getting to and from the Airport
- Improved landside access to air cargo facilities will allow for reduced laborer-truck hours for shippers delivering bulk seafood products

Other quantitative benefits are likely to exist and will be fully evaluated in the full EIS Benefit-Cost Analysis.

5.7.7 Phase I Qualitative Benefits

Unalaska Airport provides the community of Unalaska essential access to services and supplies, enhances the quality of life of residents, and helps maintain a competitive environment for the fish harvesting and processing industry. As such, significant social and economic benefits are generated by the Airport, but are difficult to represent with an assigned quantitative value. The following points represent some of the qualitative benefits, such as increased convenience, that will be realized by Phase I airport improvements.

- Unalaska passengers will benefit from improved schedule predictability and seat availability due to the increased number of seats on the larger ARC B-III aircraft which will be accommodated by the runway and a larger, more efficient terminal apron
- Aircraft operators will be able to make more efficient use of personnel and equipment
- Increased apron capacity will allow Unalaska aircraft operators, passengers, and cargo shippers to place more confidence in flight availability due to the reduced number of operations that experience delay events (exclusive of weather delays)
- Improved airport access will allow for better accommodation of vehicular traffic peaking activity associated with the various Unalaska air travel demand components
- Improved airport access supports and encourages transportation services to the Airport to meet the travel needs of passengers, employees, and other airport visitors
- Improved airside access to air cargo handling facilities will increase labor efficiency and relieve congestion through dedicated air cargo aircraft parking facilities
- Increased cargo lift capacity as a result of larger ARC B-III aircraft will allow for the carriage of larger quantities of higher value fresh seafood to market

Other qualitative benefits are likely to exist and will be fully evaluated in the full EIS Benefit-Cost Analysis.

5.7.8 Summary

The FAA requires airport sponsors to conduct a Benefit-Cost Analysis (BCA) to demonstrate the merit of improvement projects. A BCA evaluates all costs and benefits accruing to the aviation public, including airport sponsors, tenants, and users, and determines whether it is economically worthwhile to implement planned projects. Project costs and benefits are compared using a Benefit-Cost Ratio and other values, and improvement projects resulting in a positive Benefit-Cost Ratio of 1.0 or higher are generally considered to have significant benefits to the airport and the community.

The estimated costs associated with Phase I improvements total approximately $11M (of the $69M total for Phase I projects)through the 2016 planning period, excluding operations and maintenance costs. Based on this preliminary evaluation of qualitative and quantitative benefits, total project benefits are expected to significantly exceed total costs of improvements, and thus result in a favorable cost-benefit determination (1.0 or greater). However, this preliminary assessment is not intended to be a comprehensive BCA estimate. As such, additional evaluation of all costs and benefits will be provided in the full Benefit-Cost Analysis following completion of the Unalaska Airport EIS.

Appendix A
City Resolution for ARC B-III Airfield

CITY OF UNALASKA
UNALASKA, ALASKA

RESOLUTION NO. 2006-17

A RESOLUTION OF THE UNALASKA CITY COUNCIL IN SUPPORT OF B-III DESIGNATION FOR THE UNALASKA AIRPORT.

WHEREAS, the FAA (Federal Aviation Administration), in conjunction with ADOT (Alaska Department of Transportation), is currently in a pre-planning phase leading to the development of an EIS (Environmental Impact Statement) with regards to certain improvements at the Unalaska Airport, which is owned and operated by the Alaska Department of Transportation, and

WHEREAS, the FAA has hired a third party contractor, CH2MHill, who is paid by ADOT via a memorandum of understanding, to develop the planning documents that will lead to the scoping phase for the EIS in the NEPA process, and

WHEREAS, the ADOT has been in the process of developing a 20 year Master Plan for the Unalaska Airport that was initiated in 2000 and completed in 2003; both ADOT and FAA consultants forecasted that the Unalaska Airport will experience a significant increase in passenger and cargo traffic over the next twenty years, and

WHEREAS, the FAA is tasked nationally to review airports and make improvements to the Safety Areas of runways and the Unalaska Airport runway is a facility identified as needing improvements, and

Whereas, the FAA is recommending that the design aircraft for the Unalaska Airport be a B-II designation and has developed a preferred alternative with limited community input, and

Whereas, Peninsula Airways, Unalaska's service provider, has written a letter to the FAA indicating that within the next two years, they will be looking into the process of phasing in upgrades to their fleet from B-II aircraft to B-III aircraft, and

Whereas, the ADOT, City of Unalaska, and Peninsula Airways all agree that the design aircraft for the Unalaska Airport should be a B-III designation.

NOW THEREFORE BE IT RESOLVED by the Unalaska City Council that the following recommendations be incorporated into the NEPA process for the EIS for the Unalaska Airport:

1. A dispute resolution process be drafted and agreed upon between the FAA and the ADOT.
2. That the FAA grant to the City of Unalaska Cooperating Agency status in the NEPA process.
3. The design aircraft used for the EIS for the Unalaska Airport be included in the NEPA process as the B-III designation.
4. The economic and socio-economic, as well as cargo, impacts to the Unalaska Airport be incorporated in the NEPA process.
5. Better communication with the Unalaska public be included in the process.
6. Assurances that every effort will be made by ADOT and FAA to perform the EIS in 18 months as opposed to 3 or more years.

PASSED AND ADOPTED BY A DULY CONSTITUTED QUORUM OF THE UNALASKA CITY COUNCIL THIS 14th DAY OF March, 2006.

MAYOR

ATTEST:

CITY CLERK

Appendix B
Environmental Overview

APPENDIX B

B. Environmental Overview

This section describes the existing conditions of the natural and built environment in the Unalaska Airport study area (Exhibit B-1). This section is divided into environmental categories required under FAA Order 1050.1E: Environmental Impacts: Policies and Procedures for documentation associated with the National Environmental Policy Act (NEPA).

B.1 Air Quality

Air quality in the Unalaska area is generally good and likely meets all National Ambient Air Quality Standards (NAAQS) set by the US Environmental Protection Agency, although air quality here is not actively monitored. Due to the high levels of sulfur dioxide emissions in Unalaska, however, the city is within a Special Protection Area for sulfur dioxide (18 Alaska Administrative Code (AAC) 50.025), which has more stringent requirements for these emissions. Sulfur dioxide is released by power generating plants but is also present in high concentrations in marine fuel. Diesel fuel used in the Special Protection Area may not exceed 0.075 percent sulfur by weight, and diesel generators or engines may not be used (ASCG 2001). Other air quality pollutants are not monitored in Unalaska.

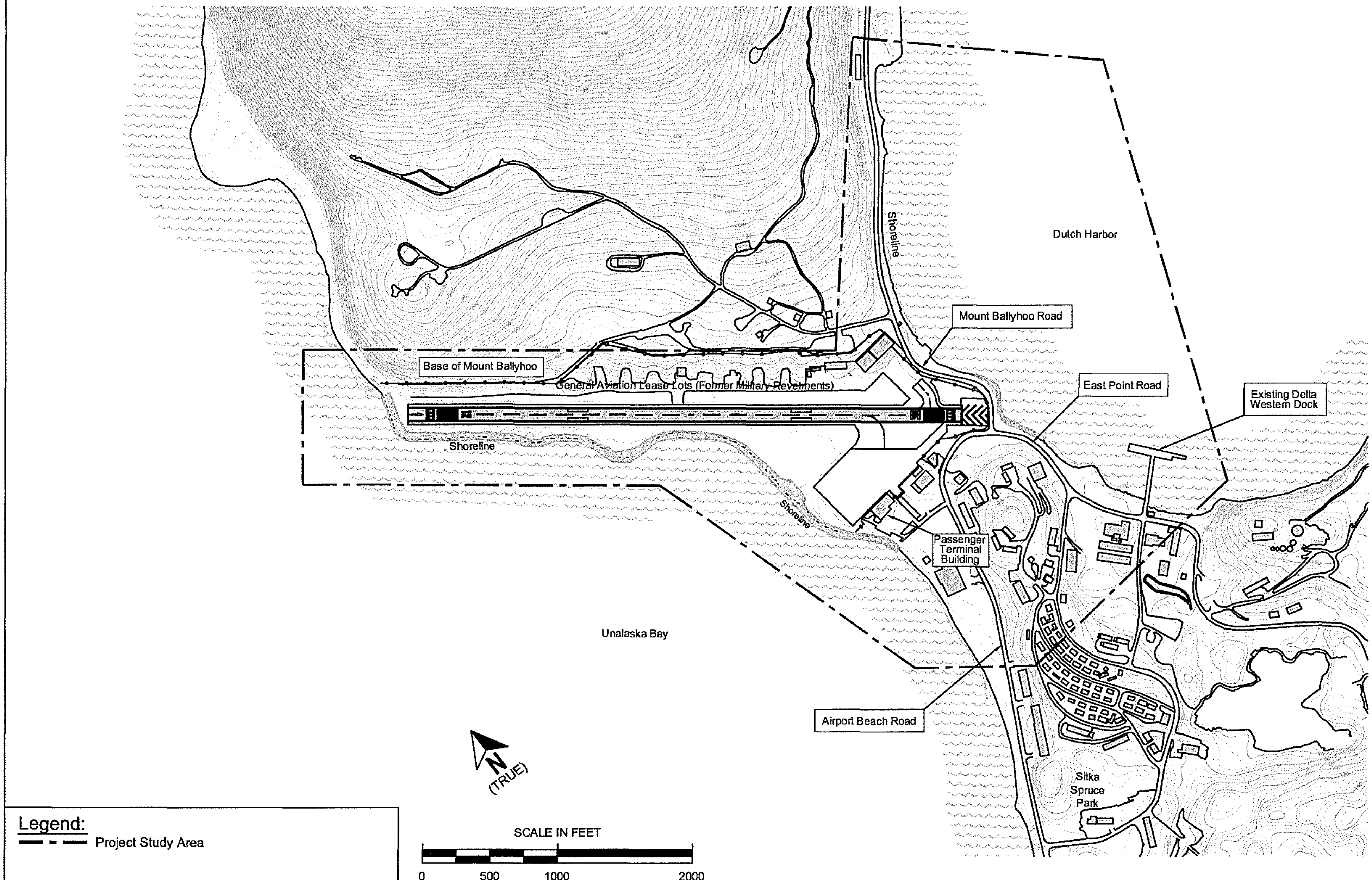
B.2 Noise

FAA uses the Day-Night Average Sound Level (DNL), measured in decibels, to evaluate aircraft related noise impacts. Measurements of sound levels throughout a 24-hour period are averaged to create contours of the noise, which are then used to evaluate compatibility of the aircraft noise with land uses within the contours. Modeling of these contours is influenced by the type of aircraft used, the number and time of day of operations, the direction of landings and departures, and predominant wind directions.

The last noise contours developed for Unalaska Airport were in 1982 as part of the Unalaska Airport Master Plan 1982-2000 (USKH 1982). No newer information about aviation noise exposure is available for Unalaska at this time.

B.3 Compatible Land Use

Unalaska Airport occupies 105 acres of land owned by the State of Alaska, DOT&PF. Adjacent land uses include Mount Ballyhoo along the east side, Unalaska Bay along the west side, commercial property to the south (owned by the Ounalashka Corporation and currently leased to FTS) and the firehouse and City power plant and marine-oriented commercial and light industrial businesses along East Point Drive to the southeast. Single and multi-family residences are present along Biorka Drive and Driftwood Way further to the south.



CH2MHILL

Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Project Study Area

Exhibit B-1

Source: AC/150 5300-13 R8, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

May 2007

The City of Unalaska includes the main part of the city on Unalaska Island, as well as all of Amaknak Island except for the airport. Most land within the City is owned by the Ounalashka Corporation, the State or the City. Zoning on airport land is Public/Quasi-Public and zoning of adjacent properties include Marine Related/Industrial to the north and High Density Residential, General Commercial and Marine Dependent/Industrial to the south. Future land uses that would be allowed within these zones would likely be compatible with airport noise levels, with the exception of the High Density Residential zone. This zone allows uses that are not considered compatible with noise levels above DNL 65, including residential, schools, and churches, and hospitals and nursing homes, which are conditional uses. The General Commercial zone also allows mobile home parks and residential dwellings as conditional uses, which would not be compatible with noise levels above DNL 65.

B.4 Coastal Resources

All of Amaknak Island is within the coastal zone, as defined by the Alaska Coastal Management Program. Unalaska is located within the Aleutians West Coastal Resource Area (AWCRA), which is responsible for managing the coastal resources from Amaknak Island west to the end of the Aleutian chain. AWCRA recently updated its' Coastal Management Plan in 2006. This plan provides an inventory of natural resources within the coastal zone, and "guidance for sound development and uses of coastal resources while ensuring wise management of resources, compliance with environmental protection criteria, and the maintenance of important habitats" (AWCRSA 2006).

These policies are considered enforceable and state resource agencies and municipalities are given enforcement responsibility for these policies under Alaska Statute 46.40.100. Enforcement of these policies occurs during the permitting process, when consistency with the Coastal Management Plan is determined.

Specific policies that may affect development at Unalaska Airport include:

Policy A-2, Dredge and Fill Requirements: Placement of fill in coastal water shall be located, designed, constructed, operated, and maintained to limit the extent of direct disturbance to the minimum area necessary to accommodate the proposed purpose or use. In doing so, the applicant shall implement a Best Managements Practices Plan that he/she provided as part of the project application.

Policy A-3, Disposal of Dredged Materials: Dredged materials placed on tidelands shall not cause significant adverse changes to shoreline processes, such as sediment transport, coastal erosion, and deposition patterns. Offshore disposal of dredge material shall avoid significant adverse impacts to coastal resources.

Policy I-1, Cultural and Historic Resource Areas: The evaluation and protection of historic and archaeological values of an area proposed for development within the designated area as described in the introduction to *Section I* shall be part of project planning. In addition to the requirements of the State Historic Preservation Officer, the developer shall:

a) evaluate the potential for encountering historic and archaeological resources by contacting the Museum of the Aleutians

b) prepare a plan based on the evaluation for protecting historic and archaeological resources found on the site during construction and incorporate it into the project description;

c) report observations of undocumented cultural resources to the landowner and the Museum of the Aleutians.

Policy I-2, Resource Protection: Uses and activities which may adversely affect cultural resource areas within the designated area as described in the introduction to *Section I* shall comply with the following standards:

1. artifacts of significant historic, prehistoric, or archaeological importance shall not be disturbed during project development unless the State Historic Preservation Office in consultation with the landowner authorizes such disturbance;

2. where disturbance is authorized an artifact curation agreement shall be prepared by the developer in consultation with the landowner, Museum and the appropriate state or federal preservation authorities; and

3. where previously undiscovered artifacts or areas of historic, prehistoric, or archaeological importance are encountered during development, the discovery shall be protected from further disturbance pending evaluation by the State Historic Preservation Office and the Museum of the Aleutians.

Policy K-1, Siting of Material Sources: To the extent practicable, coastal sources of sand and gravel shall be approved in the following sequence:

a) existing approved gravel pits or quarries operated in compliance with state and federal authorizations ;

b) reuse of material from abandoned development area, unless reuse could cause more environmental damage than non-use or the material is contaminated; and

c) beaches that are not within designated important habitats, recreation or subsistence areas.

Policy K-2, Sand and Gravel Extraction Operations: Sand and gravel extraction operations in coastal floodplains shall be located and designed to minimize adverse changes to channel hydraulics and the potential for channel diversion through the extraction site, unless specifically designed to reduce erosion or flooding threats.

These updated and directly applicable policies took effect March 1, 2007.

B.5 Floodplains

There are no mapped floodplains in the study area. Storm surges do inundate the north end and east side of the runway several times annually and the airport is susceptible to a 100-year storm surge flood (ASCG 2001). Additional shoreline constructed as part of the airport would be susceptible to this flooding as well.

B.6 Fish, Wildlife and Plants

This section provides an overview of the fish, wildlife and plants present in the Unalaska Airport area. The marine environment, and the plants and animals present within it, dominate this section because of the minimal diversity of terrestrial plant and animal life in the study area.

B.6.1. Marine Environment

The marine environment in the study area is divided into two geographic areas, Unalaska Bay and Dutch Harbor (Exhibit B-1). The physical habitat is divided into intertidal, shallow subtidal (4 to 30 feet mean lower low water [MLLW]), and deeper subtidal (30 to 80 feet MLLW). Table B-1 lists species identified in these habitats in both Unalaska Bay and Dutch Harbor.

Information used to describe marine habitat came from two studies conducted within the study area. The first was conducted in 1980 and was conducted only in Unalaska Bay and was based on SCUBA diver observations (ADOT&PF 1980). The second study was conducted in November 2006 using underwater videography. The video transects documented in this study are shown in Exhibits B-2, B-3, and B-4. In addition, benthic grabs were employed to examine organisms found in harbor sediments. A detailed description of these ecosystems is included is Attachment B-1.

TABLE B-1
Marine Flora and Fauna of Unalaska Bay and Dutch Harbor
Unalaska Airport Master Plan Update

Zone	Plant/Animal Type	Species	*Scientific Name*	Presence in	
				Unalaska Bay	Dutch Harbor
Intertidal					
Upper	Plants	sea lettuce	*Ulva* spp.	X	X
		rockweed	*Fucus gardneri*	X	X
	Invertebrates	acorn barnacle	*Balanus glandula*	X	X
		Limpet	*Collisela spp.*	X	X
		whelk	*Nucella emarginata*	X	X
		blue mussel	*Mytilus trosselus*	X	X
Middle	Plants	sea lettuce	*Ulva* spp.	X	
		Northern mazza weed	*Mazzaella heterocarpa*	X	
		Laver	*Porphyra* sp	X	
		brown kelp	*Alaria* sp	X	
	Invertebrates	thatched barnacles	*Balanus cariosus*	X	
		proliferating anemone	*Epiactis prolifera*	X	
		Limpet	*Collisela spp.*	X	
		large chiton	*Katharina tunicata*	X	

TABLE B-1
Marine Flora and Fauna of Unalaska Bay and Dutch Harbor
Unalaska Airport Master Plan Update

Zone	Plant/Animal Type	Species	*Scientific Name*	Presence in	
				Unalaska Bay	Dutch Harbor
		whelk	*Nucella emarginata*	X	
Lower	Invertebrates	thatched barnacle	*Balanus cariosus*	X	
		Whelk	*Nucella emarginata*	X	
Shallow Subtidal					
< 10 feet	Plants	sieve kelp	*Agarum clathratum*	X	X
		dragon kelp	*Alaria fistulosa*	X	
	Invertebrates	clam	Unknown sp.	X	
> 10 feet	Plants	sieve kelp	*Agarum clathratum*	X	
		split kelp	*Laminaria bongardiana*	X	
		witch's hair	*Desmarestia aculeata*	X	X
		rusty rock	*Hildenbrandia rubra*	X	
		rock crust	*Lithrothamnion phymatodeuam*	X	
		green algae	Unknown sp.		X
		Folios red algae	*Rhodophysta sp.*		X
	Invertebrates	white plumed anemone	*Metidium giganteum*	X	
		sunflower star	*Pycnopodia helianthoides*	X	X
		green sea urchin	*Strongylocentrotus droebachiensis*	X	X
		White plumed anemone	*Metidium giganteum*		X
		White plumed anemone	*Metidium giganteum*		X
		painted anemone	*Urticina crassicornis*	X	
		hairy triton snail	*Fusitriton oregonensis*	X	
		Alaska false jingle	*Pododesmus macroschisma*	X	
		Chiton	*Tonicella lineata*	X	
		hermit crab	*Paguris* spp.	X	
		sea cucumber	*Cumaria miniata*	X	
			Eupentacta pseudoquinquesemita		
		false ochre star	*Evasterias troschelii*	X	
	Fishes	sculpin	*Cottidae*	X	
		unidentified flatfish	*Pleuronectidae*	X	

TABLE B-1
Marine Flora and Fauna of Unalaska Bay and Dutch Harbor
Unalaska Airport Master Plan Update

Zone	Plant/Animal Type	Species	*Scientific Name*	Presence in	
				Unalaska Bay	Dutch Harbor
Deeper Subtidal					
> 30 feet	Plants	dragon kelp	*Alaria fistulosa*	X	
		sieve kelp	*Agarum clathratum*	X	X
		split kelp	*Laminaria bongardiana*	X	X
		witch's hair	*Desmarestia aculeata*	X	
		mixed red algae	*Rhodophyta* sp.	X	
		rock crust	*Lithrothamnion phymatodeuam*	X	
		Folio's red algae	*Rhodophyta sp.*		X
	Invertebrates	hermit crab	*Elassochirus* sp.	X	
		hairy triton snail	*Fusitriton oregonensis*	X	
		false ochre star	*Evasterias troschelii*	X	
		blood star	*Henricia leviuscula*	X	
		Stimpson's sun star	*Solster stimpsoni*	X	
		giant Pacific chiton	*Cryptochiton stelleri*	X	
		brittle star	*Ophiopholis* spp.	X	
		polychaete worm	*Owenia fusiformis*	X	X
		spoonworm	*Bonelliopsis* sp.	X	
		Burrowing anemone	*Halcampia duedecimcirrata*	X	
		White plumed anemone	*Metidium giganteum*		X
		Clam	Unknown sp.		X
		Sunflower star	*Pycnopodia helianthoides*		X
	Fishes	pacific cod	*Gadus macrocephalus*	X	
		great sculpin	*Myoxocephalus polyacanthocephalus*	X	
> 60 feet	Fish	Snake prickleback	*Lumpenus sagitta*		X

Source: CH2M HILL analysis, 2006.

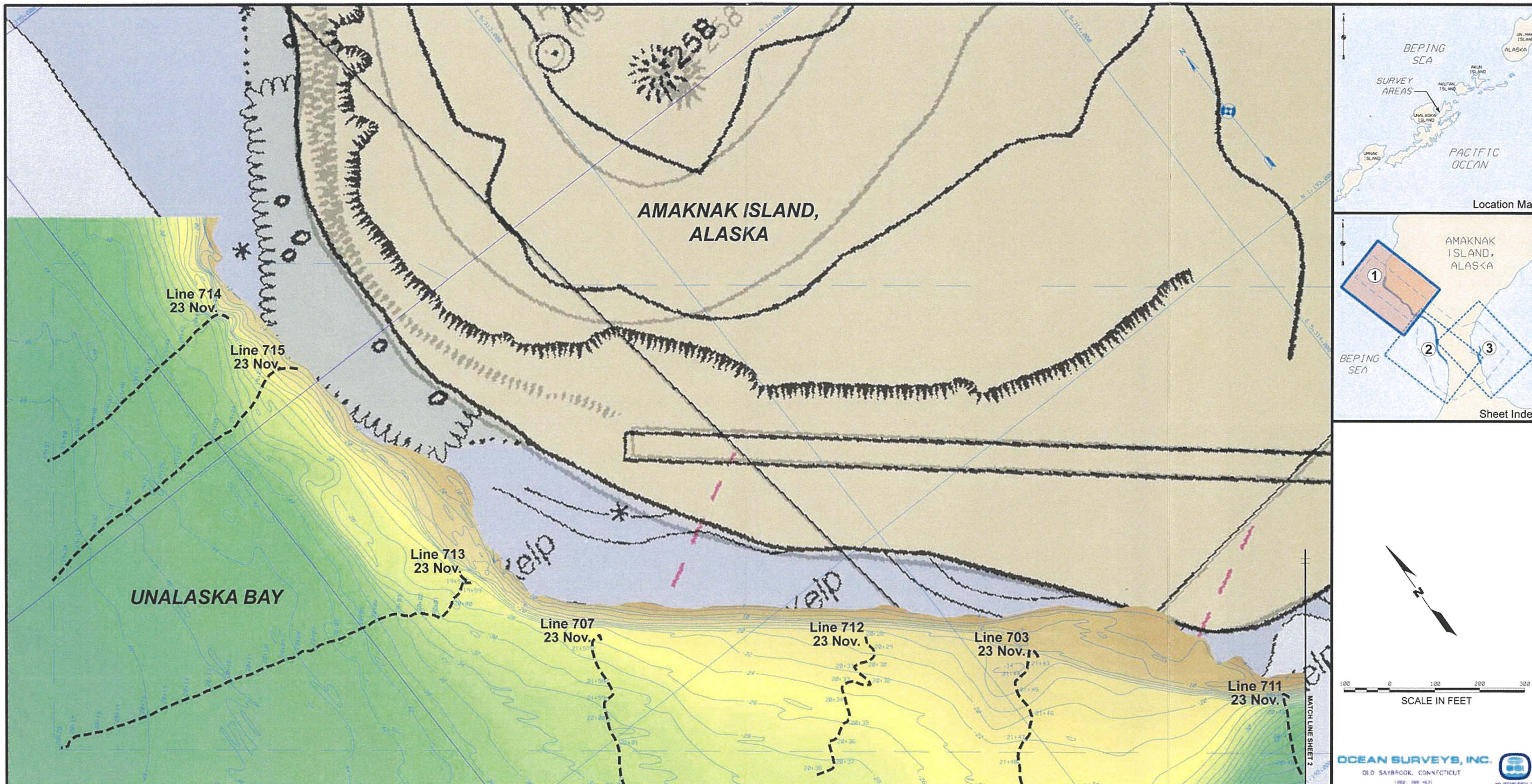


Exhibit B-2

Video Imagery Tracklines with Hydrography
Unalaska Airport Extension Area (sheet 1 of 3)
Unalaska, Alaska

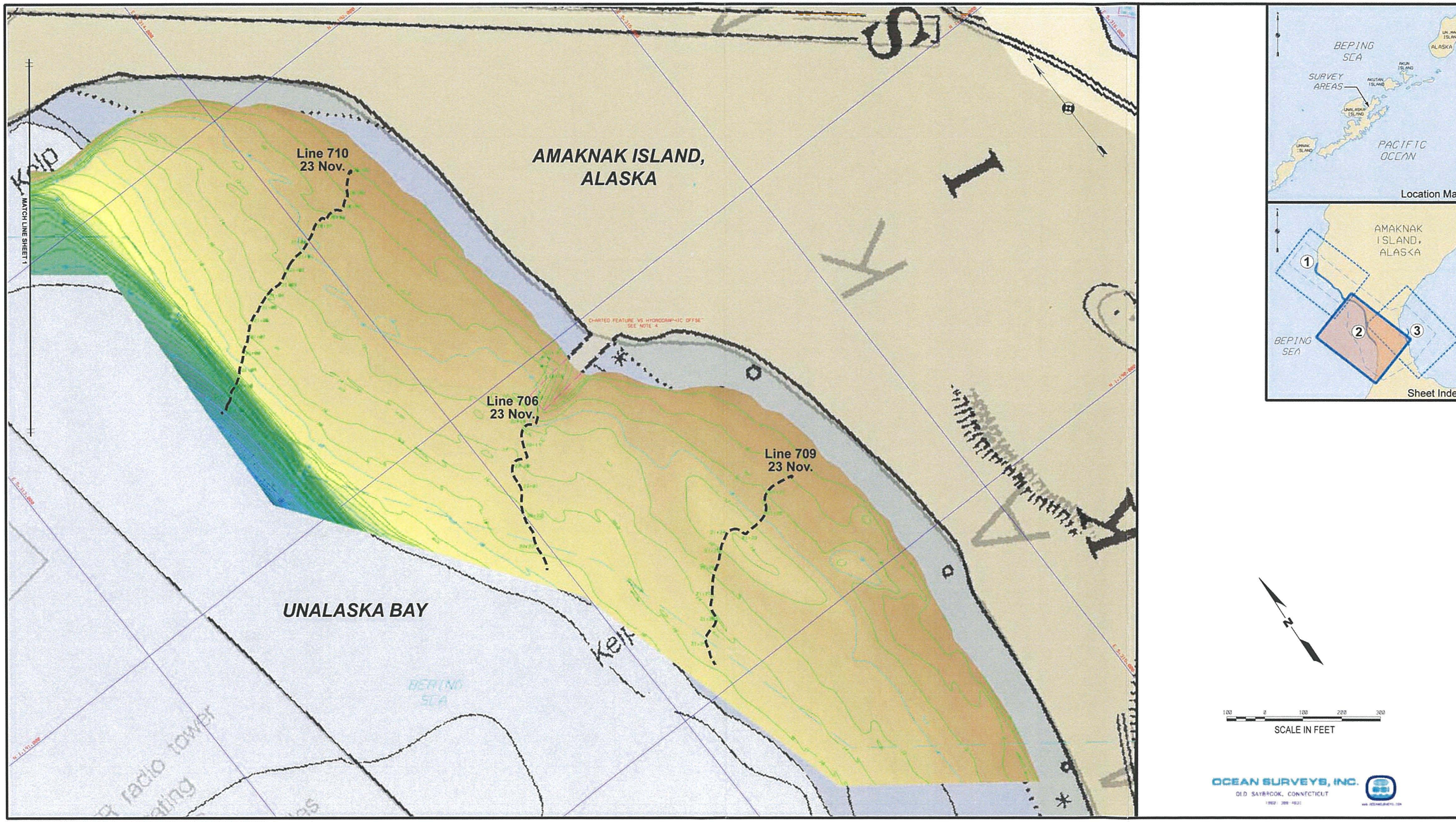


Exhibit B-3

Video Imagery Tracklines with Hydrography
Unalaska Airport Extension Area (sheet 2 of 3)
Unalaska, Alaska

MATCH LINE SHEET 1

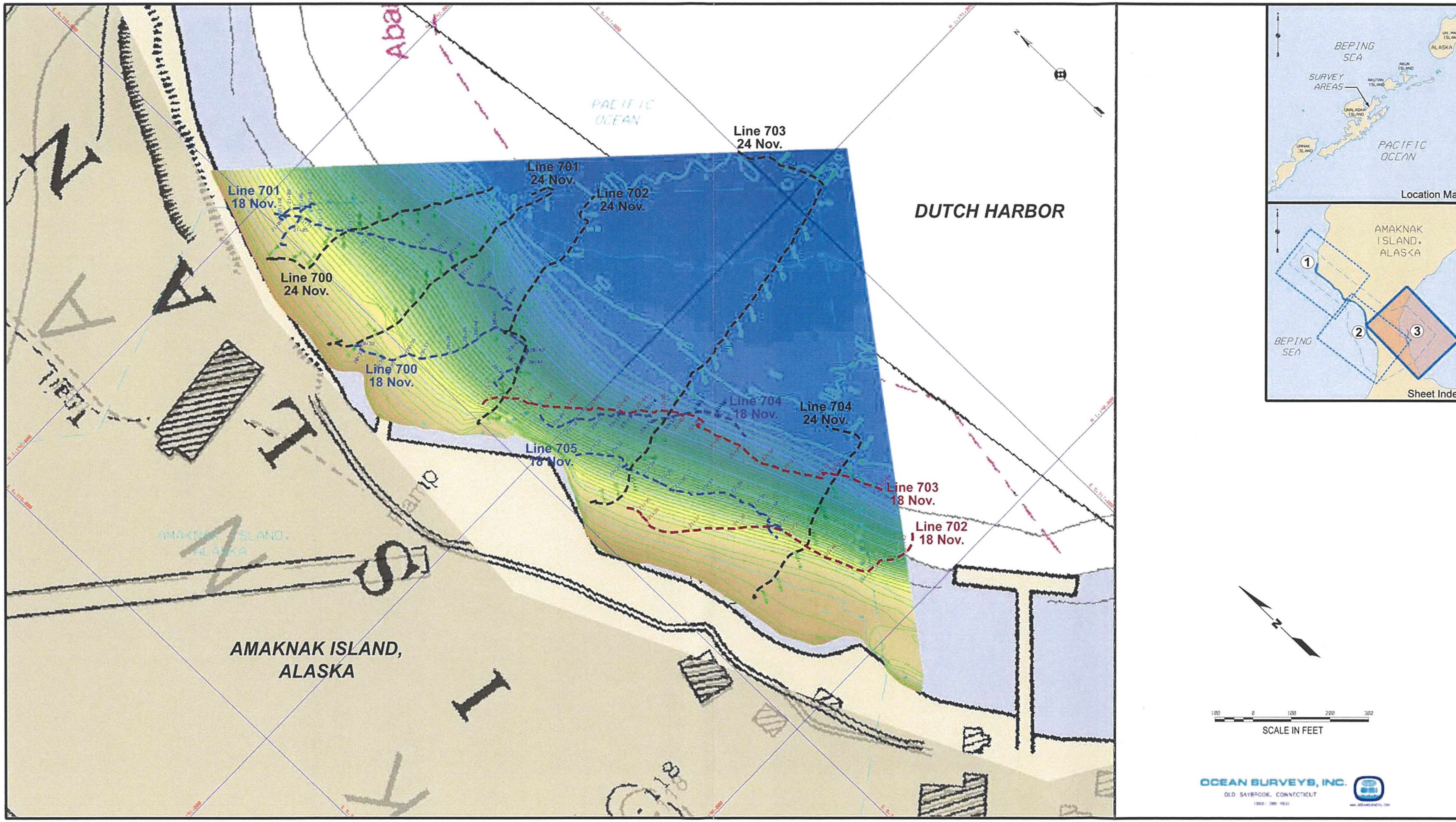


Exhibit B-4
Video Imagery Tracklines with Hydrography
Unalaska Airport Extension Area (sheet 3 of 3)
Unalaska, Alaska

B.6.1.1 Unalaska Bay

The intertidal zone in Unalaska Bay is dominated by large and small boulders, most of which are angular and were probably part of the fill of the original airport construction. At the toe of the boulder slope, the bottom transitions into a mixture of cobble and gravel which extends well offshore. Further offshore, the substrate transitions into gravel and sand mixtures. Areas of predominantly sand at depths less than 40 feet are rippled into small dune formations, indicating that wave action is affecting the bottom at these depths and giving an indication of the great force of winter storms hitting the Amaknak Island coast.

02.B.61.1.01 Intertidal

The intertidal zone in most locations is composed of large to small boulders on moderately steep slopes, although there are some areas of cobble and large gravel on lesser slopes. The plant community in the upper intertidal zone largely consists of sea lettuce and rockweed. The middle intertidal zone is dominated by sea lettuce, Northern mazza weed, seaweeds, and black pine. The lower intertidal zone is dominated by brown kelp, a filamentous red algae (unidentified), black pine, rockweed, and sea lettuce.

Animal life in the intertidal zone is dominated by acorn barnacles, with limpets, a whelk, and blue mussels also present. The middle intertidal zone is dominated by thatched barnacles, with proliferating anemone, limpets, large chiton, and whelk. The lower inter tidal zone supports thatched barnacles and whelks. Overall, the intertidal zone is typical of intertidal habitats in many areas in southern Alaska and the Pacific Northwest (ADOT&PF 1980).

Shallow Subtidal (4 to 30 feet MLLW)

The physical character of this zone is varied. The shallowest portion is almost all boulders and cobble. In deeper water (> 20 feet), this generally transitions into large gravel with some cobble and small boulders. There are some localized areas of sand that are formed into small dunes. Almost all plant and animal life is associated with the boulders, cobble, and gravel. The sand dune areas appear to be too unstable to support plant or animal life.

Shallower than 10 feet, the plant community is dominated by sieve kelp. Just offshore from this, dragon kelp forms dense beds, creating a surface canopy and an overstory in deeper water. The understory is formed by sieve kelp, split kelp, and witch's hair. All rock surfaces not covered with the aforementioned species are covered with either the encrusting alga, rusty rock, or the coralline encrusting alga, rock crust. Progressing offshore, the dragon kelp diminishes but the understory plants, sieve kelp, split kelp, rusty rock, rock crust, and witch's hair growth continue.

The animal community in the shallow subtidal zone is dominated by the large white plumed anemone, unidentified clams (as evidenced by empty shells), the sunflower star, and, in areas, green sea urchins. White plumed anemones are somewhat ubiquitous in distribution and can be found on any substrate as long as there is something hard to attach to. Sunflower stars are found wherever clams or urchins are abundant as food. Green sea urchins are found in aggregations on gravel, cobble or rock, in groups of hundreds to tens of thousands. Other invertebrates present in at least moderate numbers include painted anemones, proliferating anemones, hairy triton snails, Alaska false jingle, a chiton, hermit crabs, sea cucumbers, and false ochre stars. Fish were found to be relatively sparse, but included unidentified sculpins and unidentified flatfish.

Deeper Subtidal (30 to 70 feet)

Below 30 feet, the bottom type is mostly gravel and sand with dominance shifting back and forth, and shifts more and more towards sand and silt as depth increases. At 30 to 40 feet, dragon kelp is still present, but the bottom is mostly covered with sieve kelp, split kelp, witch's hair, mixed red algaes, and rock crust. At depths greater than 50 feet, the bottom is almost devoid of algal growth.

The most abundant animals in this zone are white plumed anemones, sunflower stars, painted anemones, green sea urchins, unidentified clams, and unidentified small shrimp. Other animals observed include hermit crabs, hairy triton snails, false ochre stars, blood stars, Stimpson's sun stars, and giant Pacific chitons. Other less conspicuous but important and abundant organisms present includes brittle stars, a tube-forming polychaete worm, a spoonworm, and a burrowing anemone.

Fish were not very abundant in this zone during the 2006 survey, but few small unidentified sculpins were observed along with one pacific cod and one great sculpin.

02.B.61.1.02 Dutch Harbor

As previously mentioned, Dutch Harbor was surveyed using a towed underwater video camera. As a result, many of the observations are not supported with definitive species identification of the harder to recognize species, unlike the Unalaska Bay observations.

Intertidal

The intertidal zone could not be surveyed using the towed video camera because of the nature of the shoreline, which is composed of abruptly steep riprap boulders. Based on observations made in Unalaska Bay, the intertidal zone is likely to have dense growths of rockweed and sea lettuce growing on the boulders. In the middle and lower intertidal zone, the rocks would be covered with barnacles and mussels in places, with limpets and whelk (snail) also present.

Shallow Subtidal (4 to 30 feet MLLW)

The riprap shoreline-armoring rock transitions into smaller boulders, then gravel, at a depth of about 20 feet. Gravel and sand extends throughout the zone described in this section. Clam shells are common to abundant in areas of gravel and sand. In shallower water, the rocks are covered with short fuzzy filamentous green algae. This substrate transitions to thick growth of sieve kelp mixed with short folios red algae and patches of witch's hair.

The most abundant large animals are green sea urchins, white plumed anemones, and sunflower stars. The urchins are grouped in numbers ranging from 50 to many thousands, while the anemones are dispersed. The sunflower stars are grouped wherever urchins or clams are abundant because they provide prey for this starfish.

Deeper Subtidal (30 to 90 feet MLLW)

At 30 feet, the bottom character is gravel or gravel and sand in most places. This generally transitions into sand at 40 to 50 feet, and then shifts to silt in the 65- to 75-foot depth range. Gravel in the 30- to 40-foot range is mostly covered by a short fuzzy filamentous algae growth. Although there is some split kelp, sieve kelp, and folios red algae present in places, this type of growth is generally sparse. Below 50 feet, no algaes are present. There are expansive areas in the 70- to 90-foot range on silt that are covered with a fluffy layer of white filaments that are probably bacterial growths. This is supported by the fact that most of the benthic grab samples were mucky with an odor of hydrogen sulfide. This suggests that there is a high degree of rapid deposition of organic sediments in the area.

In the shallower depths of this zone, where the bottom is mostly gravel, clams are locally abundant as evidenced by empty shells. Sunflower stars are common in the shallower areas; especially where clams appear to be abundant and white plumed anemones are common at all depths, especially where hard attachment points are available. In deeper areas where the substrate shifts to silt, polychaete worms are abundant. At depths in the 80- to 90-foot range, holes were estimated to be about 2 to 3 per square foot. More fish were observed here than in shallower areas, with snake pricklebacks fairly common at depths greater than 60 feet.

B.6.1.2 Marine Mammals

A total of 16 marine mammal species occur regularly or sporadically in the region of the study area. An expanded study area was evaluated for marine mammals to include nearshore as well as offshore areas that could be airport construction affected by activities in the vicinity of the airport as well as extraction and sea transport of fill materials from land areas beyond the airport, which are assumed to occur within 25 miles of the airport. Impacts from these activities could include disturbance of seals, sea otters or sea lions haul out sites from material extraction, behavioral disturbance of marine mammals from underwater construction and vessel noise, and collisions with vessels transporting materials. More detailed information on all species discussed here is available in Attachment B-2.

Table B-2 provides an overview of the each species status, habitat, prey, and listing under the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA). Within the study area, the northern right whale, sei whale, fin whale, humpback whale, Steller sea lion, and the southwest Alaska stock of the northern sea otter are listed as endangered or threatened under the ESA. The stocks of these species and the eastern North Pacific stock of northern fur seals are considered depleted by NOAA Fisheries under the MMPA.

TABLE B-2
Marine Mammals Potentially in the Region and Their Federal/State Status
Unalaska Airport Master Plan Update

Species	*Scientific Name*	Relative Abundance	Primary Habitat	Primary Prey	*Season(s) Present*	*ESA/MMPA Status*
Harbor seal	*Phoca vitulina*	Common	Coastal/ Shelf	Fish	Year-round	
Steller sea lion	*Eumetopias jubatus*	Uncommon	Coastal/ Shelf	Fish	Year-round	*Endangered/ Depleted*
Northern fur seal	*Callorhinus ursinus*	Uncommon	Offshore/ Slope	Fish/ Squid	Spring-Fall	*Depleted*
Dall's porpoise	*Phocoenoides dalli*	Common	Shelf/Slope/ Offshore	Fish	Year-round	
Harbor porpoise	*Phocoena phocoena*	Common	Shelf/ Coastal	Fish/ Squid	Year-round	
Killer whale	*Orcinus orca*	Common	Shelf/Slope/	Fish/Marine	Year-round	

TABLE B-2
Marine Mammals Potentially in the Region and Their Federal/State Status
Unalaska Airport Master Plan Update

Species	*Scientific Name*	Relative Abundance	Primary Habitat	Primary Prey	*Season(s) Present*	*ESA/MMPA Status*
			Coastal	Mammals		
Gray whale	*Eschrichtius robustus*	Common	Coastal/ Shelf	Crustaceans	Spring-Fall	
Humpback whale	*Megaptera novaeangliae*	Uncommon	Shelf/Slope	Zooplankton/ Fish	Spring-Fall	*Endangered/ Depleted*
Minke whale	*Balaenoptera acutorostrata*	Common	Shelf	Fish/Squid	Year-round	
Fin whale	*Balaenoptera physalus*	Uncommon	Slope/ Offshore	Fish/ Zooplankton	Spring-Fall	*Endangered/ Depleted*
Sei whales	*Balaenoptera borealis*	Uncommon	Offshore	Zooplankton	Spring-Fall	*Endangered/ Depleted*
Right whale	*Balaena glacialis*	Rare	Shelf/Slope	Zooplankton	Spring-Fall	*Endangered/ Depleted*
Baird's beaked whale	*Berardius bairdii*	Rare	Slope/ Offshore	Squid/ Ocopus/Fish	Spring-Summerl	
Curvier beaked whales	*Ziphius cavirostris*	Rare	Offshore	Squid/ Fish	Unknown	
Stejneger's beaked whale	*Mesoplodon stejnegeri*	Rare	Shelf/ Offshore	Squid/Fish	Unknown	
Northern sea otter	*Enhydra lutris kenyoni*	Common	Coastal	Sea Urchins/ Clams	Year-round	*Threatened/ Depleted*

Source: Canyon Creek Consulting, 2006.

Threatened and -Endangered Marine Mammals in the Study Area

The following species that occur in the study area are listed as threatened or endangered under ESA.

Northern right whales in the eastern North Pacific Ocean historically ranged across the entire ocean basin north of 25°N latitude and occasionally as far south as 20°N before numbers were reduced by commercial whaling. Today, the distribution and migratory patterns are largely unknown. There is historic and recent evidence of right whale occurrence in the Gulf of Alaska and Bering Sea (Mellinger et al., 2004, Brueggeman et al. 1986). Right whales have been encountered in the southeastern Bering Sea and Gulf of Alaska from May to November (Munger et al. 2003; Wade et al. 2006). The locations of the right whales indicate that they could occur in the project area, particularly as they migrate through Unimak Pass in the spring and fall. There are no population estimates for the North Pacific right whale, but the number is thought to be very low (<200).

Sei whales in Alaska are most common in temperate deepwater areas of open ocean, most commonly over the continental slope, and only occasionally venture into the Bering Sea from the Gulf of Alaska (Reeves et al. 1998). Sei whales have been reported in the Gulf of Alaska and Aleutian Islands during summer (Reeves et al. 1998), with the highest number of sighting south of the western Aleutian Islands off the Kamchatka Peninsula to the Commander Islands (Nasu, 1963). Brueggeman et al. (1983, 1987a,b, 1988) did not encounter any sei whales during extensive aerial and vessel surveys of the nearshore and offshore areas of the Bering Sea and Gulf of Alaska in mid to late 1980. Based on this information, few if any sei whales would be expected in the project area.

Fin whales range from subtropical to arctic waters, and in Alaska occur year round in the Bering Sea with peak number present in spring. While fin whales occur in the Bering Sea, considerably more spend the summer in the Gulf of Alaska (Brueggeman et al. 1987a, 1988), and may enter the study area while migrating through Unimak Pass while transiting between the Gulf of Alaska and the Bering Sea in spring and fall. A rough estimate of the population size of fin whales east of the Kenai Peninsula is over 5,000 animals (Angliss and Outlaw 2005).

Humpback whales are distributed worldwide in all ocean basins, though less common in arctic waters. Two stocks occur in Alaska waters: the western North Pacific stock west of Kodiak Island and the central North Pacific stock east and south of Kodiak Island. The distribution of the two stocks may partially overlap in the Gulf of Alaska and possibly the Bering Sea (Angliss and Outlaw 2006). Brueggeman et al. (1983, 1987a,b) did not encounter any humpback whales in the north central or southeastern Bering Sea during extensive aerial and vessel surveys. More recently, Moore et al. (2002) recorded one humpback whale south and west of St. Lawrence Island in the east-central Bering Sea. Based on the available information, it is not likely humpback whales occur in the study area except for possibly when they migrate through Unimak Pass in the spring and fall. The western North Pacific stock is estimated to number 394 animals (Calambokidis et al. 1997).

Northern fur seals occur from California north to the Bering Sea and west to the Okhotsk Sea and Honshu Island, Japan. Seals temporarily haul out on land at non-breeding sites in Alaska, British Columbia and the continental US (Angliss and Outlaw 2005). Most adult males overwinter in Alaskan waters, while most females and immature males winter in waters of British Columbia, Washington, Oregon, and California (Angliss and Outlaw 2005). Survey results suggest that most fur seals occur beyond the project area, but small numbers may transit the project area during migration through the Aleutian Islands into the North Pacific Ocean (Ream et al. 2005). On July 17, 1998, the eastern Pacific stock was designated as depleted under the MMPA (Angliss and Outlaw 2005). The population is estimated at almost 700,000 animals (Angliss and Outlaw 2005).

Steller sea lions occur in two stocks in Alaska: (1) an eastern US stock listed as threatened under the ESA, including animals east of Cape Suckling, Alaska (144°W) and (2) a western US stock as endangered, including animals at and west of Cape Suckling (62 CFR 30772, June 5, 1997: Angliss and Outlaw 2005). Those present around Unalaska fall into the western stock. At sea, Steller sea lions commonly occur near the 200-meter depth contour, but have been seen from near shore to well beyond the continental shelf (Kajimura and Loughlin 1988). About three-fourths of all Steller sea lions haul out on and pup in US territory (Marine Mammal Commission 2000). Sea lion rookeries in Alaska are located in the Pribilof Islands; on Amak Island north of the Alaska Peninsula; throughout the Aleutian Islands and western Gulf of Alaska to Prince William Sound; and on several islands in southeastern

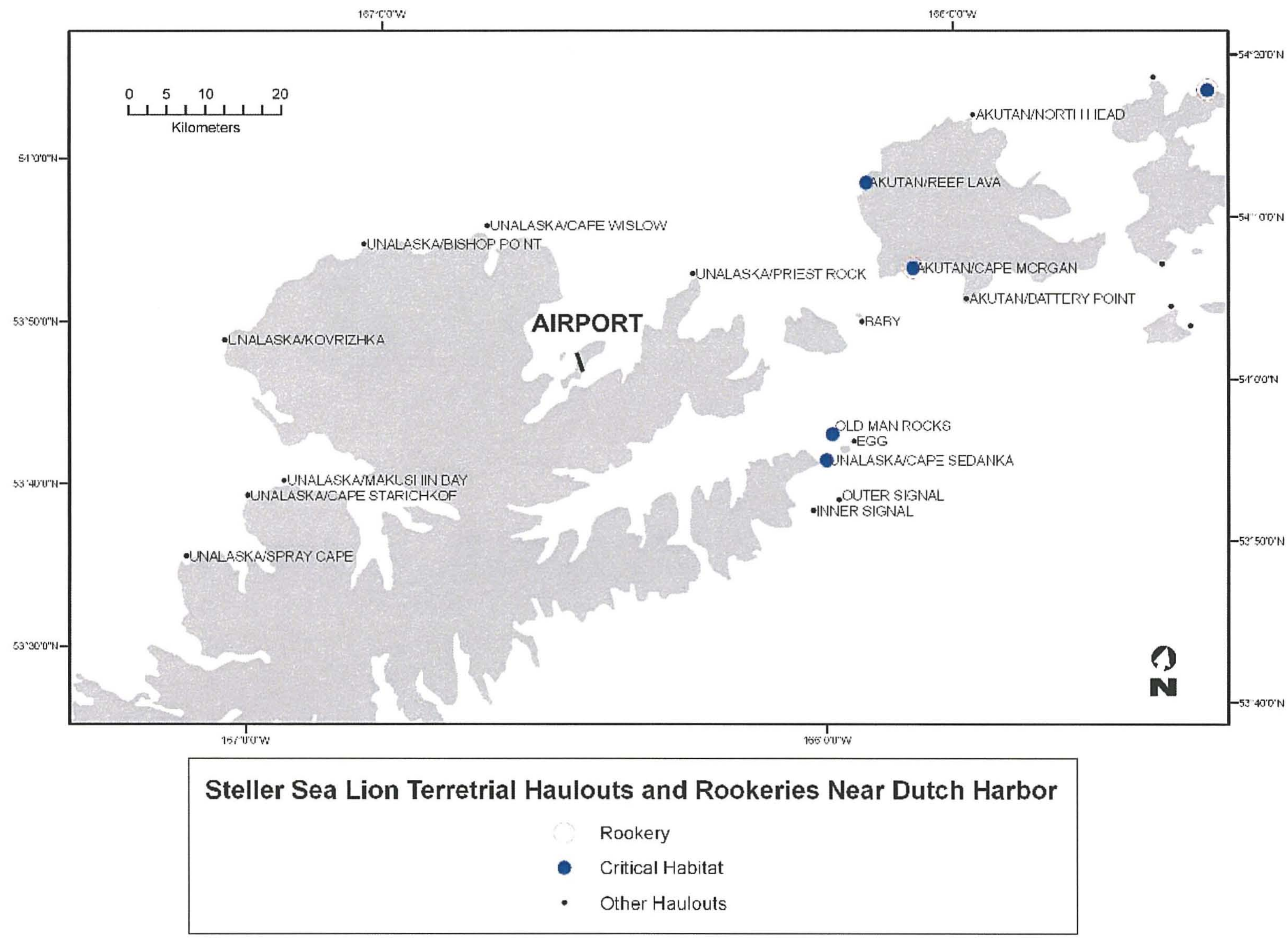
Alaska. Haul outs and rookery sites are numerous throughout the breeding range, and those located in the region of the project area are provided in Exhibit B-5 and Table B-2. All sea lion haul outs are considered critical habitat because of their limited numbers and high density use; special foraging areas in Alaska have also been designated critical habitat for Steller sea lions (50 CFR 226.202). The population size of the western stock is 40,000 animals (Angliss and Outlaw 2005).

Northern Sea Otters that occur in the Unalaska area belong to the Southwest Alaska stock of the northern sea otter. This stock includes animals found off the Alaska Peninsula and Bristol Bay coasts and on the Aleutian, Barren, Kodiak, and Pribilof Islands. Although other sea otter stocks in Alaska are considered stable, the Southwest stock has declined dramatically over the past 10-20 years, causing the USFWS to list the population as threatened under the ESA on August 9, 2000 (70 CFR 46366, Doroff et al. 2003). No critical habitat has been designated for this stock. Sea otters occur in nearshore coastal waters generally less than 40 m depth and 1-2 km from shore, since they need frequent access to subtidal and intertidal zones for feeding (Green and Brueggeman 1992). Distribution is nearly continuous from Attu Island in the western Aleutians to the Alaska Peninsula. Exhibit B-6 shows the sea otter distribution around Unalaska Island. Approximately 9,000 sea otters inhabit the Aleutian Islands (Angliss and Outlaw 2005).

Other Marine Mammals in the Study Area

Minke whales occur from the Bering and Chukchi seas south to near the equator (Angliss and Lodge 2004). In spring most are found over the continental shelf and prefer shallow, coastal waters. In Alaska, minke whales occur in the Bering and Chukchi Seas and the inshore waters of the Gulf of Alaska (Mizroch 1992). Aerial surveys over the last 25 years show that minke whales occur in small numbers in the Bering Sea year-round and a few could transit through the project area (Brueggeman et al. 1983, 1987, Moore et al. 2002). The number of minke whales estimated in the Bering Sea is around 1,000 (Angliss and Outlaw 2005).

Gray whales that occur in the Bering Sea belong to the Eastern North Pacific stock (Angliss and Outlaw 2005). The size of the population is currently estimated at approximately 18,000 whales (Rugh et al 2005), which may be at or near carrying capacity (Angliss and Outlaw 2005). Gray whales are not expected to occur in the project area, although a few could be encountered during the spring or fall migration through Unimak Pass.



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Unalaska Airport Master Plan Update

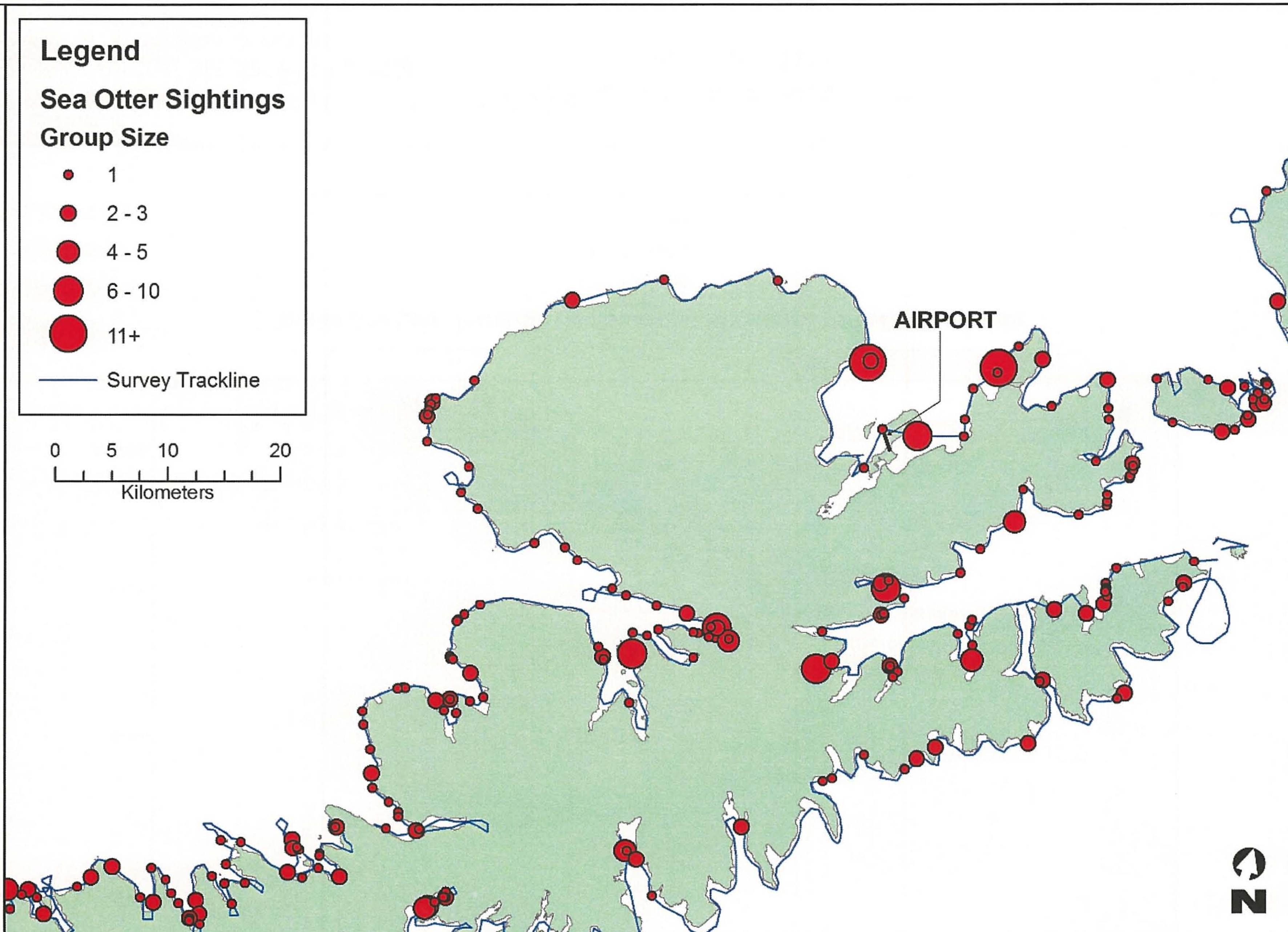
Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Steller Sea Lion Haulouts and Rookeries Near Dutch Harbor

Exhibit B-5

Source: Steller sea lion haulouts and rookeries in the vicinity of the project area as provided by the Tom Gilatt and Lowell Fritz of the National Marine Mammal Laboratory, Seattle, WA.

May 2007



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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Sea Otter Distribution
Along Unalaska Island

Exhibit B-6

Source: Sea otter distribution along Unalaska Island based on aerial survey data collected in 2000 and reported by Doroff et al (2003)

May 2007

Killer whales occur along the entire Alaska coast within the Chukchi Sea, Bering Sea, Aleutian Islands, Gulf of Alaska, and southward along the Alaska coast. Within these areas, three genetically distinct ecotypes, or forms, of killer whales exist: resident, transient, and offshore (Angliss and Lodge, 2004). There are eight recognized killer whale stocks within the Pacific U.S. Exclusive Economic Zone, which have been differentiated on the basis of differences in morphology, ecology, genetics, and behavior (Angliss and Lodge, 2004). The whales found off the project area may belong to at least two of the eight stocks including the Alaska resident stock and the Gulf of Alaska, Aleutian Islands, and Bering Sea transient stock (Angliss and Outlaw 2005). Killer whales exhibit movement to nearshore waters, especially in summer and fall, in association with the inshore migrations of prey such as salmon (Balcomb et al. 1980). Killer whales also prey on sea otters, which may have contributed to the decline in the sea otter populations in the Aleutian Islands during the 1990s (Estes et al. 1998). The minimum population estimate for the Gulf of Alaska, Aleutian Islands, and Bering Sea transient population is about 300 animals (Angliss and Outlaw 2005). The Alaska resident stock numbers about 1,000 whales (Angliss and Outlaw 2005). These results suggest that killer whales could occur in the project area year-round, particularly during summer and fall.

Baird's beaked whale's range is from Cape Navarin and the central Sea of Okhotsk to St. Mathew Island, the Pribilof Islands in the Bering Sea and the northern Gulf of Alaska (Rice 1986, Rice 1998, Kasuya 2002). A break in the distribution occurs in the eastern Gulf of Alaska; however, from the mid-Gulf to the Aleutian Islands and in the southern Bering Sea, there have been numerous sighting records (Angliss and Outlaw 2005). There are no estimates of the size of the population (Angliss and Outlaw 2005). Baird's beaked whales could be encountered in the study area during spring through fall.

Cuvier's beaked whale is distributed in the northeastern Pacific Ocean from Baja California to the northern Gulf of Alaska, Aleutian Islands, and Commander Islands (Rice 1986, 1998). This species is largely absent north of the Aleutian Islands but some sightings have been reported in the St. George Basin in the last ten years (Angliss and Outlaw 2005), which includes the project area. Little is known about the seasonality of this species, and there are no population estimates.

Stejneger's beaked whale is endemic to the cold-temperate waters of the North Pacific Ocean, Sea of Japan, and deep waters of the southwest Bering Sea (Angliss and Outlaw 2005). In the Alaska outer continental shelf, the species occurs throughout the Gulf of Alaska to the Aleutian Islands and the Bering Sea to the Pribilof Islands and Commander Islands (Loughlin and Perez 1985). Near the central Aleutian Islands, groups of 3-15 Stejneger's beaked whales have been sighted on a number of occasions (Rice 1986 and Angliss and Outlaw 2005). The species could occur in the project area, but the number would likely be small and occurrence infrequent.

Dall's porpoise occur year-round throughout their entire range in the northeastern Pacific, from Baja California, Mexico, to Alaska, occurring over the outer continental shelf adjacent to the slope and over very deep water (>2,500 m or 8,000 ft) oceanic waters (Angliss and Lodge 2004). Recent surveys in the central-eastern and southeastern Bering Sea in 1999 and 2000 found Dall's porpoises abundant in both areas (Moor et al. 2002). The Alaska stock is estimated at 83,400 animals (Angliss and Lodge 2004). Dall's porpoise could be encountered in the project area because of their widespread distribution in the Bering Sea.

Harbor porpoises are generally found in coastal waters including harbors, bays, and river mouths but may also be concentrated in and around turbid river water plumes. The range of this species in the North Pacific Ocean is from Point Conception, California, to Point Barrow, Alaska (Gaskin 1984). The Bering Sea stock occurs throughout the Aleutian Islands and all waters north of Unimak Pass (Angliss and Lodge 2004). The Bering Sea population size is estimated to be around 47,000 porpoises (Angliss and Lodge 2004). The widespread distribution, abundance, and coastal occurrence suggest that harbor porpoise likely occur in the project area, possibly year-round.

Harbor seals are distributed along the Alaskan coastline throughout the Gulf of Alaska, the Aleutian Islands, and the Bering Sea. This non-migratory species exhibits local movements associated with tides, weather, season, food availability, and reproduction (Scheffer and Slipp 1944, Fisher 1952, Bigg 1981). Major haulout grounds in the project area are shown in Exhibit B-7. The Bering Sea stock of harbor seals is estimated to number about 13,000 seals (Hill and DeMaster 1998).

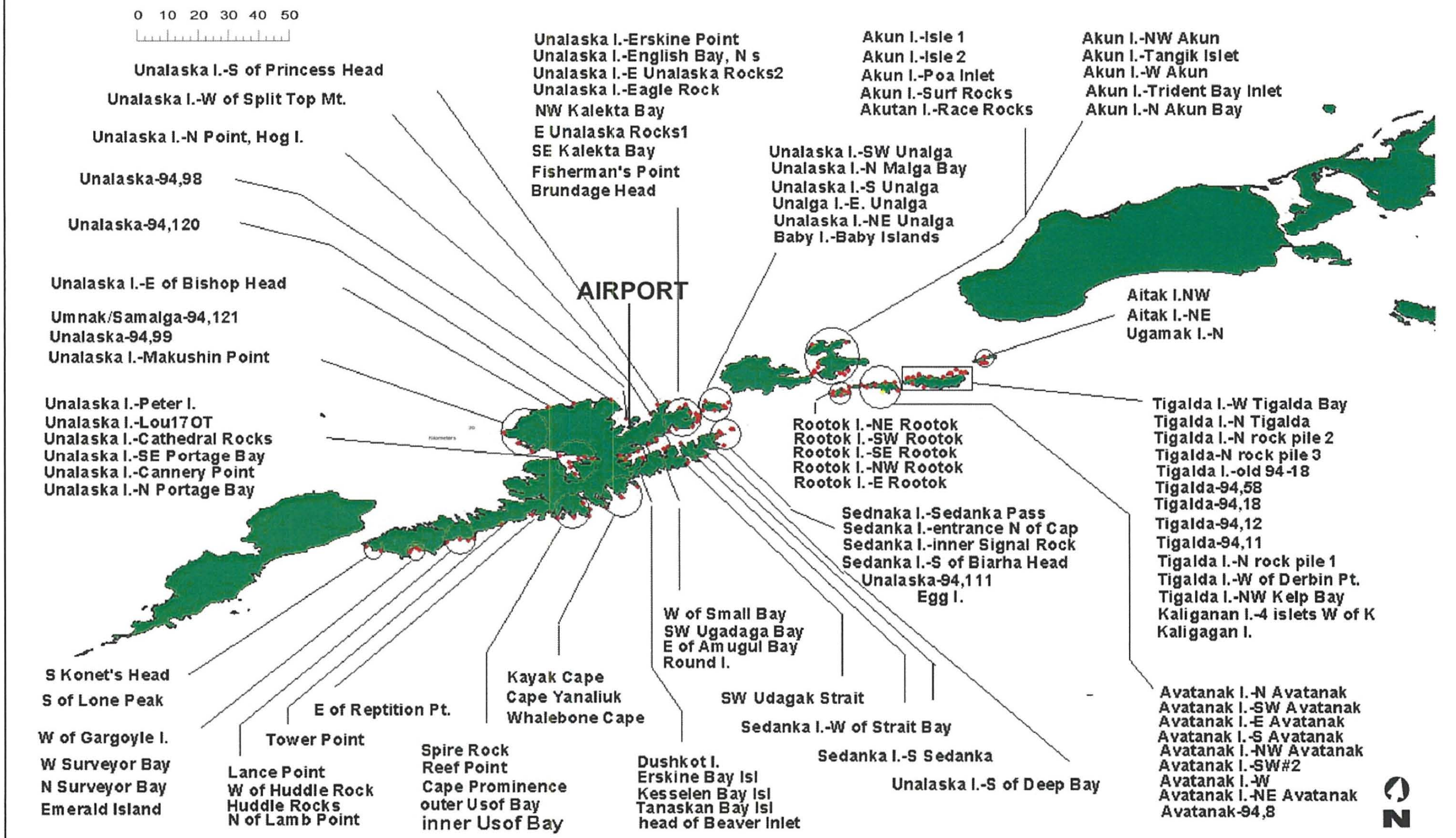
Other marine mammal species in the Bering Sea

Other species in the Bering Sea, but not likely to occur in the study area, include bowhead whales, beluga whales, Pacific white-sided dolphin, Pacific walrus, ringed seals, bearded seals, spotted seals, and ribbon seals. Most of these species seasonally occur considerably north of the project area over the outer continental shelf in the central and northern Bering Sea (Burns 1970, Brueggeman 1984). Many migrate north into the Chukchi and Beaufort seas during the late spring before returning to the Bering Sea as the pack ice advances south. Occurrence of any of these species in the project area would be unusual and rare.

B.6.1.3 Birds

The bird community in the Unalaska region and study area is dominated by species with a strong affinity for the marine environments of the eastern Aleutian Islands. Of the approximately 140 species of birds recorded in the region (all species listed in Attachment B-3), over 50 percent are species that spend most their life cycle in marine, estuarine, or freshwater habitats: seabirds (27 species); waterfowl (30 species); loons and grebes (6 species); and gulls, jaegers, and terns (11 species, also considered to be seabirds). Shorebirds (20 species) account for another 14 percent of the bird community. As might be expected given the treeless landscape in the region, the diversity of landbird species is lower than on mainland Alaska, with many land species recorded only as casual or rare occurrences at Unalaska (22 of 43 landbirds; all species listed in Attachment B-3).

Although seabirds are the dominant species group in this region, some species (e.g., shearwaters, albatrosses) are restricted to the nearshore and offshore marine environments and are unlikely to occur regularly in the immediate vicinity of the Unalaska airport. Other species, such as murrelets, occur in the nearshore waters adjacent to the airport, but no breeding colonies of seabirds are located near the airport. The seabird colonies (primarily of pigeon guillemots and horned puffins) closest to the airport are located less than 3 km from shore on the Hay Islands and on the southern shore of Amaknak Island (USFWS 2007). Several additional breeding colonies are located within 10 km of the airport: islets off Amaknak Island (pigeon guillemot), Captains Bay islets (pigeon guillemot, horned puffin), and Eider Point (red-faced cormorant).



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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Harbor Seal Haulout Sites

Exhibit B-7

Source: Harbor seal haulout sites in the region of the project area (Map provided by David Withrow, National Marine Mammal Laboratory).

May 2007

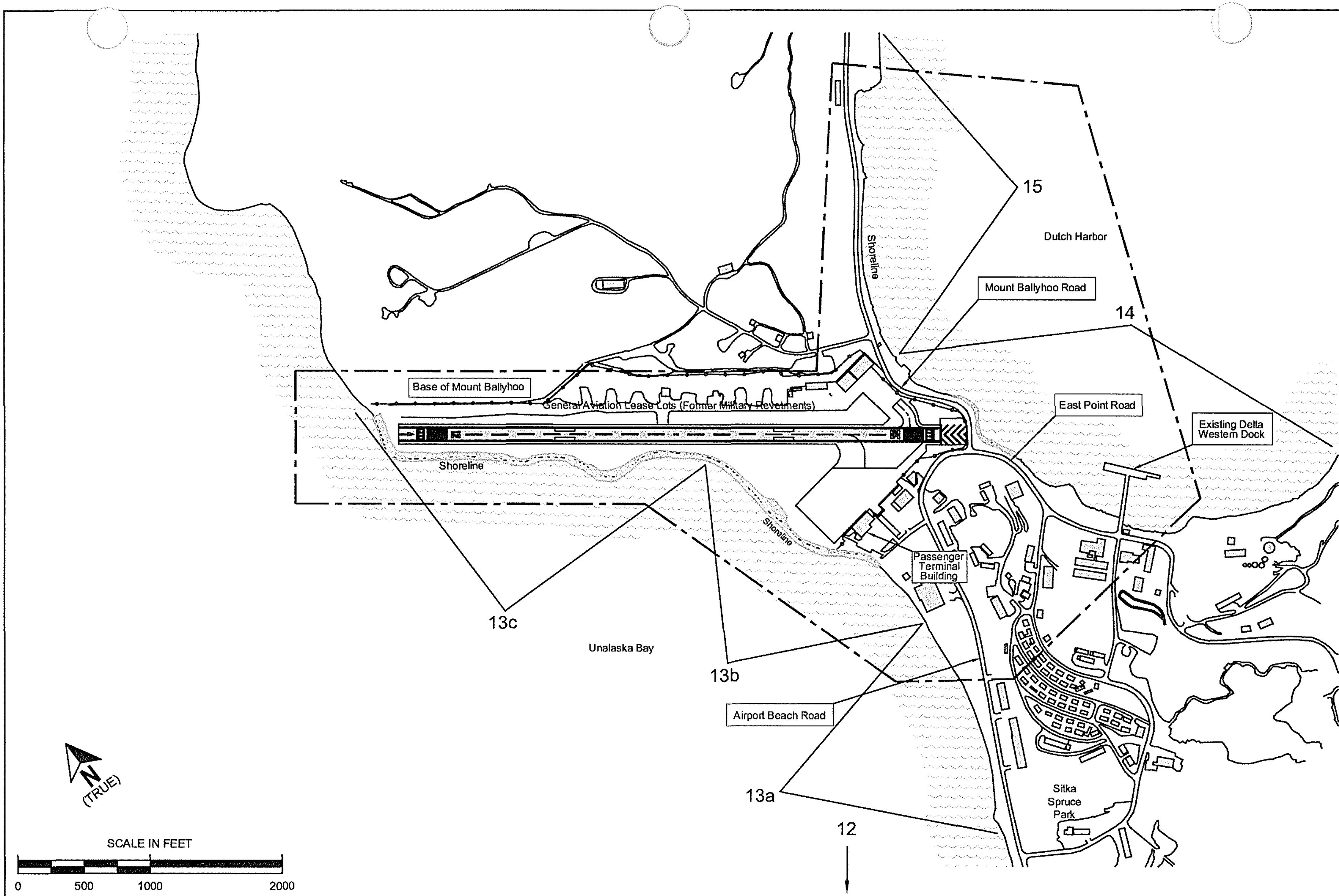
In addition to seabirds, about 30 other species of birds have been reported as breeding in the region, including several species of waterfowl (e.g., tundra swan, mallard, green-winged teal, and greater scaup), shorebirds (e.g., black oystercatcher, least sandpiper, and red-necked phalarope), and landbirds (e.g., rock ptarmigan; fox, song, Savannah, and golden-crowned sparrows; bank swallow; gray-crowned rosy finch) (All species listed in Attachment B-3). The most common raptor breeding in the area is the bald eagle, but breeding pairs of peregrine falcons and rough-legged hawks also have been recorded.

Site-specific information on birds in the airport project area is limited. Winter counts of seaducks and other waterbirds were conducted at Unalaska Bay and Dutch Harbor in the winters of 2000–2003 by the U.S. Army Corps of Engineers (USACE) to provide baseline information for a proposed new boat harbor (C. Hoffman, USACE, unpublished trip reports and data). The primary focus of these surveys was to determine the distribution and abundance of the federally threatened Steller's eider. These winter surveys included both the shorelines of Unalaska Bay southwest of the airport and the shorelines of Dutch Harbor east and northeast of the airport (see Exhibit B-8). Observations of other species of seaducks, other waterfowl, seabirds, and shorebirds indicate that the southwestern shorelines near the airport support a number of these species during winter is provided in Table B-3. Nearshore waters southwest of the airport consistently supported both a greater diversity and higher abundance of seaducks, emperor geese, and seabirds than did the nearshore waters off the eastern and northeastern edges of the airport. Outfalls from seafood processing plants in Dutch Harbor dump processing waste products ("gurry") into the waters southwest of the airport, which may attract some birds to this area by providing a nutrient source for fish and marine invertebrates.

02.B.61.3.01 Endangered, Threatened, and Sensitive Bird Species

Three species of birds listed under the federal Endangered Species Act occur in the region: short-tailed albatross (endangered), Steller's eider (threatened), and Kittlitz's murrelet (candidate species). The short-tailed albatross is found in the offshore marine waters around Unalaska Island, but it is unlikely to venture into the airport project area. Kittlitz's murrelets also are found in marine waters near Unalaska Island in winter, and have been reported to occur in the Amaknak Island region during April–August and December (Zeillemaker 1987). Steller's eiders, however, have been recorded regularly in winter (November–March) in

Dutch Harbor and Unalaska Bay and have been seen in the airport project area both southwest of the airport in Unalaska Bay and off the eastern and northeastern edges of the airport in Dutch Harbor (Table B-4). Hoffman (December 2000, unpubl. trip report to USACOE) reported that the gurry outflows appeared to affect use of the area southwest of the airport, with fewer Steller's eiders using this area when the water's surface was covered by gurry, but more moving back in once the water had cleared. Hoffman also noted few movements of birds between locations along the shoreline; instead, flocks tended to be relatively cohesive and stayed in the same general locations over the several days each month that were sampled. In addition to bird species listed under the Endangered Species Act, lists of species of conservation concern or sensitive species are maintained by federal and state agencies and non-governmental organizations (e.g., Audubon Society). Approximately 26 species present in the study area are on these lists (see Attachment B-3).



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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Steller's Eider Survey Sections
USACE 2000 - 2003

Exhibit B-8

Source: AC/150 5300-13 R8, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

May 2007

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PLOT DATE: 11-May-07 PLOT TIME: 11:40:38 AM FILENAME: C:\DOCUMENTS AND SETTINGS\CJOLE\MY DOCUMENTS\NDMPROJ\322561 - DUTCH HARBOR UNALASKA\EXH B-08 - STELLERS EIDER SURVEY.DWG

02.B.61.3.02 Potential Bird Hazards at the Unalaska Airport

Little is known about the movements of birds in the vicinity of the airport, but the use of nearshore waters on both sides of the airport by seaducks and other waterbirds suggests that these birds fly between Unalaska Bay and Dutch Harbor when moving between possible feeding and resting areas. These types of movements can present hazards to aircraft operating at the airport from collisions with birds. The wildlife strike database maintained by the U.S. Department of Agriculture (USDA) was queried for data on reported strikes at the Unalaska Airport on 12 January 2007 (S. Wright, USDA, email). The database, which covers military and civilian aircraft records from 1990–2006, contained records of nine reported strikes: 1 glaucous-winged gull, 4 gulls (species not identified), 3 bald eagles, and 1 unknown species. Wright reported that, of the nine strikes, three caused damage to an aircraft, two caused substantial damage (unidentified gull and glaucous-winged gull) and one caused minor damage (bald eagle). Because reporting wildlife strikes is not mandatory, the FAA estimates that only about 20% of all strikes are ever reported (S. Wright, USDA). Maintaining runway verges and areas adjacent to the airport to reduce their attractiveness to birds can help reduce the potential for bird collisions with aircraft.

B.6.1.4 Terrestrial Environment

The Unalaska area is within a maritime climate and is dominated by alpine and moist tundra ecosystems. Vegetation on Amaknak Island is primarily grasses and forbs, although spruce trees imported during the 1800's are present in Sitka Spruce Park. Moist tundra occurs near at lower elevations and along shorelines, and is dominated by beach grasses, ferns, and forbs.

Terrestial wildlife on Unalaska Island is limited to small mammals, many of which have been introduced at various times by Russians and Americans for the fur industry. The largest endemic species is the arctic fox, and other small mammals that have been introduced include the red fox, Norway rat, lemmings and the Arctic ground squirrel.

B.7 Wetlands

No wetlands, as defined by the U.S. Army Corps of Engineers (USACE), are present in the study area. Waters of the U.S., as defined by the USACE, within the study area include Dutch Harbor and Unalaska Bay. Although this area has not been surveyed as part of the National Wetlands Inventory (NWI), deepwater habitats identified in the 2001 Master Plan Update Technical Memorandum #1 include Marine Intertidal Rocky Shore and Subtidal Rock Bottom systems from the Cowardin et al. classification system used by NWI (ASCG 2001).

TABLE B-3
Maximum daily counts of birds (other than Steller's Eiders) recorded during surveys of nearshore waters of Unalaska Bay and Dutch Harbor, winters 2000–2003.
Unalaska Airport Master Plan Update

	2000	2001					2002				2003		
Location / Species	**Dec**	**Jan**	**Feb**	**Mar**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Dec**	**Jan**	**Feb**	**Mar**
Southwest (Unalaska Bay)													
Emperor Goose		111	19	32	69	162		5	62	562	488	458	
Greater Scaup								1		1			
Scaup spp.			30			3	164	3	1	215			
King Eider	1	13	3	25	1	33	1	17	7	10	36	57	62
Harlequin Duck	70	55	18	91	99	76	14	56	71	64	100	64	88
Black Scoter	65	33	60	51	52	55	12	71	86	144	93	117	77
White-winged Scoter	29	14	29	22	51	77	16	55	39	31	78	67	105
Long-tailed Duck	30	14	97	62	27	66	113	256	46	46	90	101	34
Barrow's Goldeneye						8					7		
Red-breasted Merganser								8	3		2		
Common Loon		1		1									1
Yellow-billed Loon	1												
Loon spp.						1					1		
Red-necked Grebe											1		
Cormorant spp.	16	12	7	5	17	12	7	8	12	23	27	25	28
Black Oystercatcher									3			23	
Rock Sandpiper									10		13		2
Murre spp.	68	22	2		86	1		4	1		2		
Pigeon Guillemot	1	22	11	5	14	7	7	7	10	5	15	16	13
Marbled Murrelet						7					1		
Crested Auklet			1			1							
East-Northeast (Dutch Harbor)													
Harlequin Duck	103	26	26	49	20	50	26	45	28	34	32	33	39
Black Scoter	3	50	5	2		20	19	42	29		3	11	14
White-winged Scoter	1	17				0	6	4					
Long-tailed Duck	40	44	10			4	6	4			4	1	
Cormorant spp.	10	1		1			2	2	4	4	4	1	3
Murre spp.	2	6	1										
Marbled Murrelet	1										4		

Source: C. Hoffman, unpublished data, U.S. Army Corps of Engineers (southwest counts from segment 13; east-northeast counts from segments 14 and 15)

TABLE B-4
Maximum daily counts of Steller's Eiders in coastal waters near the Unalaska Airport, Alaska, during winter, 2000–2001.
Unalaska Airport Master Plan Update

Month	Location Relative to Airport[a]	Maximum Daily Count/Survey Period[b]			
		2000	2001	2002	2003
November					
	Southwest	--	135	--	--
	South	--	21	--	--
	Northeast	--	0	--	--
	Total Survey Area	--	236	--	--
December					
	Southwest	401	172	328	--
	South	24	22	15	--
	Northeast	10	60	2	--
	Total Survey Area	504	667	463	--
January					
	Southwest	--	264	92	94
	South	--	108	86	12
	Northeast	--	53	22	10
	Total Survey Area	--	694	399	435
February					
	Southwest	--	280	437	375
	South	--	287	13	111
	Northeast	--	21	10	20
	Total Survey Area	--	892	1175	701
March					
	Southwest	--	309	154	89
	South	--	0	105	5
	Northeast	--	2	9	41
	Total Survey Area	--	484	312	309

Source: Counts derived from 2–4 day surveys by C. Hoffman, U.S. Army Corps of Engineers (unpublished data).

[a] "Southwest" of Unalaska Airport (encompassed survey sections 12–13) along the coast northwest-southwest of the airport from approximately the northwestern end of the runway southwest to near Cave Rock.

"South" of Unalaska Airport (encompassing survey sections 10–11) along the southern coast between Cave Rock and Arch Rock at the mouth of Captains Bay.

"Northeast" of Unalaska Airport (encompassing survey sections 14-15) along the coast in Dutch Harbor (Iliuliuk Bay) between Rocky Point and the CSX crane.

Total survey area encompassed 20 sections along the coastlines in Captains Bay, Unalaska Bay, and Dutch Harbor (including the northwest side of Amaknak Island near the airport) from Point Levashef in the southwest to the base of the spit on the northeastern part of Amaknak Island.

[b] The maximum daily count was calculated for the survey segments during the survey period, which ranged from 2 to 4 days per month; "—" indicates no survey conducted that month.

B.8 Water Quality

The water bodies on either side of the airport are considered impaired by the Alaska Department of Environmental Conservation (ADEC). South Unalaska Bay is listed as a Category 4a waterbody on the State's 303(d) list, which means it is impaired with an approved Total Maximum Daily Load (TMDL) for the specific impairments of biological oxygen demand and setteable solids, caused primarily by discharges from fish processing plants. Iluiliuk Bay, including Dutch Harbor, is listed on the 303(d) list as a Category 5 waterbody, meaning it is considered impaired and requires preparation of a TMDL for the pollutant source. Pollutants at this location include petroleum hydrocarbons, oil and grease due to industrial and urban runoff. TMDLs are scheduled to be completed for Iliuliuk Bay and Dutch Harbor by June 30, 2008.

There is no non-marine surface water present within the study area. The north end of the airfield in Watersheds A and B drains to Unalaska Bay via ditches that flow into two pipes and then to an outfall (see Exhibit B-9). The south side of the airfield in Watershed A and B sheet flows into Unalaska Bay. Watershed C flows through pipes into a detention pond east of the apron.

B.9 Historical, Architectural, Archaeological, and Cultural Resources

This discussion of historical, architectural, archaeological, and cultural resources is separated into two sections based on the resources present in the study area: archaeological resources, and historical and architectural resources.

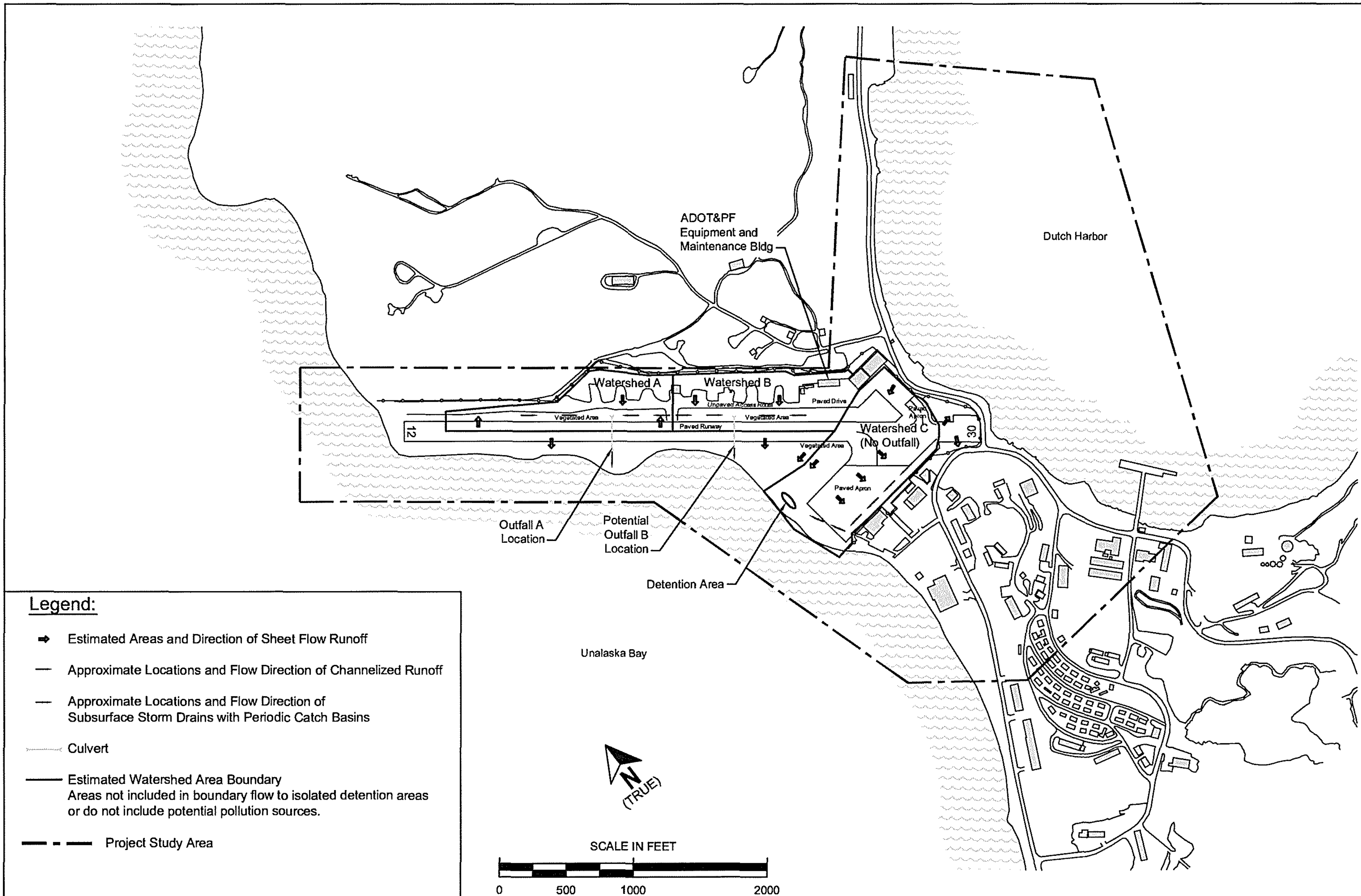
B.9.1. Archaeological Resources

There are numerous known archeological sites on Amaknak Island. Sites in the study area include the Powerhouse Flake site (UNL-114), the Airport Not Buried site (UNL-293), the Airport Buried site (UNL-123), and the Airport Flake site (UNL-105).

The Powerhouse Flake site (UNL-114) is on the low hill behind the city powerhouse. Approximately 90 artifacts, including flakes and blades, have been collected from unvegetated patches at this site. There are also artifacts eroding from a road cut along its southern margin.

The Airport Not Buried site (UNL-293) is southwest of the eastern end of the airport, across the road from the Aerology Building (Exhibit B-10). It is composed of a small hill with a World War II structure on top. There is a Quonset hut to the south and the Dutch Harbor fire station lies to the southwest. On the southern flank of the hill is a fresh pile of spoil containing numerous artifacts, including a stemmed point that Rick Knecht (personal communication 1999) says is approximately 6,000 years old. Numerous flakes are also exposed on a track running northeast-southwest across the back of the hill.

This material may in some way be related to the Airport Buried site (UNL-123). This now-buried midden site is located under the road south of the airport terminal building, and was buried when the road was built in the early 1940s. Part of the site was dug up and deposited south of the airport terminal. Veltre et al. (1984:44) unsuccessfully tried to locate remnants of the site in 1984.



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Unalaska Airport Master Plan Update

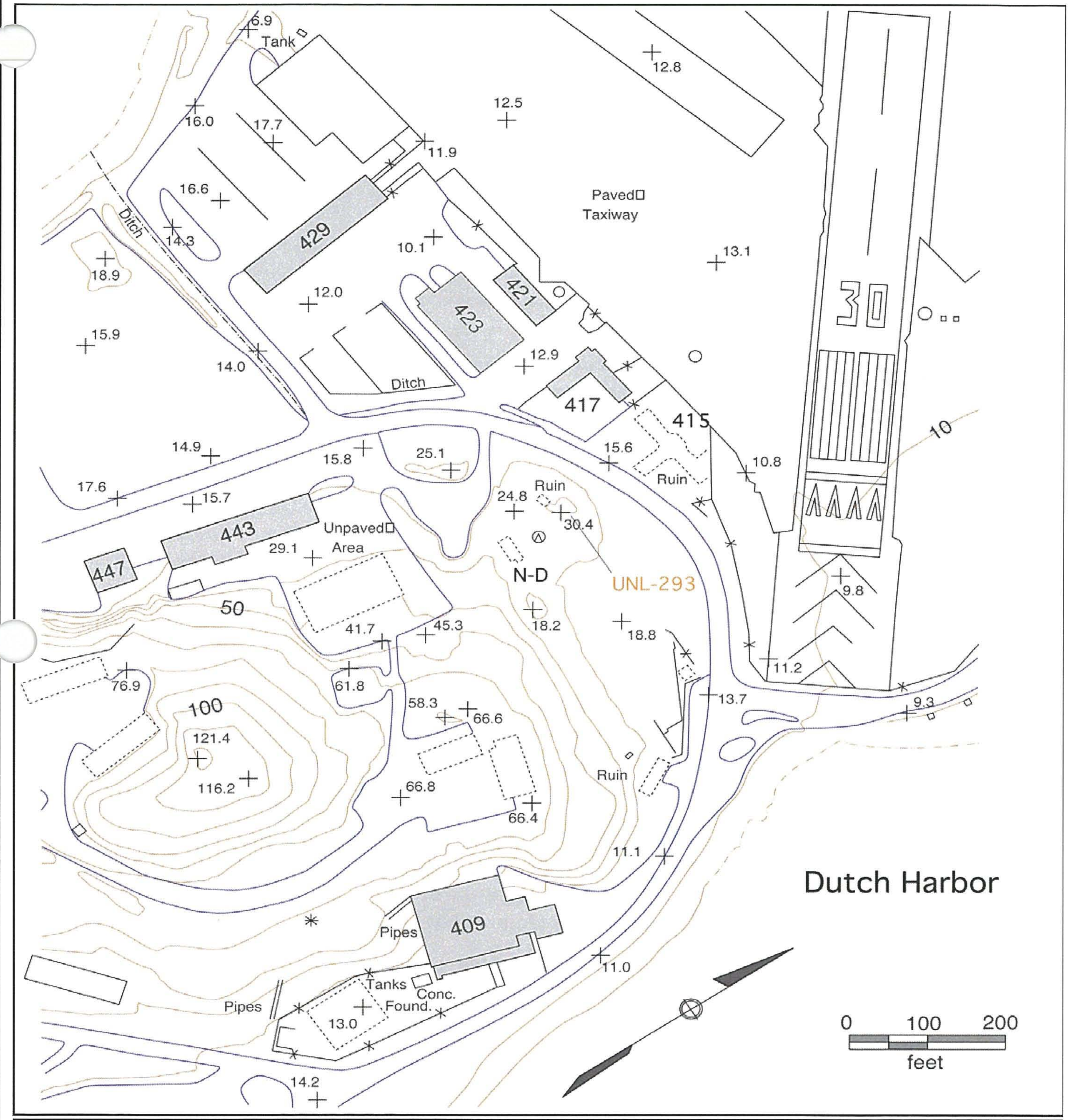
Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Watersheds in Study Area

Exhibit B-9

Source: AC/150 5300-13 R8, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

May 2007



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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Location of the Airport Not Buried Site (UNL-293) and World War II Buildings in the Vicinity of the Airport

Exhibit B-10

May 2007

The Airport Flake site (UNL-105) is located on the second terrace above Ballyhoo Road. The site is near the southeastern end of the runway, between a large concrete hanger cut into the lower mountain slope and a secondary road that runs northwest from Ballyhoo Road.

B.9.1.1 Historical and Architectural Resources

The following description of historical and architectural resources is divided into two time frames: prior to World War II, and World War II.

02.B.91.1.01 Pre-World War II

Approximately 30 feet north of the seaplane ramp off of Ballyhoo Road and 30 feet offshore, in about 8 to 10 feet of water, are the boiler and engine remains and large numbers of firebricks from the *Eliza Anderson* (UNL-473), a side-wheel steamship that was abandoned in Dutch Harbor in 1898.

The existing remains are severely corroded and broken. No part extends more than one meter above the seafloor. Due to the bottom composition (sand and fine silt), more remains may be preserved beneath the seafloor.

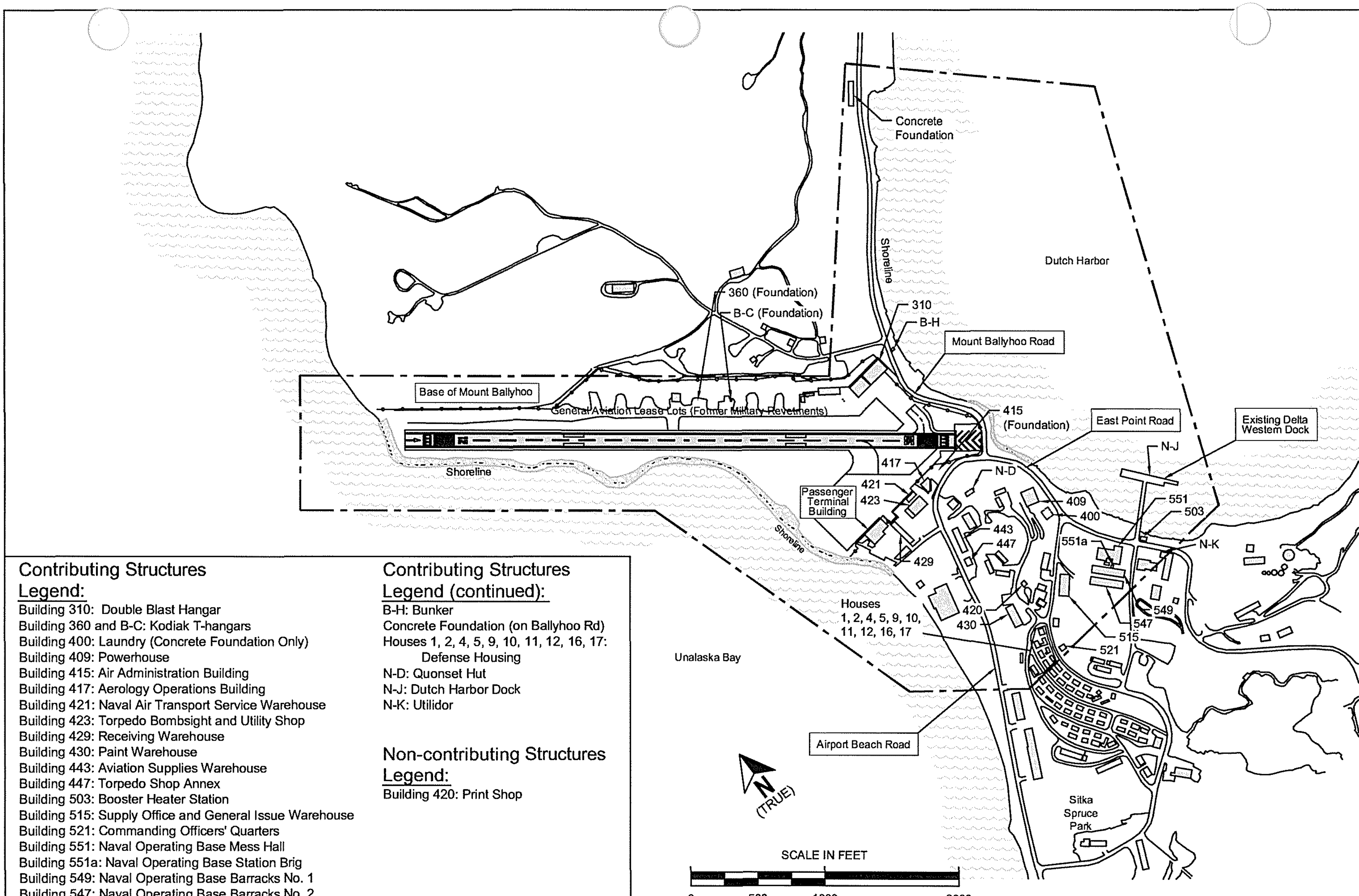
02.B.91.1.02 World War II

NHL contributing structures in the vicinity of the current airport include the Aerology Operations Building (Building 417), the Naval Air Transport Service Warehouse (Building 421), the Torpedo Bombsight and Utility Shop (Building 423), the Receiving Warehouse (Building 429), the Aviation Supplies Warehouse (Building 443), the Torpedo Shop Annex (Building 447), and the Air Administration Building (Building 415) (see Exhibit B-11). The airport runway is also considered a contributing element. These buildings, shown on Exhibit B-11, were documented by a HABS recording team in 1985 (Faulkner and Spude 1987).

The Aerology Operations Building was built in early 1941. Until the 1980s, the building was used as an airport terminal by the City of Unalaska. Although the interior has been modernized, it still features a terrazzo floor with the logo of the U.S. Naval Air Transport Services. This building has been reconstructed as a visitors center for the Aleutian World War II Historic Area (located outside the project area to the north), and is owned and run by the Ounalashka Corporation in cooperation with the National Park Service. To the east of the Aerology Building is the concrete foundation of the Air Administration Building (Building 415). Across the road from the Aerology Building, entrenched into the surface of UNL-293, are the remains of a World War II structure. To the south is a collapsed Quonset hut [N-D].

Constructed in the 1940s, the Naval Air Transport Service Warehouse was used during the war as a cargo terminal. The Torpedo Bombsight and Utility Shop, built in 1942, housed a torpedo repair facility. Because it is in close proximity to the Aerology Operations Building and the N.A.T.S. Warehouse, it adds to the historic integrity of the area.

The Receiving Warehouse was used during the war to store airbase supplies and is currently leased to and being used by PenAir for cargo processing. The Aviation Supplies Warehouse has a wood-frame second story built above a concrete lower level. Torpedo body parts were stored on the second floor and assembled below. It is currently leased to and being used by ACE for cargo processing. The Torpedo Shop Annex and an associated tunnel dug into the hillside were used during World War II as shop space and a torpedo assembly area.



Contributing Structures
Legend:
Building 310: Double Blast Hangar
Building 360 and B-C: Kodiak T-hangars
Building 400: Laundry (Concrete Foundation Only)
Building 409: Powerhouse
Building 415: Air Administration Building
Building 417: Aerology Operations Building
Building 421: Naval Air Transport Service Warehouse
Building 423: Torpedo Bombsight and Utility Shop
Building 429: Receiving Warehouse
Building 430: Paint Warehouse
Building 443: Aviation Supplies Warehouse
Building 447: Torpedo Shop Annex
Building 503: Booster Heater Station
Building 515: Supply Office and General Issue Warehouse
Building 521: Commanding Officers' Quarters
Building 551: Naval Operating Base Mess Hall
Building 551a: Naval Operating Base Station Brig
Building 549: Naval Operating Base Barracks No. 1
Building 547: Naval Operating Base Barracks No. 2

Contributing Structures
Legend (continued):
B-H: Bunker
Concrete Foundation (on Ballyhoo Rd)
Houses 1, 2, 4, 5, 9, 10, 11, 12, 16, 17: Defense Housing
N-D: Quonset Hut
N-J: Dutch Harbor Dock
N-K: Utilidor

Non-contributing Structures
Legend:
Building 420: Print Shop

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Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Dutch Harbor Naval Operating Base and Fort Mears National Historic Landmark

Exhibit B-11

Source: AC/150 5300-13 R8, CH2M Hill Inc., 1987 Unalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

May 2007

To the north of the runway along Ballyhoo Road, there is a Double Blast Hanger[1] (Building 310; Exhibit B-12) adjacent to the runway and to the northeast, between the road and the bay, is a large bunker (B-H). North of the runway, at the base of Ballyhoo, are the revetments that the military constructed to protect parked aircraft and vehicles from shrapnel damage. In the third and fourth revetments from the blast hangar are the concrete foundations of two Kodiak T-hangars (Building 360 and B-C), named after Kodiak where they were constructed (Denfeld 1987:255).

EXHIBIT B-12.
Double Blast Hangar (Building 310; gray building on the right)
Unalaska Airport Master Plan Update
Source: Cultural Resource Consultants, 2007.

To the southeast of the airport along East Point Loop Road is the Powerhouse (Building 409), a reinforced concrete structure designed to withstand a direct hit from a 250 kg bomb. This massive building is still used for power generation. Next to the Powerhouse is the concrete foundation of a laundry (Building 400).

Nearby is the wood-frame Supply Office and General Issue warehouse (Building 515), constructed in 1942. To the west, on a small hill, are the Print Shop (420) and Paint Warehouse (430). Now a private residence, the print shop was used by Navy war photographers for offices, equipment storage, and film development. With its structural adaptation for residential use, the shop retains little of its historic integrity. The paint warehouse currently serves as a storage facility and is a contributing building to the NHL.

To the south is the Defense Housing Area. Thirty-seven units remain of the original 40 (36 duplexes and 4 single family houses) that were built as officers' quarters during World War

[1] World War II era double-reinforced concrete hangar capable of withstanding flying shrapnel

II. Sitting in five rows along three streets on top of the hill, most of these units are now private residences. Most still have their original horizontal wood siding, shingled roofs, wood window frames, and individual base numbers over the doors. Ten of these units are in the project area: House 1, 2, 4, 5, 9, 10, 11, 12, 16, and 17.

Currently used as a private residence, the Commanding Officers' Quarters (Building 521) is a wood-frame house originally designed for family use. Completed in 1942 after families had already been evacuated from the Aleutians, it was used to house commanding officers for the Naval Operating Base during World War II.

Structures southwest of the Delta Western Dock that contribute to the significance of the NHL include the Naval Operating Base Barracks Nos. 1 and 2 (Buildings 549 and 547), the Naval Operating Base Mess Hall (Building 551), the Naval Operating Base Station Brig (551a), the Supply Office and General Issue (Building 515), the Booster Heater Station (Building 503), the Dutch Harbor Dock (N-J), and a utilidor (N-K). Built in late 1941, the barracks housed enlisted Navy men during the war.

The mess hall, built in early 1942, is a wood-frame building on a cement foundation, with shiplap horizontal siding and a shingled roof. The dining room had a 500-man seating capacity. The brig, also dating to early 1942, is a concrete and reinforced steel cellblock, with one solitary confinement cell and two open cells. The wood-frame supply office and general issue warehouse was also constructed in 1942. The booster heater station, from the early 1940s, is a square, concrete block building. During the war, it housed equipment to heat oil as it passed through fuel lines.

The North American Commercial Company (NACC) dock was rebuilt by the Navy in early 1940s. It is made of both treated (creosoted) and untreated piling, with plank decking. During the war, facilities included stiffleg and floating derricks, and traveling gantry cranes. It is now the Delta Western Fuel Dock (UNL-205).

The poured concrete utilidor is opposite the dock, along the road in front of the mess hall.

B.9.2. 1.10 Department of Transportation Act: Section 4(f)

Section 4(f) of the US Department of Transportation Act of 1966 provides for the protection of certain publicly owned resources, including public parks, recreational area, wildlife and waterfowl refuges of federal, state, or local significance, and any land from an historic site of federal, state, or local significance. If a project is found to have an adverse impact on a protected Section 4(f) resource, it must be shown that there is no prudent or feasible alternative to the proposed action.

There are no parks or recreational facilities within the study area. The nearest park is Sitka Spruce Park, located approximately one half mile southwest of the airport on Airport Beach Road. Although much of the Aleutian Chain is within the Alaska Maritime National Wildlife Refuge, Ounalashka Corporation land and the City of Unalaska are excluded from this refuge.

Unalaska Airport is within the Dutch Harbor Naval Operating Base and Fort Mears National Historic Landmark (NHL), which covers much of Amaknak Island, and is near the

Aleutian World War II National Historic Area, which includes most of the north end of Amaknak Island. This area, established in 1985, is located on land owned by the State and the Ounalashka Corporation, but is managed by the National Park Service.

UNL-105, the Airport Flake site, UNL-114, Powerhouse Flake site, UNL-123, the Airport Buried site and UNL-293, the Airport Not Buried site may be considered DOT Section 4(f) resources if determined eligible for the National Register of Historic Places.

B.9.3. Socioeconomic Impacts, Environmental Justice, and Children's Health and Safety Risks

The economy of Unalaska is dominated by the fishing industry, with jobs provided by fishing vessels, seven on-shore processors, and support industries. Until the 1980's, the primary commercial fishery in the area was king crab, which was suspended in the early 1980's. In subsequent years, fisheries have been re-established for a number of groundfish and other shellfish, with openings occurring throughout the year. This has resulted in a shift from fishing being a seasonal industry to a year-round industry, supporting a more stable and permanent population. Dutch Harbor is currently ranked the number one U.S. port in volume of commercial fish landed since 1988, and often ranks first or second in value of fish landed as well.

The population in Unalaska has grown from over 3,000 from the 1990 census to over 4,200 in the 2000 census (AWCRSA 2006), however only half of these residents applied for a Permanent Fund Dividend in 1999, an indicator of the number of full time permanent State of Alaska resident. Although employment data is not available for Unalaska, the Alaska Department of Labor and Workforce Development reported that 51 percent of employment in the AWCRSA, of which 78 percent live in Unalaska, is related to manufacturing, which includes fishing and fish processing. Other strong employment sectors include government (16 percent), services (12 percent), and trade (11 percent) (AWCRSA 2006). The unemployment rate in the AWCRSA, however, increased from 0.5 percent in 1990 to 6.9 percent in 1999. These statistics are affected, however, by seasonal employment and fluctuations in the fishing industry.

Unalaska has a diverse population, with the primary races reported in the 2000 census being white (44 percent) and Asian (31 percent), with other races comprising the remaining 25 percent. American Indians and Alaska Natives compose approximately eight percent of the population. In 2000, only two percent of families had incomes below poverty level, while 12.5 percent of individuals fell into this category, qualifying them as low-income under US DOT Order 5610.2, *Environmental Justice in Minority Populations and Low-Income Populations*. Most properties in Unalaska are rental properties, with only 183 of 988 total housing units being owner-occupied (ACED 2007). A number of employers also provide housing for seasonal employees.

Due to topography, however, housing opportunities are fairly limited, and could be a problem for displaced residents if residential land uses near the airport become incompatible with noise levels. Due to the diverse population present in Unalaska, impacts to residents could potentially result in an environmental justice impact.

There are no schools located in the study area or on Amaknak Island. The nearest playground is over a half mile away from the airport proper at Sitka Spruce Park. Some residences are located within the study area where children may congregate outside and may be affected by changes in air quality if any occur.

B.9.4. Hazardous Materials, Pollution Prevention, and Solid Waste

B.9.4.1 Hazardous Materials

As a former military facility that has been in operation for over 60 years, there are a number of known hazardous sites consisting of hazardous building materials and contaminated soil due to spills and leaking tanks. Known sites on airport property include:

- Double-Blast Hangar: This site is listed as active on the ADEC Contaminated Sites database and is considered medium priority. The site was identified in 2004 as having groundwater contaminated with diesel range petroleum hydrocarbons (DRPH) and total petroleum hydrocarbons (TPH). The soil was not found to be contaminated, indicating the contamination did not come from the surface in this location. No cleanup is planned for this site at this time.
- Dutch Harbor Airport Torpedo Building: This site is listed as inactive on the ADEC Contaminated Sites database and is considered medium priority. The site was identified in 1992, and was found to have soils and groundwater contaminated by diesel-range organics. Leachable lead and hydrocarbons were also found below the building floor in concentrations exceeding regulatory levels. The building is also known to contain asbestos, which would require specialized clean-up if the building were to be demolished. Hazardous materials within the building, including lead impacted soils, motor oil, used sorbent pads and oil filters, and purge water were removed in 2001.

Sites located off airport property but within and adjacent to the study area include multiple sites that have contaminated soil and groundwater, located in the Rocky Point area southeast of the airport along East Point Road. The Delta Western Fuel Dock has been located here for over 100 years, along with fuel tank farms have been present for many decades as well. Sites off of airport property, but within the study area, include:

- Pre-WWII Tank Farm: This site is considered active and a high priority, with diesel and bunker C fuel contaminated soil and groundwater. Contamination resulted from the tank farm that existed at the site prior to and during World War II, when it was bombed. The site is currently used for warehouses and other storage. Clean-up and ground water quality monitoring is ongoing.
- City Power Plant: This site is located between the tank farm and the airport and is listed as active and a high priority with PCB contaminated soil. Other tank farms and fueling facilities are located nearby, and contamination is widespread in this area. A utilidor and pipelines run from the tank farm at the Delta Western Fuel Dock to the City Power Plant and then to the airport. Cleanup in this area has been ongoing for several years by Chevron, Delta Western, and the Corps of Engineers. Cleanup of the power plant will occur under a $200,000 Environmental Protection Agency Brownfield grant, approved in 2006.

- Warehouse WWII B 551: This site consists of PCB contaminated soil beneath a former transformer platform located between the current Delta Western warehouse and East Point Road.
- Rocky Point Thermal Treatment: This site is located at the base of Rocky Point, and is downgradient from active and inactive tank farms and associated facilities. Soils in this area have been contaminated by diesel fuel, jet fuel, gasoline, and bunker C oil. Produce/sheen discharges into the East Point Road ditch during and after significant rainfalls. This area was also used by the US Army Corps of Engineers for a thermal treatment facility for contaminated soils from 1996 to 2002.
- Aqua Fuel System #1: This site consisted of the fuel system constructed during WWII to deliver fuel to the airport from the current Delta Western Fuel Dock. Clean-up is considered complete and groundwater monitoring for this site is ongoing.

Sites adjacent to, but outside of, the study area include:

- Delta Western Bulk Plant: This site is located southeast of the Delta Western Fuel Dock, on top of Rocky Point. Diesel soil contamination has occurred from leaks in six above ground fuel tanks. Contamination is considered to be contained on site and the site has been recommended for closure.
- Rocky Point Tar Ponds A, B, C and D: These four sites are ponds of bunker C oil and water that has collected in four ponds around Rocky Point. Clean-up levels and a monitoring plan have been approved for these sites.

B.9.4.2 Solid Waste

Metal, concrete, wood and other debris remnants of historic development occurs in the study area. While some of this material contributes to the historic fabric of the NHL, some provides no useful purpose and can be disposed of if needed.

Solid waste is disposed of at a permitted Class I landfill on Unalaska Island, located at 1181 Summer Bay Road, operating under Permit # 0125-BA001. This landfill is across Iliuliuk Bay, but is within 10,000 feet of the airport, the separation preferred by FAA between public airports and landfills because of their tendency to attract hazardous wildlife, especially birds. This landfill existed prior to issuance of Advisory Circular (AC) 150/5200-34, therefore this AC does not apply to this landfill.

There is also a closed, non-municipal landfill in the downtown Unalaska area.

B.9.5. Natural Resources, Energy Supply, and Sustainable Design

B.9.5.1 Natural Resources

Demand for natural resources at the Unalaska Airport would generally be limited to material required for additional fill. Borrow sites with suitable material are limited on Unalaska Island, and material from off the island could be barged in, using a significant amount of fuel, depending on where it was coming from. Given the volcanic origins of Unalaska, and the remoteness of the community from fuel sources, earthen/rock fill, other building materials (Coreloc, steel, wood, HVAC, etc.) and fuel, demand for any future improvements will require careful planning.

The quantity of material needed is unknown at this time, however, borrow sites in the area have been evaluated for their suitability. Borrow material could be obtained from any of the following four locations:

1. Airport property: Borrow material could be excavated from the slope of Mt. Ballyhoo on the east side of the runway. Minimal transport to different airport areas would occur.
2. Ugadaga Pits (upper and lower): These two pits, owned by the Aleut Regional Corporation and operated by the Ounalashka Corporation, are located at the end of the Unalaska Valley, past the main town area of Unalaska. Material would need to be hauled approximately five to six miles through Unalaska to Amaknak Island.
3. South America Pit: This pit is located on the southeast side of the Little South America area of Amaknak Island, is owned by the Aleut Regional Corporation and operated by the Ounalashka Corporation. Material would need to be hauled up to three miles from this site.
4. Shaishnikoff Pit: This pit, owned by the Shaishnikoff family, is located on Captain's Bay, south of Amaknak Island. Material would need to be hauled approximately six to seven miles through Unalaska to Amaknak Island.

B.9.5.2 Energy Supply

Electricity at the Unalaska Airport is provided by the City of Unalaska, which is generated by two diesel-generating plants, with a total installed capacity of 7.5 megawatts. The Dutch Harbor Power Plant, adjacent to the airport has an installed capacity of 6.5 megawatts with the remaining megawatt coming from the Unalaska Plant in Unalaska Valley. There is an additional 4.0 megawatts available from UniSea Inc. Average peak consumption is approximately 5.9 megawatts.

Aviation gas and other bulk fuels are provided by three companies, Delta Western Fuel, North Pacific Fuel and Offshore Systems, with a combined storage capacity of approximately 18 million gallons.

B.9.5.3 Sustainable Design

Given the remoteness, environmental complexity and cost of making any changes at Unalaska Airport, sustainable design principals will be extremely important for any future changes at the airport to minimize environmental impact and cost, and providing the greatest and longest-lasting benefit from the project.

B.9.6. Light Emissions and Visual Impacts

Unalaska Airport is located in an area dominated by industrial and commercial uses, which dominate the view for potential sensitive viewers in residential areas. In addition, airport lighting is not used at night because nighttime landings are not allowed.

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Attachment B-1
2006 Videography Survey Results

Marine Affected Environment

This report describes areas of the marine environment that could be affected by the project. The marine environment is divided into two geographic areas, Unalaska Bay and Dutch Harbor (Figure 1). The physical habitat is divided into intertidal, shallow subtidal (4 to 30 feet mean lower low water [MLLW]), and deeper subtidal (30 to 80 feet MLLW).

Information used to describe marine habitat came from two studies. The first was conducted by Dames and Moore in 1980 (Lees 1980). This 1980 study was conducted only in Unalaska Bay and was based on SCUBA diver observations. The second study was conducted in 2006 for CH2M HILL by Ocean Surveys, Inc., using underwater videography (Figures 2, 3, and 4). In addition, benthic grabs were employed to examine infaunal organisms in the harbor.

Unalaska Bay

The following subsections provide an overview of the physical habitat types found in Unalaska Bay that are potentially affected by the project. The intertidal zone is dominated by large and small boulders, most of which are angular and were probably part of the fill of the original airport construction. At the toe of the boulder slope, the bottom transitions into a mixture of cobble and gravel, which extends well offshore. Further offshore, this transition into gravel and sand or sand and gravel. Areas of predominantly sand at depths less than 40 feet are rippled into small dune formations, indicating that wave action is affecting the bottom at these depths and giving an indication of the great force of winter storms hitting the Amaknak Island coast.

Intertidal

The intertidal zone in most locations is composed of large to small boulders on moderately steep slopes, although there are some areas of cobble and large gravel on less steep slopes. The plant community in the upper intertidal zone largely consists of sea lettuce (*Ulva* spp.) and rockweed (*Fucus gardneri*). The middle intertidal zone is dominated by sea lettuce, Northern mazza weed (*Mazzaella heterocarpa*), *Porphyra* sp., and black pine (*Neorhdomela larix*). The lower intertidal zone is dominated by a brown kelp, Alaria sp., a filamentous red algae (unidentified), black pine, rockweed, and sea lettuce.

Animal life in the upper intertidal zone is dominated by acorn barnacles (*Balanus glandula*). Also present are limpets (*Collisela spp.*), a whelk (*Nucella emarginata*), and blue mussels (*Mytilus trosselus*). The middle intertidal zone is dominated by thatched barnacles (*Balanus cariosus*). Other important species include the proliferating anemone (*Epiactis prolifera*), limpets, a large chiton (*Katharina tunicata*), and a whelk (*Nucella*). The lower inter tidal zone supports thatched barnacles and whelks. The intertidal zone as a whole was characterized by Lees (1980) as typical of intertidal habitats in many areas in southern Alaska and the Pacific Northwest.

Shallow Subtidal (4 to 30 feet MLLW)

The physical character of this zone is varied. The shallowest portion is almost all boulders and cobble. In deeper water (>20 feet), this generally transitions into large gravel with some cobble and small boulders. There are some localized areas of sand that are formed into small dunes. Almost all plant and animal life is associated with the boulders, cobble, and gravel. The sand dune areas appear to be too unstable to support plant or animal life.

Shallower than 10 feet, the plant community is dominated by sieve kelp (*Agarum clathratum*). Just offshore from this, dragon kelp (*Alaria fistulosa*) forms dense beds, creating a surface canopy and in deeper water, an overstory. The understory is formed by sieve kelp, split kelp (*Laminaria* *bongardiana*), and witch's hair (*Desmarestia aculeata*). All rock surfaces not covered with the aforementioned species are covered with either the encrusting alga, rusty rock (*Hildenbrandia rubra*), or the coralline encrusting alga, rock crust (*Lithrothamnion phymatodeuam*). Progressing offshore, the dragon kelp diminishes but the understory plants, sieve kelp, split kelp, rusty rock, rock crust, and witch's hair growth continue.

The animal community in the shallow subtidal zone is dominated by the large white plumed anemone (*Metidium giganteum*), unidentified clams (as evidenced by empty shells), the sunflower star (*Pycnopodia helianthoides*), and, in areas, green sea urchins (*Strongylocentrotus droebachiensis*). White plumed anemones are somewhat ubiquitous in distribution and can be found on any substrate as long as there is something hard to attach to. Sunflower stars are found wherever clams or urchins are abundant as food. Green sea urchins, where present, are found in aggregations on gravel, cobble or rock, in groups in hundreds to tens of thousands. In some places, the density of urchins is so great that they are 1 to 3 inches apart, covering the bottom. Other conspicuous invertebrates present in at least moderate numbers include painted anemones (*Urticina crassicornis*), proliferating anemones, hairy triton snails (*Fusitriton oregonensis*), Alaska false jingle (*Pododesmus macroschisma*), a chiton (*Tonicella lineata*), hermit crabs (*Paguris* spp.), sea cucumbers (*Cumaria miniata* and *Eupentacta pseudoquinquesemita*), and false ochre stars (*Evasterias troschelii*). Fish were found to be relatively sparse. Those observed included unidentified sculpins (*Cottidae*) and unidentified flatfish (*Pleuronectidae*).

Deeper Subtidal (30 to 70 feet)

Below 30 feet, the bottom type is mostly gravel and sand with dominance shifting back and forth. The bottom shifts more and more towards sand and silt as depth increases.

At 30 to 40 feet, there are still a few dragon kelps. The bottom is mostly covered with sieve kelp, split kelp, witch's hair, mixed red algaes, and rock crust. At depths greater than 50 feet, the bottom is almost devoid of algal growth.

The most abundant conspicuous animals in this zone are white plumed anemones, sunflower stars, painted anemones, green sea urchins, unidentified clams, and unidentified small shrimp. Other animals observed include hermit crabs (*Elassochirus* sp.), hairy triton snails, false ochre stars, blood stars (*Henricia leviuscula*), Stimpson's sun stars (*Solster stimpsoni*), and giant Pacific chitons (*Cryptochiton stelleri*). Other less conspicuous but important and abundant organisms present include brittle stars (*Ophiopholis* spp.), a tube-forming polychaete worm (*Owenia fusiformis*), a spoonworm (*Bonelliopsis* sp.), and a burrowing anemone (*Halcampia duedecimcirrata*).

Fish are not apparently very abundant in this zone, but a few were seen in the videos. A few small unidentified sculpins were observed along with one pacific cod (*Gadus macrocephalus*) and one great sculpin (*Myoxocephalus polyacanthocephalus*).

Dutch Harbor

As previously mentioned, Dutch Harbor was surveyed using a towed underwater video camera. As a result, many of the observations are not supported with definitive species identification of the harder to recognize species, unlike the Unalaska Bay observations.

Intertidal

The intertidal zone could not be surveyed using the towed video camera because of the nature of the shoreline. The shoreline adjacent to the airport in the intertidal zone is abruptly steep riprap boulders. Based on observations made in Unalaska Bay, the intertidal zone is likely to have dense growths of rockweed and sea lettuce growing on the boulders. In the middle and lower intertidal zone, the rocks would be covered with barnacles and mussels in places. Also present would be the limpets *Collisella* spp., and the whelk (snail) *Nucella.*

Shallow Subtidal (4 to 30 feet MLLW)

The riprap shoreline-armoring rock transitions into smaller boulders, then gravel, at a depth of about 20 feet. Gravel and sand extends throughout the zone described in this section. Clam shells are common to abundant in areas of gravel and sand. In shallower water, the rocks are covered with short fuzzy filamentous green algae. This transition into thick growth of sieve kelp mixed with short folios red algae and patches of witch's hair.

The most abundant large conspicuous animals are green sea urchins, white plumed anemones, and sunflower stars. The urchins are grouped in numbers ranging from 50 to many thousands. The anemones are dispersed. The sunflower stars are grouped wherever urchins or clams are abundant because they are food for this starfish.

Deeper Subtidal (30 to 90 feet MLLW)

At 30 feet, the bottom character is gravel or gravel/sand in most places. This generally transitions into sand at 40 to 50 feet but is shallower or deeper in different locations. The bottom shifts to silt in the 65- to 75-foot depth range.

Gravel in the 30- to 40-foot range is mostly covered by a short fuzzy filamentous algae growth. Although there is some split kelp, sieve kelp, and folios red algae present in places, this type of growth is generally sparse. From 40 to 50 feet, there is a short crusty growth that was unidentifiable. Below this depth, no algaes are present. There are expansive areas in the 70- to 90-foot range on silt that are covered with a fluffy layer of white filaments that are probably bacterial growths. This fits with the fact that most of the benthic grab samples were mucky with an odor of hydrogen sulfide. This suggests that there is a high degree of rapid deposition of sediments of organic origin in the area.

In the shallower depths of this zone, where the bottom is mostly gravel, clams are locally abundant as evidenced by empty shells. Sunflower stars are common in the shallower areas, especially where clams appear to be abundant. White plumed anemones are common at all depths, especially shallower where hard attachment points (rocks) are available. In deeper areas where the substrate shifts to silt, polychaete worms are abundant as evidenced by holes, cone-shaped mounts, and protruding tubes. At depths in the 80- to 90-foot range, holes were estimated to be about 2 to 3 per square foot. Although fish were uncommon at shallow depths, more were observe in the deeper areas. Snake pricklebacks (*Lumpenus sagitta*) were fairly common at depths greater than 60 feet.

Attachment B-2
Marine Mammal Report

Draft Report

Marine Mammals Report

AKSAS Project No. 53091
Federal Project No. AIP3-02-0082-2006

Prepared for
CH2MHILL

Prepared by
Canyon Creek Consulting

February 2007

Contents

Background Information

Project Area

The project area as defined for characterizing marine mammal use includes the nearshore and offshore areas affected by activities required to expand the airport footprint. These activities would include in-water construction adjacent to the existing airport and extraction and sea transport of fill materials from land areas beyond the airport. Extraction and transport of materials are assumed to occur within 25 miles of the airport. Impacts from this suite of activities could include disturbance of seals or sea lions haul out sites from material extraction, behavioral disturbance of marine mammals from underwater construction and vessel noise, and collisions with vessels transporting materials. The size of the project area requires description of a variety of marine mammal species; however, most impacts will be limited to a much smaller number of species inhabiting the nearshore area immediately off the airport.

Species Accounts

A total of 16 marine mammal species occur regularly or sporadically in the region of the project area. These species include six baleen and six toothed whales, one fur seal, one sea lion, one true seal, and the sea otter. Of these, the northern right whale, sei whale, fin whale, humpback whale, northern sea lion, and the southwest Alaska stock of the northern sea otter are listed as endangered or threatened under the Endangered Species Act (ESA). In addition, the stocks of these species and the eastern North Pacific stock of northern fur seals are considered depleted under the Marine Mammal Protection Act (MMPA).

Table 1 provides an overview of the each species status, habitat, prey, and listing under the ESA and MMPA. A brief description of each species is provided in the following section for developing a foundation for assessing potential project impacts. Sections are also provided after the species accounts on noise disturbance and mortality. Information from this report was obtained from Alaska Marine Mammal Stock Assessment Report; Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012, DEIS; technical reports; scientific publications; and staff from the USFWS in Anchorage and National Marine Mammal Laboratory in Seattle.

TABLE 1
Marine Mammals Potentially in the Region of the Project Area and Their Federal/State Status
Unalaska Airport Master Plan Update

Species	*Scientific Name*	Relative Abundance	Primary Habitat	Primary Prey	*Season(s) Present*	*ESA/MMPA Status*
Harbor seal	*Phoca vitulina*	Common	Coastal/ Shelf	Fish	Year-round	
Steller sea lion	*Eumetopias jubatus*	Uncommon	Coastal/ Shelf	Fish	Year-round	*Endangered/ Depleted*
Northern fur seal	*Callorhinus ursinus*	Uncommon	Offshore/ Slope	Fish/ Squid	Spring-Fall	*Depleted*
Dall's porpoise	*Phocoenoides dalli*	Common	Shelf/Slope/ Offshore	Fish	Year-round	
Harbor porpoise	*Phocoena phocoena*	Common	Shelf/ Coastal	Fish/ Squid	Year-round	
Killer whale	*Orcinus orca*	Common	Shelf/Slope/ Coastal	Fish/Marine Mammals	Year-round	
Gray whale	*Eschrichtius robustus*	Common	Coastal/ Shelf	Crustaceans	Spring-Fall	
Humpback whale	*Megaptera novaeangliae*	Uncommon	Shelf/Slope	Zooplankton/ Fish	Spring-Fall	*Endangered/ Depleted*
Minke whale	*Balaenoptera acutorostrata*	Common	Shelf	Fish/Squid	Year-round	
Fin whale	*Balaenoptera physalus*	Uncommon	Slope/ Offshore	Fish/ Zooplankton	Spring-Fall	*Endangered/ Depleted*
Sei whales	*Balaenoptera borealis*	Uncommon	Offshore	Zooplankton	Spring-Fall	*Endangered/ Depleted*
Right whale	*Balaena glacialis*	Rare	Shelf/Slope	Zooplankton	Spring-Fall	*Endangered/ Depleted*
Baird's beaked whale	*Berardius bairdii*	Rare	Slope/ Offshore	Squid/ Ocopus/Fish	Spring-Summerl	
Curvier beaked whales	*Ziphius cavirostris*	Rare	Offshore	Squid/ Fish	Unknown	
Stejneger's beaked whale	*Mesoplodon stejnegeri*	Rare	Shelf/ Offshore	Squid/Fish	Unknown	
Northern sea otter	*Enhydra lutris kenyoni*	Common	Coastal	Sea Urchins/ Clams	Year-round	*Threatened/ Depleted*

Threatened and Endangered Marine Mammals

Northern right whales in the eastern North Pacific Ocean historically ranged across the entire ocean basin north of 25°N latitude and occasionally as far south as 20°N before numbers were reduced by commercial whaling. Today, the distribution and migratory patterns are largely unknown. Right whales summer in the high-latitudes where they feed on copepods and euphausiid crustaceans, and migrate to more temperate waters to winter (Braham and Rice, 1984). Right whales calve in coastal waters during winter, but no calving grounds have been found in the eastern North Pacific Ocean (Scarff 1986). There is historic and recent evidence of right whale occurrence in the Gulf of Alaska and Bering Sea (Mellinger et al., 2004, Brueggeman et al. 1986). Right whales have been encountered in the southeastern Bering Sea and Gulf of Alaska from May to November (Munger et al. 2003; Wade et al. 2006). Recently, 17 right whales including 10 males, 7 females, and possibly 3 calves were observed in September 2004 north of Unimak Pass on the mid and outer (> 100 m depth) continental shelf (Wade et al. 2006, Wiggins et al 2004). Calling right whales were also encountered in a similar location in August (Wade et al. 2006). Two whales were also satellite tracked in this same general location. The locations of the right whales indicate that they could occur in the project area, particularly as they migrate through Unimak Pass in the spring and fall. There are no population estimates for the North Pacific right whale, but the number is thought to be very low (< 200).

Sei whales in Alaska are most common in temperate pelagic waters and only occasionally venture into the Bering Sea from the Gulf of Alaska. They inhabit deepwater areas of open ocean, most commonly over the continental slope (Reeves et al. 1998). They migrate to lower latitudes for breeding and calving in winter and to higher latitudes in summer for feeding on copepods, euphasiids, fish, and squid (Kawamura 1980). Sei whales have been reported in the Gulf of Alaska and Aleutian Islands during summer (Reeves et al. 1998), with the highest number of sighting south of the western Aleutian Islands off the Kamchatka Peninsula to the Commander Islands (Nasu, 1963). Brueggeman et al. (1983, 1987a,b, 1988) did not encounter any sei whales during extensive aerial and vessel surveys of the nearshore and offshore areas of the Bering Sea and Gulf of Alaska in mid to late 1980. Based on this information, few if any sei whales would be expected in the project area.

Fin whales range from subtropical to arctic waters, and are usually found in high-relief area along the continental shelf break or edges of submarine canyons where productivity of euphasiids, copepods, fish, and squid is likely high (Brueggeman et al 1983). Most whales are believed to migrate seasonally from relatively low latitude wintering habitats where breeding and calving take place to high latitude summer feeding areas. In Alaska fin whales occur year round in the Bering Sea with peak number present in spring. Fin whales migrate north into the Bering Sea in spring, feed during summer, and most return to more southern latitudes in the late fall and winter (Reeves et al. 1998). Brueggeman et al. (1983) conducted surveys in the north central Bering Sea in 1982-83 and encountered 26 fin whales in the late spring, 7 in the summer, 13 in the fall, and 6 in the winter. More recent surveys reported by Moore et al. (2002) in 1999 and 2000 found fin whales to be over five times more abundant in the central-eastern Bering Sea than in the southeastern Bering Sea (Moore et al. 2002), and most sighting in the former area were associated with a zone of high productivity along the continental shelf break (Moore et al 2000). Few have been reported in the deeper waters south of the continental shelf (Brueggeman et al 1987a). While fin whales occur in the Bering Sea, considerably more summer in the Gulf of Alaska (Brueggeman et al. 1987a, 1988). These findings show the fin whales occur north of the project area year round in or near areas of high relief, and may enter the study area while migrating through Unimak Pass while transiting between the Gulf of Alaska and the Bering Sea in spring and fall. A rough estimate of the population size of fin whales east of the Kenai Peninsula is over 5,000 animals (Angliss and Outlaw 2005).

Humpback whales are distributed worldwide in all ocean basins, though less common in arctic waters. Two stocks occur in Alaska waters. The western North Pacific stock occurs west of Kodiak Island and the central North Pacific stock east and south of Kodiak Island, although the distribution of the two stocks may partially overlap in the Gulf of Alaska and possibly the Bering Sea (Angliss and Outlaw 2006). The Bering Sea is primarily the summer feeding grounds for the North Pacific stock, which winters and calves in the lower latitudes off Japan (Angliss and Outlaw 2005). Brueggeman et al. (1983, 1987a,b) did not encountered any humpback whales in the north central or southeastern Bering Sea during extensive aerial and vessel surveys. More recently, Moore et al. (2002) recorded one humpback whales south and west of St. Lawrence Island in the east-central Bering Sea. Based on the available information, it is not likely humpback whales occur in the study area except for possibly when they migrate through Unimak Pass in the spring and fall. The western North Pacific stock is estimated to number 394 animals (Calambokidis et al. 1997).

Northern fur seals occur from California north to the Bering Sea and west to the Okhotsk Sea and Honshu Island, Japan. The seals are highly migratory and lead a primarily pelagic existence when not breeding. Seals temporarily haul out on land at non-breeding sites in Alaska, British Columbia and the continental US (Angliss and Outlaw 2005). Southward migration from the Pribilof Islands begins in October with seal appearing off southeast Alaska by December. The northward migration from the lower latitude wintering area begins in March and from April to June large numbers of seals are found in coastal gulf waters (Consiglieri et al. 1982). Most adult males overwinter in Alaskan waters, while most females and immature males winter in waters of British Columbia, Washington, Oregon, and California (Angliss and Outlaw 2005). During the breeding season, approximately 74 percent of the worldwide population is found on the Pribilof Islands in the southern eastern Bering Sea with the remaining animals spread throughout the North Pacific Ocean (Lander and Kajimura, 1982). Of the seals in US waters outside of the Pribilof Islands, 3 percent of the population is found on Bogoslof Island in the southern Bering Sea and on San Miguel Island in California (NMFS 1993). A large concentration of fur seals apparently winters in the nearshore waters of Baranof Island in southeastern Alaska, and smaller numbers occur in Sitka Sound, Kodiak Island, Chirikof Island, Resurrection Bay, Montague Island, and off Yakutat (Consiglieri et al 1982). Brueggeman et al (1986) reported small numbers of fur seals in the central Bering Sea during summer and fall of 1982, winter of 1983 but none in spring of 1982. The results suggest that most fur seals occur beyond the project area, but small numbers may transit the project area during migration through the Aleutian Islands into the North Pacific Ocean (Ream et al. 2005). On July 17, 1998, the eastern Pacific stock was designated as depleted under the MMPA (Angliss and Outlaw 2005). The population is estimated at almost 700,000 animals (Angliss and Outlaw 2005).

Steller sea lions occur in two stocks in Alaska: (1) an eastern US stock listed as threatened under the ESA, including animals east of Cape Suckling, Alaska (144°W) and (2) a western US stock as endangered, including animals at and west of Cape Suckling (62 CFR 30772, June 5, 1997: Angliss and Outlaw 2005). The centers of abundance and distribution are located in the Gulf of Alaska and Aleutian Islands. Members of this species are not known to migrate, but individuals disperse widely outside of the breeding season (late May to early July). At sea, Steller sea lions commonly occur near the 200-m depth contour, but have been seen from near shore to well beyond the continental shelf (Kajimura and Loughlin 1988). About three-fourths of all Steller sea lions haul out on and pup in US territory (Marine Mammal Commission 2000). Sea lion rookeries in Alaska are located in the Pribilof Islands; on Amak Island north of the Alaska Peninsula; throughout the Aleutian Islands and western Gulf of Alaska to Prince William Sound; and on several islands in southeastern Alaska. Haul outs and rookery sites are numerous throughout the breeding range, and those located in the region of the project area are provided in Figure 1 and Table 2.

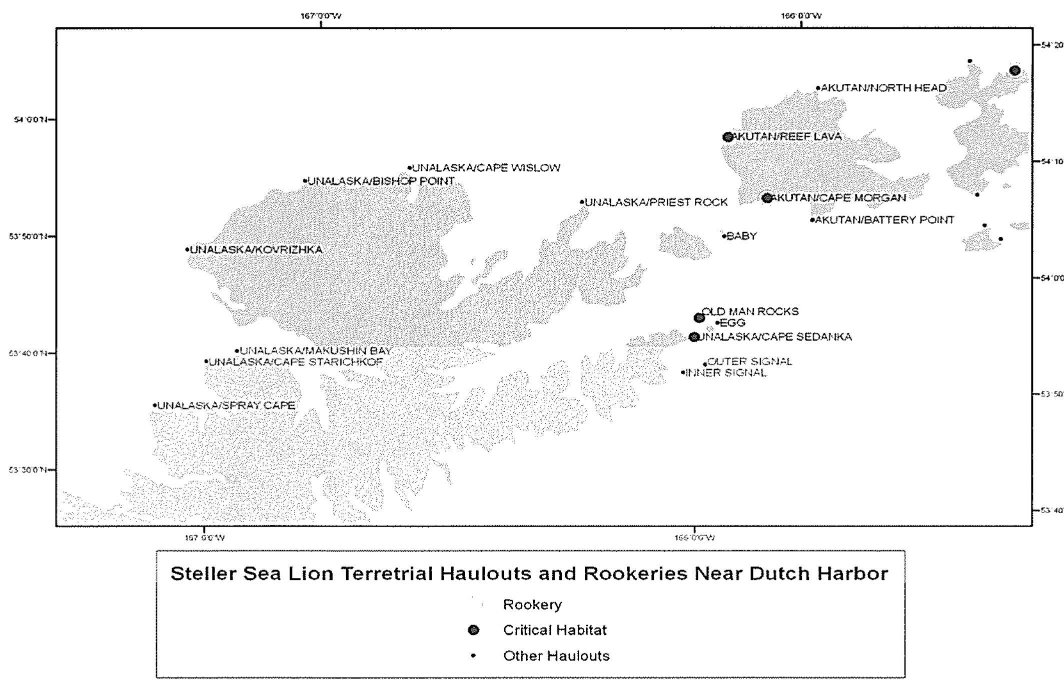

FIGURE 1
Steller Sea Lion Terrestrial Haulouts and Rookeries near Dutch Harbor
Unalaska Airport Master Plan Update
Source: Tom Gilatt and Lowell Fritz of the National Marine Mammal Laboratory, Seattle, WA.

All sea lion haul outs are considered critical habitat because of their limited numbers and high density use; special foraging areas in Alaska have also been designated critical habitat for Steller sea lions, including Bogoslof area in the Bering Sea shelf and Seguam Pass area in the central Aleutian Islands (50 CFR 226.202). The diet of the Steller sea lion consists predominately of a variety of fish and invertebrates (Pitcher 1981; Merrick et al. 1997). The population size of the western stock is 40,000 animals (Angliss and Outlaw 2005).

The Southwest Alaska stock of **northern sea otter** includes animals found off the Alaska Peninsula and Bristol Bay coasts and on the Aleutian, Barren, Kodiak, and Pribilof

Islands. Although other sea otter stocks in Alaska are considered stable, the Southwest stock has declined dramatically over the past 10-20 years, causing the USFWS to list the population as threatened under the ESA on August 9, 2000 (70 CFR 46366, Doroff et al. 2003). No critical habitat has been designated for this stock. Sea otters occur in nearshore coastal waters generally less than 40 m depth and 1-2 km from shore, since they need frequency access to subtidal and intertidal zones for feeding (Green and Brueggeman 1992). Sea otters in Alaska are not migratory and do not normally disperse over long distances. Distribution is nearly continuous from Attu Island in the western Aleutians to the Alaska Peninsula. Figure 2 shows the sea otter distribution around Unalaska Island. Approximately 9,000 sea otters inhabit the Aleutian Islands (Angliss and Outlaw 2005).

TABLE 2
2006 Summer Count of Steller sea lions
Unalaska Airport Master Plan Update

Sitename	Adults and Juveniles	Pups	Critical habitat	rookery
AKUTAN/BATTERY POINT	0	0	0	0
AKUTAN/NORTH HEAD			0	0
AKUTAN/CAPE MORGAN	1249	609	1	1
EGG	0	0	0	0
OUTER SIGNAL	0	0	0	0
BABY	4	0	0	0
OLD MAN ROCKS	112	0	1	0
UNALASKA/CAPE SEDANKA	0	0	1	0
INNER SIGNAL	0	0	0	0
AKUTAN/REEF-LAVA	103	9	1	0
UNALASKA/PRIEST ROCK	1	0	0	0
UNALASKA/WHALEBONE CAPE	0	0	0	0
UNALASKA/CAPE WISLOW	0	0	0	0
UNALASKA/BISHOP POINT	285	0	0	0
UNALASKA/MAKUSHIN BAY	28	0	0	0
UNALASKA/CAPE STARICHKOF	0	0	0	0
UNALASKA/SPRAY CAPE	0	0	0	0
UNALASKA/KOVRIZHKA	0	0	0	0

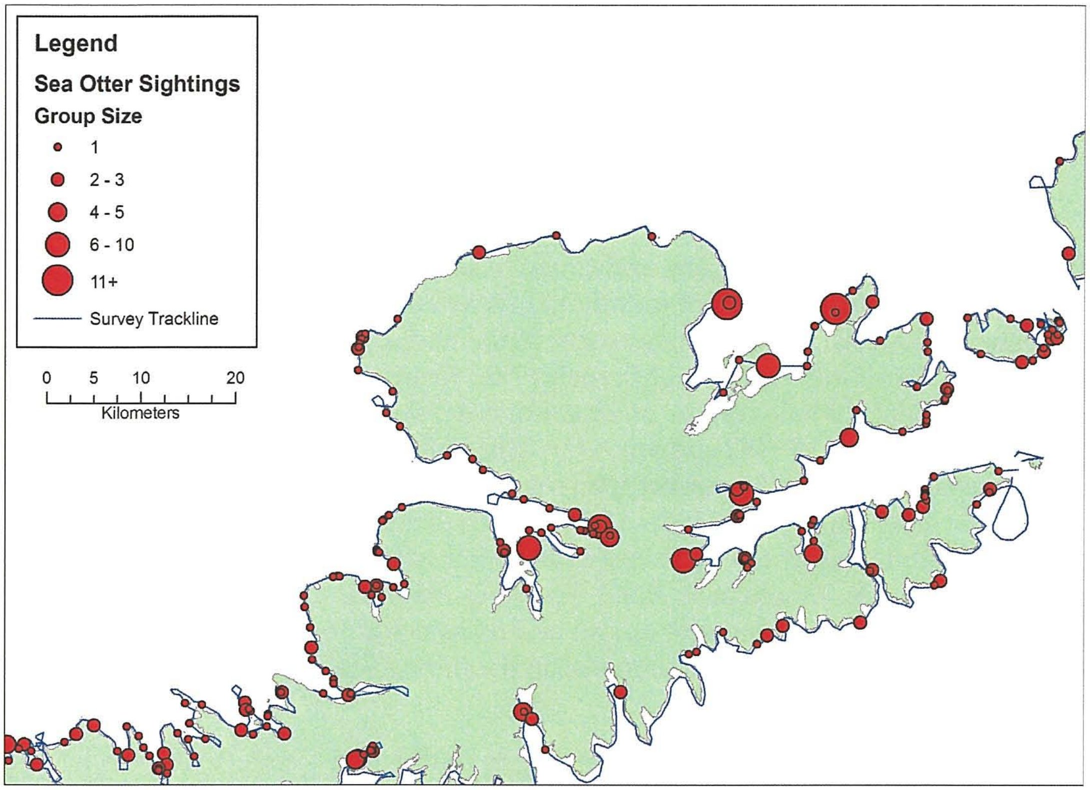

FIGURE 2
Sea otter distribution along Unalaska Island based on aerial survey data collected in 2000
Unalaska Airport Master Plan Update
Source: Canyon Creek Consulting, based on date from Doroff et al (2003)

Non-Threatened and Non-Endangered Marine Mammals

Minke whales occur from the Bering and Chukchi seas south to near the equator (Angliss and Lodge 2004). In spring most are found over the continental shelf and prefer shallow, coastal waters. In Alaska, minke whales occur in the Bering and Chukchi Seas and the inshore waters of the Gulf of Alaska (Mizroch 1992). Brueggeman et al (1983) recorded eight (1-3 per season) minke whales on the outer continental shelf in the central Bering Sea during spring, summer, and fall of 1982 and winter in 1983. Subsequent surveys by Brueggeman et al. (1987) between April and December 1985 found one minke whale north of Unalaska Island near the outer continental shelf in July. More recently, a survey in the central Bering Sea during July and August 1999 resulted in 20 sightings of minke whales on the continental slope (100-200 m deep) (Moore et al. 2002). These results show that minke whales occur in small numbers in the Bering Sea year-round and a few could transit through the project area. The number of minke whales estimated in the Bering Sea is around 1000 (Angliss and Outlaw 2005).

Gray whales that occur in the Bering Sea belong to the Eastern North Pacific stock (Angliss and Outlaw 2005). The whales for this stock winter primarily along the west coast of Baja California, where calving occurs from January to mid-February. The northward migration begins in mid-February and continues through May, and occurs nearshore from central California to Alaska (Rice et al. 1984, Green et al. 1995). Gray whales arrive on the summer feeding grounds in the Gulf of Alaska in late March and April, the northern Bering Sea in May and June, and the Chukchi Sea in July or August (Rice and Wolman 1971, Rugh et al 2005). Gray whales feed on benthic organism and invertebrates in the water column located in the shallow waters on the continental shelf. Some feeding may also occur opportunistically during migration. Each fall gray whales migrate south from Alaska, along the North America coast to Baja California in Mexico (Angliss and Outlaw 2005). Breeding occurs during the northward migration. The size of the population is currently estimated at approximately 18,000 whales (Rugh et al 2005), which may be at or near carrying capacity (Angliss and Outlaw 2005). Gray whales are not expected to occur in the project area except a few may be encountered during the spring or fall migration through Unimak Pass but most migrate out of the project area along the east shore of the pass.

Killer whales occur along the entire Alaska coast within the Chukchi Sea, Bering Sea, Aleutian Islands, Gulf of Alaska, and southward along the Alaska coast. Within these areas, three genetically distinct ecotypes, or forms, of killer whales exist: resident, transient, and offshore (Angliss and Lodge, 2004). In addition, there are eight recognized killer whale stocks within the Pacific U.S. Exclusive Economic Zone, which have been differentiated on the basis of differences in morphology, ecology, genetics, and behavior (Angliss and Lodge, 2004). The whales found off the project area may belong to at least two of the eight stocks including the Alaska resident stock and the Gulf of Alaska, Aleutian Islands, and Bering Sea transient stock (Angliss and Outlaw 2005). Killer whales exhibit movement to nearshore waters, especially in summer and fall, in association with the inshore migrations of prey such as salmon (Balcomb et al. 1980). Killer whales also prey on sea otters, which may have contributed to the decline in the sea otter populations in the Aleutian Islands during the 1990s (Estes et al. 1998). The peak breeding period for killer whales is May through July (Consiglieri et al. 1982). The minimum population estimate for the Gulf of Alaska, Aleutian Islands, and Bering Sea transient population is about 300 animals (Angliss and Outlaw 2005). The Alaska resident stock numbers about 1,000 whales (Angliss and Outlaw 2005). These results suggest that killer whales could occur in the project area year-round, particularly during summer and fall.

Baird's beaked whale's range is from Cape Navarin and the central Sea of Okhotsk to St Mathew Island, the Pribilof Islands in the Bering Sea and the northern Gulf of Alaska (Rice 1986, Rice 1998, Kasuya 2002). A break in the distribution occurs in the eastern Gulf of Alaska; however, from the mid-Gulf to the Aleutian Islands and in the southern Bering Sea, there have been numerous sighting records (Angliss and Outlaw 2005). Baird's beaked whales are migratory, arriving in continental slope waters of the Bering Sea in April/May, peak in abundance in summer, and decrease in October (Kasuya 2002). During this time they are infrequently observed in offshore waters and their winter distribution is unknown (Kasuya 2002). There are no estimates of the size of the population (Angliss and Outlaw 2005). Baird's beaked whales could be encountered in the study area during spring through fall.

Cuvier's beaked whale is distributed in the northeastern Pacific Ocean from Baja California to the northern Gulf of Alaska, Aleutian Islands, and Commander Islands (Rice 1986, 1998). This species is largely absent north of the Aleutian Islands but some sightings have been reported in the St. George Basin in the last ten years (Angliss and Outlaw 2005), which includes the project area. Little is known about the seasonality of this species, and there are no population estimates.

Stejneger's beaked whale is endemic to the cold-temperate waters of the North Pacific Ocean, Sea of Japan, and deep waters of the southwest Bering Sea (Angliss and Outlaw 2005). In the Alaska outer continental shelf, the species occurs throughout the Gulf of Alaska to the Aleutian Islands and the Bering Sea to the Pribilof Islands and Commander Islands (Loughlin and Perez 1985). Near the central Aleutian Islands, groups of 3-15 Stejneger's beaked whales have been sighted on a number of occasions (Rice 1986 and Angliss and Outlaw 2005). The species could occur in the project area, but the number would likely be small and occurrence infrequent.

Dall's porpoise occur year-round throughout their entire range in the northeastern Pacific, from Baja California, Mexico, to Alaska, occurring over the outer continental shelf adjacent to the slope and over very deep water (> 2,500 m or 8,000 ft) oceanic waters (Angliss and Lodge 2004). Their may be some seasonal movement of Dall's porpoise out of the Bering Sea during winter (Angliss and Lodge 2004). Recent surveys in the central-eastern and southeastern Bering Sea in 1999 and 2000 found Dall's porpoises abundant in both areas, where they were clustered around the shelf break (Moor et al. 2002). The Alaska stock is estimated at 83,400 animals (Angliss and Lodge 2004). Dall's porpoise could be encountered in the project area because of their widespread distribution in the Bering Sea.

Harbor porpoises are generally found in coastal waters including harbors, bays, and river mouths but may also be concentrated in and around turbid river water plumes. The range of this species in the North Pacific Ocean is from Point Conception, California, to Point Barrow, Alaska (Gaskin 1984). The Bering Sea stock occurs throughout the Aleutian Islands and all waters north of Unimak Pass (Angliss and Lodge 2004). Harbor porpoise typically occur as solitary animals that frequent waters less than 100 m (325 ft) in depth (Dahlheim et al. 2000). Mating likely occurs from June or July to October, with peak calving in May and June. Harbor porpoise consume a wide variety of prey including fish and cephalopods, apparently preferring non-spiny, schooling fish such as herring, mackerel, and Pollock (Houck and Jefferson, 1999). The Bering Sea population size is estimated to be around 47,000 porpoises (Angliss and Lodge 2004). The widespread distribution, abundance, and coastal occurrence suggest that harbor porpoise likely occur in the project area, possibly year-round.

Harbor seals are distributed along the Alaskan coastline throughout the Gulf of Alaska, the Aleutian Islands, and the Bering Sea. This non-migratory species exhibits local movements associated with tides, weather, season, food availability, and reproduction (Scheffer and Slipp 1944, Fisher 1952, Bigg 1981). Breeding occurs generally in late spring through fall. Major haulout grounds in the project area are shown in Figure 3. Harbor seals feed opportunistically on fish, cephalopods, and crustaceans (Kinkhart and Pitcher 1994). The Bering Sea stock of harbor seals is estimated to number about 13,000 seals (Hill and DeMaster 1998).

Other species in the Bering Sea

Other species in the Bering Sea but not likely to occur in the project area include bowhead whales, beluga whales, Pacific white-sided dolphin, Pacific walrus, ringed seals, bearded seals, spotted seals, and ribbon seals. Most of these species seasonally occur considerably north of the project area over the outer continental shelf in the central and northern Bering Sea (Burns 1970, Brueggeman 1984). Many migrate north into the Chukchi and Beaufort seas during the late spring before returning to the Bering Sea as the pack ice advances south. Occurrence of any of these species in the project area would be unusual and rare.

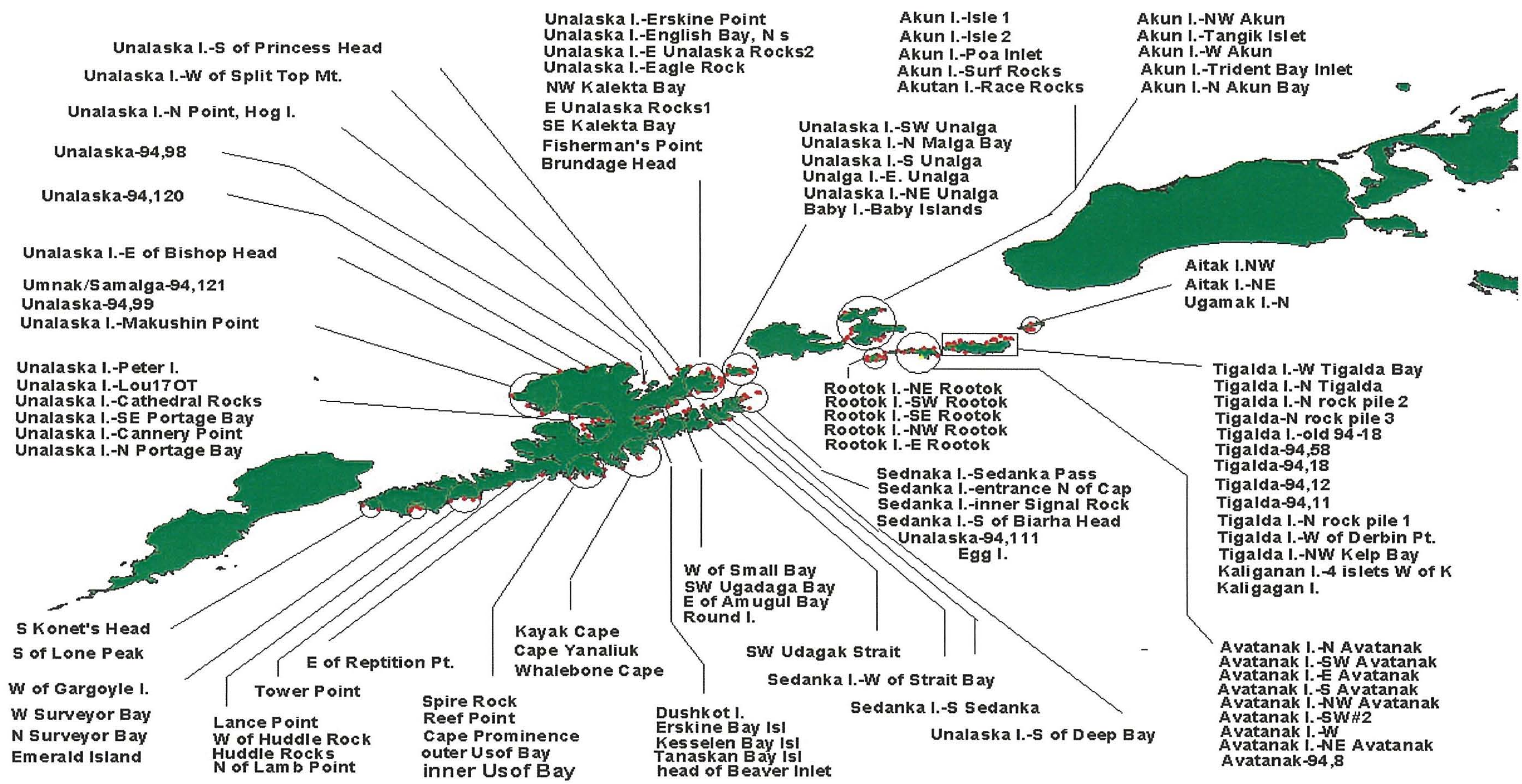

FIGURE 3
Harbor seal haulout sites in the Aleutian region
Unalaska Airport Master Plan Update
Source: David Withrow, National Marine Mammal Laboratory.

Issues Specific to Marine Mammals

Noise Disturbance

Noises from industrial activities (pile driving, drilling, etc.) and vessels can temporarily disturb marine mammals (Richardson et al. 1995). Typical in-water disturbances to marine mammals include short term changes in respiration patterns, movement patterns, and feeding activities. Disturbances at terrestrial haul outs or rookeries can cause seals and sea lions to stampede into the water resulting in the trampling death of some pups (Richardson et al. 1995). Most disturbances rarely cause injury or death, given mitigation measures stipulated in permits issued by NMFS for activities potentially disturbing marine mammals as required under the ESA and MMPA.

Marine mammals respond differently to underwater industrial noise. Most industrial and ship noises are below 1 kHz (Blackwell and Green 2003). Baleen whales (right, fin, sei, gray, humpback, etc.) hear sounds at frequencies primarily below 1 kHz, where as seals and toothed whales (porpoises, dolphins, killer whales, etc.) hear sounds at frequencies primarily about 1 kHz (Richardson et al. 1995). Industrial and vessel noise seems to have little if any effect on prey (Richardson et al. 1995). Therefore, industrial and vessel noises associated with the project will primarily affect baleen whales, most of which are listed as endangered or threatened under the ESA. However, these types of underwater noises have not been shown to have a biologically significant affect on the individual or populations of marine mammals occurring in the vicinity of the project area (National Research Council 2005, Richardson et al. 1995).

Mortality

Primary mortality factors affecting marine mammals are deaths due to commercial fisheries, pollution, hunting (legal and illegal), and ship strikes (Angliss and Outlaw 2005). Ship strikes account for a small number of the total marine mammal mortalities, primarily affecting large whales (Angliss and Outlaw 2005). These mortalities often occur while whales are sleeping on the surface of the ocean, where ship noise is masked by surface water noise.

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Attachment B-3
Birds in Study Area

TABLE 1
The seasonal occurrence and breeding status of birds in the Unalaska–Dutch Harbor region, southwestern Alaska. Sources for information are provided in footnotes[a].

Common Name[c,d]	Scientific Name	Seasonal Occurrence[b]	Breeding Status[b]
Emperor Goose *	*Chen canagica*	Winter	
Brant	*Branta bernicla*	Casual	
Cackling Goose *	*Branta hutchinsii*	Migrant	
Tundra Swan	*Cygnus columbianus*	Summer	Breeding
Gadwall	*Anas strepera*	Winter	
Eurasian Wigeon	*Anas penelope*	Casual	
American Wigeon	*Anas americana*	Casual	
Mallard	*Anas platyrhynchos*	Resident	Breeding
Northern Shoveler	*Anas clypeata*	Casual	
Northern Pintail	*Anas acuta*	Casual	
Baikal Teal	*Anas formosa*	Accidental	
Green-winged Teal *	*Anas crecca*	Resident	Breeding
Ring-necked Duck	*Aythya collaris*	Casual	
Tufted Duck	*Aythya fuligula*	Casual	
Greater Scaup	*Aythya marila*	Resident	Breeding
Lesser Scaup	*Aythya affinis*	Casual	
Steller's Eider +[d]	*Polysticta stelleri*	Winter	
Spectacled Eider +	*Somateria fischeri*	Casual, nsr	
King Eider *	*Somateria spectabilis*	Winter	
Common Eider *	*Somateria mollissima*	Resident	
Harlequin Duck	*Histrionicus histrionicus*	Resident	
Surf Scoter *	*Melanitta perspicillata*	Casual, nsr	
White-winged Scoter	*Melanitta fusca*	Resident	
Black Scoter *	*Melanitta nigra*	Resident	
Long-tailed Duck *	*Clangula hyemalis*	Winter	
Bufflehead	*Bucephala albeola*	Winter	
Common Goldeneye	*Bucephala clangula*	Winter	
Barrow's Goldeneye	*Bucephala islandica*	Casual, Winter	
Common Merganser	*Mergus merganser*	Resident	
Red-breasted Merganser	*Mergus serrator*	Resident	Breeding

TABLE 1
The seasonal occurrence and breeding status of birds in the Unalaska–Dutch Harbor region, southwestern Alaska. Sources for information are provided in footnotes[a].

Common Name[c,d]	Scientific Name	Seasonal Occurrence[b]	Breeding Status[b]
Rock Ptarmigan *	*Lagopus muta*	Resident	Breeding
Red-throated Loon *	*Gavia stellata*	Casual	Breeding
Pacific Loon	*Gavia pacifica*	Winter	
Common Loon	*Gavia immer*	Resident	
Yellow-billed Loon	*Gavia adamsii*	Winter	
Horned Grebe	*Podiceps auritus*	Resident	
Red-necked Grebe	*Podiceps grisegena*	Resident	
Laysan Albatross	*Phoebastria immutabilis*	Offshore	
Black-footed Albatross	*Phoebastria nigripes*	Offshore	
Short-tailed Albatross +	*Phoebastria albatrus*	Offshore	
Northern Fulmar	*Fulmarus glacialis*	Resident, Offshore	Breeding
Mottled Petrel	*Pterodroma inexpectata*	Casual	
Sooty Shearwater	*Puffinus griseus*	Summer, Offshore	
Short-tailed Shearwater	*Puffinus tenuirostris*	Summer, Offshore	
Fork-tailed Storm-Petrel	*Oceanodroma furcata*	Resident, Offshore	
Leach's Storm-Petrel	*Oceanodroma leucorhoa*	Summer, Offshore	Breeding
Double-crested Cormorant	*Phalacrocorax auritus*	Resident	
Red-faced Cormorant *	*Phalacrocorax urile*	Resident	Breeding
Pelagic Cormorant	*Phalacrocorax pelagicus*	Resident	Breeding
Bald Eagle	*Haliaeetus leucocephalus*	Resident	Breeding
Northern Harrier	*Circus cyaneus*	Casual	
Sharp-shinned Hawk	*Accipiter striatus*	Casual	
Rough-legged Hawk	*Buteo lagopus*	Summer	Breeding
Golden Eagle	*Aquila chrysaetos*	Resident	
Merlin	*Falco columbarius*	Winter	
Gyrfalcon *	*Falco rusticolus*	Resident?	Breeding
Peregrine Falcon *	*Falco peregrinus*	Resident	Breeding
Sandhill Crane	*Grus canadensis*	Accidental	
Pacific Golden-Plover *	*Pluvialis fulva*	Migrant	
Semipalmated Plover	*Charadrius semipalmatus*	Summer	Breeding
Black Oystercatcher *	*Haematopus bachmani*	Resident	Breeding

TABLE 1
The seasonal occurrence and breeding status of birds in the Unalaska–Dutch Harbor region, southwestern Alaska. Sources for information are provided in footnotes[a].

Common Name[c,d]	Scientific Name	Seasonal Occurrence[b]	Breeding Status[b]
Wandering Tattler *	*Tringa incana*	Migrant	
Wood Sandpiper	*Tringa glareola*	Accidental	
Whimbrel	*Numenius phaeopus*	Migrant	
Bar-tailed Godwit	*Limosa lapponica*	Migrant	
Ruddy Turnstone	*Arenaria interpres*	Migrant	
Red Knot	*Calidris canutus*	Migrant	
Sanderling *	*Calidris alba*	Migrant	
Western Sandpiper	*Calidris mauri*	Migrant	
Least Sandpiper	*Calidris minutilla*	Breeding	
Pectoral Sandpiper	*Calidris melanotos*	Migrant	
Sharp-tailed Sandpiper	*Calidris acuminata*	Migrant	
Rock Sandpiper *	*Calidris ptilocnemis*	Resident	Breeding
Dunlin	*Calidris alpina*	Migrant	
Short-billed Dowitcher	*Limnodromus griseus*	Migrant	
Wilson's Snipe	*Gallinago delicata*	Resident	
Red-necked Phalarope	*Phalaropus lobatus*	Resident	Breeding
Red Phalarope	*Phalaropus fulicarius*	Migrant	
Bonaparte's Gull	*Larus philadelphia*	Migrant, nsr	
Mew Gull	*Larus canus*	Resident	Breeding?
Herring Gull	*Larus argentatus*	Winter	
Slaty-backed Gull *	*Larus schistisagus*	Casual	
Glaucous-winged Gull	*Larus glaucescens*	Resident	Breeding
Glaucous Gull	*Larus hyperboreus*	Casual, Winter	
Black-legged Kittiwake	*Rissa tridactyla*	Resident	Breeding?
Red-legged Kittiwake *	*Rissa brevirostris*	Casual	
Arctic Tern	*Sterna paradisaea*	Breeding	Breeding
Aleutian Tern *	*Sterna aleutica*	Breeding	Breeding
Pomarine Jaeger	*Stercorarius pomarinus*	Migrant, Offshore	
Parasitic Jaeger	*Stercorarius parasiticus*	Breeding, Offshore	
Long-tailed Jaeger	*Stercorarius longicaudus*	Migrant, Offshore	
Common Murre	*Uria aalge*	Resident	Rare

TABLE 1
The seasonal occurrence and breeding status of birds in the Unalaska–Dutch Harbor region, southwestern Alaska. Sources for information are provided in footnotes[a].

Common Name[c,d]	Scientific Name	Seasonal Occurrence[b]	Breeding Status[b]
Thick-billed Murre	*Uria lomvia*	Resident	Breeding
Pigeon Guillemot	*Cepphus columba*	Resident	Breeding
Marbled Murrelet *	*Brachyramphus marmoratus*	Resident	Breeding?
Kittlitz's Murrelet +	*Brachyramphus brevirostris*	Spring-Summer, Offshore in Winter	
Ancient Murrelet	*Synthliboramphus antiquus*	Resident	Breeding
Parakeet Auklet	*Aethia psittacula*	Resident, Offshore in Winter	Breeding
Least Auklet	*Aethia pusilla*	Resident	
Cassin's Auklet	*Ptychoramphus aleuticus*	Resident, Offshore in Winter	Breeding
Whiskered Auklet *	*Aethia pygmaea*	Resident	
Crested Auklet	*Aethia cristatella*	Resident, Offshore in Winter	Breeding
Rhinoceros Auklet	*Cerorhinca monocerata*	Summer	Breeding?
Horned Puffin	*Fratercula corniculata*	Resident, Offshore in Winter	Breeding
Tufted Puffin	*Fratercula cirrhata*	Resident, Offshore in Winter	Breeding
Oriental Cuckoo	*Cuculus optatus*	Accidental	
Snowy Owl	*Bubo scandiacus*	Casual	Breeding (rare)
Short-eared Owl *	*Asio flammeus*	Summer	Breeding
Rufous Hummingbird	*Selasphorus rufus*	Accidental	
Belted Kingfisher	*Ceryle alcyon*	Resident	Breeding?
Northern Shrike	*Lanius excubitor*	Casual in Winter	
Black-billed Magpie	*Pica pica*	Casual	
Common Raven	*Corvus corax*	Resident	Breeding
Sky Lark	*Alauda arvensis*	Casual	
Violet-green Swallow	*Tachycineta thalassina*	Casual	
Bank Swallow	*Riparia riparia*	Summer	Breeding
Barn Swallow	*Hirundo rustica*	Casual	
Winter Wren	*Troglodytes troglodytes*	Resident	Breeding
American Dipper	*Cinclus mexicanus*	Resident	Breeding

TABLE 1
The seasonal occurrence and breeding status of birds in the Unalaska–Dutch Harbor region, southwestern Alaska. Sources for information are provided in footnotes[a].

Common Name[c,d]	Scientific Name	Seasonal Occurrence[b]	Breeding Status[b]
American Robin	*Turdus migratorius*	Casual	
Eastern Yellow Wagtail	*Motacilla tschutschensis*	Accidental	
Red-throated Pipit	*Anthus cervinus*	Casual, nsr	
American Pipit	*Anthus rubescens*	Summer	Breeding
Bohemian Waxwing	*Bombycilla garrulus*	Casual	
Yellow Warbler	*Dendroica petechia*	Casual	
Wilson's Warbler	*Wilsonia pusilla*	Casual	
Savannah Sparrow	*Passerculus sandwichensis*	Summer	Breeding
Fox Sparrow	*Passerella iliaca*	Summer, Casual in Winter	Breeding
Song Sparrow *	*Melospiza melodia*	Resident	Breeding
Golden-crowned Sparrow	*Zonotrichia atricapilla*	Summer, Casual in Winter	Breeding
Dark-eyed Junco	*Junco hyemalis*	Casual in Winter	
Lapland Longspur	*Calcarius lapponicus*	Summer	Breeding
Snow Bunting	*Plectrophenax nivalis*	Resident	Breeding
Brown-headed Cowbird	*Molothrus ater*	Accidental	
Brambling *	*Fringilla montifringilla*	Accidental	
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*	Resident	Breeding
Pine Grosbeak	*Pinicola enucleator*	Casual	
Red Crossbill	*Loxia curvirostra*	Accidental	
Redpoll spp. (Common & Hoary redpolls)	*Carduelis flammea* & *C. hornemanni*	Resident	Breeding
Pine Siskin	*Carduelis pinus*	Casual in Winter	

[a] Sources:

North Pacific Seabird Colony Database (U.S. Fish and Wildlife Service 2007)

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Fairchild, L. A., and M. L. Heer. 1997. Unalaska winter waterbird surveys, March 1995: trip report. Unpublished report. U.S. Fish and Wildlife Service, Ecological Service, Anchorage, AK. 18 pp.

Fairchild, L. A., and M. R. North. 1993. Unalaska winter waterbird surveys, March 1993: trip report. Unpublished report. U.S. Fish and Wildlife Service, Ecological Service, Anchorage, AK. 16 pp.

TABLE 1
The seasonal occurrence and breeding status of birds in the Unalaska–Dutch Harbor region, southwestern Alaska. Sources for information are provided in footnotes[a].

Common Name[c,d]	Scientific Name	Seasonal Occurrence[b]	Breeding Status[b]

Zeillemaker, C. F. 1987. Birds of fifteen locations on Amaknak (Dutch Harbor) and Unalaska Islands, Aleutian Islands, Alaska. Unpublished report. U.S. Fish and Wildlife Service, Adak, AK. 5 pp.

[b] Seasonal occurrence and breeding status (modified from Golodoff 2007 and Zeillemaker 1987):

Resident: present throughout the year

Winter: wintering

Migrant: occurs only during migration

Offshore: occurs in offshore marine waters

Casual: occurs only casually (i.e., one to several sightings in a decade, within or near its normal range)

Accidental: occurs only accidentally (i.e., very few records, so far outside its normal range that additional recores are unlikely)

nsr: no substantiated record, but has been reported.

Breeding status: evidence of breeding, ? indicates resident species that may be breeding, but not confirmed

[c] Asterisk (*) indicates that this species is considered a species of conservation concern or a sensitive species by a federal (USFWS, BLM), state (ADFG), or non-governmental organization (Audubon, Alaska Natural Heritage Program).

[d] The plus (+) indicates that the species is listed under the Endangered Species Act as endangered (Short-tailed Albatross), threatened (Spectacled and Steller's eiders), or is a candidate for listing (Kittlitz's Murrelet).

Attachment B-4
Cultural Resources Report

Draft Report

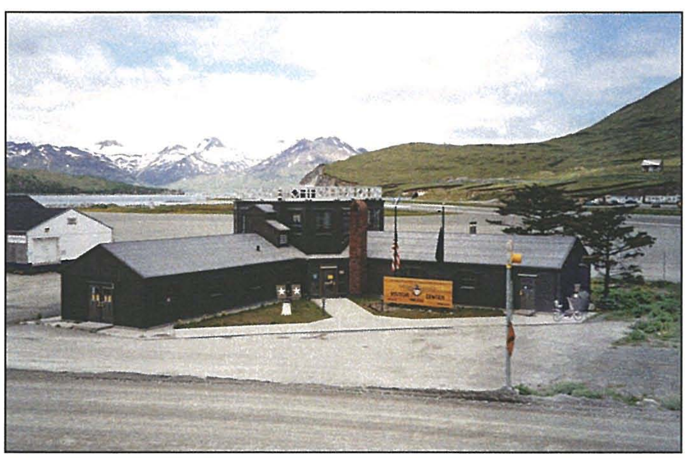
Archeological and Historical Resources

AKSAS Project No. 53091
Federal Project No. AIP3-02-0082-2006

Prepared for
CH2MHILL

Prepared by
Cultural Resource Consultants LLC

February 2007



World War II Aerology Building, Dutch Harbor

Contents

Introduction

Cultural resources are the physical manifestations of the past that are worthy of listing on the National Register of Historic Places (National Register). By passing the National Historic Preservation Act (NHPA) of 1966, the U.S. Congress declared that "the historical and cultural foundations of the Nation should be preserved…" and that "the preservation of this irreplaceable heritage is in the public interest…." The NHPA authorizes the Secretary of the Interior "to expand and maintain a National Register of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture" (36 CFR 60.1). A site's significance is evaluated according to criteria established by the Secretary of the Interior for use in determining the eligibility of properties for the National Register (36 CFR Part 60). The NHPA defines "historic properties" as prehistoric and historic sites, buildings, structures, districts, and objects included in or eligible for inclusion in the National Register, as well as artifacts, records, and remains related to such properties.

Archeological and historic sites are extremely sensitive to physical disturbance and can be adversely affected by direct, indirect, or cumulative impacts associated with any proposed project. Section 106 of the NHPA requires that the possible effects of Federal undertakings on properties included in or eligible for the National Register be considered.

Background Information

Past Research

There has long been an interest in the archeology of Amaknak Island. Both William H. Dall, geologist and natural historian, and Alphonse Pinart, a French explorer, investigated archeological remains on the island in the 1870s (Dall 1873:283-285; McCartney 1967:41). Waldemar Jochelson (1975), who spent 19 months in the Aleutians during 1909 and 1910 as part of the Aleutian-Kamchatka Expedition, excavated at three sites on Amaknak. Ales Hrdlicka (1945) also worked on the island, digging at a single site (*Amaknax*, UNL-054) periodically from 1936 to 1938. During World War II, Dr. Alvin Cahn, a Lt. Commander in the Naval Reserve, mapped, described, and excavated sites on Amaknak. His main efforts, however, were concentrated on *Xatacxan* (UNL-018), a site also tested by Helge Larsen in 1945 and Ted Bank in 1951, 1954 and 1971 (McCartney 1967:1; Bank 1974). The material collected by Cahn was reported on briefly by George Quimby (1946, 1948). A more extensive analysis of the bone artifacts from this collection was done by Allen McCartney (1967).

Ted Bank returned to Amaknak occasionally during the two decades following his first work at *Xatacxan*, excavating at several sites and conducting a systematic survey of the island and Unalaska Bay (Veltre *et al.* 1984:10). In 1977, Glenn Bacon (1977) excavated at the Amaknak Bridge site (UNL-050). Doug and Mary Veltre briefly tested several sites on Amaknak for the Ounalashka Corporation in 1982, and Wayne Wiersum looked at project areas associated with an expansion of the Unalaska airport in 1983. The Veltres, Allen McCartney, and Jean Aigner conducted a fairly intensive survey of Amaknak and adjacent areas of Unalaska Island in 1984 (Veltre *et al.* 1984). Also during that year, Michael Yarborough (1984) investigated the site of a proposed new runway on Ulakta Spit.

During the summer and fall of 1988, David Yesner and Robert Mack (Yesner 1988a and 1988b), and Michael Yarborough (1988) surveyed and tested the Margaret Bay site (UNL-048), located on a bedrock knob along the eastern side of the entrance to Margaret Bay. In 1989, Michael R. Yarborough conducted an archeological and historical survey of a proposed Unisea Port Complex (Yarborough 1989). Rick Knecht (1998:2) and crews from the Museum of the Aleutians excavated at the Margaret Bay site during 1996 and 1997, the Summer Bay site in 1998, and the Amaknak Bridge site in 2000.

Interest in the World War II history of the Dutch Harbor area is a more recent development. Historic American Building Survey (HABS) field teams spent November of 1984, and the summers of 1985 and 1986 recording historic structures that remained from the military build-up on Amaknak and Unalaska Islands. The HABS project was intended to preserve through documentation the large number of buildings that had been determined to be hazardous and were to be removed by the U.S. Army Corps of Engineers (Faulkner and Spude 1987:v). The most comprehensive history of Dutch Harbor during the war years is by Denfeld (1987). His study also includes a detailed inventory of the World War II structures on Amaknak.

Eastern Aleutian Prehistory

Richard Knecht and Richard Davis (2001:270) have identified five "basic phases" of eastern Aleutian prehistory, "all of which combine to describe the Aleutian Tradition." The phases may be summarized as follows (after Knecht and Davis 2001):

- Early Anangula Phase 9000 – 7000 B.P.
- Late Anangula Phase 7000 – 4000 B.P.
- Margaret Bay Phase 4000 – 3000 B.P.
- Amaknak Phase 3000 – 1000 B.P.
- Late Aleutian Phase 1000 – 200 B.P.

The Early Anangula phase forms the foundation of the Aleutian Tradition. Known from the Anangula site on Ananiuliak Island and two sites on Hog Island in Unalaska Bay (Knecht and Davis 2001:272), this phase is characterized by cores and blades, burins, scrapers, and fragments of stone vessels (Dumond 1977:42). The succeeding the Late Anangula phase retained this older tool kit while adding innovations such as bifacially worked artifacts (Knecht and Davis 2001:273).

The Margaret Bay phase forms a link between the Anangula phases and the later Amaknak and Aleutian phases that lasted up until the time of Russian contact. Margaret Bay phase sites are often found along raised fossil shorelines 8 to 10 meters (m) above the modern sea level and as far as a kilometer inland (Knecht and Davis 2001:275-276). The lithic assemblage still includes cores and blades, although small blades become less common thorough time, and core and blade technology "becomes rare or absent by about 3000 BP"(Knecht and Davis 2001:276). The assemblage features a variety of burins, including polished versions, and ground slate tools—ulu blades and lances—make their first appearance. Stemmed points are common early, but are supplanted later by small bullet shaped points. The phase also includes some Arctic Small Tool tradition-like elements such as "small and round beaked end scrapers, bell shaped scrapers, polished adzes, fine pressure flaking, and incised artwork in addition to the polished burins" (Knecht and Davis 2001:276).

The beginning of the Amaknak phase was marked by a 2 m drop in relative sea level that led to the abandonment of Margaret Bay phase sites. The Amaknak phase "represents the high-water mark of the Aleutian Tradition in terms of the sheer variety in lithic and bone tools" and is characterized by "a stylistic exuberance evident in a plethora of barbing styles, highly decorated hunting equipment…and in decorative items" (Knecht and Davis 2001:278).

The Late Aleutian phase includes the last 800 years of prehistory prior to Russian contact. Late Aleutian phase occupations usually top the massive midden mounds closest to the current shoreline, which were often first occupied in the Amaknak phase. This phase is marked by the appearance of the ethnographically known longhouses (Knecht and Davis 2001:278-279) and was a period of accelerated inter-island contacts (McCartney 1971:96; Dumond 1977:77).

Despite past archeological work on Amaknak, our understanding of this area is limited by small samples, the nature of past excavations, and the lack of proper analysis and publication of information. Dall, Jochelson, Hrdlicka, and military collectors did not retain all of the material that they excavated, discarding broken or mundane items. Artifacts which did make their way into museums usually lack provenience and, except for the bone assemblages from Cahn's collections, they have yet to be properly analyzed.

Excavations at the Margaret Bay site during 1996 and 1997 produced evidence of an occupation from ca. 5600 B.P. to about 3000 B.P. (Knecht 1998:2). Margaret Bay is the earliest dated Aleutian tradition site in the area, as other midden sites around Unalaska Bay date back no farther than 2,500 years ago (Veltre *et al.* 1984:75). Recent testing at the Amaknak Bridge site has revealed deposits that date to ca. 3400 years B.P. (Rick Knecht, personal communication 2000).

Artifacts have been recovered from several sites on Amaknak that are reminiscent of assemblages from both the Sandy Beach and Anangula village sites. These assemblages exhibit not only a prepared core and blade technology related to that at Anangula, but also an irregular core and flake industry that appeared in the Aleutians by 6,000 years ago.

Archeological sites are ubiquitous on Amaknak and Unalaska Islands, and commonly occur at elevations up to 20 m above sea level (Rick Knecht, personal communication, 1998). According to Knecht (1998:6-7):

> The relationship between the morphology and location of the paleo-shorelines during the Holocene and the location of occupation sites is very strong. The prehistoric people were intimately tied to the marine environment and lived at places on the shoreline that were suitable for occupation. The majority of archeological sites identified in the region are located on or in immediate proximity to paleo-shorelines. Holocene beaches, storm berms, wave cut shore platforms and marine terraces and other shoreline features show the coastline of northwest Unalaska has been highly dynamic and undergone significant local changes in location and form.

There is an early to mid-Holocene shoreline that extends inland as far as 3 km from Morris Cove, and Summer, Kalekta, and Constantine Bays. This paleo-shoreline, the oldest yet identified on the northwestern coast of Unalaska Island, is marked by a prominent wave-cut scarp and raised marine terraces that are 3 to 4 m above the modern shoreline at Morris Cove. A second paleo-shoreline, composed of two thin gravel beaches interstratified with colluvium composed primarily of cultural material, has been found at the Margaret Bay site. These beaches are 1.8 to 2.2 m above the modern beach and probably date somewhere between 3100 B.P. and 4600 B.P. (Knecht 1998:7-8).

History

Russian explorers had visited Unalaska Island by 1760. The exact date of a permanent Russian settlement at Iliuliuk village, named *Dobroe Soglasie* by the Russians, is uncertain, although it could have been as early as 1765 or as late as the early 1770s. By 1821:

> The settlement of *Dobroe Soglasie* in Captain's Harbor on Unalashka Island consisted of 'a handful of small buildings which the lack of trees made it inconvenient to improve.' About 10 Russians and kaiurs lived there (Fedorova 1973:198, 201).

Commerce, especially trade in sea mammal furs, dominated the Aleutian economy until the early American period. At the time of the transfer of Alaska from Russia to the United States in 1867, the assets of the Russian American Company, including the trading post at Unalaska, were acquired by the firm that ultimately became the Alaska Commercial Company (ACC). For many years, the ACC, based in Unalaska, had a monopoly on the fur seal harvest in the Pribilof Islands. However, in 1890, the North American Commercial Company (NACC):

> ...successfully outbid the ACC for the coveted seal lease and bought the company's buildings in the Pribilof Islands outright for $67,000. Within a year the company established offices on the south side of Dutch Harbor, at a place about a mile across the bay from the ACC holdings (Cook 1993:29-32).

The NACC constructed "warehouses, wharves, offices, dwelling houses, elevators, and coal bins for the accommodation of Government vessels, whalers, natives and the public." The company also built an L-shaped dock (Cook 1993:29-32). As Kathleen Lopp Smith described Dutch Harbor in 1900:

> The land is hilly and mountainous, no trees, but covered with moss, grass, and heather to the very top. They say cattle thrive wonderfully well, and the cattle belonging to the company for their use here were certainly in fine condition. It looked good to see horses, cows, sheep and hogs, everything in good condition. There was a day-old litter of pigs in one yard. The land is staked in all directions from the town, and the W. A. C. Co. have a pasture fence around their quarter section. There are about a dozen buildings in the town, but Malaska [sic] Village is only a mile across the neck of land, and a number of passengers walked over there (Smith 1984:310-311).

Notes from the 1887 U.S. Survey of the company property list improvements on the tract as "a Store, Wharf, Warehouse, 100 x 50 feet store house, carpenter shop, Cook house, mess house, Residence and lodging house all of which I estimate has not cost less than twenty thousand dollars" (Gurves 1892). The NACC had a contract to supply coal to U.S. naval ships stationed in the Bering Sea, and supplied provisions and coal to sealers and whalers. The company also carried on "a general business with the natives dealing in articles of general merchandise for sale to all persons" (Gurves 1892).

Dutch Harbor grew to considerable size during the Nome gold rush of 1902, when it served as a stopover port for vessels heading north. Vessels stopped at Unalaska for supplies and to wait for the ice to breakup in the Bering Sea (Denfeld 1987:18, 26-27).

However, in just a few years, the end of the gold rush and the near extinction of both the sea otter and fur seal led to a decline in shipping, leaving the communities of Unalaska and Dutch Harbor economically depressed. By April of 1908, three employees of the NACC living in the company house were the only inhabitants of Dutch Harbor (Seran 1930).

By the 1910s, the once thriving town was occupied only by a company caretaker:

> [Billy Moran] was caretaker at Dutch Harbor for the old N.A.C. Company that had closed sometime after the gold rush to Nome had ceased its rushing, for the gold had also ceased. No one lived at Dutch Harbor but Billy Moran, and he was a genial soul who liked to visit. He lived in the old "Molly Garfield house," which he kept in shining order even to the big, copper, hot-water heater in the kitchen. Molly (daughter of former President Garfield) had designed the house and lived there when her husband was in charge of the N.A.C. Company. I think her husband's name was Brown, but the house was always called the "Molly Garfield House." It still had the old rosewood piano she had used, several good articles of furniture and blue willow ware dishes in the cupboards (Winchell 1954:168).

In 1919, the facilities at Dutch Harbor were deeded to the Alaska Commercial Company (DPRA Inc. 1994:4-1), and by the 1930s, "[m]ost of the old buildings, consisting of a Company House, a hotel, a dance hall, a bunkhouse, and numerous small houses, still remain[ed], somewhat worse for wear..."(Lockhart 1937, quoted in Denfeld 1987:26-27). The ACC Store and the Company House survived until at least March 1942, but had been torn down by 1943.

A Naval Radio Station was established on Amaknak Island in 1911. This was one of several stations built by the Navy in Alaska between 1908 and 1924 (Denfeld 1985:13). Although land on Amaknak Island was set aside in 1902 for use as a Naval coaling station, the Navy did not actually move to the Aleutians until the construction of the radio station (Faulkner and Spude 1987:9). Two pole masts, an antenna, and a radio room were built and the station was officially commissioned August 6, 1911. High winds blew down the masts and antenna in October of 1911, and wood lattice masts were erected in 1912 to replace the originals. At the same time, improvements to the station building were made, including replacement of exterior shingles and interior remodeling. On September 5, 1912, the southern mast was blown down in another wind storm. It was later replaced by a ship's mast.

There was much expansion and many improvements between 1912 and the 1930s. By 1932, the Naval Radio Station included five structures, a cottage, a concrete power house, a wood frame pumphouse, a paint locker, a coal shed, and a two story brick apartment building. The apartment building was built between 1931 and 1932 for families at the station. It is the only brick building in the Aleutians, and had six four-room apartments.

The existence of a naval reservation with available land at Dutch Harbor was a large factor in selection of Amaknak Island as a World War II base (Denfeld 1987).

The Dutch Harbor Naval Operating Base and Fort Mears National Historic Landmark

All of Amaknak Island is within the 400-hectare Dutch Harbor Naval Operating Base and Fort Mears National Historic Landmark (NHL), designated in February of 1985. Due to deterioration of the historic structures and new development within the landmark, a revised National Register nomination was prepared in 1990, but it was never finalized.

The NHL includes the Dutch Harbor Naval Radio Station (UNL-113), Fort Schwatka (UNL-119), Fort Mears (UNL-121), and Hill 400 (UNL-122). Fort Schwatka is also a National

Historic Area established on Ounalashka Corporation land by the Aleutian World War II National Historic Areas Act of 1996.

Work on a naval facility on Amaknak, encompassing the entire island except for the previously set aside Naval Radio Station, began in July of 1940. By the end of 1941, a Naval Section Base and Naval Air Station had been commissioned. The naval facility continued to expand and in January, 1943, the Dutch Harbor Naval Operating Base was commissioned. Among its components were the Naval Air Station, the section base, the Iliuliuk Submarine Base and other naval shore activities, a detachment of marines, and the Naval Radio Station (Faulkner and Spude 1987:15-16).

Construction of a submarine facility at Iliuliuk Harbor was authorized in June, 1941. However, by January, 1942, it consisted of little more than a dolphin pier (Denfeld 1987:52, 138). Because of the important role submarines were expected to play in the war in the north Pacific, work on the base received the highest priority during the summer of 1942. By the end of July of that year, the submarine docking and repair facility, on Expedition Island and Amaknak Island at the base of the causeway that joins the two, was sufficiently completed to be commissioned (Denfeld 1987:121). Ultimately, the base included a dock; electrical, optical, radio, hull, torpedo, and general machine shops; a mess hall; power plant; two barracks; chapel; fire station; dispensary; gymnasium; administration building; and the submarine base commander's house (Denfeld 1987:141, 261-262).

During 1942 and 1943, a ship repair and maintenance facility was established adjacent to the submarine base. It included a boat shop, marine railway, two dry docks, and a machine foundry, as well as shipfitters, sheet metal, battery, carpenter, and canvas shops (Denfeld 1987:141).

Naval activity at Dutch Harbor decreased as World War II drew to a close. During 1945, the submarine base was decommissioned and the air station was reduced to an air facility. Finally, in 1947, the Naval Operating Base was decommissioned and the last of the naval personnel were transferred from Dutch Harbor (Faulkner and Spude 1987:21).

Construction of Fort Mears, established to protect the naval facilities, began at Margaret Bay in January, 1941. The first army personnel arrived in May of 1941, and by October of 1942 the fort had "reached its peak strength" of almost 10,000 officers and enlisted men (Faulkner and Spude 1987:23, 27). Because it soon became apparent that Amaknak Island was not large enough for both Fort Mears and the Naval Operating Base, the Army decided in 1942 to give its facilities on the island to the Navy and construct a new fort on Unalaska. However, the new Fort Mears was not completed and the last Army personnel did not leave Amaknak Island until March of 1944 (Faulkner and Spude 1987:27-28).

By the summer of 1944, Unalaska was far removed from the war front. In August of that year, the fort was placed on housekeeping status and in 1952 the Army declared the land and structures on the Fort Mears Military Reservation to be surplus (Faulkner and Spude 1987:35).

After five decades of neglect, many of the World War II era buildings have fallen into ruin and are no longer historically integral to the NHL. Others have been adapted for reuse in ways that have destroyed their historic integrity. On Amaknak, there are approximately 140 contributing structures and a historic landscape of trench lines, roads, and blast marks.

Principle features of the landmark still in existence include a 4,385-foot runway (the present-day commercial airport), plane revetments, magazines, an aerology-operations building, a double hanger, a bomb-proof power plant, two wharves, a brick apartment house, a large number of former Naval quarters, and a torpedo storehouse and two hillside tunnels for torpedo explosives.

Description of the Resource

Archeological Sites

There are numerous known archeological sites on Amaknak Island. Sites in the study area include the Powerhouse Flake site (UNL-114), the Airport Not Buried site (UNL-293), the Airport Buried site (UNL-123), and the Airport Flake site (UNL-105).

The Powerhouse Flake site (UNL-114) is on the low hill behind the city powerhouse. Approximately 90 artifacts, including flakes and blades, have been collected from unvegetated patches at this site. There are also artifacts eroding from a road cut along its southern margin.

The Airport Not Buried site (UNL-293) is southwest of the eastern end of the Dutch Harbor airport, across the road from the Aerology Building (Figure 3-1). It is composed of a small hill with a World War II structure on top. There is a Quonset hut to the south and the Dutch Harbor fire station lies to the southwest. On the southern flank of the hill is a fresh pile of spoil containing numerous artifacts, including a stemmed point that Rick Knecht (personal communication 1999) says is approximately 6,000 years old. Numerous flakes are also exposed on a track running northeast-southwest across the back of the hill.

This material may in some way be related to the Airport Buried site (UNL-123). This now-buried midden site is located under the road south of the airport terminal building. First reported by Jim Dickson, a heavy machinery operator for the City of Unalaska, the site was buried when the road adjacent to the airstrip was built in the early 1940s. Dickson dug up part of the site and deposited some of the midden south of the airport terminal. Veltre et al. (1984:44) unsuccessfully tried to locate remnants of the site in 1984.

The Airport Flake site (UNL-105), found by Bank in 1969, is located on the second terrace above Ballyhoo Road. The site is near the southeastern end of the runway, between a large concrete hanger cut into the lower mountain slope and a secondary road that runs northwest from Ballyhoo Road.

World War II Structures

NHL contributing structures in the vicinity of the current airport include the Aerology Operations Building (Building 417), the Naval Air Transport Service Warehouse (Building 421), the Torpedo Bombsight and Utility Shop (Building 423), the Receiving Warehouse (Building 429), the Aviation Supplies Warehouse (Building 443), the Torpedo Shop Annex (Building 447), and the Air Administration Building (Building 415) (see Figure 3-1).

The Aerology Operations Building was built in early 1941. It is a two-story wood frame structure with an octagonal frame core and two loxstave wings. Until the 1980s, the building was used as an airport terminal by the City of Unalaska. Although the interior has been modernized, it still features a terrazzo floor with the logo of the U.S. Naval Air Transport

Services. This building was documented by a HABS recording team in 1985 (Faulkner and Spude 1987) and has been reconstructed as a visitors center. To the east of the Aerology Building is the concrete foundation of the Air Administration Building (Building 415).

Entrenched into the surface of UNL-293, the archeological site across the road from the Aerology Building (see above), are the remains of a World War II structure. Still in place in front of the structure is a locally made, metal tripod that once supported binoculars or a spotting scope (Linda Cook, personal communication 2000). To the south is a collapsed Quonset hut [N-D].

Constructed in the 1940s, the Naval Air Transport Service Warehouse was used during war as a cargo terminal. The building has new shiplap wood siding and a new metal roof, but these are representative of the original material.

The Torpedo Bombsight and Utility Shop, built in 1942, housed a torpedo repair facility. This two-story, steel frame building is structurally sound and in stable condition, although its windows are broken and its steel siding is falling off. Because it is in close proximity to the Aerology Operations Building and the N.A.T.S. Warehouse, it adds to the historic integrity of the area. The building was also documented by the HABS recording team in 1985.

The Receiving Warehouse was used during the war to store airbase supplies. It was recently repaired and is currently being used as an airport supply warehouse. The Aviation Supplies Warehouse has a wood-frame second story built above a concrete lower level. Torpedo body parts were stored on the second floor and assembled below. The Torpedo Shop Annex and an associated tunnel dug into the hillside were used during World War II as shop space and a torpedo assembly area.

Along Ballyhoo Road, there is a Double Blast Hanger (Building 310; Figure 3-2) adjacent to the runway and to the northeast, between the road and the bay, is a large bunker (B-H). North of the runway, at the base of Ballyhoo, are the revetments that the military constructed to protect parked aircraft and vehicles from shrapnel damage. In the third and fourth revetments from the blast hangar are the concrete foundations of two Kodiak T-hangars (Building 360 and B-C), named after Kodiak where they were constructed (Denfeld 1987:255). Further up Ballyhoo Road, across from the city dock, is the concrete foundation of a World War II building.

To the southeast of the airport along East Point Loop Road is the Powerhouse (Building 409), a reinforced concrete structure designed to withstand a direct hit from a 250 kg bomb. This massive building is still used for power generation. Next to the Powerhouse is the concrete foundation of a laundry (Building 400).

Nearby is the wood-frame Supply Office and General Issue warehouse (Building 515) constructed in 1942. To the west, on a small hill, are the Print Shop (420) and Paint Warehouse (430). Now a private residence, the print shop was used by Navy war photographers for offices, equipment storage, and film development. With its structural adaptation for residential use, the shop retains little of its historic integrity. The paint warehouse currently serves as a storage facility and is a contributing building to the NHL.

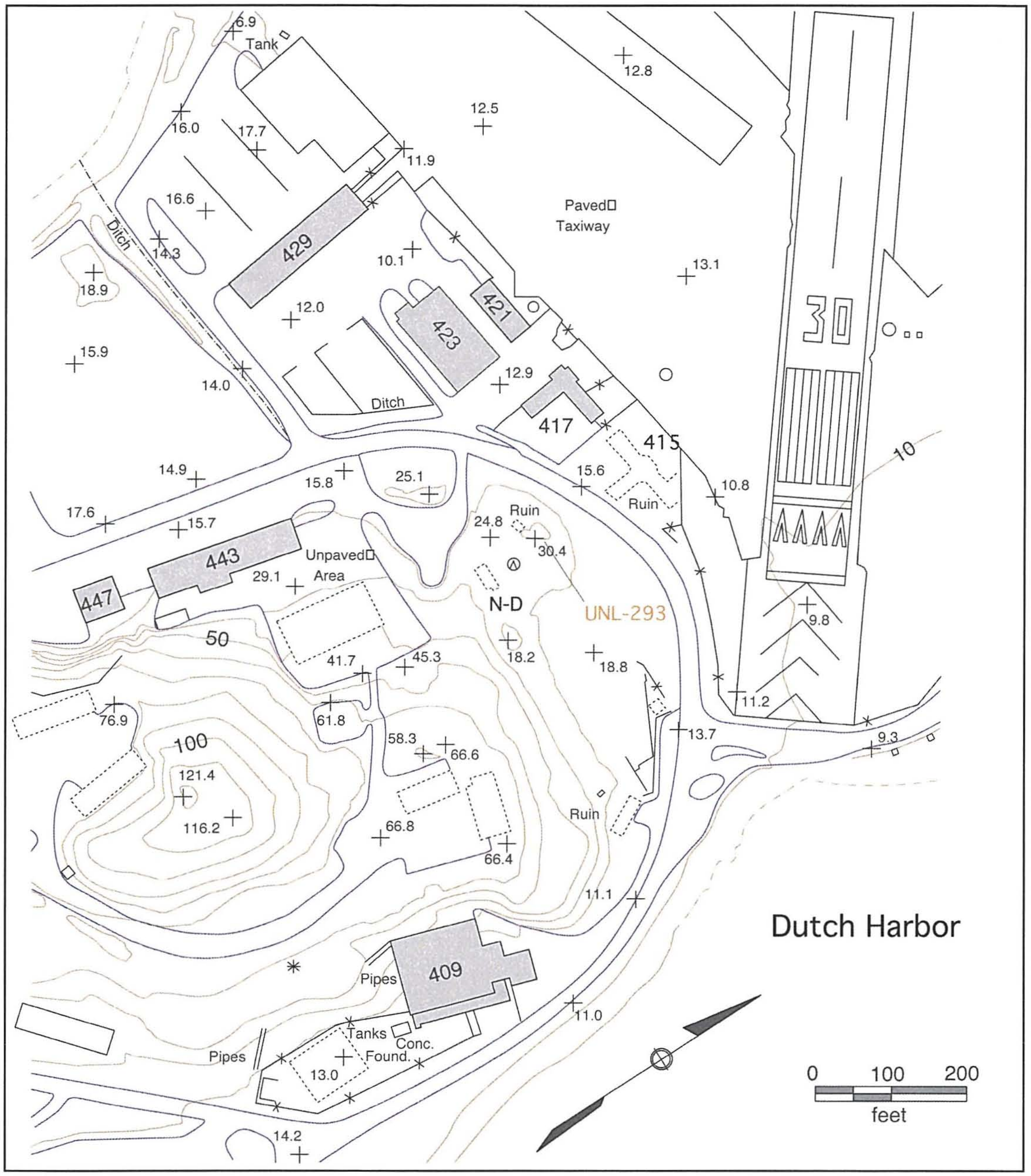


FIGURE 3-1
Location of the Airport Not Buried Site (UNL-293) and World War II Buildings in the vicinity of the airport.

To the south is the Defense Housing Area. Thirty-seven units remain of the original 40 (36 duplexes and 4 single family houses) that were built as officers' quarters during World War II. Sitting in five rows along three streets on top of the hill, most of these units are now private residences. Most still have their original horizontal wood siding, shingled roofs, wood window frames, and individual base numbers over the doors. At least five of these units are in the project area: House 1, 2, 9, 10, and 16. House 2 has an enclosed porch and new number plate over the door.

Just outside of the project area are Houses 4, 11 (one of two of the original 40 units that has a basement), 17, and 24 and the Commanding Officers' Quarters (Building 521). Currently used as a private residence, the Commanding Officers' Quarters is a wood-frame house originally designed for family use. Completed in 1942 after families had already been evacuated from the Aleutians, it was used to house commanding officers for the Naval Operating Base during World War II.

Structures southwest of the Delta Western Dock that contribute to the significance of the NHL include the Naval Operating Base Barracks Nos. 1 and 2 (Buildings 549 and 547), the Naval Operating Base Mess Hall (Building 551), the Naval Operating Base Station Brig (551a), the Supply Office and General Issue (Building 515), the Booster Heater Station (Building 503), the Dutch Harbor Dock (N-J), and a utilidor (N-K). Built in late 1941, the barracks housed enlisted Navy men during the war. These large, two and one-half-story, open bay structures are wood-frame on a concrete foundation, with shiplap horizontal siding and a shingled roof. The barracks are connected to a mess hall and brig by a covered corridor.

The mess hall, built in early 1942, is a wood-frame building on a cement foundation, with shiplap horizontal siding and a shingled roof. The dining room had a 500-man seating capacity. The brig, also dating to early 1942, is a concrete and reinforced steel cellblock, with one solitary confinement cell and two open cells.

The wood-frame supply office and general issue warehouse was also constructed in 1942. The booster heater station, from the early 1940s, is a square, concrete block building. During the war, it housed equipment to heat oil as it passed through fuel lines.

The NACC dock was rebuilt by the Navy in early 1940s. It is made of both treated (creosoted) and untreated piling, with plank decking. During the war, facilities included stiffleg and floating derricks, and traveling gantry cranes. It is now the Delta Western Fuel Dock (UNL-205).

The poured concrete utilidor is opposite the dock, in front of the barracks.

Eliza Anderson

Approximately 10 meters north of the seaplane ramp off of Ballyhoo Road and 10 m offshore, in about 8 to 10 feet of water, are the boiler and engine remains and large numbers of firebricks from the *Eliza Anderson* (UNL-473), a side-wheel steamship that was abandoned in Dutch Harbor in 1898.

The 140-foot *Eliza Anderson* was built in Portland, Oregon, in 1858, and had a long and eventful career as a mail boat and passenger ferry. She was pulled from a Seattle "boneyard" to carry gold-rush prospectors to Alaska in 1897. After a collision off of the coast of British Colombia and a 3-day gale off of Kodiak Island, she limped into Dutch Harbor and was abandoned. In 1898, she was blown from her anchorage in a storm and was stranded on the beach. By the 1920s, most anything of use or of value had been taken off of the steamship, and what was left eventually collapsed into the water (Rogers n.d.).

The existing remains are severely corroded and broken. No part extends more than one meter above the seafloor. Due to the bottom composition (sand and fine silt), more remains may be preserved beneath the seafloor.

Dutch Harbor Townsite

The Dutch Harbor Townsite (UNL-294) evolved from a fur trading and general mercantile post to a gold rush boomtown, and spanned the turn of the nineteenth and twentieth centuries. The town sprang into existence in 1890 as a planned company post, bustled and prospered during the gold rush, and was all but abandoned by 1908. By the end of 1942, the town had vanished.

Many of the buildings were destroyed as Siems Drake-Puget Sound Contractors began work on the naval facility on September 1, 1940 (War Diary: Dutch Harbor Alaska n.d.:12). A tank farm built by the Northern Commercial Company in the early 1920s (DPRA Inc. 1994:4-2) was dismantled after the Japanese air raids of June 1942 (Denfeld 1987:231). The store and the company house survived until at least March 1942, although they had been torn down by late September of that year (DHBR 5177, 29 September 1942). All that remains of the townsite today is the dock (now the Delta Western Fuel Dock UNL-205).

The undisturbed portions of the Dutch Harbor Townsite, however, are likely rich in historical archeological material. Backhoe testing suggests that when Siems Drake-Puget Sound Contractors began work on the naval facility they simply bulldozed the buildings and covered the remains with fill. There is potential in this area for material from the late nineteenth and early twentieth century, including sheet midden, trash pits, privies, and building foundations. Among the latter could be the remains of both ephemeral structures that dotted the site over the years and more permanent buildings, some of which stood until 1942 (Yarborough 2002).

Even though the buildings and other structures are gone, the site itself possesses archeological value (Yarborough 2002). The Dutch Harbor Townsite was determined eligible for listing on the National Register of Historic Places in 2002.

FIGURE 3-2
Double Blast Hangar (Building 310; gray building on the right)

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Appendix C
PenAir Long-term Aircraft Options Correspondence

PENAIR
The Spirit of Alaska

February 20, 2007

Mark Mayo
Project Manager
State of Alaska Department of Transportation
PO Box 196900
Anchorage, Alaska 99519-6900

Dear Mr. Mayo,

PenAir has been considering its long-term options for air service to Unalaska. We are committed to this important market, and will continue to serve the demand there, which we anticipate will grow some 3% per year, similar to the DOT's Master Plan forecast presented at the January SRC meeting.

The Saab 340Bs are approximately 25 years old on average. PenAir will retire the Saab 340Bs before the airframes reach obsolescence. Our current use of these aircraft results in approximately 2200 hours per year per airframe, meaning that they will last a maximum of 15 years. Before that time we must therefore not only replace all 8 of these aircraft but have the newer aircraft in circulation. We will start our phase-out by introducing two replacement aircraft into the DUT fleet in 2016, followed by one or two per year, up to six or eight aircraft by 2020.

Regarding the replacement aircraft, we have considered several types of larger, longer range turboprop aircraft. We considered the Saab 2000, as we previously documented, but upon close study found that the aircraft configuration does not allow enlarging the baggage and cargo hold- something we must do to meet demand in DUT. Also, the cost of working with Saab and the FAA on certificating this aircraft for commercial use in the US (we would be the first US customer and therefore bear this burden) would be very high. We also considered the ATR 42 and 72. The former is too small too allow a favorable operating cost per passenger seat mile.

We have selected the Bombardier Q400 aircraft for the DUT market. This aircraft will allow sufficient rear hold capacity, has a favorable operating cost, good range, and a good cruising speed. We also project a reasonable acquisition cost. The Q400 has been in service since 1999 and continues to be a strong seller and reliable work horse, and this translates into a wide availability and reasonable price by 2015 (we project $8 million).

As we move closer to implementing this fleet change, we will keep you and the FAA posted. In the mean time, please call me with any questions.

Sincerely,

Danny Seybert
President

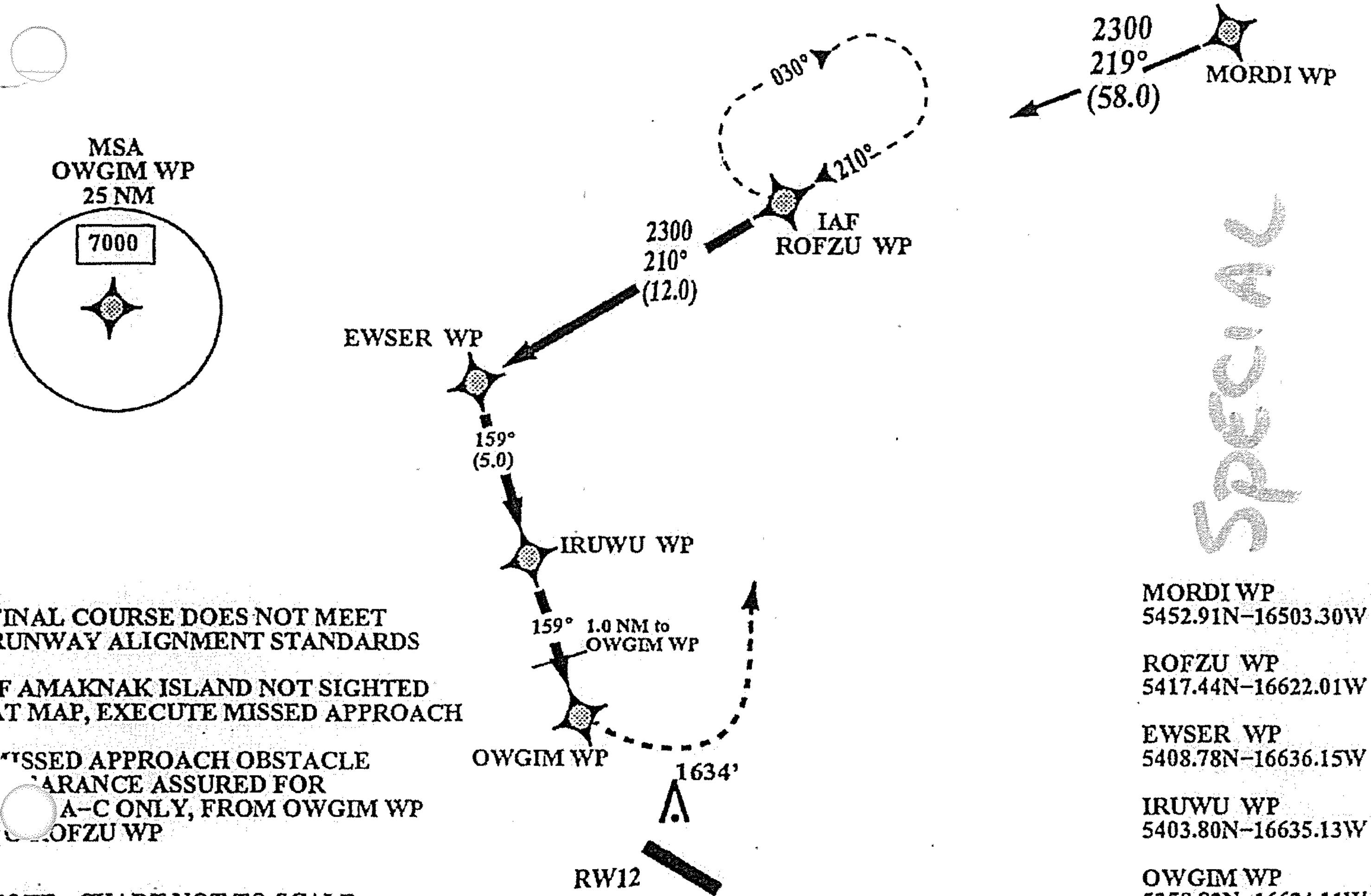
Appendix D

Instrument Approach Procedures for Unalaska Airport

ORIGINAL

GPS RWY 12 SPECIAL

UNALASKA (PADU)
UNALASKA, ALASKA



FINAL COURSE DOES NOT MEET RUNWAY ALIGNMENT STANDARDS

IF AMAKNAK ISLAND NOT SIGHTED AT MAP, EXECUTE MISSED APPROACH

MISSED APPROACH OBSTACLE CLEARANCE ASSURED FOR CAT A–C ONLY, FROM OWGIM WP TO ROFZU WP

NOTE: CHART NOT TO SCALE.

MORDI WP
5452.91N–16503.30W

ROFZU WP
5417.44N–16622.01W

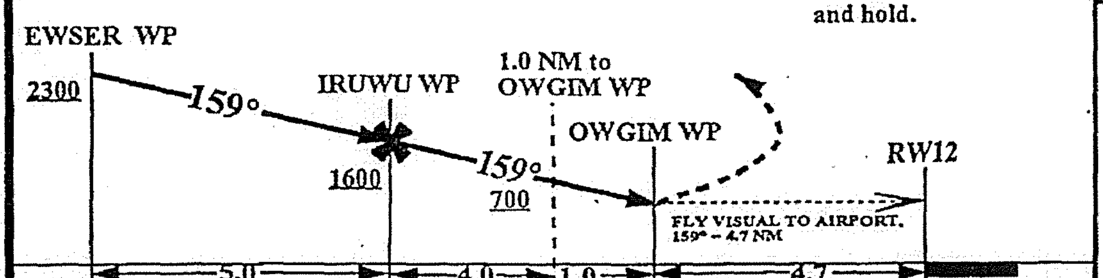
EWSER WP
5408.78N–16636.15W

IRUWU WP
5403.80N–16635.13W

OWGIM WP
5358.83N–16634.11W

MISSED APPROACH: Climbing left turn to 2300 direct ROFZU WP and hold.

ELEV 22



CATEGORY	A	B	C	D
~~CIRCLING~~	S-12		500 478	

CIRCLING NOT AUTHORIZED

FLY VISUAL TO AIRPORT, 159° – 4.7 NM

PROCEDURE NOT AUTHORIZED AT NIGHT

NA

PROCEDURE DEVELOPED BY NATIONAL FLIGHT PROCEDURES OFFICE AVN–130

FOR FLIGHT INSPECTION PURPOSES ONLY. DATA ON THE LEGAL DOCUMENTS/FORMS WILL TAKE PRECEDENCE.

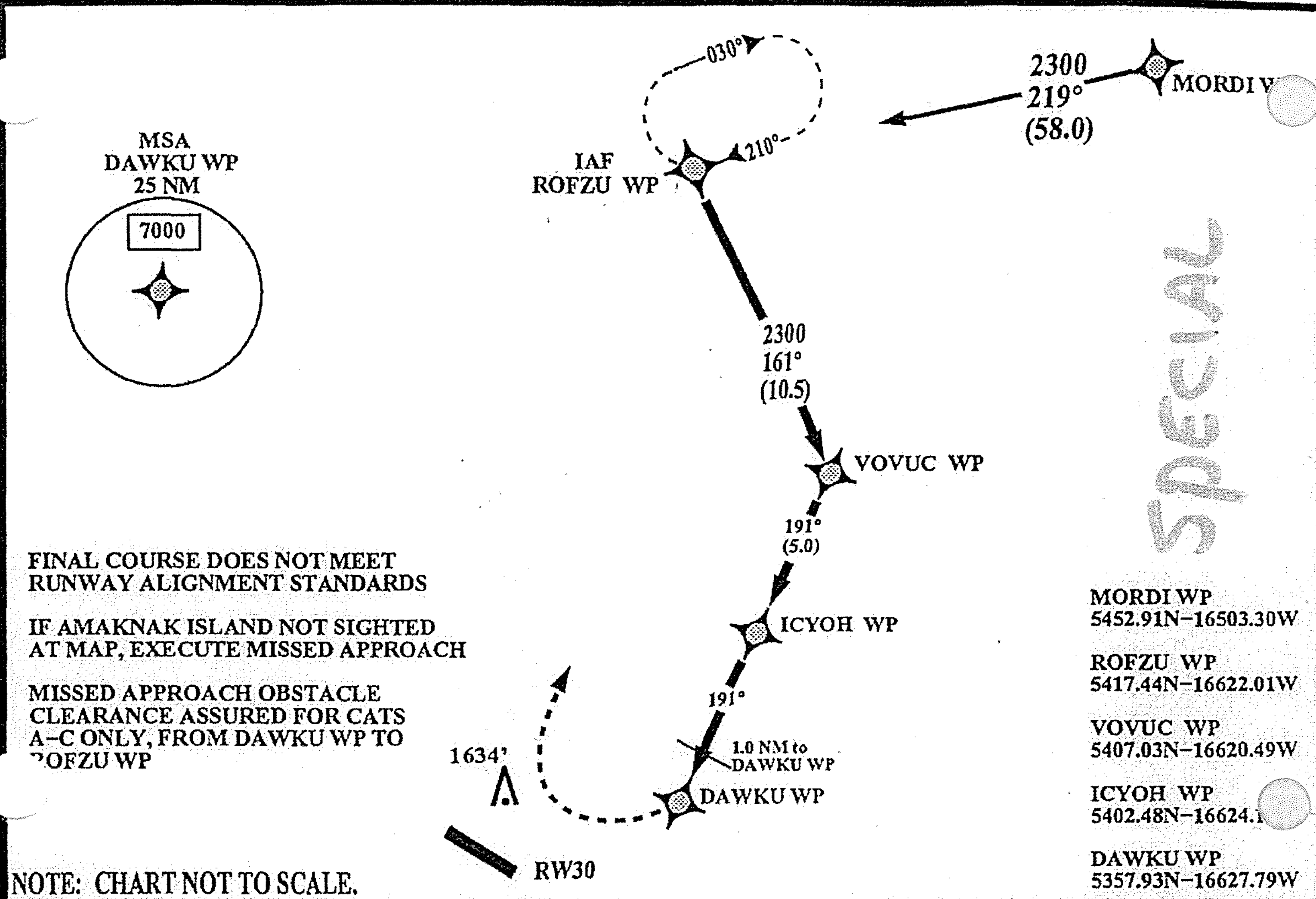
GPS RWY 12 SPECIAL
ORIGINAL

UNALASKA, ALASKA
UNALASKA (PADU)

ORIGINAL

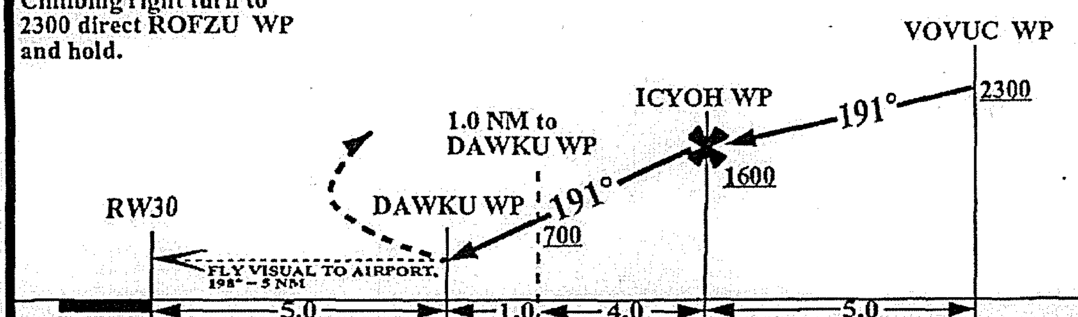
GPS RWY 30 SPECIAL

UNALASKA (PADU)
UNALASKA, ALASKA



MISSED APPROACH:
Climbing right turn to
2300 direct ROFZU WP
and hold.

ELEV 22



PROCEDURE DEVELOPED
BY
NATIONAL FLIGHT
PROCEDURES OFFICE
AVN–130

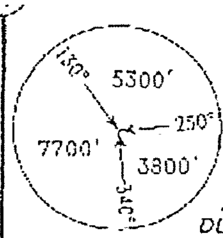
CATEGORY	A	B	C	D
~~CIRCLING~~	S-30	500 478		

CIRCLING NA TO RUNWAY 12
FLY VISUAL TO AIRPORT, 198° – 5 NM
PROCEDURE NOT AUTHORIZED AT NIGHT

FOR FLIGHT INSPECTION PURPOSES ONLY. DATA ON THE LEGAL DOCUMENTS/FORMS WILL TAKE PRECEDENCE.

T A NA

AWOS-3 125.(
ANCHORAGE Center 124.4
COLD BAY Radio CIAF 122.6
When local altimeter setting not received, procedure not authorized.
Alt Set: INCHES



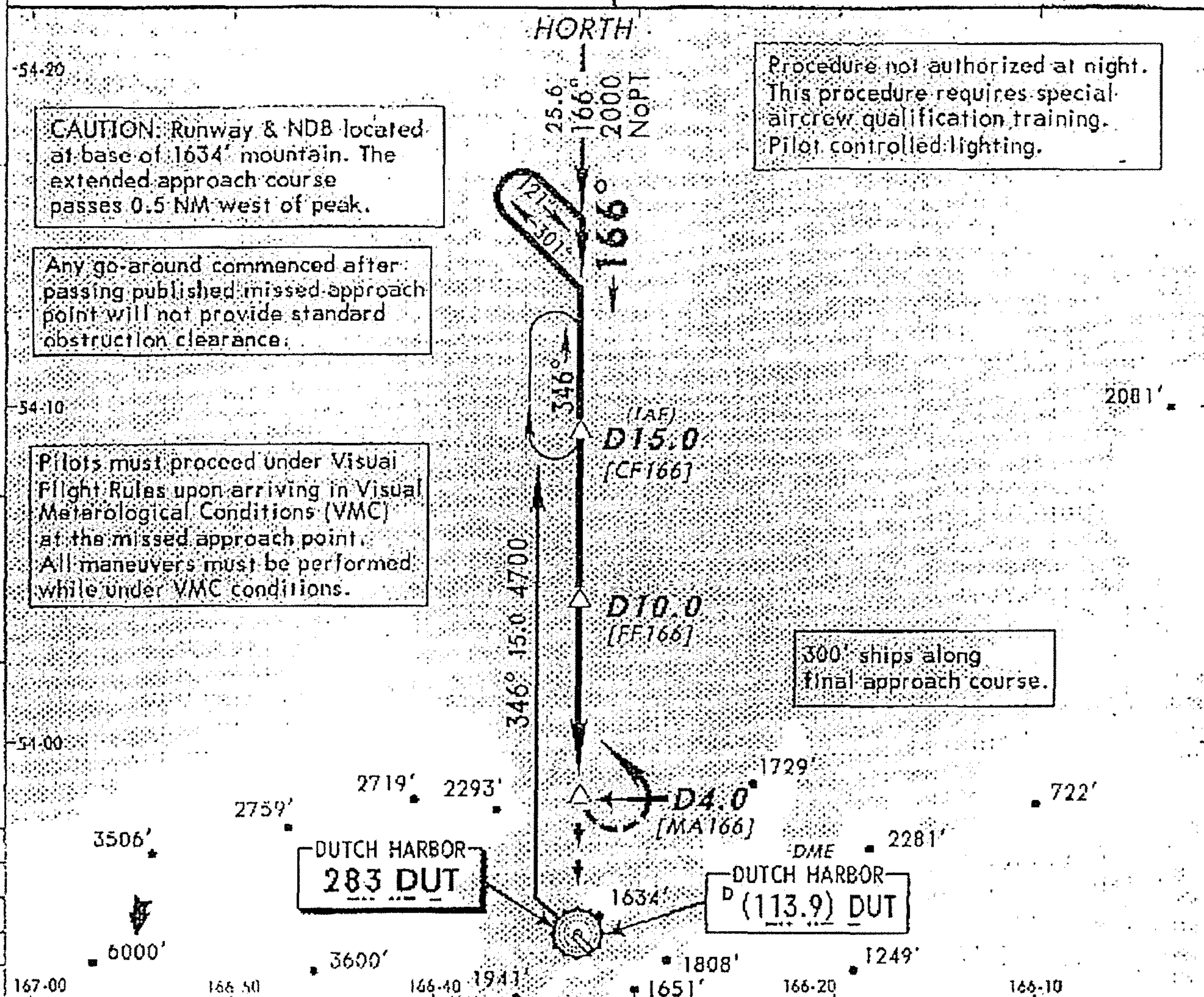
UNALASKA, ALASKA

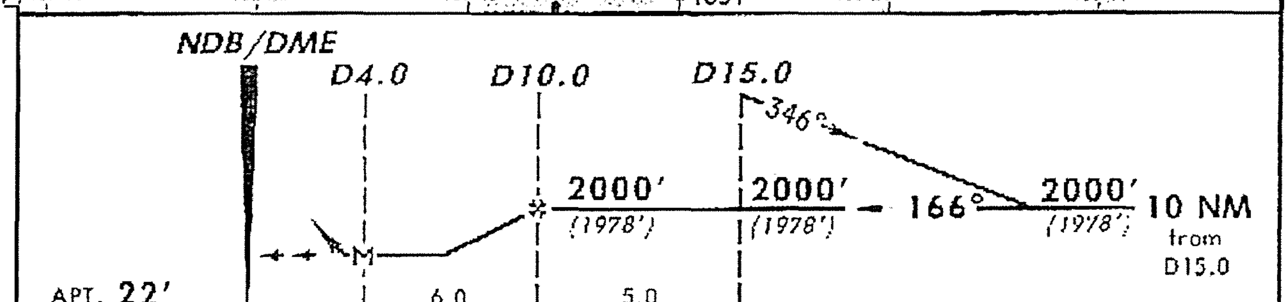
UNALASKA

NDB DME or GPS-C

NDB 283 DUT

PADU Apt. Elev 22'





MISSED APPROACH: Immediate climbing **LEFT** turn to **2000'** via **DUT NDB 346°** bearing to **D15.0** and hold. Do not exceed a ground track radius of 1.5 NM. Missed approach limited to maximum airspeed of 140 KTS IAS and requires a climb gradient of 300' per NM to 2000'.

		CIRCLE-TO-LAND	
	Max Kts	DAY MDA(H)	NIGHT
A	90	620'(598')-3	NA
B	120	620'(598')-3	NA
C	140	620'(598')-3	NA
D	165	630'(608')-3	NA

PADU
UNALASKA

19 FEB 99 (16-8)

NDB DME or GPS-B

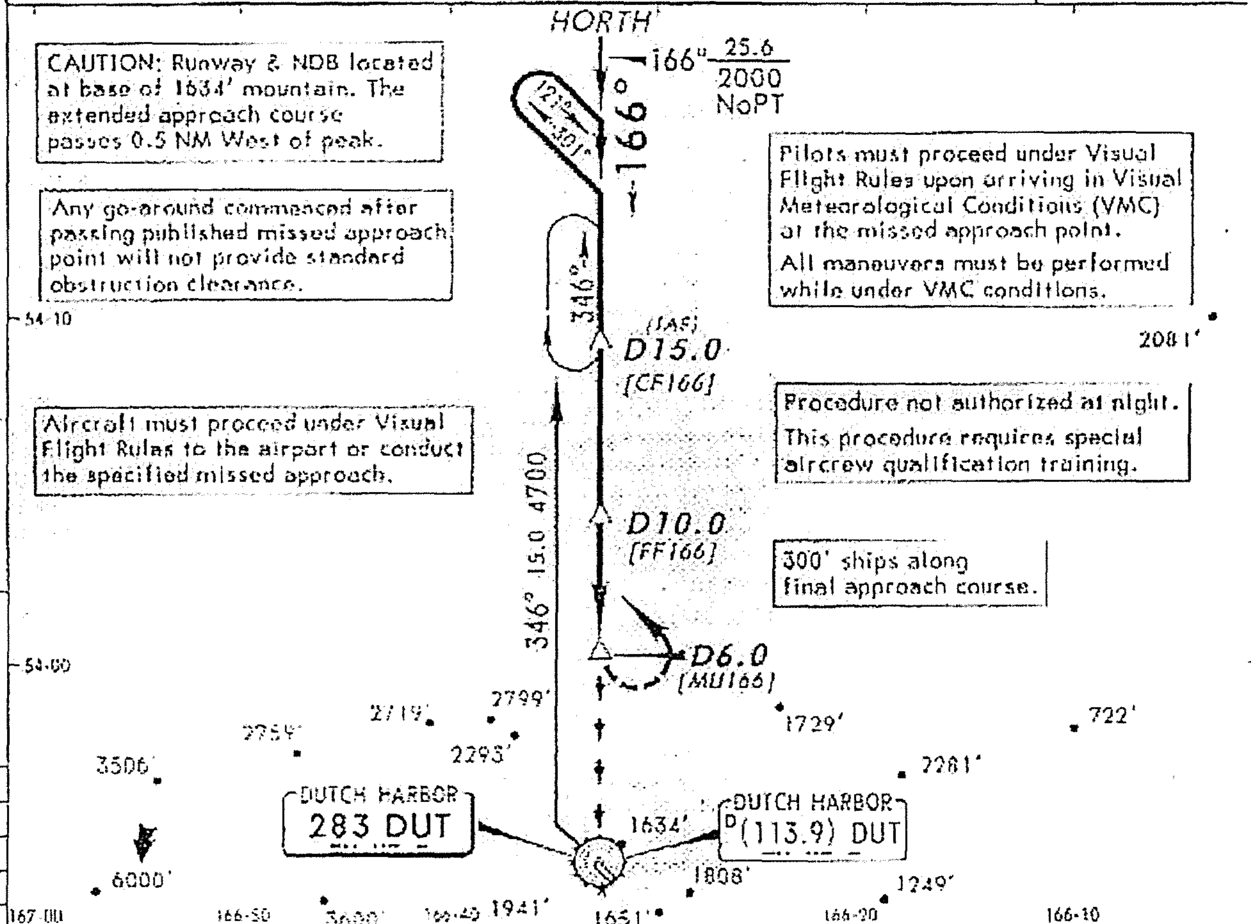
ANCHORAGE Center		COLD BAY Radio
125.8	124.4	CTAF 122.6

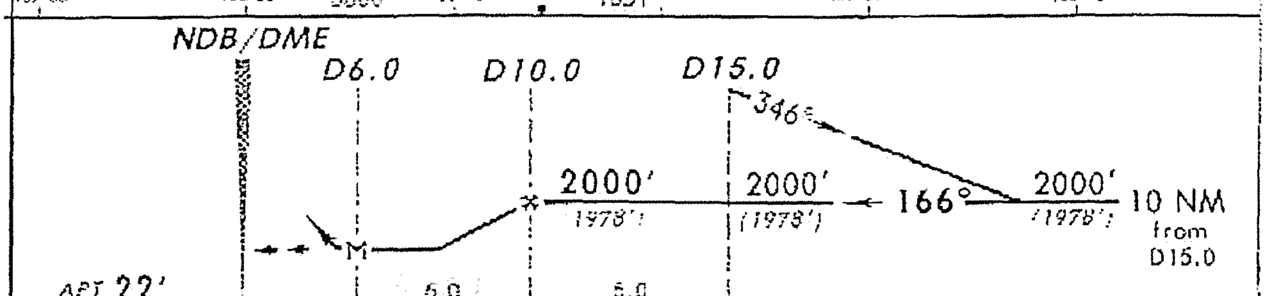
NDB DUT 283	Final Apch Crs 166°	Minimum Alt D10.0 2000′ (1978′)	Refer to minimums	Apt Elev 22′

MISSED APCH: Immediate climbing LEFT turn to 2000′ via DUT NDB 346° bearing to D15.0 and hold.

Alt Set: INCHES 1. When local altimeter setting not received, procedure not authorized. 2. Pilot controlled lighting on 122.6.

MSA DUT NDB: 5300′ / 3800′ / 7700′ (250° / 346° / 155°)





MAP at D6.0	Lighting: See Airport Chart	2000′ LT	DUT 283 346°	D15.0

CIRCLE-TO-LAND

	Max Kts	DAY MDA (H)	NIGHT
A	90	620′(598′)-3	NA
B	120		
C	140		
D	165		

FOR FILING AS ALTERNATE
Authorized Only With Unalaska Weather

	DAY	NIGHT
A	2000-3	NA
B		
C		
D		

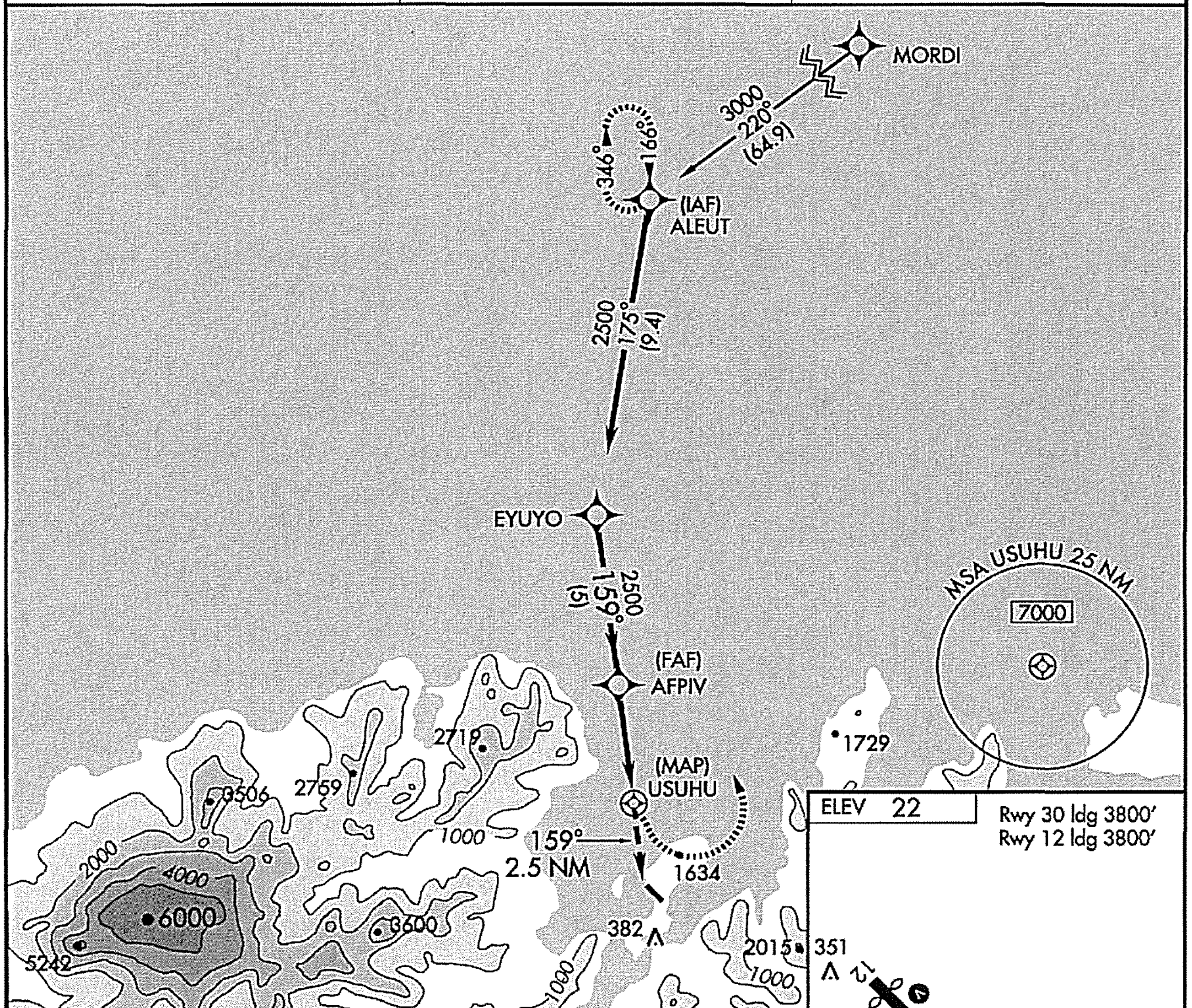
APP CRS	Rwy ldg	N/A
159°	TDZE	N/A
	Apt Elev	22

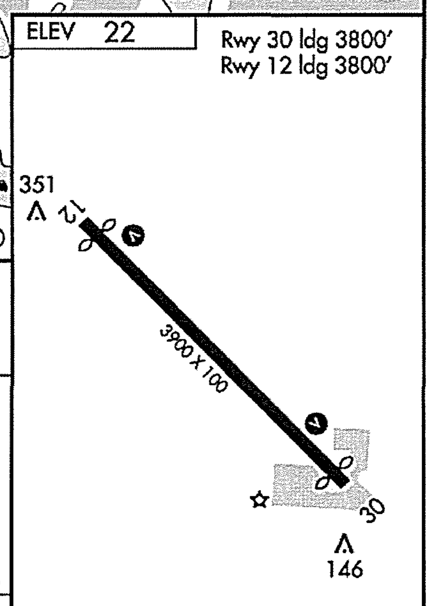
GPS-E
UNALASKA (DUT)

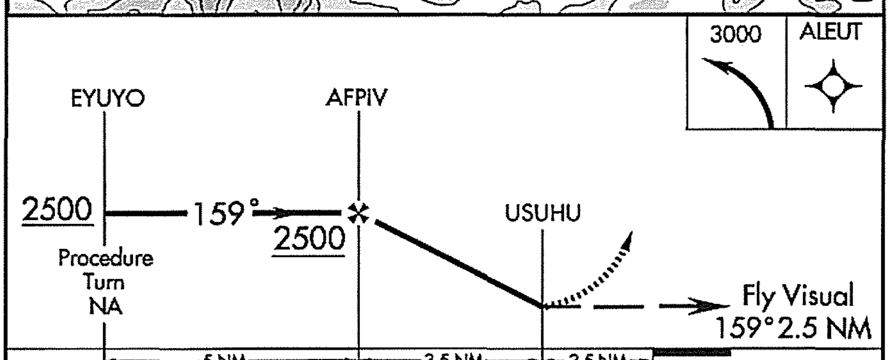
Circling not authorized northeast of runway 12-30.
NA Procedure not authorized at night.

MISSED APPROACH: Climbing left turn to 3000 direct ALEUT WP and hold.

AWOS-3	ANCHORAGE CENTER	CTAF
125.8	121.4	122.6 ★







CATEGORY	A	B	C	D
CIRCLING	1820-3 1798 (1800-3)			2000-3 1978 (2000-3)

MIRL Rwy 12-30
REIL Rwys 12 and 30
LDIN Rwy 12

AK, 10 MAY 2007 to 07 JUN 2007
AK, 10 MAY 2007 to 07 JUN 2007

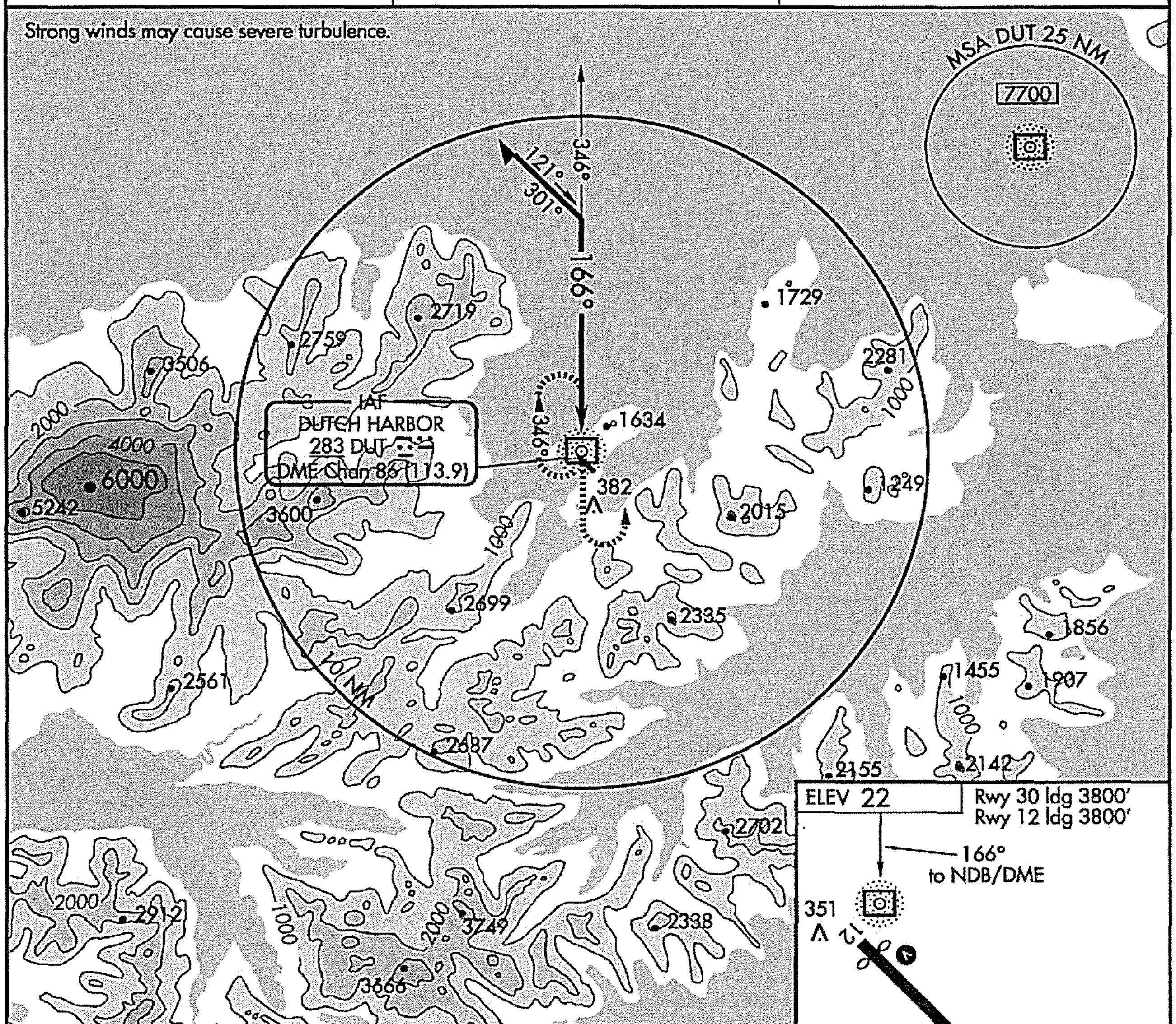
NDB-A
UNALASKA (DUT)

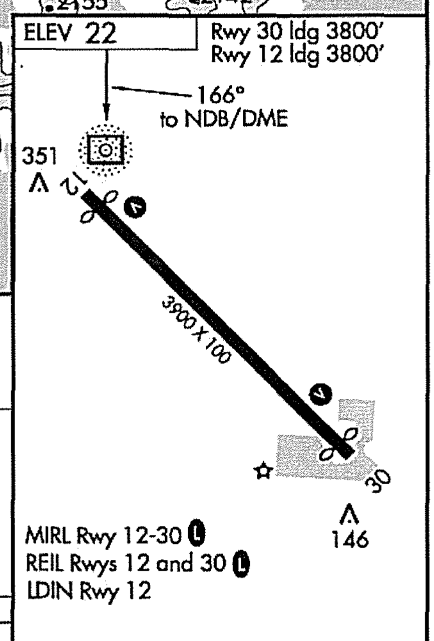
NDB/DME DUT 283 Chan 86 (113.9)	APP CRS 166°	Rwy ldg N/A TDZE N/A Apt Elev 22

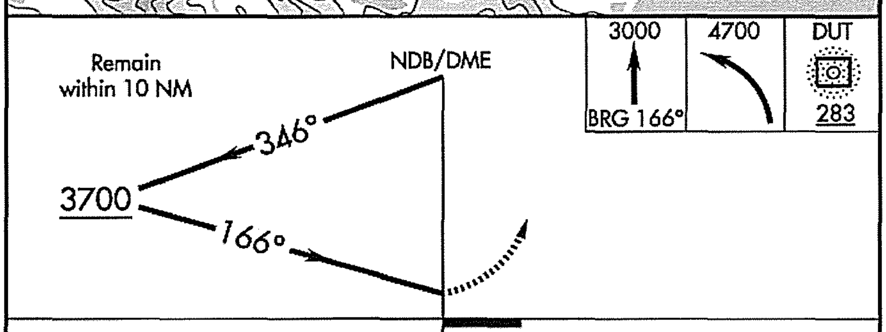
When Unalaska altimeter setting not available procedure not authorized.
Circling not authorized Northeast of Rwy 12-30.
Procedure not authorized at night.
Descend to 6000 in holding pattern.

MISSED APPROACH: Climb to 3000 via 166° bearing then climbing left turn to 4700 direct DUT NDB/DME and hold.

AWOS-3	ANCHORAGE CENTER	CTAF
125.8	121.4	122.6 ⓛ *







CATEGORY	A	B	C	D
CIRCLING	2200-1¼ 2187 (2200-1¼)	2200-1½ 2187 (2200-1½)	2200-3 2187 (2200-3)	

Knots	60	90	120	150	180
Min:Sec					

AK, 10 MAY 2007 to 07 JUN 2007

AK, 10 MAY 2007 to 07 JUN 2007

Appendix E
Infeasibility of Improved Approach Procedures Memo

FEB 17 2005

U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject: Unalaska, AK, Instrument Approach Procedures Review and Feasibility Study

Date: February 17, 2005

From: Dennis W. Stoner, Mgr
Anchorage Flight Procedures Office

Reply to: Kyle R. Christiansen
(907) 271-5187

To : Memorandum For Record

At the request of the Alaskan Region Airports Division, the Anchorage Flight Procedures Office (FPO) accomplished a complete review of Instrument Approach Procedures (IAP) at Unalaska, AK. The request was made to see if possible future IAP improvements or changes would require modifications to the airport environment coincidental with an ongoing Airport Improvement Project. The FPO reviewed current public and special IAP's as well as conducted feasibility studies on other IAP options not currently utilized at Unalaska.

The public approaches, NDB-A and GPS-E, meet current criteria and cannot be further optimized.

The special approaches, GPS RWY 12, GPS RWY 30, NDB/DME or GPS-C, and NDB/DME or GPS-D, have all been reviewed to see if current criteria application and flight track relocation would provide a decrease in descent and visibility minimums. Unfortunately, these minimums cannot be improved upon.

Installation of a ground-based navigation aid, i.e. Instrument Landing System (ILS), was also reviewed and found to be impractical.

Navigation signal, space-based or ground-based, is not the limiting factor in approach minimums at Unalaska. The cause is high terrain surrounding the harbor. In all cases, the missed approach procedure dictates the achievable minimums at this airport.

Dennis W. Stoner
Manager, ANC FPO
271-5220 phone
271-6851 fax
Dennis.W.Stoner@faa.gov

Appendix F
FAA Declaration of Maximum RSA Funding

U.S. Department
of Transportation

**Federal Aviation
Administration**

FAA Alaskan Region
222 W. 7th Avenue, Box 14
Anchorage, Alaska
99513-7587

AUG 24 2004

Mr. Kip Knudson
Deputy Commissioner of Aviation
State of Alaska, DOT&PF
Anchorage, Alaska 99519-6900

Dear Mr. Knudson:

Runway Safety Area Program

The Alaska Department of Transportation (AKDOT) and Alaskan Region FAA have developed a plan for improving runway safety areas at the certificated airports within the state. The plan was developed assuming a discretionary funding level of $25 million would be available each year with no more than a $30 million runway safety area (RSA) investment per runway.

Since the plan was developed, the FAA has released FAA Order 5200.9 "Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Material Arresting Systems (EMAS)" which provides further guidance on determining financial feasibility of RSA improvements. Figure 4 in the order is used to determine the maximum feasible RSA improvement cost based on an EMAS bed length for the design aircraft. The order suggests this figure be adjusted where local conditions dictate. Alaskan Region has determined Figure 4 should be adjusted to account for the remoteness of Alaskan airports (higher mobilization costs), shorter construction seasons, and challenges in finding suitable locally available materials. This figure can be adjusted up to 1.5-2 times those shown on Figure 4. Using the 737 as the design aircraft and related EMAS bed length, the maximum feasible costs for runway improvements per runway for Alaska is approximately $23-$30 million.

The release of FAA Order 5200.9 will require a re-evaluation of all RSA practicability determinations where runway safety area improvements are planned. AKDOT should give priority to those RSA improvements planned in the 2005/2006 timeframe (development and environmental) and those locations where full runway safety areas are not feasible due to high costs.

Locations that have been previously identified as costly to develop full RSA (or may have some yet to be determined environmental mitigation costs) are listed below. The maximum feasible runway safety area improvement costs for these runways, based on FAA Order 5200.9, are provided below:

Ketchikan 11/29 $30M
Sitka 11/29 $30M
Kodiak 18/36 $25M
Kodiak 7/25 $25M
Kotzebue 8/26 $25M
Nome 2/20 $25M
Nome 9/27 $25M
Unalaska 12/30 $25M
Dillingham 1/29 $25M
Petersburg 4/22 $25M
Wrangell 10/28 $25M

We commend you and your staff's efforts over the past year to work with Alaskan Region FAA to strategize and develop an RSA improvement plan for the state. We look forward to your continued support in implementing this plan.

Sincerely,

Byron K. Huffman
Manager, Airports Division

Appendix G
Quantity and Cost Estimates

Introduction & Commentary

Initial Estimates

Unalaska Airport Master Plan Update

Introduction

This section of Appendix G includes the following summary and commentary on initial estimating efforts, followed by a summary of initial estimates, which is followed by initial cost estimates and their supporting documentation. Most initial cost estimates were made during late March and mid-April 2007, but continued through June 2007 for terminal area elements.

The information contained herein was prepared to support the analysis and decision making of the Unalaska Airport master plan update. The master planning effort was prepared in the period 2006 through 2007, and conceptual engineering and associated quantity and cost estimating efforts commenced late in 2006 or early 2007. Runway size and location alternates were the initial focus of the planning efforts, and were closely followed by development and evaluation of terminal area alternates. The planning alternatives were evaluated based on approximately 15 percent design completion or, more specifically to a level consistent with a Class Four Estimate as defined by the Association for Advancement of Cost Engineering (AACE). Once the preferred alternative was selected, design of the preferred airfield alternative was advanced to approximately 30 percent complete which corresponds with an AACE Class Three Estimate. Appendix G is intended to support and document the conceptual engineering, quantity and cost estimates prepared in support of the project planning.

Engineering was conceptual. The design team tried to capture the many assumptions and thoughts that will guide further investigation and design in tables of "bulleted" points included in other parts of Appendix G.

These notes are written months after the initial estimates were made and may include comments on refinements that occurred as the planning effort progressed and engineering and estimating efforts focused on the selected alternatives.

Base Mapping

Base mapping and digital terrain models used in estimating quantities were produced using satellite imagery controlled by ground measurements for those areas above sea level. Bathymetric surveys produced terrain models for those features below sea level. These two models were merged to create a project digital terrain model.

Runway and RSA

The deficiencies at the Unalaska Airport are documented in the master plan update. Terrain severely restrains development alternatives to address those deficiencies. Runway length and runway safety area (RSA) to serve the design aircraft were identified to be of greatest concern during the planning effort; so, early engineering and estimating efforts focused on those two, inter-related issues. Increasing runway length to serve the design aircraft and provide the required RSA, requires fill into either Unalaska Bay, off the northwesterly end of the runway (runway 12); or into Dutch Harbor, off the southeasterly end of the runway (Runway 30). Similarly, providing the required RSA adjacent to the runway would require fill into Unalaska Bay between the existing terminal and the end of the runway. While this area is more sheltered than an extension of the runway, wave action is still more energetic than in Dutch Harbor.

As documented in Appendix H, ocean engineering and shoreline protection requires shoreline armoring stones or manufactured armoring devices, particularly at the runway extension into Unalaska Bay where wave action is much more severe than in Dutch Harbor, and the size and quality of locally available armor stones for the wave action in Unalaska Bay would probably cost more than manufactured armoring units. The previous use of dolos and CORE LOC® to armor and protect the Unalaska Bay end and side of the existing runway demonstrates their success in this environment and reflects previous concerns about locally available materials.

Initially, estimating efforts considered multiple potential local sources for armor stones and the stone layers required below them. Later, geotechnical research indicates that at least one local pit (Ugadaga) can be expected to produce the quantity and qualities of stones required to armor fills into Dutch Harbor and provide the layers below manufactured armor units in Unalaska Bay.

Portions of Mt. Ballyhoo, adjacent to the runway, can be excavated to increase the obstacle free area (OFA) and the excavated material can be used in the core of fills required to create the RSA. Initially, there were concerns about using these materials in fills in salt water, even if they are placed in the "core" of the fill and were protected by appropriate armoring stones or units and layers of higher quality rock below the armor stones or units (e.g. "under layers"). Later, the geotechnical investigation concluded that with selective grading and sizing, most of the excavation from Mt. Ballyhoo can probably be used in core fills. "Under layers" were assumed to come from the Ugadaga pit. See the geotechnical research appendix (Appendix H) for further comments.

The armoring, under layers (immediately below the armoring) and that part of the core fill that will be most affected by wave action are expected to be open graded, allowing the wave action to force water and air through these materials. This wave action has been observed at the Unalaska Airport when storms have caused stones to be ejected from the fills onto adjacent fill and occasionally on to paved surfaces; therefore leaving surfaces that do not meet strict RSA requirements. Ocean engineering also produced estimates that waves may run up and occasionally *break-over* fills placed into Unalaska Bay to support a runway extension. These considerations resulted in a "wave action" zone surrounding the required RSA fill. Initial estimates assumed a vertical, reinforced concrete "wall" below the surface at the boundary of the RSA to separate and protect static areas of fill from the "wave action" zone. Initial estimates assumed that the armoring and under layers would constitute the wave action zone and that they would extend beyond the RSA boundary about 15 feet horizontally.

Later, further evaluation of the preferred alternate concluded that the "wave action" zone should be increased to about 30 feet (horizontal) at the northerly end of fills into Unalaska Bay and along the runway part-way toward the terminal area; and transition to about 20 feet wide with the transition to smaller armor units.

Estimates assumed that RSA areas beyond the runway threshold, and full width of the RSA, will be paved to minimize maintenance of these areas after recognizing that wave action or severe storm precipitation could make them non-compliant with FAA requirements.

Roads

Initial estimates considered three potential modifications to roads in the vicinity of the airport:

- Relocation or closure of Airport Beach Road from the vicinity of the fire station to its intersection with Mt. Ballyhoo Road.
- If Airport Beach Road is closed, a replacement road connecting Airport Beach Road to Biorka Road near the power plant.
- Relocation of Mt. Ballyhoo Road to move it out of "protected" areas near the runway. Protected areas that were considered include the approach surface, transitional surfaces, primary surface and RSA.

Studies to relocate Airport Beach Road out of the primary surface or transitional surfaces did not find a location that eliminated conflicts with airport operations; so this relocation was dropped from further study when it became apparent that Airport Beach Road must be closed from approximately the fire station to approximately the power plant. .

The Airport Beach Road/Biorka Road connector was geometrically possible with a substantial cut at the crest of the hill which would require either a bridge to connect the remnant property or acquisition of the remnant property. Estimates assumed construction of a bridge to access the property and retaining walls to minimize the footprint of the improvements. Because the cost of this improvement was substantial and alternate routes were found to be available, this improvement was dropped from further consideration.

In all the alternatives, Mt. Ballyhoo Road must be relocated to move it out of the approach surface. Ideally, the road would be relocated to be outside of the obstacle-free area as well, but water depths in Dutch Harbor make the cost of relocating the road escalate very quickly as the road is moved further from the runway. Initial estimates assumed that Mt. Ballyhoo Road would be moved outside of the RSA – this assumption is reflected in the estimates that follow. Almost immediately, estimates of the additional cost to move it beyond the primary surface were developed. The possibility of a tunnel to carry Mt. Ballyhoo Road under the runway was considered very briefly; and discarded because of the cost and technical challenges of constructing a tunnel whose floor would be below sea level. Similarly, the potential for a bridge, rather than fill, to carry the relocated Mt. Ballyhoo Road across Dutch Harbor, was discussed and quickly discarded because of the cost to build and maintain a bridge in deep water.

Initial estimates assumed that all fill at the airport would be hauled along Airport Beach Road; and that excavation from Mt. Ballyhoo Road might be "back hauled" along Airport

Beach Road for disposal. Either activity is expected to produce significant wear on the roadway, so all estimates assumed that agreements with the City of Unalaska would require the project to repair the wear.

Building Demolition and Replacement

Initial studies identified many buildings around the airport for demolition, modification, or relocation. Some of these buildings conflict with airport "protected" surfaces (primary surface or transitional surface), and others are beyond their useful life or conflict with planned improvements. Estimates to demolish were prepared for all identified buildings initially without regard to alternative because it was not clear which buildings would be affected by which alternate. Similarly, initial estimates to replace these building assumed they would all be replaced in kind because nothing more was known more about size or configuration of replacement buildings.

Eventually, estimates assumed that the Aerology building would probably not be demolished because of its historical significance, and an estimate was developed to relocate the building. Relocation will be very difficult, and so is expected to be costly, because of the slab on grade construction.

Costs of building demolition and construction used estimates of building square footages by level (i.e. "Tier 1" is a building's first floor, "Tier 2" is a second floor, and so on) or estimated building volumes coupled with estimating guides for pricing to produce the estimated cost.

Estimates

Estimates are summarized on the spreadsheet in the next section. Initial estimates were developed from the perspective of a contractor looking at the project. Hence, they did not include an allowance for design, construction engineering services, or DOT&PF management of design and construction, which is included at 25 percent of estimated construction cost in the summary.

Initial estimates assumed that all demolition and construction would be accomplished in one contract. Now, it is assumed that airfield improvements (i.e. runway extension and RSA improvements) will probably be in a separate contract from building demolition and construction and associated terminal area improvements; so, "common and miscellaneous costs" associated with a second construction contract are included in the summary.

Initial estimates are compiled into a 102 page .pdf file (titled "Unalaska Airport Master Plan Estimate R03a.pdf") with bookmarks. The first sections of the estimate should be read by everyone using the estimate. This estimate includes all elements except terminal area apron improvements, which are included in other files. Elements from several of these estimates are pulled together in the summary to develop the estimate for the presently envisioned terminal area improvements in the planning period that has evolved as studies progressed.

Initial Estimates Summary

Unalaska Airport Master Plan Update

		Alternate 1	Source		Alternate 2	Source		Alternate 3	Source		Alternate 4	Source
Airfield												
Airfield		$84,883,128	1		$80,066,135	1		$79,547,814	1		$70,460,862	1
Roads												
Mt. Ballyhoo Road												
Around RSA					$113,077	1		$180,926	1		$254,389	1
Around Primary Surface, Add					$1,070,000	2		$4,840,000	2		$6,630,000	2
Airport Beach Road/Biorka Road Connector		$8,317,553	1		$8,317,553	1		$8,317,553	1		$8,317,553	1
Airport Beach Road Realignment		$907,170	1		$907,170	1		$907,170	1		$907,170	1
Terminal Area	markups			markups			markups			markups		
Building Demolition		1937448										
Terminal Building	1.61	$364,452	5		Note 1		1.61	$364,452	5		Note 1	
Pen Air Cargo	1.61	$19,492	5	1.63	$19,492	4	1.61	$19,492	5	1.63	$19,492	4
ACE Air Cargo	1.61	$55,012	5	1.63	$55,012	4	1.61	$55,012	5	1.63	$55,012	4
Torpedo	1.61	$356,221	5	1.63	$356,221	4	1.61	$356,221	5	1.63	$356,221	4
Demo Subtotal		$795,178			$430,726			$795,178			$430,726	
Building Construction												
Terminal	1.52	$8,474,253	1	1.63	$5,931,428	4	1.61	$8,798,765	5	1.63	$5,931,428	4
New Cargo Bldg	1.61	$3,002,000	5	1.63	$3,025,575	4	1.61	$3,002,000	5	1.63	$3,025,575	4
Construction Subtotal		$11,476,253			$8,957,003			$11,800,765			$8,957,003	
Site Work												
Apron	1.62	$3,363,200	3	1.63	$1,114,485	4	1.61	$2,177,464	5	1.62	$7,670,148	6
Roads	1.62	$178,333	3	1.63	$208,849	4	1.61	$255,031	5	1.61	$255,031	5
Parking	1.62	$91,514	3	1.63	$285,474	4	1.61	$350,861	5	1.61	$350,861	5
Misc. Site Improvements	1.62	$484,952	3	1.63	$1,463,988	4	1.61	$1,452,581	5	1.63	$1,463,988	4
Site Work Subtotal		$4,117,999			$3,072,796			$4,235,936			$9,740,028	
Terminal Area Total (including markups)		$16,389,430			$12,460,525			$16,831,879			$19,127,756	
25% Predesign, design, CA, management	0.25	$4,097,358			$3,115,131			$4,207,970			$4,781,939	
Common & Misc. Costs (surveys, field office, labs, etc.)		$8,000,000			$8,000,000			$8,000,000			$8,000,000	
TOTAL		$28,486,788			$23,575,656			$29,039,849			$31,909,695	

Sources:	**Dated**
1 Unalaska Airport Master Plan Estimate R03a.pdf	9-Apr-07
2 Email: Kevin Cooley to Tom Klin and others	11-May-07
3 UARE Airport Apron Alternates R01.pdf	30-Mar-07
4 UARE Airport Apron Alternates 06-22-07 R02b.pdf	22-Jun-07
5 UARE Airport Apron Alternates 06-22-07 R03b.pdf	22-Jun-07
6 UARE Airport Apron Alternates R04.pdf	30-Mar-07

Notes:

1 Alternates 2 and 4 assume remodeling the existing terminal building.

Alaska Department of Transportation and Public Facilities

Unalaska Airport Master Plan Update

Unalaska, Alaska

BASIS OF ESTIMATE

CH2MHILL

Estimate ID:	07-0274
Project Name:	Unalaska Airport Master Plan Update
Class Estimate:	Class IV
Requested By:	Tom Klin/NYC
Estimated By:	Rob Edgerton/PDX
Estimator Phone:	503.872.4590
Estimate Date:	April 3, 2007
Revision Date:	April 9, 2007
CCI Index:	7856 (March 2007)
Material Index:	2545 (March 2007)

Rob Edgerton/PDX
ESTIMATOR

Purpose of Estimate

The objective for this estimate is to develop a comprehensive master plan update for Unalaska Airport that reflects recent changes and projected demand for aviation in Unalaska. The Engineer's Estimate for Construction Cost is to establish an opinion of probable cost at the planning stage of design.

General Project Description

A range of options are presented to help narrow the range of alternatives. The Alternatives are presented with sufficient detail to identify facility layouts; preliminary engineering and construction cost estimates as well as potential environmental impacts. Four build alternatives (one of which shall later be defined as the preferred alternative) have been developed to fulfill aeronautical needs, and shall be refined to incorporate constructability factors (because of the potentially significant cost implications in Unalaska). Constructability impacts have included evaluating tangential issues including demolition or relocation of existing infrastructure, property acquisition/leasing, drainage, stormwater management, construction staging logistics, and related topics where standard unit costs may not be applicable due to the unique Unalaska circumstances. CH2M HILL has developed Class IV cost estimates to facilitate equal comparison of planning alternatives.

The cost estimates have been prepared for each alternative according to a design development of about 15 percent complete and to the Association for Advancement of Cost Engineers (AACE) standards for a Class IV Estimate (see appendix C for definitions). The estimates include standard contingencies for this level of estimate, as suggested by AACE. CH2M HILL has specifically identified unique constructability issues that exist in each of the alternatives developed and highlight them specifically in the text.

Overall Costs

See Appendix B for the overall breakdown of Costs and Alternates for this project.

Scope of Work

- Runway Extension Alternate #1 –
- Runway Extension Alternate #2
- Runway Extension Alternate #3
- Runway Extension Alternate #4
- Road Alternate #1 for Runway Alternate #1
- Road Alternate #1 for Runway Alternate #2
- Road Alternate #1 for Runway Alternate #4
- Runway 30 Tunnel

- Road Alternate #4B
- Road Alternate #5
- Building Demolition
- Building Replacement

Markups

The following typical contractor markups where applied to the Cost Estimate:

Material Take-off Allowance	8%
Labor Overtime Allowance	25% of Labor Component
Contractor Overhead	10%
Profit	5%
Bond/Insurance	2.2%
Estimate Contingency	20%
Escalation Rate	EXCLUDED%
Market Adjustment Factor	8%

Material Take-off Allowance

The material take-off allowance is to cover know items which were not quantified in this phase of the estimate process either due to a lack of detail or changing definition. A 25% factor was added to the labor costs to allow for the normal Alaska condition of working six ten hour days per week.

Estimate Contingency

The estimate contingency at 20% is defined to cover "known unknowns" in the project. The selection of a 20% contingency is based on many factors. In addition to the Estimate Contingency there is also an 8% Material Takeoff Allowance, and an 8% Market Conditions allowance.

Although the 20% contingency is lower than used on other projects at this stage of design, this project is pretty straight forward as far as the work being accomplished is concerned. There are no new technologies being used, no rare or unusual materials, and site access, work conditions, schedule, and weather are known factors. Probably the largest unknown on the project is the Quarry site and material. The largest complexity factor is the physical location and that only because of its distance from other major metropolitan areas. In the estimate there are allowances for to accommodate material and equipment delivery, and also generous allowances for Per Diem and Travel.

As an example of items to be considered in the contingency, it is known that there is a requirement for quarry stone of suitable quality to act as armor stone on the project. What is still unknown is if there is a suitable location on the island to provide this material, and what the total requirements are to obtain it. Therefore this qualifies as a "known unknown", and so is subject to a contingency assignment.

Another example of work assigned contingency is the building demolition. We know that buildings will need to be demolished, and we have a general idea of their size and structure, however we do not know at this time how those buildings will be demolished (deconstruct vs. demolish) or where the demolition/salvage material may need to be delivered or handled. Again we have another "known unknown", and so contingency is applied to allow for this scope.

The listed construction contingency amount is not intended to cover changes in scope or to allow for impacts from nature or other outside forces; those items belong in the owners' contingency allowance.

Escalation Rate

Escalation is excluded from this estimate. All costs are current costs.

Market Conditions

The current market conditions are drastically impacting the construction market, across the country. This is based upon recent bids and comparisons with Engineer's Estimates. Bids are coming in between 10% to 20% and even 30% higher than the current engineer's estimates. Despite the estimator's best practices and adjustments, bids are being driven by current market conditions. Currently at CH2M HILL, the estimating policy is to include a 5% to 15% Market adjustment factor, which may be higher in some regions of the county. A detailed analysis of local market conditions should be made. This could be performed by a review of upcoming and current similar projects around the region of this project site. This market adjustment factor is above and beyond the typical contractor mark-ups, normal estimating contingency and current but normal escalation factors (5% per year) listed above. The Market Adjustment Factor covers:

- Busy Contractors.
- Contractors selectively bidding jobs.
- Contractors selectively choosing which Owners they want to do jobs for.
- Premium Wages to keep skilled workers and management staff.
- Availability of crafts/trades.
- Immigration impacts and uncertainty.
- Abnormal Fuel impacts and uncertainty - Oil = $75 barrel, Gas $3.00/Gal
- Abnormal material impacts of the last two years - when will it stop.
- Katrina impacts and other unplanned natural disasters.

Estimate Classification

This cost estimate prepared is considered a Class 4 estimate as defined by the American Association of Cost Engineering (AACE). It is considered accurate to +50% to -30%, based upon a 15% design deliverable.

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final cost of the project will depend upon the actual labor and material costs, competitive market conditions, final project costs, implementation schedule and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding. Our estimate is based on material, equipment, and labor pricing as of March 19, 2007. The client should be cautioned that such prices are highly subject to variation as a result of shortages resulting from recent natural disasters.

Cost Resources

The following is a list of the various cost resources used in the development of the cost estimate.

- R.S. Means
- Richardson Process Plant Estimating Standards
- Mechanical Contractors Association - Labor Manual
- National Electrical Contractors Association - Labor Unit Manual (NECA)
- CH2M HILL Historical Data
- Vendor Quotes on Equipment, Materials, and Transportation where appropriate.
- Estimator Judgment

Labor unit prices reflect a burdened rate, including: workers compensation, unemployment taxes, Fringe Benefits, and medical insurance.

Estimate Methodology

This cost estimate is considered a bottom rolled up type estimate with detailed cost items and breakdown of Labor, Materials and Equipment. Some quotations where obtained for various items. The estimate may include allowance cost and dollars per SF cost for certain components of the estimate.

Labor Costs

The estimate has been adjusted for local area labor rates, based upon GENERAL DECISION: **AK20070001** Date: February 16, 2007.

Sales Tax

No Sales Tax has been included.

Allowance Costs

The cost estimate includes the following allowances within the cost estimate:

- Archeological Investigations
-

Major Assumptions

The estimate is based on the assumption the work will be done on a competitive bid basis and the contractor will have a reasonable amount of time to complete the work. All contractors are equal, with a reasonable project schedule, no overtime, constructed as under a single contract, no liquidated damages.

This estimate should be evaluated for market changes after 90 days of the issue date. It is assumed that much of the fabricated equipment will be shipped from the mainland USA.

- Sales tax is not included, the project is assumed to be sales tax exempt.
- Core-Loc units are barged at contractor expense from Tacoma Washington
- All cement, fuel, equipment, and construction supplies are barged from Seattle or Tacoma, Washington
- Contractor will charter barge and tug for mobilization, demobilization and Core-Loc transportation efforts. All other supplies and equipment will arrive by barge on scheduled itineraries.
- Labor costs are based on Davis-Bacon determination for West Aleutian rates
- All craft are provided with room, board, and travel allowance
- Project duration is assumed to be approximately 52 weeks over two seasons for the heavy civil portion of the work.
- All rock and fill material is assumed to come from the Arch Rock site.
- Contractor will have full access to Arch Rock, and freedom to develop pit site to meet their needs and equipment requirements
- Runway OFA excavated material is assumed to be "rippable" and not require the use of explosives.
- OFA excavation material can be deposited somewhere in the area of Arch Rock, but not at the Arch Rock quarry site.
- Local Municipality will accommodate contractor use of Beach Rd to transport all material from Arch Rock Quarry, with some haul routes
- Permit fee of $30,000 is included for the permission to use Beach Rd
- All material taken from the Arch Rock Quarry is subject to a royalty of $6.50 Cy

- Contractor will repair and repave Beach Road at the completion of the project. Beach Road will be maintained in a passable condition throughout the project.
- Contractor will provide traffic control on Beach Road during the duration of the project to allow for safe passage of local and heavy haul quarry vehicles
- Contractor will work a 6-10 schedule over a two season construction period lasting approximately 26 weeks each.
- Contractor will perform majority of airport runway work during nighttime hours, at which time airport will be closed to all but emergency flights.
- It is assumed that Unalaska Airport is an unsecured facility, and contractor staff will not need security clearance to work at or on the facility
- Standard safety precautions will prevail since work is to be performed during times when the airport is officially closed to all but emergency traffic
- Quantities and bill of materials are based upon information as provided by the design staff

Excluded Costs

The cost estimate excludes the following costs:

- Non-construction or soft costs for design, services during construction, land, legal and owner administration costs.
- Material Adjustment allowances above and beyond what is included at the time of the cost estimate.
- Escalation
- Sales Taxes
- Owners' Contingency
- Hazardous materials detection, removal, or mitigation
- Archeological surveys, investigations, and relocation/preservation, except for an allowance for Road Option 4B.

Reference Documents

- 04/02/2007 05:19 PM 213,461 Document (4).pdf
- 03/27/2007 03:39 PM 204,947 Exh Shoreline Rway Ext - XSection.pdf
- 03/28/2007 01:41 PM 486,989 Existing RWY improvements section markup_28-Mar-07.pdf
- 04/02/2007 05:19 PM 213,461 Existing RWY improvements section_02-Apr-07.pdf
- 03/27/2007 06:25 PM 1,605,290 MtBallyho_PS Sections.pdf

- 03/27/2007 03:40 PM 448,711 North and South RWY extension sections.pdf
- 04/02/2007 05:20 PM 233,887 North RWY extension section _02-Apr-07.pdf
- 03/28/2007 01:42 PM 418,969 North RWY extension section markup_28-Mar-07.pdf
- 04/02/2007 05:20 PM 223,891 South RWY extension section _02-Apr-07.pdf
- 03/28/2007 01:39 PM 412,386 South RWY extension section markup_28-Mar-07.pdf
- 03/29/2007 06:09 PM 57,344 TECHNICAL MEMORANDUM_Storm Return Period_29-Mar-07.doc
- 03/29/2007 06:09 PM 72,992 TECHNICAL MEMORANDUM_Storm Return Period_29-Mar-07.pdf
- 04/02/2007 05:17 PM 371,938 Alt 1 Plan.pdf
- 04/02/2007 05:17 PM 354,275 Alt 2 Plan.pdf
- 04/02/2007 05:18 PM 351,349 Alt 3 Plan.pdf
- 04/02/2007 05:18 PM 358,278 Alt 4 Plan.pdf
- 03/15/2007 04:59 PM 6,933,604 DUT ALP - Aerial Photo w Contours.pdf
- 03/21/2007 04:12 PM 1,229,307 DUT ALP - Aerial Photo.pdf
- 03/21/2007 04:12 PM 716,936 DUT ALP - B-II Deficiencies.pdf
- 03/21/2007 04:12 PM 872,043 DUT ALP - B-III Deficiencies.pdf
- 03/21/2007 04:12 PM 688,610 DUT ALP - Exist Conditions.pdf
- 03/22/2007 09:32 AM 141,530 Dutch ALP87.pdf
- 03/23/2007 12:47 PM 221,429 Exh 2-1 - Applicable Dsgn Stds.pdf
- 03/23/2007 12:47 PM 225,187 Exh 2-10 - Landside Requirements.pdf
- 03/23/2007 12:47 PM 531,292 Exh 2-2 - Exst Rwy Dims.pdf
- 03/23/2007 12:47 PM 532,144 Exh 2-3 - Surveyed Rwy Dims.pdf
- 03/23/2007 12:47 PM 192,589 Exh 2-4 - Exst Terminal Apron.pdf
- 03/23/2007 12:47 PM 692,035 Exh 2-5 - B-II RSA OFA Defic.pdf
- 03/23/2007 12:47 PM 721,761 Exh 2-6 - B-III RSA OFA Defic.pdf
- 03/23/2007 12:47 PM 263,238 Exh 2-7 - RPZ Dims.pdf
- 03/23/2007 12:47 PM 199,905 Exh 2-8 - Part 77 Surfaces.pdf
- 03/23/2007 12:47 PM 916,842 Exh 2-9 - Part 77 Penetrations.pdf
- 03/28/2007 08:31 AM 351,298 Exhibit - Historic Bldgs.pdf
- 03/27/2007 04:40 PM 557,172 Exhibit - Project Study Area.pdf
- 03/28/2007 08:31 AM 223,284 Exhibit - Stellers Eider Survey.pdf

Unalaska Airport Master Plan
Airport Runway Extension Alternate #1
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Alt #1
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
01 - Common			**COMMON**									
	ATN		**Aids to Navigation**									
		16529.498	**Runway Lighting**									
			Runway Navigation Equipment & Lights	1 ls				100,000.00 /ls	-	-	100,000.00 /ls	100,000
			Runway Lighting			/ea	/ea	/ea	/ea	/ea	/ea	**100,000**
			ATN Aids to Navigation									**100,000**
	Arch Pit Mob											
		01050.100	**Permits**									
			Site Permit	1 ls		-		20,000.00 /ls	-	-	20,000.00 /ls	20,000
			Permits			/ls	/ls	/ls	/ls	/ls	/ls	**20,000**
		01065.100	**Surveys**									
			Pit Survey & Layouts	1 ls		5,750.00 /ls		-	-	-	5,750.00 /ls	5,750
			Surveys			/ls	/ls	/ls	/ls	/ls	/ls	**5,750**
		01102.100	**Site Supervision**									
			Superintendent	78 wk	4,680.000	1,725.00 /wk	-	-		-	1,725.00 /wk	134,550
			Site Supervision		**4,680.000**	/wk	/wk	/wk	/wk	/wk	/wk	**134,550**
		01201.100	**Offices**									
			Office Trailer	18 mo		-	250.00 /mo	-		-	250.00 /mo	4,500
			Offices			/mo	/mo	/mo	/mo	/mo	/mo	**4,500**
		01203.100	**Utilities**									
			Temporary Toilets	18 mo		-	225.00 /mo	-	-	-	225.00 /mo	4,050
			Utilities			/mo	/mo	/mo	/mo	/mo	/mo	**4,050**
		01300.100	**Project Clean Up**									
			Final Cleaning	1 ls	100.000	6,774.08 /ls			19,765.00 /ls	-	26,539.08 /ls	26,539
			Project Clean Up		**100.000**	/ls	/ls	/ls	/ls	/ls	/ls	**26,539**
		01910.000	**Equipment**									
			Scale House	18 mo		-	140.00 /mo	-	500.00 /mo	-	640.00 /mo	11,520
			Equipment			/ls	/ls	/ls	/ls	/ls	/ls	**11,520**
		02230.010	**Clear & Grub**									
			Pile & Burn Lt Brush Hard	23 acre	323.923	998.06 /acre		-	923.08 /acre	-	1,921.14 /acre	44,104
			Clear & Grub		**323.923**	/ac	/ac	/ac	/ac	/ac	/ac	**44,104**
		02317.000	**Earthwork**									
			Overburden Removal	88,889 cy	444.444	0.34 /cy	-	-	0.99 /cy	-	1.33 /cy	117,951
			Drill & Shoot Quarry Rock	533,024 Cy		2.82 /Cy	2.04 /Cy		3.62 /Cy	-	8.48 /Cy	4,518,711
			Articulated Off-road 25cy (0 - 1 Mile)	88,889 cuyd	888.889	0.56 /cuyd		-	0.84 /cuyd	-	1.40 /cuyd	124,658
			Earthwork		**1,333.333**	/cy	/cy	/cy	/cy	/cy	/cy	**4,761,320**
			Arch Pit Mob		**6,437.256**							**5,012,333**
	Beach Rd M&R		**Airport Beach Road Maintenance & Repair**									
		01050.100	**Permits**									
			Road Use Permit	1 ls		-		30,000.00 /ls	-	-	30,000.00 /ls	30,000

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Permits			/ls	/ls	/ls	/ls	/ls	/ls	**30,000**
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 2"	74,667 sy	776.537	0.67 /sy	4.00 /sy		0.32 /sy	-	5.00 /sy	373,016
			Asphalt Top Course 2"	74,667 sy	776.537	0.67 /sy	4.50 /sy		0.32 /sy	-	5.50 /sy	410,349
			Asphalt Paving		**1,553.074**	/sy	/sy	/sy	/sy	/sy	/sy	**783,365**
		02740.130	**Paving Textiles**									
			Road Base Geo Textile	74,667 sy	186.667	0.14 /sy	2.20 /sy	-	-	-	2.34 /sy	174,499
			Paving Textiles		**186.667**	/sy	/sy	/sy	/sy	/sy	/sy	**174,499**
			Beach Rd M&R Airport Beach Road Maintenance & Repair		**1,739.741**							**987,863**
	Const Survey		**Construction Surveying**									
		01065.100	**Surveys**									
			Airport Survey & Layouts	1 ls		115,000.00 /ls		-	-	-	115,000.00 /ls	115,000
			Surveys			/ls	/ls	/ls	/ls	/ls	/ls	**115,000**
			Const Survey Construction Surveying									**115,000**
	Envir Protect		**Envioronment Protection**									
		02370.150	**Temp Erosion Control**									
			Silt Fence	4,000 lf	80.000	1.10 /lf	4.40 /lf	-	-	-	5.50 /lf	21,985
			Erosion Control Mats-Slopes	10,000 sf	100.000	0.55 /sf	2.20 /sf	-	-	-	2.75 /sf	27,481
			Reseed Site for Winter	200,000 sf	200.000	0.06 /sf	0.02 /sf	-	-	-	0.08 /sf	15,363
			Temp Erosion Control		**380.000**	/ls	/ls	/ls	/ls	/ls	/ls	**64,830**
		02370.200	**Temp Filter Dams**									
			Filter Fabric	0 cy		-	1.60 /cy	-	-	-	1.60 /cy	0
			Temp Filter Dams			/cy	/cy	/cy	/cy	/cy	/cy	**0**
			Envir Protect Envioronment Protection		**380.000**							**64,830**
	Field Lab		**Field Labratory**									
		01201.100	**Offices**									
			Inspector's Trailer	12 mo		-	1,250.00 /mo	-		-	1,250.00 /mo	15,000
			Offices			/mo	/mo	/mo	/mo	/mo	/mo	**15,000**
		01202.100	**Supplies & Equip**									
			Copy Machine	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies & Equip			/mo	/mo	/mo	/mo	/mo	/mo	**9,600**
		01203.100	**Utilities**									
			Electric Power	12 mo		-	300.00 /mo	-	-	-	300.00 /mo	3,600
			Telephone Charges	12 mo		-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Temporary Toilets	12 mo		-	225.00 /mo	-	-	-	225.00 /mo	2,700
			Utilities			/mo	/mo	/mo	/mo	/mo	/mo	**12,300**
		01401.100	**Testing**									
			Misc Test & Inspection	1 ls		-	-	50,000.00 /ls	-	-	50,000.00 /ls	50,000
			Soil Testing	1 ls		-	-	25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Material Testing	1 ls		-	-	25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Testing			/ls	/ls	/ls	/ls	/ls	/ls	**100,000**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Field Lab Field Labratory									**136,900**
	Field Office		**Field Office**									
		01060.100	**Documents**									
			Prints & Records	1 ls		-		25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Documents			**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**25,000**
		01070.100	**Photos**									
			Project Photos	12 mo		287.50 /mo	250.00 /mo	-	-	-	537.50 /mo	6,450
			Photos			**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**6,450**
		01075.100	**Signs**									
			Project Signs 8x8	3 ea	15.000	315.50 /ea	750.00 /ea	-	-	-	1,065.50 /ea	3,197
			Signs		**15.000**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**3,197**
		01100.100	**Project Management**									
			Construction Manager	52 wk	3,120.000	2,875.00 /wk	-	-		300.00 /wk	3,175.00 /wk	165,100
			Project Manager	52 wk	3,120.000	3,450.00 /wk	-	-		-	3,450.00 /wk	179,400
			Project Management		**6,240.000**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**344,500**
		01102.100	**Site Supervision**									
			Superintendent	52 wk	3,120.000	2,875.00 /wk	-	-		-	2,875.00 /wk	149,500
			Site Supervision		**3,120.000**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**149,500**
		01110.100	**Travel**									
			Weekly Travel Subsistence (Room & Board)	1,820 wk		-		850.00 /wk	-	-	850.00 /wk	1,547,000
			Airline Fares (See Notes)	424 ea		-		715.00 /ea	-	-	715.00 /ea	303,160
			Motel & Hotel (Home Office Staff Only)	365 dy		-		175.00 /dy	-	-	175.00 /dy	63,875
			Travel			**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**1,914,035**
		01201.100	**Offices**									
			Office Trailer	12 mo		-	2,000.00 /mo	-		-	2,000.00 /mo	24,000
			Offices			**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**24,000**
		01202.100	**Supplies & Equip**									
			Copy Machine	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies & Equip			**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**9,600**
		01203.100	**Utilities**									
			Electric Power	12 mo		-	350.00 /mo	-	-	-	350.00 /mo	4,200
			Telephone Charges	12 mo		-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Temporary Toilets	12 mo		-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Utilities			**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**16,200**
		01310.100	**Tools & Equipment**									
			Fueling Equipment	52 wk	4,160.000	5,022.82 /wk		-	3,241.92 /wk	-	8,264.74 /wk	429,766
			Misc. Tools	1 ls		-	-	-	25,000.00 /ls	-	25,000.00 /ls	25,000
			Tools & Equipment		**4,160.000**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**454,766**
		01330.100	**Scheduling**									

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		01330.100	**Scheduling**									
			Scheduling Expense	1 ls		1,725.00 /ls		-	-	-	1,725.00 /ls	1,725
			Scheduling			/ls	/ls	/ls	/ls	/ls	/ls	**1,725**
			Field Office Field Office		**13,535.000**							**2,948,973**
	Mob Demob		**Mobilization/Demobilization**									
		01910.000	**Equipment**									
			Construction Equipment Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Asphalt Plant Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Quarry Site Equipment Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Misc Equipment & Supplies Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Construction Equipment De-Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Asphalt Plant De-Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Quarry Site Equipment De-Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Misc Equipment & Supplies De-Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Equipment			/ls	/ls	/ls	/ls	/ls	/ls	**2,630,000**
			Mob Demob Mobilization/Demobilization									**2,630,000**
	Safety & Flagging		**Safety & Traffic Control**									
		01204.100	**OSHA & Safety**									
			Safety Officer	52 wk	2,080.000	2,300.00 /wk	-	-	-	-	2,300.00 /wk	119,600
			Safety Equipment/Signage	1 ls		-	-	10,000.00 /ls	35,000.00 /ls	-	45,000.00 /ls	45,000
			OSHA & Safety		**2,080.000**	/wk	/wk	/wk	/wk	/wk	/wk	**164,600**
		01205.100	**Safety Protection**									
			Temporary Fences	1 ls		-	-	7.15 /ls	-	-	7.15 /ls	7
			Traffic Control	52 wk				5,000.00 /wk	-	-	5,000.00 /wk	260,000
			Safety Protection			/wk	/wk	/wk	/wk	/wk	/wk	**260,007**
			Safety & Flagging Safety & Traffic Control		**2,080.000**							**424,607**
			01 - Common COMMON		**########**							**12,420,506**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
'2 - RW 12 Extend			**Runway 12 Extension**									
	Asphalt 4"		**Asphalt RSA Material**									
		02720.100	**Base**									
			Crushed Gravel	2,923 cy	93.302	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.65 /cy	42,831
			Base		**93.302**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**42,831**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	17,500 sy	77.778	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	10,156
			Asphalt Base Course 2"	17,500 sy	182.000	0.67 /sy	4.00 /sy	0.00 /sy	0.32 /sy	-	5.00 /sy	87,425
			Asphalt Top Course 2"	17,500 sy	182.000	0.67 /sy	4.50 /sy	0.00 /sy	0.32 /sy	-	5.50 /sy	96,175
			Asphalt Paving		**441.778**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**193,756**
			Asphalt 4" Asphalt RSA Material		**535.080**							**236,587**
	Asphalt 8"		**Asphalt Runway Material**									
		02720.100	**Base**									
			Crushed Gravel	1,066 cy	34.027	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.66 /cy	15,623
			Base		**34.027**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**15,623**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	3,200 sy	14.222	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	1,857
			Asphalt Base Course 4"	3,200 sy	41.600	0.84 /sy	8.00 /sy	0.00 /sy	0.40 /sy	-	9.25 /sy	29,583
			Asphalt Top Course 4.0"	3,200 sy	41.600	0.84 /sy	8.50 /sy	0.00 /sy	0.40 /sy	-	9.75 /sy	31,183
			Asphalt Paving		**97.422**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**62,623**
			Asphalt 8" Asphalt Runway Material		**131.449**							**78,246**
	Core 34 Ton		**Core-Loc 34 Ton Units**									
		02330.000	**Haul**									
			Core-Loc Units Haul	1,411 ea	7,055.000	361.02 /ea	0.00 /ea	-	1,122.67 /ea	-	1,483.69 /ea	2,093,483
			Haul		**7,055.000**							**2,093,483**
		02370.100	**Rip Rap**									
			Core-Loc Units 34 Ton	1,411 ea	11,288.000	574.36 /ea	4,137.93 /ea	340.00 /ea	619.70 /ea	-	5,671.99 /ea	8,003,175
			Rip Rap		**11,288.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**8,003,175**
			Core 34 Ton Core-Loc 34 Ton Units		**18,343.000**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**10,096,659**
	Core Fill		**Core Material Fill**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	340,000 cuyd	3,400.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	471,089
			Earthwork		**3,400.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**471,089**
		02370.100	**Rip Rap**									
			Crushed Rock Production	340,000 cy	4,857.143	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	4,038,602
			Quarry Stone < 100#	340,000 cy	14,711.538	2.78 /cy	0.00 /cy	0.00 /cy	1.21 /cy	-	3.99 /cy	1,357,122
			Rip Rap		**19,568.681**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**5,395,724**
			Core Fill Core Material Fill		**22,968.681**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**5,866,813**
	Elbow Fill											
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	112,500 cuyd	1,125.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	155,875
			Earthwork		**1,125.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**155,875**
		02370.100	**Rip Rap**									
			Crushed Rock Production	112,500 cy	1,607.143	0.92 /cy		6.50 /cy	4.46 /cy	-	11.88 /cy	1,336,302
			Quarry Stone < 100#	112,500 cy	4,867.788	2.78 /cy			1.21 /cy	-	3.99 /cy	449,048

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Rip Rap		**6,474.931**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**1,785,350**
			Elbow Fill		**7,599.931**							**1,941,225**
	Understone 1		**Understone Layer 1**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	30,300 cuyd	303.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	41,982
			Earthwork		**303.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**41,982**
		02370.100	**Rip Rap**									
			Crushed Rock Production	30,300 cy	432.857	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	359,911
			Armor Quarry Stone > 5 Ton	30,300 cy	48,480.000	114.87 /cy	0.00 /cy	0.00 /cy	123.94 /cy	-	238.81 /cy	7,235,986
			Rip Rap		**48,912.857**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**7,595,897**
			Understone 1 Understone Layer 1		**49,215.857**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**7,637,879**
	Understone 2		**Understone Layer 2**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	11,000 cuyd	110.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	15,241
			Earthwork		**110.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**15,241**
		02370.100	**Rip Rap**									
			Crushed Rock Production	11,000 cy	157.143	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	130,661
			Quarry Stone 500# - 1 Ton	11,000 cy	4,400.000	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	656,731
			Rip Rap		**4,557.143**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**787,392**
			Understone 2 Understone Layer 2		**4,667.143**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**802,633**
			02 - RW 12 Extend Runway 12 Extension		**########**							**26,660,042**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
3 - RW 30 Extend												
	Asphalt 4"		Asphalt RSA Material									
		02720.100	Base									
			Crushed Gravel	735 cy	23.461	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.65 /cy	10,770
			Base		23.461	/cy	/cy	/cy	/cy	/cy	/cy	10,770
		02740.100	Asphalt Paving									
			Rough Grading Roads	4,400 sy	19.556	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	2,553
			Asphalt Base Course 2"	4,400 sy	45.760	0.67 /sy	4.00 /sy	0.00 /sy	0.32 /sy	-	5.00 /sy	21,981
			Asphalt Top Course 2"	4,400 sy	45.760	0.67 /sy	4.50 /sy	0.00 /sy	0.32 /sy	-	5.50 /sy	24,181
			Asphalt Paving		111.076	/sy	/sy	/sy	/sy	/sy	/sy	48,716
			Asphalt 4" Asphalt RSA Material		134.537							59,486
	Asphalt 8"		Asphalt Runway Material									
		02720.100	Base									
			Crushed Gravel	0 cy	0.011	2.00 /cy	11.77 /cy	-	0.87 /cy	-	14.66 /cy	5
			Base		0.011	/cy	/cy	/cy	/cy	/cy	/cy	5
		02740.100	Asphalt Paving									
			Rough Grading Roads	1 sy	0.004	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	1
			Asphalt Base Course 4"	1 sy	0.013	0.84 /sy	8.00 /sy	0.00 /sy	0.40 /sy	-	9.24 /sy	9
			Asphalt Top Course 4"	1 sy	0.013	0.84 /sy	8.50 /sy	0.00 /sy	0.40 /sy	-	9.74 /sy	10
			Asphalt Paving		0.030	/sy	/sy	/sy	/sy	/sy	/sy	20
			Asphalt 8" Asphalt Runway Material		0.041							24
	Core Fill		Core Material Fill									
		02317.000	Earthwork									
			Articulated Off-road 25cy (1 - 3 Mile)	*0 cuyd*		*0.00 /cuyd*	*0.00 /cuyd*	*-*	*0.00 /cuyd*	*-*	*0.00 /cuyd*	*0*
		02370.100	Rip Rap									
			Crushed Rock Production	*0 cy*		*0.00 /cy*	*0.00 /cy*	*-*	*0.00 /cy*	*-*	*0.00 /cy*	*0*
			Quarry Stone < 100#	*0 cy*		*0.00 /cy*	*0.00 /cy*	*0.00 /cy*	*0.00 /cy*	*-*	*0.00 /cy*	*0*
	Understone 1		Understone Layer 1									
		02317.000	Earthwork									
			Articulated Off-road 25cy (1 - 3 Mile)	*0 cuyd*		*0.00 /cuyd*	*0.00 /cuyd*	*-*	*0.00 /cuyd*	*-*	*0.00 /cuyd*	*0*
		02370.100	Rip Rap									
			Crushed Rock Production	*0 cy*		*0.00 /cy*	*0.00 /cy*	*-*	*0.00 /cy*	*-*	*0.00 /cy*	*0*
			Armor Quarry Stone > 5 Ton	*0 cy*		*0.00 /cy*	*0.00 /cy*	*0.00 /cy*	*0.00 /cy*	*-*	*0.00 /cy*	*0*
	Understone 2		Understone Layer 2									
		02317.000	Earthwork									
			Articulated Off-road 25cy (1 - 3 Mile)	*0 cuyd*		*0.00 /cuyd*	*0.00 /cuyd*	*-*	*0.00 /cuyd*	*-*	*0.00 /cuyd*	*0*

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		02370.100	Rip Rap									
			Crushed Rock Production	*0 cy*		*0.00 /cy*	*0.00 /cy*	-	*0.00 /cy*	-	*0.00 /cy*	*0*
			Quarry Stone 500# - 1 Ton	*0 cy*		*0.00 /cy*	*0.00 /cy*	*0.00 /cy*	*0.00 /cy*	-	*0.00 /cy*	*0*
			03 - RW 30 Extend		**134.578**							**59,510**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
)7 - Runway mprove			**Runway Improvements**									
	Core 8 Ton											
		02330.000	**Haul**									
			Core-Loc Units Haul	3,000 ea	3,750.000	90.25 /ea		-	264.16 /ea	-	354.41 /ea	1,063,236
			Haul		**3,750.000**							**1,063,236**
		02370.100	**Rip Rap**									
			Core-Loc Units 8 Ton	3,000 ea	12,000.000	287.18 /ea	960.00 /ea	80.00 /ea	309.85 /ea	-	1,637.03 /ea	4,911,086
			Rip Rap		**12,000.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**4,911,086**
			Core 8 Ton		**15,750.000**							**5,974,322**
	Core Fill		**Core Material Fill**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	4,500 cuyd	45.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	6,235
			Earthwork		**45.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**6,235**
		02370.100	**Rip Rap**									
			Crushed Rock Production	4,500 cy	64.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	53,452
			Quarry Stone < 100#	4,500 cy	194.712	2.78 /cy	0.00 /cy	0.00 /cy	1.21 /cy	-	3.99 /cy	17,962
			Rip Rap		**258.998**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**71,414**
			Core Fill Core Material Fill		**303.998**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**77,649**
	Rock Exc		**Rock Excavation**									
		02317.000	**Earthwork**									
			Exc Mass - Tough	125,000 cuyd	3,750.000	1.99 /cuyd		-	4.50 /cu yd	-	6.49 /cuyd	811,408
			Load Stkpile W/Ldr Med Hard	125,000 cuyd	3,472.500	1.79 /cuyd		-	1.32 /cu yd	-	3.11 /cuyd	388,536
			Articulated Off-road 25cy (3 - 5 Mile)	125,000 cuyd	2,604.167	1.16 /cuyd		-	1.79 /cu yd	-	2.96 /cuyd	369,799
			Earthwork		**9,826.667**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,569,743**
			Rock Exc Rock Excavation		**9,826.667**							**1,569,743**
	Understone 1		**Understone Layer 1**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	22,000 cuyd	220.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	30,482
			Earthwork		**220.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**30,482**
		02370.100	**Rip Rap**									
			Crushed Rock Production	22,000 cy	314.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	261,321
			Armor Quarry Stone > 5 Ton	22,000 cy	35,200.000	114.87 /cy	0.00 /cy	0.00 /cy	123.94 /cy	-	238.81 /cy	5,253,851
			Rip Rap		**35,514.286**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**5,515,173**
			Understone 1 Understone Layer 1		**35,734.286**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**5,545,655**
	Understone 2		**Understone Layer 2**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	8,000 cuyd	80.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	11,084
			Earthwork		**80.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**11,084**
		02370.100	**Rip Rap**									
			Crushed Rock Production	8,000 cy	114.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	95,026

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		02370.100	**Rip Rap**									
			Quarry Stone 500# - 1 Ton	8,000 cy	3,200.000	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	477,623
			Rip Rap		**3,314.286**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**572,649**
			Understone 2 Understone Layer 2		**3,394.286**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**583,733**
			07 - Runway Improve Runway Improvements		**########**	**/Sy**	**/Sy**	**/S y**	**/S y**	**/S y**	**/Sy**	**13,751,102**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
09 - Misc Items												
	ATN		Aids to Navigation									
		02766.100	Pavement Marking									
			Runway Marking	1 ls				12,500.00 /ls	-	-	12,500.00 /ls	12,500
			Pavement Marking			/lf	/lf	/lf	/lf	/lf	/lf	12,500
		16001.250	Misc Site Work									
			Relocate Navigation Aids	1 ls		57,500.00 /ls	100,000.00 /ls	-	-	-	157,500.00 /ls	157,500
			Misc Site Work			/ls	/ls	/ls	/ls	/ls	/ls	157,500
			ATN Aids to Navigation									170,000
	Drainage											
		02630.200	Storm Drainage									
			Runway Storm Drainage Allowance	1 ls		57,500.00 /ls	50,000.00 /ls	0.00 /ls	15,000.00 /ls	-	122,500.00 /ls	122,500
			Storm Drainage			/lf	/lf	/lf	/lf	/lf	/lf	122,500
			Drainage									122,500
	OFA Grading		OFA Grading									
		02230.010	Clear & Grub									
			Rough Blade Hard	33,333 sy	388.889	0.78 /sy		-	0.31 /sy	-	1.09 /sy	36,386
			Clear & Grub		388.889	/ac	/ac	/ac	/ac	/ac	/ac	36,386
		02900.200	Soil Preparation									
			Machine Rake	300,000 sf		-	-	0.06 /sf	-	-	0.06 /sf	16,500
			Soil Preparation			/sf	/sf	/sf	/sf	/sf	/sf	16,500
		02920.100	Lawns & Grasses									
			Hydroseeding	300,000 sf		-	-	0.04 /sf	-	-	0.04 /sf	12,000
			Lawns & Grasses			/sf	/sf	/sf	/sf	/sf	/sf	12,000
			OFA Grading OFA Grading		388.889							64,886
	RSA Grading		Runway Safety Area Grading									
		02230.010	Clear & Grub									
			Finish Blade Tgh	65,833 sy	376.190	0.39 /sy	-	-	0.36 /sy	-	0.75 /sy	49,119
			Rough Blade Hard	65,833 sy	768.275	0.78 /sy	-	-	0.31 /sy	-	1.09 /sy	71,877
			Clear & Grub		1,144.465	/ac	/ac	/ac	/ac	/ac	/ac	120,997
		02900.200	Soil Preparation									
			Machine Rake	592,500 sf		-	-	0.06 /sf	-	-	0.06 /sf	32,588
			Hand Rake	592,500 sf		-	-	0.08 /sf	-	-	0.08 /sf	44,438
			Soil Preparation			/sf	/sf	/sf	/sf	/sf	/sf	77,025
		02920.100	Lawns & Grasses									
			Hydroseeding	592,500 sf		-	-	0.04 /sf	-	-	0.04 /sf	23,700
			Lawns & Grasses			/sf	/sf	/sf	/sf	/sf	/sf	23,700
			RSA Grading Runway Safety Area Grading		1,144.465							221,722
			09 - Misc Items		1,533.354							579,108

Estimate Totals

Description	Amount	Totals	Hours	Rate	C
Labor	15,040,152		194,310.307 hrs		
Material	11,196,521				
Subcontract	9,154,457				
Equipment	18,063,538		176,035.472 hrs		
Other	15,600				
	53,470,268	53,470,268			
Material Take-off Allowance	4,277,621			8.000 %	C
Labor Overtime	3,760,038			25.000 %	C
Bond	382,986				E
Overhead & Profit	8,020,540			15.000 %	C
Contingency	10,694,054			20.000 %	C
Market Conditions Allowance	4,277,621			8.000 %	C
Total		***84,883,128***			

Unalaska A[illegible]t Master Plan
Airport Runway Extension Alternate #2
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Alt #2
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
01 - Common			**COMMON**									
	ATN		**Aids to Navigation**									
		16529.498	**Runway Lighting**									
			Runway Navigation Equipment & Lights	1 ls				100,000.00 /ls	-	-	100,000.00 /ls	100,000
			Runway Lighting			/ea	/ea	/ea	/ea	/ea	/ea	**100,000**
			ATN Aids to Navigation									**100,000**
	Arch Pit Mob											
		01050.100	**Permits**									
			Site Permit	1 ls		-		20,000.00 /ls	-	-	20,000.00 /ls	20,000
			Permits			/ls	/ls	/ls	/ls	/ls	/ls	**20,000**
		01065.100	**Surveys**									
			Pit Survey & Layouts	1 ls		5,750.00 /ls		-	-	-	5,750.00 /ls	5,750
			Surveys			/ls	/ls	/ls	/ls	/ls	/ls	**5,750**
		01102.100	**Site Supervision**									
			Superintendent	78 wk	4,680.000	1,725.00 /wk	-	-		-	1,725.00 /wk	134,550
			Site Supervision		**4,680.000**	/wk	/wk	/wk	/wk	/wk	/wk	**134,550**
		01201.100	**Offices**									
			Office Trailer	18 mo		-	250.00 /mo	-		-	250.00 /mo	4,500
			Offices			/mo	/mo	/mo	/mo	/mo	/mo	**4,500**
		01203.100	**Utilities**									
			Temporary Toilets	18 mo		-	225.00 /mo	-	-	-	225.00 /mo	4,050
			Utilities			/mo	/mo	/mo	/mo	/mo	/mo	**4,050**
		01300.100	**Project Clean Up**									
			Final Cleaning	1 ls	100.000	6,774.08 /ls			19,765.00 /ls	-	26,539.08 /ls	26,539
			Project Clean Up		**100.000**	/ls	/ls	/ls	/ls	/ls	/ls	**26,539**
		01910.000	**Equipment**									
			Scale House	18 mo		-	140.00 /mo	-	500.00 /mo	-	640.00 /mo	11,520
			Equipment			/ls	/ls	/ls	/ls	/ls	/ls	**11,520**
		02230.010	**Clear & Grub**									
			Pile & Burn Lt Brush Hard	23 acre	323.923	998.06 /acre		-	923.08 /acre	-	1,921.14 /acre	44,104
			Clear & Grub		**323.923**	/ac	/ac	/ac	/ac	/ac	/ac	**44,104**
		02317.000	**Earthwork**									
			Overburden Removal	88,889 cy	444.444	0.34 /cy	-	-	0.99 /cy	-	1.33 /cy	117,951
			Drill & Shoot Quarry Rock	407,986 Cy		2.82 /Cy	2.04 /Cy	-	3.62 /Cy	-	8.48 /Cy	3,458,701
			Articulated Off-road 25cy (0 - 1 Mile)	88,889 cuyd	888.889	0.56 /cuyd		-	0.84 /cuyd	-	1.40 /cuyd	124,658
			Earthwork		**1,333.333**	/cy	/cy	/cy	/cy	/cy	/cy	**3,701,310**
			Arch Pit Mob		**6,437.256**							**3,952,323**
	Beach [illegible]M&R		**Airport Beach Road Maintenance & Repair**									
		01050.100	**Permits**									
			Road Use Permit	1 ls		-		30,000.00 /ls	-	-	30,000.00 /ls	30,000

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Permits			/ls	/ls	/ls	/ls	/ls	/ls	**30,000**
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 2"	74,667 sy	776.537	0.67 /sy	4.00 /sy		0.32 /sy	-	5.00 /sy	373,016
			Asphalt Top Course 2"	74,667 sy	776.537	0.67 /sy	4.50 /sy		0.32 /sy	-	5.50 /sy	410,349
			Asphalt Paving		**1,553.074**	/sy	/sy	/sy	/sy	/sy	/sy	**783,365**
		02740.130	**Paving Textiles**									
			Road Base Geo Textile	74,667 sy	186.667	0.14 /sy	2.20 /sy	-	-	-	2.34 /sy	174,499
			Paving Textiles		**186.667**	/sy	/sy	/sy	/sy	/sy	/sy	**174,499**
			Beach Rd M&R Airport Beach Road Maintenance & Repair		**1,739.741**							**987,863**
Const Survey			**Construction Surveying**									
	01065.100		**Surveys**									
			Airport Survey & Layouts	1 ls		115,000.00 /ls		-	-	-	115,000.00 /ls	115,000
			Surveys			/ls	/ls	/ls	/ls	/ls	/ls	**115,000**
			Const Survey Construction Surveying									**115,000**
Envir Protect			**Envioronment Protection**									
		02370.150	**Temp Erosion Control**									
			Silt Fence	4,000 lf	80.000	1.10 /lf	4.40 /lf	-	-	-	5.50 /lf	21,985
			Erosion Control Mats-Slopes	10,000 sf	100.000	0.55 /sf	2.20 /sf	-	-	-	2.75 /sf	27,481
			Reseed Site for Winter	200,000 sf	200.000	0.06 /sf	0.02 /sf	-	-	-	0.08 /sf	15,363
			Temp Erosion Control		**380.000**	/ls	/ls	/ls	/ls	/ls	/ls	**64,830**
		02370.200	**Temp Filter Dams**									
			Filter Fabric	0 cy		-	1.60 /cy	-	-	-	1.60 /cy	0
			Temp Filter Dams			/cy	/cy	/cy	/cy	/cy	/cy	**0**
			Envir Protect Envioronment Protection		**380.000**							**64,830**
Field Lab			**Field Labratory**									
		01201.100	**Offices**									
			Inspector's Trailer	12 mo		-	1,250.00 /mo	-		-	1,250.00 /mo	15,000
			Offices			/mo	/mo	/mo	/mo	/mo	/mo	**15,000**
		01202.100	**Supplies & Equip**									
			Copy Machine	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies & Equip			/mo	/mo	/mo	/mo	/mo	/mo	**9,600**
		01203.100	**Utilities**									
			Electric Power	12 mo		-	300.00 /mo	-	-	-	300.00 /mo	3,600
			Telephone Charges	12 mo		-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Temporary Toilets	12 mo		-	225.00 /mo	-	-	-	225.00 /mo	2,700
			Utilities			/mo	/mo	/mo	/mo	/mo	/mo	**12,300**
		01401.100	**Testing**									
			Misc Test & Inspection	1 ls		-	-	50,000.00 /ls	-	-	50,000.00 /ls	50,000
			Soil Testing	1 ls		-	-	25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Material Testing	1 ls		-	-	25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Testing			/ls	/ls	/ls	/ls	/ls	/ls	**100,000**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Field Lab Field Labratory									**136,900**
	Field Office		**Field Office**									
		01060.100	**Documents**									
			Prints & Records	1 ls		-		25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Documents			**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**25,000**
		01070.100	**Photos**									
			Project Photos	12 mo		287.50 /mo	250.00 /mo	-	-	-	537.50 /mo	6,450
			Photos			**/mo**	**/mo**	**/m o**	**/m o**	**/m o**	**/mo**	**6,450**
		01075.100	**Signs**									
			Project Signs 8x8	3 ea	15.000	315.50 /ea	750.00 /ea	-	-	-	1,065.50 /ea	3,197
			Signs		**15.000**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**3,197**
		01100.100	**Project Management**									
			Construction Manager	52 wk	3,120.000	2,875.00 /wk	-	-		300.00 /wk	3,175.00 /wk	165,100
			Project Manager	52 wk	3,120.000	3,450.00 /wk	-	-		-	3,450.00 /wk	179,400
			Project Management		**6,240.000**	**/wk**	**/wk**	**/wk**	**/w k**	**/wk**	**/wk**	**344,500**
		01102.100	**Site Supervision**									
			Superintendent	52 wk	3,120.000	2,875.00 /wk	-	-		-	2,875.00 /wk	149,500
			Site Supervision		**3,120.000**	**/wk**	**/wk**	**/wk**	**/w k**	**/wk**	**/wk**	**149,500**
		01110.100	**Travel**									
			Weekly Travel Subsistence (Room & Board)	1,820 wk		-		850.00 /wk	-	-	850.00 /wk	1,547,000
			Airline Fares (See Notes)	424 ea		-		715.00 /ea	-	-	715.00 /ea	303,160
			Motel & Hotel (Home Office Staff Only)	365 dy		-		175.00 /dy	-	-	175.00 /dy	63,875
			Travel			**/wk**	**/wk**	**/wk**	**/w k**	**/wk**	**/wk**	**1,914,035**
		01201.100	**Offices**									
			Office Trailer	12 mo		-	2,000.00 /mo	-		-	2,000.00 /mo	24,000
			Offices			**/mo**	**/mo**	**/m o**	**/m o**	**/m o**	**/mo**	**24,000**
		01202.100	**Supplies & Equip**									
			Copy Machine	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies & Equip			**/mo**	**/mo**	**/m o**	**/m o**	**/m o**	**/mo**	**9,600**
		01203.100	**Utilities**									
			Electric Power	12 mo		-	350.00 /mo	-	-	-	350.00 /mo	4,200
			Telephone Charges	12 mo		-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Temporary Toilets	12 mo		-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Utilities			**/mo**	**/mo**	**/m o**	**/m o**	**/m o**	**/mo**	**16,200**
		01310.100	**Tools & Equipment**									
			Fueling Equipment	52 wk	4,160.000	5,022.82 /wk		-	3,241.92 /wk	-	8,264.74 /wk	429,766
			Misc. Tools	1 ls		-	-	-	25,000.00 /ls	-	25,000.00 /ls	25,000
			Tools & Equipment		**4,160.000**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**454,766**
		01330.100	**Scheduling**									

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		01330.100	**Scheduling**									
			Scheduling Expense	1 ls		1,725.00 /ls		-	-	-	1,725.00 /ls	1,725
			Scheduling			/ls	/ls	/ls	/ls	/ls	/ls	**1,725**
			Field Office Field Office		**13,535.000**							**2,948,973**
	Mob Demob		**Mobilization/Demobilization**									
		01910.000	**Equipment**									
			Construction Equipment Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Asphalt Plant Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Quarry Site Equipment Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Misc Equipment & Supplies Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Construction Equipment De-Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Asphalt Plant De-Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Quarry Site Equipment De-Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Misc Equipment & Supplies De-Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Equipment			/ls	/ls	/ls	/ls	/ls	/ls	**2,630,000**
			Mob Demob Mobilization/Demobilization									**2,630,000**
	Safety & Flagging		**Safety & Traffic Control**									
		01204.100	**OSHA & Safety**									
			Safety Officer	52 wk	2,080.000	2,300.00 /wk	-	-	-	-	2,300.00 /wk	119,600
			Safety Equipment/Signage	1 ls		-	-	10,000.00 /ls	35,000.00 /ls	-	45,000.00 /ls	45,000
			OSHA & Safety		**2,080.000**	/wk	/wk	/wk	/wk	/wk	/wk	**164,600**
		01205.100	**Safety Protection**									
			Temporary Fences	1 ls		-	-	7.15 /ls	-	-	7.15 /ls	7
			Traffic Control	52 wk				5,000.00 /wk	-	-	5,000.00 /wk	260,000
			Safety Protection			/wk	/wk	/wk	/wk	/wk	/wk	**260,007**
			Safety & Flagging Safety & Traffic Control		**2,080.000**							**424,607**
			01 - Common COMMON		**########**							**11,360,496**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
2 - RW 12 Extend			**Runway 12 Extension**									
	Asphalt 4"		**Asphalt RSA Material**									
		02720.100	**Base**									
			Crushed Gravel	2,772 cy	88.482	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.65 /cy	40,619
			Base		**88.482**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**40,619**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	16,600 sy	73.778	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	9,633
			Asphalt Base Course 2"	16,600 sy	172.640	0.67 /sy	4.00 /sy	0.00 /sy	0.32 /sy	-	5.00 /sy	82,929
			Asphalt Top Course 2"	16,600 sy	172.640	0.67 /sy	4.50 /sy	0.00 /sy	0.32 /sy	-	5.50 /sy	91,229
			Asphalt Paving		**419.058**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**183,791**
			Asphalt 4" Asphalt RSA Material		**507.540**							**224,410**
	Asphalt 8"		**Asphalt Runway Material**									
		02720.100	**Base**									
			Crushed Gravel	516 cy	16.471	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.66 /cy	7,563
			Base		**16.471**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**7,563**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	1,550 sy	6.889	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	899
			Asphalt Base Course 4"	1,550 sy	20.150	0.84 /sy	8.00 /sy	0.00 /sy	0.40 /sy	-	9.25 /sy	14,329
			Asphalt Top Course 4.0"	1,550 sy	20.150	0.84 /sy	8.50 /sy	0.00 /sy	0.40 /sy	-	9.75 /sy	15,104
			Asphalt Paving		**47.189**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**30,333**
			Asphalt 8" Asphalt Runway Material		**63.660**							**37,895**
	Core 34 Ton		**Core-Loc 34 Ton Units**									
		02330.000	**Haul**									
			Core-Loc Units Haul	1,215 ea	6,075.000	361.02 /ea	0.00 /ea	-	1,122.67 /ea	-	1,483.69 /ea	1,802,681
			Haul		**6,075.000**							**1,802,681**
		02370.100	**Rip Rap**									
			Core-Loc Units 34 Ton	1,215 ea	9,720.000	574.36 /ea	4,137.93 /ea	340.00 /ea	619.70 /ea	-	5,671.99 /ea	6,891,466
			Rip Rap		**9,720.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**6,891,466**
			Core 34 Ton Core-Loc 34 Ton Units		**15,795.000**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**8,694,146**
	Core Fill		**Core Material Fill**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	222,500 cuyd	2,225.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	308,286
			Earthwork		**2,225.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**308,286**
		02370.100	**Rip Rap**									
			Crushed Rock Production	222,500 cy	3,178.571	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	2,642,909
			Quarry Stone < 100#	222,500 cy	9,627.404	2.78 /cy	0.00 /cy	0.00 /cy	1.21 /cy	-	3.99 /cy	888,116
			Rip Rap		**12,805.975**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**3,531,025**
			Core Fill Core Material Fill		**15,030.975**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**3,839,311**
	Elbow Fill											
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	56,713 cuyd	567.130	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	78,579
			Earthwork		**567.130**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**78,579**
		02370.100	**Rip Rap**									
			Crushed Rock Production	56,713 cy	810.186	[illegible] /cy		6.50 /cy	4.46 /cy	-	11.88 /	673,651
			Quarry Stone < 100#	56,713 cy	2,453.928	2.78 /cy			1.21 /cy	-	3.99 /cy	226,372

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Rip Rap		**3,264.114**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**900,023**
			Elbow Fill		**3,831.244**							**978,602**
	Understone 1		**Understone Layer 1**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	26,100 cuyd	261.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	36,163
			Earthwork		**261.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**36,163**
		02370.100	**Rip Rap**									
			Crushed Rock Production	26,100 cy	372.857	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	310,022
			Armor Quarry Stone > 5 Ton	26,100 cy	41,760.000	114.87 /cy	0.00 /cy	0.00 /cy	123.94 /cy	-	238.81 /cy	6,232,978
			Rip Rap		**42,132.857**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**6,543,000**
			Understone 1 Understone Layer 1		**42,393.857**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**6,579,163**
	Understone 2		**Understone Layer 2**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	9,500 cuyd	95.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	13,163
			Earthwork		**95.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**13,163**
		02370.100	**Rip Rap**									
			Crushed Rock Production	9,500 cy	135.714	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	112,843
			Quarry Stone 500# - 1 Ton	9,500 cy	3,800.000	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	567,177
			Rip Rap		**3,935.714**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**680,020**
			Understone 2 Understone Layer 2		**4,030.714**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**693,183**
			02 - RW 12 Extend Runway 12 Extension		**########**							**21,046,711**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
3 - RW 30 Extend												
	Asphalt 4"		**Asphalt RSA Material**									
		02720.100	**Base**									
			Crushed Gravel	1,386 cy	44.241	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.65 /cy	20,309
			Base		**44.241**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**20,309**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	8,300 sy	36.889	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	4,817
			Asphalt Base Course 2"	8,300 sy	86.320	0.67 /sy	4.00 /sy	0.00 /sy	0.32 /sy	-	5.00 /sy	41,464
			Asphalt Top Course 2"	8,300 sy	86.320	0.67 /sy	4.50 /sy	0.00 /sy	0.32 /sy	-	5.50 /sy	45,614
			Asphalt Paving		**209.529**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**91,896**
			Asphalt 4" Asphalt RSA Material		**253.770**							**112,205**
	Asphalt 8"		**Asphalt Runway Material**									
		02720.100	**Base**									
			Crushed Gravel	1 cy	0.032	2.02 /cy	11.77 /cy	-	0.86 /cy	-	14.65 /cy	15
			Base		**0.032**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**15**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	1 sy	0.004	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	1
			Asphalt Base Course 4"	1 sy	0.013	0.84 /sy	8.00 /sy	0.00 /sy	0.40 /sy	-	9.24 /sy	9
			Asphalt Top Course 4"	1 sy	0.013	0.84 /sy	8.50 /sy	0.00 /sy	0.40 /sy	-	9.74 /sy	10
			Asphalt Paving		**0.030**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**20**
			Asphalt 8" Asphalt Runway Material		**0.062**							**34**
	Core Fill		**Core Material Fill**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	40,000 cuyd	400.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	55,422
			Earthwork		**400.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**55,422**
		02370.100	**Rip Rap**									
			Crushed Rock Production	40,000 cy	571.429	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	475,130
			Quarry Stone < 100#	40,000 cy	1,730.769	2.78 /cy	0.00 /cy	0.00 /cy	1.21 /cy	-	3.99 /cy	159,661
			Rip Rap		**2,302.198**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**634,791**
			Core Fill Core Material Fill		**2,702.198**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**690,213**
	Understone 1		**Understone Layer 1**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	10,000 cuyd	100.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	13,856
			Earthwork		**100.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**13,856**
		02370.100	**Rip Rap**									
			Crushed Rock Production	10,000 cy	142.857	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	118,782
			Armor Quarry Stone > 5 Ton	10,000 cy	16,000.000	114.87 /cy	0.00 /cy	0.00 /cy	123.94 /cy	-	238.81 /cy	2,388,114
			Rip Rap		**16,142.857**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**2,506,897**
			Understone 1 Understone Layer 1		**16,242.857**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**2,520,752**
	Understone 2		**Understone Layer 2**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	4,000 cuyd	40.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	5,542
			Earthwork		**40.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	[illegible]	**5,542**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		02370.100	Rip Rap									
			Crushed Rock Production	4,000 cy	57.143	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	47,513
			Quarry Stone 500# - 1 Ton	4,000 cy	1,600.000	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	238,811
			Rip Rap		1,657.143	/sf	/sf	/sf	/sf	/sf	/sf	286,324
			Understone 2 Understone Layer 2		1,697.143	/Cy	/Cy	/Cy	/C y	/Cy	/Cy	291,867
			03 - RW 30 Extend		########							3,615,071

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
07 - Runway Improve			**Runway Improvements**									
	Core 8 Ton											
		02330.000	Haul									
			Core-Loc Units Haul	3,000 ea	3,750.000	90.25 /ea		-	264.16 /ea	-	354.41 /ea	1,063,236
			Haul		3,750.000							1,063,236
		02370.100	Rip Rap									
			Core-Loc Units 8 Ton	3,000 ea	12,000.000	287.18 /ea	960.00 /ea	80.00 /ea	309.85 /ea	-	1,637.03 /ea	4,911,086
			Rip Rap		12,000.000	/sf	/sf	/sf	/sf	/sf	/sf	4,911,086
			Core 8 Ton		15,750.000							5,974,322
	Core Fill		Core Material Fill									
		02317.000	Earthwork									
			Articulated Off-road 25cy (1 - 3 Mile)	4,500 cuyd	45.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	6,235
			Earthwork		45.000	/cy	/cy	/cy	/cy	/cy	/cy	6,235
		02370.100	Rip Rap									
			Crushed Rock Production	4,500 cy	64.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	53,452
			Quarry Stone < 100#	4,500 cy	194.712	2.78 /cy	0.00 /cy	0.00 /cy	1.21 /cy	-	3.99 /cy	17,962
			Rip Rap		258.998	/sf	/sf	/sf	/sf	/sf	/sf	71,414
			Core Fill Core Material Fill		303.998	/Cy	/Cy	/Cy	/C y	/Cy	/Cy	77,649
	Rock Exc		Rock Excavation									
		02317.000	Earthwork									
			Exc Mass - Tough	125,000 cuyd	3,750.000	1.99 /cuyd		-	4.50 /cu yd	-	6.49 /cuyd	811,408
			Load Stkpile W/Ldr Med Hard	125,000 cuyd	3,472.500	1.79 /cuyd		-	1.32 /cu yd	-	3.11 /cuyd	388,536
			Articulated Off-road 25cy (3 - 5 Mile)	125,000 cuyd	2,604.167	1.16 /cuyd		-	1.79 /cu yd	-	2.96 /cuyd	369,799
			Earthwork		9,826.667	/cy	/cy	/cy	/cy	/cy	/cy	1,569,743
			Rock Exc Rock Excavation		9,826.667							1,569,743
	Understone 1		Understone Layer 1									
		02317.000	Earthwork									
			Articulated Off-road 25cy (1 - 3 Mile)	22,000 cuyd	220.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	30,482
			Earthwork		220.000	/cy	/cy	/cy	/cy	/cy	/cy	30,482
		02370.100	Rip Rap									
			Crushed Rock Production	22,000 cy	314.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	261,321
			Armor Quarry Stone > 5 Ton	22,000 cy	35,200.000	114.87 /cy	0.00 /cy	0.00 /cy	123.94 /cy	-	238.81 /cy	5,253,851
			Rip Rap		35,514.286	/sf	/sf	/sf	/sf	/sf	/sf	5,515,173
			Understone 1 Understone Layer 1		35,734.286	/Cy	/Cy	/Cy	/C y	/Cy	/Cy	5,545,655
	Understone 2		Understone Layer 2									
		02317.000	Earthwork									
			Articulated Off-road 25cy (1 - 3 Mile)	8,000 cuyd	80.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	11,084
			Earthwork		80.000	/cy	/cy	/cy	/cy	/cy	/cy	11,084
		02370.100	Rip Rap									
			Crushed Rock Production	8,000 cy	114.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	95,026

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		02370.100	Rip Rap									
			Quarry Stone 500# - 1 Ton	8,000 cy	3,200.000	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	477,623
			Rip Rap		**3,314.286**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**572,649**
			Understone 2 Understone Layer 2		**3,394.286**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**583,733**
			07 - Runway Improve Runway Improvements		**########**	**/Sy**	**/Sy**	**/S y**	**/S y**	**/S y**	**/Sy**	**13,751,102**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
09 - Misc Items												
	ATN		**Aids to Navigation**									
		02766.100	**Pavement Marking**									
			Runway Marking	1 ls				12,500.00 /ls	-	-	12,500.00 /ls	12,500
			Pavement Marking			/lf	/lf	/lf	/lf	/lf	/lf	**12,500**
		16001.250	**Misc Site Work**									
			Relocate Navigation Aids	1 ls		57,500.00 /ls	100,000.00 /ls	-	-	-	157,500.00 /ls	157,500
			Misc Site Work			/ls	/ls	/ls	/ls	/ls	/ls	**157,500**
			ATN Aids to Navigation									**170,000**
	Drainage											
		02630.200	**Storm Drainage**									
			Runway Storm Drainage Allowance	1 ls		57,500.00 /ls	50,000.00 /ls	0.00 /ls	15,000.00 /ls	-	122,500.00 /ls	122,500
			Storm Drainage			/lf	/lf	/lf	/lf	/lf	/lf	**122,500**
			Drainage									**122,500**
	OFA Grading		**OFA Grading**									
		02230.010	**Clear & Grub**									
			Rough Blade Hard	33,333 sy	388.889	0.78 /sy		-	0.31 /sy	-	1.09 /sy	36,386
			Clear & Grub		**388.889**	/ac	/ac	/ac	/ac	/ac	/ac	**36,386**
		02900.200	**Soil Preparation**									
			Machine Rake	300,000 sf		-	-	0.06 /sf	-	-	0.06 /sf	16,500
			Soil Preparation			/sf	/sf	/sf	/sf	/sf	/sf	**16,500**
		02920.100	**Lawns & Grasses**									
			Hydroseeding	300,000 sf		-	-	0.04 /sf	-	-	0.04 /sf	12,000
			Lawns & Grasses			/sf	/sf	/sf	/sf	/sf	/sf	**12,000**
			OFA Grading OFA Grading		**388.889**							**64,886**
	RSA Grading		**Runway Safety Area Grading**									
		02230.010	**Clear & Grub**									
			Finish Blade Tgh	65,833 sy	376.190	0.39 /sy	-	-	0.36 /sy	-	0.75 /sy	49,119
			Rough Blade Hard	65,833 sy	768.275	0.78 /sy		-	0.31 /sy	-	1.09 /sy	71,877
			Clear & Grub		**1,144.465**	/ac	/ac	/ac	/ac	/ac	/ac	**120,997**
		02900.200	**Soil Preparation**									
			Machine Rake	592,500 sf		-	-	0.06 /sf	-	-	0.06 /sf	32,588
			Hand Rake	592,500 sf		-	-	0.08 /sf	-	-	0.08 /sf	44,438
			Soil Preparation			/sf	/sf	/sf	/sf	/sf	/sf	**77,025**
		02920.100	**Lawns & Grasses**									
			Hydroseeding	592,500 sf		-	-	0.04 /sf	-	-	0.04 /sf	23,700
			Lawns & Grasses			/sf	/sf	/sf	/sf	/sf	/sf	**23,700**
			RSA Grading Runway Safety Area Grading		**1,144.465**							**221,722**
			09 - Misc Items		**1,533.354**							**579,108**

Estimate Totals

Description	Amount	Totals	Hours	Rate	(
Labor	14,688,342		193,263.608 hrs		
Material	10,128,102				
Subcontract	8,275,402				
Equipment	17,245,043		158,304.800 hrs		
Other	15,600				
	50,352,489	50,352,489			
Material Take-off Allowance	4.028.199			8.000 %	(
Labor Overtime	3.672.086			25.000 %	(
Bond	361.791				E
Overhead & Profit	7.552.873			15.000 %	(
Contingency	10.070.498			20.000 %	(
Market Conditions Allowance	4.028.199			8.000 %	(
Total		***80,066,135***			

Unalaska Airport Master Plan
Airport Runway Extension Alternate #3
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Alt #3
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
1 - Common			**COMMON**									
	ATN		**Aids to Navigation**									
		16529.498	**Runway Lighting**									
			Runway Navigation Equipment & Lights	1 ls				100,000.00 /ls	-	-	100,000.00 /ls	100,000
			Runway Lighting			/ls	/ls	/ls	/ls	/ls	/ls	**100,000**
			ATN Aids to Navigation									**100,000**
	Arch Pit Mob											
		01050.100	**Permits**									
			Site Permit	1 ls		-		20,000.00 /ls	-	-	20,000.00 /ls	20,000
			Permits			/ls	/ls	/ls	/ls	/ls	/ls	**20,000**
		01065.100	**Surveys**									
			Pit Survey & Layouts	1 ls		5,750.00 /ls		-	-	-	5,750.00 /ls	5,750
			Surveys			/ls	/ls	/ls	/ls	/ls	/ls	**5,750**
		01102.100	**Site Supervision**									
			Superintendent	78 wk	4,680.000	1,725.00 /wk	-	-		-	1,725.00 /wk	134,550
			Site Supervision		**4,680.000**	/wk	/wk	/wk	/wk	/wk	/wk	**134,550**
		01201.100	**Offices**									
			Office Trailer	18 mo		-	250.00 /mo	-		-	250.00 /mo	4,500
			Offices			/mo	/mo	/mo	/mo	/mo	/mo	**4,500**
		01203.100	**Utilities**									
			Temporary Toilets	18 mo		-	225.00 /mo	-	-	-	225.00 /mo	4,050
			Utilities			/mo	/mo	/mo	/mo	/mo	/mo	**4,050**
		01300.100	**Project Clean Up**									
			Final Cleaning	1 ls	100.000	6,774.08 /ls			19,765.00 /ls	-	26,539.08 /ls	26,539
			Project Clean Up		**100.000**	/ls	/ls	/ls	/ls	/ls	/ls	**26,539**
		01910.000	**Equipment**									
			Scale House	18 mo		-	140.00 /mo	-	500.00 /mo	-	640.00 /mo	11,520
			Equipment			/ls	/ls	/ls	/ls	/ls	/ls	**11,520**
		02230.010	**Clear & Grub**									
			Pile & Burn Lt Brush Hard	23 acre	323.923	998.06 /acre		-	923.08 /acre	-	1,921.14 /acre	44,104
			Clear & Grub		**323.923**	/sf	/sf	/sf	/sf	/sf	/sf	**44,104**
		02317.000	**Earthwork**									
			Overburden Removal	88,889 cy	444.444	0.34 /cy	-	-	0.99 /cy	-	1.33 /cy	117,951
			Drill & Shoot Quarry Rock	360,202 Cy		2.82 /Cy	2.04 /Cy		3.62 /Cy	-	8.48 /Cy	3,053,612
			Articulated Off-road 25cy (0 - 1 Mile)	88,889 cuyd	888.889	0.56 /cuyd		-	0.84 /cuyd	-	1.40 /cuyd	124,658
			Earthwork		**1,333.333**	/cy	/cy	/cy	/cy	/cy	/cy	**3,296,221**
			Arch Pit Mob		**6,437.256**							**3,547,234**
	Beach Rd M&R		**Airport Beach Road Maintenance & Repair**									
		01050.100	**Permits**									
			Road Use Permit	1 ls		-		30,000.00 /ls	-	-	30,000.00 /ls	30,000

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Permits			/ls	/ls	/ls	/ls	/ls	/ls	**30,000**
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 2"	74,667 sy	776.537	0.67 /sy	4.00 /sy		0.32 /sy	-	5.00 /sy	373,016
			Asphalt Top Course 2"	74,667 sy	776.537	0.67 /sy	4.50 /sy		0.32 /sy	-	5.50 /sy	410,349
			Asphalt Paving		**1,553.074**	/sy	/sy	/sy	/sy	/sy	/sy	**783,365**
		02740.130	**Paving Textiles**									
			Road Base Geo Textile	74,667 sy	186.667	0.14 /sy	2.20 /sy	-	-	-	2.34 /sy	174,499
			Paving Textiles		**186.667**	/sy	/sy	/sy	/sy	/sy	/sy	**174,499**
			Beach Rd M&R Airport Beach Road Maintenance & Repair		**1,739.741**							**987,863**
Const Survey			**Construction Surveying**									
		01065.100	**Surveys**									
			Airport Survey & Layouts	1 ls		115,000.00 /ls		-	-	-	115,000.00 /ls	115,000
			Surveys			/ls	/ls	/ls	/ls	/ls	/ls	**115,000**
			Const Survey Construction Surveying									**115,000**
Envir Protect			**Envioronment Protection**									
		02370.150	**Temp Erosion Control**									
			Silt Fence	4,000 lf	80.000	1.10 /lf	4.40 /lf	-	-	-	5.50 /lf	21,985
			Erosion Control Mats-Slopes	10,000 sf	100.000	0.55 /sf	2.20 /sf	-	-	-	2.75 /sf	27,481
			Reseed Site for Winter	200,000 sf	200.000	0.06 /sf	0.02 /sf	-	-	-	0.08 /sf	15,363
			Temp Erosion Control		**380.000**	/ls	/ls	/ls	/ls	/ls	/ls	**64,830**
		02370.200	**Temp Filter Dams**									
			Filter Fabric	0 cy		-	1.60 /cy	-	-	-	1.60 /cy	0
			Temp Filter Dams			/cy	/cy	/cy	/cy	/cy	/cy	**0**
			Envir Protect Envioronment Protection		**380.000**							**64,830**
Field Lab			**Field Labratory**									
		01201.100	**Offices**									
			Inspector's Trailer	12 mo		-	1,250.00 /mo	-		-	1,250.00 /mo	15,000
			Offices			/mo	/mo	/mo	/mo	/mo	/mo	**15,000**
		01202.100	**Supplies & Equip**									
			Copy Machine	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies & Equip			/mo	/mo	/mo	/mo	/mo	/mo	**9,600**
		01203.100	**Utilities**									
			Electric Power	12 mo		-	300.00 /mo	-	-	-	300.00 /mo	3,600
			Telephone Charges	12 mo		-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Temporary Toilets	12 mo		-	225.00 /mo	-	-	-	225.00 /mo	2,700
			Utilities			/mo	/mo	/mo	/mo	/mo	/mo	**12,300**
		01401.100	**Testing**									
			Misc Test & Inspection	1 ls		-	-	50,000.00 /ls	-	-	50,000.00 /ls	50,000
			Soil Testing	1 ls		-	-	25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Material Testing	1 ls			-	25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Testing			/ls	/ls	/ls	/ls	/ls	/ls	**100,000**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Field Lab Field Labratory									**136,900**
	Field Office		**Field Office**									
		01060.100	**Documents**									
			Prints & Records	1 ls		-		25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Documents			**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**25,000**
		01070.100	**Photos**									
			Project Photos	12 mo		287.50 /mo	250.00 /mo	-	-	-	537.50 /mo	6,450
			Photos			**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**6,450**
		01075.100	**Signs**									
			Project Signs 8x8	3 ea	15.000	315.50 /ea	750.00 /ea	-	-	-	1,065.50 /ea	3,197
			Signs		**15.000**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**3,197**
		01100.100	**Project Management**									
			Construction Manager	52 wk	3,120.000	2,875.00 /wk	-	-		300.00 /wk	3,175.00 /wk	165,100
			Project Manager	52 wk	3,120.000	3,450.00 /wk	-	-		-	3,450.00 /wk	179,400
			Project Management		**6,240.000**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**344,500**
		01102.100	**Site Supervision**									
			Superintendent	52 wk	3,120.000	2,875.00 /wk	-	-		-	2,875.00 /wk	149,500
			Site Supervision		**3,120.000**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**149,500**
		01110.100	**Travel**									
			Weekly Travel Subsistence (Room & Board)	1,820 wk		-		850.00 /wk	-	-	850.00 /wk	1,547,000
			Airline Fares (See Notes)	424 ea		-		715.00 /ea	-	-	715.00 /ea	303,160
			Motel & Hotel (Home Office Staff Only)	365 dy		-		175.00 /dy	-	-	175.00 /dy	63,875
			Travel			**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**1,914,035**
		01201.100	**Offices**									
			Office Trailer	12 mo		-	2,000.00 /mo	-		-	2,000.00 /mo	24,000
			Offices			**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**24,000**
		01202.100	**Supplies & Equip**									
			Copy Machine	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies & Equip			**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**9,600**
		01203.100	**Utilities**									
			Electric Power	12 mo		-	350.00 /mo	-	-	-	350.00 /mo	4,200
			Telephone Charges	12 mo		-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Temporary Toilets	12 mo		-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Utilities			**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**16,200**
		01310.100	**Tools & Equipment**									
			Fueling Equipment	52 wk	4,160.000	5,022.82 /wk		-	3,241.92 /wk	-	8,264.74 /wk	429,766
			Misc. Tools	1 ls		-	-	-	25,000.00 /ls	-	25,000.00 /ls	25,000
			Tools & Equipment		**4,160.000**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**454,766**
		01330.100	**Scheduling**									

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		01330.100	**Scheduling**									
			Scheduling Expense	1 ls		1,725.00 /ls		-	-	-	1,725.00 /ls	1,725
			Scheduling			/ls	/ls	/ls	/ls	/ls	/ls	**1,725**
			Field Office Field Office		**13,535.000**							**2,948,973**
	Mob Demob		**Mobilization/Demobilization**									
		01910.000	**Equipment**									
			Construction Equipment Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Asphalt Plant Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Quarry Site Equipment Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Misc Equipment & Supplies Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Construction Equipment De-Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Asphalt Plant De-Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Quarry Site Equipment De-Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Misc Equipment & Supplies De-Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Equipment			/ls	/ls	/ls	/ls	/ls	/ls	**2,630,000**
			Mob Demob Mobilization/Demobilization									**2,630,000**
	Safety & Flagging		**Safety & Traffic Control**									
		01204.100	**OSHA & Safety**									
			Safety Officer	52 wk	2,080.000	2,300.00 /wk	-	-	-	-	2,300.00 /wk	119,600
			Safety Equipment/Signage	1 ls		-	-	10,000.00 /ls	35,000.00 /ls	-	45,000.00 /ls	45,000
			OSHA & Safety		**2,080.000**	/wk	/wk	/wk	/wk	/wk	/wk	**164,600**
		01205.100	**Safety Protection**									
			Temporary Fences	1 ls		-	-	7.15 /ls	-	-	7.15 /ls	7
			Traffic Control	52 wk				5,000.00 /wk	-	-	5,000.00 /wk	260,000
			Safety Protection			/wk	/wk	/wk	/wk	/wk	/wk	**260,007**
			Safety & Flagging Safety & Traffic Control		**2,080.000**							**424,607**
			01 - Common COMMON		**########**							**10,955,407**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
2 - RW 12 Extend			**Runway 12 Extension**									
	Asphalt 4"		**Asphalt RSA Material**									
		02720.100	**Base**									
			Crushed Gravel	2,500 cy	79.800	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.65 /cy	36,633
			Base		**79.800**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**36,633**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	15,000 sy	66.667	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	8,705
			Asphalt Base Course 2"	15,000 sy	156.000	0.67 /sy	4.00 /sy	0.00 /sy	0.32 /sy	-	5.00 /sy	74,936
			Asphalt Top Course 2"	15,000 sy	156.000	0.67 /sy	4.50 /sy	0.00 /sy	0.32 /sy	-	5.50 /sy	82,436
			Asphalt Paving		**378.667**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**166,076**
			Asphalt 4" Asphalt RSA Material		**458.467**							**202,709**
	Asphalt 8"		**Asphalt Runway Material**									
		02720.100	**Base**									
			Crushed Gravel	0 cy	0.011	2.00 /cy	11.77 /cy	-	0.87 /cy	-	14.66 /cy	5
			Base		**0.011**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**5**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	1 sy	0.004	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	1
			Asphalt Base Course 4"	1 sy	0.013	0.84 /sy	8.00 /sy	0.00 /sy	0.40 /sy	-	9.24 /sy	9
			Asphalt Top Course 4.0"	1 sy	0.013	0.84 /sy	8.50 /sy	0.00 /sy	0.40 /sy	-	9.74 /sy	10
			Asphalt Paving		**0.030**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**20**
			Asphalt 8" Asphalt Runway Material		**0.041**							**24**
	Core 34 Ton		**Core-Loc 34 Ton Units**									
		02330.000	**Haul**									
			Core-Loc Units Haul	721 ea	3,605.000	361.02 /ea	0.00 /ea	-	1,122.67 /ea	-	1,483.69 /ea	1,069,739
			Haul		**3,605.000**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**1,069,739**
		02370.100	**Rip Rap**									
			Core-Loc Units 34 Ton	721 ea	5,768.000	574.36 /ea	4,137.93 /ea	340.00 /ea	619.70 /ea	-	5,671.99 /ea	4,089,503
			Rip Rap		**5,768.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**4,089,503**
			Core 34 Ton Core-Loc 34 Ton Units		**9,373.000**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**5,159,242**
	Core Fill		**Core Material Fill**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	94,100 cuyd	941.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	130,381
			Earthwork		**941.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**130,381**
		02370.100	**Rip Rap**									
			Crushed Rock Production	94,100 cy	1,344.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	1,117,743
			Quarry Stone < 100#	94,100 cy	4,071.635	2.78 /cy	0.00 /cy	0.00 /cy	1.21 /cy	-	3.99 /cy	375,603
			Rip Rap		**5,415.921**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,493,346**
			Core Fill Core Material Fill		**6,356.921**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**1,623,727**
	Elbow Fill											
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	5,556 cuyd	55.560	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	7,698
			Earthwork		**55.560**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**7,698**
		02370.100	**Rip Rap**									
			Crushed Rock Production	5,556 cy	79.371	0.92 /cy		6.50 /cy	4.46 /cy	-	11.88 /cy	65,996
			Quarry Stone < 100#	5,556 cy	240.404	2.78 /cy			1.21 /cy	-	3.99 /cy	22,177

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Rip Rap		**319.775**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**88,172**
			Elbow Fill		**375.335**							**95,871**
	Understone 1		**Understone Layer 1**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	15,500 cuyd	155.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	21,476
			Earthwork		**155.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**21,476**
		02370.100	**Rip Rap**									
			Crushed Rock Production	15,500 cy	221.429	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	184,113
			Armor Quarry Stone > 5 Ton	15,500 cy	24,800.000	114.87 /cy	0.00 /cy	0.00 /cy	123.94 /cy	-	238.81 /cy	3,701,577
			Rip Rap		**25,021.429**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**3,885,690**
			Understone 1 Understone Layer 1		**25,176.429**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**3,907,166**
	Understone 2		**Understone Layer 2**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	5,700 cuyd	57.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	7,898
			Earthwork		**57.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**7,898**
		02370.100	**Rip Rap**									
			Crushed Rock Production	5,700 cy	81.429	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	67,706
			Quarry Stone 500# - 1 Ton	5,700 cy	2,280.000	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	340,306
			Rip Rap		**2,361.429**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**408,012**
			Understone 2 Understone Layer 2		**2,418.429**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**415,910**
			02 - RW 12 Extend Runway 12 Extension		**########**							**11,404,649**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
3 - RW 30 Extend			**Runway 30 Extension**									
	Asphalt 4"		**Asphalt RSA Material**									
		02720.100	**Base**									
			Crushed Gravel	2,346 cy	74.884	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.65 /cy	34,376
			Base		**74.884**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**34,376**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	14,050 sy	62.444	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	8,153
			Asphalt Base Course 2"	14,050 sy	146.120	0.67 /sy	4.00 /sy	0.00 /sy	0.32 /sy	-	5.00 /sy	70,190
			Asphalt Top Course 2"	14,050 sy	146.120	0.67 /sy	4.50 /sy	0.00 /sy	0.32 /sy	-	5.50 /sy	77,215
			Asphalt Paving		**354.684**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**155,558**
			Asphalt 4" Asphalt RSA Material		**429.568**							**189,935**
	Asphalt 8"		**Asphalt Runway Material**									
		02720.100	**Base**									
			Crushed Gravel	0 cy	0.011	2.00 /cy	11.77 /cy	-	0.87 /cy	-	14.66 /cy	5
			Base		**0.011**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**5**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	1 sy	0.004	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	1
			Asphalt Base Course 4"	1 sy	0.013	0.84 /sy	8.00 /sy	0.00 /sy	0.40 /sy	-	9.24 /sy	9
			Asphalt Top Course 4"	1 sy	0.013	0.84 /sy	8.50 /sy	0.00 /sy	0.40 /sy	-	9.74 /sy	10
			Asphalt Paving		**0.030**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**20**
			Asphalt 8" Asphalt Runway Material		**0.041**							**24**
	Core Fill		**Core Material Fill**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	120,000 cuyd	1,200.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	166,267
			Earthwork		**1,200.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**166,267**
		02370.100	**Rip Rap**									
			Crushed Rock Production	120,000 cy	1,714.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	1,425,389
			Quarry Stone < 100#	120,000 cy	5,192.308	2.78 /cy	0.00 /cy	0.00 /cy	1.21 /cy	-	3.99 /cy	478,984
			Rip Rap		**6,906.594**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,904,373**
			Core Fill Core Material Fill		**8,106.594**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**2,070,640**
	Understone 1		**Understone Layer 1**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	20,000 cuyd	200.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	27,711
			Earthwork		**200.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**27,711**
		02370.100	**Rip Rap**									
			Crushed Rock Production	20,000 cy	285.714	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	237,565
			Armor Quarry Stone > 5 Ton	20,000 cy	32,000.000	114.87 /cy	0.00 /cy	0.00 /cy	123.94 /cy	-	238.81 /cy	4,776,229
			Rip Rap		**32,285.714**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**5,013,793**
			Understone 1 Understone Layer 1		**32,485.714**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**5,041,505**
	Understone 2		**Understone Layer 2**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	80,000 cuyd	800.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	110,844
			Earthwork		**800.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**110,844**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		02370.100	**Rip Rap**									
			Crushed Rock Production	80,000 cy	1,142.857	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	950,259
			Quarry Stone 500# - 1 Ton	80,000 cy	32,000.000	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	4,776,229
			Rip Rap		**33,142.857**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**5,726,488**
			Understone 2 Understone Layer 2		**33,942.857**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**5,837,332**
			03 - RW 30 Extend Runway 30 Extension		**########**							**13,139,436**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
07 - Runway Improve			**Runway Improvements**									
	Core 8 Ton		**Core Loc Units 8 Ton**									
		02330.000	**Haul**									
			Core-Loc Units Haul	3,000 ea	3,750.000	90.25 /ea		-	264.16 /ea	-	354.41 /ea	1,063,236
			Haul		**3,750.000**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**1,063,236**
		02370.100	**Rip Rap**									
			Core-Loc Units 8 Ton	3,000 ea	12,000.000	287.18 /ea	960.00 /ea	80.00 /ea	309.85 /ea	-	1,637.03 /ea	4,911,086
			Rip Rap		**12,000.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**4,911,086**
			Core 8 Ton Core Loc Units 8 Ton		**15,750.000**							**5,974,322**
	Core Fill		**Core Material Fill**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	4,500 cuyd	45.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	6,235
			Earthwork		**45.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**6,235**
		02370.100	**Rip Rap**									
			Crushed Rock Production	4,500 cy	64.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	53,452
			Quarry Stone < 100#	4,500 cy	194.712	2.78 /cy	0.00 /cy	0.00 /cy	1.21 /cy	-	3.99 /cy	17,962
			Rip Rap		**258.998**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**71,414**
			Core Fill Core Material Fill		**303.998**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**77,649**
	Rock Exc		**Rock Excavation**									
		02317.000	**Earthwork**									
			Exc Mass - Tough	125,000 cuyd	3,750.000	1.99 /cuyd		-	4.50 /cu yd	-	6.49 /cuyd	811,408
			Load Stkpile W/Ldr Med Hard	125,000 cuyd	3,472.500	1.79 /cuyd		-	1.32 /cu yd	-	3.11 /cuyd	388,536
			Articulated Off-road 25cy (3 - 5 Mile)	125,000 cuyd	2,604.167	1.16 /cuyd		-	1.79 /cu yd	-	2.96 /cuyd	369,799
			Earthwork		**9,826.667**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,569,743**
			Rock Exc Rock Excavation		**9,826.667**							**1,569,743**
	Understone 1		**Understone Layer 1**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	22,000 cuyd	220.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	30,482
			Earthwork		**220.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**30,482**
		02370.100	**Rip Rap**									
			Crushed Rock Production	22,000 cy	314.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	261,321
			Armor Quarry Stone > 5 Ton	22,000 cy	35,200.000	114.87 /cy	0.00 /cy	0.00 /cy	123.94 /cy	-	238.81 /cy	5,253,851
			Rip Rap		**35,514.286**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**5,515,173**
			Understone 1 Understone Layer 1		**35,734.286**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**5,545,655**
	Understone 2		**Understone Layer 2**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	8,000 cuyd	80.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	11,084
			Earthwork		**80.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**11,084**
		02370.100	**Rip Rap**									
			Crushed Rock Production	8,000 cy	114.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	95,026

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		02370.100	Rip Rap									
			Quarry Stone 500# - 1 Ton	8,000 cy	3,200.000	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	477,623
			Rip Rap		**3,314.286**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**572,649**
			Understone 2 Understone Layer 2		**3,394.286**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**583,733**
			07 - Runway Improve Runway Improvements		**########**	**/Sy**	**/Sy**	**/S y**	**/S y**	**/S y**	**/Sy**	**13,751,102**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
9 - Misc ems			**Miscellaneous Items**									
	ATN		**Aids to Navigation**									
		02766.100	**Pavement Marking**									
			Runway Marking	1 ls				12,500.00 /ls	-	-	12,500.00 /ls	12,500
			Pavement Marking			**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**12,500**
		16001.250	**Misc Site Work**									
			Relocate Navigation Aids	1 ls		57,500.00 /ls	100,000.00 /ls	-	-	-	157,500.00 /ls	157,500
			Misc Site Work			**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**157,500**
			ATN Aids to Navigation									**170,000**
	Drainage											
		02630.200	**Storm Drainage**									
			Runway Storm Drainage Allowance	1 ls		57,500.00 /ls	50,000.00 /ls	0.00 /ls	15,000.00 /ls	-	122,500.00 /ls	122,500
			Storm Drainage			**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**122,500**
			Drainage									**122,500**
	OFA Grading		**OFA Grading**									
		02230.010	**Clear & Grub**									
			Rough Blade Hard	33,333 sy	388.889	0.78 /sy		-	0.31 /sy	-	1.09 /sy	36,386
			Clear & Grub		**388.889**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**36,386**
		02900.200	**Soil Preparation**									
			Machine Rake	300,000 sf		-	-	0.06 /sf	-	-	0.06 /sf	16,500
			Soil Preparation			**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**16,500**
		02920.100	**Lawns & Grasses**									
			Hydroseeding	300,000 sf		-	-	0.04 /sf	-	-	0.04 /sf	12,000
			Lawns & Grasses			**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**12,000**
			OFA Grading OFA Grading		**388.889**							**64,886**
	RSA Grading		**Runway Safety Area Grading**									
		02230.010	**Clear & Grub**									
			Finish Blade Tgh	65,833 sy	376.190	0.39 /sy	-	-	0.36 /sy	-	0.75 /sy	49,119
			Rough Blade Hard	65,833 sy	768.275	0.78 /sy		-	0.31 /sy	-	1.09 /sy	71,877
			Clear & Grub		**1,144.465**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**120,997**
		02900.200	**Soil Preparation**									
			Machine Rake	592,500 sf		-	-	0.06 /sf	-	-	0.06 /sf	32,588
			Hand Rake	592,500 sf		-	-	0.08 /sf	-	-	0.08 /sf	44,438
			Soil Preparation			**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**77,025**
		02920.100	**Lawns & Grasses**									
			Hydroseeding	592,500 sf		-	-	0.04 /sf	-	-	0.04 /sf	23,700
			Lawns & Grasses			**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**23,700**
			RSA Grading Runway Safety Area Grading		**1,144.465**							**221,722**
			09 - Misc Items Miscellaneous Items		**1,533.354**							**579,108**

Estimate Totals

Description	Amount	Totals	Hours	Rate	(t I
Labor	15,781,818		209,837.985 hrs		
Material	7,998,220				
Subcontract	7,925,721				
Equipment	18,108,344		152,464.276 hrs		
Other	15,600				
	49,829,703	49,829,703			
Material Take-off Allowance	3.986.376			8.000 %	(
Labor Overtime	3.945.454			25.000 %	(
Bond	359.510				E
Overhead & Profit	7.474.455			15.000 %	(
Contingency	9.965.940			20.000 %	(
Market Conditions Allowance	3.986.376			8.000 %	(
Total		***79,547,814***			

Unalaska A[illegible]t Master Plan
Airport Runway Extension Alternate #4
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Alt #4
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
01 - Common			**COMMON**									
	ATN		**Aids to Navigation**									
		16529.498	**Runway Lighting**									
			Runway Navigation Equipment & Lights	1 ls				100,000.00 /ls	-	-	100,000.00 /ls	100,000
			Runway Lighting			/ea	/ea	/ea	/ea	/ea	/ea	**100,000**
			ATN Aids to Navigation									**100,000**
	Arch Pit Mob											
		01050.100	**Permits**									
			Site Permit	1 ls		-		20,000.00 /ls	-	-	20,000.00 /ls	20,000
			Permits			/ls	/ls	/ls	/ls	/ls	/ls	**20,000**
		01065.100	**Surveys**									
			Pit Survey & Layouts	1 ls		5,750.00 /ls		-	-	-	5,750.00 /ls	5,750
			Surveys			/ls	/ls	/ls	/ls	/ls	/ls	**5,750**
		01102.100	**Site Supervision**									
			Superintendent	78 wk	4,680.000	1,725.00 /wk	-	-		-	1,725.00 /wk	134,550
			Site Supervision		**4,680.000**	/wk	/wk	/wk	/wk	/wk	/wk	**134,550**
		01201.100	**Offices**									
			Office Trailer	18 mo		-	250.00 /mo	-		-	250.00 /mo	4,500
			Offices			/mo	/mo	/mo	/mo	/mo	/mo	**4,500**
		01203.100	**Utilities**									
			Temporary Toilets	18 mo		-	225.00 /mo	-	-	-	225.00 /mo	4,050
			Utilities			/mo	/mo	/mo	/mo	/mo	/mo	**4,050**
		01300.100	**Project Clean Up**									
			Final Cleaning	1 ls	100.000	6,774.08 /ls			19,765.00 /ls	-	26,539.08 /ls	26,539
			Project Clean Up		**100.000**	/ls	/ls	/ls	/ls	/ls	/ls	**26,539**
		01910.000	**Equipment**									
			Scale House	18 mo		-	140.00 /mo	-	500.00 /mo	-	640.00 /mo	11,520
			Equipment			/ls	/ls	/ls	/ls	/ls	/ls	**11,520**
		02230.010	**Clear & Grub**									
			Pile & Burn Lt Brush Hard	23 acre	323.923	998.06 /acre		-	923.08 /acre	-	1,921.14 /acre	44,104
			Clear & Grub		**323.923**	/ac	/ac	/ac	/ac	/ac	/ac	**44,104**
		02317.000	**Earthwork**									
			Overburden Removal	88,889 cy	444.444	0.34 /cy	-	-	0.99 /cy	-	1.33 /cy	117,951
			Drill & Shoot Quarry Rock	288,342 Cy		2.82 /Cy	2.04 /Cy		3.62 /Cy	-	8.48 /Cy	2,444,419
			Articulated Off-road 25cy (0 - 1 Mile)	88,889 cuyd	888.889	0.56 /cuyd		-	0.84 /cuyd	-	1.40 /cuyd	124,658
			Earthwork		**1,333.333**	/cy	/cy	/cy	/cy	/cy	/cy	**2,687,028**
			Arch Pit Mob		**6,437.256**							**2,938,041**
	Beach R M&R		**Airport Beach Road Maintenance & Repair**									
		01050.100	**Permits**									
			Road Use Permit	1 ls		-		30,000.00 /ls	-	-	30,000.00 /ls	30,000

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Permits			/ls	/ls	/ls	/ls	/ls	/ls	**30,000**
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 2"	74,667 sy	776.537	0.67 /sy	4.00 /sy		0.32 /sy	-	5.00 /sy	373,016
			Asphalt Top Course 2"	74,667 sy	776.537	0.67 /sy	4.50 /sy		0.32 /sy	-	5.50 /sy	410,349
			Asphalt Paving		**1,553.074**	/sy	/sy	/sy	/sy	/sy	/sy	**783,365**
		02740.130	**Paving Textiles**									
			Road Base Geo Textile	74,667 sy	186.667	0.14 /sy	2.20 /sy	-	-	-	2.34 /sy	174,499
			Paving Textiles		**186.667**	/sy	/sy	/sy	/sy	/sy	/sy	**174,499**
			Beach Rd M&R Airport Beach Road Maintenance & Repair		**1,739.741**							**987,863**
	Const Survey		**Construction Surveying**									
		01065.100	**Surveys**									
			Airport Survey & Layouts	1 ls		115,000.00 /ls		-	-	-	115,000.00 /ls	115,000
			Surveys			/ls	/ls	/ls	/ls	/ls	/ls	**115,000**
			Const Survey Construction Surveying									**115,000**
	Envir Protect		**Envioronment Protection**									
		02370.150	**Temp Erosion Control**									
			Silt Fence	4,000 lf	80.000	1.10 /lf	4.40 /lf	-	-	-	5.50 /lf	21,985
			Erosion Control Mats-Slopes	10,000 sf	100.000	0.55 /sf	2.20 /sf	-	-	-	2.75 /sf	27,481
			Reseed Site for Winter	200,000 sf	200.000	0.06 /sf	0.02 /sf	-	-	-	0.08 /sf	15,363
			Temp Erosion Control		**380.000**	/ls	/ls	/ls	/ls	/ls	/ls	**64,830**
		02370.200	**Temp Filter Dams**									
			Filter Fabric	0 cy		-	1.60 /cy	-	-	-	1.60 /cy	0
			Temp Filter Dams			/cy	/cy	/cy	/cy	/cy	/cy	**0**
			Envir Protect Envioronment Protection		**380.000**							**64,830**
	Field Lab		**Field Labratory**									
		01201.100	**Offices**									
			Inspector's Trailer	12 mo		-	1,250.00 /mo	-		-	1,250.00 /mo	15,000
			Offices			/mo	/mo	/mo	/mo	/mo	/mo	**15,000**
		01202.100	**Supplies & Equip**									
			Copy Machine	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies & Equip			/mo	/mo	/mo	/mo	/mo	/mo	**9,600**
		01203.100	**Utilities**									
			Electric Power	12 mo		-	300.00 /mo	-	-	-	300.00 /mo	3,600
			Telephone Charges	12 mo		-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Temporary Toilets	12 mo		-	225.00 /mo	-	-	-	225.00 /mo	2,700
			Utilities			/mo	/mo	/mo	/mo	/mo	/mo	**12,300**
		01401.100	**Testing**									
			Misc Test & Inspection	1 ls		-	-	50,000.00 /ls	-	-	50,000.00 /ls	50,000
			Soil Testing	1 ls		-	-	25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Material Testing	1 ls		-	-	25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Testing			/ls	/ls	/ls	/ls	/ls	/ls	**100,000**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Field Lab Field Labratory									**136,900**
	Field Office		**Field Office**									
		01060.100	**Documents**									
			Prints & Records	1 ls		-		25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Documents			**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**25,000**
		01070.100	**Photos**									
			Project Photos	12 mo		287.50 /mo	250.00 /mo	-	-	-	537.50 /mo	6,450
			Photos			**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**6,450**
		01075.100	**Signs**									
			Project Signs 8x8	3 ea	15.000	315.50 /ea	750.00 /ea	-	-	-	1,065.50 /ea	3,197
			Signs		**15.000**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**3,197**
		01100.100	**Project Management**									
			Construction Manager	52 wk	3,120.000	2,875.00 /wk	-	-		300.00 /wk	3,175.00 /wk	165,100
			Project Manager	52 wk	3,120.000	3,450.00 /wk	-	-		-	3,450.00 /wk	179,400
			Project Management		**6,240.000**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**344,500**
		01102.100	**Site Supervision**									
			Superintendent	52 wk	3,120.000	2,875.00 /wk	-	-		-	2,875.00 /wk	149,500
			Site Supervision		**3,120.000**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**149,500**
		01110.100	**Travel**									
			Weekly Travel Subsistence (Room & Board)	1,820 wk		-		850.00 /wk	-	-	850.00 /wk	1,547,000
			Airline Fares (See Notes)	424 ea		-		715.00 /ea	-	-	715.00 /ea	303,160
			Motel & Hotel (Home Office Staff Only)	365 dy		-		175.00 /dy	-	-	175.00 /dy	63,875
			Travel			**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**1,914,035**
		01201.100	**Offices**									
			Office Trailer	12 mo		-	2,000.00 /mo	-		-	2,000.00 /mo	24,000
			Offices			**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**24,000**
		01202.100	**Supplies & Equip**									
			Copy Machine	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies	12 mo		-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies & Equip			**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**9,600**
		01203.100	**Utilities**									
			Electric Power	12 mo		-	350.00 /mo	-	-	-	350.00 /mo	4,200
			Telephone Charges	12 mo		-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Temporary Toilets	12 mo		-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Utilities			**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**16,200**
		01310.100	**Tools & Equipment**									
			Fueling Equipment	52 wk	4,160.000	5,022.82 /wk		-	3,241.92 /wk	-	8,264.74 /wk	429,766
			Misc. Tools	1 ls		-	-	-	25,000.00 /ls	-	25,000.00 /ls	25,000
			Tools & Equipment		**4,160.000**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**454,766**
		01330.100	**Scheduling**									

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		01330.100	**Scheduling**									
			Scheduling Expense	1 ls		1,725.00 /ls		-	-	-	1,725.00 /ls	1,725
			Scheduling			/ls	/ls	/ls	/ls	/ls	/ls	**1,725**
			Field Office Field Office		**13,535.000**							**2,948,973**
	Mob Demob		**Mobilization/Demobilization**									
		01910.000	**Equipment**									
			Construction Equipment Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Asphalt Plant Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Quarry Site Equipment Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Misc Equipment & Supplies Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Construction Equipment De-Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Asphalt Plant De-Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Quarry Site Equipment De-Mobilization	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Misc Equipment & Supplies De-Mobilizations	1 LS		28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Equipment			/ls	/ls	/ls	/ls	/ls	/ls	**2,630,000**
			Mob Demob Mobilization/Demobilization									**2,630,000**
	Safety & Flagging		**Safety & Traffic Control**									
		01204.100	**OSHA & Safety**									
			Safety Officer	52 wk	2,080.000	2,300.00 /wk	-	-	-	-	2,300.00 /wk	119,600
			Safety Equipment/Signage	1 ls		-	-	10,000.00 /ls	35,000.00 /ls	-	45,000.00 /ls	45,000
			OSHA & Safety		**2,080.000**	/wk	/wk	/wk	/wk	/wk	/wk	**164,600**
		01205.100	**Safety Protection**									
			Temporary Fences	1 ls		-	-	7.15 /ls	-	-	7.15 /ls	7
			Traffic Control	52 wk				5,000.00 /wk	-	-	5,000.00 /wk	260,000
			Safety Protection			/wk	/wk	/wk	/wk	/wk	/wk	**260,007**
			Safety & Flagging Safety & Traffic Control		**2,080.000**							**424,607**
			01 - Common COMMON		**########**							**10,346,214**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
2 - RW 12 Extend			**Runway 12 Extension**									
	Asphalt 4"		**Asphalt RSA Material**									
		02720.100	**Base**									
			Crushed Gravel	1,862 cy	59.435	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.65 /cy	27,284
			Base		**59.435**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**27,284**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	11,150 sy	49.556	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	6,471
			Asphalt Base Course 2"	11,150 sy	115.960	0.67 /sy	4.00 /sy	0.00 /sy	0.32 /sy	-	5.00 /sy	55,702
			Asphalt Top Course 2"	11,150 sy	115.960	0.67 /sy	4.50 /sy	0.00 /sy	0.32 /sy	-	5.50 /sy	61,277
			Asphalt Paving		**281.476**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**123,450**
			Asphalt 4" Asphalt RSA Material		**340.911**							**150,734**
	Asphalt 8"		**Asphalt Runway Material**									
		02720.100	**Base**									
			Crushed Gravel	0 cy	0.011	2.00 /cy	11.77 /cy	-	0.87 /cy	-	14.66 /cy	5
			Base		**0.011**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**5**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	1 sy	0.004	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	1
			Asphalt Base Course 4"	1 sy	0.013	0.84 /sy	8.00 /sy	0.00 /sy	0.40 /sy	-	9.24 /sy	9
			Asphalt Top Course 4.0"	1 sy	0.013	0.84 /sy	8.50 /sy	0.00 /sy	0.40 /sy	-	9.74 /sy	10
			Asphalt Paving		**0.030**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**20**
			Asphalt 8" Asphalt Runway Material		**0.041**							**24**
	Core 34 Ton		**Core-Loc 34 Ton Units**									
		02330.000	**Haul**									
			Core-Loc Units Haul	300 ea	1,500.000	361.02 /ea	0.00 /ea	-	1,122.67 /ea	-	1,483.69 /ea	445,106
			Haul		**1,500.000**							**445,106**
		02370.100	**Rip Rap**									
			Core-Loc Units 34 Ton	300 ea	2,400.000	574.36 /ea	4,137.93 /ea	340.00 /ea	619.70 /ea	-	5,671.99 /ea	1,701,596
			Rip Rap		**2,400.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**1,701,596**
			Core 34 Ton Core-Loc 34 Ton Units		**3,900.000**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**2,146,703**
	Core Fill		**Core Material Fill**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	1,500 cuyd	15.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	2,078
			Earthwork		**15.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**2,078**
		02370.100	**Rip Rap**									
			Crushed Rock Production	1,500 cy	21.429	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	17,817
			Quarry Stone < 100#	1,500 cy	64.904	2.78 /cy	0.00 /cy	0.00 /cy	1.21 /cy	-	3.99 /cy	5,987
			Rip Rap		**86.333**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**23,805**
			Core Fill Core Material Fill		**101.333**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**25,883**
	Elbow Fill											
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	3,700 cuyd	37.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	5,127
			Earthwork		**37.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**5,127**
		02370.100	**Rip Rap**									
			Crushed Rock Production	3,700 cy	52.857	[illegible] /cy		6.50 /cy	4.46 /cy	-	11.88 /[illegible]	43,949
			Quarry Stone < 100#	3,700 cy	160.096	2.78 /cy			1.21 /cy	-	3.99 /cy	14,769

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Rip Rap		**212.953**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**58,718**
			Elbow Fill		**249.953**							**63,845**
	Understone 1		**Understone Layer 1**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	6,500 cuyd	65.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	9,006
			Earthwork		**65.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**9,006**
		02370.100	**Rip Rap**									
			Crushed Rock Production	6,500 cy	92.857	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	77,209
			Armor Quarry Stone > 5 Ton	6,500 cy	10,400.000	114.87 /cy	0.00 /cy	0.00 /cy	123.94 /cy	-	238.81 /cy	1,552,274
			Rip Rap		**10,492.857**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**1,629,483**
			Understone 1 Understone Layer 1		**10,557.857**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**1,638,489**
	Understone 2		**Understone Layer 2**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	2,500 cuyd	25.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	3,464
			Earthwork		**25.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**3,464**
		02370.100	**Rip Rap**									
			Crushed Rock Production	2,500 cy	35.714	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	29,696
			Quarry Stone 500# - 1 Ton	2,500 cy	1,000.000	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	149,257
			Rip Rap		**1,035.714**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**178,953**
			Understone 2 Understone Layer 2		**1,060.714**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**182,417**
			02 - RW 12 Extend Runway 12 Extension		**########**							**4,208,095**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
3 - RW 30 xtend												
	Asphalt 4"		**Asphalt RSA Material**									
		02720.100	**Base**									
			Crushed Gravel	2,547 cy	81.300	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.65 /cy	37,322
			Base		**81.300**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**37,322**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	15,250 sy	67.778	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	8,850
			Asphalt Base Course 2"	15,250 sy	158.600	0.67 /sy	4.00 /sy	0.00 /sy	0.32 /sy	-	5.00 /sy	76,185
			Asphalt Top Course 2"	15,250 sy	158.600	0.67 /sy	4.50 /sy	0.00 /sy	0.32 /sy	-	5.50 /sy	83,810
			Asphalt Paving		**384.978**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**168,844**
			Asphalt 4" Asphalt RSA Material		**466.278**							**206,166**
	Asphalt 8"		**Asphalt Runway Material**									
		02720.100	**Base**									
			Crushed Gravel	233 cy	7.437	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.66 /cy	3,415
			Base		**7.437**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**3,415**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	700 sy	3.111	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	406
			Asphalt Base Course 4"	700 sy	9.100	0.84 /sy	8.00 /sy	0.00 /sy	0.40 /sy	-	9.25 /sy	6,471
			Asphalt Top Course 4"	700 sy	9.100	0.84 /sy	8.50 /sy	0.00 /sy	0.40 /sy	-	9.75 /sy	6,821
			Asphalt Paving		**21.311**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**13,699**
			Asphalt 8" Asphalt Runway Material		**28.748**							**17,114**
	Core Fill		**Core Material Fill**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	120,000 cuyd	1,200.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	166,267
			Earthwork		**1,200.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**166,267**
		02370.100	**Rip Rap**									
			Crushed Rock Production	120,000 cy	1,714.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	1,425,389
			Quarry Stone < 100#	120,000 cy	5,192.308	2.78 /cy	0.00 /cy	0.00 /cy	1.21 /cy	-	3.99 /cy	478,984
			Rip Rap		**6,906.594**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**1,904,373**
			Core Fill Core Material Fill		**8,106.594**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**2,070,640**
	Understone 1		**Understone Layer 1**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	25,000 cuyd	250.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	34,639
			Earthwork		**250.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**34,639**
		02370.100	**Rip Rap**									
			Crushed Rock Production	25,000 cy	357.143	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	296,956
			Armor Quarry Stone > 5 Ton	25,000 cy	40,000.000	114.87 /cy	0.00 /cy	0.00 /cy	123.94 /cy	-	238.81 /cy	5,970,286
			Rip Rap		**40,357.143**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**6,267,242**
			Understone 1 Understone Layer 1		**40,607.143**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**6,301,881**
	Understone 2		**Understone Layer 2**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	90,000 cuyd	900.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	124,700
			Earthwork		**900.000**	**cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/**	**124,700**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		02370.100	Rip Rap									
			Crushed Rock Production	90,000 cy	1,285.714	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	1,069,042
			Quarry Stone 500# - 1 Ton	90,000 cy	36,000.000	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	5,373,257
			Rip Rap		**37,285.714**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**6,442,299**
			Understone 2 Understone Layer 2		**38,185.714**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**6,566,999**
			03 - RW 30 Extend		**########**							**15,162,799**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
7 - Runway mprove			**Runway Improvements**									
	Core 8 Ton											
		02330.000	**Haul**									
			Core-Loc Units Haul	3,000 ea	3,750.000	90.25 /ea		-	264.16 /ea	-	354.41 /ea	1,063,236
			Haul		**3,750.000**							**1,063,236**
		02370.100	**Rip Rap**									
			Core-Loc Units 8 Ton	3,000 ea	12,000.000	287.18 /ea	960.00 /ea	80.00 /ea	309.85 /ea	-	1,637.03 /ea	4,911,086
			Rip Rap		**12,000.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**4,911,086**
			Core 8 Ton		**15,750.000**							**5,974,322**
	Core Fill		**Core Material Fill**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	4,500 cuyd	45.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	6,235
			Earthwork		**45.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**6,235**
		02370.100	**Rip Rap**									
			Crushed Rock Production	4,500 cy	64.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	53,452
			Quarry Stone < 100#	4,500 cy	194.712	2.78 /cy	0.00 /cy	0.00 /cy	1.21 /cy	-	3.99 /cy	17,962
			Rip Rap		**258.998**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**71,414**
			Core Fill Core Material Fill		**303.998**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**77,649**
	Rock Exc		**Rock Excavation**									
		02317.000	**Earthwork**									
			Exc Mass - Tough	125,000 cuyd	3,750.000	1.99 /cuyd		-	4.50 /cu yd	-	6.49 /cuyd	811,408
			Load Stkpile W/Ldr Med Hard	125,000 cuyd	3,472.500	1.79 /cuyd		-	1.32 /cu yd	-	3.11 /cuyd	388,536
			Articulated Off-road 25cy (3 - 5 Mile)	125,000 cuyd	2,604.167	1.16 /cuyd		-	1.79 /cu yd	-	2.96 /cuyd	369,799
			Earthwork		**9,826.667**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,569,743**
			Rock Exc Rock Excavation		**9,826.667**							**1,569,743**
	Understone 1		**Understone Layer 1**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	22,000 cuyd	220.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	30,482
			Earthwork		**220.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**30,482**
		02370.100	**Rip Rap**									
			Crushed Rock Production	22,000 cy	314.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	261,321
			Armor Quarry Stone > 5 Ton	22,000 cy	35,200.000	114.87 /cy	0.00 /cy	0.00 /cy	123.94 /cy	-	238.81 /cy	5,253,851
			Rip Rap		**35,514.286**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**5,515,173**
			Understone 1 Understone Layer 1		**35,734.286**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**5,545,655**
	Understone 2		**Understone Layer 2**									
		02317.000	**Earthwork**									
			Articulated Off-road 25cy (1 - 3 Mile)	8,000 cuyd	80.000	0.56 /cuyd		-	0.83 /cu yd	-	1.39 /cuyd	11,084
			Earthwork		**80.000**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**11,084**
		02370.100	**Rip Rap**									
			Crushed Rock Production	8,000 cy	114.286	0.92 /cy	0.00 /cy	6.50 /cy	4.46 /cy	-	11.88 /cy	95,026

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		02370.100	Rip Rap									
			Quarry Stone 500# - 1 Ton	8,000 cy	3,200.000	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	477,623
			Rip Rap		**3,314.286**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**572,649**
			Understone 2 Understone Layer 2		**3,394.286**	**/Cy**	**/Cy**	**/Cy**	**/C y**	**/Cy**	**/Cy**	**583,733**
			07 - Runway Improve Runway Improvements		**########**	**/Sy**	**/Sy**	**/S y**	**/S y**	**/S y**	**/Sy**	**13,751,102**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
09 - Misc Items												
	ATN		Aids to Navigation									
		02766.100	Pavement Marking									
			Runway Marking	1 ls				12,500.00 /ls	-	-	12,500.00 /ls	12,500
			Pavement Marking			/lf	/lf	/lf	/lf	/lf	/lf	12,500
		16001.250	Misc Site Work									
			Relocate Navigation Aids	1 ls		57,500.00 /ls	100,000.00 /ls	-	-	-	157,500.00 /ls	157,500
			Misc Site Work			/ls	/ls	/ls	/ls	/ls	/ls	157,500
			ATN Aids to Navigation									170,000
	Drainage											
		02630.200	Storm Drainage									
			Runway Storm Drainage Allowance	1 ls		57,500.00 /ls	50,000.00 /ls	0.00 /ls	15,000.00 /ls	-	122,500.00 /ls	122,500
			Storm Drainage			/lf	/lf	/lf	/lf	/lf	/lf	122,500
			Drainage									122,500
	OFA Grading		OFA Grading									
		02230.010	Clear & Grub									
			Rough Blade Hard	33,333 sy	388.889	0.78 /sy		-	0.31 /sy	-	1.09 /sy	36,386
			Clear & Grub		388.889	/ac	/ac	/ac	/ac	/ac	/ac	36,386
		02900.200	Soil Preparation									
			Machine Rake	300,000 sf		-	-	0.06 /sf	-	-	0.06 /sf	16,500
			Soil Preparation			/sf	/sf	/sf	/sf	/sf	/sf	16,500
		02920.100	Lawns & Grasses									
			Hydroseeding	300,000 sf		-	-	0.04 /sf	-	-	0.04 /sf	12,000
			Lawns & Grasses			/sf	/sf	/sf	/sf	/sf	/sf	12,000
			OFA Grading OFA Grading		388.889							64,886
	RSA Grading		Runway Safety Area Grading									
		02230.010	Clear & Grub									
			Finish Blade Tgh	65,833 sy	376.190	0.39 /sy	-	-	0.36 /sy	-	0.75 /sy	49,119
			Rough Blade Hard	65,833 sy	768.275	0.78 /sy		-	0.31 /sy	-	1.09 /sy	71,877
			Clear & Grub		1,144.465	/ac	/ac	/ac	/ac	/ac	/ac	120,997
		02900.200	Soil Preparation									
			Machine Rake	592,500 sf		-	-	0.06 /sf	-	-	0.06 /sf	32,588
			Hand Rake	592,500 sf		-	-	0.08 /sf	-	-	0.08 /sf	44,438
			Soil Preparation			/sf	/sf	/sf	/sf	/sf	/sf	77,025
		02920.100	Lawns & Grasses									
			Hydroseeding	592,500 sf		-	-	0.04 /sf	-	-	0.04 /sf	23,700
			Lawns & Grasses			/sf	/sf	/sf	/sf	/sf	/sf	23,700
			RSA Grading Runway Safety Area Grading		1,144.465							221,722
			09 - Misc Items		**1,533.354**							**579,108**

Estimate Totals

Description	Amount	Totals	Hours	Rate	(
Labor	14,519,532		194,319.874 hrs		
Material	6,096,161				
Subcontract	7,186,817				
Equipment	16,229,209		129,900.419 hrs		
Other	15,600				
	44,047,319	44,047,319			
Material Take-off Allowance	3.523.785			8.000 %	(
Labor Overtime	3.629.883			25.000 %	(
Bond	319.528				E
Overhead & Profit	6.607.098			15.000 %	(
Contingency	8.809.464			20.000 %	(
Market Conditions Allowance	3.523.785			8.000 %	(
Total		***70,460,862***			

Item	Description	Alt 1 Takeoff Qty	Alt 1 Unit Cost	Alt 1 Amount	Alt 2 Takeoff Qty	Alt 2 Unit Cost	Alt 2 Amount	Alt 3 Takeoff Qty	Alt 3 Unit Cost	Alt 3 Amount	Alt 4 Takeoff Qty	Alt 4 Unit Cost	Alt 4 Amount
		Unalaska Airport Runway Extension Alt 1 (Total)			Unalaska Airport Runway Extension Alt 2 (Total)			Unalaska Airport Runway Extension Alt 3 (Total)			Unalaska Airport Runway Extension Alt 4 (Total)		
ATN	***Aids to Navigation***												
01 - Common	**COMMON**												
5529.498	*Runway Lighting*												
--	Runway Navigation Equipment & Lights	1.00 ls	100,000.00 /ls	100,000	1.00 ls	100,000.00 /ls	100,000	1.00 ls	100,000.00 /ls	100,000	1.00 ls	100,000.00 /ls	100,000
	Runway Lighting	*ea*		*100,000*	*ea*		*100,000*	*ls*		*100,000*	*ea*		*100,000*
	01 - Common COMMON			**100,000**			**100,000**			**100,000**			**100,000**
09 - Misc Items													
2766.100	*Pavement Marking*												
--	Runway Marking	1.00 ls	12,500.00 /ls	12,500	1.00 ls	12,500.00 /ls	12,500	1.00 ls	12,500.00 /ls	12,500	1.00 ls	12,500.00 /ls	12,500
	Pavement Marking	*lf*		*12,500*	*lf*		*12,500*	*ls*		*12,500*	*lf*		*12,500*
5001.250	*Misc Site Work*												
--	Relocate Navigation Aids	1.00 ls	157,500.00 /ls	157,500	1.00 ls	157,500.00 /ls	157,500	1.00 ls	157,500.00 /ls	157,500	1.00 ls	157,500.00 /ls	157,500
	Misc Site Work	*ls*		*157,500*	*ls*		*157,500*	*ls*		*157,500*	*ls*		*157,500*
	09 - Misc Items			**170,000**			**170,000**			**170,000**			**170,000**
	ATN Aids to Navigation			***270,000***			***270,000***			***270,000***			***270,000***
Arch Pit Mob													
01 - Common	**COMMON**												
1050.100	*Permits*												
2	Site Permit	1.00 ls	20,000.00 /ls	20,000	1.00 ls	20,000.00 /ls	20,000	1.00 ls	20,000.00 /ls	20,000	1.00 ls	20,000.00 /ls	20,000
	Permits	*ls*		*20,000*	*ls*		*20,000*	*ls*		*20,000*	*ls*		*20,000*
1065.100	*Surveys*												
10	Pit Survey & Layouts	1.00 ls	5,750.00 /ls	5,750	1.00 ls	5,750.00 /ls	5,750	1.00 ls	5,750.00 /ls	5,750	1.00 ls	5,750.00 /ls	5,750
	Surveys	*ls*		*5,750*	*ls*		*5,750*	*ls*		*5,750*	*ls*		*5,750*
1102.100	*Site Supervision*												
14	Superintendent	78.00 wk	1,725.00 /wk	134,550	78.00 wk	1,725.00 /wk	134,550	78.00 wk	1,725.00 /wk	134,550	78.00 wk	1,725.00 /wk	134,550
	Site Supervision	*wk*		*134,550*	*wk*		*134,550*	*wk*		*134,550*	*wk*		*134,550*
1201.100	*Offices*												
10	Office Trailer	18.00 mo	250.00 /mo	4,500	18.00 mo	250.00 /mo	4,500	18.00 mo	250.00 /mo	4,500	18.00 mo	250.00 /mo	4,500
	Offices	*mo*		*4,500*	*mo*		*4,500*	*mo*		*4,500*	*mo*		*4,500*
122	*Utilities*												
20	Temporary Toilets	18.00 mo	225.00 /mo	4,050	18.00 mo	225.00 /mo	4,050	18.00 mo	225.00 /mo	4,050	18.00 mo	225.00 /mo	4,050
	Utilities	*mo*		*4,050*	*mo*		*4,050*	*mo*		*4,050*	*mo*		*4,050*
1300.100	*Project Clean Up*												
14	Final Cleaning	1.00 ls	26,539.08 /ls	26,539	1.00 ls	26,539.08 /ls	26,539	1.00 ls	26,539.08 /ls	26,539	1.00 ls	26,539.08 /ls	26,539
	Project Clean Up	*ls*		*26,539*	*ls*		*26,539*	*ls*		*26,539*	*ls*		*26,539*
1910.000	*Equipment*												
10	Scale House	18.00 mo	640.00 /mo	11,520	18.00 mo	640.00 /mo	11,520	18.00 mo	640.00 /mo	11,520	18.00 mo	640.00 /mo	11,520
	Equipment	*ls*		*11,520*	*ls*		*11,520*	*ls*		*11,520*	*ls*		*11,520*
2230.010	*Clear & Grub*												
6270	Pile & Burn Lt Brush Hard	22.96 acre	1,921.14 /acre	44,104	22.96 acre	1,921.14 /acre	44,104	22.96 acre	1,921.14 /acre	44,104	22.96 acre	1,921.14 /acre	44,104
	Clear & Grub	*ac*		*44,104*	*ac*		*44,104*	*sf*		*44,104*	*ac*		*44,104*
2317.000	*Earthwork*												
1801	Overburden Removal	88,888.89 cy	1.33 /cy	117,951	88,888.89 cy	1.33 /cy	117,951	88,888.89 cy	1.33 /cy	117,951	88,888.89 cy	1.33 /cy	117,951
1810	Drill & Shoot Quarry Rock	533,024.00 Cy	8.48 /Cy	4,518,711	407,986.00 Cy	8.48 /Cy	3,458,701	360,202.00 Cy	8.48 /Cy	3,053,612	288,342.00 Cy	8.48 /Cy	2,444,419
2660	Articulated Off-road 25cy (0 - 1 Mile)	88,888.89 cuyd	1.402 /cuyd	124,658	88,888.89 cuyd	1.402 /cuyd	124,658	88,888.89 cuyd	1.402 /cuyd	124,658	88,888.89 cuyd	1.402 /cuyd	124,658
	Earthwork	*cy*		*4,761,320*	*cy*		*3,701,310*	*cy*		*3,296,221*	*cy*		*2,687,028*
	01 - Common COMMON			**5,012,333**			**3,952,323**			**3,547,234**			**2,938,041**
	Arch Pit Mob			***5,012,333***			***3,952,323***			***3,547,234***			***2,938,041***
Asphalt 4"	***Asphalt RSA Material***												
02 - RW 12 Extend	**Runway 12 Extension**												
2720.100	*Base*												
50	Crushed Gravel	2,923.00 cy	14.653 /cy	42,831	2,772.00 cy	14.653 /cy	40,619	2,500.00 cy	14.653 /cy	36,633	1,862.00 cy	14.653 /cy	27,284
	Base	*cy*		*42,831*	*cy*		*40,619*	*cy*		*36,633*	*cy*		*27,284*
2740.100	*Asphalt Paving*												
10	Rough Grading Roads	17,500.00 sy	0.58 /sy	10,156	16,600.00 sy	0.58 /sy	9,633	15,000.00 sy	0.58 /sy	8,705	11,150.00 sy	0.58 /sy	6,471
200	Asphalt Base Course 2"	17,500.00 sy	5.00 /sy	87,425	16,600.00 sy	5.00 /sy	82,929	15,000.00 sy	5.00 /sy	74,936	11,150.00 sy	5.00 /sy	55,702
440	Asphalt Top Course 2"	17,500.00 sy	5.50 /sy	96,175	16,600.00 sy	5.50 /sy	91,229	15,000.00 sy	5.50 /sy	82,436	11,150.00 sy	5.50 /sy	61,277
	Asphalt Paving	*sy*		*193,756*	*sy*		*183,791*	*sy*		*166,076*	*sy*		*123,450*
	02 - RW 12 Extend Runway 12 Extension			**236,587**			**224,410**			**202,709**			**150,734**
03 - RW 30 Extend													
272	*Base*												
50	Crushed Gravel	735.00 cy	14.653 /cy	10,770	1,386.00 cy	14.653 /cy	20,309	2,346.00 cy	14.653 /cy	34,376	2,547.00 cy	14.653 /cy	37,322
	Base	*cy*		*10,770*	*cy*		*20,309*	*cy*		*34,376*	*cy*		*37,322*
2740.100	*Asphalt Paving*												
10	Rough Grading Roads	4,400.00 sy	0.58 /sy	2,553	8,300.00 sy	0.58 /sy	4,817	14,050.00 sy	0.58 /sy	8,153	15,250.00 sy	0.58 /sy	8,850
200	Asphalt Base Course 2"	4,400.00 sy	5.00 /sy	21,981	8,300.00 sy	5.00 /sy	41,464	14,050.00 sy	5.00 /sy	70,190	15,250.00 sy	5.00 /sy	76,185
440	Asphalt Top Course 2"	4,400.00 sy	5.50 /sy	24,181	8,300.00 sy	5.50 /sy	45,614	14,050.00 sy	5.50 /sy	77,215	15,250.00 sy	5.50 /sy	83,810

em	Description	Unalaska Airport Runway Extension Alt 1 Takeoff Qty	Alt 1 Total Unit Cost	Alt 1 Total Amount	Unalaska Airport Runway Extension Alt 2 Takeoff Qty	Alt 2 Total Unit Cost	Alt 2 Total Amount	Unalaska Airport Runway Extension Alt 3 Takeoff Qty	Alt 3 Total Unit Cost	Alt 3 Total Amount	Unalaska Airport Runway Extension Alt 4 Takeoff Qty	Alt 4 Total Unit Cost	Alt 4 Total Amount
	Asphalt Paving	*sy*		*48,716*	*sy*		*91,896*	*sy*		*155,558*	*sy*		*168,844*
	03 - RW 30 Extend			**59,486**			**112,205**			**189,935**			**206,166**
	Asphalt 4" Asphalt RSA Material			***296,073***			***336,615***			***392,644***			***356,900***
ısphalt 8"	***Asphalt Runway Material***												
2 - RW 12 Extend	**Runway 12 Extension**												
2720.100	*Base*												
50	Crushed Gravel	1,066.00 cy	14.66 /cy	15,623	516.00 cy	14.66 /cy	7,563	0.333 cy	14.66 /cy	5	0.333 cy	14.66 /cy	5
	Base	*cy*		*15,623*	*cy*		*7,563*	*cy*		*5*	*cy*		*5*
2740.100	*Asphalt Paving*												
10	Rough Grading Roads	3,200.00 sy	0.58 /sy	1,857	1,550.00 sy	0.58 /sy	899	1.00 sy	0.58 /sy	1	1.00 sy	0.58 /sy	1
240	Asphalt Base Course 4"	3,200.00 sy	9.25 /sy	29,583	1,550.00 sy	9.25 /sy	14,329	1.00 sy	9.24 /sy	9	1.00 sy	9.24 /sy	9
480	Asphalt Top Course 4.0"	3,200.00 sy	9.75 /sy	31,183	1,550.00 sy	9.75 /sy	15,104	1.00 sy	9.74 /sy	10	1.00 sy	9.74 /sy	10
	Asphalt Paving	*sy*		*62,623*	*sy*		*30,333*	*sy*		*20*	*sy*		*20*
	02 - RW 12 Extend Runway 12 Extension			**78,246**			**37,895**			**24**			**24**
3 - RW 30 Extend													
2720.100	*Base*												
50	Crushed Gravel	0.333 cy	14.66 /cy	5	1.00 cy	14.65 /cy	15	0.333 cy	14.66 /cy	5	233.00 cy	14.66 /cy	3,415
	Base	*cy*		*5*	*cy*		*15*	*cy*		*5*	*cy*		*3,415*
2740.100	*Asphalt Paving*												
10	Rough Grading Roads	1.00 sy	0.58 /sy	1	1.00 sy	0.58 /sy	1	1.00 sy	0.58 /sy	1	700.00 sy	0.58 /sy	406
240	Asphalt Base Course 4"	1.00 sy	9.24 /sy	9	1.00 sy	9.24 /sy	9	1.00 sy	9.24 /sy	9	700.00 sy	9.25 /sy	6,471
480	Asphalt Top Course 4"	1.00 sy	9.74 /sy	10	1.00 sy	9.74 /sy	10	1.00 sy	9.74 /sy	10	700.00 sy	9.75 /sy	6,821
	Asphalt Paving	*sy*		*20*	*sy*		*20*	*sy*		*20*	*sy*		*13,699*
	03 - RW 30 Extend			**24**			**34**			**24**			**17,114**
	Asphalt 8" Asphalt Runway Material			***78,271***			***37,930***			***49***			***17,138***
leach Rd M&R	***Airport Beach Road Maintenance & Repair***												
1 - Common	**COMMON**												
1050.100	*Permits*												
5	Road Use Permit	1.00 ls	30,000.00 /ls	30,000	1.00 ls	30,000.00 /ls	30,000	1.00 ls	30,000.00 /ls	30,000	1.00 ls	30,000.00 /ls	30,000
	Permits	*ls*		*30,000*	*ls*		*30,000*	*ls*		*30,000*	*ls*		*30,000*
2740.100	*Asphalt Paving*												
200	Asphalt Base Course 2"	74,667.00 sy	5.00 /sy	373,016	74,667.00 sy	5.00 /sy	373,016	74,667.00 sy	5.00 /sy	373,016	74,667.00 sy	5.00 /sy	373,016
440	Asphalt Top Course 2"	74,667.00 sy	5.50 /sy	410,349	74,667.00 sy	5.50 /sy	410,349	74,667.00 sy	5.50 /sy	410,349	74,667.00 sy	5.50 /sy	410,349
	Asphalt Paving	*sy*		*783,365*	*sy*		*783,365*	*sy*		*783,365*	*sy*		*783,365*
2740.130	*Paving Textiles*												
10	Road Base Geo Textile	74,666.67 sy	2.34 /sy	174,499	74,666.67 sy	2.34 /sy	174,499	74,666.67 sy	2.34 /sy	174,499	74,666.67 sy	2.34 /sy	174,499
	Paving Textiles	*sy*		*174,499*	*sy*		*174,499*	*sy*		*174,499*	*sy*		*174,499*
	01 - Common COMMON			**987,863**			**987,863**			**987,863**			**987,863**
	Beach Rd M&R Airport Beach Road Maintenance & Repair			***987,863***			***987,863***			***987,863***			***987,863***
:onst Survey	***Construction Surveying***												
1 - Common	**COMMON**												
1065.100	*Surveys*												
10	Airport Survey & Layouts	1.00 ls	115,000.00 /ls	115,000	1.00 ls	115,000.00 /ls	115,000	1.00 ls	115,000.00 /ls	115,000	1.00 ls	115,000.00 /ls	115,000
	Surveys	*ls*		*115,000*	*ls*		*115,000*	*ls*		*115,000*	*ls*		*115,000*
	01 - Common COMMON			**115,000**			**115,000**			**115,000**			**115,000**
	Const Survey Construction Surveying			***115,000***			***115,000***			***115,000***			***115,000***
:ore 34 Ton	***Core-Loc 34 Ton Units***												
2 - RW 12 Extend	**Runway 12 Extension**												
2330.000	*Haul*												
20	Core-Loc Units Haul	1,411.00 ea	1,483.69 /ea	2,093,483	1,215.00 ea	1,483.69 /ea	1,802,681	721.00 ea	1,483.69 /ea	1,069,739	300.00 ea	1,483.69 /ea	445,106
	Haul			*2,093,483*			*1,802,681*	*ea*		*1,069,739*			*445,106*
2370.100	*Rip Rap*												
90	Core-Loc Units 34 Ton	1,411.00 ea	5,671.99 /ea	8,003,175	1,215.00 ea	5,671.99 /ea	6,891,466	721.00 ea	5,671.99 /ea	4,089,503	300.00 ea	5,671.99 /ea	1,701,596
	Rip Rap	*sf*		*8,003,175*	*sf*		*6,891,466*	*cy*		*4,089,503*	*sf*		*1,701,596*
	02 - RW 12 Extend Runway 12 Extension			**10,096,659**			**8,694,146**			**5,159,242**			**2,146,703**
	Core 34 Ton Core-Loc 34 Ton Units	***ea***		***10,096,659***	***ea***		***8,694,146***	***ea***		***5,159,242***	***ea***		***2,146,703***
:ore 8 Ton													
7 - Runway Improve	**Runway Improvements**												
2330.000	*Haul*												
20	Core-Loc Units Haul	3,000.00 ea	354.412 /ea	1,063,236	3,000.00 ea	354.412 /ea	1,063,236	3,000.00 ea	354.412 /ea	1,063,236	3,000.00 ea	354.412 /ea	1,063,236

em	Description	Unalaska Airport Runway Extension Alt 1 Takeoff Qty	Alt 1 Total Unit Cost	Alt 1 Total Amount	Unalaska Airport Runway Extension Alt 2 Takeoff Qty	Alt 2 Total Unit Cost	Alt 2 Total Amount	Unalaska Airport Runway Extension Alt 3 Takeoff Qty	Alt 3 Total Unit Cost	Alt 3 Total Amount	Unalaska Airport Runway Extension Alt 4 Takeoff Qty	Alt 4 Total Unit Cost	Alt 4 Total Amount
	Haul			*1,063,236*			*1,063,236*	*ea*		*1,063,236*			*1,063,236*
2370	*Rip Rap*												
	94 Core-Loc Units 8 Ton	3,000.00 ea	1,637.03 /ea	4,911,086	3,000.00 ea	1,637.03 /ea	4,911,086	3,000.00 ea	1,637.03 /ea	4,911,086	3,000.00 ea	1,637.03 /ea	4,911,086
	Rip Rap	*sf*		*4,911,086*	*sf*		*4,911,086*	*cy*		*4,911,086*	*sf*		*4,911,086*
	07 - Runway Improve Runway Improvements	**Sy**		**5,974,322**	**Sy**		**5,974,322**	**Sy**		**5,974,322**	**Sy**		**5,974,322**
	Core 8 Ton			***5,974,322***			***5,974,322***			***5,974,322***			***5,974,322***
:ore Fill	***Core Material Fill***												
2 - RW 12 Extend	**Runway 12 Extension**												
2317.000	*Earthwork*												
	2670 Articulated Off-road 25cy (1 - 3 Mile)	340,000.00 cuyd	1.39 /cuyd	471,089	222,500.00 cuyd	1.39 /cuyd	308,286	94,100.00 cuyd	1.39 /cuyd	130,381	1,500.00 cuyd	1.39 /cuyd	2,078
	Earthwork	*cy*		*471,089*	*cy*		*308,286*	*cy*		*130,381*	*cy*		*2,078*
2370.100	*Rip Rap*												
	50 Crushed Rock Production	340,000.00 cy	11.88 /cy	4,038,602	222,500.00 cy	11.88 /cy	2,642,909	94,100.00 cy	11.88 /cy	1,117,743	1,500.00 cy	11.88 /cy	17,817
	88 Quarry Stone < 100#	340,000.00 cy	3.992 /cy	1,357,122	222,500.00 cy	3.992 /cy	888,116	94,100.00 cy	3.992 /cy	375,603	1,500.00 cy	3.992 /cy	5,987
	Rip Rap	*sf*		*5,395,724*	*sf*		*3,531,025*	*cy*		*1,493,346*	*sf*		*23,805*
	02 - RW 12 Extend Runway 12 Extension			**5,866,813**			**3,839,311**			**1,623,727**			**25,883**
3 - RW 30 Extend													
2317.000	*Earthwork*												
	2670 Articulated Off-road 25cy (1 - 3 Mile)	0.00 cuyd			40,000.00 cuyd	1.39 /cuyd	55,422	120,000.00 cuyd	1.39 /cuyd	166,267	120,000.00 cuyd	1.39 /cuyd	166,267
	Earthwork	*cy*			*cy*		*55,422*	*cy*		*166,267*	*cy*		*166,267*
2370.100	*Rip Rap*												
	50 Crushed Rock Production	0.00 cy			40,000.00 cy	11.88 /cy	475,130	120,000.00 cy	11.88 /cy	1,425,389	120,000.00 cy	11.88 /cy	1,425,389
	88 Quarry Stone < 100#	0.00 cy			40,000.00 cy	3.992 /cy	159,661	120,000.00 cy	3.992 /cy	478,984	120,000.00 cy	3.992 /cy	478,984
	Rip Rap	*sf*			*sf*		*634,791*	*cy*		*1,904,373*	*sf*		*1,904,373*
	03 - RW 30 Extend			**0**			**690,213**			**2,070,640**			**2,070,640**
7 - Runway Improve	**Runway Improvements**												
2317.000	*Earthwork*												
	2670 Articulated Off-road 25cy (1 - 3 Mile)	4,500.00 cuyd	1.39 /cuyd	6,235	4,500.00 cuyd	1.39 /cuyd	6,235	4,500.00 cuyd	1.39 /cuyd	6,235	4,500.00 cuyd	1.39 /cuyd	6,235
	Earthwork	*cy*		*6,235*	*cy*		*6,235*	*cy*		*6,235*	*cy*		*6,235*
237	*Rip Rap*												
	50 Crushed Rock Production	4,500.00 cy	11.88 /cy	53,452	4,500.00 cy	11.88 /cy	53,452	4,500.00 cy	11.88 /cy	53,452	4,500.00 cy	11.88 /cy	53,452
	88 Quarry Stone < 100#	4,500.00 cy	3.992 /cy	17,962	4,500.00 cy	3.992 /cy	17,962	4,500.00 cy	3.992 /cy	17,962	4,500.00 cy	3.992 /cy	17,962
	Rip Rap	*sf*		*71,414*	*sf*		*71,414*	*cy*		*71,414*	*sf*		*71,414*
	07 - Runway Improve Runway Improvements	**Sy**		**77,649**	**Sy**		**77,649**	**Sy**		**77,649**	**Sy**		**77,649**
	Core Fill Core Material Fill	***Cy***		***5,944,462***	***Cy***		***4,607,173***	***Cy***		***3,772,015***	***Cy***		***2,174,172***
)rainage													
9 - Misc Items													
2630.200	*Storm Drainage*												
	10 Runway Storm Drainage Allowance	1.00 ls	122,500.00 /ls	122,500	1.00 ls	122,500.00 /ls	122,500	1.00 ls	122,500.00 /ls	122,500	1.00 ls	122,500.00 /ls	122,500
	Storm Drainage	*lf*		*122,500*	*lf*		*122,500*	*ls*		*122,500*	*lf*		*122,500*
	09 - Misc Items			**122,500**			**122,500**			**122,500**			**122,500**
	Drainage			***122,500***			***122,500***			***122,500***			***122,500***
:lbow Fill													
2 - RW 12 Extend	**Runway 12 Extension**												
2317.000	*Earthwork*												
	2670 Articulated Off-road 25cy (1 - 3 Mile)	112,500.00 cuyd	1.39 /cuyd	155,875	56,713.00 cuyd	1.39 /cuyd	78,579	5,556.00 cuyd	1.39 /cuyd	7,698	3,700.00 cuyd	1.39 /cuyd	5,127
	Earthwork	*cy*		*155,875*	*cy*		*78,579*	*cy*		*7,698*	*cy*		*5,127*
2370.100	*Rip Rap*												
	50 Crushed Rock Production	112,500.00 cy	11.88 /cy	1,336,302	56,713.00 cy	11.88 /cy	673,651	5,556.00 cy	11.88 /cy	65,996	3,700.00 cy	11.88 /cy	43,949
	88 Quarry Stone < 100#	112,500.00 cy	3.992 /cy	449,048	56,713.00 cy	3.992 /cy	226,372	5,556.00 cy	3.992 /cy	22,177	3,700.00 cy	3.992 /cy	14,769
	Rip Rap	*sf*		*1,785,350*	*sf*		*900,023*	*cy*		*88,172*	*sf*		*58,718*
	02 - RW 12 Extend Runway 12 Extension			**1,941,225**			**978,602**			**95,871**			**63,845**
	Elbow Fill			***1,941,225***			***978,602***			***95,871***			***63,845***
:nvir Protect	***Envioronment Protection***												
1 - Common	**COMMON**												
237	*Temp Erosion Control*												
	20 Silt Fence	4,000.00 lf	5.50 /lf	21,985	4,000.00 lf	5.50 /lf	21,985	4,000.00 lf	5.50 /lf	21,985	4,000.00 lf	5.50 /lf	21,985
	40 Erosion Control Mats-Slopes	10,000.00 sf	2.75 /sf	27,481	10,000.00 sf	2.75 /sf	27,481	10,000.00 sf	2.75 /sf	27,481	10,000.00 sf	2.75 /sf	27,481
	80 Reseed Site for Winter	200,000.00 sf	0.08 /sf	15,363	200,000.00 sf	0.08 /sf	15,363	200,000.00 sf	0.08 /sf	15,363	200,000.00 sf	0.08 /sf	15,363
	Temp Erosion Control	*ls*		*64,830*	*ls*		*64,830*	*ls*		*64,830*	*ls*		*64,830*
2370.200	*Temp Filter Dams*												
	30 Filter Fabric	0.04 cy	1.60 /cy	0	0.04 cy	1.60 /cy	0	0.04 cy	1.60 /cy	0	0.04 cy	1.60 /cy	0
	Temp Filter Dams	*cy*		*0*	*cy*		*0*	*cy*		*0*	*cy*		*0*

em	Description	Unalaska Airport Runway Extension Alt 1 Takeoff Qty	Alt 1 Total Unit Cost	Alt 1 Total Amount	Unalaska Airport Runway Extension Alt 2 Takeoff Qty	Alt 2 Total Unit Cost	Alt 2 Total Amount	Unalaska Airport Runway Extension Alt 3 Takeoff Qty	Alt 3 Total Unit Cost	Alt 3 Total Amount	Unalaska Airport Runway Extension Alt 4 Takeoff Qty	Alt 4 Total Unit Cost	Alt 4 Total Amount
	01 - Common COMMON			64,830			64,830			64,830			64,830
	Envir Protect Envioronment Protection			***64,830***			***64,830***			***64,830***			***64,830***
ield Lab	***Field Labratory***												
1 - Common	COMMON												
1201.100	*Offices*												
	16 Inspector's Trailer	12.00 mo	1,250.00 /mo	15,000	12.00 mo	1,250.00 /mo	15,000	12.00 mo	1,250.00 /mo	15,000	12.00 mo	1,250.00 /mo	15,000
	Offices	*mo*		*15,000*	*mo*		*15,000*	*mo*		*15,000*	*mo*		*15,000*
1202.100	*Supplies & Equip*												
	10 Copy Machine	12.00 mo	400.00 /mo	4,800	12.00 mo	400.00 /mo	4,800	12.00 mo	400.00 /mo	4,800	12.00 mo	400.00 /mo	4,800
	15 Supplies	12.00 mo	400.00 /mo	4,800	12.00 mo	400.00 /mo	4,800	12.00 mo	400.00 /mo	4,800	12.00 mo	400.00 /mo	4,800
	Supplies & Equip	*mo*		*9,600*	*mo*		*9,600*	*mo*		*9,600*	*mo*		*9,600*
1203.100	*Utilities*												
	14 Electric Power	12.00 mo	300.00 /mo	3,600	12.00 mo	300.00 /mo	3,600	12.00 mo	300.00 /mo	3,600	12.00 mo	300.00 /mo	3,600
	18 Telephone Charges	12.00 mo	500.00 /mo	6,000	12.00 mo	500.00 /mo	6,000	12.00 mo	500.00 /mo	6,000	12.00 mo	500.00 /mo	6,000
	20 Temporary Toilets	12.00 mo	225.00 /mo	2,700	12.00 mo	225.00 /mo	2,700	12.00 mo	225.00 /mo	2,700	12.00 mo	225.00 /mo	2,700
	Utilities	*mo*		*12,300*	*mo*		*12,300*	*mo*		*12,300*	*mo*		*12,300*
1401.100	*Testing*												
	10 Misc Test & Inspection	1.00 ls	50,000.00 /ls	50,000	1.00 ls	50,000.00 /ls	50,000	1.00 ls	50,000.00 /ls	50,000	1.00 ls	50,000.00 /ls	50,000
	12 Soil Testing	1.00 ls	25,000.00 /ls	25,000	1.00 ls	25,000.00 /ls	25,000	1.00 ls	25,000.00 /ls	25,000	1.00 ls	25,000.00 /ls	25,000
	14 Material Testing	1.00 ls	25,000.00 /ls	25,000	1.00 ls	25,000.00 /ls	25,000	1.00 ls	25,000.00 /ls	25,000	1.00 ls	25,000.00 /ls	25,000
	Testing	*ls*		*100,000*	*ls*		*100,000*	*ls*		*100,000*	*ls*		*100,000*
	01 - Common COMMON			136,900			136,900			136,900			136,900
	Field Lab Field Labratory			***136,900***			***136,900***			***136,900***			***136,900***
ield Office	***Field Office***												
1 - Common	COMMON												
1060.100	*Documents*												
	10 Prints & Records	1.00 ls	25,000.00 /ls	25,000	1.00 ls	25,000.00 /ls	25,000	1.00 ls	25,000.00 /ls	25,000	1.00 ls	25,000.00 /ls	25,000
	Documents	*ls*		*25,000*	*ls*		*25,000*	*ls*		*25,000*	*ls*		*25,000*
1070.100	*Photos*												
	10 Project Photos	12.00 mo	537.50 /mo	6,450	12.00 mo	537.50 /mo	6,450	12.00 mo	537.50 /mo	6,450	12.00 mo	537.50 /mo	6,450
	Photos	*mo*		*6,450*	*mo*		*6,450*	*mo*		*6,450*	*mo*		*6,450*
1075.100	*Signs*												
	12 Project Signs 8x8	3.00 ea	1,065.503 /ea	3,197	3.00 ea	1,065.503 /ea	3,197	3.00 ea	1,065.503 /ea	3,197	3.00 ea	1,065.503 /ea	3,197
	Signs	*ea*		*3,197*	*ea*		*3,197*	*ea*		*3,197*	*ea*		*3,197*
1100.100	*Project Management*												
	12 Construction Manager	52.00 wk	3,175.00 /wk	165,100	52.00 wk	3,175.00 /wk	165,100	52.00 wk	3,175.00 /wk	165,100	52.00 wk	3,175.00 /wk	165,100
	14 Project Manager	52.00 wk	3,450.00 /wk	179,400	52.00 wk	3,450.00 /wk	179,400	52.00 wk	3,450.00 /wk	179,400	52.00 wk	3,450.00 /wk	179,400
	Project Management	*wk*		*344,500*	*wk*		*344,500*	*wk*		*344,500*	*wk*		*344,500*
1102.100	*Site Supervision*												
	14 Superintendent	52.00 wk	2,875.00 /wk	149,500	52.00 wk	2,875.00 /wk	149,500	52.00 wk	2,875.00 /wk	149,500	52.00 wk	2,875.00 /wk	149,500
	Site Supervision	*wk*		*149,500*	*wk*		*149,500*	*wk*		*149,500*	*wk*		*149,500*
1110.100	*Travel*												
	10 Weekly Travel Subsistence (Room & Board)	1,820.00 wk	850.00 /wk	1,547,000	1,820.00 wk	850.00 /wk	1,547,000	1,820.00 wk	850.00 /wk	1,547,000	1,820.00 wk	850.00 /wk	1,547,000
	50 Airline Fares (See Notes)	424.00 ea	715.00 /ea	303,160	424.00 ea	715.00 /ea	303,160	424.00 ea	715.00 /ea	303,160	424.00 ea	715.00 /ea	303,160
	60 Motel & Hotel (Home Office Staff Only)	365.00 dy	175.00 /dy	63,875	365.00 dy	175.00 /dy	63,875	365.00 dy	175.00 /dy	63,875	365.00 dy	175.00 /dy	63,875
	Travel	*wk*		*1,914,035*	*wk*		*1,914,035*	*wk*		*1,914,035*	*wk*		*1,914,035*
1201.100	*Offices*												
	10 Office Trailer	12.00 mo	2,000.00 /mo	24,000	12.00 mo	2,000.00 /mo	24,000	12.00 mo	2,000.00 /mo	24,000	12.00 mo	2,000.00 /mo	24,000
	Offices	*mo*		*24,000*	*mo*		*24,000*	*mo*		*24,000*	*mo*		*24,000*
1202.100	*Supplies & Equip*												
	10 Copy Machine	12.00 mo	400.00 /mo	4,800	12.00 mo	400.00 /mo	4,800	12.00 mo	400.00 /mo	4,800	12.00 mo	400.00 /mo	4,800
	15 Supplies	12.00 mo	400.00 /mo	4,800	12.00 mo	400.00 /mo	4,800	12.00 mo	400.00 /mo	4,800	12.00 mo	400.00 /mo	4,800
	Supplies & Equip	*mo*		*9,600*	*mo*		*9,600*	*mo*		*9,600*	*mo*		*9,600*
1203.100	*Utilities*												
	14 Electric Power	12.00 mo	350.00 /mo	4,200	12.00 mo	350.00 /mo	4,200	12.00 mo	350.00 /mo	4,200	12.00 mo	350.00 /mo	4,200
	18 Telephone Charges	12.00 mo	500.00 /mo	6,000	12.00 mo	500.00 /mo	6,000	12.00 mo	500.00 /mo	6,000	12.00 mo	500.00 /mo	6,000
	20 Temporary Toilets	12.00 mo	500.00 /mo	6,000	12.00 mo	500.00 /mo	6,000	12.00 mo	500.00 /mo	6,000	12.00 mo	500.00 /mo	6,000
	Utilities	*mo*		*16,200*	*mo*		*16,200*	*mo*		*16,200*	*mo*		*16,200*
1310.100	*Tools & Equipment*												
	14 Fueling Equipment	52.00 wk	8,264.74 /wk	429,766	52.00 wk	8,264.74 /wk	429,766	52.00 wk	8,264.74 /wk	429,766	52.00 wk	8,264.74 /wk	429,766
	16 Misc. Tools	1.00 ls	25,000.00 /ls	25,000	1.00 ls	25,000.00 /ls	25,000	1.00 ls	25,000.00 /ls	25,000	1.00 ls	25,000.00 /ls	25,000
	Tools & Equipment	*ls*		*454,766*	*ls*		*454,766*	*ls*		*454,766*	*ls*		*454,766*
1330.100	*Scheduling*												
	10 Scheduling Expense	1.00 ls	1,725.00 /ls	1,725	1.00 ls	1,725.00 /ls	1,725	1.00 ls	1,725.00 /ls	1,725	1.00 ls	1,725.00 /ls	1,725
	Scheduling	*ls*		*1,725*	*ls*		*1,725*	*ls*		*1,725*	*ls*		*1,725*
	01 - Common COMMON			2,948,973			2,948,973			2,948,973			2,948,973
	Field Office Field Office			***2,948,973***			***2,948,973***			***2,948,973***			***2,948,973***
1ob Demob	***Mobilization/Demobilization***												
1 - Common	COMMON												
1910.000	*Equipment*												
	10 Construction Equipment Mobilizations	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750

em	Description	Unalaska Airport Runway Extension Alt 1 Takeoff Qty	Alt 1 Total Unit Cost	Alt 1 Total Amount	Unalaska Airport Runway Extension Alt 2 Takeoff Qty	Alt 2 Total Unit Cost	Alt 2 Total Amount	Unalaska Airport Runway Extension Alt 3 Takeoff Qty	Alt 3 Total Unit Cost	Alt 3 Total Amount	Unalaska Airport Runway Extension Alt 4 Takeoff Qty	Alt 4 Total Unit Cost	Alt 4 Total Amount
1910.000	*Equipment*												
10	Asphalt Plant Mobilization	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750
10	Quarry Site Equipment Mobilization	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750
10	Misc Equipment & Supplies Mobilizations	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750
10	Construction Equipment De-Mobilizations	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750
10	Asphalt Plant De-Mobilization	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750
10	Quarry Site Equipment De-Mobilization	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750
10	Misc Equipment & Supplies De-Mobilizations	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750	1.00 LS	328,750.00 /LS	328,750
	Equipment	*ls*		*2,630,000*	*ls*		*2,630,000*	*ls*		*2,630,000*	*ls*		*2,630,000*
	01 - Common COMMON			**2,630,000**			**2,630,000**			**2,630,000**			**2,630,000**
	Mob Demob Mobilization/Demobilization			***2,630,000***			***2,630,000***			***2,630,000***			***2,630,000***
)FA Grading	***OFA Grading***												
) - Misc Items													
2230.010	*Clear & Grub*												
6790	Rough Blade Hard	33,333.333 sy	1.092 /sy	36,386	33,333.333 sy	1.092 /sy	36,386	33,333.333 sy	1.092 /sy	36,386	33,333.333 sy	1.092 /sy	36,386
	Clear & Grub	*ac*		*36,386*	*ac*		*36,386*	*sf*		*36,386*	*ac*		*36,386*
2900.200	*Soil Preparation*												
50	Machine Rake	300,000.00 sf	0.06 /sf	16,500	300,000.00 sf	0.06 /sf	16,500	300,000.00 sf	0.06 /sf	16,500	300,000.00 sf	0.06 /sf	16,500
	Soil Preparation	*sf*		*16,500*	*sf*		*16,500*	*sf*		*16,500*	*sf*		*16,500*
2920.100	*Lawns & Grasses*												
15	Hydroseeding	300,000.00 sf	0.04 /sf	12,000	300,000.00 sf	0.04 /sf	12,000	300,000.00 sf	0.04 /sf	12,000	300,000.00 sf	0.04 /sf	12,000
	Lawns & Grasses	*sf*		*12,000*	*sf*		*12,000*	*sf*		*12,000*	*sf*		*12,000*
	09 - Misc Items			**64,886**			**64,886**			**64,886**			**64,886**
	OFA Grading OFA Grading			***64,886***			***64,886***			***64,886***			***64,886***
:SA Grading	***Runway Safety Area Grading***												
) - Misc Items													
2230.010	*Clear & Grub*												
5670	Finish Blade Tgh	65,833.333 sy	0.75 /sy	49,119	65,833.333 sy	0.75 /sy	49,119	65,833.333 sy	0.75 /sy	49,119	65,833.333 sy	0.75 /sy	49,119
6790	Rough Blade Hard	65,833.333 sy	1.092 /sy	71,877	65,833.333 sy	1.092 /sy	71,877	65,833.333 sy	1.092 /sy	71,877	65,833.333 sy	1.092 /sy	71,877
	Clear & Grub	*ac*		*120,997*	*ac*		*120,997*	*sf*		*120,997*	*ac*		*120,997*
2900.200	*Soil Preparation*												
50	Machine Rake	592,500.00 sf	0.06 /sf	32,588	592,500.00 sf	0.06 /sf	32,588	592,500.00 sf	0.06 /sf	32,588	592,500.00 sf	0.06 /sf	32,588
55	Hand Rake	592,500.00 sf	0.08 /sf	44,438	592,500.00 sf	0.08 /sf	44,438	592,500.00 sf	0.08 /sf	44,438	592,500.00 sf	0.08 /sf	44,438
	Soil Preparation	*sf*		*77,025*	*sf*		*77,025*	*sf*		*77,025*	*sf*		*77,025*
2920.100	*Lawns & Grasses*												
15	Hydroseeding	592,500.00 sf	0.04 /sf	23,700	592,500.00 sf	0.04 /sf	23,700	592,500.00 sf	0.04 /sf	23,700	592,500.00 sf	0.04 /sf	23,700
	Lawns & Grasses	*sf*		*23,700*	*sf*		*23,700*	*sf*		*23,700*	*sf*		*23,700*
	09 - Misc Items			**221,722**			**221,722**			**221,722**			**221,722**
	RSA Grading Runway Safety Area Grading			***221,722***			***221,722***			***221,722***			***221,722***
:ock Exc	***Rock Excavation***												
7 - Runway Improve	**Runway Improvements**												
2317.000	*Earthwork*												
14	Exc Mass - Tough	125,000.00 cuyd	6.491 /cuyd	811,408	125,000.00 cuyd	6.491 /cuyd	811,408	125,000.00 cuyd	6.491 /cuyd	811,408	125,000.00 cuyd	6.491 /cuyd	811,408
290	Load Stkpile W/Ldr Med Hard	125,000.00 cuyd	3.11 /cuyd	388,536	125,000.00 cuyd	3.11 /cuyd	388,536	125,000.00 cuyd	3.11 /cuyd	388,536	125,000.00 cuyd	3.11 /cuyd	388,536
2680	Articulated Off-road 25cy (3 - 5 Mile)	125,000.00 cuyd	2.96 /cuyd	369,799	125,000.00 cuyd	2.96 /cuyd	369,799	125,000.00 cuyd	2.96 /cuyd	369,799	125,000.00 cuyd	2.96 /cuyd	369,799
	Earthwork	*cy*		*1,569,743*	*cy*		*1,569,743*	*cy*		*1,569,743*	*cy*		*1,569,743*
	07 - Runway Improve Runway Improvements	**Sy**		**1,569,743**	**Sy**		**1,569,743**	**Sy**		**1,569,743**	**Sy**		**1,569,743**
	Rock Exc Rock Excavation			***1,569,743***			***1,569,743***			***1,569,743***			***1,569,743***
:afety & Flagging	***Safety & Traffic Control***												
1 - Common	**COMMON**												
1204.100	*OSHA & Safety*												
10	Safety Officer	52.00 wk	2,300.00 /wk	119,600	52.00 wk	2,300.00 /wk	119,600	52.00 wk	2,300.00 /wk	119,600	52.00 wk	2,300.00 /wk	119,600
14	Safety Equipment/Signage	1.00 ls	45,000.00 /ls	45,000	1.00 ls	45,000.00 /ls	45,000	1.00 ls	45,000.00 /ls	45,000	1.00 ls	45,000.00 /ls	45,000
	OSHA & Safety	*wk*		*164,600*	*wk*		*164,600*	*wk*		*164,600*	*wk*		*164,600*
1205.100	*Safety Protection*												
54	Temporary Fences	1.00 ls	7.15 /ls	7	1.00 ls	7.15 /ls	7	1.00 ls	7.15 /ls	7	1.00 ls	7.15 /ls	7
--	Traffic Control	52.00 wk	5,000.00 /wk	260,000	52.00 wk	5,000.00 /wk	260,000	52.00 wk	5,000.00 /wk	260,000	52.00 wk	5,000.00 /wk	260,000
	Safety Protection	*wk*		*260,007*	*wk*		*260,007*	*wk*		*260,007*	*wk*		*260,007*
	01 - Common COMMON			**424,607**			**424,607**			**424,607**			**424,607**
	Safety & Flagging Safety & Traffic Control			***424,607***			***424,607***			***424,607***			***424,607***
Inderstone 1	***Understone Layer 1***												
2 - RW 12 Extend	**Runway 12 Extension**												
2317.000	*Earthwork*												
2670	Articulated Off-road 25cy (1 - 3 Mile)	30,300.00 cuyd	1.39 /cuyd	41,982	26,100.00 cuyd	1.39 /cuyd	36,163	15,500.00 cuyd	1.39 /cuyd	21,476	6,500.00 cuyd	1.39 /cuyd	9,006

em	Description	Alt 1 Takeoff Qty	Alt 1 Unit Cost	Alt 1 Amount	Alt 2 Takeoff Qty	Alt 2 Unit Cost	Alt 2 Amount	Alt 3 Takeoff Qty	Alt 3 Unit Cost	Alt 3 Amount	Alt 4 Takeoff Qty	Alt 4 Unit Cost	Alt 4 Amount
		Unalaska Airport Runway Extension Alt 1	Total		Unalaska Airport Runway Extension Alt 2	Total		Unalaska Airport Runway Extension Alt 3	Total		Unalaska Airport Runway Extension Alt 4	Total	
	Earthwork	cy		*41,982*	cy		*36,163*	cy		*21,476*	cy		*9,006*
237(	*Rip Rap*												
50	Crushed Rock Production	30,300.00 cy	11.88 /cy	359,911	26,100.00 cy	11.88 /cy	310,022	15,500.00 cy	11.88 /cy	184,113	6,500.00 cy	11.88 /cy	77,209
80	Armor Quarry Stone > 5 Ton	30,300.00 cy	238.811 /cy	7,235,986	26,100.00 cy	238.811 /cy	6,232,978	15,500.00 cy	238.811 /cy	3,701,577	6,500.00 cy	238.811 /cy	1,552,274
	Rip Rap	sf		*7,595,897*	sf		*6,543,000*	cy		*3,885,690*	sf		*1,629,483*
	02 - RW 12 Extend Runway 12 Extension			**7,637,879**			**6,579,163**			**3,907,166**			**1,638,489**
3 - RW 30 Extend													
2317.000	*Earthwork*												
2670	Articulated Off-road 25cy (1 - 3 Mile)	0.00 cuyd			10,000.00 cuyd	1.39 /cuyd	13,856	20,000.00 cuyd	1.39 /cuyd	27,711	25,000.00 cuyd	1.39 /cuyd	34,639
	Earthwork	cy			cy		*13,856*	cy		*27,711*	cy		*34,639*
2370.100	*Rip Rap*												
50	Crushed Rock Production	0.00 cy			10,000.00 cy	11.88 /cy	118,782	20,000.00 cy	11.88 /cy	237,565	25,000.00 cy	11.88 /cy	296,956
80	Armor Quarry Stone > 5 Ton	0.00 cy			10,000.00 cy	238.811 /cy	2,388,114	20,000.00 cy	238.811 /cy	4,776,229	25,000.00 cy	238.811 /cy	5,970,286
	Rip Rap	sf			sf		*2,506,897*	cy		*5,013,793*	sf		*6,267,242*
	03 - RW 30 Extend			**0**			**2,520,752**			**5,041,505**			**6,301,881**
7 - Runway Improve	**Runway Improvements**												
2317.000	*Earthwork*												
2670	Articulated Off-road 25cy (1 - 3 Mile)	22,000.00 cuyd	1.39 /cuyd	30,482	22,000.00 cuyd	1.39 /cuyd	30,482	22,000.00 cuyd	1.39 /cuyd	30,482	22,000.00 cuyd	1.39 /cuyd	30,482
	Earthwork	cy		*30,482*	cy		*30,482*	cy		*30,482*	cy		*30,482*
2370.100	*Rip Rap*												
50	Crushed Rock Production	22,000.00 cy	11.88 /cy	261,321	22,000.00 cy	11.88 /cy	261,321	22,000.00 cy	11.88 /cy	261,321	22,000.00 cy	11.88 /cy	261,321
80	Armor Quarry Stone > 5 Ton	22,000.00 cy	238.811 /cy	5,253,851	22,000.00 cy	238.811 /cy	5,253,851	22,000.00 cy	238.811 /cy	5,253,851	22,000.00 cy	238.811 /cy	5,253,851
	Rip Rap	sf		*5,515,173*	sf		*5,515,173*	cy		*5,515,173*	sf		*5,515,173*
	07 - Runway Improve Runway Improvements	**Sy**		**5,545,655**	**Sy**		**5,545,655**	**Sy**		**5,545,655**	**Sy**		**5,545,655**
	Understone 1 Understone Layer 1	***Cy***		***13,183,534***	***Cy***		***14,645,571***	***Cy***		***14,494,326***	***Cy***		***13,486,025***
Inderstone 2	***Understone Layer 2***												
2 - RW 12 Extend	**Runway 12 Extension**												
2317.000	*Earthwork*												
2670	Articulated Off-road 25cy (1 - 3 Mile)	11,000.00 cuyd	1.39 /cuyd	15,241	9,500.00 cuyd	1.39 /cuyd	13,163	5,700.00 cuyd	1.39 /cuyd	7,898	2,500.00 cuyd	1.39 /cuyd	3,464
	Earthwork	cy		*15,241*	cy		*13,163*	cy		*7,898*	cy		*3,464*
237(	*Rip Rap*												
50	Crushed Rock Production	11,000.00 cy	11.88 /cy	130,661	9,500.00 cy	11.88 /cy	112,843	5,700.00 cy	11.88 /cy	67,706	2,500.00 cy	11.88 /cy	29,696
84	Quarry Stone 500# - 1 Ton	11,000.00 cy	59.703 /cy	656,731	9,500.00 cy	59.703 /cy	567,177	5,700.00 cy	59.703 /cy	340,306	2,500.00 cy	59.703 /cy	149,257
	Rip Rap	sf		*787,392*	sf		*680,020*	cy		*408,012*	sf		*178,953*
	02 - RW 12 Extend Runway 12 Extension			**802,633**			**693,183**			**415,910**			**182,417**
3 - RW 30 Extend													
2317.000	*Earthwork*												
2670	Articulated Off-road 25cy (1 - 3 Mile)	0.00 cuyd			4,000.00 cuyd	1.39 /cuyd	5,542	80,000.00 cuyd	1.39 /cuyd	110,844	90,000.00 cuyd	1.39 /cuyd	124,700
	Earthwork	cy			cy		*5,542*	cy		*110,844*	cy		*124,700*
2370.100	*Rip Rap*												
50	Crushed Rock Production	0.00 cy			4,000.00 cy	11.88 /cy	47,513	80,000.00 cy	11.88 /cy	950,259	90,000.00 cy	11.88 /cy	1,069,042
84	Quarry Stone 500# - 1 Ton	0.00 cy			4,000.00 cy	59.703 /cy	238,811	80,000.00 cy	59.703 /cy	4,776,229	90,000.00 cy	59.703 /cy	5,373,257
	Rip Rap	sf			sf		*286,324*	cy		*5,726,488*	sf		*6,442,299*
	03 - RW 30 Extend			**0**			**291,867**			**5,837,332**			**6,566,999**
7 - Runway Improve	**Runway Improvements**												
2317.000	*Earthwork*												
2670	Articulated Off-road 25cy (1 - 3 Mile)	8,000.00 cuyd	1.39 /cuyd	11,084	8,000.00 cuyd	1.39 /cuyd	11,084	8,000.00 cuyd	1.39 /cuyd	11,084	8,000.00 cuyd	1.39 /cuyd	11,084
	Earthwork	cy		*11,084*	cy		*11,084*	cy		*11,084*	cy		*11,084*
2370.100	*Rip Rap*												
50	Crushed Rock Production	8,000.00 cy	11.88 /cy	95,026	8,000.00 cy	11.88 /cy	95,026	8,000.00 cy	11.88 /cy	95,026	8,000.00 cy	11.88 /cy	95,026
84	Quarry Stone 500# - 1 Ton	8,000.00 cy	59.703 /cy	477,623	8,000.00 cy	59.703 /cy	477,623	8,000.00 cy	59.703 /cy	477,623	8,000.00 cy	59.703 /cy	477,623
	Rip Rap	sf		*572,649*	sf		*572,649*	cy		*572,649*	sf		*572,649*
	07 - Runway Improve Runway Improvements	**Sy**		**583,733**	**Sy**		**583,733**	**Sy**		**583,733**	**Sy**		**583,733**
	Understone 2 Understone Layer 2	***Cy***		***1,386,366***	***Cy***		***1,568,783***	***Cy***		***6,836,976***	***Cy***		***7,333,149***
	Total			***53,470,268***			***50,352,489***			***49,829,702***			***44,047,318***

Estimate Totals

	Alt 1 Hours	Alt 1 Amount	Alt 2 Hours	Alt 2 Amount	Alt 3 Hours	Alt 3 Amount	Alt 4 Hours	Alt 4 Amount
Labor	194,310.307hrs	15,040,152	193,263.608hrs	14,688,342	209,837.985hrs	15,781,818	194,319.874hrs	14,519,532
Material		11,196,521		10,128,102		7,998,220		6,096,161
Subcontract		9,154,457		8,275,402		7,925,721		7,186,817
Equipment	176,035.472hrs	18,063,538	158,304.800hrs	17,245,043	152,464.276hrs	18,108,344	129,900.419hrs	16,229,209
Other		15,600		15,600		15,600		15,600
		53,470,268		**50,352,489**		**49,829,703**		**44,047,319**
Addon totals		31,412,860		29,713,646		29,718,111		26,413,543

em	Description	Unalaska Airport Runway Extension Alt 1			Unalaska Airport Runway Extension Alt 2			Unalaska Airport Runway Extension Alt 3			Unalaska Airport Runway Extension Alt 4		
			Total			Total			Total			Total	
		Takeoff Qty	Unit Cost	Amount	Takeoff Qty	Unit Cost	Amount	Takeoff Qty	Unit Cost	Amount	Takeoff Qty	Unit Cost	Amount
	Total			*84,883,128*			*80,066,135*			*79,547,814*			*70,460,862*

Unalaska A rt Master Plan
UARE Road Alt #1 for Runway Alt #1 (Ballyhoo Rd)
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	UARE Ballyhoo Rd Alt #1
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
03 - RW 30 Extend												
	Ballyhoo Rd-end											
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 6"	2,667 sy		-	-	10.50 /sy	-	-	10.50 /sy	28,000
			Asphalt Base Course 6"	2,667 sy		-	-	10.50 /sy	-	-	10.50 /sy	28,000
			Asphalt Binder Course 3"	2,667 sy		-	-	5.75 /sy	-	-	5.75 /sy	15,333
			Asphalt Top Course 3"	2,667 sy		-	-	6.00 /sy	-	-	6.00 /sy	16,000
			Asphalt Paving			/tn	/tn	/tn	/tn	/tn	/tn	**87,333**
		02766.100	**Pavement Marking**									
			Painted Lines 4" Wide	2,400 lf		-	-	0.12 /lf	-	-	0.12 /lf	288
			Pavement Marking			/lf	/lf	/lf	/lf	/lf	/lf	**288**
		02770.100	**Curbs**									
			Concrete Curb & Gutter 12"	1,600 lf	35.200	1.17 /lf	6.20 /lf	-	0.70 /lf	-	8.07 /lf	12,916
			Curbs		**35.200**	/lf	/lf	/lf	/lf	/lf	/lf	**12,916**
		03060.110	**Curing**									
			Liquid Curing Compounds	1,600 sf	3.200	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	237
			Curing		**3.200**	/sf	/sf	/sf	/sf	/sf	/sf	**237**
		03110.120	**Forms- Curbs**									
			Forms - Curbs 6 - 12"	3,200 sf	224.000	4.13 /sf	0.72 /sf	-	-	-	4.85 /sf	15,528
			Forms- Curbs		**224.000**	/sf	/sf	/sf	/sf	/sf	/sf	**15,528**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	53 lf	2.133	2.20 /lf	0.73 /lf	-	-	-	2.92 /lf	156
			Expansion Joints		**2.133**	/lf	/lf	/lf	/lf	/lf	/lf	**156**
			Ballyhoo Rd-end		**264.533**	/LF	/LF	/LF	/LF	/LF	/LF	**116,458**
			03 - RW 30 Extend		**264.533**							**116,458**

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	15,370		264.533 hrs				8.49%	
Material	12,347						6.82%	
Subcontract	87,621						48.43%	
Equipment	1,121		17.778 hrs				0.62%	
Other								
	116,459	116,459					64.37	64.37%
Material Take-off Allowance	9.317			8.000 %	C		5.15%	
Labor Overtime	3.842			25.000 %	C		2.12%	
Bond	1.230				B		0.68%	
Overhead & Profit	17.469			15.000 %	C		9.66%	
Contingency	23.292			20.000 %	C		12.87%	
Market Conditions Allowance	9.317			8.000 %	C		5.15%	
Total		***180,926***						

Unalaska Airport Master Plan
UARE Road Alt #1 for Runway Alt #2 (Ballyhoo Rd)
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	UARE Ballyhoo Rd Alt #2
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
03 - RW 30 Extend												
	Ballyhoo Rd-end											
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 6"	1,667 sy		-	-	10.50 /sy	-	-	10.50 /sy	17,500
			Asphalt Base Course 6"	1,667 sy		-	-	10.50 /sy	-	-	10.50 /sy	17,500
			Asphalt Binder Course 3"	1,667 sy		-	-	5.75 /sy	-	-	5.75 /sy	9,583
			Asphalt Top Course 3"	1,667 sy		-	-	6.00 /sy	-	-	6.00 /sy	10,000
			Asphalt Paving			**/tn**	**/tn**	**/tn**	**/tn**	**/tn**	**/tn**	**54,583**
		02766.100	**Pavement Marking**									
			Painted Lines 4" Wide	1,500 lf		-	-	0.12 /lf	-	-	0.12 /lf	180
			Pavement Marking			**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**180**
		02770.100	**Curbs**									
			Concrete Curb & Gutter 12"	1,000 lf	22.000	1.17 /lf	6.20 /lf	-	0.70 /lf	-	8.07 /lf	8,073
			Curbs		**22.000**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**8,073**
		03060.110	**Curing**									
			Liquid Curing Compounds	1,000 sf	2.000	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	148
			Curing		**2.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**148**
		03110.120	**Forms- Curbs**									
			Forms - Curbs 6 - 12"	2,000 sf	140.000	4.13 /sf	0.72 /sf	-	-	-	4.85 /sf	9,705
			Forms- Curbs		**140.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**9,705**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	33 lf	1.333	2.20 /lf	0.73 /lf	-	-	-	2.92 /lf	97
			Expansion Joints		**1.333**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**97**
			Ballyhoo Rd-end		**165.333**	**/LF**	**/LF**	**/LF**	**/LF**	**/LF**	**/LF**	**72,786**
			03 - RW 30 Extend		**165.333**							**72,786**

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	9,606		165.333 hrs				8.50%	
Material	7,717						6.82%	
Subcontract	54,763						48.43%	
Equipment	700		11.111 hrs				0.62%	
Other								
	72,786	72,786					64.37	64.37%
Material Take-off Allowance	5.823			8.000 %	C		5.15%	
Labor Overtime	2.401			25.000 %	C		2.12%	
Bond	769				B		0.68%	
Overhead & Profit	10.918			15.000 %	C		9.66%	
Contingency	14.557			20.000 %	C		12.87%	
Market Conditions Allowance	5.823			8.000 %	C		5.15%	
Total		***113,077***						

Unalaska A rt Master Plan
UARE Road Alt #1 for Runway Alt #4 (Ballyhoo Rd)
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	UARE Ballyhoo Rd Alt #4
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
3 - RW 30 Extend												
	Ballyhoo Rd-end											
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 6"	3,667 sy		-	-	10.50 /sy	-	-	10.50 /sy	38,500
			Asphalt Base Course 6"	3,667 sy		-	-	10.50 /sy	-	-	10.50 /sy	38,500
			Asphalt Binder Course 3"	3,667 sy		-	-	5.75 /sy	-	-	5.75 /sy	21,083
			Asphalt Top Course 3"	3,667 sy		-	-	6.00 /sy	-	-	6.00 /sy	22,000
			Asphalt Paving			/tn	/tn	/tn	/tn	/tn	/tn	**120,083**
		02766.100	**Pavement Marking**									
			Painted Lines 4" Wide	3,300 lf		-	-	0.12 /lf	-	-	0.12 /lf	396
			Pavement Marking			/lf	/lf	/lf	/lf	/lf	/lf	**396**
		02770.100	**Curbs**									
			Concrete Curb & Gutter 12"	2,200 lf	48.400	1.35 /lf	6.20 /lf	-	0.70 /lf	-	8.25 /lf	18,147
			Curbs		**48.400**	/lf	/lf	/lf	/lf	/lf	/lf	**18,147**
		03060.110	**Curing**									
			Liquid Curing Compounds	2,200 sf	4.400	0.11 /sf	0.05 /sf	-	-	-	0.16 /sf	357
			Curing		**4.400**	/sf	/sf	/sf	/sf	/sf	/sf	**357**
		03110.120	**Forms- Curbs**									
			Forms - Curbs 6 - 12"	4,400 sf	308.000	4.75 /sf	0.72 /sf	-	-	-	5.47 /sf	24,079
			Forms- Curbs		**308.000**	/sf	/sf	/sf	/sf	/sf	/sf	**24,079**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	73 lf	2.933	2.52 /lf	0.73 /lf	-	-	-	3.25 /lf	238
			Expansion Joints		**2.933**	/lf	/lf	/lf	/lf	/lf	/lf	**238**
			Ballyhoo Rd-end		**363.733**	/LF	/LF	/LF	/L F	/LF	/LF	**163,300**
			03 - RW 30 Extend		**363.733**							**163,300**

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	24,303		363.733 hrs				9.55%	
Material	16,977						6.67%	
Subcontract	120,479						47.36%	
Equipment	1,541		24.444 hrs				0.61%	
Other								
	163,300	163,300					64.19	64.19%
Material Take-off Allowance	13.064			8.000 %	C		5.14%	
Labor Overtime	6.076			25.000 %	C		2.39%	
Bond	1.730				B		0.68%	
Overhead & Profit	24.495			15.000 %	C		9.63%	
Contingency	32.660			20.000 %	C		12.84%	
Market Conditions Allowance	13.064			8.000 %	C		5.14%	
Total		***254,389***						

Unalaska Airport Master Plan
Airport Runway Extension RW30 Tunnel
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport RW30 Tun
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
PM / Contact Name	K.Green/SEA
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
3 - RW 30 Extend												
	Tunnel											
		01910.400	**Pumps**									
			Dewatering Allowance	1 ls		-	-	150,000.00 /ls		-	150,000.00 /ls	150,000
			Pumps			/hr	/hr	/hr	/hr	/hr	/hr	**150,000**
		02317.000	**Earthwork**									
			Exc Mass - Tough	104,988 cuyd	3,149.640	1.73 /cuyd		-	4.50 /cu yd	-	6.23 /cuyd	654,219
			Load Stkpile W/Ldr Med Hard	120,736 cuyd	3,354.046	1.55 /cuyd		-	1.32 /cu yd	-	2.88 /cuyd	347,138
			Articulated Off-road 25cy (3 - 5 Mile)	76,121 cuyd	1,585.854	1.01 /cuyd		-	1.79 /cu yd	-	2.81 /cuyd	213,635
			Earthwork		**8,089.540**							**1,214,991**
		02320.070	**Backfill Soil/Rock Fill**									
			Struc Fill - Roads 3/4' minus	3,160 cy	75.840	1.32 /cy	35.10 /cy	-	0.32 /cy	-	36.75 /cy	116,116
			Bldg Fill Gravel - Native	101,180 cy	12,141.600	6.62 /cy		-	4.37 /cy	-	10.99 /cy	1,111,782
			Backfill Soil/Rock Fill		**12,217.440**	/cy	/cy	/cy	/cy	/cy	/cy	**1,227,898**
		03060.110	**Curing**									
			Liquid Curing Compounds	160,631 sf	321.262	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	23,746
			Liquid Curing Compounds	85,320 sf	170.639	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	12,613
			Liquid Curing Compounds	34,998 sf	69.997	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	5,174
			Curing		**561.898**	/sf	/sf	/sf	/sf	/sf	/sf	**41,533**
		03060.120	**Hardener**									
			Seal Floors	85,320 sf	170.639	0.10 /sf	0.04 /sf	-	-	-	0.14 /sf	11,717
			Hardener		**170.639**	/sf	/sf	/sf	/sf	/sf	/sf	**11,717**
		03110.140	**Forms- Footing**									
			Continuous Footing Forms > 12"	14,694 sf	1,043.274	4.19 /sf	0.89 /sf	-	-	-	5.08 /sf	74,706
			Forms- Footing		**1,043.274**	/sf	/sf	/sf	/sf	/sf	/sf	**74,706**
		03110.300	**Forms- Suspended Slab**									
			Form Suspended Slab 15-up	34,998 sf	2,624.869	4.43 /sf	1.10 /sf	-	-	-	5.53 /sf	193,550
			Slab Edge Form > 1'	114,280 sf	27,427.200	14.17 /sf	2.80 /sf	-	-	-	16.97 /sf	1,939,204
			Forms- Suspended Slab		**30,052.069**	/sf	/sf	/sf	/sf	/sf	/sf	**2,132,754**
		03110.500	**Forms- Wall Forms Gang**									
			Gang Forms 16- >	160,631 sf	33,427.332	12.29 /sf	1.86 /sf	-	-	-	14.14 /sf	2,271,982
			Forms- Wall Forms Gang		**33,427.332**	/sf	/sf	/sf	/sf	/sf	/sf	**2,271,982**
		03110.560	**Forms- Strip & Oil**									
			Strip & Oil Suspended Slab Frm	34,998 sf	174.991	0.24 /sf	-	-	-	-	0.24 /sf	8,341
			Strip & Oil Footing Forms	14,694 sf	73.470	0.24 /sf	-	-	-	-	0.24 /sf	3,502
			Strip & Oil Wall Forms	160,631 sf	803.156	0.24 /sf	-	-	-	-	0.24 /sf	38,282
			Strip & Oil SOG Form	10,665 sf	53.325	0.24 /sf	-	-	-	-	0.24 /sf	2,542
			Forms- Strip & Oil		**1,104.942**	/sf	/sf	/sf	/sf	/sf	/sf	**52,667**
		03110.600	**Forms- Wall Access**									
			Wall Bulkhead Forms	2,268 sf	680.468	17.71 /sf	1.05 /sf	-	-	-	18.76 /sf	42,554
			Forms- Wall Access		**680.468**	/ls	/ls	/ls	/ls	/ls	/ls	**42,554**
		03110.660	**Forms- Wall Inserts**									
			Pour Strips	149,278 lf	7,463.913	2.38 /lf	0.19 /lf	-	-	-	2.57 /lf	383,981
			Forms- Wall Inserts		**7,463.913**	/ls	/ls	/ls	/ls	/ls	/ls	**383,981**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		03150.100	**Keyway**									
			Keyway 4"	3,666 lf	54.953	0.89 /lf	0.37 /lf	-	-	-	1.25 /lf	4,592
			Horizontal Wall Keyway 4"	2,833 lf	42.467	0.89 /lf	0.37 /lf	-	-	-	1.25 /lf	3,548
			Keyway		**97.420**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**8,140**
		03150.120	**Vapor Barrier**									
			6 Mil. Vapor Barrier	85,320 sf	170.639	0.14 /sf	0.01 /sf	-	-	-	0.16 /sf	13,200
			Vapor Barrier		**170.639**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**13,200**
		03150.170	**Waterstop**									
			Waterstop 9" Flat	4,372 lf	65.536	0.71 /lf	2.36 /lf	-	-	-	3.08 /lf	13,453
			Waterstop		**65.536**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**13,453**
		03200.110	**Rebar- by Lbs/CY**									
			Footing Rebar	76 tn	763.750	721.05 /tn	777.00 /tn	-	-	-	1,498.05 /tn	114,414
			SOG Rebar	205 tn	2,053.990	721.05 /tn	777.00 /tn	-	-	-	1,498.05 /tn	307,698
			Wall Rebar	390 tn	3,904.230	721.05 /tn	777.00 /tn	-	-	-	1,498.05 /tn	584,873
			Suspended Slab Rebar	259 tn	2,592.460	721.05 /tn	777.00 /tn	-	-	-	1,498.05 /tn	388,363
			Rebar- by Lbs/CY		**9,314.430**	**/ton**	**/ton**	**/to n**	**/to n**	**/to n**	**/ton**	**1,395,348**
		03220.100	**Wire Mesh- Rolls**									
			Mesh Support - bricks	11,415 ea	22.830	0.14 /ea	0.19 /ea	-	-	-	0.33 /ea	3,804
			Wire Mesh- Rolls		**22.830**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**3,804**
		03300.010	**Concrete- Buy**									
			4000 psi Concrete	2,037 cy		-	113.40 /cy	-	-	-	113.40 /cy	230,958
			4000 psi Concrete	4,462 cy		-	113.40 /cy	-	-	-	113.40 /cy	505,988
			4000 psi Concrete	3,160 cy		-	113.40 /cy	-	-	-	113.40 /cy	358,343
			4000 psi Concrete	2,592 cy		-	113.40 /cy	-	-	-	113.40 /cy	293,985
			Concrete- Buy			**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,389,274**
		03310.100	**Place- Wall Footings**									
			Pump Place Wall Footings	2,037 cy	1,303.467	33.53 /cy	-	-	-	-	33.53 /cy	68,290
			Place- Wall Footings		**1,303.467**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**68,290**
		03310.170	**Place- S-O-G**									
			Pump Place Slab on Grade	3,160 cy	1,554.714	25.78 /cy	-	-	-	-	25.78 /cy	81,453
			Place- S-O-G		**1,554.714**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**81,453**
		03310.180	**Place- Suspended Slab**									
			Pump Place Suspended Slab	2,592 cy	1,184.756	23.94 /cy	-	-	-	-	23.94 /cy	62,071
			Place- Suspended Slab		**1,184.756**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**62,071**
		03310.200	**Place- Walls**									
			Pump Place Walls	4,462 cy	2,596.869	30.49 /cy	-	-	-	-	30.49 /cy	136,053
			Place- Walls		**2,596.869**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**136,053**
		03350.100	**Finish Flatwork**									
			Finish- Hard Trowel	85,320 sf	1,278.942	0.80 /sf	0.03 /sf	-	-	-	0.83 /sf	70,597
			Finish- Hard Trowel	34,998 sf	524.624	0.80 /sf	0.03 /sf	-	-	-	0.83 /sf	28,959
			Finish Flatwork		**1,803.566**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**99,556**
		03350.120	**Patch & Grind**									
			Grind/Patch Walls	160,631 sf	2,407.860	0.71 /sf	0.01 /sf	-	-	-	0.72 /sf	116,377
			Patch & Grind		**2,407.860**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**116,377**
		07100.100	**Waterproofing**									

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		07100.100	**Waterproofing**									
			Trowel On Waterproofing	180,000 sf	2,880.000	0.99 /sf	0.80 /sf	-	-	-	1.80 /sf	323,223
			Waterproofing		**2,880.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**323,223**
		16521.360	**Sodium Comm Surface HP**									
			250w Commercial Surface HPS Fixture + Wiring Allow: Tunnel	100 E	70.000	47.88 /E	500.00 /E	1,000.00 /E	-	-	1,547.88 /E	154,788
			250w Commercial Surface HPS Fixture + Wiring Allow: Ramps	70 E	49.000	47.88 /E	500.00 /E	1,000.00 /E	-	-	1,547.88 /E	108,352
			Sodium Comm Surface HP		**119.000**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**263,140**
			Tunnel		**118,332.602**							**11,578,163**
			03 - RW 30 Extend		**########**							**11,578,163**

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	6,853,187		118,332.602 hrs				35.53%	
Material	3,193,502						16.55%	
Subcontract	320,000						1.66%	
Equipment	1,211,474		13,146.805 hrs				6.28%	
Other								
	11,578,163	11,578,163					60.02	60.02%
Material Take-off Allowance	926.253			8.000 %	C		4.80%	
Labor Overtime	1.713.297			25.000 %	C		8.88%	
Bond	94.379				B		0.49%	
Overhead & Profit	1.736.724			15.000 %	C		9.00%	
Contingency	2.315.633			20.000 %	C		12.00%	
Market Conditions Allowance	926.253			8.000 %	C		4.80%	
Total		***19,290,702***						

Unalaska A[illegible]rt Master Plan
UARE Road Alt #4B (Beach Rd Realignment)
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Beach Re
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
)4 - Biorka Rd Conn												
	Beach Rd_Biorka Conn											
		01050.100	**Permits**									
			Cultural Resources	1 ls		-		500,000.00 /ls	-	-	500,000.00 /ls	500,000
			Permits			**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**500,000**
			Beach Rd_Biorka Conn			**/LF**	**/LF**	**/LF**	**/L F**	**/LF**	**/LF**	**500,000**
			04 - Biorka Rd Conn									**500,000**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
05 - Beach Rd ReAlgn												
	Beach Rd ReAlign											
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 6"	2,167 sy		-	-	10.50 /sy	-	-	10.50 /sy	22,750
			Asphalt Base Course 6"	2,167 sy		-	-	10.50 /sy	-	-	10.50 /sy	22,750
			Asphalt Binder Course 3"	2,167 sy		-	-	5.75 /sy	-	-	5.75 /sy	12,458
			Asphalt Top Course 3"	2,167 sy		-	-	6.00 /sy	-	-	6.00 /sy	13,000
			Asphalt Paving			/tn	/tn	/tn	/tn	/tn	/tn	**70,958**
		02766.100	**Pavement Marking**									
			Painted Lines 4" Wide	1,950 lf		-	-	0.12 /lf	-	-	0.12 /lf	234
			Pavement Marking			/lf	/lf	/lf	/lf	/lf	/lf	**234**
		02770.100	**Curbs**									
			Concrete Curb & Gutter 12"	1,300 lf	28.600	1.17 /lf	6.20 /lf	-	0.70 /lf	-	8.07 /lf	10,494
			Curbs		**28.600**	/lf	/lf	/lf	/lf	/lf	/lf	**10,494**
		03060.110	**Curing**									
			Liquid Curing Compounds	1,300 sf	2.600	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	192
			Curing		**2.600**	/sf	/sf	/sf	/sf	/sf	/sf	**192**
		03110.120	**Forms- Curbs**									
			Forms - Curbs 6 - 12"	2,600 sf	182.000	4.13 /sf	0.72 /sf	-	-	-	4.85 /sf	12,617
			Forms- Curbs		**182.000**	/sf	/sf	/sf	/sf	/sf	/sf	**12,617**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	43 lf	1.733	2.20 /lf	0.73 /lf	-	-	-	2.92 /lf	127
			Expansion Joints		**1.733**	/lf	/lf	/lf	/lf	/lf	/lf	**127**
			Beach Rd ReAlign		**214.933**	/LF	/LF	/LF	/L F	/LF	/LF	**94,622**
			05 - Beach Rd ReAlgn		**214.933**							**94,622**

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	12,488		214.933 hrs				1.38%	
Material	10,032						1.11%	
Subcontract	571,192						62.96%	
Equipment	910		14.444 hrs				0.10%	
Other								
	594,622	594,622					65.55	65.55%
Material Take-off Allowance	47.570			8.000 %	C		5.24%	
Labor Overtime	3.122			25.000 %	C		0.34%	
Bond	6.169				B		0.68%	
Overhead & Profit	89.193			15.000 %	C		9.83%	
Contingency	118.924			20.000 %	C		13.11%	
Market Conditions Allowance	47.570			8.000 %	C		5.24%	
Total		***907,170***						

Unalaska A... rt Master Plan
UARE Road Alt #5 (Beach Rd - Biorka Connector)
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Beach Rd
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
IDC Project No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
4 - Biorka Rd Conn												
	Beach Rd_Biorka Conn											
		02200.130	**Demo- Buildings**									
			Demo Wood Building	14,000 sf		-	-	3.50 /sf	-	-	3.50 /sf	49,000
			Demo- Buildings			/sf	/sf	/sf	/sf	/sf	/sf	**49,000**
		02317.000	**Earthwork**									
			Exc Mass - Tough	11,000 cuyd	330.000	1.99 /cuyd		-	4.50 /cu yd	-	6.49 /cuyd	71,404
			Load Stkpile W/Ldr Med Hard	11,000 cuyd	305.580	1.79 /cuyd		-	1.32 /cu yd	-	3.11 /cuyd	34,191
			Load Stkpile W/Ldr Med Hard-Upgrade Existing Roadway	480 cuyd	13.334	1.79 /cuyd		-	1.32 /cu yd	-	3.11 /cuyd	1,492
			Bobtail (Truck/trailer) 24cy (1 - 3 Mile)-Upgrade Existing Roadway	480 cuyd	4.800	0.56 /cuyd		-	0.60 /cu yd	-	1.16 /cuyd	558
			Articulated Off-road 25cy (3 - 5 Mile)-Excavation	11,000 cuyd	229.167	1.16 /cuyd		-	1.79 /cu yd	-	2.96 /cuyd	32,542
			Earthwork		**882.881**							**140,187**
		02370.050	**Slope & Erosion Control**									
			Precast Concrete Retaining Wall System	55,000 sf	4,009.500	4.60 /sf	36.00 /sf	-	2.00 /sf	-	42.60 /sf	2,342,999
			Slope & Erosion Control		**4,009.500**	/sf	/sf	/sf	/sf	/sf	/sf	**2,342,999**
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 6"	1,833 sy		-	-	10.50 /sy	-	-	10.50 /sy	19,250
			Asphalt Base Course 6"	1,833 sy		-	-	10.50 /sy	-	-	10.50 /sy	19,250
			Asphalt Base Course 6"	2,500 sy		-	-	10.50 /sy	-	-	10.50 /sy	26,250
			Asphalt Base Course 6"	2,500 sy		-	-	10.50 /sy	-	-	10.50 /sy	26,250
			Asphalt Binder Course 3"	1,833 sy		-	-	5.75 /sy	-	-	5.75 /sy	10,542
			Asphalt Binder Course 3"	2,500 sy		-	-	5.75 /sy	-	-	5.75 /sy	14,375
			Asphalt Top Course 3"	1,833 sy		-	-	6.00 /sy	-	-	6.00 /sy	11,000
			Asphalt Top Course 3"	2,500 sy		-	-	6.00 /sy	-	-	6.00 /sy	15,000
			Cold Plane Asphalt - Upgrade Existing Roadway	2,500 sy		-	-	-	-	5.00 /sy	5.00 /sy	12,500
			Asphalt Paving			/tn	/tn	/tn	/tn	/tn	/tn	**154,417**
		02766.100	**Pavement Marking**									
			Painted Lines 4" Wide	1,650 lf		-	-	0.12 /lf	-	-	0.12 /lf	198
			Painted Lines 4" Wide	2,250 lf		-	-	0.12 /lf	-	-	0.12 /lf	270
			Pavement Marking			/lf	/lf	/lf	/lf	/lf	/lf	**468**
		02770.100	**Curbs**									
			Concrete Curb & Gutter 12"	1,100 lf	24.200	1.35 /lf	6.20 /lf	-	0.70 /lf	-	8.25 /lf	9,073
			Concrete Curb & Gutter 12"	1,500 lf	33.000	1.35 /lf	6.20 /lf	-	0.70 /lf	-	8.25 /lf	12,373
			Curbs		**57.200**	/lf	/lf	/lf	/lf	/lf	/lf	**21,446**
		02895.100	**Walk /Road / Parking Imp**									
			Precast Bridge	4,500 sf		20.00 /sf	100.00 /sf	-	10.00 /sf	-	130.00 /sf	585,000
			Walk /Road / Parking Imp									**585,000**
		02895.200	**Buildings**									
			New Houses	4,625 sf				200.00 /sf	-	-	200.00 /sf	925,000
			New Warehouse	9,275 sf				125.00 /sf	-	-	125.00 /sf	1,159,375
			Buildings			/ea	/ea	/ea	/ea	/ea	/ea	**2,084,375**
		03060.110	**Curing**		**5.200**	/sf	/sf	/sf	/sf	/sf		**422**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		03110.120	**Forms- Curbs**									
			Forms - Curbs 6 - 12"	2,200 sf	154.000	4.75 /sf	0.72 /sf	-	-	-	5.47 /sf	12,039
			Forms - Curbs 6 - 12"	3,000 sf	210.000	4.75 /sf	0.72 /sf	-	-	-	5.47 /sf	16,417
			Forms- Curbs		**364.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**28,457**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	37 lf	1.467	2.52 /lf	0.73 /lf	-	-	-	3.25 /lf	119
			Expansion Joint - LF	50 lf	2.000	2.52 /lf	0.73 /lf	-	-	-	3.25 /lf	162
			Expansion Joints		**3.467**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**282**
			Beach Rd_Biorka Conn		**5,322.248**	**/LF**	**/LF**	**/LF**	**/L F**	**/LF**	**/LF**	**5,407,052**
			04 - Biorka Rd Conn		**5,322.248**							**5,407,052**

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	427,232		5,322.248 hrs	
Material	2,450,063			
Subcontract	2,275,760			
Equipment	241,497		######## hrs	
Other	12,500			
	5,407,052	5,407,052		
Material Take-off Allowance	432.564			8.000 %
Labor Overtime	106.808			25.000 %
Bond	46.097			
Overhead & Profit	811.058			15.000 %
Contingency	1.081.410			20.000 %
Market Conditions Allowance	432.564			8.000 %
Total		***8,317,553***		

Unalaska A rt Master Plan
Airport Runway Extension Bldg Demolition
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Bldg Dem
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
PM / Contact Name	K.Green/SEA
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
9 - Misc Items												
	Bldg Demo											
		02200.130	**Demo- Buildings**									
			Demo Wood/Stl Bldg - PT #03 - Airport Hsg-Staff	12,960 cf		-	-	0.31 /cf	-	-	0.31 /cf	4,024
			Demo Wood/Stl Bldg - PT #04 - Airport Hsg-Staff	12,984 cf		-	-	0.31 /cf	-	-	0.31 /cf	4,032
			Demo Wood/Stl Bldg - PT #15 - Aerology Bldg-Top	70,544 cf		-	-	0.31 /cf	-	-	0.31 /cf	21,904
			Demo Wood/Stl Bldg - PT #17 - PenAir Cargo Bldg (2)	44,730 cf		-	-	0.31 /cf	-	-	0.31 /cf	13,889
			Demo Wood/Stl Bldg - PT #23 - ACE Cargo Bldg (1)	126,240 cf		-	-	0.31 /cf	-	-	0.31 /cf	39,198
			Demo Wood/Stl Bldg - PT #34 - Housing Unit 1 (hill1)	51,100 cf		-	-	0.31 /cf	-	-	0.31 /cf	15,867
			Demo Wood/Stl Bldg - PT #35 - Housing Unit 2 (hill2)	46,660 cf		-	-	0.31 /cf	-	-	0.31 /cf	14,488
			Demo Steel Bldg - Pt #01 - Abandoned Hanger	137,592 cf		-	-	0.35 /cf	-	-	0.35 /cf	47,469
			Demo Steel Bldg - Pt #06 - ARFF/Adm Bldg-Tier 1	158,000 cf		-	-	0.35 /cf	-	-	0.35 /cf	54,510
			Demo Steel Bldg - Pt #07 - ARFF/Adm Bldg-Tier 2	189,600 cf		-	-	0.35 /cf	-	-	0.35 /cf	65,412
			Demo Steel Bldg - Pt #08 - ARFF/Adm Bldg-Tier 3	268,600 cf		-	-	0.35 /cf	-	-	0.35 /cf	92,667
			Demo Steel Bldg - Pt #11 - Hanger 1 B Ramp	440,316 cf		-	-	0.35 /cf	-	-	0.35 /cf	151,909
			Demo Steel Bldg - Pt #18 - Torpedo Bldg - Tier 1	147,140 cf		-	-	0.35 /cf	-	-	0.35 /cf	50,763
			Demo Steel Bldg - Pt #19 - Torpedo Bldg - Tier 2	210,200 cf		-	-	0.35 /cf	-	-	0.35 /cf	72,519
			Demo Steel Bldg - Pt #20 - Torpedo Bldg - Tier 3	378,360 cf		-	-	0.35 /cf	-	-	0.35 /cf	130,534
			Demo Steel Bldg - Pt #24 - Terminal - Tier 1	392,712 cf		-	-	0.35 /cf	-	-	0.35 /cf	135,486
			Demo Steel Bldg - Pt #24 - Terminal - Tier 2	359,986 cf		-	-	0.35 /cf	-	-	0.35 /cf	124,195
			Demo Conc/Stl Bldg - PT #12 - Hanger 2 B Ramp	602,272 cf		-	-	0.39 /cf	-	-	0.39 /cf	235,488
			Demo- Buildings			/sf	/sf	/sf	/sf	/sf	/sf	1,274,353
			Bldg Demo									1,274,353
			09 - Misc Items									1,274,353

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor								
Material								
Subcontract	1,274,353						65.77%	
Equipment								
Other								
	1,274,353	1,274,353					65.77	65.77%
Material Take-off Allowance	101.948			8.000 %	C		5.26%	
Labor Overtime				25.000 %	C			
Bond	13.175				B		0.68%	
Overhead & Profit	191.153			15.000 %	C		9.87%	
Contingency	254.871			20.000 %	C		13.15%	
Market Conditions Allowance	101.948			8.000 %	C		5.26%	
Total		***1,937,448***						

Unalaska Airport Master Plan
Airport Runway Extension Building Replacement
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Bldg Rep
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
PM / Contact Name	K.Green/SEA
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
9 - Misc Items												
	Bldg Replacement											
		13010.050	Buildings									
			Replace Bldg - PT #03 - Airport Hsg-Staff	12,960 cf			0.00 /cf	8.63 /cf	-	-	8.63 /cf	111,845
			Replace Bldg - PT #04 - Airport Hsg-Staff	12,984 cf				8.63 /cf	-	-	8.63 /cf	112,052
			Replace Bldg - PT #15 - Aerology Bldg-Top	70,544 cf				10.08 /cf	-	-	10.08 /cf	711,084
			Replace Bldg - PT #17 - PenAir Cargo Bldg (2)	44,730 cf				4.17 /cf	-	-	4.17 /cf	186,524
			Replace Bldg - PT #23 - ACE Cargo Bldg (1)	126,240 cf				4.17 /cf	-	-	4.17 /cf	526,421
			Replace Bldg - PT #34 - Housing Unit 1 (hill1)	51,100 cf				9.92 /cf	-	-	9.92 /cf	506,912
			Replace Bldg - PT #35 - Housing Unit 2 (hill2)	46,660 cf				9.92 /cf	-	-	9.92 /cf	462,867
			Replace Bldg - Pt #06 - ARFF/Adm Bldg-Tier 1	158,000 cf				3.77 /cf	-	-	3.77 /cf	595,660
			Replace Bldg - Pt #06 - ARFF/Adm Bldg-Tier 2	189,600 cf				3.77 /cf	-	-	3.77 /cf	714,792
			Replace Bldg - Pt #08 - ARFF/Adm Bldg-Tier 3	268,600 cf				3.77 /cf	-	-	3.77 /cf	1,012,622
			Replace Bldg - Pt #11 - Hanger 1 B Ramp	440,316 cf				4.09 /cf	-	-	4.09 /cf	1,800,892
			Replace Bldg - PT #12 - Hanger 2 B Ramp	602,272 cf				4.09 /cf	-	-	4.09 /cf	2,463,292
			Replace Bldg - Pt #24 - Terminal - Tier 1	392,712 cf				7.42 /cf	-	-	7.42 /cf	2,913,923
			Replace Bldg - Pt #24 - Terminal - Tier 2	359,986 cf				7.42 /cf	-	-	7.42 /cf	2,671,096
			Buildings			/cf	/cf	/cf	/cf	/cf	/cf	**14,789,982**
			Bldg Replacement									**14,789,982**
			09 - Misc Items									**14,789,982**

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor								
Material								
Subcontract	14,789,982						65.91%	
Equipment								
Other								
	14,789,982	14,789,982					65.91	65.91%
Material Take-off Allowance	1.183.199			8.000 %	C		5.27%	
Labor Overtime				25.000 %	C			
Bond	108.241				B		0.48%	
Overhead & Profit	2.218.497			15.000 %	C		9.89%	
Contingency	2.957.996			20.000 %	C		13.18%	
Market Conditions Allowance	1.183.199			8.000 %	C		5.27%	
Total		***22,441,114***						

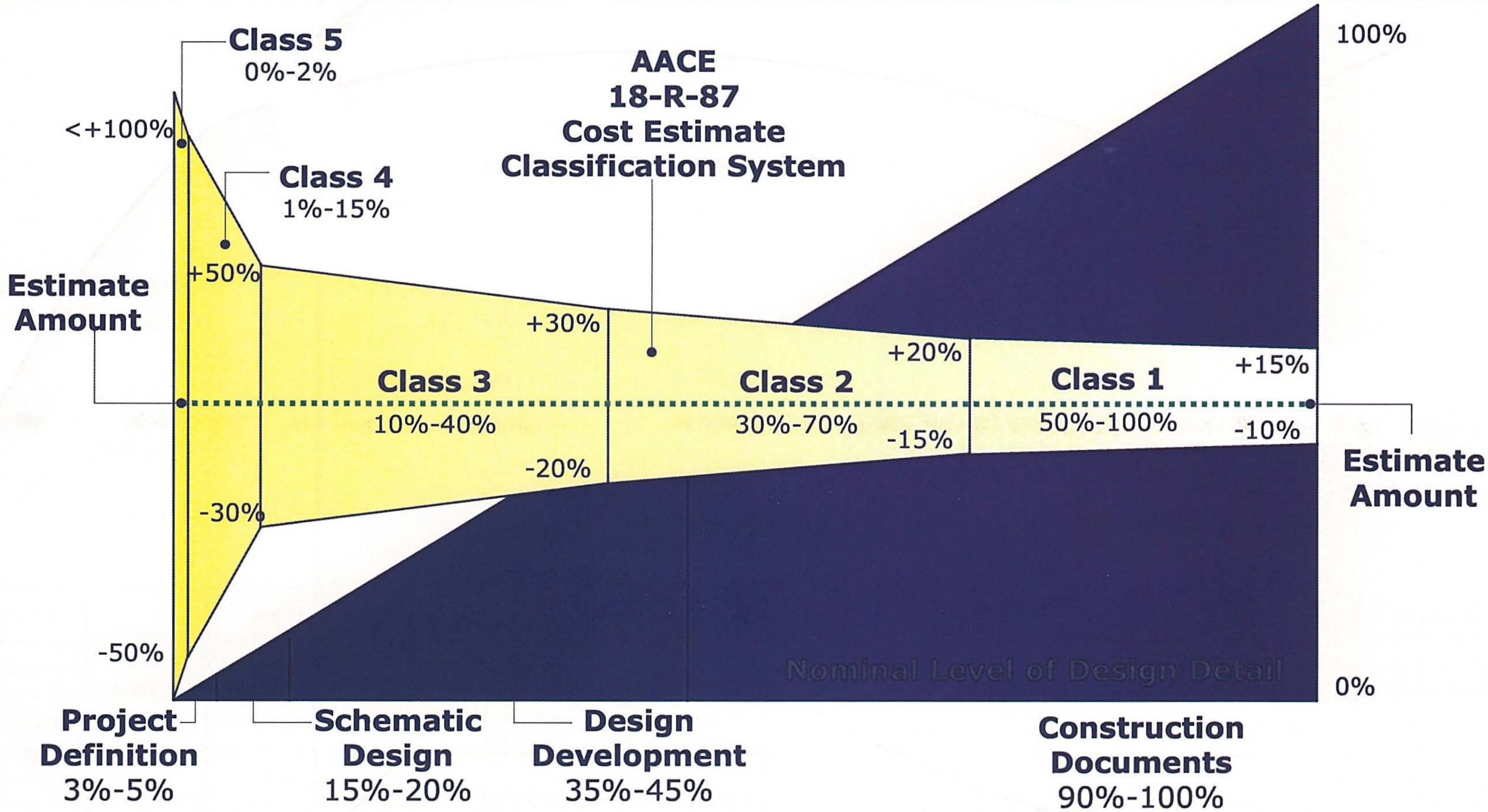
Unalaska Airport Masterplan Construction Cost Estimate

Alternatives Cost Summary

9-Apr-07

Rwy Alternative	Low Range -30%	Estimate Range	High Range 50%	Runway Extensions and Widening	Bldg Demo	Bldg Replacement	Access to West of Mt. Ballyhoo: Road Alt 1 - Ballyhoo Rd. End Arounf for Rwy Alt 3	Access to West of Mt. Ballyhoo: Tunnel	Access to West of Mt. Ballyhoo: Road Alt 1 - Ballyhoo Rd. End Arounf for Rwy Alt 2	Access to West of Mt. Ballyhoo: Road Alt 1 - Ballyhoo Rd. End Arounf for Rwy Alt 4	Access to East of Airport: Airport Beach Road Re-Alignment (Option 4B)	Access to East of Airport: Airport Beach Road / Biorka Connection (Option 5)	
Alternative 1		**$110,168,860**		$84,883,128	$1,937,448	$22,441,114					$907,170		<--- Selected Road Alternative
	$77,118,202		**$165,253,290**					$19,290,702				$8,317,553	<--- Not Selected Road Alternative
Alternative 2		**$105,464,944**		$80,066,135	$1,937,448	$22,441,114			$113,077		$907,170		<--- Selected Road Alternative
	$73,825,461		**$158,197,416**					$19,290,702				$8,317,553	<--- Not Selected Road Alternative
Alternative 3		**$105,014,472**		$79,547,814	$1,937,448	$22,441,114	$180,926				$907,170		<--- Selected Road Alternative
	$73,510,130		**$157,521,708**					$19,290,702				$8,317,553	<--- Not Selected Road Alternative
Alternative 4		**$96,000,983**		$70,460,862	$1,937,448	$22,441,114				$254,389	$907,170		<--- Selected Road Alternative
	$67,200,688		**$144,001,475**					$19,290,702				$8,317,553	<--- Not Selected Road Alternative

AACE – Classification System



Construction Cost Estimate Accuracy Ranges

CH2MHILL

Estimate Class	Class 5	Class 4	Class 3	Class 2	Class 1
LEVEL OF PROJECT DEFINITION Expressed as a % of complete definition	0% to 2%	1% to 15%	10% to 40%	30% to 70%	50% to 100%
END USAGE Typical Purpose of Estimate	Concept Screening	Study or Feasibility	Budget Authorization, or Control	Control or Bid / Tender	Check Estimate or Bid / Tender
METHODOLOGY Typical estimating method	Capacity Factored, Parametric Models, Judgment, or Analogy	Equipment Factored or Parametric Models	Semi-Detailed Unit Costs with Assembly Level Line Items	Detailed Unit Cost with Forced Detailed Take-Off	Detailed Unit Cost with Detailed Take-Off
EXPECTED ACCURACY RANGE Typical variation in low and high ranges [a]	L: -20% to -50% H: +30% to +100%	L: -15% to -30% H: +20% to +50%	L: -10% to -20% H: +10% to +30%	L: -5% to -15% H: +5% to +20%	L: -3% to -10% H: +3% to +15%
PREPARATION EFFORT Typical degree of effort relative to least cost index of 1 [b]	1	2 to 4	3 to 10	4 to 20	5 to 100
REFINED CLASS DEFINITION	Class 5 estimates are generally prepared based on very limited information, and subsequently have very wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systematic manner. Class 5 estimates, due to the requirements of end use, may be prepared within a very limited amount of time and with very little effort expended - sometimes requiring less than 1 hour to prepare. Often, little more than proposed plant type, location, and capacity are known at the time of estimate preparation.	Class 4 estimates are generally prepared based on very limited information, and subsequently have very wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Typically, engineering is from 1% to 5% complete, and would comprise at a minimum the following: plant capacity, block schematics, indicated layout, process flow diagrams (PFDs) for main process systems and preliminary engineered process and utility equipment lists. Level of Project Definition Required: 1% to 15% of full project definition.	Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation, and/or funding. As such, they typically form the initial control estimate against which all actual costs and resources will be monitored. Typically, engineering is from 10% to 40% complete, and would comprise at a minimum the following: process flow diagrams, utility flow diagrams, preliminary piping and instrument diagrams, utility flow diagrams, preliminary piping and instrument diagrams, plot plan, developed layout drawings, and essentially complete engineering process and utility equipment lists. Level Of Project Definition Required: 10% to 40% of full project definition.	Class 2 estimates are generally prepared to form a detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the "bid" estimate to establish contract value. Typically, engineering is from 30% to 70% complete, and would comprise at a minimum the following: Process flow diagrams, utility flow diagrams, piping and instrument flow diagrams, heat and material balances, final plot plan, final layout drawings, complete engineered process and utility equipment lists, single line diagrams for electrical, electrical equipment and motor schedules, vendor quotations, detailed project execution plans, resourcing and work force plans, etc.	Class 1 estimates are generally prepared for discrete parts or sections of the total project rather than generating this level of detail for the entire project. The parts of the project estimated at this level of detail will typically be used by subcontractors for bids, or by owners for check estimates. The updated estimate is often referred to as the current control estimate and becomes the new baseline for cost/schedule control of the project. Class 1 estimates may be prepared for parts of the project to comprise a fair price estimate or bid check estimate to compare against a contractor's bid estimate, or to evaluate/dispute claims. Typically, engineering is from 50% to 100% complete, and would comprise virtually all engineering and design documentation of the project, and complete project execution and commissioning plans. Level for Project Definition Required: 50% to 100% of full project definition.
END USAGE DEFINED	Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.	Class 4 estimates are prepared for a number of purposes, such as but not limited to, detailed strategic planning, business development, project screening at more developed stages, alternative scheme analysis, confirmation of economic and/or technical feasibility, and preliminary budget approval or approval to proceed to next stage.	Class 3 estimates are typically prepared to support full project funding requests, and become the first of the project phase "control estimate" against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates. In many owner organizations, a Class 3 estimate may be the last estimate required and could well form the only basis for cost/schedule control.	Class 2 estimates are typically prepared as the detailed control baseline against which all actual costs an resources will now be monitored for variation to the budget, and form a part of the change/variation control program.	Class 1 estimates are typically prepared to form a current control estimate to be used as the final control baseline against which all actual coasts and resources will now be monitored for variations to the budget, and form a part of the change/variation control program. They may be used to evaluate bid checking, to support vendor/contractor negotiations, or for claim evaluations and dispute resolution.
ESTIMATING METHODS USED	Class 5 estimates virtually always use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Handy-Whitman factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, and other parametric and modeling techniques.	Class 4 estimates virtually always use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, the Miller method, gross unit costs/ratios, and other parametric and modeling techniques.	Class 3 estimates usually involve more deterministic estimating methods that stochastic methods. They usually involve a high degree of unit cost line items, although these may be at an assembly level of detail rather than individual components. Factoring and other stochastic methods may be used to estimate less-significant areas of the project.	Class 2 estimates always involve a high degree of deterministic estimating methods. Class 2 estimates are prepared in great detail, and often involve tens of thousands of unit cost line items. For those areas of the project still undefined, an assumed level of detailed takeoff (forced detail) may be developed to use as line items in the estimate instead of relying on factoring methods.	Class 1 estimates involve the highest degree of deterministic estimating methods, and require a great amount of effort. Class 1 estimates are prepared in great detail, and thus are usually performed on only the most important or critical areas of the project. All items in the estimate are usually unit cost line items based on actual design quantities.
EXPECTED ACCURACY RANGE	Typical accuracy ranges for Class 5 estimates are -20% to 50% on the low side, and +30% to +100% on the high side, depending on the technological complexity of the project, appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 4 estimates are -15% to -30% on the low side, and +20% to +50% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 3 estimates are -10% to -20% on the low side, and +10% to +30% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 2 estimates are -5% to -15% on the low side, and +5% to +20% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 1 estimates are -3% to -10% on the low side, and +3% to +15% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.
EFFORT TO PREPARE (for US$20MM project):	As little as 1 hour or less to prepare to perhaps more than 200 hours, depending on the project and the estimating methodology used.	Typically, as little as 20 hours or less to perhaps more than 300 hours, depending on the project and the estimating methodology used.	Typically, as little as 150 hours or less to perhaps more than 1500 hours, depending on the project and the estimating methodology used.	Typically, as little as 300 hours or less to perhaps more than 3000 hours, depending on the project and the estimating methodology used. Bid Estimates typically require more effort than estimates used for funding or control purposes	Class 1 estimates require the most effort to create, and as such are generally developed for only selected areas of the project, or for bidding purposes. A complete Class 1 estimate may involve as little as 600 hours or less, to perhaps more than 6,000 hours, depending on the project and the estimating methodology used. Bid estimate typically require more effort than estimates used for funding or control purposes.
ANSI Standard Reference Z94.2-1989 name; Alternate Estimate Names, Terms, Expressions, Synonyms:	Order of Magnitude Estimate; Ratio, ballpark, blue sky, seat-of-pants, ROM, idea study, prospect estimate, concession license estimate, guesstimate, rule-of-thumb.	Budget Estimate; Screening, top-down, feasibility, authorization, factored, pre-design, pre-study.	Budget Estimate; Budget, scope, sanction, semi-detailed, authorization, preliminary control, concept study, development, basic engineering phase estimate, target estimate.	Definitive Estimate; Detailed Control, forced detail, execution phase, master control, engineering, bid, tender, change order estimate.	Definitive Estimate; Full detail, release, fall-out, tender, firm price, bottoms-up, final, detailed control, forced detail, execution phase, master control, fair price, definitive, change order estimate.

Estimate Class	Class 5	Class 4	Class 3	Class 2	Class 1
Estimate Input Checklist and Maturity Index	Class 5	Class 4	Class 3	Class 2	Class 1
GENERAL PROJECT DATA					
Project Scope Description	General	Preliminary	Defined	Defined	Defined
Plant Production / Facility Capacity	Assumed	Preliminary	Defined	Defined	Defined
Plant Location	General	Approximate	Specific	Specific	Specific
Soils & Hydrology	None	Preliminary	Defined	Defined	Defined
Integrated Project Plan	None	Preliminary	Defined	Defined	Defined
Project Master Schedule	None	Preliminary	Defined	Defined	Defined
Escalation Strategy	None	Preliminary	Defined	Defined	Defined
Work Breakdown Structure	None	Preliminary	Defined	Defined	Defined
Project Code of Accounts	None	Preliminary	Defined	Defined	Defined
Contracting Strategy	Assumed	Assumed	Preliminary	Defined	Defined

ENGINEERING DELIVERABLES:	Class 5	Class 4	Class 3	Class 2	Class 1
Block Flow Diagrams	Started / Preliminary	Preliminary / Complete	Complete	Complete	Complete
Plot Plans		Started	Preliminary / Complete	Complete	Complete
Process Flow Diagrams (PFDs)		Started / Preliminary	Preliminary / Complete	Complete	Complete
Utility Flow Diagrams (UFDs)		Started / Preliminary	Preliminary / Complete	Complete	Complete
Piping & Instrument Diagrams (P&IDS)		Started	Preliminary / Complete	Complete	Complete
Heat and Material Balances		Started	Preliminary / Complete	Complete	Complete
Process Equipment List		Started / Preliminary	Preliminary / Complete	Complete	Complete
Utility Equipment List		Started / Preliminary	Preliminary / Complete	Complete	Complete
Electrical One Line Drawings		Started / Preliminary	Preliminary / Complete	Complete	Complete
Specifications and Datasheets		Started	Preliminary / Complete	Complete	Complete
General Equipment Arrangement Drawings		Started	Preliminary / Complete	Complete	Complete
Spare Parts Lists			Started / Preliminary	Preliminary	Complete
Architectural Details / Schedules		Started	Preliminary / Complete	Complete	Complete
Structural Details		Started	Preliminary / Complete	Complete	Complete
Mechanical Discipline Drawings			Started	Preliminary	Preliminary / Complete
Electrical Discipline Drawings			Started	Preliminary	Preliminary / Complete
System Discipline Drawings			Started	Preliminary	Preliminary / Complete
Civil/Site Discipline Drawings			Started	Preliminary	Preliminary / Complete
Demolition Details		Started	Preliminary / Complete	Complete	Complete

Unalaska A t Master Plan
UARE Road Alt #4B (Beach Rd Realignment)
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Beach Re
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
04 - Biorka Rd Conn												
	Beach Rd_Biorka Conn											
		01050.100	Permits									
			Cultural Resources	1 ls		-		500,000.00 /ls	-	-	500,000.00 /ls	500,000
			Permits			/ls	/ls	/ls	/ls	/ls	/ls	500,000
			Beach Rd_Biorka Conn			/LF	/LF	/LF	/LF	/LF	/LF	500,000
			04 - Biorka Rd Conn									500,000

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
)5 - Beach Rd ReAlgn												
	Beach Rd ReAlign											
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 6"	2,167 sy		-	-	10.50 /sy	-	-	10.50 /sy	22,750
			Asphalt Base Course 6"	2,167 sy		-	-	10.50 /sy	-	-	10.50 /sy	22,750
			Asphalt Binder Course 3"	2,167 sy		-	-	5.75 /sy	-	-	5.75 /sy	12,458
			Asphalt Top Course 3"	2,167 sy		-	-	6.00 /sy	-	-	6.00 /sy	13,000
			Asphalt Paving			/tn	/tn	/tn	/tn	/tn	/tn	**70,958**
		02766.100	**Pavement Marking**									
			Painted Lines 4" Wide	1,950 lf		-	-	0.12 /lf	-	-	0.12 /lf	234
			Pavement Marking			/lf	/lf	/lf	/lf	/lf	/lf	**234**
		02770.100	**Curbs**									
			Concrete Curb & Gutter 12"	1,300 lf	28.600	1.17 /lf	6.20 /lf	-	0.70 /lf	-	8.07 /lf	10,494
			Curbs		**28.600**	/lf	/lf	/lf	/lf	/lf	/lf	**10,494**
		03060.110	**Curing**									
			Liquid Curing Compounds	1,300 sf	2.600	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	192
			Curing		**2.600**	/sf	/sf	/sf	/sf	/sf	/sf	**192**
		03110.120	**Forms- Curbs**									
			Forms - Curbs 6 - 12"	2,600 sf	182.000	4.13 /sf	0.72 /sf	-	-	-	4.85 /sf	12,617
			Forms- Curbs		**182.000**	/sf	/sf	/sf	/sf	/sf	/sf	**12,617**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	43 lf	1.733	2.20 /lf	0.73 /lf	-	-	-	2.92 /lf	127
			Expansion Joints		**1.733**	/lf	/lf	/lf	/lf	/lf	/lf	**127**
			Beach Rd ReAlign		**214.933**	/LF	/LF	/LF	/L F	/LF	/LF	**94,622**
			05 - Beach Rd ReAlgn		**214.933**							**94,622**

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	12,488		214.933 hrs				1.38%	
Material	10,032						1.11%	
Subcontract	571,192						62.96%	
Equipment	910		14.444 hrs				0.10%	
Other								
	594,622	594,622					65.55	65.55%
Material Take-off Allowance	47.570			8.000 %	C		5.24%	
Labor Overtime	3.122			25.000 %	C		0.34%	
Bond	6.169				B		0.68%	
Overhead & Profit	89.193			15.000 %	C		9.83%	
Contingency	118.924			20.000 %	C		13.11%	
Market Conditions Allowance	47.570			8.000 %	C		5.24%	
Total		***907,170***						

Unalaska A t Master Plan
UARE Road Alt #1 for Runway Alt #1 (Ballyhoo Rd)
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	UARE Ballyhoo Rd Alt #1
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
3 - RW 30 Extend												
	Ballyhoo Rd-end											
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 6"	2,667 sy		-	-	10.50 /sy	-	-	10.50 /sy	28,000
			Asphalt Base Course 6"	2,667 sy		-	-	10.50 /sy	-	-	10.50 /sy	28,000
			Asphalt Binder Course 3"	2,667 sy		-	-	5.75 /sy	-	-	5.75 /sy	15,333
			Asphalt Top Course 3"	2,667 sy		-	-	6.00 /sy	-	-	6.00 /sy	16,000
			Asphalt Paving			**/tn**	**/tn**	**/tn**	**/tn**	**/tn**	**/tn**	**87,333**
		02766.100	**Pavement Marking**									
			Painted Lines 4" Wide	2,400 lf		-	-	0.12 /lf	-	-	0.12 /lf	288
			Pavement Marking			**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**288**
		02770.100	**Curbs**									
			Concrete Curb & Gutter 12"	1,600 lf	35.200	1.17 /lf	6.20 /lf	-	0.70 /lf	-	8.07 /lf	12,916
			Curbs		**35.200**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**12,916**
		03060.110	**Curing**									
			Liquid Curing Compounds	1,600 sf	3.200	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	237
			Curing		**3.200**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**237**
		03110.120	**Forms- Curbs**									
			Forms - Curbs 6 - 12"	3,200 sf	224.000	4.13 /sf	0.72 /sf	-	-	-	4.85 /sf	15,528
			Forms- Curbs		**224.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**15,528**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	53 lf	2.133	2.20 /lf	0.73 /lf	-	-	-	2.92 /lf	156
			Expansion Joints		**2.133**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**156**
			Ballyhoo Rd-end		**264.533**	**/LF**	**/LF**	**/LF**	**/LF**	**/LF**	**/LF**	**116,458**
			03 - RW 30 Extend		**264.533**							**116,458**

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	15,370		264.533 hrs				8.49%	
Material	12,347						6.82%	
Subcontract	87,621						48.43%	
Equipment	1,121		17.778 hrs				0.62%	
Other								
	116,459	116,459					64.37	64.37%
Material Take-off Allowance	9.317			8.000 %	C		5.15%	
Labor Overtime	3.842			25.000 %	C		2.12%	
Bond	1.230				B		0.68%	
Overhead & Profit	17.469			15.000 %	C		9.66%	
Contingency	23.292			20.000 %	C		12.87%	
Market Conditions Allowance	9.317			8.000 %	C		5.15%	
Total		***180,926***						

Unalaska Airport Master Plan
UARE Road Alt #1 for Runway Alt #2 (Ballyhoo Rd)
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	UARE Ballyhoo Rd Alt #2
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
03 - RW 30 Extend												
	Ballyhoo Rd-end											
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 6"	1,667 sy		-	-	10.50 /sy	-	-	10.50 /sy	17,500
			Asphalt Base Course 6"	1,667 sy		-	-	10.50 /sy	-	-	10.50 /sy	17,500
			Asphalt Binder Course 3"	1,667 sy		-	-	5.75 /sy	-	-	5.75 /sy	9,583
			Asphalt Top Course 3"	1,667 sy		-	-	6.00 /sy	-	-	6.00 /sy	10,000
			Asphalt Paving			/tn	/tn	/tn	/tn	/tn	/tn	**54,583**
		02766.100	**Pavement Marking**									
			Painted Lines 4" Wide	1,500 lf		-	-	0.12 /lf	-	-	0.12 /lf	180
			Pavement Marking			/lf	/lf	/lf	/lf	/lf	/lf	**180**
		02770.100	**Curbs**									
			Concrete Curb & Gutter 12"	1,000 lf	22.000	1.17 /lf	6.20 /lf	-	0.70 /lf	-	8.07 /lf	8,073
			Curbs		**22.000**	/lf	/lf	/lf	/lf	/lf	/lf	**8,073**
		03060.110	**Curing**									
			Liquid Curing Compounds	1,000 sf	2.000	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	148
			Curing		**2.000**	/sf	/sf	/sf	/sf	/sf	/sf	**148**
		03110.120	**Forms- Curbs**									
			Forms - Curbs 6 - 12"	2,000 sf	140.000	4.13 /sf	0.72 /sf	-	-	-	4.85 /sf	9,705
			Forms- Curbs		**140.000**	/sf	/sf	/sf	/sf	/sf	/sf	**9,705**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	33 lf	1.333	2.20 /lf	0.73 /lf	-	-	-	2.92 /lf	97
			Expansion Joints		**1.333**	/lf	/lf	/lf	/lf	/lf	/lf	**97**
			Ballyhoo Rd-end		**165.333**	/LF	/LF	/LF	/LF	/LF	/LF	**72,786**
			03 - RW 30 Extend		**165.333**							**72,786**

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	9,606		165.333 hrs				8.50%	
Material	7,717						6.82%	
Subcontract	54,763						48.43%	
Equipment	700		11.111 hrs				0.62%	
Other								
	72,786	72,786					64.37	64.37%
Material Take-off Allowance	5.823			8.000 %	C		5.15%	
Labor Overtime	2.401			25.000 %	C		2.12%	
Bond	769				B		0.68%	
Overhead & Profit	10.918			15.000 %	C		9.66%	
Contingencv	14.557			20.000 %	C		12.87%	
Market Conditions Allowance	5.823			8.000 %	C		5.15%	
Total		***113,077***						

Unalaska A... t Master Plan
UARE Road Alt #1 for Runway Alt #4 (Ballyhoo Rd)
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	UARE Ballyhoo Rd Alt #4
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
03 - RW 30 Extend												
	Ballyhoo Rd-end											
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 6"	3,667 sy		-	-	10.50 /sy	-	-	10.50 /sy	38,500
			Asphalt Base Course 6"	3,667 sy		-	-	10.50 /sy	-	-	10.50 /sy	38,500
			Asphalt Binder Course 3"	3,667 sy		-	-	5.75 /sy	-	-	5.75 /sy	21,083
			Asphalt Top Course 3"	3,667 sy		-	-	6.00 /sy	-	-	6.00 /sy	22,000
			Asphalt Paving			**/tn**	**/tn**	**/tn**	**/tn**	**/tn**	**/tn**	**120,083**
		02766.100	**Pavement Marking**									
			Painted Lines 4" Wide	3,300 lf		-	-	0.12 /lf	-	-	0.12 /lf	396
			Pavement Marking			**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**396**
		02770.100	**Curbs**									
			Concrete Curb & Gutter 12"	2,200 lf	48.400	1.35 /lf	6.20 /lf	-	0.70 /lf	-	8.25 /lf	18,147
			Curbs		**48.400**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**18,147**
		03060.110	**Curing**									
			Liquid Curing Compounds	2,200 sf	4.400	0.11 /sf	0.05 /sf	-	-	-	0.16 /sf	357
			Curing		**4.400**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**357**
		03110.120	**Forms- Curbs**									
			Forms - Curbs 6 - 12"	4,400 sf	308.000	4.75 /sf	0.72 /sf	-	-	-	5.47 /sf	24,079
			Forms- Curbs		**308.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**24,079**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	73 lf	2.933	2.52 /lf	0.73 /lf	-	-	-	3.25 /lf	238
			Expansion Joints		**2.933**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**238**
			Ballyhoo Rd-end		**363.733**	**/LF**	**/LF**	**/LF**	**/L F**	**/LF**	**/LF**	**163,300**
			03 - RW 30 Extend		**363.733**							**163,300**

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	24,303		363.733 hrs				9.55%	
Material	16,977						6.67%	
Subcontract	120,479						47.36%	
Equipment	1,541		24.444 hrs				0.61%	
Other								
	163,300	163,300					64.19	64.19%
Material Take-off Allowance	13.064			8.000 %	C		5.14%	
Labor Overtime	6.076			25.000 %	C		2.39%	
Bond	1.730				B		0.68%	
Overhead & Profit	24.495			15.000 %	C		9.63%	
Contingency	32.660			20.000 %	C		12.84%	
Market Conditions Allowance	13.064			8.000 %	C		5.14%	
Total		***254,389***						

Unalaska Airport Master Plan
UARE Road Alt #5 (Beach Rd - Biorka Connector)
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Beach Rd
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
IDC Project No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
4 - Biorka Rd Conn												
	Beach Rd_Biorka Conn											
		02200.130	**Demo- Buildings**									
			Demo Wood Building	14,000 sf		-	-	3.50 /sf	-	-	3.50 /sf	49,000
			Demo- Buildings			/sf	/sf	/sf	/sf	/sf	/sf	**49,000**
		02317.000	**Earthwork**									
			Exc Mass - Tough	11,000 cuyd	330.000	1.99 /cuyd		-	4.50 /cuyd	-	6.49 /cuyd	71,404
			Load Stkpile W/Ldr Med Hard	11,000 cuyd	305.580	1.79 /cuyd		-	1.32 /cuyd	-	3.11 /cuyd	34,191
			Load Stkpile W/Ldr Med Hard-Upgrade Existing Roadway	480 cuyd	13.334	1.79 /cuyd		-	1.32 /cuyd	-	3.11 /cuyd	1,492
			Bobtail (Truck/trailer) 24cy (1 - 3 Mile)-Upgrade Existing Roadway	480 cuyd	4.800	0.56 /cuyd		-	0.60 /cuyd	-	1.16 /cuyd	558
			Articulated Off-road 25cy (3 - 5 Mile)-Excavation	11,000 cuyd	229.167	1.16 /cuyd		-	1.79 /cuyd	-	2.96 /cuyd	32,542
			Earthwork		**882.881**							**140,187**
		02370.050	**Slope & Erosion Control**									
			Precast Concrete Retaining Wall System	55,000 sf	4,009.500	4.60 /sf	36.00 /sf	-	2.00 /sf	-	42.60 /sf	2,342,999
			Slope & Erosion Control		**4,009.500**	/sf	/sf	/sf	/sf	/sf	/sf	**2,342,999**
		02740.100	**Asphalt Paving**									
			Asphalt Base Course 6"	1,833 sy		-	-	10.50 /sy	-	-	10.50 /sy	19,250
			Asphalt Base Course 6"	1,833 sy		-	-	10.50 /sy	-	-	10.50 /sy	19,250
			Asphalt Base Course 6"	2,500 sy		-	-	10.50 /sy	-	-	10.50 /sy	26,250
			Asphalt Base Course 6"	2,500 sy		-	-	10.50 /sy	-	-	10.50 /sy	26,250
			Asphalt Binder Course 3"	1,833 sy		-	-	5.75 /sy	-	-	5.75 /sy	10,542
			Asphalt Binder Course 3"	2,500 sy		-	-	5.75 /sy	-	-	5.75 /sy	14,375
			Asphalt Top Course 3"	1,833 sy		-	-	6.00 /sy	-	-	6.00 /sy	11,000
			Asphalt Top Course 3"	2,500 sy		-	-	6.00 /sy	-	-	6.00 /sy	15,000
			Cold Plane Asphalt - Upgrade Existing Roadway	2,500 sy		-	-	-	-	5.00 /sy	5.00 /sy	12,500
			Asphalt Paving			/tn	/tn	/tn	/tn	/tn	/tn	**154,417**
		02766.100	**Pavement Marking**									
			Painted Lines 4" Wide	1,650 lf		-	-	0.12 /lf	-	-	0.12 /lf	198
			Painted Lines 4" Wide	2,250 lf		-	-	0.12 /lf	-	-	0.12 /lf	270
			Pavement Marking			/lf	/lf	/lf	/lf	/lf	/lf	**468**
		02770.100	**Curbs**									
			Concrete Curb & Gutter 12"	1,100 lf	24.200	1.35 /lf	6.20 /lf	-	0.70 /lf	-	8.25 /lf	9,073
			Concrete Curb & Gutter 12"	1,500 lf	33.000	1.35 /lf	6.20 /lf	-	0.70 /lf	-	8.25 /lf	12,373
			Curbs		**57.200**	/lf	/lf	/lf	/lf	/lf	/lf	**21,446**
		02895.100	**Walk /Road / Parking Imp**									
			Precast Bridge	4,500 sf		20.00 /sf	100.00 /sf	-	10.00 /sf	-	130.00 /sf	585,000
			Walk /Road / Parking Imp									**585,000**
		02895.200	**Buildings**									
			New Houses	4,625 sf				200.00 /sf	-	-	200.00 /sf	925,000
			New Warehouse	9,275 sf				125.00 /sf	-	-	125.00 /sf	1,159,375
			Buildings			/ea	/ea	/ea	/ea	/ea	/ea	**2,084,375**
		03060.110	**Curing**		**5.200**	/sf	/sf	/sf	/sf	/sf	/sf	**422**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		03110.120	**Forms- Curbs**									
			Forms - Curbs 6 - 12"	2,200 sf	154.000	4.75 /sf	0.72 /sf	-	-	-	5.47 /sf	12,039
			Forms - Curbs 6 - 12"	3,000 sf	210.000	4.75 /sf	0.72 /sf	-	-	-	5.47 /sf	16,417
			Forms- Curbs		**364.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**28,457**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	37 lf	1.467	2.52 /lf	0.73 /lf	-	-	-	3.25 /lf	119
			Expansion Joint - LF	50 lf	2.000	2.52 /lf	0.73 /lf	-	-	-	3.25 /lf	162
			Expansion Joints		**3.467**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**282**
			Beach Rd_Biorka Conn		**5,322.248**	**/LF**	**/LF**	**/LF**	**/LF**	**/LF**	**/LF**	**5,407,052**
			04 - Biorka Rd Conn		**5,322.248**							**5,407,052**

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	427,232		5,322.248 hrs	
Material	2,450,063			
Subcontract	2,275,760			
Equipment	241,497		######## hrs	
Other	12,500			
	5,407,052	5,407,052		
Material Take-off Allowance	432.564			8.000 %
Labor Overtime	106.808			25.000 %
Bond	46.097			
Overhead & Profit	811.058			15.000 %
Contingency	1.081.410			20.000 %
Market Conditions Allowance	432.564			8.000 %
Total		***8,317,553***		

Unalaska Airport Master Plan
Airport Runway Extension RW30 Tunnel
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport RW30 Tun
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
PM / Contact Name	K.Green/SEA
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
3 - RW 30 Extend												
	Tunnel											
		01910.400	**Pumps**									
			Dewatering Allowance	1 ls		-	-	150,000.00 /ls		-	150,000.00 /ls	150,000
			Pumps			/hr	/hr	/hr	/hr	/hr	/hr	**150,000**
		02317.000	**Earthwork**									
			Exc Mass - Tough	104,988 cuyd	3,149.640	1.73 /cuyd		-	4.50 /cu yd	-	6.23 /cuyd	654,219
			Load Stkpile W/Ldr Med Hard	120,736 cuyd	3,354.046	1.55 /cuyd		-	1.32 /cu yd	-	2.88 /cuyd	347,138
			Articulated Off-road 25cy (3 - 5 Mile)	76,121 cuyd	1,585.854	1.01 /cuyd		-	1.79 /cu yd	-	2.81 /cuyd	213,635
			Earthwork		**8,089.540**							**1,214,991**
		02320.070	**Backfill Soil/Rock Fill**									
			Struc Fill - Roads 3/4' minus	3,160 cy	75.840	1.32 /cy	35.10 /cy	-	0.32 /cy	-	36.75 /cy	116,116
			Bldg Fill Gravel - Native	101,180 cy	12,141.600	6.62 /cy		-	4.37 /cy	-	10.99 /cy	1,111,782
			Backfill Soil/Rock Fill		**12,217.440**	/cy	/cy	/cy	/cy	/cy	/cy	**1,227,898**
		03060.110	**Curing**									
			Liquid Curing Compounds	160,631 sf	321.262	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	23,746
			Liquid Curing Compounds	85,320 sf	170.639	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	12,613
			Liquid Curing Compounds	34,998 sf	69.997	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	5,174
			Curing		**561.898**	/sf	/sf	/sf	/sf	/sf	/sf	**41,533**
		03060.120	**Hardener**									
			Seal Floors	85,320 sf	170.639	0.10 /sf	0.04 /sf	-	-	-	0.14 /sf	11,717
			Hardener		**170.639**	/sf	/sf	/sf	/sf	/sf	/sf	**11,717**
		03110.140	**Forms- Footing**									
			Continuous Footing Forms > 12"	14,694 sf	1,043.274	4.19 /sf	0.89 /sf	-	-	-	5.08 /sf	74,706
			Forms- Footing		**1,043.274**	/sf	/sf	/sf	/sf	/sf	/sf	**74,706**
		03110.300	**Forms- Suspended Slab**									
			Form Suspended Slab 15-up	34,998 sf	2,624.869	4.43 /sf	1.10 /sf	-	-	-	5.53 /sf	193,550
			Slab Edge Form > 1'	114,280 sf	27,427.200	14.17 /sf	2.80 /sf	-	-	-	16.97 /sf	1,939,204
			Forms- Suspended Slab		**30,052.069**	/sf	/sf	/sf	/sf	/sf	/sf	**2,132,754**
		03110.500	**Forms- Wall Forms Gang**									
			Gang Forms 16- >	160,631 sf	33,427.332	12.29 /sf	1.86 /sf	-	-	-	14.14 /sf	2,271,982
			Forms- Wall Forms Gang		**33,427.332**	/sf	/sf	/sf	/sf	/sf	/sf	**2,271,982**
		03110.560	**Forms- Strip & Oil**									
			Strip & Oil Suspended Slab Frm	34,998 sf	174.991	0.24 /sf	-	-	-	-	0.24 /sf	8,341
			Strip & Oil Footing Forms	14,694 sf	73.470	0.24 /sf	-	-	-	-	0.24 /sf	3,502
			Strip & Oil Wall Forms	160,631 sf	803.156	0.24 /sf	-	-	-	-	0.24 /sf	38,282
			Strip & Oil SOG Form	10,665 sf	53.325	0.24 /sf	-	-	-	-	0.24 /sf	2,542
			Forms- Strip & Oil		**1,104.942**	/sf	/sf	/sf	/sf	/sf	/sf	**52,667**
		03110.600	**Forms- Wall Access**									
			Wall Bulkhead Forms	2,268 sf	680.468	17.71 /sf	1.05 /sf	-	-	-	18.76 /sf	42,554
			Forms- Wall Access		**680.468**	/ls	/ls	/ls	/ls	/ls	/ls	**42,554**
		03110.660	**Forms- Wall Inserts**									
			Pour Strips	149,278 lf	7,463.913	2.38 /lf	0.19 /lf	-	-	-	2.57 /lf	383,981
			Forms- Wall Inserts		**7,463.913**	/ls	/ls	/ls	/ls	/ls	/ls	**383,981**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		03150.100	**Keyway**									
			Keyway 4"	3,666 lf	54.953	0.89 /lf	0.37 /lf	-	-	-	1.25 /lf	4,592
			Horizontal Wall Keyway 4"	2,833 lf	42.467	0.89 /lf	0.37 /lf	-	-	-	1.25 /lf	3,548
			Keyway		**97.420**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**8,140**
		03150.120	**Vapor Barrier**									
			6 Mil. Vapor Barrier	85,320 sf	170.639	0.14 /sf	0.01 /sf	-	-	-	0.16 /sf	13,200
			Vapor Barrier		**170.639**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**13,200**
		03150.170	**Waterstop**									
			Waterstop 9" Flat	4,372 lf	65.536	0.71 /lf	2.36 /lf	-	-	-	3.08 /lf	13,453
			Waterstop		**65.536**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**13,453**
		03200.110	**Rebar- by Lbs/CY**									
			Footing Rebar	76 tn	763.750	721.05 /tn	777.00 /tn	-	-	-	1,498.05 /tn	114,414
			SOG Rebar	205 tn	2,053.990	721.05 /tn	777.00 /tn	-	-	-	1,498.05 /tn	307,698
			Wall Rebar	390 tn	3,904.230	721.05 /tn	777.00 /tn	-	-	-	1,498.05 /tn	584,873
			Suspended Slab Rebar	259 tn	2,592.460	721.05 /tn	777.00 /tn	-	-	-	1,498.05 /tn	388,363
			Rebar- by Lbs/CY		**9,314.430**	**/ton**	**/ton**	**/ton**	**/ton**	**/ton**	**/ton**	**1,395,348**
		03220.100	**Wire Mesh- Rolls**									
			Mesh Support - bricks	11,415 ea	22.830	0.14 /ea	0.19 /ea	-	-	-	0.33 /ea	3,804
			Wire Mesh- Rolls		**22.830**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**3,804**
		03300.010	**Concrete- Buy**									
			4000 psi Concrete	2,037 cy		-	113.40 /cy	-	-	-	113.40 /cy	230,958
			4000 psi Concrete	4,462 cy		-	113.40 /cy	-	-	-	113.40 /cy	505,988
			4000 psi Concrete	3,160 cy		-	113.40 /cy	-	-	-	113.40 /cy	358,343
			4000 psi Concrete	2,592 cy		-	113.40 /cy	-	-	-	113.40 /cy	293,985
			Concrete- Buy			**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,389,274**
		03310.100	**Place- Wall Footings**									
			Pump Place Wall Footings	2,037 cy	1,303.467	33.53 /cy	-	-	-	-	33.53 /cy	68,290
			Place- Wall Footings		**1,303.467**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**68,290**
		03310.170	**Place- S-O-G**									
			Pump Place Slab on Grade	3,160 cy	1,554.714	25.78 /cy	-	-	-	-	25.78 /cy	81,453
			Place- S-O-G		**1,554.714**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**81,453**
		03310.180	**Place- Suspended Slab**									
			Pump Place Suspended Slab	2,592 cy	1,184.756	23.94 /cy	-	-	-	-	23.94 /cy	62,071
			Place- Suspended Slab		**1,184.756**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**62,071**
		03310.200	**Place- Walls**									
			Pump Place Walls	4,462 cy	2,596.869	30.49 /cy	-	-	-	-	30.49 /cy	136,053
			Place- Walls		**2,596.869**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**136,053**
		03350.100	**Finish Flatwork**									
			Finish- Hard Trowel	85,320 sf	1,278.942	0.80 /sf	0.03 /sf	-	-	-	0.83 /sf	70,597
			Finish- Hard Trowel	34,998 sf	524.624	0.80 /sf	0.03 /sf	-	-	-	0.83 /sf	28,959
			Finish Flatwork		**1,803.566**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**99,556**
		03350.120	**Patch & Grind**									
			Grind/Patch Walls	160,631 sf	2,407.860	0.71 /sf	0.01 /sf	-	-	-	0.72 /sf	116,377
			Patch & Grind		**2,407.860**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**116,377**
		07100.100	**Waterproofing**									

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Man Hrs	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		07100.100	**Waterproofing**									
			Trowel On Waterproofing	180,000 sf	2,880.000	0.99 /sf	0.80 /sf	-	-	-	1.80 /sf	323,223
			Waterproofing		**2,880.000**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**323,223**
		16521.360	**Sodium Comm Surface HP**									
			250w Commercial Surface HPS Fixture + Wiring Allow: Tunnel	100 E	70.000	47.88 /E	500.00 /E	1,000.00 /E	-	-	1,547.88 /E	154,788
			250w Commercial Surface HPS Fixture + Wiring Allow: Ramps	70 E	49.000	47.88 /E	500.00 /E	1,000.00 /E	-	-	1,547.88 /E	108,352
			Sodium Comm Surface HP		**119.000**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**263,140**
			Tunnel		**118,332.602**							**11,578,163**
			03 - RW 30 Extend		**########**							**11,578,163**

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	6,853,187		118,332.602 hrs				35.53%	
Material	3,193,502						16.55%	
Subcontract	320,000						1.66%	
Equipment	1,211,474		13,146.805 hrs				6.28%	
Other								
	11,578,163	11,578,163					60.02	60.02%
Material Take-off Allowance	926.253			8.000 %	C		4.80%	
Labor Overtime	1.713.297			25.000 %	C		8.88%	
Bond	94.379				B		0.49%	
Overhead & Profit	1.736.724			15.000 %	C		9.00%	
Contingency	2.315.633			20.000 %	C		12.00%	
Market Conditions Allowance	926.253			8.000 %	C		4.80%	
Total		***19,290,702***						

Unalaska Airport Master Plan
Airport Runway Extension Alternate & Apron #1
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Alt #1
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
09 - Misc Items											
	Bldg Demo										
		02200.130	Demo- Buildings								
			Demo Wood/Stl Bldg - PT #03 - Airport Hsg-Staff	12,960.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	3,499
			Demo Wood/Stl Bldg - PT #04 - Airport Hsg-Staff	12,984.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	3,506
			Demo Wood/Stl Bldg - PT #15 - Aerology Bldg-Top	70,544.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	19,047
			Demo Wood/Stl Bldg - PT #17 - PenAir Cargo Bldg (2)	44,730.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	12,077
			Demo Wood/Stl Bldg - PT #23 - ACE Cargo Bldg (1)	126,240.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	34,085
			Demo Wood/Stl Bldg - PT #34 - Housing Unit 1 (hill1)	51,100.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	13,797
			Demo Wood/Stl Bldg - PT #35 - Housing Unit 2 (hill2)	46,660.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	12,598
			Demo Steel Bldg - Pt #01 - Abandoned Hanger	137,592.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	41,278
			Demo Steel Bldg - Pt #06 - ARFF/Adm Bldg-Tier 1	158,000.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	47,400
			Demo Steel Bldg - Pt #07 - ARFF/Adm Bldg-Tier 2	189,600.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	56,880
			Demo Steel Bldg - Pt #08 - ARFF/Adm Bldg-Tier 3	268,600.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	80,580
			Demo Steel Bldg - Pt #11 - Hanger 1 B Ramp	440,316.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	132,095
			Demo Steel Bldg - Pt #18 - Torpedo Bldg - Tier 1	147,140.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	44,142
			Demo Steel Bldg - Pt #19 - Torpedo Bldg - Tier 2	210,200.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	63,060
			Demo Steel Bldg - Pt #20 - Torpedo Bldg - Tier 3	378,360.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	113,508
			Demo Steel Bldg - Pt #24 - Terminal - Tier 1	392,712.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	117,814
			Demo Steel Bldg - Pt #24 - Terminal - Tier 2	359,986.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	107,996
			Demo Conc/Stl Bldg - PT #12 - Hanger 2 B Ramp	602,272.00 cf	-	-	0.34 /cf	-	-	0.34 /cf	204,772
			Demo- Buildings		/sf	/sf	/sf	/sf	/sf	/sf	1,108,133
			Bldg Demo								1,108,133
			09 - Misc Items								1,108,133

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
10 - Apron											
	15" Apron Expansion										
		02320.070	**Backfill Soil/Rock Fill**								
			Gravel fill at Slabs	2,915.43 cy	7.05 /cy	15.60 /cy	-		-	22.65 /cy	66,038
			Fill Sand	1,457.72 cy	-	13.00 /cy	-	-	-	13.00 /cy	18,950
			Backfill Soil/Rock Fill		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**84,988**
		03060.000	**Concrete- Admixtures**								
			Superplasticizers	10,932.87 cy	-	3.31 /cy	-	-	-	3.31 /cy	36,160
			Concrete- Admixtures		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**36,160**
		03060.110	**Curing**								
			Liquid Curing Compounds	236,150.00 sf	0.10 /sf	0.01 /sf	-	-	-	0.11 /sf	24,992
			Curing		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**24,992**
		03060.120	**Hardener**								
			Seal Floors	236,150.00 sf	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	34,910
			Hardener		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**34,910**
		03110.260	**Forms- S-O-G**								
			S.O.G. Edge Form > 1'	6,362.50 sf	16.94 /sf	1.23 /sf	-	-	-	18.17 /sf	115,620
			Forms- S-O-G		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**115,620**
		03110.560	**Forms- Strip & Oil**								
			Strip & Oil SOG Form	6,362.50 sf	0.24 /sf	-	-	-	-	0.24 /sf	1,516
			Forms- Strip & Oil		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**1,516**
		03220.100	**Wire Mesh- Rolls**								
			Mesh Support - bricks	27,095.00 ea	0.14 /ea	0.19 /ea	-	-	-	0.33 /ea	9,028
			Wire Mesh- Rolls		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**9,028**
		03300.010	**Concrete- Buy**								
			5000 psi Concrete	10,932.87 cy	-	120.75 /cy	-	-	-	120.75 /cy	1,320,144
			Concrete- Buy		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,320,144**
		03310.170	**Place- S-O-G**								
			Truck Place Slab on Grade	10,932.87 cy	23.58 /cy	-	-	-	-	23.58 /cy	257,776
			Place- S-O-G		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**257,776**
		03350.100	**Finish Flatwork**								
			Finish- Hard Trowel	236,150.00 sf	0.80 /sf	0.03 /sf	-	-	-	0.83 /sf	195,399
			Finish Flatwork		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**195,399**
			15" Apron Expansion								**2,080,535**
	Parking										
		02320.070	**Backfill Soil/Rock Fill**								
			Struc Fill - Parking Lots	987.65 cy	0.66 /cy	10.40 /cy	-	0.32 /cy	-	11.38 /cy	11,243
			Struc Fill - Parking Lots	493.83 cy	0.66 /cy	10.40 /cy	-	0.32 /cy	-	11.38 /cy	5,622

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Backfill Soil/Rock Fill		/cy	/cy	/cy	/cy	/cy	/cy	**16,865**
		02740.100	**Asphalt Paving**								
			Rough Grade Parking Lots	4,444.44 sy	0.26 /sy	-	-	0.28 /sy	-	0.54 /sy	2,414
			Asphalt Base Course 2"	4,444.44 sy	-	-	4.40 /sy	-	-	4.40 /sy	19,556
			Asphalt Top Course 2"	4,444.44 sy	-	-	4.00 /sy	-	-	4.00 /sy	17,778
			Asphalt Paving		/sy	/sy	/sy	/sy	/sy	/sy	**39,747**
			Parking								**56,612**
	Streets										
		02317.000	**Earthwork**								
			Backfill Crushed Rock Med	123.46 cuyd	3.76 /cuyd	12.00 /cuyd	-	5.11 /cuyd	-	20.87 /cuyd	2,576
			Earthwork		/cy	/cy	/cy	/cy	/cy	/cy	**2,576**
		02720.100	**Base**								
			Crushed Gravel	1,481.48 cy	1.76 /cy	8.89 /cy	-	0.86 /cy	-	11.51 /cy	17,051
			Crushed Gravel	493.83 cy	1.76 /cy	8.89 /cy	-	0.86 /cy	-	11.51 /cy	5,684
			Base		/cy	/cy	/cy	/cy	/cy	/cy	**22,734**
		02740.100	**Asphalt Paving**								
			Rough Grading Roads	4,444.44 sy	0.15 /sy	0.00 /sy	-	0.15 /sy	-	0.30 /sy	1,333
			Asphalt Base Course 2"	4,444.44 sy	-	-	4.40 /sy	-	-	4.40 /sy	19,556
			Asphalt Top Course 2"	4,444.44 sy	-	-	4.00 /sy	-	-	4.00 /sy	17,778
			Asphalt Paving		/sy	/sy	/sy	/sy	/sy	/sy	**38,667**
		02770.100	**Curbs**								
			Extruded Curbs & Gutter 18"	2,000.00 lf	1.17 /lf	4.50 /lf	-	0.69 /lf	-	6.37 /lf	12,731
			Curbs		/lf	/lf	/lf	/lf	/lf	/lf	**12,731**
		03060.110	**Curing**								
			Liquid Curing Compounds	3,000.00 sf	0.10 /sf	0.01 /sf	-	-	-	0.11 /sf	317
			Liquid Curing Compounds	10,000.00 sf	0.10 /sf	0.01 /sf	-	-	-	0.11 /sf	1,058
			Curing		/sf	/sf	/sf	/sf	/sf	/sf	**1,376**
		03110.260	**Forms- S-O-G**								
			S.O.G. Edge Form < 1'	1,336.67 sf	7.08 /sf	0.35 /sf	-	-	-	7.43 /sf	9,933
			Forms- S-O-G		/sf	/sf	/sf	/sf	/sf	/sf	**9,933**
		03110.560	**Forms- Strip & Oil**								
			Strip & Oil SOG Form	1,336.67 sf	0.24 /sf	-	-	-	-	0.24 /sf	319
			Forms- Strip & Oil		/sf	/sf	/sf	/sf	/sf	/sf	**319**
		03150.160	**Expansion Joints**								
			Expansion Joint - LF	330.00 lf	2.20 /lf	0.73 /lf	-	-	-	2.92 /lf	963
			Expansion Joints		/lf	/lf	/lf	/lf	/lf	/lf	**963**
		03300.010	**Concrete- Buy**								
			3000 psi Concrete	123.46 cy	-	94.50 /cy	-	-	-	94.50 /cy	11,667
			Concrete- Buy		/cy	/cy	/cy	/cy	/cy	/cy	**11,667**
		03310.170	**Place- S-O-G**								
			Truck Place Slab on Grade	123.46 cy	23.58 /cy	-	-	-	-	23.58	2,911

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Place- S-O-G		/cy	/cy	/cy	/cy	/cy	/cy	2,911
		03350.100	**Finish Flatwork**								
			Finish- Broom	10,000.00 sf	0.64 /sf	0.01 /sf	-	-	-	0.64 /sf	6,444
			Finish Flatwork		/sf	/sf	/sf	/sf	/sf	/sf	6,444
			Streets								110,320
	Terminal										
		21000.000	**New Buildings**								
			New Terminal Building	40,000.00 sf	100.00 /sf	100.00 /sf	-	10.00 /sf	-	210.00 /sf	8,400,000
			Misc Site Improvements	1.00 ls	100,000.00 /ls	150,000.00 /ls	-	50,000.00 /ls	-	300,000.00 /ls	300,000
			New Buildings								8,700,000
			Terminal								8,700,000
			10 - Apron								10,947,467

Estimate Totals

Description	Amount	Totals	Hours	Rate	(t I
Labor	4,755,052		12,260.021 hrs		
Material	5,661,650				
Subcontract	1,182,800				
Equipment	456,098		224.708 hrs		
Other					
	12,055,600	12,055,600			
Material Take-off Allowance	964.448			8.000 %	(
Labor Overtime	1.188.763			25.000 %	(
Bond	95.247				E
Overhead & Profit	1.808.340			15.000 %	(
Contingency	2.411.120			20.000 %	(
Market Conditions Allowance	964.448			8.000 %	(
Total		***19,487,966***			

Unalaska Airport Master Plan
Airport Apron Alternate #2
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Alt #2
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
10 - Apron												
	Apron Expansion											
		02320.070	**Backfill Soil/Rock Fill**									
			Gravel fill at Slabs	927.78 cy	7.05 /cy	15.60 /cy	-		-	22.65 /cy	21,015	0.175
			Fill Sand	463.89 cy	-	13.00 /cy	-	-	-	13.00 /cy	6,031	0.050
			Backfill Soil/Rock Fill		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**27,046**	**0.225**
		03060.110	**Curing**									
			Liquid Curing Compounds	75,150.00 sf	0.11 /sf	0.01 /sf	-	-	-	0.12 /sf	9,028	0.075
			Curing		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**9,028**	**0.075**
		03060.120	**Hardener**									
			Seal Floors	75,150.00 sf	0.11 /sf	0.05 /sf	-	-	-	0.16 /sf	12,184	0.101
			Hardener		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**12,184**	**0.101**
		03110.260	**Forms- S-O-G**									
			S.O.G. Edge Form > 1'	2,296.25 sf	19.49 /sf	1.23 /sf	-	-	-	20.71 /sf	47,564	0.395
			Forms- S-O-G		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**47,564**	**0.395**
		03110.560	**Forms- Strip & Oil**									
			Strip & Oil SOG Form	2,296.25 sf	0.27 /sf	-	-	-	-	0.27 /sf	629	0.005
			Forms- Strip & Oil		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**629**	**0.005**
		03220.100	**Wire Mesh- Rolls**									
			Mesh Support - bricks	8,658.95 ea	0.17 /ea	0.19 /ea	-	-	-	0.36 /ea	3,073	0.026
			Wire Mesh- Rolls		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**3,073**	**0.026**
		03300.010	**Concrete- Buy**									
			5000 psi Concrete	3,479.17 cy	-	120.75 /cy	-	-	-	120.75 /cy	420,109	3.492
			Concrete- Buy		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**420,109**	**3.492**
		03310.170	**Place- S-O-G**									
			Truck Place Slab on Grade	3,479.17 cy	27.12 /cy	-	-	-	-	27.12 /cy	94,337	0.784
			Place- S-O-G		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**94,337**	**0.784**
		03350.100	**Finish Flatwork**									
			Finish- Hard Trowel	75,150.00 sf	0.92 /sf	0.03 /sf	-	-	-	0.95 /sf	71,171	0.592
			Finish Flatwork		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**71,171**	**0.592**
			Apron Expansion								**685,140**	**5.695**
	Parking											
		02320.070	**Backfill Soil/Rock Fill**									
			Struc Fill - Parking Lots	3,061.73 cy	0.66 /cy	10.40 /cy	-	0.32 /cy	-	11.38 /cy	34,854	0.290
			Struc Fill - Parking Lots	1,530.86 cy	0.66 /cy	10.40 /cy	-	0.32 /cy	-	11.38 /cy	17,427	0.145
			Backfill Soil/Rock Fill		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**52,281**	**0.435**
		02740.100	**Asphalt Paving**									
			Rough Grade Parking Lots	13,777.78 sy	0.26 /sy	-	-	0.28 /sy	-	0.54 /sy	7,483	0.062
			Asphalt Base Course 2"	13,777.78 sy	-	-	4.40 /sy	-	-	4.40 /sy	60,622	0.504
			Asphalt Top Course 2"	13,777.78 sy	-	-	4.00 /sy	-	-	4.00 /sy	55,111	0.458
			Asphalt Paving		**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**123,217**	**1.024**
			Parking								**175,498**	**1.459**
	Streets											
		02317.000	**Earthwork**									
			Backfill Crushed Rock Med	104.69 cuyd	3.76 /cuyd	12.00 /cuyd	-	5.11 /cuyd	-	20.87 /cuyd	2,185	0.018
			Earthwork		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**2,185**	**0.018**
		[illegible]2720.100	**Base**									
			Crushed Gravel	1,256.30 cy	[illegible]6 /cy	8.89 /cy	-	0.86 /cy	-	11.51 /cy	[illegible]459	0.120
			Crushed Gravel	418.77 cy	[illegible].76 /cy	8.89 /cy	-	0.86 /cy	-	11.51 /cy	[illegible],820	0.040

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
			Base		/cy	/cy	/cy	/cy	/cy	/cy	**19,278**	**0.160**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	3,768.89 sy	0.15 /sy	-	-	0.15 /sy	-	0.30 /sy	1,131	0.009
			Asphalt Base Course 2"	3,768.89 sy	-	-	4.40 /sy	-	-	4.40 /sy	16,583	0.138
			Asphalt Top Course 2"	3,768.89 sy	-	-	4.00 /sy	-	-	4.00 /sy	15,076	0.125
			Asphalt Paving		/sy	/sy	/sy	/sy	/sy	/sy	**32,789**	**0.273**
		02770.100	**Curbs**									
			Extruded Curbs & Gutter 18"	3,200.00 lf	1.17 /lf	4.50 /lf	-	0.69 /lf	-	6.37 /lf	20,370	0.169
			Curbs		/lf	/lf	/lf	/lf	/lf	/lf	**20,370**	**0.169**
		03060.110	**Curing**									
			Liquid Curing Compounds	4,800.00 sf	0.10 /sf	0.01 /sf	-	-	-	0.11 /sf	508	0.004
			Liquid Curing Compounds	16,000.00 sf	0.10 /sf	0.01 /sf	-	-	-	0.11 /sf	1,693	0.014
			Curing		/sf	/sf	/sf	/sf	/sf	/sf	**2,201**	**0.018**
		03110.260	**Forms- S-O-G**									
			S.O.G. Edge Form < 1'	2,136.67 sf	7.08 /sf	0.35 /sf	-	-	-	7.43 /sf	15,877	0.132
			Forms- S-O-G		/sf	/sf	/sf	/sf	/sf	/sf	**15,877**	**0.132**
		03110.560	**Forms- Strip & Oil**									
			Strip & Oil SOG Form	2,136.67 sf	0.24 /sf	-	-	-	-	0.24 /sf	509	0.004
			Forms- Strip & Oil		/sf	/sf	/sf	/sf	/sf	/sf	**509**	**0.004**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	530.00 lf	2.20 /lf	0.73 /lf	-	-	-	2.92 /lf	1,547	0.013
			Expansion Joints		/lf	/lf	/lf	/lf	/lf	/lf	**1,547**	**0.013**
		03300.010	**Concrete- Buy**									
			3000 psi Concrete	197.53 cy	-	94.50 /cy	-	-	-	94.50 /cy	18,667	0.155
			Concrete- Buy		/cy	/cy	/cy	/cy	/cy	/cy	**18,667**	**0.155**
		03310.170	**Place- S-O-G**									
			Truck Place Slab on Grade	197.53 cy	23.58 /cy	-	-	-	-	23.58 /cy	4,657	0.039
			Place- S-O-G		/cy	/cy	/cy	/cy	/cy	/cy	**4,657**	**0.039**
		03350.100	**Finish Flatwork**									
			Finish- Broom	16,000.00 sf	0.64 /sf	0.01 /sf	-	-	-	0.64 /sf	10,310	0.086
			Finish Flatwork		/sf	/sf	/sf	/sf	/sf	/sf	**10,310**	**0.086**
			Streets								**128,392**	**1.067**
Terminal												
		21000.000	**New Buildings**									
			Remodel/Expand Terminal & Ops Buildings	13,760.00 sf	125.00 /sf	125.00 /sf	-	15.00 /sf	-	265.00 /sf	3,646,400	30.311
			Misc Site Improvements	1.00 ls	300,000.00 /ls	450,000.00 /ls	-	150,000.00 /ls	-	900,000.00 /ls	900,000	7.481
			New Air Cargo Building	12,000.00 sf	75.00 /sf	75.00 /sf	-	5.00 /sf	-	155.00 /sf	1,860,000	15.462
			New Buildings								**6,406,400**	**53.254**
			Terminal								**6,406,400**	**53.254**
			10 - Apron								**7,395,430**	**61.476**

Estimate Totals

Description	Amount	Totals	Hours	Rate	€ I
Labor	3,201,079		4,669.282 hrs		
Material	3,620,476				
Subcontract	147,392				
Equipment	426,483		216.491 hrs		
Other					_
	7,395,430	7,395,430			
Material Take-off Allowance	591.634			8.000 %	(
Labor Overtime	800.270			25.000 %	(
Bond	62.431				E
Overhead & Profit	1.109.314			15.000 %	(
Contingency	1.479.086			20.000 %	(
Market Conditions Allowance	591.634			8.000 %	(
Total		***12,029,799***			

Unalaska Airport Master Plan
Airport Aprons Alternate #3
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Aprons
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	4/12/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
09 - Misc Items			**Miscellaneous Items**									
	Bldg Demo											
		02200.130	**Demo- Buildings**									
			Demo Wood/Stl Bldg - PT #03 - Airport Hsg-Staff	12,960.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	3,499	0.020
			Demo Wood/Stl Bldg - PT #04 - Airport Hsg-Staff	12,984.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	3,506	0.020
			Demo Wood/Stl Bldg - PT #15 - Aerology Bldg-Top	70,544.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	19,047	0.107
			Demo Wood/Stl Bldg - PT #17 - PenAir Cargo Bldg (2)	44,730.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	12,077	0.068
			Demo Wood/Stl Bldg - PT #23 - ACE Cargo Bldg (1)	126,240.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	34,085	0.191
			Demo Wood/Stl Bldg - PT #34 - Housing Unit 1 (hill1)	51,100.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	13,797	0.077
			Demo Wood/Stl Bldg - PT #35 - Housing Unit 2 (hill2)	46,660.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	12,598	0.071
			Demo Steel Bldg - Pt #01 - Abandoned Hanger	137,592.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	41,278	0.232
			Demo Steel Bldg - Pt #06 - ARFF/Adm Bldg-Tier 1	158,000.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	47,400	0.266
			Demo Steel Bldg - Pt #07 - ARFF/Adm Bldg-Tier 2	189,600.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	56,880	0.319
			Demo Steel Bldg - Pt #08 - ARFF/Adm Bldg-Tier 3	268,600.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	80,580	0.452
			Demo Steel Bldg - Pt #11 - Hanger 1 B Ramp	440,316.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	132,095	0.741
			Demo Steel Bldg - Pt #18 - Torpedo Bldg - Tier 1	147,140.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	44,142	0.248
			Demo Steel Bldg - Pt #19 - Torpedo Bldg - Tier 2	210,200.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	63,060	0.354
			Demo Steel Bldg - Pt #20 - Torpedo Bldg - Tier 3	378,360.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	113,508	0.637
			Demo Steel Bldg - Pt #24 - Terminal - Tier 1	392,712.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	117,814	0.661
			Demo Steel Bldg - Pt #24 - Terminal - Tier 2	359,986.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	107,996	0.606
			Demo Conc/Stl Bldg - PT #12 - Hanger 2 B Ramp	602,272.00 cf	-	-	0.34 /cf	-	-	0.34 /cf	204,772	1.149
			Demo- Buildings		/sf	/sf	/sf	/sf	/sf	/sf	**1,108,133**	**6.217**
			Bldg Demo								**1,108,133**	**6.217**
			09 - Misc Items Miscellaneous Items								**1,108,133**	**6.217**
10 - Aprons			**Apron Expansion**									
	15" Concrete Apron		**15" Concrete Apron**									
		02320.070	**Backfill Soil/Rock Fill**									
			Gravel fill at Slabs	1,987.65 cy	7.05 /cy	15.60 /cy	-		-	22.65 /cy	45,023	0.253
			Fill Sand	993.83 cy	-	13.00 /cy	-	-	-	13.00 /cy	12,920	0.072
			Backfill Soil/Rock Fill		/cy	/cy	/cy	/cy	/cy	/cy	**57,942**	**0.325**
		03060.110	**Curing**									
			Liquid Curing Compounds	129,000.00 sf	0.10 /sf	0.01 /sf	-	-	-	0.11 /sf	13,652	0.077
			Curing		/sf	/sf	/sf	/sf	/sf	/sf	**13,652**	**0.077**
		03060.120	**Hardener**									
			Seal Floors	129,000.00 sf	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	19,070	0.107
			Hardener		/sf	/sf	/sf	/sf	/sf	/sf	**19,070**	**0.107**
		03110.260	**Forms- S-O-G**									
			S.O.G. Edge Form > 1'	4,125.00 sf	16.94 /sf	1.23 /sf	-	-	-	18.17 /sf	74,960	0.421
			Forms- S-O-G		/sf	/sf	/sf	/sf	/sf	/sf	**74,960**	**0.421**
		03110.560	**Forms- Strip & Oil**									
			Strip & Oil SOG Form	4,125.00 sf	0.24 /sf	-	-	-	-	0.24 /sf	983	0.006
			Forms- Strip & Oil		/sf	/sf	/sf	/sf	/sf	/sf	**983**	**0.006**
		03300.010	**Concrete- Buy**									
			5000 psi Concrete	7,453.70 cy	-	120.75 /cy	-	-	-	120.75 /cy	900,035	5.049
			Concrete- Buy		/cy	/cy	/cy	/cy	/cy	/cy	**900,035**	**5.049**
		03310.170	**Place- S-O-G**									
			Truck Place Slab on Grade	7,453.70 cy	23.58 /cy	-	-	-	-	23.58 /cy	175,744	0.986
			Place- S-O-G		/cy	/cy	/cy	/cy	/cy	/cy	**175,744**	**0.986**
		03350.100	**Finish Flatwork**									
			Finish- Hard Trowel	129,000.00 sf	0.80 /sf	0.03 /sf	-	-	-	0.83 /sf	106,740	0.599
			Finish Flatwork		/sf	/sf	/sf	/sf	/sf	/sf	**106,740**	**0.599**
			15" Concrete Apron 15" Concrete Apron		/Sy	/Sy	/Sy	/Sy	/Sy	/Sy	**[illegible],126**	**7.569**
	Parking											

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		02320.070	**Backfill Soil/Rock Fill**									
			Struc Fill - Parking Lots	3,792.59 cy	0.66 /cy	10.40 /cy	-	0.32 /cy	-	11.38 /cy	43,174	0.242
			Struc Fill - Parking Lots	1,896.30 cy	0.66 /cy	10.40 /cy	-	0.32 /cy	-	11.38 /cy	21,587	0.121
			Backfill Soil/Rock Fill		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**64,761**	**0.363**
		02740.100	**Asphalt Paving**									
			Rough Grade Parking Lots	17,066.67 sy	0.26 /sy	-	-	0.28 /sy	-	0.54 /sy	9,270	0.052
			Asphalt Base Course 2"	17,066.67 sy	-	-	4.40 /sy	-	-	4.40 /sy	75,093	0.421
			Asphalt Top Course 2"	17,066.67 sy	-	-	4.00 /sy	-	-	4.00 /sy	68,267	0.383
			Asphalt Paving		**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**152,630**	**0.856**
			Parking								**217,391**	**1.220**
Streets												
		02317.000	**Earthwork**									
			Backfill Crushed Rock Med	207.59 cuyd	3.76 /cuyd	12.00 /cuyd	-	5.11 /cuyd	-	20.87 /cuyd	4,332	0.024
			Earthwork		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**4,332**	**0.024**
		02720.100	**Base**									
			Crushed Gravel	1,383.95 cy	1.76 /cy	8.89 /cy	-	0.86 /cy	-	11.51 /cy	15,928	0.089
			Crushed Gravel	553.58 cy	1.76 /cy	8.89 /cy	-	0.86 /cy	-	11.51 /cy	6,371	0.036
			Base		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**22,299**	**0.125**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	4,982.22 sy	0.15 /sy	-	-	0.15 /sy	-	0.30 /sy	1,495	0.008
			Asphalt Base Course 2"	4,982.22 sy	-	-	4.40 /sy	-	-	4.40 /sy	21,922	0.123
			Asphalt Top Course 2"	4,982.22 sy	-	-	4.00 /sy	-	-	4.00 /sy	19,929	0.112
			Asphalt Paving		**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**43,345**	**0.243**
		02770.100	**Curbs**									
			Extruded Curbs & Gutter 18"	3,800.00 lf	1.17 /lf	4.50 /lf	-	0.69 /lf	-	6.37 /lf	24,189	0.136
			Curbs		**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**24,189**	**0.136**
		03060.110	**Curing**									
			Liquid Curing Compounds	5,700.00 sf	0.10 /sf	0.01 /sf	-	-	-	0.11 /sf	603	0.003
			Liquid Curing Compounds	19,000.00 sf	0.10 /sf	0.01 /sf	-	-	-	0.11 /sf	2,011	0.011
			Curing		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**2,614**	**0.015**
		03110.260	**Forms- S-O-G**									
			S.O.G. Edge Form < 1'	2,536.67 sf	7.08 /sf	0.35 /sf	-	-	-	7.43 /sf	18,850	0.106
			Forms- S-O-G		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**18,850**	**0.106**
		03110.560	**Forms- Strip & Oil**									
			Strip & Oil SOG Form	2,536.67 sf	0.24 /sf	-	-	-	-	0.24 /sf	605	0.003
			Forms- Strip & Oil		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**605**	**0.003**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	630.00 lf	2.20 /lf	0.73 /lf	-	-	-	2.92 /lf	1,839	0.010
			Expansion Joints		**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**1,839**	**0.010**
		03300.010	**Concrete- Buy**									
			3000 psi Concrete	234.57 cy	-	94.50 /cy	-	-	-	94.50 /cy	22,167	0.124
			Concrete- Buy		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**22,167**	**0.124**
		03310.170	**Place- S-O-G**									
			Truck Place Slab on Grade	234.57 cy	23.58 /cy	-	-	-	-	23.58 /cy	5,531	0.031
			Place- S-O-G		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**5,531**	**0.031**
		03350.100	**Finish Flatwork**									
			Finish- Broom	19,000.00 sf	0.64 /sf	0.01 /sf	-	-	-	0.64 /sf	12,243	0.069
			Finish Flatwork		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**12,243**	**0.069**
			Streets								**158,014**	**0.886**
Terminal												
		21000.000	**New Buildings**									
			New Terminal & Ops Buildings	25,960.00 sf	100.00 /sf	100.00 /sf	-	10.00 /sf	-	210.00 /sf	5,451,600	30.584
			Misc Site Improvements	1.00 ls	300,000.00 /ls	450,000.00 /ls	-	150,000.00 /ls	-	900,000.00 /ls	900,000	5.049

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		21000.000	**New Buildings**									
			New Air Cargo Building	12,000.00 sf	75.00 /sf	75.00 /sf	-	5.00 /sf	-	155.00 /sf	1,860,000	10.435
			New Buildings								**8,211,600**	**46.067**
			Terminal								**8,211,600**	**46.067**
			10 - Aprons Apron Expansion	**17,900.00 Sy**	**236.97 /Sy**	**280.83 /Sy**	**10.35 /Sy**	**26.94 /Sy**	**/Sy**	**555.09 /Sy**	**9,936,130**	**55.742**

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	4,241,734		8,316.691 hrs	
Material	5,026,882			
Subcontract	1,293,344			
Equipment	482,304		304.762 hrs	
Other				
	11,044,264	11,044,264		
Material Take-off Allowance	883.541			8.000 %
Labor Overtime	1.060.434			25.000 %
Bond	87.931			
Overhead & Profit	1.656.640			15.000 %
Contingency	2.208.853			20.000 %
Market Conditions Allowance	883.541			8.000 %
Total		***17,825,204***		

Unalaska Airport Master Plan
Airport Runway Extension & Apron Alternate #4
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Alt #4
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	3/30/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
10 - Apron											
	Apron Expansion										
		02320.070	**Backfill Soil/Rock Fill**								
			Gravel fill at Slabs	1,419.75 cy	7.05 /cy	15.60 /cy	-		-	22.65 /cy	32,159
			Fill Sand	709.88 cy	-	13.00 /cy	-	-	-	13.00 /cy	9,228
			Backfill Soil/Rock Fill		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**41,387**
		03060.000	**Concrete- Admixtures**								
			Superplasticizers	5,324.07 cy	-	3.31 /cy	-	-	-	3.31 /cy	17,609
			Concrete- Admixtures		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**17,609**
		03060.110	**Curing**								
			Liquid Curing Compounds	115,000.00 sf	0.10 /sf	0.01 /sf	-	-	-	0.11 /sf	12,170
			Curing		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**12,170**
		03060.120	**Hardener**								
			Seal Floors	115,000.00 sf	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	17,000
			Hardener		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**17,000**
		03110.260	**Forms- S-O-G**								
			S.O.G. Edge Form > 1'	3,025.00 sf	16.94 /sf	1.23 /sf	-	-	-	18.17 /sf	54,971
			Forms- S-O-G		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**54,971**
		03110.560	**Forms- Strip & Oil**								
			Strip & Oil SOG Form	3,025.00 sf	0.24 /sf	-	-	-	-	0.24 /sf	721
			Forms- Strip & Oil		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**721**
		03220.100	**Wire Mesh- Rolls**								
			Mesh Support - bricks	13,185.00 ea	0.14 /ea	0.19 /ea	-	-	-	0.33 /ea	4,393
			Wire Mesh- Rolls		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**4,393**
		03300.010	**Concrete- Buy**								
			5000 psi Concrete	5,324.07 cy	-	120.75 /cy	-	-	-	120.75 /cy	642,882
			Concrete- Buy		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**642,882**
		03310.170	**Place- S-O-G**								
			Truck Place Slab on Grade	5,324.07 cy	23.58 /cy	-	-	-	-	23.58 /cy	125,531
			Place- S-O-G		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**125,531**
		03350.100	**Finish Flatwork**								
			Finish- Hard Trowel	115,000.00 sf	0.80 /sf	0.03 /sf	-	-	-	0.83 /sf	95,155
			Finish Flatwork		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**95,155**
			Apron Expansion								**1,011,821**
	Core Fill		**Core Material Fill**								
		02317.000	**Earthwork**								
			Articulated Off-road 25cy (1 - 3 Mile)	30,000.00 cuyd	0.56 /cuyd		-	0.83 /cuyd	-	1.39 /cuyd	41,567
			Earthwork		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**41,567**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		02370.100	**Rip Rap**								
			Crushed Rock Production	30,000.00 cy	0.92 /cy		6.50 /cy	4.46 /cy	-	11.88 /cy	356,347
			Quarry Stone < 100#	30,000.00 cy	2.78 /cy			1.21 /cy	-	3.99 /cy	119,746
			Rip Rap		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**476,093**
			Core Fill Core Material Fill		**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**517,660**
	Underston e 1		**Understone Layer 1**								
		02317.000	**Earthwork**								
			Articulated Off-road 25cy (1 - 3 Mile)	6,250.00 cuyd	0.56 /cuyd		-	0.83 /cuyd	-	1.39 /cuyd	8,660
			Earthwork		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**8,660**
		02370.100	**Rip Rap**								
			Crushed Rock Production	6,250.00 cy	0.92 /cy		6.50 /cy	4.46 /cy	-	11.88 /cy	74,239
			Armor Quarry Stone > 5 Ton	6,250.00 cy	114.87 /cy			123.94 /cy	-	238.81 /cy	1,492,571
			Rip Rap		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**1,566,810**
			Understone 1 Understone Layer 1		**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**1,575,470**
	Underston e 2		**Understone Layer 2**								
		02317.000	**Earthwork**								
			Articulated Off-road 25cy (1 - 3 Mile)	22,500.00 cuyd	0.56 /cuyd		-	0.83 /cuyd	-	1.39 /cuyd	31,175
			Earthwork		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**31,175**
		02370.100	**Rip Rap**								
			Crushed Rock Production	22,500.00 cy	0.92 /cy		6.50 /cy	4.46 /cy	-	11.88 /cy	267,260
			Quarry Stone 500# - 1 Ton	22,500.00 cy	28.72 /cy			30.99 /cy	-	59.70 /cy	1,343,314
			Rip Rap		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**1,610,575**
			Understone 2 Understone Layer 2		**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**1,641,750**
			10 - Apron								**4,746,701**

Estimate Totals

Description	Amount	Totals	Hours	Rate	(t I
Labor	1,837,524		27,413.194 hrs		
Material	708,771				
Subcontract	381,875				
Equipment	1,818,531		14,271.047 hrs		
Other					
	4,746,701	4,746,701			
Material Take-off Allowance	379.736			8.000 %	(
Labor Overtime	459.381			25.000 %	(
Bond	43.249				E
Overhead & Profit	712.005			15.000 %	(
Contingency	949.340			20.000 %	(
Market Conditions Allowance	379.736			8.000 %	(
Total		***7,670,148***			

Interim Period (2016) Estimate Assumptions

Basis Assumptions - Airfield and Terminal

- Airfield improvements will be constructed under one bid package.
- Terminal area improvements will be constructed under a separate bid package.
- The planning alternatives were evaluated based on a design completion of approximately 15 percent or, more specifically to a level consistent with a Class Four Estimate as defined by the Association for the Advancement of Cost Engineering (AACE).
- Once the preferred alternative was selected, design of the preferred airfield alternate was furthered to approximately 30 percent complete which corresponds with an AACE Class Three Estimate.

Airfield

- Maximum federal funding to improve the RSA is limited to $25 million by statute.
- The "full" RSA, as defined in this study, will extend 300′ wide X 600′ beyond the displaced thresholds. The estimates presented herein assume that the RSA will be paved full width to withstand heavy weather conditions with minimal maintenance.
- Federal funding limitations may preclude construction of "full" RSAs. The length of the RSA may not actually be decreased; because reduced RSA length, instead, effectively "reduces" the available runway length.
- The ocean wave action requires heavy armoring (estimated 32-foot top width) at the northwesterly (runway 12) end of the runway. With this armoring, a 30-foot wide "splash" zone (allowing wave caused air movement and water movement to vent) will be required to allow the RSA itself to be reasonably maintainable. Estimates assumed that armoring top width and "splash" zones were outside of the limits of the RSA.
- Armoring at the northerly end of the runway and along the side of the runway were assumed to be precast, reinforced concrete units, with approximately 8 to 10 ton units required along the northerly runway end and side, and transitioning to 3 to 4 ton units along the side of the runway. Layers below the armor units were assumed to be locally quarried stone.
- At the southeasterly end of the runway, wave action is much less severe. A 20-foot wide, dual function "splash" zone and roadway safety zone are assumed. Armoring and under layer are assumed to have a top width of about 5 feet. Locally quarried armoring stones and under layers were assumed.
- The relocated Mt. Ballyhoo Road is assumed to be surfaced 30-feet wide. Road centerline was assumed to be 40-feet beyond the "RSA corner". A guardrail between the relocated Mt. Ballyhoo Road and the bay was assumed.

- Costs of construction were estimated for the "full" RSA, in 2007 dollars (9/25/2007 estimate date). "Common" costs will not change very much, even if direct construction costs vary significantly.

- Cost estimates assumed salvage and re-use of 90 percent of existing dolos and/or Core Loc® armoring units (above the waterline) where they are affected by planned improvements. Significant cost savings are expected; however there is risk that the existing units may not be salvageable or re-usable at the estimated 90 percent rate. It is recommended that contract documents allow the bidders options of bidding the work either reusing the existing armor units or importing new units; and allowing the contractor to estimate the amount that it can salvage and reuse. There is also a risk of storm damage while areas are without armoring, during construction.

- A means to "positively" control vehicles from crossing under the runway 30 approach during flight operations was assumed. Tentatively, modified railroad crossing signals – one at each side of the RSA or primary surface (with drop arms and warning lights) operated by aircraft radio control is thought to be possible. This device and associated detection of vehicles within the RSA (and warning indication to pilots) would be "one of a kind" with attendant research, development and design costs.

- Cost of construction project "soft" costs (including pre-design services, design and contract document preparation, services during construction, and project management/coordination, but excluding airport master plan update and environmental impact statement preparation) was estimated at 25 percent of estimated direct and common/miscellaneous costs.

- Construction work will be limited to night time hours, when the airport is normally closed to operations, to minimize air service disruptions.

- Airfield improvements will be packaged into one construction contract.

- Estimates assumed that 3 construction seasons will be required to complete the airfield improvements. One season to develop quarries and produce armor stone and underlying stone, and two seasons of construction at the airport.

- Estimates assume using the Ugadaga quarry for armor stone and high quality stone layers immediately below armor stones and armor unit (e.g. "under-layers") because it is a proven source of good quality stone.

- Estimates assume drilling/blasting and "grizzly" processing (coarse screening) or selectively taking the better quality Mt. Ballyhoo excavation to be used in the "core" of fills into the ocean for the fills below water while using the lesser quality Mt. Ballyhoo materials for core fills above water.

- Estimates assumed a significant cost to rehabilitate city streets at the conclusion of the project, to repair damage expected as a result of hauling armor stone and underlying stone to the airport.

- Construction materials and equipment will be mobilized to the project via barge. Cost estimates assume that equipment and new precast concrete armor units will be barged from Washington.

- Designers will need to confirm sizing (width) for the "wave action zone" for the future final design phase. We expect at least 3 zones – In Unalaska Bay, off the end of runway 12 and along the runway part way toward the terminal; along the runway near the terminal area; and in Dutch Harbor.
- Environmental documentation should address the potential for full build out of the RSA and relocation of Mt. Ballyhoo Road outside of the primary surface. Doing so will leave the option open to complete the build-out if funding becomes available.
- Petroleum product is known to contaminate the area near the southeasterly end of the runway.
- DOT&PF should investigate to determine if the assumption that royalty must be paid for excavation at the airport from Mt. Ballyhoo is correct, and if the amount of the royalty is correct.

Terminal Area

- Buildings will be constructed to satisfy the projected year 2026 space needs when they are constructed (currently assumed to be about the year 2016) to avoid costly "remodeling" costs and re-mobilization costs.

Introduction & Commentary

Interim Estimates – Development during the Planning Period

Unalaska Airport Master Plan Update

Introduction

Airfield alternative 3 was selected as the preferred alternative. After the initial estimates this airfield alternative was advanced to about the 30 percent level of design completion including further consideration for armoring size, width of the "wave action" zone, reducing the scope of RSA improvements to more closely fit the limited funding available ($25 million), and associated adjustments of the Mt. Ballyhoo Road realignment. This section addresses the associated quantity changes and adjusted cost estimates.

Terminal alternative 3 was selected as the preferred alternative. Cost estimates for the new terminal building were revised to reflect the building size defined in planning studies and to reflect further consideration of costs to construct the building in Unalaska. Similarly, cost estimates for the new cargo building were revised to reflect the refined building size and construction in Unalaska.

Airfield

Fills into Unalaska Bay and into Dutch Harbor are required to construct the preferred alternative. Wave action requires that all fill slopes be armored to preserve fills from erosion and to minimize the footprint of fills. Cost of materials and ease of construction encourage using the minimum size armor unit required to resist wave action. Further analysis of wave action and armoring units led to the assumption that Core Loc® units, in more vigorous wave areas of Unalaska Bay, can probably be sized at 8 to 10 tons each; and those Core Loc® units in the less vigorous areas can probably be 3 ton size.

Initial estimates assumed that all existing dolos and Core Loc® would remain in place and be covered by the extended fills, requiring all new armoring. Further study and consultations with constructors familiar with the area led to the assumption that 90 percent of the existing armor units above water level could be salvaged and re-used. Construction documents should be assembled to give bidders the flexibility to consider salvage and reuse of existing units, and to price the work competitively.

Balancing initial construction cost against continuing maintenance costs and long term durability will be an important consideration as the design moves ahead. Initial estimates assumed that RSA could be adequately protected from Unalaska Bay wave action if the armoring and the under layers (from the Ugadaga pit) began at the edge of the RSA and extended outward to the waters, approximately 10 to 15 feet. The wave action zone was increased to 20 feet in Dutch Harbor and to 20 or 30 feet in Unalaska Bay(depending on estimated wave activity) after further consideration of the vigorous wave activity. Waves are very active at the northwesterly end of the runway and for approximately 1,000 feet along the side of the runway near its north end. The additional fill required between the limits of the RSA and the wave action zone was assumed to be selected materials taken from excavations at Mt. Ballyhoo on the airport.

In Dutch Harbor the distance between the edge of the relocated Mt. Ballyhoo Road and the top of the fill slope was increased from about 6 feet to 20 feet to accommodate guardrail or concrete barrier rail placement and provide separation between the road and potential wave run up during storm events. This recognizes that the profile required to provide adequate roadway and airfield drainage may place the road elevation only marginally above sea level.

Cost estimates for the "full RSA" (e.g. 300′ wide and 600′ beyond each end of the displaced thresholds for a total length of 4,900′) assumed Mt. Ballyhoo Road would be aligned to stay clear of the primary surface (e.g. 500′ wide and 200′ beyond each runway end for a total length of 4,600′). This alignment requires deep fills into Dutch Harbor.

When improvement costs are allocated between "RSA improvements" and "other airfield improvements" categories, as agreed upon between DOT&PF and FAA, the amount attributed to RSA improvements exceeds the maximum $25 million expenditure. So, alternative configurations of fills were developed to estimate how much RSA can be constructed using the agreed upon allocation and assuming that wave action zones remain as indicated above; and assuming that Mt. Ballyhoo Road alignment will continue to be near the edge of the reduced RSA. Two alternatives were evaluated, first narrowing the RSA width was evaluated, and then second, shortening the RSA was considered. After careful evaluation, the second alternative was dropped from further consideration because shortening the RSA effectively reduces the runway length available for landing to less than required by the design aircraft.

In the "narrowed" RSA evaluation, we assumed that the RSA width would only be reduced on the "deep" water side of the runway at both ends. Reducing the width on the "shallow" side of the RSA would create a "pocket" (in plan view) between the shoreline and extended runway fills, causing concerns about wave run up and erosion. And reductions on the shallow side have a much smaller effect on cost than the same reduction on the deep side.

Geotechnical research noted that fills should be expected to settle following placement and recommended that settlement be monitored to confirm that it has stabilized; then topping the fills to design elevation before placing crushed aggregate, paving, and other improvements. Recognizing that the expected settlement will require that the fills experience at least one storm season (with associated wave action) and may require two years, or more, the estimates assumed that filling and armoring would be in a separate construction package from building construction.

Estimates assumed that three construction seasons would be required for airfield improvements. Mobilization, development of the pit (Ugadaga pit assumed) and production of armor stone (for Dutch Harbor) and under layer stone (will be placed below armor stone and armor units) are expected in the first construction season. Construction of fills and armoring were assumed in the second season; and completion of fills and armoring, repairing any settlement and surfacing are expected in the third season (assuming fills have stabilized).

Estimates also assumed one construction contract for airfield improvements and another construction contract for terminal area improvements because of the significantly different types of work, equipment, and materials involved in each.

Terminal Area

The selected terminal area alternative 3 assumes demolition of the existing Torpedo building, two existing air cargo buildings, and the existing airport terminal. In considering the alternative further, it was noted that the new terminal building and new cargo building must be complete and functional before demolition of existing buildings to avoid the cost of temporary facilities; and that completion of the terminal apron must follow building demolition. Cost estimates assume that terminal area improvements can be completed in two full construction seasons, with the buildings being enclosed in the first season which allows interior work to continue through the winter. Building completion and move-in early in the second construction season will make demolition of the existing buildings and complete site improvements possible before the close of the second construction season.

If terminal area improvements are sequenced to begin construction in the second or third year of the airfield improvements, the airfield fills settlement should be stabilized when terminal area paving is needed, allowing a single asphalt plant mobilization to accomplish all paving for airfield improvements, Mt. Ballyhoo Road relocation, and terminal area improvements.

Cost estimates for terminal area improvements assume that all improvements required during the planning period will be constructed in one package. This approach will result in facilities with more than require capacity initially; and avoids remodel costs and the expected high mobilization costs that would be incurred if the work is done in multiple construction packages.

Estimated Cost of Impovements during the Planning Period

Unalaska Airport
Unalaska, Alaska

	Source		markups		Total Project	RSA allocation	
Airfield							
"Full" RSA build out	1, 2				**$53,600,000.0**	**$44,760,000.0**	Source 7
"Reduced" RSA (to achieve $25 million limit)	6				**$34,400,000.0**	**$26,100,000.0**	
Terminal Area							
Demolition							
Existing Terminal Building - Tier 1	3	$135,486	1.52	$205,985			
Existing Terminal Building - Tier 2	3	$124,195	1.52	$188,818			
Torpedo Building - Tier 1	3	$50,763	1.52	$77,177			
Torpedo Building - Tier 2	3	$72,519	1.52	$110,253			
Torpedo Building - Tier 3	3	$130,534	1.52	$198,456			
Cargo Bldg - ACE	3	$39,198	1.52	$59,594			
Cargo Bldg Pen Air	3	$13,889	1.52	$21,116			
Demolition Subtotal				$861,400			
Construction							
Terminal Building - Assumed to be single story	4	$10,152,000	1.52	$15,405,811			
Cargo Building	4	$680,832	1.52	$1,033,173			
Apron	5	$1,349,126	1.61	$2,177,460			
Parking	5	$217,391	1.61	$350,864			
Access Road	5	$158,014	1.61	$255,031			
Misc. site improvements	5	$900,000	1.61	$1,452,581			
Construction Subtotal				$20,674,920			
Terminal Area Subtotal				$21,536,319			
Plus 25% Predesign, design, CA, management				$5,384,080			
Plus Common & Misc Costs (if terminal area improvements are separate contract)				$8,000,000			
Terminal Area Total					**$34,920,399**		
Estimated Total Project, Full RSA					**$88,520,399**		
Estimated Total Project, Reduced RSA					**$69,320,399**		

Sources:	**Dated**
1 Unalaska Airport Runway Extension 30% Alt 3.pdf	25-Sep-07
2 UARE Basis of Estimate 09-24-2007.pdf	24-Sep-07
3 Unalaska Airport Master Plan Estimate R03a.pdf	9-Apr-07
4 UARE Bldg Replacement Interim Facilities R02.pdf	31-Oct-07
5 UARE Airport Apron Alternates 06-22-07 R03b.pdf	22-Jun-07
6 75ft_Alt_3_Costing_Philosophy_Breakdown_30%_(ERC 9-29-07).xls	
7 150ft RSA_Alt_3_Costing_Philosophy_Breakdown_30%_(JE 9-11-07__ERC 9-29-07).xls	

Notes:

Interim Estimates Summary 2007 12 20 (2).xls
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Unalaska Airport Master Plan
Airport Runway Extension Alternate #3 - 9/24/2007
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Alt #3
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	9/24/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary Paginate

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
01 - Common			COMMON								
	ATN		Aids to Navigation								
		16529.498	Runway Lighting								
			Runway Navigation Equipment & Lights	1.00 ls			100,000.00 /ls	-	-	100,000.00 /ls	100,000
			Runway Lighting		/ls	/ls	/ls	/ls	/ls	/ls	100,000
			ATN Aids to Navigation								100,000
	Beach Rd M&R		Airport Beach Road Maintenance & Repair								
		01050.100	Permits								
			Road Use Permit	1.00 ls	-		30,000.00 /ls	-	-	30,000.00 /ls	30,000
			Permits		/ls	/ls	/ls	/ls	/ls	/ls	30,000
		02740.100	Asphalt Paving								
			Asphalt Base Course 2"	74,667.00 sy	0.67 /sy	4.00 /sy		0.32 /sy	-	5.00 /sy	373,016
			Asphalt Top Course 2"	74,667.00 sy	0.67 /sy	4.50 /sy		0.32 /sy	-	5.50 /sy	410,349
			Asphalt Paving		/sy	/sy	/sy	/sy	/sy	/sy	783,365
		02740.130	Paving Textiles								
			Road Base Geo Textile	74,666.67 sy	0.14 /sy	2.20 /sy	-	-	-	2.34 /sy	174,499
			Paving Textiles		/sy	/sy	/sy	/sy	/sy	/sy	174,499
			Beach Rd M&R Airport Beach Road Maintenance & Repair								987,863
	Const Survey		Construction Surveying								
		01065.100	Surveys								
			Airport Survey & Layouts	1.00 ls	115,000.00 /ls		-	-	-	115,000.00 /ls	115,000
			Surveys		/ls	/ls	/ls	/ls	/ls	/ls	115,000
			Const Survey Construction Surveying								115,000
	Envir Protect		Envioronment Protection								
		02370.150	Temp Erosion Control								
			Silt Fence	4,000.00 lf	1.10 /lf	4.40 /lf	-	-	-	5.50 /lf	21,985
			Erosion Control Mats-Slopes	10,000.00 sf	0.55 /sf	2.20 /sf	-	-	-	2.75 /sf	27,481
			Reseed Site for Winter	200,000.00 sf	0.06 /sf	0.02 /sf	-	-	-	0.08 /sf	15,363
			Temp Erosion Control		/ls	/ls	/ls	/ls	/ls	/ls	64,830
		02370.200	Temp Filter Dams								
			Filter Fabric	0.04 cy	-	1.60 /cy	-	-	-	1.60 /cy	0
			Temp Filter Dams		/cy	/cy	/cy	/cy	/cy	/cy	0
			Envir Protect Envioronment Protection								64,830
	Field Lab		Field Labratory								
		01201.100	Offices								
			Inspector's Trailer	12.00 mo	-	,250.00 /mo	-		-	1,250.00	15,000

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Offices		**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**15,000**
		01202.100	**Supplies & Equip**								
			Copy Machine	12.00 mo	-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies	12.00 mo	-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies & Equip		**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**9,600**
		01203.100	**Utilities**								
			Electric Power	12.00 mo	-	300.00 /mo	-	-	-	300.00 /mo	3,600
			Telephone Charges	12.00 mo	-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Temporary Toilets	12.00 mo	-	225.00 /mo	-	-	-	225.00 /mo	2,700
			Utilities		**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**12,300**
		01401.100	**Testing**								
			Misc Test & Inspection	1.00 ls	-	-	50,000.00 /ls	-	-	50,000.00 /ls	50,000
			Soil Testing	1.00 ls	-	-	25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Material Testing	1.00 ls	-	-	25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Testing		**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**100,000**
			Field Lab Field Labratory								**136,900**
Field Office			**Field Office**								
		01060.100	**Documents**								
			Prints & Records	1.00 ls	-		25,000.00 /ls	-	-	25,000.00 /ls	25,000
			Documents		**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**25,000**
		01070.100	**Photos**								
			Project Photos	12.00 mo	287.50 /mo	250.00 /mo	-	-	-	537.50 /mo	6,450
			Photos		**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**/mo**	**6,450**
		01075.100	**Signs**								
			Project Signs 8x8	3.00 ea	315.50 /ea	750.00 /ea	-	-	-	1,065.50 /ea	3,197
			Signs		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**3,197**
		01100.100	**Project Management**								
			Construction Manager	52.00 wk	2,875.00 /wk	-	-		300.00 /wk	3,175.00 /wk	165,100
			Project Manager	52.00 wk	3,450.00 /wk	-	-		-	3,450.00 /wk	179,400
			Project Management		**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**344,500**
		01102.100	**Site Supervision**								
			Superintendent	52.00 wk	2,875.00 /wk	-	-		-	2,875.00 /wk	149,500
			Site Supervision		**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**149,500**
		01110.100	**Travel**								
			Weekly Travel Subsistence (Room & Board)	1,820.00 wk	-		850.00 /wk	-	-	850.00 /wk	1,547,000
			Airline Fares (See Notes)	424.00 ea	-		715.00 /ea	-	-	715.00 /ea	303,160
			Motel & Hotel (Home Office Staff Only)	365.00 dy	-		175.00 /dy	-	-	175.00 /dy	63,875
			Travel		**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**/wk**	**1,914,035**
		01201.100	**Offices**								
			Office Trailer	12.00 mo	-	2,000.00 /mo	-		-	2,000.00 /mo	24,000

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Offices		/mo	/mo	/mo	/mo	/mo	/mo	**24,000**
		01202.100	**Supplies & Equip**								
			Copy Machine	12.00 mo	-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies	12.00 mo	-	400.00 /mo	-	-	-	400.00 /mo	4,800
			Supplies & Equip		/mo	/mo	/mo	/mo	/mo	/mo	**9,600**
		01203.100	**Utilities**								
			Electric Power	12.00 mo	-	350.00 /mo	-	-	-	350.00 /mo	4,200
			Telephone Charges	12.00 mo	-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Temporary Toilets	12.00 mo	-	500.00 /mo	-	-	-	500.00 /mo	6,000
			Utilities		/mo	/mo	/mo	/mo	/mo	/mo	**16,200**
		01310.100	**Tools & Equipment**								
			Fueling Equipment	52.00 wk	5,022.82 /wk		-	3,241.92 /wk	-	8,264.74 /wk	429,766
			Misc. Tools	1.00 ls	-	-	-	25,000.00 /ls	-	25,000.00 /ls	25,000
			Tools & Equipment		/ls	/ls	/ls	/ls	/ls	/ls	**454,766**
		01330.100	**Scheduling**								
			Scheduling Expense	1.00 ls	1,725.00 /ls		-	-	-	1,725.00 /ls	1,725
			Scheduling		/ls	/ls	/ls	/ls	/ls	/ls	**1,725**
			Field Office Field Office								**2,948,973**
Mob Demob			**Mobilization/Demobilization**								
		01910.000	**Equipment**								
			Construction Equipment Mobilizations	1.00 LS	28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Asphalt Plant Mobilization	1.00 LS	28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Quarry Site Equipment Mobilization	2.00 LS	28,750.00 /LS	0.00 /LS	150,000.00 /LS	0.00 /LS	-	178,750.00 /LS	357,500
			Misc Equipment & Supplies Mobilizations	1.00 LS	28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Construction Equipment De-Mobilizations	1.00 LS	28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Asphalt Plant De-Mobilization	1.00 LS	28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Quarry Site Equipment De-Mobilization	2.00 LS	28,750.00 /LS	0.00 /LS	150,000.00 /LS	0.00 /LS	-	178,750.00 /LS	357,500
			Misc Equipment & Supplies De-Mobilizations	1.00 LS	28,750.00 /LS	0.00 /LS	300,000.00 /LS	0.00 /LS	-	328,750.00 /LS	328,750
			Equipment		/ls	/ls	/ls	/ls	/ls	/ls	**2,687,500**
			Mob Demob Mobilization/Demobilization								**2,687,500**
Pit Mob			**Quarry Pit Mobilization**								
		01050.100	**Permits**								
			Site Permit	1.00 ls	-		20,000.00 /ls	-	-	20,000.00 /ls	20,000
			Permits		/ls	/ls	/ls	/ls	/ls	/ls	**20,000**
		01065.100	**Surveys**								
			Pit Survey & Layouts	2.00 ls	5,750.00 /ls		-	-	-	5,750.00 /ls	11,500
			Surveys		/ls	/ls	/ls	/ls	/ls	/ls	**11,500**
		01102.100	**Site Supervision**								
			Superintendent	78.00 wk	1,725.00 /wk	-	-		-	1,725.00 /wk	134,550
			Site Supervision		/wk	/wk	/wk	/wk	/wk	/	**134,550**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		01201.100	**Offices**								
			Office Trailer	18.00 mo	-	250.00 /mo	-		-	250.00 /mo	4,500
			Offices		/mo	/mo	/mo	/mo	/mo	/mo	**4,500**
		01203.100	**Utilities**								
			Temporary Toilets	18.00 mo	-	225.00 /mo	-	-	-	225.00 /mo	4,050
			Utilities		/mo	/mo	/mo	/mo	/mo	/mo	**4,050**
		01300.100	**Project Clean Up**								
			Final Cleaning	1.00 ls	6,774.08 /ls			19,765.00 /ls	-	26,539.08 /ls	26,539
			Project Clean Up		/ls	/ls	/ls	/ls	/ls	/ls	**26,539**
		01910.000	**Equipment**								
			Scale House	18.00 mo	-	140.00 /mo	-	500.00 /mo	-	640.00 /mo	11,520
			Equipment		/ls	/ls	/ls	/ls	/ls	/ls	**11,520**
		02230.010	**Clear & Grub**								
			Pile & Burn Lt Brush Hard	5.74 acre	998.06 /acre		-	923.08 /acre	-	1,921.14 /acre	11,027
			Clear & Grub		/sf	/sf	/sf	/sf	/sf	/sf	**11,027**
		02317.000	**Earthwork**								
			Overburden Removal	11,100.00 cy	0.34 /cy	-	-	0.99 /cy	-	1.33 /cy	14,729
			Drill & Shoot Quarry Rock	76,050.00 Cy	2.82 /Cy	2.04 /Cy		3.62 /Cy	-	8.48 /Cy	644,714
			Drill & Shoot Mt.Ballyhoo Rock	400,000.00 Cy	2.82 /Cy	2.04 /Cy		3.62 /Cy	-	8.48 /Cy	3,391,000
			Articulated Off-road 25cy (0 - 1 Mile)	11,100.00 cuyd	0.56 /cuyd		-	0.43 /cuyd	-	0.99 /cuyd	10,983
			Earthwork		/cy	/cy	/cy	/cy	/cy	/cy	**4,061,426**
			Pit Mob Quarry Pit Mobilization								**4,285,112**
Safety & Flagging			**Safety & Traffic Control**								
		01204.100	**OSHA & Safety**								
			Safety Officer	52.00 wk	2,300.00 /wk	-	-	-	-	2,300.00 /wk	119,600
			Safety Equipment/Signage	1.00 ls	-	-	10,000.00 /ls	35,000.00 /ls	-	45,000.00 /ls	45,000
			OSHA & Safety		/wk	/wk	/wk	/wk	/wk	/wk	**164,600**
		01205.100	**Safety Protection**								
			Temporary Fences	1.00 ls	-	-	7.15 /ls	-	-	7.15 /ls	7
			Traffic Control	52.00 wk			5,000.00 /wk	-	-	5,000.00 /wk	260,000
			Safety Protection		/wk	/wk	/wk	/wk	/wk	/wk	**260,007**
			Safety & Flagging Safety & Traffic Control								**424,607**
			01 - Common COMMON								**11,750,785**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
02 - RW 12 Extend			**Runway 12 Extension Sta 44+00 to 50+00**								
	Asphalt 4"		**Asphalt RSA Material**								
		02720.100	**Base**								
			Crushed Gravel	1,950.00 cy	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.65 /cy	28,574
			Base		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**28,574**
		02740.100	**Asphalt Paving**								
			Rough Grading Roads	17,300.00 sy	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	10,039
			Asphalt Base Course 2"	17,300.00 sy	0.67 /sy	4.00 /sy	0.00 /sy	0.32 /sy	-	5.00 /sy	86,426
			Asphalt Top Course 2"	17,300.00 sy	0.67 /sy	4.50 /sy	0.00 /sy	0.32 /sy	-	5.50 /sy	95,076
			Asphalt Paving		**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**191,541**
			Asphalt 4" Asphalt RSA Material								**220,115**
	Asphalt 8"		**Asphalt Runway Material**								
		02720.100	**Base**								
			Crushed Gravel	0.33 cy	2.00 /cy	11.77 /cy	-	0.87 /cy	-	14.66 /cy	5
			Base		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**5**
		02740.100	**Asphalt Paving**								
			Rough Grading Roads	1.00 sy	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	1
			Asphalt Base Course 4"	1.00 sy	0.84 /sy	8.00 /sy	0.00 /sy	0.40 /sy	-	9.24 /sy	9
			Asphalt Top Course 4.0"	1.00 sy	0.84 /sy	8.50 /sy	0.00 /sy	0.40 /sy	-	9.74 /sy	10
			Asphalt Paving		**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**20**
			Asphalt 8" Asphalt Runway Material								**24**
	Core 8 Ton		**Core Loc Units 8 Ton**								
		02330.000	**Haul**								
			Core-Loc Units Haul	2,120.00 ea	180.51 /ea	0.00 /ea	-	290.58 /ea	-	471.09 /ea	998,710
			Haul		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**998,710**
		02370.100	**Rip Rap**								
			Core-Loc Units 8.8 Ton	2,120.00 ea	287.18 /ea	1,056.00 /ea	88.00 /ea	309.85 /ea	-	1,741.03 /ea	3,690,981
			Core-Loc Units 8.8 Ton REUSE	930.00 ea	382.91 /ea	0.00 /ea	0.00 /ea	413.13 /ea	-	796.04 /ea	740,315
			Rip Rap		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**4,431,296**
			Core 8 Ton Core Loc Units 8 Ton								**5,430,006**
	Core Fill		**Core Material Fill**								
		02317.000	**Earthwork**								
			Articulated Off-road 25cy (1 - 3 Mile)	147,000.00 cuyd	0.56 /cuyd		-	0.52 /cuyd	-	1.08 /cuyd	158,413
			Earthwork		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**158,413**
		02370.100	**Rip Rap**								
			Screened Rock Production	147,000.00 cy	0.80 /cy		1.50 /cy	1.53 /cy	-	3.83 /cy	563,023
			Quarry Stone < 100#	147,000.00 cy	1.39 /cy			0.60 /cy	-	2.00 /cy	293,378
			Rip Rap		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**856,400**
			Core Fill Core Material Fill		**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**1,014,814**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
	Underston e 1		**Understone Layer 1**								
		02317.000	**Earthwork**								
			Tandem Axle Truck 15cy (5 - 7 Mile)	20,100.00 cuyd	1.84 /cuyd		-	1.55 /cuyd	-	3.40 /cuyd	68,239
			Earthwork		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**68,239**
		02370.100	**Rip Rap**								
			Crushed Rock Production	20,100.00 cy	0.92 /cy		8.50 /cy	4.46 /cy	-	13.88 /cy	278,953
			Quarry Stone 500# - 1 Ton	20,100.00 cy	28.72 /cy			30.99 /cy	-	59.70 /cy	1,200,027
			Rip Rap		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,478,980**
			Understone 1 Understone Layer 1		**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**1,547,219**
	Underston e 2		**Understone Layer 2**								
		02317.000	**Earthwork**								
			Tandem Axle Truck 15cy (5 - 7 Mile)	11,750.00 cuyd	1.84 /cuyd		-	1.55 /cuyd	-	3.40 /cuyd	39,891
			Earthwork		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**39,891**
		02370.100	**Rip Rap**								
			Crushed Rock Production	11,750.00 cy	0.92 /cy		8.50 /cy	4.46 /cy	-	13.88 /cy	163,069
			Quarry Stone < 100#	11,750.00 cy	2.78 /cy			1.21 /cy	-	3.99 /cy	46,901
			Rip Rap		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**209,970**
			Understone 2 Understone Layer 2		**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**249,861**
			02 - RW 12 Extend Runway 12 Extension Sta 44+00 to 50+00								**8,462,039**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
03 - RW 30 Extend			**Runway 30 Extension Sta 87+00 to 93+00 Including Road**								
	Asphalt 4"		**Asphalt RSA Material**								
		02720.100	**Base**								
			Crushed Gravel	1,950.00 cy	2.03 /cy	11.77 /cy	-	0.86 /cy	-	14.65 /cy	28,574
			Base		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**28,574**
		02740.100	**Asphalt Paving**								
			Rough Grading Roads	17,300.00 sy	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	10,039
			Asphalt Base Course 2"	17,300.00 sy	0.67 /sy	4.00 /sy	0.00 /sy	0.32 /sy	-	5.00 /sy	86,426
			Asphalt Top Course 2"	17,300.00 sy	0.67 /sy	4.50 /sy	0.00 /sy	0.32 /sy	-	5.50 /sy	95,076
			Asphalt Paving		**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**191,541**
			Asphalt 4" Asphalt RSA Material								**220,115**
	Asphalt 8"		**Asphalt Runway Material**								
		02720.100	**Base**								
			Crushed Gravel	0.33 cy	2.00 /cy	11.77 /cy	-	0.87 /cy	-	14.66 /cy	5
			Base		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**5**
		02740.100	**Asphalt Paving**								
			Rough Grading Roads	1.00 sy	0.30 /sy	-	-	0.28 /sy	-	0.58 /sy	1
			Asphalt Base Course 4"	1.00 sy	0.84 /sy	8.00 /sy	0.00 /sy	0.40 /sy	-	9.24 /sy	9
			Asphalt Top Course 4"	1.00 sy	0.84 /sy	8.50 /sy	0.00 /sy	0.40 /sy	-	9.74 /sy	10
			Asphalt Paving		**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**20**
			Asphalt 8" Asphalt Runway Material								**24**
	Ballyhoo Rd-end		**Ballyhoo Road Improvement**								
		02740.100	**Asphalt Paving**								
			Asphalt Base Course 6"	5,833.00 sy	-	-	10.50 /sy	-	-	10.50 /sy	61,247
			Asphalt Top Course 3"	5,833.00 sy	-	-	6.00 /sy	-	-	6.00 /sy	34,998
			Asphalt Paving		**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**/sy**	**96,245**
		02766.100	**Pavement Marking**								
			Painted Lines 4" Wide	4,500.00 lf	-	-	0.12 /lf	-	-	0.12 /lf	540
			Pavement Marking		**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**540**
		02770.100	**Curbs**								
			Concrete Curb & Gutter 12"	3,000.00 lf	1.35 /lf	6.20 /lf	-	0.70 /lf	-	8.25 /lf	24,745
			Curbs		**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**24,745**
		02840.500	**Guard Rails**								
			Steel Guard Rails	1,500.00 lf	-	-	25.00 /lf	-	-	25.00 /lf	37,500
			Steel Guard Rail End Tratments	2.00 ea	-	-	2,500.00 /ea	-	-	2,500.00 /ea	5,000
			Guard Rails		**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**42,500**
			Ballyhoo Rd-end Ballyhoo Road Improvement		**/LF**	**/LF**	**/LF**	**/LF**	**/LF**	**/LF**	**164,030**
	Core		**Core Material Fill**								

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
		02317.000	Earthwork								
			Articulated Off-road 25cy (1 - 3 Mile)	283,100.00 cuyd	0.56 /cuyd		-	0.52 /cuyd	-	1.08 /cuyd	305,080
			Earthwork		/cy	/cy	/cy	/cy	/cy	/cy	305,080
		02370.100	Rip Rap								
			Screened Rock Production	283,100.00 cy	0.80 /cy		1.50 /cy	1.53 /cy	-	3.83 /cy	1,084,297
			Quarry Stone < 100#	283,100.00 cy	1.39 /cy	0.00 /cy	0.00 /cy	0.60 /cy	-	2.00 /cy	565,002
			Rip Rap		/cy	/cy	/cy	/cy	/cy	/cy	1,649,299
			Core Fill Core Material Fill		/Cy	/Cy	/Cy	/Cy	/Cy	/Cy	1,954,379
PVC			Positive Vehicle Control								
		10610.100	Folding\Security Gates								
			Vehicle Control Gates	1.00 ls	-	-	190,000.00 /ls	-	-	190,000.00 /ls	190,000
			Folding\Security Gates		/ea	/ea	/ea	/ea	/ea	/ea	190,000
			PVC Positive Vehicle Control								190,000
Understone 1			Understone Layer 1								
		02317.000	Earthwork								
			Tandem Axle Truck 15cy (5 - 7 Mile)	23,500.00 cuyd	1.84 /cuyd		-	1.55 /cuyd	-	3.40 /cuyd	79,782
			Earthwork		/cy	/cy	/cy	/cy	/cy	/cy	79,782
		02370.100	Rip Rap								
			Crushed Rock Production	23,500.00 cy	0.92 /cy	0.00 /cy	8.50 /cy	4.46 /cy	-	13.88 /cy	326,139
			Quarry Stone 500# - 1 Ton	23,500.00 cy	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	1,403,017
			Rip Rap		/cy	/cy	/cy	/cy	/cy	/cy	1,729,156
			Understone 1 Understone Layer 1		/Cy	/Cy	/Cy	/Cy	/Cy	/Cy	1,808,937
Understone 2			Understone Layer 2								
		02317.000	Earthwork								
			Tandem Axle Truck 15cy (5 - 7 Mile)	9,700.00 cuyd	1.84 /cuyd		-	1.55 /cuyd	-	3.40 /cuyd	32,931
			Earthwork		/cy	/cy	/cy	/cy	/cy	/cy	32,931
		02370.100	Rip Rap								
			Crushed Rock Production	9,700.00 cy	0.92 /cy	0.00 /cy	8.50 /cy	4.46 /cy	-	13.88 /cy	134,619
			Quarry Stone < 100#	9,700.00 cy	2.78 /cy			1.21 /cy	-	3.99 /cy	38,718
			Rip Rap		/cy	/cy	/cy	/cy	/cy	/cy	173,337
			Understone 2 Understone Layer 2		/Cy	/Cy	/Cy	/Cy	/Cy	/Cy	206,268
			03 - RW 30 Extend Runway 30 Extension Sta 87+00 to 93+00 Including Road								**4,543,754**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
07 - Runway Improve			**Runway Improvements**								
	Core 3 Ton		**Core Loc 3.4 Ton Units**								
		02330.000	**Haul**								
			Core-Loc Units Haul	2,830.00 ea	90.25 /ea		-	112.27 /ea	-	202.52 /ea	573,142
			Haul		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**573,142**
		02370.100	**Rip Rap**								
			Core-Loc Units 3.4 Ton	2,830.00 ea	191.45 /ea	408.00 /ea	34.00 /ea	206.57 /ea	-	840.02 /ea	2,377,254
			Rip Rap		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**2,377,254**
			Core 3 Ton Core Loc 3.4 Ton Units								**2,950,395**
	Core Fill		**Core Material Fill**								
		02317.000	**Earthwork**								
			Articulated Off-road 25cy (1 - 3 Mile)	20,000.00 cuyd	0.56 /cuyd		-	0.52 /cuyd	-	1.08 /cuyd	21,553
			Earthwork		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**21,553**
		02370.100	**Rip Rap**								
			Screened Rock Production	20,000.00 cy	0.80 /cy		1.50 /cy	1.53 /cy	-	3.83 /cy	76,602
			Quarry Stone < 100#	20,000.00 cy	1.39 /cy	0.00 /cy	0.00 /cy	0.60 /cy	-	2.00 /cy	39,915
			Rip Rap		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**116,517**
			Core Fill Core Material Fill		**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**/Cy**	**138,070**
	Seaplane Ramp		**Sea Plane Ramp**								
		02320.070	**Backfill Soil/Rock Fill**								
			Gravel fill compacted under-floor slab 12"	18.52 cy	10.98 /cy	18.46 /cy	-		-	29.44 /cy	545
			Backfill Soil/Rock Fill		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**545**
		03060.000	**Concrete- Admixtures**								
			Accelerator	111.11 cy	-	9.56 /cy	-	-	-	9.56 /cy	1,062
			Concrete- Admixtures		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,062**
		03060.110	**Curing**								
			Liquid Curing Compounds	3,000.00 sf	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	443
			Curing		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**443**
		03060.120	**Hardener**								
			Seal Floors	3,000.00 sf	0.10 /sf	0.04 /sf	-	-	-	0.14 /sf	412
			Hardener		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**412**
		03110.560	**Forms- Strip & Oil**								
			Strip & Oil SOG Form	340.00 sf	0.24 /sf	-	-	-	-	0.24 /sf	81
			Forms- Strip & Oil		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**81**
		03220.100	**Wire Mesh- Rolls**								
			WWM 4X4- W 1.4 Rolls	3,210.00 sf	0.36 /sf	0.19 /sf	-	-	-	0.56 /sf	1,781
			Mesh Support - bricks	391.00 ea	0.14 /ea	0.19 /ea	-	-	-	0.33 /	130

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			Wire Mesh- Rolls		/sf	/sf	/sf	/sf	/sf	/sf	**1,911**
		03300.010	**Concrete- Buy**								
			4000 psi Concrete	111.11 cy	-	113.40 /cy	-	-	-	113.40 /cy	12,600
			Concrete- Buy		/cy	/cy	/cy	/cy	/cy	/cy	**12,600**
		03310.170	**Place- S-O-G**								
			Pump Place Slab on Grade	111.11 cy	25.78 /cy	-	-	-	-	25.78 /cy	2,864
			Place- S-O-G		/cy	/cy	/cy	/cy	/cy	/cy	**2,864**
		03350.100	**Finish Flatwork**								
			Finish- Hard Trowel	3,000.00 sf	0.80 /sf	0.03 /sf	-	-	-	0.83 /sf	2,482
			Finish Flatwork		/sf	/sf	/sf	/sf	/sf	/sf	**2,482**
			Seaplane Ramp Sea Plane Ramp								**22,401**
Understone 1			**Understone Layer 1**								
		02317.000	**Earthwork**								
			Tandem Axle Truck 15cy (5 - 7 Mile)	8,000.00 cuyd	1.84 /cuyd		-	1.55 /cuyd	-	3.40 /cuyd	27,160
			Earthwork		/cy	/cy	/cy	/cy	/cy	/cy	**27,160**
		02370.100	**Rip Rap**								
			Crushed Rock Production	8,000.00 cy	0.92 /cy	0.00 /cy	8.50 /cy	4.46 /cy	-	13.88 /cy	111,026
			Quarry Stone 500# - 1 Ton	8,000.00 cy	28.72 /cy	0.00 /cy	0.00 /cy	30.99 /cy	-	59.70 /cy	477,623
			Rip Rap		/cy	/cy	/cy	/cy	/cy	/cy	**588,649**
			Understone 1 Understone Layer 1		/Cy	/Cy	/Cy	/Cy	/Cy	/Cy	**615,808**
Understone 2			**Understone Layer 2**								
		02317.000	**Earthwork**								
			Tandem Axle Truck 15cy (5 - 7 Mile)	3,000.00 cuyd	1.84 /cuyd		-	1.55 /cuyd	-	3.40 /cuyd	10,185
			Earthwork		/cy	/cy	/cy	/cy	/cy	/cy	**10,185**
		02370.100	**Rip Rap**								
			Crushed Rock Production	3,000.00 cy	0.92 /cy		8.50 /cy	4.46 /cy	-	13.88 /cy	41,635
			Quarry Stone < 100#	3,000.00 cy	2.78 /cy			1.21 /cy	-	3.99 /cy	11,975
			Rip Rap		/cy	/cy	/cy	/cy	/cy	/cy	**53,609**
			Understone 2 Understone Layer 2		/Cy	/Cy	/Cy	/Cy	/Cy	/Cy	**63,794**
			07 - Runway Improve		/Sy	/Sy	/Sy	/Sy	/Sy	/Sy	**3,790,469**
			Runway Improvements								

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
09 - Misc Items			**Miscellaneous Items**								
	ATN		**Aids to Navigation**								
		02766.100	**Pavement Marking**								
			Runway Marking	1.00 ls			12,500.00 /ls	-	-	12,500.00 /ls	12,500
			Pavement Marking		/ls	/ls	/ls	/ls	/ls	/ls	**12,500**
		16001.250	**Misc Site Work**								
			Relocate Navigation Aids	1.00 ls	57,500.00 /ls	100,000.00 /ls	-	-	-	157,500.00 /ls	157,500
			Misc Site Work		/ls	/ls	/ls	/ls	/ls	/ls	**157,500**
			ATN Aids to Navigation								**170,000**
	Drainage										
		02630.200	**Storm Drainage**								
			Runway Storm Drainage Allowance	1.00 ls	57,500.00 /ls	50,000.00 /ls	0.00 /ls	15,000.00 /ls	-	122,500.00 /ls	122,500
			Storm Drainage		/ls	/ls	/ls	/ls	/ls	/ls	**122,500**
			Drainage								**122,500**
	OFA Grading		**OFA Grading**								
		02230.010	**Clear & Grub**								
			Rough Blade Hard	33,333.33 sy	0.78 /sy		-	0.31 /sy	-	1.09 /sy	36,386
			Clear & Grub		/sf	/sf	/sf	/sf	/sf	/sf	**36,386**
		02900.200	**Soil Preparation**								
			Machine Rake	300,000.00 sf	-	-	0.06 /sf	-	-	0.06 /sf	16,500
			Soil Preparation		/sf	/sf	/sf	/sf	/sf	/sf	**16,500**
		02920.100	**Lawns & Grasses**								
			Hydroseeding	300,000.00 sf	-	-	0.04 /sf	-	-	0.04 /sf	12,000
			Lawns & Grasses		/sf	/sf	/sf	/sf	/sf	/sf	**12,000**
			OFA Grading OFA Grading								**64,886**
	RSA Grading		**Runway Safety Area Grading**								
		02230.010	**Clear & Grub**								
			Finish Blade Tgh	65,833.33 sy	0.39 /sy	-	-	0.36 /sy	-	0.75 /sy	49,119
			Rough Blade Hard	65,833.33 sy	0.78 /sy	-	-	0.31 /sy	-	1.09 /sy	71,877
			Clear & Grub		/sf	/sf	/sf	/sf	/sf	/sf	**120,997**
		02900.200	**Soil Preparation**								
			Machine Rake	592,500.00 sf	-	-	0.06 /sf	-	-	0.06 /sf	32,588
			Hand Rake	592,500.00 sf	-	-	0.08 /sf	-	-	0.08 /sf	44,438
			Soil Preparation		/sf	/sf	/sf	/sf	/sf	/sf	**77,025**
		02920.100	**Lawns & Grasses**								
			Hydroseeding	592,500.00 sf	-	-	0.04 /sf	-	-	0.04 /sf	23,700
			Lawns & Grasses		/sf	/sf	/sf	/sf	/sf	/sf	**23,700**

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
			RSA Grading Runway Safety Area Grading								221,722
			09 - Misc Items								**579,108**
			Miscellaneous Items								

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	8,346,322		101,280.739 hrs	
Material	5,834,177			
Subcontract	6,934,407			
Equipment	7,995,650		96,124.173 hrs	
Other	15,600			
	29,126,156	29,126,156		
Material Take-off Allowance	2,330,092			8.000 %
Labor Overtime	2,086,581			25.000 %
Bond	216,995			
Overhead & Profit	5,242,708			18.000 %
Contingency	5,825,231			20.000 %
Market Conditions Allowance	2,330,092			8.000 %
Total		***47,157,855***		

Alaska Department of Transportation and Public Facilities

Unalaska Airport Master Plan Update
RUNWAY ALTERNATE #3

Unalaska, Alaska

BASIS OF ESTIMATE

Estimate ID:	07-0274
Project Name:	Unalaska Airport Master Plan Update
Class Estimate:	Class IV
Requested By:	Tom Klin/NYC
Estimated By:	Rob Edgerton/PDX
Estimator Phone:	503.872.4590
Estimate Date:	September 24, 2007
Revision Date:	September 24, 2007
CCI Index:	8049 (September 2007)
Material Index:	2596 (September 2007)

Rob Edgerton/PDX
ESTIMATOR

Purpose of Estimate

The objective for this estimate is to develop a comprehensive master plan update for Unalaska Airport that reflects recent changes and projected demand for aviation in Unalaska. The Engineer's Estimate for Construction Cost is to establish an opinion of probable cost at the planning stage of design.

General Project Description

A range of options are presented to help narrow the range of alternatives. The Alternatives are presented with sufficient detail to identify facility layouts; preliminary engineering and construction cost estimates as well as potential environmental impacts. Four build alternatives (one of which shall later be defined as the preferred alternative) have been developed to fulfill aeronautical needs, and shall be refined to incorporate constructability factors (because of the potentially significant cost implications in Unalaska). Constructability impacts have included evaluating tangential issues including demolition or relocation of existing infrastructure, property acquisition/leasing, drainage, stormwater management, construction staging logistics, and related topics where standard unit costs may not be applicable due to the unique Unalaska circumstances. CH2M HILL has developed Class IV cost estimates to facilitate equal comparison of planning alternatives.

The cost estimates have been prepared for each alternative according to a design development of about 15 percent complete and to the Association for Advancement of Cost Engineers (AACE) standards for a Class IV Estimate (see appendix C for definitions). The estimates include standard contingencies for this level of estimate, as suggested by AACE. CH2M HILL has specifically identified unique constructability issues that exist in each of the alternatives developed and highlight them specifically in the text.

Overall Costs

See Appendix B for the overall breakdown of Costs and Alternates for this project.

Scope of Work

- Runway Extension Alternate #3
- Building Demolition
- Building Replacement

Markups

The following typical contractor markups where applied to the Cost Estimate:

Material Take-off Allowance	8%
Labor Overtime Allowance	25% of Labor Component
Contractor Overhead	10%
Profit	8%
Bond/Insurance	2.2%
Estimate Contingency	20%
Escalation Rate	EXCLUDED%
Market Adjustment Factor	8%

Material Take-off Allowance

The material take-off allowance is to cover know items which were not quantified in this phase of the estimate process either due to a lack of detail or changing definition. A 25% factor was added to the labor costs to allow for the normal Alaska condition of working six ten hour days per week.

Estimate Contingency

The estimate contingency at 20% is defined to cover "known unknowns" in the project. The selection of a 20% contingency is based on many factors. In addition to the Estimate Contingency there is also an 8% Material Takeoff Allowance, and an 8% Market Conditions allowance.

Although the 20% contingency is lower than used on other projects at this stage of design, this project is pretty straight forward as far as the work being accomplished is concerned. There are no new technologies being used, no rare or unusual materials, and site access, work conditions, schedule, and weather are known factors. Probably the largest unknown on the project is the Quarry site and material. The largest complexity factor is the physical location, and that only because of its distance from other major metropolitan areas. In the estimate there are allowances for to accommodate material and equipment delivery, and also generous allowances for Per Diem and Travel.

As an example of items to be considered in the contingency, it is known that there is a requirement for quarry stone of suitable quality to act as armor stone on the project. What is still unknown is if there is a suitable location on the island to provide this material, and what the total requirements are to obtain it. Therefore this qualifies as a "known unknown", and so is subject to a contingency assignment.

Another example of work assigned contingency is the building demolition. We know that buildings will need to be demolished, and we have a general idea of their size and structure, however we do not know at this time how those buildings will be demolished (deconstruct vs. demolish) or where the demolition/salvage material may need to be delivered or handled. Again, this presents another "known unknown", and so contingency is applied to allow for this scope.

The listed construction contingency amount is not intended to cover changes in scope or to allow for impacts from nature or other outside forces; those items belong in the owners' contingency allowance.

Escalation Rate

Escalation is excluded from this estimate. All costs are current costs.

Market Conditions

The current market conditions are drastically impacting the construction market, across the country. This is based upon recent bids and comparisons with Engineer's Estimates. Bids are coming in between 10% to 20% and even 30% higher than the current engineer's estimates. Despite the estimator's best practices and adjustments, bids are being driven by current market conditions. Currently at CH2M HILL, the estimating policy is to include a 5% to 15% Market adjustment factor, which may be higher in some regions of the county. A detailed analysis of local market conditions should be made. This could be performed by a review of upcoming and current similar projects around the region of this project site. This market adjustment factor is above and beyond the typical contractor mark-ups, normal estimating contingency and current but normal escalation factors (5% per year) listed above. The Market Adjustment Factor covers:

- Busy Contractors.
- Contractors selectively bidding jobs.
- Contractors selectively choosing which Owners they want to do jobs for.
- Premium Wages to keep skilled workers and management staff.
- Availability of crafts/trades.
- Immigration impacts and uncertainty.
- Abnormal Fuel impacts and uncertainty - Oil = $75 barrel, Gas $3.00/Gal
- Abnormal material impacts of the last two years - when will it stop.
- Katrina impacts and other unplanned natural disasters.

Estimate Classification

This cost estimate prepared is considered a Class 4 estimate as defined by the American Association of Cost Engineering (AACE). It is considered accurate to +50% to -30%, based upon a 15% design deliverable.

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final cost of the project will depend upon the actual labor and material costs, competitive market conditions, final project costs, implementation schedule and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding. Our estimate is based on material, equipment, and labor pricing as of March

19, 2007. The client should be cautioned that such prices are highly subject to variation as a result of shortages resulting from recent natural disasters.

Cost Resources

The following is a list of the various cost resources used in the development of the cost estimate.

- R.S. Means
- Richardson Process Plant Estimating Standards
- Mechanical Contractors Association - Labor Manual
- National Electrical Contractors Association - Labor Unit Manual (NECA)
- CH2M HILL Historical Data
- Vendor Quotes on Equipment, Materials, and Transportation where appropriate.
- Estimator Judgment

Labor unit prices reflect a burdened rate, including: workers compensation, unemployment taxes, Fringe Benefits, and medical insurance.

Estimate Methodology

This cost estimate is considered a bottom rolled up type estimate with detailed cost items and breakdown of Labor, Materials and Equipment. Some quotations where obtained for various items. The estimate may include allowance cost and dollars per SF cost for certain components of the estimate.

Labor Costs

The estimate has been adjusted for local area labor rates, based upon GENERAL DECISION: **AK20070001** Date: February 16, 2007.

Sales Tax

No Sales Tax has been included.

Allowance Costs

The cost estimate includes the following allowances within the cost estimate:

- Archeological Investigations
-

Major Assumptions

The estimate is based on the assumption the work will be done on a competitive bid basis and the contractor will have a reasonable amount of time to complete the work. All contractors are equal, with a reasonable project schedule, no overtime, constructed as under a single contract, no liquidated damages.

This estimate should be evaluated for market changes after 90 days of the issue date. It is assumed that much of the fabricated equipment will be shipped from the mainland USA.

- Sales tax is not included, the project is assumed to be sales tax exempt.
- Core-Loc units are barged at contractor expense from Tacoma Washington
- All cement, fuel, equipment, and construction supplies are barged from Seattle or Tacoma, Washington
- Contractor will charter barge and tug for mobilization, demobilization and Core-Loc transportation efforts. All other supplies and equipment will arrive by barge on scheduled itineraries.
- Labor costs are based on Davis-Bacon determination for West Aleutian rates
- All craft are provided with room, board, and travel allowance
- Project duration is assumed to be approximately 52 weeks over two seasons for the heavy civil portion of the work.
- All rock and fill material is assumed to come from the Shaishnikoff or Ugadaga site.
- Contractor(s) will have full access to Shaishnikoff or Ugadaga, and freedom to develop pit site to meet their needs and equipment requirements
- Runway OFA excavated material is assumed to require the use of explosives.
- OFA excavation material will be used as core fill material for runway extension.
- Local Municipality will accommodate contractor use of Beach Rd to transport all material from Shaishnikoff or Ugadaga Quarry.
- Permit fee of $30,000 is included for the permission to use local roads.
- All material taken from the Shaishnikoff or Ugadaga Quarry is subject to a royalty of $6.50 Cy
- Contractor will repair and repave local roads at the completion of the project. All local roads used will be maintained in a passable condition throughout the project.
- Contractor will provide traffic control on all local roads as necessary during the duration of the project to allow for safe passage of local and trucking vehicles

- Contractor will work a 6-10 schedule over a two season construction period lasting approximately 26 weeks each.
- Contractor will perform majority of airport runway work during nighttime hours, at which time airport will be closed to all but emergency flights.
- It is assumed that Unalaska Airport is an unsecured facility, and contractor staff will not need security clearance to work at or on the facility
- Standard safety precautions will prevail since work is to be performed during times when the airport is officially closed to all but emergency traffic
- Quantities and bill of materials are based upon information as provided by the design staff

Excluded Costs

The cost estimate excludes the following costs:

- Non-construction or soft costs for design, services during construction, land, legal and owner administration costs.
- Material Adjustment allowances above and beyond what is included at the time of the cost estimate.
- Escalation
- Sales Taxes
- Owners' Contingency
- Hazardous materials detection, removal, or mitigation
- Archeological surveys, investigations, and relocation/preservation, except for an allowance for Road Option 4B.

Reference Documents

- 04/02/2007 05:19 PM 213,461 Document (4).pdf
- 03/27/2007 03:39 PM 204,947 Exh Shoreline Rway Ext - XSection.pdf
- 03/28/2007 01:41 PM 486,989 Existing RWY improvements section markup_28-Mar-07.pdf
- 04/02/2007 05:19 PM 213,461 Existing RWY improvements section_02-Apr-07.pdf
- 03/27/2007 06:25 PM 1,605,290 MtBallyho_PS Sections.pdf
- 03/27/2007 03:40 PM 448,711 North and South RWY extension sections.pdf
- 04/02/2007 05:20 PM 233,887 North RWY extension section _02-Apr-07.pdf
- 03/28/2007 01:42 PM 418,969 North RWY extension section markup_28-Mar-07.pdf
- 04/02/2007 05:20 PM 223,891 South RWY extension section _02-Apr-07.pdf
- 03/28/2007 01:39 PM 412,386 South RWY extension section markup_28-Mar-07.pdf

- 03/29/2007 06:09 PM 57,344 TECHNICAL MEMORANDUM_Storm Return Period_29-Mar-07.doc
- 03/29/2007 06:09 PM 72,992 TECHNICAL MEMORANDUM_Storm Return Period_29-Mar-07.pdf
- 04/02/2007 05:17 PM 371,938 Alt 1 Plan.pdf
- 04/02/2007 05:17 PM 354,275 Alt 2 Plan.pdf
- 04/02/2007 05:18 PM 351,349 Alt 3 Plan.pdf
- 04/02/2007 05:18 PM 358,278 Alt 4 Plan.pdf
- 03/15/2007 04:59 PM 6,933,604 DUT ALP - Aerial Photo w Contours.pdf
- 03/21/2007 04:12 PM 1,229,307 DUT ALP - Aerial Photo.pdf
- 03/21/2007 04:12 PM 716,936 DUT ALP - B-II Deficiencies.pdf
- 03/21/2007 04:12 PM 872,043 DUT ALP - B-III Deficiencies.pdf
- 03/21/2007 04:12 PM 688,610 DUT ALP - Exist Conditions.pdf
- 03/22/2007 09:32 AM 141,530 Dutch ALP87.pdf
- 03/23/2007 12:47 PM 221,429 Exh 2-1 - Applicable Dsgn Stds.pdf
- 03/23/2007 12:47 PM 225,187 Exh 2-10 - Landside Requirements.pdf
- 03/23/2007 12:47 PM 531,292 Exh 2-2 - Exst Rwy Dims.pdf
- 03/23/2007 12:47 PM 532,144 Exh 2-3 - Surveyed Rwy Dims.pdf
- 03/23/2007 12:47 PM 192,589 Exh 2-4 - Exst Terminal Apron.pdf
- 03/23/2007 12:47 PM 692,035 Exh 2-5 - B-II RSA OFA Defic.pdf
- 03/23/2007 12:47 PM 721,761 Exh 2-6 - B-III RSA OFA Defic.pdf
- 03/23/2007 12:47 PM 263,238 Exh 2-7 - RPZ Dims.pdf
- 03/23/2007 12:47 PM 199,905 Exh 2-8 - Part 77 Surfaces.pdf
- 03/23/2007 12:47 PM 916,842 Exh 2-9 - Part 77 Penetrations.pdf
- 03/28/2007 08:31 AM 351,298 Exhibit - Historic Bldgs.pdf
- 03/27/2007 04:40 PM 557,172 Exhibit - Project Study Area.pdf
- 03/28/2007 08:31 AM 223,284 Exhibit - Stellers Eider Survey.pdf

Alternative 3 Costing Philosphy Breakdown
Based Upon 30% Typical Sections Dated 5/9/2007

$6.90	CY	Core Fill	
$76.98	CY	Armor Stone	
$76.98	CY	U1 Under Layer	
$21.27	CY	U2 Underlayer	
$21.27	CY	Quarry Stone	
$11.08	SY	Asphalt 4" with basee	
$14.65	CY	Crushed Aggregate Base	
$2,212.12	EA	Core Loc 8.8T - New	
$796.04	EA	Core Loc 8.8T - Re-use	
$1,042.54	EA	Core Loc 3.3T	
$190,000.00	LS	Positive Control Gates/Signals	
$25.00	LF	Steel Guardrail	
$16.50	SY	Mt. Ballyhoo Road Surfacing	4" ACP over 6" CA base
$16.62	LF	Curbs & Pav't Marking	
$22,400.00	LS	Seaplane Ramp (New)	somewhere Unalaska Bay

Alternative 3 Costing Philosphy Breakdown
Based Upon 30% Typical Sections Dated 5/9/2007

Runway 12 Extension "Staged Construction"

Sta 47+50 to Sta 50+00		250 section				
Item	Quantity	Unit	Core Loc Size (tons)	Units (assuming .8 ton/CY)	Unit Price	Cost
Fill		cy			$6.90	$0
Core Loc (10 Ton) - New		cy	8.8	0	$2,212.12	$0
Core Loc (10 Ton) - Reuse			8.8	0	$796.04	$0
U1 Layer		cy			$76.98	$0
U2 Layer		cy			$21.27	$0
RSA Surfacing		sy			$ 11.08	$0
Crushed Aggr. Base		cy			$14.65	$0
					Total	**$0**

Asssumes re-using existing dolos and Core Loc

0	100%			1	0.75	0.5
0	75%	350'	$4,059,256	$4,059,256	$3,044,442	$2,029,628
0	50%	250'	$0	$0	$0	$0
			$4,059,256	$4,059,256	$3,044,442	$2,029,628

Sta 45+00 to Sta 50+00						
Item	Quantity	Unit	Core Loc Size (tons)	Unit	Unit Price	Cost
Fill	88,600	cy			$6.90	$611,340
Core Loc (10 Ton)	26,000	cy	8.8	2,370	$2,212.12	$5,242,724
U1 Layer	15,600	cy			$76.98	$1,200,888
U2 Layer	9,100	cy			$21.27	$193,557
RSA Surfacing	13,900	sy			$ 11.08	$154,012
Crushed Aggr. Base	1550	cy			$14.65	$22,708
					Total	**$7,425,229**

7,425,229	100%
5,568,922	75%
3,712,614	50%

Sta 44+00 to Sta 50+00						
Item	Quantity	Unit	Core Loc Size (tons)	Unit	Unit Price	Cost
Fill	91,000	cy			$6.90	$627,900
Core Loc (10 Ton) - New	8,000	cy	8.8	730	$2,212.12	$1,614,848
Core Loc (10 Ton) - Reuse	8,000		8.8	730	$796.04	$581,109
U1 Layer	11,900	cy			$76.98	$916,062
U2 Layer	7,000	cy			$21.27	$148,890
RSA Surfacing	13,400	sy			$ 11.08	$148,472
Crushed Aggr. Base	1500	cy			$14.65	$21,975
					Total	**$4,059,256**

Asssumes re-using existing dolos and Core Loc

4,059,256	100%
3,044,442	75%
2,029,628	50%

Salvagable Fill

Removable Armoring	Total Volume (CY)	Percent Salvagable	
Core Loc	11350	90%	10215.0
Underlayer	10750	70%	

Alternative 3 Costing Philosphy Breakdown
Based Upon 30% Typical Sections Dated 5/9/2007

Runway 30 Extension "Staged Construction"

Sta 87+00 to 89+50	250'section			
Item	Quantity	Unit	Unit Price	Cost
Fill	200	yd3	$6.90	$1,380
Armor Stone 1 ton	0	yd3	$76.98	$0
Quarry Stone	0	yd3	$21.27	$0
Asphalt 4"	5,600	sy	$11.08	$62,048
Crushed Aggr. Base	650	cy	$14.65	$9,523
Road Surfacing		SY	$16.50	$0
Steel Guardrail		LF	$25.00	$0
Curbs & Pav't Marking		LF	$16.62	$0
Positive Control Gates/Signals	1	LS	$190,000.00	$190,000
			Total	**$262,951**

262,951	100%
197,213	75%
131,475	50%

*Note: The Armor Stone and Quarry Stone prices are for larger rock sizes in Rob's Estimate. Actual costs for those two items is most likely lower.

*1200# Armor Stone (3.9 ft thickness)
*500# < Armor Stone

		1	0.75	0.5
350'	$1,630,300	$1,630,300	$1,222,725	$815,150
250'	$262,951	$262,951	$197,213	$131,475
	$1,893,251			

Sta 87+00 to 92+00	250+250			
Item	Quantity	Unit	Unit Price	Cost
Fill	28,900	yd3	$6.90	$199,410
Armor Stone 1 ton	5,500	yd3	$76.98	$423,390
Quarry Stone	2,300	yd3	$21.27	$48,921
RSA Surfacing	13,900	sy	$11.08	$154,012
Crushed Aggr. Base	1550	cy	$14.65	$22,708
Road Surfacing	5,650	SY	$16.50	
Steel Guardrail	1,440	LF	$25.00	
Curbs & Pav't Marking	1,440	LF	$16.62	
Positive Control Gates/Signals	1	LS	$190,000.00	
			Total	**$848,441**

848,441	100%
636,330	75%
424,220	50%

Sta 87+00 to 93+00	250+250+100			
Item	Quantity	Unit	Unit Price	Cost
Fill	67,700	yd3	$6.90	$467,130
Armor Stone 1 ton	9,600	yd3	$76.98	$739,008
Quarry Stone	4,000	yd3	$21.27	$85,080
RSA Surfacing	17,300	sy	$11.08	$191,684
Crushed Aggr. Base	1950	cy	$14.65	$28,568
Road Surfacing	5,717	SY	$16.50	
Steel Guardrail	1,460	LF	$25.00	
Curbs & Pav't Marking	1,460	LF	$16.62	
Positive Control Gates/Signals	1	LS	$190,000.00	
			Total	**$1,511,470**

1,511,470	100%
1,133,602	75%
755,735	50%

Sta 87+00 to 93+00 Plus Relocated Road			250+250+100+Road		
Item	Quantity	Unit	Unit Price	Cost	
Fill	105,000	yd3	$6.90	$724,500	
Armor Stone 1 ton	8,000	yd3	$76.98	$615,840	
Quarry Stone	3,400	yd3	$21.27	$72,318	$1,412,658
RSA Surfacing	10,000	sy	$11.08	$110,800	
Crushed Aggr. Base	1950	cy	$14.65	$28,568	
Road Surfacing	5,583	SY	$16.50	$92,125	
Steel Guardrail	1,420	LF	$25.00	$35,500	
Curbs & Pav't Marking	1,420	LF	$16.62	$23,600	
Positive Control Gates/Signals	1	LS	$190,000.00	$190,000	
			Total	**$1,893,251**	

310000	$2,139,000	310000	$2,139,000
20000	$1,539,600	4000	$307,920
9000	$191,430	7400	$157,398
	$3,870,030		$2,604,318

1,893,251	100%
1,419,938	75%
946,625	50%

Relocated Road Only				
Item	Quantity	Unit	Unit Price	Cost
Fill	234,000	yd3	$6.90	$1,614,600
Armor Stone 1 ton	23,500	yd3	$76.98	$1,809,030
Quarry Stone	9,700	yd3	$21.27	$206,319
RSA Surfacing	0	sy	11.08	$0
Crushed Aggr. Base	0	cy	$14.65	$0
Road Surfacing	5,650	SY	$16.50	$93,225
Steel Guardrail	1,440	LF	$25.00	$36,000
Curbs & Pav't Marking	1,440	LF	$16.62	$23,933
Positive Control Gates/Signals	1	LS	$190,000.00	$190,000
			Total	**$3,973,107**

Alternative 3 Costing Philosphy Breakdown
Based Upon 30% Typical Sections Dated 5/9/2007

Runway RSA Improvements between Stations 50+00 and 87+00

Item	Quantity	Unit	Core Loc Size (tons)	Units	Unit Price	Cost
Core Lok (3.3 Ton)		cy	3.0	0	$1,042.54	$0
U1 Layer		cy			$76.98	$0
U2 Layer		cy			$21.27	$0
Fill		cy			$6.90	$0
Seaplane Ramp (New)	1	LS			$22,400.00	$22,400
				Total		$22,400

22,400	100%
16,800	75%
11,200	50%

Amount saved if west side Core Loks are left in place						
Core Lok (3.3 Ton)		cy	3.0	0	$1,042.54	$0
U1 Layer		cy			$76.98	$0
U2 Layer		cy			$21.27	$0
Fill		cy			$6.90	$0
				Total		$0

$22,400	$22,400	100%
	$16,800	75%
	$11,200	50%

Runway RSA Improvements between Stations 50+00 and 87+00, Re-using Core Loc

Item	Quantity	Unit	Core Loc Size (tons)	Units	Unit Price	Cost
Core Loc (8.8 Ton) - Reuse			8.8	0	$796.04	$0
Core Lok (3.3 Ton)		cy	3.0	0	$1,042.54	$0
U1 Layer		cy			$76.98	$0
U2 Layer		cy			$21.27	$0
Fill		cy			$6.90	$0
Seaplane Ramp (New)	1	LS			$22,400.00	$22,400
				Total		$22,400

$22,400	100%
$16,800	75%
$11,200	50%

Total Raw Construction Cost $5,974,907 Assumes re-use of existing dolos & Core Loc @ RW12 end and leaving existing Core Loc along runway

Rob's Estimate - Assumed no re-use, and full build out

		Markups	
$29,120,060	Direct Constr.+Common & Misc		
$16,790,167	Direct Constr.		
$12,329,893	Common & Misc	0.7344	
$18,031,699	Markups	1.0739	
$47,151,759	Total Constr.	1.8083	
$7,280,015	Dsgn/CA/Admn Markup		
$54,431,774	Total Project	25%	Dsgn/CA/Admn Markup
		3.0583	

Assumes re-use of existing dolos & Core Loc @ RW12 end and leaving existing Core Loc along runway

		Markups
$16,240,800	Direct Constr.+Common & Misc	
$5,974,907	Direct Constr.	
$10,265,893	Common & Misc	1.7182
$6,416,715	Markups	1.0739
$22,657,515	Total Constr.	2.7921
$4,060,200	Dsgn/CA/Admn Markup	
$26,717,715		
$6,019,985		
$32,737,700		

Assumes re-use of existing dolos & Core Loc @ RW12 end and leaving existing Core Loc along runway

Total RSA Rollup (50/50 betwn thrshlds and 100% beyond)		
RWY 12	$0	$4,059,256
RWY 30	$131,475	$1,630,300
Middle	$11,200	
Direct Construction	$5,832,231	
Common & Misc Constr	$10,020,753	
Markups on Dir. Constr.	$6,263,490	
Constr Subtotal	$22,116,474	
Dsgn/CA/Admn Markup	$3,963,246	
RSA Total	$26,079,720	

Total RSA Rollup (50/50 betwn thrshlds and 75% beyond)		
RWY 12	$0	$3,044,442
RWY 30	$131,475	$1,222,725
Middle	$11,200	
Direct Construction	$4,409,842	
Common & Misc Constr	$7,576,850	
Constr Subtotal	$11,986,692	
Dsgn/CA/Admn Markup	$2,996,673	
Markups on Dir. Constr.	$4,735,924	
RSA Total	$19,719,289	

Total RSA Rollup (50/50 for all)		
RWY 12	$0	$2,029,628
RWY 30	$131,475	$815,150
Middle	$11,200	
Direct Construction	$2,987,453	
Common & Misc Constr	$5,132,947	
Constr Subtotal	$8,120,400	
Dsgn/CA/Admn Markup	$2,030,100	
Markups on Dir. Constr.	$3,208,358	
RSA Total	$13,358,857	

Add about $7.5 million $7,682,326 **related to filling and armoring adjacent to the runway.**
$32,099,706

12/27/2007 Note by ERC: The $7.682 million cost above, overestimates the total because it "double dips" the Common & Miscellaneous costs by about $
Taking it apart for the Implementation Plan:

Base construction costs	$2,322,140	(sourced from the 150' wide estimate to fill along the runway & armor, assumed that it'll be to "plan" width, when it's done.)
Common & Misc	$0	(It's included in the proportioned amount above and in column A, so it doesn't need to be included again)
Markups	$2,493,848	
Subtotal	$4,815,988	
Dsgn/CA/Admn Markup	1,203,997	
Total	6,019,985	

Direct	$8,297,047		
Common & Misc	$10,265,893		
Markups	$8,910,563		
Total Constr.	$27,473,503	$6,868,376	$34,341,879
Dsgn/CA/Admn Markup	$5,264,197		
Total Constr.	$32,737,700		

Alternative 3 Costing Philosphy Breakdown
Based Upon 30% Typical Sections Dated 5/9/2007

Salvagable Fill-North End*

Removable Armoring	Total Volume (CY)	Percent Salvagable	Total Salvagable (CY)
Dolos/Core Loc	11350	90%	10220
Underlayer	10750	70%	7530

Salvagable Fill-Beyond Station 50+00**

Removable Armoring	Total Volume (CY)	Percent Salvagable	Total Salvagable (CY)
Core Loc	9,800	90%	8820
Underlayer	6,150	70%	4310

* Dolos estimated with a length of 550 LF, a width of 60 LF and a Depth of 8'. Underlayer assumed to have same depth
** Core Loks estimated with a length of 750 LF, a width of 50 LF, and a Depth of 8'. Underlayer assumed to have a depth of 5'

RWAY 12 Extension Cost Differences

Item	Quantity	Unit	Core Loc Size (tons)	Units (assuming .8 ton/CY)	Unit Price	Cost
Fill	22,100	cy			$6.90	$152,490
Core Loc (8 Ton)	-1,440	cy	8.8	-140	$1,416.08	-$198,251
Dolos	-8,780	cy	8.8	-800	$1,416.08	-$1,132,864
U1 Layer	0	cy			76.98	$0
U2 Layer	0	cy			$21.27	$0
Asphalt 4"	0	sy			$11.08	$0
Asphalt Base	0	cy			$14.65	$0
					Total	**-$1,178,625**

1416.08 Price Difference between new and reused

100	75	50
-$1,178,625	-$883,969	-$589,313

RSA Improvements between Stations 50+00 and 87+00 Improvements

Item	Quantity	Unit	Core Loc Size (tons)	Units (assuming .8 ton/CY)	Unit Price	Cost
Fill	15,400	cy			$6.90	$106,260
Core Loc (8 Ton)	-8,550	cy	8.8	-780	$796.04	-$620,911
U1 Layer	0	cy			76.98	$0
U2 Layer	0	cy			$21.27	$0
Asphalt 4"	0	sy			$11.08	$0
Asphalt Base	0	cy			$14.65	$0
					Total	**-$514,651**

*Note: The Armor Stone and Quarry Stone prices are for larger rock sizes in Rob's Estimate. Actual costs for those two items is most likely lower.

Alternative 3 Costing Philosphy Breakdown
Based Upon 30% Typical Sections Dated 5/9/2007

NW Runway 12

Full RSA-(From Station 44+00 to 50+00)

Fill	147,000	yd3
Core Loc	33,500	yd3
U1 Layer	20,100	yd3
U2 Layer	11,750	yd3
Asphalt 4"	17,300	sy
Asphalt Base	1,950	cy

Runway Plus 250 (From Station 45+00 to 50+00)

Fill	88,600	yd3
Core Loc	26,000	yd3
U1 Layer	15,600	yd3
U2 Layer	9,100	yd3
Asphalt 4"	13,900	sy
Asphalt Base	1,550	cy

250' of Runway End (From Station 47+50 to 50+00)

Fill	17,900	yd3
Core Loc	10,000	yd3
Quarry Stone	5,800	yd3
Underlayer	3,400	yd3
Asphalt 4"	5,600	sy
Asphalt Base	650	cy

Salvagable Fill

Dolos/Core Lok	10,220	cy
Underlayer	7,530	cy

SE Runway 30

Full RSA (From Station 87+00 to 93+00)

Fill	67,700	yd3
Armor Stone	9,600	yd3
Quarry Stone	4,000	yd3
Asphalt 4"	17,300	sy
Asphalt Base	1950	cy

Runway Plus 250 (From Station 87+00 to 92+00)

Fill	28,900	yd3
Armor Stone	5,500	yd3
Quarry Stone	2,300	yd3
Asphalt 4"	13,900	sy
Asphalt Base	1550	cy

250' of Runway (From Station 87+00 to 89+50)

Fill	200	yd3
Armor Stone	0	yd3
Quarry Stone	0	yd3
Asphalt 4"	5,600	sy
Asphalt Base	650	cy

Full RSA and Road

Fill	283,100	yd3
Armor Stone	23,500	yd3
Quarry Stone	9,700	yd3
Asphalt 4"	17,300	sy
Asphalt Base	1950	cy

Road Only

Fill	234,700	yd3
Armer Stone	23,500	yd3
Quarry Stone	9,700	yd3
Asphalt 4"	0	sy
Asphalt Base	0	cy

Runway RSA Improvements Between Stations 50+00 and 87+00

Core Lok (3.3 Ton)	10,600	cy
U1 Layer	8,000	cy
U2 Layer	3,000	cy
Fill	20,000	cy

Salvagable Fill

Core Lok	9,990	cy
Underlayer	4,830	cy

Notes:
9/11/2007
Assumes armoring all the way to the ocean floor

Old Numbers
79
38.8
2.036082

Alternative 3 Costing Philosphy Breakdown
Based Upon 30% Typical Sections Dated 5/9/2007

$6.90	CY	Core Fill	
$76.98	CY	Armor Stone	
$76.98	CY	U1 Under Layer	
$21.27	CY	U2 Underlayer	
$21.27	CY	Quarry Stone	
$11.08	SY	Asphalt 4" with basee	
$14.65	CY	Crushed Aggregate Base	
$2,212.12	EA	Core Loc 8.8T - New	
$796.04	EA	Core Loc 8.8T - Re-use	
$1,042.54	EA	Core Loc 3.3T	
$190,000.00	LS	Positive Control Gates/Signals	
$25.00	LF	Steel Guardrail	
$16.50	SY	Mt. Ballyhoo Road Surfacing	4" ACP over 6" CA base
$16.62	LF	Curbs & Pav't Marking	
$22,400.00	LS	Seaplane Ramp (New)	somewhere Unalaska Bay

Alternative 3 Costing Philosphy Breakdown
Based Upon 30% Typical Sections Dated 5/9/2007

Runway 12 Extension "Staged Construction"

Sta 47+50 to Sta 50+00		250 section				
Item	Quantity	Unit	Core Loc Size (tons)	Units (assuming .8 ton/CY)	Unit Price	Cost
Fill	17,900	cy			$6.90	$123,510
Core Loc (10 Ton) - New	900	cy	8.8	90	$2,212.12	$199,091
Core Loc (10 Ton) - Reuse	9,000		8.8	820	$796.04	$652,753
U1 Layer	5,800	cy			$76.98	$446,484
U2 Layer	3,400	cy			$21.27	$72,318
RSA Surfacing	5,600	sy			$ 11.08	$62,048
Crushed Aggr. Base	650	cy			$14.65	$9,523
					Total	**$1,565,726**

Asssumes re-using existing dolos and Core Loc

1,565,726	100%			1	0.75	0.5
1,174,295	75%	350'	$6,896,058	$6,896,058	$5,172,043	$3,448,029
782,863	50%	250'	$1,565,726	$1,565,726	$1,174,295	$782,863
			$8,461,784	$8,461,784	$6,346,338	$4,230,892

Sta 45+00 to Sta 50+00						
Item	Quantity	Unit	Core Loc Size (tons)	Unit	Unit Price	Cost
Fill	88,600	cy			$6.90	$611,340
Core Loc (10 Ton)	26,000	cy	8.8	2,370	$2,212.12	$5,242,724
U1 Layer	15,600	cy			$76.98	$1,200,888
U2 Layer	9,100	cy			$21.27	$193,557
RSA Surfacing	13,900	sy			$ 11.08	$154,012
Crushed Aggr. Base	1550	cy			$14.65	$22,708
					Total	**$7,425,229**

7,425,229	100%
5,568,922	75%
3,712,614	50%

Sta 44+00 to Sta 50+00						
Item	Quantity	Unit	Core Loc Size (tons)	Unit	Unit Price	Cost
Fill	147,000	cy			$6.90	$1,014,300
Core Loc (10 Ton) - New	23,285	cy	8.8	2,120	$2,212.12	$4,689,694
Core Loc (10 Ton) - Reuse	10,215		8.8	930	$796.04	$740,317
U1 Layer	20,100	cy			$76.98	$1,547,298
U2 Layer	11,750	cy			$21.27	$249,923
RSA Surfacing	17,300	sy			$ 11.08	$191,684
Crushed Aggr. Base	1950	cy			$14.65	$28,568
					Total	**$8,461,784**

Asssumes re-using existing dolos and Core Loc

8,461,784	100%
6,346,338	75%
4,230,892	50%

Salvagable Fill

Removable Armoring	Total Volume (CY)	Percent Salvagable	
Core Loc	11350	90%	10215.0
Underlayer	10750	70%	

150ft RSA_Alt_3_Costing_Philosophy_Breakdown_30%_(JE 9-11-07__ERC 9-29-07).xls
RWAY 12 Staged Const.
1/4/2008
4:10 PM

Alternative 3 Costing Philosphy Breakdown
Based Upon 30% Typical Sections Dated 5/9/2007

Runway 30 Extension "Staged Construction"

*Note: The Armor Stone and Quarry Stone prices are for larger rock sizes in Rob's Estimate. Actual costs for those two items is most likely lower.

*1200# Armor Stone (3.9 ft thickness)
*500# < Armor Stone

Sta 87+00 to 89+50	250'section			
Item	Quantity	Unit	Unit Price	Cost
Fill	200	yd3	$6.90	$1,380
Armor Stone 1 ton	0	yd3	$76.98	$0
Quarry Stone	0	yd3	$21.27	$0
Asphalt 4"	5,600	sy	$11.08	$62,048
Crushed Aggr. Base	650	cy	$14.65	$9,523
Road Surfacing	5,850	SY	$16.50	$96,525
Steel Guardrail	1,500	LF	$25.00	$37,500
Curbs & Pav't Marking	1,500	LF	$16.62	$24,930
Positive Control Gates/Signals	1	LS	$190,000.00	$190,000
			Total	$421,906

			1	0.75	0.5
421,906	100%	350'	$4,116,040 $4,116,040	$3,087,030	$2,058,020
316,429	75%	250'	$421,906 $421,906	$316,429	$210,953
210,953	50%		$4,537,946		

Sta 87+00 to 92+00	250+250			
Item	Quantity	Unit	Unit Price	Cost
Fill	28,900	yd3	$6.90	$199,410
Armor Stone 1 ton	5,500	yd3	$76.98	$423,390
Quarry Stone	2,300	yd3	$21.27	$48,921
RSA Surfacing	13,900	sy	$11.08	$154,012
Crushed Aggr. Base	1550	cy	$14.65	$22,708
Road Surfacing	5,850	SY	$16.50	$96,525
Steel Guardrail	1,500	LF	$25.00	$37,500
Curbs & Pav't Marking	1,500	LF	$16.62	$24,930
Positive Control Gates/Signals	1	LS	$190,000.00	$190,000
			Total	$1,197,396

1,197,396	100%
898,047	75%
598,698	50%

Sta 87+00 to 93+00	250+250+100			
Item	Quantity	Unit	Unit Price	Cost
Fill	67,700	yd3	$6.90	$467,130
Armor Stone 1 ton	9,600	yd3	$76.98	$739,008
Quarry Stone	4,000	yd3	$21.27	$85,080
RSA Surfacing	17,300	sy	$11.08	$191,684
Crushed Aggr. Base	1950	cy	$14.65	$28,568
Road Surfacing	5,850	SY	$16.50	
Steel Guardrail	1,500	LF	$25.00	
Curbs & Pav't Marking	1,500	LF	$16.62	
Positive Control Gates/Signals	1	LS	$190,000.00	
			Total	$1,511,470

1,511,470	100%
1,133,602	75%
755,735	50%

Sta 87+00 to 93+00 Plus Relocated Road			250+250+100+Road		
Item	Quantity	Unit	Unit Price	Cost	
Fill	283,100	yd3	$6.90	$1,953,390	
Armor Stone 1 ton	23,500	yd3	$76.98	$1,809,030	
Quarry Stone	9,700	yd3	$21.27	$206,319	$3,968,739
RSA Surfacing	17,300	sy	$11.08	$191,684	
Crushed Aggr. Base	1950	cy	$14.65	$28,568	
Road Surfacing	5,850	SY	$16.50	$96,525	
Steel Guardrail	1,500	LF	$25.00	$37,500	
Curbs & Pav't Marking	1,500	LF	$16.62	$24,930	
Positive Control Gates/Signals	1	LS	$190,000.00	$190,000	
			Total	$4,537,946	

310000	$2,139,000	310000	$2,139,000
20000	$1,539,600	11750	$904,515
9000	$191,430	21450	$456,242
	$3,870,030		$3,499,757

4,537,946	100%
3,403,459	75%
2,268,973	50%

Relocated Road Only				
Item	Quantity	Unit	Unit Price	Cost
Fill	234,700	yd3	$6.90	$1,619,430
Armor Stone 1 ton	23,500	yd3	$76.98	$1,809,030
Quarry Stone	9,700	yd3	$21.27	$206,319
RSA Surfacing	0	sy	11.08	$0
Crushed Aggr. Base	0	cy	$14.65	$0
Road Surfacing	5,850	SY	$16.50	$96,525
Steel Guardrail	1,500	LF	$25.00	$37,500
Curbs & Pav't Marking	1,500	LF	$16.62	
Positive Control Gates/Signals	1	LS	$190,000.00	$190,000
			Total	$3,958,804

Alternative 3 Costing Philosphy Breakdown
Based Upon 30% Typical Sections Dated 5/9/2007

Runway RSA Improvements between Stations 50+00 and 87+00

Item	Quantity	Unit	Core Loc Size (tons)	Units	Unit Price	Cost		
Core Lok (3.3 Ton)	10,600	cy	3.0	2830	$1,042.54	$2,950,388		
U1 Layer	8,000	cy			$76.98	$615,840		
U2 Layer	3,000	cy			$21.27	$63,810		
Fill	20,000	cy			$6.90	$138,000		
Seaplane Ramp (New)	1	LS			$22,400.00	$22,400		
				Total		**$3,790,438**	3,790,438	100%
							2,842,829	75%
							1,895,219	50%

Amount saved if west side Core Loks are left in place									
Core Lok (3.3 Ton)	-4,130	cy	3.0	-1110	$1,042.54	-$1,157,219			
U1 Layer	-3,060	cy			$76.98	-$235,559			
U2 Layer	-1,150	cy			$21.27	-$24,461			
Fill	-7,400	cy			$6.90	-$51,060			
				Total		**-$1,468,299**	**$2,322,140**	$2,322,140	100%
								$1,741,605	75%
								$1,161,070	50%

Runway RSA Improvements between Stations 50+00 and 87+00, Re-using Core Loc

Item	Quantity	Unit	Core Loc Size (tons)	Units	Unit Price	Cost		
Core Loc (8.8 Ton) - Reuse	8,991		8.8	820	$796.04	$652,753		
Core Lok (3.3 Ton)	6,470	cy	3.0	1730	$1,042.54	$1,803,594		
U1 Layer	9,770	cy			$76.98	$752,095		
U2 Layer	3,850	cy			$21.27	$81,890		
Fill	17,380	cy			$6.90	$119,922		
Seaplane Ramp (New)	1	LS			$22,400.00	$22,400		
				Total		**$3,432,653**	$3,432,653	100%
							$2,574,490	75%
							$1,716,327	50%

Total Raw Construction Cost $16,432,382 (Assumes re-use of existing dolos & Core Loc @ RW12 end and side)

Rob's Estimate - Assumed no re-use, and full build out

		Markups
$29,120,060	Direct Constr.+Common & Misc	
$16,790,167	Direct Constr.	
$12,329,893	Common & Misc	0.7344
$18,031,699	Markups	1.0739
$47,151,759	Total Constr.	1.8083
$7,280,015	Dsgn/CA/Admn Markup	
$54,431,774	Total Project	25% Dsgn/CA/Admn Markup
		3.0583

Assumes re-use of existing dolos & Core Loc @ RW12 end and side

		Markups
$28,762,275	Direct Constr.+Common & Misc	
$16,432,382	Direct Constr.	
$12,329,893	Common & Misc	0.7503
$17,647,458	Markups	1.0739
$46,409,733	Total Constr.	1.8243
$7,190,569	Dsgn/CA/Admn Markup	
$53,600,302		

Assumes re-use of existing dolos & Core Loc @ RW12 end and side

Total RSA Rollup (50/50 betwn thrshlds and 100% beyond)		
RWY 12	$782,863	$6,896,058
RWY 30	$210,953	$4,116,040
Middle	$1,716,327	
Direct Construction	$13,722,240	
Common & Misc Constr	$10,296,362	
Constr Subtotal	$24,018,601	
Dsgn/CA/Admn Markup	$6,004,650	
Markups on Dir. Constr.	$14,736,917	
RSA Total	$44,760,169	

Total RSA Rollup (50/50 betwn thrshlds and 75% beyond)		
RWY 12	$782,863	$5,172,043
RWY 30	$210,953	$3,087,030
Middle	$1,716,327	
Direct Construction	$10,969,215	
Common & Misc Constr	$8,230,654	
Constr Subtotal	$19,199,870	
Dsgn/CA/Admn Markup	$4,799,967	
Markups on Dir. Constr.	$11,780,323	
RSA Total	$35,780,160	

Total RSA Rollup (50/50 for all)		
RWY 12	$782,863	$3,448,029
RWY 30	$210,953	$2,058,020
Middle	$1,716,327	
Direct Construction	$8,216,191	
Common & Misc Constr	$6,164,947	
Constr Subtotal	$14,381,138	
Dsgn/CA/Admn Markup	$3,595,284	
Markups on Dir. Constr.	$8,823,729	
RSA Total	$26,800,151	

17960018
17860266
35820284

Alternative 3 Costing Philosphy Breakdown
Based Upon 30% Typical Sections Dated 5/9/2007

Salvagable Fill-North End*

Removable Armoring	Total Volume (CY)	Percent Salvagable	Total Salvagable (CY)
Dolos/Core Loc	11350	90%	10220
Underlayer	10750	70%	7530

Salvagable Fill-Beyond Station 50+00**

Removable Armoring	Total Volume (CY)	Percent Salvagable	Total Salvagable (CY)
Core Loc	9,800	90%	8820
Underlayer	6,150	70%	4310

* Dolos estimated with a length of 550 LF, a width of 60 LF and a Depth of 8'. Underlayer assumed to have same depth
** Core Loks estimated with a length of 750 LF, a width of 50 LF, and a Depth of 8'. Underlayer assumed to have a depth of 5'

RWAY 12 Extension Cost Differences

Item	Quantity	Unit	Core Loc Size (tons)	Units (assuming .8 ton/CY)	Unit Price	Cost
Fill	22,100	cy			$6.90	$152,490
Core Loc (8 Ton)	-1,440	cy	8.8	-140	$1,416.08	-$198,251
Dolos	-8,780	cy	8.8	-800	$1,416.08	-$1,132,864
U1 Layer	0	cy			76.98	$0
U2 Layer	0	cy			$21.27	$0
Asphalt 4"	0	sy			$11.08	$0
Asphalt Base	0	cy			$14.65	$0
					Total	**-$1,178,625**

1416.08 Price Difference between new and reused

100	75	50
-$1,178,625	-$883,969	-$589,313

RSA Improvements between Stations 50+00 and 87+00 Improvements

Item	Quantity	Unit	Core Loc Size (tons)	Units (assuming .8 ton/CY)	Unit Price	Cost
Fill	15,400	cy			$6.90	$106,260
Core Loc (8 Ton)	-8,550	cy	8.8	-780	$796.04	-$620,911
U1 Layer	0	cy			76.98	$0
U2 Layer	0	cy			$21.27	$0
Asphalt 4"	0	sy			$11.08	$0
Asphalt Base	0	cy			$14.65	$0
					Total	**-$514,651**

*Note: The Armor Stone and Quarry Stone prices are for larger rock sizes in Rob's Estimate. Actual costs for those two items is most likely lower.

Alternative 3 Costing Philosphy Breakdown
Based Upon 30% Typical Sections Dated 5/9/2007

NW Runway 12

Full RSA-(From Station 44+00 to 50+00)

Fill	147,000 yd3
Core Loc	33,500 yd3
U1 Layer	20,100 yd3
U2 Layer	11,750 yd3
Asphalt 4"	17,300 sy
Asphalt Base	1,950 cy

Salvagable Fill

Dolos/Core Lok	10,220 cy
Underlayer	7,530 cy

Runway Plus 250 (From Station 45+00 to 50+00)

Fill	88,600 yd3
Core Loc	26,000 yd3
U1 Layer	15,600 yd3
U2 Layer	9,100 yd3
Asphalt 4"	13,900 sy
Asphalt Base	1,550 cy

250' of Runway End (From Station 47+50 to 50+00)

Fill	17,900 yd3
Core Loc	10,000 yd3
Quarry Stone	5,800 yd3
Underlayer	3,400 yd3
Asphalt 4"	5,600 sy
Asphalt Base	650 cy

SE Runway 30

Full RSA (From Station 87+00 to 93+00)

Fill	67,700 yd3
Armor Stone	9,600 yd3
Quarry Stone	4,000 yd3
Asphalt 4"	17,300 sy
Asphalt Base	1950 cy

Runway Plus 250 (From Station 87+00 to 92+00)

Fill	28,900 yd3
Armor Stone	5,500 yd3
Quarry Stone	2,300 yd3
Asphalt 4"	13,900 sy
Asphalt Base	1550 cy

250' of Runway (From Station 87+00 to 89+50)

Fill	200 yd3
Armor Stone	0 yd3
Quarry Stone	0 yd3
Asphalt 4"	5,600 sy
Asphalt Base	650 cy

Full RSA and Road

Fill	283,100 yd3
Armor Stone	23,500 yd3
Quarry Stone	9,700 yd3
Asphalt 4"	17,300 sy
Asphalt Base	1950 cy

Road Only

Fill	234,700 yd3
Armer Stone	23,500 yd3
Quarry Stone	9,700 yd3
Asphalt 4"	0 sy
Asphalt Base	0 cy

Runway RSA Improvements Between Stations 50+00 and 87+00

Core Lok (3.3 Ton)	10,600 cy
U1 Layer	8,000 cy
U2 Layer	3,000 cy
Fill	20,000 cy

Salvagable Fill

Core Lok	9,990 cy
Underlayer	4,830 cy

Notes:
9/11/2007
Assumes armoring all the way to the ocean floor

Old Numbers
79
38.8
2.036082

Interim Terminal Area Estimates

Unalaska Airport Master Plan Estimate R03a (See a copy of this estimate above.)

Unalaska Airport Master Plan
Airport Runway Extension Interim Building Replacement R02
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Bldg Rep
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	10/31/2007
Est Log No.	07-0274
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'Location/System/Bid Item/Phase' 'Detail' summary Paginate

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Notes
Alt 01													
	09 - Misc Items												
		Bldg Replacement											
			13010.050	**Buildings**									
				Replace Cargo Building	86,400.00 cf			7.88 /cf	-	-	7.88 /cf	680,832	5400 sf h =16' (guess as average) cuft = 86400 Costs developed from Marshall & Swift Valuation Service. Excellent Class S Distributin at $5.21 CF * 1.08 current cost multiplier * 1.40 Local Area Multiplier
				Replace Bldg - Pt #24 - Terminal - Tier 1	400,000.00 cf			25.38 /cf	-	-	25.38 /cf	10,152,000	25,000 sf h =16' (guess) cuft = 400,000 Costs developed from Marshall & Swift Valuation Service. See separate worksheet
				Replace Bldg - Chemical Building	70,000.00 cf			7.24 /cf	-	-	7.24 /cf	506,800	5,000 sf h =14' (guess) cuft = 70,000 Costs developed from Marshall & Swift Valuation Service. Excellent Class S storage @ $4.70 sf, 1.07 adjustment to current + 1.44 location factor.
				Buildings	2,776,704.00 cf	/cf	/cf	4.08 /cf	/cf	/cf	4.08 /cf	11,339,632	
				Bldg Replacement								11,339,632	
				09 - Misc Items								11,339,632	
				Alt 01								**11,339,632**	

Estimate Totals

Description	Amount	Totals	Hours	Rate	
Labor					
Material					
Subcontract	11,339,632				
Equipment					
Other					
	11,339,632	11,339,632			
Material Take-off Allowance	907,171			8.000	%
Labor Overtime				25.000	%
Bond	85,215				
Overhead & Profit	1,700,945			15.000	%
Contingency	2,267,926			20.000	%
Market Conditions Allowance	907,171			8.000	%
Total		***17,208,060***			

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Property of: ____________________

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Phone: (213) 683-9000 Fax: (213) 683-9010

CALCULATOR METHOD

PASSENGER TERMINALS (571)

CLASS	TYPE	EXTERIOR WALLS	INTERIOR FINISH	LIGHTING, PLUMBING AND MECHANICAL	†HEAT	COST Sq. M.	COST Cu. Ft.	COST Sq. Ft.
A-B	Excellent	Special architecture, metal and glass, stone, concrete, skylights	Special finishes, acoustic design, high-cost lobby, concourse finishes	*High-quality specialty lighting, best wiring throughout, good plumbing	Complete H.V.A.C.	$3,561.59	$23.63	$330.88
	Good	Face brick, metal and glass, limestone, architectural concrete	Good finishes throughout, some extras, typical major terminal facility	*Special lighting, good sound systems and plumbing, some extras	Complete H.V.A.C.	2,508.44	16.65	233.04
	Average	Brick, concrete or metal panels, formed concrete, decorative lobby	Vaulted ceilings, pavers, terrazzo, good air- or train-type terminal	*Good lighting, sound systems and plumbing, food service	Complete H.V.A.C.	1,765.51	11.72	164.02
	Low cost	Brick, precast concrete, good block, some trim	Finished interior, suspended ceiling, terrazzo lobby, small main terminal	*Average lighting, good sound and plumbing, lounge	Complete H.V.A.C.	1,244.32	8.26	115.60
C	Excellent	High-cost roof, large arched entries and domed skylights	Special finishes, acoustic design, high-cost lobby, concourse finishes	*High-quality specialty lighting, best wiring throughout, good plumbing	Complete H.V.A.C.	2,560.22	16.99	237.85
	Very good	Face brick, stone, terra cotta, ornamental entrance and lobby	Good finishes throughout, some extras, typical major terminal facility	*Special lighting, good sound systems and plumbing, some extras	Complete H.V.A.C.	2,008.02	13.33	186.55
	Good	Brick, block, concrete, good decorative front and lobby	Vaulted ceilings, pavers, terrazzo, good air- or train-type terminal	Good lighting, sound systems and plumbing, food service	Hot and chilled water (zoned)	1,515.68	10.06	140.81
	Average	Brick, block, concrete, good front and lobby, some trim	Finished interior, suspended ceiling, terrazzo lobby, small main terminal	Average lighting, good sound and plumbing, lounge	Warm and cool air (zoned)	932.27	6.19	86.61
	Fair	Brick, block, concrete panels, plain commercial building, small entry	Drywall, acoustic tile, vinyl comp. lobby, small city bus station	Minimum lighting, adequate sound, minimum plumbing	Heat pump system	742.07	4.92	68.94
	Low cost	Low-cost block, tilt-up, very plain, acoustic sound walls	Few partitions, very plain, minimum waiting and concession/ticket area	Minimum code, public address system	Package A.C.	589.76	3.91	54.79
D	Very good	Face brick or stone veneer, ornamental entrance and lobby	Good finishes throughout, some extras, typical major terminal facility	*Special lighting, good sound systems and plumbing, some extras	Complete H.V.A.C.	1,907.27	12.66	177.19
	Good	Stucco, some brick or stone trim, decorative front and lobby	Vaulted ceilings, pavers, terrazzo, good air- or train-type terminal	Good lighting, sound systems and plumbing, food service	Hot and chilled water (zoned)	1,433.76	9.51	133.20
	Average	Stucco or siding, good front and lobby, some trim	Finished interior, suspended ceiling, terrazzo lobby, small main terminal	Average lighting, good sound and plumbing, lounge	Warm and cool air (zoned)	877.37	5.82	81.51
	Fair	Siding or stucco, small entrance	Drywall, acoustic tile, vinyl comp. lobby, small city bus station	Minimum lighting, adequate sound, minimum plumbing	Heat pump system	697.18	4.63	64.77
	Low cost	Low-cost wood or stucco, very plain	Few partitions, very plain, minimum waiting and concession/ticket area	Minimum code, public address system	Package A.C.	553.27	3.67	51.40
DPOLE	Fair	Metal panels on pole frame, finished interior, small entrance	Drywall, acoustic tile, vinyl comp. lobby, small city bus station	Minimum lighting, adequate sound, minimum plumbing	Heat pump system	650.90	4.32	60.47
	Low cost	Pole frame and truss, metal siding, low-cost finish and insulation	Few partitions, very plain, minimum waiting and concession/ticket area	Minimum code, public address system	Package A.C.	514.30	3.41	47.78
S	Average	Good metal panels, roof, front and lobby, some trim	Finished interior, suspended ceiling, terrazzo lobby, small main terminal	Average lighting, good sound and plumbing, lounge	Warm and cool air (zoned)	850.57	5.64	79.02
	Fair	Metal panels, finished interior, small entrance, masonry sound walls	Drywall, acoustic tile, vinyl comp. lobby, small city bus station	Minimum lighting, adequate sound, minimum plumbing	Heat pump system	674.47	4.48	62.66
	Low cost	Single wall, low-cost interior finish and insulation	Few partitions, very plain, minimum waiting and concession/ticket area	Minimum code, public address system	Package A.C.	534.11	3.54	49.62

†COMPLETE H.V.A.C		SQUARE METER COSTS Mild Climate	Moderate Climate	Extreme Climate	SQUARE FOOT COSTS Mild Climate	Moderate Climate	Extreme Climate
Classes A and B . .	Excellent	$347.68	$419.26	$505.37	$32.30	$38.95	$46.95
	Good	238.96	307.31	395.04	22.20	28.55	36.70
	Average	164.15	225.51	309.47	15.25	20.95	28.75
	Low Cost	113.02	165.23	242.19	10.50	15.35	22.50
Classes C and D . .	Excellent	$238.96	$307.31	$395.58	$22.20	$28.55	$36.75
	Very Good	164.15	224.97	308.39	15.25	20.90	28.65

***ELEVATORS** – Buildings with base costs which include elevators and escalators are marked with an asterisk (*). If the subject building has no elevators, deduct the following from the base costs for the buildings on this page which are so marked. For buildings not marked, or for basement stops, add costs from Page 36.

	Sq. M.	Sq. Ft.		Sq. M.	Sq. Ft.
Classes A and B					
Excellent	$96.88	$9.00	Average	$51.67	$4.80
Good	71.04	6.60	Low	38.21	3.55
Classes C and D					
Excellent	$60.82	$5.65	Very Good	$43.59	$4.05

The data included on this page becomes obsolete after January 2008.

DISTRIBUTION WAREHOUSES (407)

CLASS	TYPE	EXTERIOR WALLS	INTERIOR FINISH	LIGHTING, PLUMBING AND MECHANICAL	HEAT	COST Sq. M.	COST Cu. Ft.	COST Sq. Ft.
A	Good	Ornamental concrete, brick, or metal/glass panels, office front	Plaster or drywall with partitions, distribution areas, fin. ceilings, vaults	*Good lighting, plumbing, restrooms for personnel	Hot water	$854.12	$5.67	$79.35
	Average	Brick on block or tile, concrete panels, good fenestration	Painted walls, offices, and distribution areas	*Reading-level lighting and adequate plumbing	Space heaters	649.50	4.31	60.34
B	Good	Ornamental concrete, brick, or metal/glass panels, office front	Plaster or drywall with partitions, distribution areas, fin. ceilings, vaults	*Good lighting, plumbing, adequate restrooms	Hot water	821.08	5.45	76.28
	Average	Brick on block or tile, concrete panels, good fenestration	Painted walls, offices and distribution areas	*Reading-level lighting, adequate plumbing	Space heaters	620.54	4.12	57.65
C	Excellent	Brick, metal/glass, ornamental facades and fenestration	Completely finished, drugs, food, or bonded storage, large offices	High-level lighting and good plumbing	Package A.C.	868.76	5.77	80.71
	Good	Steel frame, good brick, block, or tilt-up, tapered girders	Plaster or drywall, some masonry partitions, good offices	Reading-level lighting, adequate plumbing	Forced air	597.94	3.97	55.55
	Average	Steel or wood frame or bearing walls, brick, block, or tilt-up	Painted walls, finished offices and distribution areas, hardened slab	Good lighting, adequate plumbing	Space heaters	410.65	2.73	38.15
	Low cost	Block, tilt-up, very plain, light construction	Unfinished, shell type, adequate offices, partitioned areas	Adequate lighting, plumbing fixtures	Space heaters	293.75	1.95	27.29
D	Good	Good wood frame with stucco or siding, some ornamentation	Some good offices and distribution areas	Reading-level lighting, adequate plumbing	Forced air	542.29	3.60	50.38
	Average	Stucco or siding on wood, good fenestration	Small office, partitions and distribution areas	Good lighting, adequate plumbing	Space heaters	371.79	2.47	34.54
DPOLE	Average	Good pole frame, metal siding	Distribution areas, small offices	Adequate lighting/plumbing	Space heaters	326.36	2.17	30.32
	Low cost	Wood pole frame, metal siding	Unfinished, adequate offices, partitioned areas	Adequate lighting, plumbing fixtures	Space heaters	235.62	1.56	21.89
S	Excellent	Heavy steel frame, sandwich panels, good ornamentation	Completely finished, drugs, food, or bonded storage, large offices	High-level lighting and good plumbing	Package A.C.	784.48	5.21	72.88
	Good	Good steel frame, siding and fenestration	Some good offices and interior finish, distribution areas	Reading-level lighting, adequate plumbing	Forced air	534.54	3.55	49.66
	Average	Rigid steel frame and siding	Distribution areas, small offices	Adequate lighting/plumbing	Space heaters	363.18	2.41	33.74
	Low cost	Pre-eng. frame, plain shell	Adequate office, partitioned areas	Adequate lighting/plumbing	Space heaters	258.34	1.71	24.00

MULTISTORY BUILDINGS – Add .5% (1/2%) for each story, over three above ground, to all base costs of the building, including basements but excluding mezzanines.

SPRINKLERS – Systems are not included. Costs should be added from Page 36.

DOCK-HEIGHT FLOORS – See Page 27.

***ELEVATORS** – Buildings with base costs which include elevators are marked with an asterisk (*). If the subject building has no elevators, deduct the following from the base costs for buildings on this page which are so marked. For buildings not marked or for basement stops, add costs from Page 36.

Classes A and B	Sq. M.	Sq. Ft.		Sq. M.	Sq. Ft.
Good	$20.99	$1.95	Average	$16.68	$1.55

TRANSIT WAREHOUSES (387)

CLASS	TYPE	EXTERIOR WALLS	INTERIOR FINISH	LIGHTING, PLUMBING AND MECHANICAL	HEAT	COST Sq. M.	COST Cu. Ft.	COST Sq. Ft.
C	Good	Brick or block, best tilt-up, good overhead doors	Good finished office, drivers' rest areas, dock-height floor	Good lighting, plumbing for transient drivers	Forced air	$790.08	$5.24	$73.40
	Average	Block, good tilt-up, overhead doors	Some finished office, drivers' rest areas, dock-height floor	Adequate lighting, plumbing for transient drivers	Space heaters	554.45	3.68	51.51
D	Average	Wood frame, siding or stucco	Some finished office/drivers' rest areas, dock-height floor	Adequate lighting/plumbing	Space heaters	502.79	3.34	46.71
DPOLE	Average	Wood pole frame, metal siding	Some finished office/drivers' rest areas, dock-height floor	Adequate lighting/plumbing	Space heaters	462.96	3.07	43.01
S	Good	Heavy steel frame and siding, good overhead doors	Good finished office, drivers' rest areas, dock-height floor	Good lighting, plumbing for transient drivers	Forced air	702.14	4.66	65.23
	Average	Steel frame and siding	Some finished office/drivers' rest areas, dock-height floor	Adequate lighting/plumbing	Space heaters	490.84	3.26	45.60

The data included on this page becomes obsolete after January 2008.

CALCULATOR METHOD

STORAGE WAREHOUSES (406)

CLASS	TYPE	EXTERIOR WALLS	INTERIOR FINISH	LIGHTING, PLUMBING AND MECHANICAL	HEAT	COST Sq. M.	COST Cu. Ft.	COST Sq. Ft.
A	Good	Ornamental concrete or brick, small office front	Plaster or drywall with partitions, some finished ceilings	*Good lighting, plumbing, adequate restrooms	Hot water	$728.29	$4.83	$67.66
	Average	Brick on block or tile, concrete panels, very plain	Painted walls, few partitions, small offices	*Adequate lighting and plumbing	Space heaters	536.05	3.56	49.80
	Low cost	Low-cost block, tile or concrete	Unfin., small office, few partitions	*Minimum lighting/plumbing	Space heaters	421.84	2.80	39.19
B	Good	Ornamental concrete or brick, small office front	Plaster or drywall with partitions, finished ceilings in most areas	*Good lighting, plumbing, adequate restrooms	Hot water	693.63	4.60	64.44
	Average	Brick on block or tile, concrete panels, very plain	Painted walls, few partitions, small offices	*Adequate lighting and plumbing	Space heaters	506.23	3.36	47.03
	Low cost	Low-cost block, tile or concrete	Unfin., small office, few partitions	*Minimum lighting/plumbing	Space heaters	396.44	2.63	36.83
C	Excellent	Brick, concrete, good facade	Plaster or drywall, partitioned, finished ceilings in most areas	Good lighting and plumbing	Package A.C.	775.76	5.15	72.07
	Good	Steel frame, good brick, block, or tilt-up, tapered girders	Plaster or drywall, some masonry partitions, good offices	Good lighting, adequate plumbing	Space heaters	504.29	3.35	46.85
	Average	Steel or wood frame or bearing walls, brick, block, or tilt-up	Painted walls, finished office, hardened slab	Adequate lighting, low-cost plumbing fixtures	Space heaters	353.92	2.35	32.88
	Low cost	Block, cheap brick, tilt-up, light construction	Unfinished, small office, shell type, minimum code	Minimum lighting and plumbing	Space heaters	250.05	1.66	23.23
C MILL	Good	Mill-type construction, brick walls, wood or steel trusses	Plaster walls, masonry partitions, painted trusses	*Good lighting, adequate plumbing	Steam	686.21	4.55	63.75
	Average	Mill-type construction, brick and block, wood trusses	Painted walls, few partitions, small offices	*Adequate lighting and plumbing	Space heaters	477.38	3.17	44.35
D	Good	Heavy wood frame, wood or stucco siding	Heavy slab or mill-type floors	Good lighting, adequate plumbing	Space heaters	459.08	3.05	42.65
	Average	Stucco on wood frame, wood trusses	Small office, average slab	Adequate lighting, low-cost plumbing fixtures	Space heaters	321.20	2.13	29.84
	Low cost	Stucco or siding on wood	Unfinished, slab, utility type, minimum office	Minimum lighting and plumbing	Space heaters	226.47	1.50	21.04
D POLE	Average	Pole frame, good metal siding, insulated	Small office, some finish, slab	Adequate lighting, little plumbing	Space heaters	275.34	1.83	25.58
	Low cost	Pole frame, metal siding	Unfinished utility type, light slab, minimum office	Minimum lighting and plumbing	Space heaters	194.94	1.29	18.11
S	Excellent	Heavy steel frame, insulated panels, good facade	Plaster or drywall, partitioned, finished ceilings in most areas	Good lighting and plumbing	Package A.C.	708.81	4.70	65.85
	Good	Good steel frame, siding and fenestration	Some good office, interior finish and floor	Good lighting, adequate plumbing	Space heaters	451.98	3.00	41.99
	Average	Rigid steel frame, siding	Small office, average slab	Adequate lighting, low-cost plumbing fixtures	Space heaters	313.66	2.08	29.14
	Low cost	Pre-engineered frame, metal siding	Unfinished utility type, light slab, minimum office	Minimum lighting and plumbing	Space heaters	219.48	1.46	20.39

NOTE: For light commodity storage, see Section 17.

MULTISTORY BUILDINGS – Add .5% (1/2%) for each story, over three above ground, to all base costs of the building, including basements but excluding mezzanines.

SPRINKLERS – Systems are not included. Costs should be added from Page 36.

DOCK-HEIGHT FLOORS – See Page 27.

WAREHOUSE SHELLS – See Page 35.

***ELEVATORS** – Buildings with base costs which include elevators are marked with an asterisk (*). If the subject building has no elevators, deduct the following from the base costs for buildings on this page, which are so marked. For buildings not marked or for basement stops, add costs from Page 36.

	Sq. M.	Sq. Ft.		Sq. M.	Sq. Ft.		Sq. M.	Sq. Ft.
Good	$20.45	$1.90	Average . . .	$16.68	$1.55	Low Cost . .	$12.92	$1.20

The data included on this page becomes obsolete after January 2008.

CURRENT C ST MULTIPLIERS

These multipliers bring costs from preceding pages up to date. Also apply Local Multipliers, Section 99, Pages 5 through 10.

CALCULATOR COST SECTIONS

(Effective Date of Cost Pages)		11 (11/06)	12 (8/06)	13 (5/06)	14 (2/06)	15 (11/05)	16 (8/07)	17 (5/07)	18 (2/07)
EASTERN	A	1.06	1.10	1.09	1.11	1.14	1.03	1.06	1.07
	B	1.06	1.09	1.09	1.12	1.14	1.03	1.05	1.07
	C	1.03	1.07	1.07	1.09	1.13	1.02	1.03	1.06
	D	1.03	1.07	1.06	1.10	1.11	1.01	1.02	1.04
	S	1.04	1.08	1.08	1.10	1.14	1.03	1.05	1.06
CENTRAL	A	1.02	1.06	1.06	1.09	1.11	1.01	1.02	1.02
	B	1.01	1.05	1.06	1.08	1.11	.99	1.00	1.01
	C	1.00	1.04	1.04	1.07	1.09	.98	.99	1.02
	D	.98	1.05	1.04	1.07	1.11	.98	.99	1.02
	S	1.00	1.05	1.06	1.08	1.11	1.00	1.02	1.02
WESTERN	A	1.02	1.07	1.09	1.10	1.13	1.02	1.04	1.03
	B	1.02	1.06	1.08	1.09	1.13	1.02	1.02	1.03
	C	1.00	1.04	1.06	1.08	1.10	.99	1.00	1.03
	D	.99	1.04	1.04	1.07	1.10	.98	1.00	1.02
	S	1.00	1.05	1.09	1.08	1.13	1.02	1.03	1.02

SEGREGATED COST SECTIONS

(Effective Date of Cost Pages)		41 (12/06)	42 (9/06)	43 (6/06)	44 (3/06)	45 (12/05)	46 (9/07)	47 (6/07)	48 (3/07)
EASTERN	A	1.06	1.10	1.09	1.11	1.14	1.03	1.06	1.07
	B	1.06	1.09	1.09	1.12	1.14	1.03	1.05	1.07
	C	1.03	1.07	1.07	1.09	1.13	1.02	1.03	1.06
	D	1.03	1.07	1.06	1.10	1.11	1.01	1.02	1.04
	S	1.04	1.08	1.08	1.10	1.14	1.03	1.05	1.06
CENTRAL	A	1.02	1.06	1.06	1.09	1.11	1.01	1.02	1.02
	B	1.01	1.05	1.06	1.08	1.11	.99	1.00	1.01
	C	1.00	1.04	1.04	1.07	1.09	.98	.99	1.02
	D	.98	1.05	1.04	1.07	1.11	.98	.99	1.02
	S	1.00	1.05	1.06	1.08	1.11	1.00	1.02	1.02
WESTERN	A	1.02	1.07	1.09	1.10	1.13	1.02	1.04	1.03
	B	1.02	1.06	1.08	1.09	1.13	1.02	1.02	1.03
	C	1.00	1.04	1.06	1.08	1.10	.99	1.00	1.03
	D	.99	1.04	1.04	1.07	1.10	.98	1.00	1.02
	S	1.00	1.05	1.09	1.08	1.13	1.02	1.03	1.02

UNIT-IN-PLACE COST SECTIONS (51 – 67)

Sec.	Page	Date		Eastern	Central	Western
51 -	2-3	(3/07)	Concrete Foundations	1.03	1.00	1.03
51 -	4	(3/07)	Pilings	1.03	.99	1.00
51 -	7-8	(3/07)	Steel and Concrete Frame	1.05	1.00	1.03
51 -	7	(3/07)	Wood Frame	1.02	1.00	1.01
52 -	1-4, 6	(3/07)	Interior Construction	1.05	1.02	1.02
52 -	5	(3/07)	Bank Vaults and Equipment	1.04	1.02	1.02
53 -	1-8	(6/07)	Heating, Cooling & Ventilating	1.02	1.00	1.02
53 -	9-12	(6/07)	Plumbing, Fire Protection, etc.	1.03	1.00	1.01
54 -	1-6	(6/07)	Electrical, Security	1.02	1.02	1.01
55 -	3-7	(8/07)	Wall Costs	1.01	.99	1.01
56 -	1-2	(8/07)	Stained Glass	1.01	.99	1.01
56 -	3-6	(8/07)	Storefronts	1.01	.99	1.01
56 -	7	(8/07)	Stonework	1.02	1.00	1.02
56 -	8	(8/07)	Columns, Stone & Concrete	1.02	1.00	1.02
56 -	8	(8/07)	Columns, Wood & Aluminum	1.01	.99	1.00
57 -	1-6	(9/07)	Roofs	1.04	1.01	1.03
58 -	1	(9/07)	Cold Storage	1.02	.99	1.01
58 -	2-8	(9/07)	Elevators, Conveying Systems	1.03	1.00	1.01

Sec.	Page	Date		Eastern	Central	Western
61 -	1-8	(12/06)	Tanks	1.04	1.01	1.03
62 -	1	(6/06)	Industrial Pumps & Boilers	1.08	1.06	1.08
62 -	2-3, 6	(6/06)	Piping	1.08	1.06	1.08
62 -	4	(6/06)	Electrical Motors	1.08	1.06	1.08
62 -	5	(6/06)	Steel Stacks, Chutes	1.08	1.06	1.08
62 -	5	(6/06)	Masonry & Concrete Chimneys	1.09	1.06	1.09
62 -	6	(6/06)	Compactors, Incinerators	1.08	1.06	1.08
63 -	1-4	(9/06)	Trailer and Mfg. Housing Parks	1.04	1.02	1.05
63 -	5-10	(9/06)	Manufactured Housing	1.01	1.01	1.02
64 -	1-6	(3/06)	Service Stations, Car Washes	1.10	1.08	1.08
64 -	7-9	(3/06)	Prefabricated Metal Structures	1.09	1.07	1.08
64 -	7-8	(3/06)	Prefab. Wood & Air Structures	1.10	1.09	1.09
65 -	1-12	(3/06)	Equipment Costs	1.10	1.10	1.09
66 -	1	(12/05)	Subdivision Costs	1.13	1.10	1.12
66 -	2-9	(12/05)	Yard Improvements	1.11	1.09	1.10
66 -	10-11	(12/05)	Demolition & Remediation	1.12	1.10	1.11
67 -	1-2	(12/05)	Recreational Facilities	1.13	1.12	1.12
67 -	3-7	(12/05)	Recreational Facilities	1.12	1.10	1.11

This page supercedes the September 2007 Green Supplement.

The data included on this page becomes obsolete after October 2007.

LOCAL MULTIPLIERS

Apply to costs brought up-to-date from preceding pages. Do not apply to Section 98 or any other indexes.

UNITED STATES

CLASS	A	B	C	D	S
ALABAMA	.88	.88	.89	.87	.86
Anniston	.87	.87	.88	.85	.85
Auburn	.82	.83	.84	.83	.81
Bessemer	.91	.91	.92	.91	.88
Birmingham	.91	.91	.92	.93	.91
Dothan	.93	.93	.91	.89	.92
Florence	.87	.87	.87	.86	.84
Gadsden	.87	.88	.88	.87	.87
Huntsville	.92	.92	.93	.95	.91
Mobile	.93	.93	.93	.93	.93
Montgomery	.92	.92	.91	.90	.92
Opelika	.82	.83	.84	.83	.81
Phenix City	.82	.83	.84	.83	.81
Sheffield	.87	.87	.87	.86	.84
Tuscaloosa	.90	.89	.88	.86	.87
ALASKA	1.36	1.32	1.36	1.38	1.36
Anchorage	1.22	1.21	1.25	1.25	1.21
Fairbanks	1.27	1.27	1.28	1.29	1.26
Juneau	1.35	1.35	1.43	1.39	1.35
Kenai Peninsula	1.22	1.21	1.25	1.25	1.22
Ketchikan	1.33	1.32	1.37	1.33	1.35
Kodiak	1.38	1.37	1.39	1.38	1.35
Mat-Su Valley	1.18	1.18	1.22	1.20	1.19
Sitka	1.38	1.35	1.40	1.40	1.40
ARIZONA	.98	.99	.98	.97	.96
Apache County	.96	.97	.96	.91	.91
Bullhead City	1.01	1.01	1.02	1.00	.98
Casa Grande	.98	.97	.98	.96	.95
Cochise County	.97	.95	.97	.96	.94
Coconino County	.97	.97	.95	.92	.92
Douglas	.97	.95	.97	.96	.94
Flagstaff	1.03	1.03	1.02	1.01	1.01
Gila County	.94	.94	.94	.90	.92
Graham County	.93	.94	.94	.90	.90
Greenlee County	.94	.94	.93	.89	.90
Kingman	1.01	1.02	1.03	1.00	.98
La Paz County	.97	.96	.98	.97	.94
Lake Havasu	1.02	1.03	1.04	1.02	1.00
Maricopa County	1.01	1.02	.99	.98	.98
Mohave County	1.01	1.01	1.02	1.01	.98
Navajo County	.94	.95	.94	.90	.91
Nogales	.95	.94	.94	.94	.94
Phoenix	1.02	1.02	1.01	.99	1.00
Pima County	1.00	.99	.97	.95	.95
Pinal County	.96	.96	.97	.96	.94
Prescott	1.09	1.10	1.09	1.08	1.05
Santa Cruz County	.94	.93	.93	.93	.93
Sedona	1.08	1.07	1.08	1.07	1.05
Tucson	1.00	.99	.97	.96	.98
Yavapai County	1.05	1.05	1.03	1.03	1.00
Yuma	.99	.97	.95	.96	.97
Yuma County	.96	.94	.92	.92	.94

CLASS	A	B	C	D	S
ARKANSAS	.88	.86	.87	.86	.87
Blytheville	.83	.81	.82	.81	.84
Fayetteville	.91	.91	.91	.91	.91
Fort Smith	.89	.88	.89	.87	.87
Hot Springs	.92	.90	.91	.89	.90
Jonesboro	.83	.81	.82	.82	.84
Little Rock	.93	.92	.93	.91	.92
Texarkana	.90	.88	.88	.85	.88
West Memphis	.94	.93	.93	.92	.93
CALIFORNIA	1.17	1.18	1.17	1.17	1.17
Alameda County	1.34	1.34	1.35	1.33	1.29
Alpine County	1.16	1.15	1.16	1.17	1.17
Amador County	1.16	1.15	1.16	1.17	1.17
Antelope Valley	1.17	1.16	1.16	1.16	1.17
Atascadero	1.14	1.15	1.14	1.15	1.14
Bakersfield	1.18	1.17	1.18	1.19	1.17
Barstow	1.17	1.16	1.16	1.17	1.17
Big Bear	1.20	1.21	1.20	1.22	1.21
Bishop	1.23	1.23	1.25	1.24	1.23
Blythe	1.15	1.17	1.17	1.15	1.15
Butte County	1.12	1.11	1.12	1.13	1.14
Calaveras County	1.09	1.10	1.11	1.11	1.11
Coalinga	1.17	1.17	1.18	1.17	1.18
Colusa County	1.14	1.13	1.14	1.15	1.14
Contra Costa County	1.33	1.33	1.34	1.32	1.29
Del Norte County	1.24	1.23	1.26	1.24	1.23
El Dorado County	1.19	1.18	1.18	1.19	1.21
Eureka	1.24	1.23	1.26	1.24	1.23
Fresno	1.18	1.19	1.19	1.19	1.18
Glenn County	1.14	1.13	1.14	1.15	1.14
Gilroy	1.18	1.19	1.19	1.20	1.20
Goleta	1.16	1.17	1.17	1.19	1.16
Hanford	1.12	1.12	1.11	1.11	1.10
Hesperia	1.13	1.12	1.11	1.13	1.12
Huntington Beach	1.23	1.22	1.22	1.24	1.21
Imperial County	1.17	1.17	1.17	1.18	1.17
Indio	1.17	1.18	1.17	1.19	1.16
Laguna Beach	1.23	1.22	1.20	1.24	1.21
Lake County	1.17	1.17	1.16	1.15	1.16
Lake Arrowhead	1.21	1.22	1.23	1.23	1.22
Lake Tahoe	1.21	1.21	1.22	1.22	1.21
Lompoc	1.16	1.17	1.16	1.17	1.16
Los Angeles	1.20	1.20	1.20	1.22	1.20
Madera	1.08	1.10	1.09	1.09	1.09
Mammoth Lakes	1.20	1.21	1.24	1.24	1.20
Marin County	1.31	1.31	1.33	1.30	1.27

CLASS	A	B	C	D	S
CALIFORNIA (Continued)					
Mariposa County	1.12	1.12	1.11	1.12	1.12
Marysville	1.11	1.11	1.12	1.12	1.12
Mendocino County	1.11	1.11	1.10	1.10	1.12
Merced	1.10	1.10	1.10	1.09	1.09
Modesto	1.12	1.11	1.13	1.11	1.10
Modoc County	1.14	1.13	1.14	1.15	1.15
Mono County	1.17	1.18	1.20	1.20	1.17
Monterey	1.27	1.25	1.24	1.21	1.23
Napa County	1.25	1.23	1.23	1.19	1.20
Nevada County	1.15	1.15	1.16	1.17	1.16
Newport Beach	1.23	1.23	1.22	1.24	1.21
Orange Co. (x/beaches)	1.21	1.21	1.20	1.22	1.21
Oxnard	1.17	1.15	1.17	1.20	1.17
Palm Springs	1.22	1.22	1.20	1.22	1.22
Paso Robles	1.15	1.16	1.15	1.16	1.14
Placer County	1.17	1.17	1.17	1.18	1.18
Plumas County	1.14	1.13	1.15	1.15	1.13
Redding	1.22	1.22	1.20	1.19	1.21
Riverside	1.20	1.18	1.18	1.20	1.19
Sacramento	1.21	1.20	1.21	1.20	1.20
Salinas	1.19	1.18	1.18	1.15	1.17
San Benito County	1.23	1.23	1.23	1.20	1.20
San Bernardino	1.18	1.16	1.17	1.17	1.17
San Clemente	1.22	1.22	1.22	1.24	1.22
San Diego	1.19	1.18	1.17	1.19	1.17
San Francisco	1.38	1.39	1.40	1.37	1.31
San Jose	1.35	1.34	1.36	1.36	1.31
San Luis Obispo	1.15	1.15	1.15	1.17	1.15
San Mateo County	1.32	1.33	1.33	1.30	1.27
Santa Barbara	1.19	1.20	1.21	1.23	1.20
Santa Clara County	1.31	1.30	1.30	1.27	1.25
Santa Cruz County	1.23	1.21	1.23	1.20	1.19
Santa Maria	1.24	1.23	1.21	1.21	1.23
Santa Rosa	1.24	1.22	1.22	1.19	1.21
Sierra County	1.14	1.13	1.15	1.15	1.13
Siskiyou County	1.22	1.22	1.20	1.19	1.21
Solano County	1.26	1.25	1.25	1.22	1.24
Stockton	1.18	1.18	1.17	1.17	1.17
Susanville	1.14	1.13	1.14	1.15	1.15
Tehama County	1.22	1.22	1.20	1.19	1.21
Trinity County	1.23	1.22	1.23	1.21	1.22
Tulare County	1.11	1.12	1.11	1.11	1.11
Tuolumne County	1.10	1.11	1.11	1.12	1.12
Ventura County	1.19	1.18	1.21	1.23	1.19
Victorville	1.15	1.16	1.15	1.19	1.16
Watsonville	1.20	1.18	1.18	1.16	1.18
Yolo County	1.13	1.11	1.12	1.14	1.14
Yuba City	1.12	1.10	1.11	1.12	1.12

The data included on this page becomes obsolete after December 2007.

Unalaska Airport Master Plan
Airport Aprons Alternate #3
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	Unalaska Airport Aprons
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	4/12/2007
Est Log No.	07-0274
Revision Number	01
PM / Contact Name	T.Klin/NYC
Estimate Class 1-5	4
Report format	Sorted by 'System/Bid Item/Phase' 'Detail' summary

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
09 - Misc Items			**Miscellaneous Items**									
	Bldg Demo											
		02200.130	**Demo- Buildings**									
			Demo Wood/Stl Bldg - PT #03 - Airport Hsg-Staff	12,960.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	3,499	0.020
			Demo Wood/Stl Bldg - PT #04 - Airport Hsg-Staff	12,984.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	3,506	0.020
			Demo Wood/Stl Bldg - PT #15 - Aerology Bldg-Top	70,544.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	19,047	0.107
			Demo Wood/Stl Bldg - PT #17 - PenAir Cargo Bldg (2)	44,730.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	12,077	0.068
			Demo Wood/Stl Bldg - PT #23 - ACE Cargo Bldg (1)	126,240.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	34,085	0.191
			Demo Wood/Stl Bldg - PT #34 - Housing Unit 1 (hill1)	51,100.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	13,797	0.077
			Demo Wood/Stl Bldg - PT #35 - Housing Unit 2 (hill2)	46,660.00 cf	-	-	0.27 /cf	-	-	0.27 /cf	12,598	0.071
			Demo Steel Bldg - Pt #01 - Abandoned Hanger	137,592.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	41,278	0.232
			Demo Steel Bldg - Pt #06 - ARFF/Adm Bldg-Tier 1	158,000.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	47,400	0.266
			Demo Steel Bldg - Pt #07 - ARFF/Adm Bldg-Tier 2	189,600.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	56,880	0.319
			Demo Steel Bldg - Pt #08 - ARFF/Adm Bldg-Tier 3	268,600.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	80,580	0.452
			Demo Steel Bldg - Pt #11 - Hanger 1 B Ramp	440,316.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	132,095	0.741
			Demo Steel Bldg - Pt #18 - Torpedo Bldg - Tier 1	147,140.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	44,142	0.248
			Demo Steel Bldg - Pt #19 - Torpedo Bldg - Tier 2	210,200.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	63,060	0.354
			Demo Steel Bldg - Pt #20 - Torpedo Bldg - Tier 3	378,360.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	113,508	0.637
			Demo Steel Bldg - Pt #24 - Terminal - Tier 1	392,712.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	117,814	0.661
			Demo Steel Bldg - Pt #24 - Terminal - Tier 2	359,986.00 cf	-	-	0.30 /cf	-	-	0.30 /cf	107,996	0.606
			Demo Conc/Stl Bldg - PT #12 - Hanger 2 B Ramp	602,272.00 cf	-	-	0.34 /cf	-	-	0.34 /cf	204,772	1.149
			Demo- Buildings		/sf	/sf	/sf	/sf	/sf	/sf	**1,108,133**	**6.217**
			Bldg Demo								**1,108,133**	**6.217**
			09 - Misc Items Miscellaneous Items								**1,108,133**	**6.217**
10 - Aprons			**Apron Expansion**									
	15" Concrete Apron		**15" Concrete Apron**									
		02320.070	**Backfill Soil/Rock Fill**									
			Gravel fill at Slabs	1,987.65 cy	7.05 /cy	15.60 /cy	-		-	22.65 /cy	45,023	0.253
			Fill Sand	993.83 cy	-	13.00 /cy	-	-	-	13.00 /cy	12,920	0.072
			Backfill Soil/Rock Fill		/cy	/cy	/cy	/cy	/cy	/cy	**57,942**	**0.325**
		03060.110	**Curing**									
			Liquid Curing Compounds	129,000.00 sf	0.10 /sf	0.01 /sf	-	-	-	0.11 /sf	13,652	0.077
			Curing		/sf	/sf	/sf	/sf	/sf	/sf	**13,652**	**0.077**
		03060.120	**Hardener**									
			Seal Floors	129,000.00 sf	0.10 /sf	0.05 /sf	-	-	-	0.15 /sf	19,070	0.107
			Hardener		/sf	/sf	/sf	/sf	/sf	/sf	**19,070**	**0.107**
		03110.260	**Forms- S-O-G**									
			S.O.G. Edge Form > 1'	4,125.00 sf	16.94 /sf	1.23 /sf	-	-	-	18.17 /sf	74,960	0.421
			Forms- S-O-G		/sf	/sf	/sf	/sf	/sf	/sf	**74,960**	**0.421**
		03110.560	**Forms- Strip & Oil**									
			Strip & Oil SOG Form	4,125.00 sf	0.24 /sf	-	-	-	-	0.24 /sf	983	0.006
			Forms- Strip & Oil		/sf	/sf	/sf	/sf	/sf	/sf	**983**	**0.006**
		03300.010	**Concrete- Buy**									
			5000 psi Concrete	7,453.70 cy	-	120.75 /cy	-	-	-	120.75 /cy	900,035	5.049
			Concrete- Buy		/cy	/cy	/cy	/cy	/cy	/cy	**900,035**	**5.049**
		03310.170	**Place- S-O-G**									
			Truck Place Slab on Grade	7,453.70 cy	23.58 /cy	-	-	-	-	23.58 /cy	175,744	0.986
			Place- S-O-G		/cy	/cy	/cy	/cy	/cy	/cy	**175,744**	**0.986**
		03350.100	**Finish Flatwork**									
			Finish- Hard Trowel	129,000.00 sf	0.80 /sf	0.03 /sf	-	-	-	0.83 /sf	106,740	0.599
			Finish Flatwork		/sf	/sf	/sf	/sf	/sf	/sf	**106,740**	**0.599**
			15" Concrete Apron 15" Concrete Apron		/Sy	/Sy	/Sy	/Sy	/Sy	/Sy	**[illegible]126**	**7.569**
	Parking											

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		02320.070	**Backfill Soil/Rock Fill**									
			Struc Fill - Parking Lots	3,792.59 cy	0.66 /cy	10.40 /cy	-	0.32 /cy	-	11.38 /cy	43,174	0.242
			Struc Fill - Parking Lots	1,896.30 cy	0.66 /cy	10.40 /cy	-	0.32 /cy	-	11.38 /cy	21,587	0.121
			Backfill Soil/Rock Fill		/cy	/cy	/cy	/cy	/cy	/cy	**64,761**	**0.363**
		02740.100	**Asphalt Paving**									
			Rough Grade Parking Lots	17,066.67 sy	0.26 /sy	-	-	0.28 /sy	-	0.54 /sy	9,270	0.052
			Asphalt Base Course 2"	17,066.67 sy	-	-	4.40 /sy	-	-	4.40 /sy	75,093	0.421
			Asphalt Top Course 2"	17,066.67 sy	-	-	4.00 /sy	-	-	4.00 /sy	68,267	0.383
			Asphalt Paving		/sy	/sy	/sy	/sy	/sy	/sy	**152,630**	**0.856**
			Parking								**217,391**	**1.220**
Streets												
		02317.000	**Earthwork**									
			Backfill Crushed Rock Med	207.59 cuyd	3.76 /cuyd	12.00 /cuyd	-	5.11 /cuyd	-	20.87 /cuyd	4,332	0.024
			Earthwork		/cy	/cy	/cy	/cy	/cy	/cy	**4,332**	**0.024**
		02720.100	**Base**									
			Crushed Gravel	1,383.95 cy	1.76 /cy	8.89 /cy	-	0.86 /cy	-	11.51 /cy	15,928	0.089
			Crushed Gravel	553.58 cy	1.76 /cy	8.89 /cy	-	0.86 /cy	-	11.51 /cy	6,371	0.036
			Base		/cy	/cy	/cy	/cy	/cy	/cy	**22,299**	**0.125**
		02740.100	**Asphalt Paving**									
			Rough Grading Roads	4,982.22 sy	0.15 /sy	-	-	0.15 /sy	-	0.30 /sy	1,495	0.008
			Asphalt Base Course 2"	4,982.22 sy	-	-	4.40 /sy	-	-	4.40 /sy	21,922	0.123
			Asphalt Top Course 2"	4,982.22 sy	-	-	4.00 /sy	-	-	4.00 /sy	19,929	0.112
			Asphalt Paving		/sy	/sy	/sy	/sy	/sy	/sy	**43,345**	**0.243**
		02770.100	**Curbs**									
			Extruded Curbs & Gutter 18"	3,800.00 lf	1.17 /lf	4.50 /lf	-	0.69 /lf	-	6.37 /lf	24,189	0.136
			Curbs		/lf	/lf	/lf	/lf	/lf	/lf	**24,189**	**0.136**
		03060.110	**Curing**									
			Liquid Curing Compounds	5,700.00 sf	0.10 /sf	0.01 /sf	-	-	-	0.11 /sf	603	0.003
			Liquid Curing Compounds	19,000.00 sf	0.10 /sf	0.01 /sf	-	-	-	0.11 /sf	2,011	0.011
			Curing		/sf	/sf	/sf	/sf	/sf	/sf	**2,614**	**0.015**
		03110.260	**Forms- S-O-G**									
			S.O.G. Edge Form < 1'	2,536.67 sf	7.08 /sf	0.35 /sf	-	-	-	7.43 /sf	18,850	0.106
			Forms- S-O-G		/sf	/sf	/sf	/sf	/sf	/sf	**18,850**	**0.106**
		03110.560	**Forms- Strip & Oil**									
			Strip & Oil SOG Form	2,536.67 sf	0.24 /sf	-	-	-	-	0.24 /sf	605	0.003
			Forms- Strip & Oil		/sf	/sf	/sf	/sf	/sf	/sf	**605**	**0.003**
		03150.160	**Expansion Joints**									
			Expansion Joint - LF	630.00 lf	2.20 /lf	0.73 /lf	-	-	-	2.92 /lf	1,839	0.010
			Expansion Joints		/lf	/lf	/lf	/lf	/lf	/lf	**1,839**	**0.010**
		03300.010	**Concrete- Buy**									
			3000 psi Concrete	234.57 cy	-	94.50 /cy	-	-	-	94.50 /cy	22,167	0.124
			Concrete- Buy		/cy	/cy	/cy	/cy	/cy	/cy	**22,167**	**0.124**
		03310.170	**Place- S-O-G**									
			Truck Place Slab on Grade	234.57 cy	23.58 /cy	-	-	-	-	23.58 /cy	5,531	0.031
			Place- S-O-G		/cy	/cy	/cy	/cy	/cy	/cy	**5,531**	**0.031**
		03350.100	**Finish Flatwork**									
			Finish- Broom	19,000.00 sf	0.64 /sf	0.01 /sf	-	-	-	0.64 /sf	12,243	0.069
			Finish Flatwork		/sf	/sf	/sf	/sf	/sf	/sf	**12,243**	**0.069**
			Streets								**158,014**	**0.886**
Terminal												
		21000.000	**New Buildings**									
			New Terminal & Ops Buildings	25,960.00 sf	100.00 /sf	100.00 /sf	-	10.00 /sf	-	210.00 /sf	5,451,600	30.584
			Misc Site Improvements	1.00 ls	300,000.00 /ls	450,000.00 /ls	-	150,000.00 /ls	-	900,000.00 /ls	900,000	5.049

System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		21000.000	**New Buildings**									
			New Air Cargo Building	12,000.00 sf	75.00 /sf	75.00 /sf	-	5.00 /sf	-	155.00 /sf	1,860,000	10.435
			New Buildings								**8,211,600**	**46.067**
			Terminal								**8,211,600**	**46.067**
			10 - Aprons Apron Expansion	**17,900.00 Sy**	**236.97 /Sy**	**280.83 /Sy**	**10.35 /Sy**	**26.94 /Sy**	**/Sy**	**555.09 /Sy**	**9,936,130**	**55.742**

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	4,241,734		8,316.691 hrs	
Material	5,026,882			
Subcontract	1,293,344			
Equipment	482,304		304.762 hrs	
Other				
	11,044,264	11,044,264		
Material Take-off Allowance	883.541			8.000 %
Labor Overtime	1.060.434			25.000 %
Bond	87.931			
Overhead & Profit	1.656.640			15.000 %
Contingency	2.208.853			20.000 %
Market Conditions Allowance	883.541			8.000 %
Total		***17,825,204***		

Introduction & Commentary

Long Term Estimates – Development following the Planning Period

Unalaska Airport Master Plan Update

Introduction

This section deals with those improvements that are required or desirable to bring the Unalaska Airport into conformance with FAA standards, but that will be implemented following the planning period, that is after 2026. The estimated cost of these improvements is summarized in the table immediately following.

The estimated cost of earth moving far overshadows all other costs. Estimates of earthwork volumes to remove part of Mt. Ballyhoo from the obstacle free area (OFA) adjacent to the runway; to cut into Mt. Ballyhoo to create a space for replacement of the existing DOT&PF station and housing, and the existing hangar, and to remove part of utility hill from the OFA totals more than 1.6 million cubic yards of earth. Estimates assume that about 450,000 cubic yards of earth could be placed in Dutch Harbor to allow the relocation of Mt. Ballyhoo Road out of the OFA, leaving nearly 1.2 million cubic yard for disposal elsewhere. Estimates do not include costs to armor any increased fill in Dutch Harbor or the cost of constructing Mt. Ballyhoo on a new alignment.

Summary of Estimated Development Cost after the Planning Period (after 2026)

Unalaska Airport
Unalaska, Alaska

Airfield/Roads

Earthwork		Est. Volume		Est. Price	Source	Amount	Notes
Excavation to create site for DOT&PF buildings & hangar replacements (Note 1)		290,000	CY				
Excavation at Mt. Ballyhoo to clear OFA (Note 2)		1,220,000	CY				
Excavation at Utility Hill to clear OFA		113,000	CY				
Subtotal - estimated earthwork volumed.	Note 3	1,623,000	CY	$8.48	1	$13,763,040	Drill & blast
	Note 3			$6.91	1	$11,214,930	Load/haul/place in Dutch Harbor
	Note 3				1	$8,838,893	Common & Miscellaneous
	Note 3					$5,000,000	Armor & underlayers
	Note 3					$24,031,114	Markups
Estimated fill to move Mt. Ballyhoo Road outside of OFA		(450,000)					
Earthwork disposal (Note 4)		1,173,000	CY	$10.00		$11,730,000	
Earthwork Subtotal						$74,577,977	
Build Mt. Ballyhoo Road in new alignment, remove signal (allowance)						$500,000	
Airfield & Roads Subtotal						**$75,077,977**	

Notes:

1 Site is assumed to be "away" from the runway, into Mt. Ballyhoo.
2 Estimated volumes assumes that the "Full" RSA improvement identified in airfield alternate 3 has been made and that the only airfield improvement is grading to the OFA line.
3 Prices and costs are estimated from the source 1 cost estimate, assuming that armor quantities will be double those estimated for the runway 30 "full" RSA estimated in source 1.
4 An estimated 450,000 CY of fill is required to relocate Mt. Ballyhoo Road beyond the OFA, leaving significant excavated material to dispose. Assume it can be dispose within 10 miles at only haul (one way @ $1/CY/mile, or $10/CY for the 10 mile haul)

Sources of estimated amounts and markups:	Dated
1 Unalaska Airport Runway Extension 30% Alt 3.pdf	24-Sep-07
2 Unalaska Airport Master Plan Estimate R03a.pdf	9-Apr-07
3 UARE Delta Western Unloading Dock Relo R01.pdf	19-Apr-07

Buildings

Demolition

ource

Summary of Estimated Development Cost after the Planning Period (after 2026)

Unalaska Airport
Unalaska, Alaska

Item		Cost	markups	Marked-up Cost	Sc
Terminal Area					
Utility Hill Housing Unit 1		$15,867	1.52	$24,123	2
Utility Hill Housing Unit 2		$14,488	1.52	$22,027	
	Subtotal			$46,150	
DOT&PF/Hangar Area					
DOT&PF Staff Housing (PT #03)		$4,024	1.52	$6,118	2
DOT&PF Staff Housing (PT #04)		$4,024	1.52	$6,118	2
Abandoned Hangar (PT #01)		$47,469	1.52	$72,169	2
DOT&PF Station Bldg (ARFF/Admn, PT #06) Tier 1		$54,510	1.52	$82,874	2
DOT&PF Station Bldg (ARFF/Admn, PT #07) Tier 2		$65,412	1.52	$99,448	2
DOT&PF Station Bldg (ARFF/Admn, PT #08) Tier 3		$92,667	1.52	$140,885	2
Hangar 1B Ramp (PT #11)		$151,909	1.52	$230,953	2
Hangar 2B Ramp (PT #12)		$235,488	1.52	$358,021	2
	Subtotal			$996,586	
Relocation/Adjustment					
Aerology Building - remove top		$21,904	1.52	$33,235	2
Aerology Building - move/replace top		$711,084	1.52	$1,078,941	2
Electric generation plant building modification (Notes 2)				$500,000	
Relocate Western Fuel Dock			1.661	$0	3
	Subtotal			$1,612,176	
Construction					
Terminal Area					
Utility Hill Housing Unit 1		$506,912	1.52	$769,147	2
Utility Hill Housing Unit 2		$462,867	1.52	$702,317	2
	Subtotal			$1,471,464	
DOT&PF/Hangar Area					
DOT&PF Staff Housing (PT #03)		$227,578	1.52	$345,308	2
DOT&PF Staff Housing (PT #04)		$227,999	1.52	$345,947	2
DOT&PF Station Bldg (ARFF/Admn, PT #06) Tier 1		$1,813,840	1.52	$2,752,173	2
DOT&PF Station Bldg (ARFF/Admn, PT #07) Tier 2		$2,176,608	1.52	$3,302,608	2
DOT&PF Station Bldg (ARFF/Admn, PT #08) Tier 3		$3,083,528	1.52	$4,678,694	2
Hangar 1B Ramp (PT #11)		$1,800,892	1.52	$2,732,527	2
Hangar 2B Ramp (PT #12)		$2,463,292	1.52	$3,737,599	2
	Subtotal			$17,894,856	
	Buildings Subtotal			**$22,021,232**	
	Long Term Development Total				**$97,099,210**

Notes:

1 Assumes airfield alternate 3 and terminal area alternate 3 improvements have been implemented.

2 An allowance is made to modify the corner of the existing building, if future detailed surveys confirm that it extends into protected airspace; and if it a determination is made that it must be removed.

Long-term Airfield Estimates

Unalaska Airport Runway Extension 30% Alt 3 (See a copy of this estimate above.)

Long-term Terminal Area Estimates

Unalaska Airport Master Plan Estimate R03a (See a copy of this estimate above.)

Unalaska A t Master Plan
Delta Western Unloading Dock Relocation Study R01
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	UARE Delta Western
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	4/19/2007
Est Log No.	07-0274
PM / Contact Name	K.Green/SEA
Estimate Class 1-5	4
Report format	Sorted by 'Location/System/Bid Item/Phase' 'Detail' summary Paginate

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
lt 03													
	11 - Delta Western												
		Barge Dock											
			02320.070	**Backfill Soil/Rock Fill**									
				Gravel fill at Slabs	740.74 cy	8.11 /cy	15.60 /cy	-		-	23.71 /cy	17,562	0.117
				Backfill Soil/Rock Fill		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**17,562**	**0.117**
			03060.110	**Curing**									
				Liquid Curing Compounds	120,000.00 sf	0.11 /sf	0.01 /sf	-	-	-	0.12 /sf	14,416	0.096
				Curing		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**14,416**	**0.096**
			03060.120	**Hardener**									
				Seal Floors	120,000.00 sf	0.11 /sf	0.05 /sf	-	-	-	0.16 /sf	19,456	0.130
				Hardener		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**19,456**	**0.130**
			03110.260	**Forms- S-O-G**									
				S.O.G. Edge Form < 1'	1,266.67 sf	8.15 /sf	0.35 /sf	-	-	-	8.49 /sf	10,759	0.072
				Forms- S-O-G		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**10,759**	**0.072**
			03110.560	**Forms- Strip & Oil**									
				Strip & Oil SOG Form	1,266.67 sf	0.27 /sf	-	-	-	-	0.27 /sf	347	0.002
				Forms- Strip & Oil		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**347**	**0.002**
			03150.120	**Vapor Barrier**									
				6 Mil. Vapor Barrier	120,000.00 sf	0.17 /sf	0.01 /sf	-	-	-	0.18 /sf	21,161	0.141
				Vapor Barrier		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**21,161**	**0.141**
			03200.170	**Rebar- SOG**									
				SOG Rebar # 4	29.69 tn	1,153.68 /tn	519.75 /tn	-	-	-	1,673.42 /tn	49,677	0.331
				SOG Rebar # 4	29.45 tn	1,153.68 /tn	519.74 /tn	-	-	-	1,673.42 /tn	49,277	0.328
				Rebar- SOG		**/ton**	**/ton**	**/to n**	**/ton**	**/ton**	**/ton**	**98,954**	**0.659**
			03220.100	**Wire Mesh- Rolls**									
				Mesh Support - bricks	13,651.00 ea	0.17 /ea	0.19 /ea	-	-	-	0.36 /ea	4,844	0.032
				Wire Mesh- Rolls		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**4,844**	**0.032**
			03300.010	**Concrete- Buy**									
				4000 psi Concrete	2,962.96 cy	-	105.00 /cy	-	-	-	105.00 /cy	311,111	2.073
				Concrete- Buy		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**311,111**	**2.073**
			03310.170	**Place- S-O-G**									
				Pump Place Slab on Grade	2,962.96 cy	30.13 /cy	-	-	-	-	30.13 /cy	89,259	0.595
				Place- S-O-G		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**89,259**	**0.595**
			03350.100	**Finish Flatwork**									
				Finish- Hard Trowel	120,000.00 sf	0.92 /sf	0.03 /sf	-	-	-	0.95 /sf	113,646	0.757
				Finish Flatwork		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**113,646**	**0.757**
				Barge Dock								**701,515**	**4.674**

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		Dock											
			02320.070	**Backfill Soil/Rock Fill**									
				Gravel fill at Dock	133,333.34 cy	8.11 /cy	2.50 /cy	-		-	10.61 /cy	1,414,511	9.424
				Backfill Soil/Rock Fill		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,414,511**	**9.424**
			02451.118	**Sheetpiling**									
				Sheetpiling Face	60,000.00 sf	-	-	33.68 /sf	-	-	33.68 /sf	2,020,800	13.463
				Sheetpiling Tails	37,800.00 sf	-	-	33.68 /sf	-	-	33.68 /sf	1,273,104	8.482
				Sheetpiling		**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**3,293,904**	**21.945**
			02480.185	**Mooring & Fenders**									
				TWIN CONE PMF, SCN600 (E0.8)	6.00 ea			27,000.00 /ea	-	-	27,000.00 /ea	162,000	1.079
				PNEUMATIC FENDER (10kPa), 2000x3500	4.00 ea			17,000.00 /ea	-	-	17,000.00 /ea	68,000	0.453
				MOORING BOLLARD	8.00 ea			2,000.00 /ea	-	-	2,000.00 /ea	16,000	0.107
				PMF SUPPORT STRUCTURE (1200 LB)	6.00 ea			3,700.00 /ea	-	-	3,700.00 /ea	22,200	0.148
				PNEUMATIC SUPPORT STRUCTURE (7500 LB)	4.00 ea			23,000.00 /ea	-	-	23,000.00 /ea	92,000	0.613
				PMF ANCHOR BOLTS	48.00 ea			500.00 /ea	-	-	500.00 /ea	24,000	0.160
				PNEUMATIC FENDER ANCHOR BOLTS	128.00 ea			500.00 /ea	-	-	500.00 /ea	64,000	0.426
				PMF INSTALLATION	6.00 ea			5,000.00 /ea	-	-	5,000.00 /ea	30,000	0.200
				PNUEMATIC FENDER INSTALLATION	4.00 ea			3,000.00 /ea	-	-	3,000.00 /ea	12,000	0.080
				BOLLARD INSTALLATION	1.00 ea			2,000.00 /ea	-	-	2,000.00 /ea	2,000	0.013
				Mooring & Fenders		**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**492,200**	**3.279**
				Dock								**5,200,615**	**34.649**

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		Fuel Xfer											
			02317.000	**Earthwork**									
				Exc Trnch W/hoe Med Hard	1,362.96 cuyd	9.51 /cuyd		-	5.95 /cuyd	-	15.46 /cuyd	21,068	0.140
				Backfill Native Med Hard	939.26 cuyd	7.20 /cuyd		-	6.39 /cuyd	-	13.59 /cuyd	12,763	0.085
				Bobtail (Truck/trailer) 24cy (1 - 3 Mile)	423.70 cuyd	0.56 /cuyd		-	0.60 /cuyd	-	1.16 /cuyd	492	0.003
				Earthwork								**34,323**	**0.229**
			02502.012	**Trench Shoring**									
				Trench Box 8' Deep	4,000.00 lf	-	2.85 /lf	-		-	2.85 /lf	11,400	0.076
				Trench Shoring		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**11,400**	**0.076**
			02502.014	**Pipe Bedding**									
				Pipe Bedding - Crushed Rock	205.39 cy	2.19 /cy	15.60 /cy	-		-	17.79 /cy	3,654	0.024
				Pipe Bedding		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**3,654**	**0.024**
			02502.016	**Pipe Cover**									
				Pipe Zone - Crushed Rock	205.39 cy	2.19 /cy	15.60 /cy	-		-	17.79 /cy	3,654	0.024
				Pipe Cover		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**3,654**	**0.024**
			09960.010	**Painting- Pipe**									
				Coating, Prime & Finish Enamel	13,089.97 sf	1.21 /sf	0.27 /sf	-	-	-	1.48 /sf	19,320	0.129
				Coating, Prime & Finish Enamel	6,937.68 sf	1.21 /sf	0.27 /sf	-	-	-	1.48 /sf	10,239	0.068
				Coating, Prime & Finish Enamel	6,937.68 sf	1.21 /sf	0.27 /sf	-	-	-	1.48 /sf	10,239	0.068
				Coating, Prime & Finish Enamel	4,712.39 sf	1.05 /sf	0.27 /sf	-	-	-	1.32 /sf	6,214	0.041
				Painting- Pipe		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**46,013**	**0.307**
			11210.920	**Pumps- Transfer**									
				Pumps Transfer 6" ASME	2.00 ea	1,725.01 /ea	4,500.00 /ea	-	-	-	6,225.01 /ea	12,450	0.083
				Pumps Transfer 6" ASME	1.00 ea	2,874.97 /ea	10,000.00 /ea	-	-	-	12,874.97 /ea	12,875	0.086
				Pumps- Transfer		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**25,325**	**0.169**
			15061.013	**CS Std Wt Pipe PE**									
				CS Sch 40 A53 SMLS PE 4"	4,000.00 lf	15.39 /lf	3.80 /lf	-	-	-	19.19 /lf	76,755	0.511
				CS Std Wt Pipe PE		**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**76,755**	**0.511**
			15061.050	**CS S80 XH Pipe PE**									
				CS Sch 80 A53 SMLS PE 6"	4,000.00 lf	24.01 /lf	13.80 /lf	-	-	-	37.81 /lf	151,226	1.008
				CS Sch 80 A53 SMLS PE 6"	4,000.00 lf	24.01 /lf	13.80 /lf	-	-	-	37.81 /lf	151,226	1.008
				CS Sch 80 A53 SMLS PE 10"	4,000.00 lf	38.78 /lf	35.00 /lf	-	-	-	73.78 /lf	295,118	1.966
				CS S80 XH Pipe PE		**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**597,570**	**3.981**
			15061.130	**CS Flange WN**									
				CS Std Flange WN 150 RF Sch 40 4	50.00 ea	166.20 /ea	37.41 /ea	-	-	-	203.61 /ea	10,180	0.068
				CS Std Flange WN 150 RF Sch 40 6	50.00 ea	193.90 /ea	56.03 /ea	-	-	-	249.93 /ea	12,496	0.083
				CS Std Flange WN 150 RF Sch 40 6	50.00 ea	193.90 /ea	56.03 /ea	-	-	-	249.93 /ea	12,496	0.083
				CS Std Flange WN 150 RF Sch 40 10	50.00 ea	313.93 /ea	143.79 /ea	-	-	-	457.72 /ea	22,886	0.152
				CS Flange WN		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**58,059**	**0.387**
			15101.080	**Valves - Cast Steel Gate**									
				Cast Steel Gate Flg 150# 4"	8.00 ea	120.65 /ea	700.00 /ea	-	-	-	820.65 /ea	6,565	0.044
				Cast Steel Gate Flg 150# 6"	8.00 ea	176.05 /ea	1,120.00 /ea	-	-	-	1,296.05 /ea	10,368	0.069
				Cast Steel Gate Flg 150# 6"	8.00 ea	176.05 /ea	1,120.00 /ea	-	-	-	1,296.05 /ea	10,368	0.069
				Cast Steel Gate Flg 150# 10"	8.00 ea	324.39 /ea	2,810.00 /ea	-	-	-	3,134.39 /ea	25,075	0.167
				Valves - Cast Steel Gate		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**52,377**	**0.349**
			15120.005	**Bolt - Nut & Gasket Sets**									
				Bolt - Nut & Gasket Set 150# 4	50.00 ea	9.81 /ea	9.00 /ea	-	-	-	18.81 /ea	941	0.006
				Bolt - Nut & Gasket Set 150# 6	50.00 ea	11.45 /ea	14.00 /ea	-	-	-	25.45 /ea	1,272	0.008
				Bolt - Nut & Gasket Set 150# 6	50.00 ea	11.45 /ea	14.00 /ea	-	-	-	25.45 /ea	1,272	0.008
				Bolt - Nut & Gasket Set 150# 10	50.00 ea	20.44 /ea	30.00 /ea	-	-	-	50.44 /ea	2,522	0.017
				Bolt - Nut & Gasket Sets		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**6,008**	**0.040**
			15140.005	**Pipe Support**									
				Pipe Support - Large Bore 2 1/2" - 6"	500.00 ea	123.11 /ea	50.00 /ea	-	-	-	173.11 /ea	86,555	0.577

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
			15140.005	**Pipe Support**									
				Pipe Support - Large Bore 2 1/2" - 6"	500.00 ea	123.11 /ea	50.00 /ea	-	-	-	173.11 /ea	86,555	0.577
				Pipe Support - Large Bore 2 1/2" - 6"	500.00 ea	107.05 /ea	50.00 /ea	-	-	-	157.05 /ea	78,526	0.523
				Pipe Support - Large Bore 8" - 12"	500.00 ea	246.22 /ea	80.00 /ea	-	-	-	326.22 /ea	163,110	1.087
				Pipe Support		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**414,746**	**2.763**
			15300.700	**Non Distructive Pipe Test**									
				Radiographic Inspection 4"	40.00 ea		40.00 /ea	-	30.00 /ea	-	70.00 /ea	2,800	0.019
				Radiographic Inspection 6"	40.00 ea		40.00 /ea	-	30.00 /ea	-	70.00 /ea	2,800	0.019
				Radiographic Inspection 6"	40.00 ea		40.00 /ea	-	30.00 /ea	-	70.00 /ea	2,800	0.019
				Radiographic Inspection 10"	40.00 ea		60.00 /ea	-	30.00 /ea	-	90.00 /ea	3,600	0.024
				Non Distructive Pipe Test								**12,000**	**0.080**
			16001.250	**Misc Site Work**									
				Electrical Utility Allowance	1.00 ls	-	-	50,000.00 /ls	-	-	50,000.00 /ls	50,000	0.333
				Misc Site Work		**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**50,000**	**0.333**
				Fuel Xfer								**1,391,884**	**9.273**

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		Mob Demob		Mobilization/Demobilization									
			01910.000	Equipment									
				Construction Equipment Mobilizations	1.00 LS	28,750.00 /LS		300,000.00 /LS		-	328,750.00 /LS	328,750	2.190
				Equipment		/hr	/hr	/hr	/hr	/hr	/hr	328,750	2.190
				Mob Demob								328,750	2.190
				Mobilization/Demobilization									

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
	Warehouse												
			02720.100	**Base**									
				Crushed Gravel	92.59 cy	2.03 /cy	8.89 /cy	-	0.86 /cy	-	11.77 /cy	1,090	0.007
				Base		/cy	/cy	/cy	/cy	/cy	/cy	**1,090**	**0.007**
			02740.100	**Asphalt Paving**									
				Asphalt Base Course 2"	555.56 sy	-	-	4.40 /sy	-	-	4.40 /sy	2,444	0.016
				Asphalt Top Course 2"	555.56 sy	-	-	4.00 /sy	-	-	4.00 /sy	2,222	0.015
				Asphalt Paving		/tn	/tn	/tn	/tn	/tn	/tn	**4,667**	**0.031**
			02766.100	**Pavement Marking**									
				Parking Spaces	45.00 ea	-	-	5.00 /ea	-	-	5.00 /ea	225	0.001
				Parking Spaces Handicap	5.00 ea	-	-	10.00 /ea	-	-	10.00 /ea	50	0.000
				Painted Crosswalks	200.00 sf	-	-	1.00 /sf	-	-	1.00 /sf	200	0.001
				Painted Handicap Symbol	5.00 ea	-	-	65.00 /ea	-	-	65.00 /ea	325	0.002
				Painted Arrows	5.00 ea	-	-	10.00 /ea	-	-	10.00 /ea	50	0.000
				Painted Letters	15.00 ea	-	-	10.00 /ea	-	-	10.00 /ea	150	0.001
				Pavement Marking		/lf	/lf	/lf	/lf	/lf	/lf	**1,000**	**0.007**
			05510.200	**Fabricated Steel**									
				Metal Frame Warehouse 150 x 75	11,250.00 sf	-	-	125.00 /sf	-	-	125.00 /sf	1,406,250	9.369
				Fabricated Steel		/ls	/ls	/ls	/ls	/ls	/ls	**1,406,250**	**9.369**
				Warehouse								**1,413,007**	**9.414**
				11 - Delta Western								**9,035,770**	**60.200**
				Alt 03								**9,035,770**	**60.200**

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	2,268,336		37,576.754 hrs	
Material	1,200,170			
Subcontract	5,548,021			
Equipment	19,244		5,586.112 hrs	
Other				
	9,035,771	9,035,771		
General Conditions	722,862			8.000 %
Material Take-off Allowance	722,862			8.000 %
Labor Overtime	567,084			25.000 %
Bond	75,542			
Overhead & Profit	1,355,366			15.000 %
Contingency	1,807,154			20.000 %
Market Conditions Allowance	722,862			8.000 %
Total		***15,009,503***		

Appendix H
Investigation of Sources for Armor Stone and Site Conditions for Proposed Expansion of Unalaska

Investigation of Sources for Armor Stone and Site Conditions for Unalaska Airport Project

PREPARED FOR: Eric Cutbirth/SEA

PREPARED BY: Ken Green/SEA
Greg Warren/BOI

DATE: November 8, 2007

CH2M HILL investigated local borrow sources for use as rockfill and for potential use as armoring for wave protection at Unalaska Airport. The purpose of the rock source investigation was to:

- Evaluate the durability of local rock sources for use as armoring, rock fills, and production of aggregates
- Estimate the quantity and maximum size of rock available for armor stone and general rock fill
- Allow development of typical cross sections for the proposed airfield improvements showing material types and sizes and computation of rock fill quantities for various zones of the proposed embankments
- Recommend preferred sources for each type of required rockfill for use in constructing the runway embankments
- Provide construction recommendations for the project

Most of the sources of rock investigated have been investigated in various details by others for similar uses during past studies. Many of the pits have been further developed since that time and continue to be used for development of a variety of products for local use.

1.0 Geology of Local Rock Sources

Local rock sources consist primarily of two distinctly different types of rock: extrusive volcanic rocks of the Unalaska Formation, and granodiorite formed by cooling of plutonic intrusions. The following is a general summary of the characteristics, lithology, and durability of the various rock types. Figure 1 shows a geologic map with the distribution of the different rock types.

1.1 Unalaska Formation

Lithology and Rock Characteristics

The most common type of rock encountered on the island and in the vicinity of Unalaska consists of slightly weathered to moderately weathered volcanic and sedimentary rock of the Unalaska Formation. The Unalaska Formation consists of a wide variety of volcanic rocks ranging from basalt, rhyolite, breccia, tuff, ash, andesite, and other volcanic rock types. The rock of the Unalaska Formation varies from soft to moderately hard and is generally highly fractured. Much of the rock mass is moderately to severely weathered.

Massive andesite flows and dikes are found within the Unalaska Formation. Andesite is defined as a fine-grained igneous rock with a chemical composition between rhyolite and basalt. The andesite is generally less fractured, more durable, higher-quality rock than the rest of the Unalaska Formation. Based on site observations, the andesite is maroon to brown colored, porphyritic, and consists of andesite breccia (contains clasts of mixed lithology).

The Unalaska Formation rock is generally highly fractured and breaks along fracture surfaces that are typically 2 to 24 inches or more in size and form blocky shapes, having a major axis roughly 1.5 to 2 times the length of the minor axis. A few rocks that have originated from the hard, more erosion resistant andesite dikes can be observed as large as approximately 30 tons, but most rocks range less than 3 tons.

Quarries developed in the Unalaska Formation rocks include the Airport Pit, Little South America Pit, Margarets Bay Pit, and OSI Pit.

Rock Quality

Because of the diversity of lithology, and varying degrees of alteration and weathering, the rock quality and durability characteristics of the Unalaska Formation are inconsistent and generally poor. Portions of the rock from this formation appear to degrade when exposed to accelerated weathering conditions (i.e., freeze-thaw and wetting-drying conditions). In general, the Unalaska Formation volcanic rocks are highly variable in quality with test results that both pass and fail standard specification limits.

1.2 Granodiorite Batholith

Lithology and Rock Characteristics

A second type of rock that is available locally consists of granodiorite. Granodiorite is defined as a plutonic, coarse-grained igneous rock with a composition between granite and diorite. The granodiorite was formed as part of a large batholith that underlies a portion of the island, as shown on Figure 1. Based on site observations, the granodiorite is gray, phaneritic (coarse-grained), and contains quartz, feldspar, and mica minerals. Zones of greenish fine-grained igneous rock were observed within the granodiorite (possible epidote or chlorite alteration zones).

Two rock quarries have currently been developed in this rock type and are presently actively being mined; these are known as the Upper and Lower Ugadaga pits.

Rock Quality

Because this rock is hard, coarse-crystalline, and less fractured, it is consistently much more durable than any of the rock from the Unalaska Formation. Durability test results of the granodiorite indicate that this rock typically passes the durability requirements for a potential rock source.

2.0 Rock Pit Investigation Summary and Observations

CH2M HILL investigated numerous existing rock pits in the Unalaska area in April 2007. These pits included the following (as shown on Figure 1):

- Airport Pit (Ballyhoo)
- Existing Little South America Pit on southeast side of peninsula
- Arch Rock - a new rock source on the west side of the South America peninsula previously identified by others
- OSI Pit (east side of Captain's Bay)
- Lower Ugadaga Pit
- Upper Ugadaga Pit
- Shaishnikoff Pit (south end of Captain's Bay)
- Margarets Bay Pit (Dutch Harbor, north of South America Peninsula)

Currently, the operating pits include the two Ugadaga Pits, the Shaishnikoff Pit, South America Pit (southeast side of peninsula), and airport pit. The option of opening new rock pits was discussed with the City Planner at the City of Unalaska and the Public Works Director, both having long-time experience in planning and trying to coordinate such activities with the Ounalaska Corporation. This option was also discussed with contractors who have worked in the area for dozens of years. It is clear that the Ounalaska Corporation is not interested in opening new, unpermitted rock sources unless absolutely necessary. They are also quite concerned about the restoration of all of the rock pit excavations and desire to minimize the visual impact of such excavations, including existing pits.

The following discussion summarizes observations at each pit.

2.1 Airport Pit (Ballyhoo)

This area is located near the north end and along the northeast side of the existing runway. The rock face exposed in the pit is currently approximately 140 feet high and approximately 1,200 feet long. The rock is highly fractured and some zones within the rock mass have lower strength and durability than other rock sources in the area. It is our understanding that: a) the site is owned by the Alaska Department of Transportation (ADOT), b) royalties for mineral rights would not apply to rock removed from this site, and c) the area is not currently operated as a rock pit but has been mined for removal of rock in the past for use in various areas along Ballyhoo Road and elsewhere. It is our understanding that the mining activities in the past exposed a very steep condition along the toe at one point resulting in a rock slide failure. To correct the slide problem, the top of the slope was cut back, leaving intermediate benches and an overall slope of approximately 1H:1V. The base of the slope was reshaped and portions of the slope were backfilled to form its current stable configuration.

Rock types observed include basalt, andesite, rhyolite, breccia, cemented tuff, and other extrusive volcanic rock types of the Unalaska Formation. The rock is highly fractured and much of the materials appear to fracture down to less than 12 inches in size. Fracture spacing varies generally from approximately 2 to 36 inches. The largest rock sizes observed were comprised of maroon-colored massive andesite and were approximately 30 tons. Hairline fractures could be observed in many of the larger rocks. Most of the larger rocks observed have surficial degradation and spalling, extensive fractures and could be expected to break down into smaller rock sizes when left exposed to weathering and freeze-thaw conditions. Because several zones of poorer quality rock are intermixed in zones within the Unalaska Formation in this area, it is expected that the excavated rock mass would generally have less durability than the South America Pit and considerably less durability than the granodiorite of the Ugadaga rock source. However, this rock is expected to have good to moderate durability for use in rock fills if placed in an environment protected from freezing and thawing and wetting and drying.

2.2 Existing Little South America Pit on Southeast Side of Peninsula

This pit has been operated for many years. The land is owned by the Aleut Native Corporation and the pit is leased to a private operator. Royalties for the rock removed would be included in the cost of rockfill material removed from this pit. The pit has been recently permitted for operation and use by Archie Stepp (Northern Mechanical Contractors), and will be expanded in the near future. The pit is located on the southeast side of South America Peninsula and has been mined primarily in two adjacent areas.

The rock type in the Little South America pit consists primarily of andesite and includes breccia, basalt, and other rock types of the Unalaska Formation. The rock quality from this pit varies, as it does elsewhere in the Unalaska Formation. However, the rock types exposed and currently mined from this pit have been of moderate to good quality. The exposed rock faces in the pit are currently approximately 50 feet or less in height. The rock is highly fractured with fracture spacing of 2 inches to 36 inches. The largest rocks from this quarry appear to be approximately 5 to 7 tons but the yield for this size of rock is expected to be low. Most of the larger rocks observed have extensive fractures and could be expected to break down into smaller rock sizes when left exposed to weathering, including wetting-drying and freeze-thaw conditions.

The rock mass generated from this site is expected have less durability than the granodiorite of the Ugadaga rock source but the rock is expected to have good to moderate durability for use in rock fills, particularly if placed in an environment protected from freezing and thawing and wetting and drying. This quarry could also potentially provide some of the underlayer stone depending on the results of the rock quality tests.

2.3 Arch Rock

This is an undeveloped potential quarry site owned by the Aleut Native Corporation. Explorations have been conducted by others in the past to investigate the characteristics and quality of a large andesite dike exposed at Arch Rock on the west point of the South America peninsula. Rock faces along the west bluff of the peninsula are currently up to approximately 300 feet in height. The andesite dikes trend more or less in a northwest/southeast direction and currently form prominent ridges that are more resistant to erosion. Rock from this dike is exposed and has fallen onto the beach at the west side of the peninsula and is exposed to similar waves and erosion as might be expected at the north end of the runway. The boulders on the beach are eroded and generally subangular in shape. The largest of the boulders on the beach was estimated to be approximately 30 tons and most of the largest size rocks were approximately 10 to 15 tons. These rocks seemed to be highly fractured and could eventually be expected to further break up into smaller pieces. Most of the rock easily fractured into rock sizes from 2 to 36 inches.

An area was also investigated where borings and preliminary blasting of the rock was conducted in the past to better expose a face of the rock mass and generate a limited amount of shot rock to more accurately estimate the gradation and rock character. The rock exposed from the blasted area was fractured with naturally occurring hairline fractures that caused the rock to break up into rock sizes ranging from approximately 2 to 48 inches. The largest rock pieces observed ranged from approximately 2 to 7 tons.

Because of the concern from the Ounalaska Corporation about opening new pits, it was concluded that although Arch Rock would provide suitable, moderately durable rock for the rock fill and possibly underlayer stone, its quality/durability was generally far less than the granodiorite and it was unlikely that the native corporation would issue a permit to allow removal of the rock from Arch Rock. It was also felt that there would be great sensitivity to construction of a new road along the beach for access or leaving a new scar or changing the landscape in this popular and well-utilized area near town.

2.4 OSI Pit

This pit has been operated for many years and may have been mined primarily to create additional space for the OSI Corporation's facilities. It is not known whether the land is owned by the Aleut Native Corporation or OSI. It is likely that the mineral rights are owned by the Aleut Native Corporation. The pit is not currently being mined or expanded. Structures have been constructed in close proximity to the rock excavation faces.

The rock types exposed in this pit appear to consist of basalt, andesite, breccia, rhyolite, and other rocks of the Unalaska Formation. The rock is highly fractured with fracture spacing ranging from approximately 2 to 36 inches. Rock faces exposed in the pit areas are estimated to be approximately 70 feet or less in height. The rock from this pit is expected to be similar in quality to rock in other areas of the Unalaska Formation.

2.5 Lower and Upper Ugadaga Pits

Active mining in these pits began approximately 20 years ago. The land is owned by the Aleut Native Corporation and the pit is leased to a private operator. Royalties for the rock removed would be included in the cost of rockfill material removed from this pit. The pit is currently permitted for operation and use by Archie Stepp (Northern Mechanical Contractors) and has been used extensively during the past few years. Both pits will be expanded in the future. The pit is located southeast of Unalaska and slightly beyond the area currently developed for housing. The two pit areas are approximately 1,000 feet apart.

The rock type encountered is primarily granodiorite and biotite granodiorite. The rock quality from this pit is generally very good and rock testing has consistently shown that the rock is hard and durable and is the best quality of any rock sources available in the area. In addition, the rock durability is generally more consistent than other areas. Some areas of the pit have been found to produce better quality large armor stone that other areas. The rock is fractured and fracture spacing is estimated to range from 6 inches to 48 inches. The largest rocks observed from the pit ranged from 8 to 10 tons. Some of these rocks where fractured and would be expected to experience further breakdown to smaller pieces with exposure to wet/dry and freeze/thaw conditions. The individual rock pieces are quite hard and are expected to be very durable compared to any of the other rock sources on the island. The Lower Ugadaga Pit can produce 1- to 3-ton rock, and occasionally larger (5-ton) stone, but the yield is low for the 5-ton stone. It is anticipated that the Ugadaga Pit could provide small armor/underlayer stone and durable general rock fill.

2.6 Shaishnikoff Pit (South End of Captain's Bay)

This pit, located near the south end of Captain's Bay, is privately owned and operated by Shai Construction. It is understood that separate royalties to the native corporations for mineral rights would not apply to rock removed from this site since it is privately owned. The pit is currently permitted for operation and use, and it is our understanding that the pit may be used for the portions of rock fill required for the new bridge project to be constructed in 2007.

The mining activities at the Shaishnikoff Pit are likely in close proximity to the large granodiorite pluton that underlies a significant portion of area south of Unalaska. This pluton is part of the same batholith and rock type exposed at the Lower and Upper Ugadaga pits. However, the Shaishnikoff Pit has not currently exposed the higher-quality rock (granodiorite) and is currently mining in the fractured lower-quality extrusive volcanic rock of the Unalaska Formation (see Figure 1). The geologic map clearly shows the contact of the granodiorite very close to this location. It appears from this mapping that Shaishnikoff Pit and land may encounter granodiorite if the mining extends a little further south from the present pit area; the pit could potentially expose some high-quality rock.

People who are experienced with the area suggest that delivery of rock from this area could be challenging because the access road to the pit apparently extends through private property (OSI). Agreements should probably be established prior to use of the pit to assure that there is a clear understanding about the use and maintenance of the access road as required to perform the work.

3.0 Durability Testing and Summary of Test Results

3.1 Durability Test Methods

A laboratory testing program was performed to evaluate the suitability of the rock for use as fill material for the embankments and armor stone proposed for the runway expansion. The laboratory testing program consisted of a suite of rock durability tests. The samples tested consisted primarily of bulk grab samples from the quarry sites that are anticipated to be used as sources of materials. Appendix X, Laboratory Testing, contains the following:

- Table 1 shows a summary of our recent laboratory testing of rock samples for various local pits in Unalaska, as well as testing from these pits that was conducted by others
- A summary of the typically recognized rock soundness and durability testing criteria for various test methods
- Copy of recent test reports for lab testing from Alaska Test Labs
- Full descriptions of the individual durability test methods

The following tests were performed on the samples:

- *Specific Gravity and Absorption (ASTM D6473):* This test method determines specific gravity and absorption of rock. The specific gravity may be expressed as bulk specific gravity or apparent specific gravity. Bulk specific gravity and absorption are based on a 24-hour soaking time for the rock specimens tested.
- *Los Angeles (LA) Abrasion (ASTM C131):* This test method tests sizes of coarse aggregate between 1.5 inches and No. 8 sieve (0.09 inch) for resistance to degradation using the LA testing machine. The test results are expressed as a percent loss of the rock after a certain number of revolutions.
- *Sodium or Magnesium Sulfate Soundness (ASTM C88):* This test method tests aggregates to estimate their soundness when subjected to wet/dry salt water weathering action. It is primarily used to test concrete aggregates when adequate information is not available from service records of the material exposed to actual weathering conditions. The test results are expressed as percent loss of the rock sample at the completion of the test.
- *Freeze/Thaw (ASTM D5312):* This test method evaluates the durability of rock for erosion control when exposed to freezing and thawing conditions. The test results are expressed as a percent loss of the original rock surface.
- *Expansive Breakdown on Soaking in Ethylene Glycol (CRD-C 148-69):* Ethylene glycol is a material that reacts with swelling clays of the montmorillonite group. Therefore, a stone that contains swelling clays will be expected to undergo expansive breakdown upon soaking in ethylene glycol. If breakdown does occur, then similar breakdown may occur in similar rock samples exposed to wetting and drying or freezing and thawing in a water-soaked condition. The test results are presented as qualitative observations of the breakdown and quantitative measurement of loss of material through a ¾-inch sieve.
- *Degradation (ATM T13):* The procedure takes a sample of aggregate retained on the 12.5-millimeter sieve and crushed it so that it will then pass the 12.5-millimeter sieve. This crushed material is then placed in a container filled with water and the container is agitated for 20 minutes. The amount of fines generated is measured and the result is reported as a degradation factor. The more fine generated, the lower the degradation factor. Degradation factors are reported as between 0 and 100, with higher values representing less degradation (higher quality rock).

3.2 Durability Test Results

Samples were collected from the Airport Excavation (Ballyhoo), South America Pit (LSA), and Lower Ugadaga Pit. Appendix X, Table 1 provides a summary of durability test results from the current investigation and previous rock source investigations. The table provided in Attachment H-7 shows typically recognized rock soundness and durability testing criteria for various test methods. This table lists typical specification limits for aggregate from various references.

In general, Unalaska Formation samples from various pits typically failed degradation tests, generally passed sulfate soundness, passed specific gravity, failed absorption, passed LA abrasion, and passed ethylene glycol.

Andesite rock samples of the Unalaska Formation from Arch Rock and South America Pit typically failed degradation tests, passed sulfate soundness, passed and failed specific gravity and absorption, passed LA abrasion, and passed and failed ethylene glycol. The samples from the South America pit severely failed the ethylene glycol test.

Granodiorite rock from the Upper and Lower Ugadaga pits passed all of the durability tests and has the most consistent test results.

A discussion of the test results from previous investigations can be found in the DOT&PF (2002) and Dames & Moore (1980) reports preceding the current work.

4.0 Proposed Runway Cross Sections

Figures 2, 3, and 4 show preliminary concepts of the proposed typical runway sections for the north and south ends of the runway, as well as along a central zone, illustrating details for making the rock cut on the east side of the airport and access road. These sections were developed from preliminary concepts and the configuration is expected to change depending upon the outcome of the final option chosen. These figures provide a visual layout of the relative configuration of the cut and various fill zones of the embankments compared to the existing topography.

5.0 Anticipated Sources of Materials for Runway Extensions

Materials for runway construction and aggregate are likely to come from a variety of sources. Tables 1 and 2 provide a summary of the anticipated sources of the various materials required to construct the runway extensions.

TABLE 1
Recommended Sources of Rock Fill, Aggregate, and Armor for Runway 12 Extension (North End)

Zone	Rock Type/Size	Potential Quarry or Source	Comments
Core, Below-Water	Shot Rock, 2-foot minus, or Class III riprap	Airport Excavation	Poor-quality rock; recommend minimum of 24 months to settle and monitor prior to paving
		South America Pit	Durable andesite from established pit, short haul; recommend minimum of 24 months to settle prior to paving
		Ugadaga Pits	Durable granodiorite, established quarry, more costly haul; recommend minimum of 24 months to settle prior to paving
Core, Above-Water	Type B Select Fill, mixed lithology Unalaska	Airport Excavation	Closest to runway, poor rock; can be compacted to dense condition

TABLE 1 Recommended Sources of Rock Fill, Aggregate, and Armor for Runway 12 Extension (North End)			
Zone	**Rock Type/Size**	**Potential Quarry or Source**	**Comments**
	Formation, or andesite, 4- or 5-inch minus	South America Pit	Durable andesite from established pit, short haul
Second Underlayer (U2)	Durable andesite or granodiorite Median = ~30 to 200 lbs	South America Pit	Durable andesite from established pit, short haul, required size available
		Ugadaga Pits	Durable granodiorite of adequate size, established quarry
Quarrystone Underlayer (U1)	Granodiorite or possibly durable andesite rock Median = .25 to 2 tons	South America Pit	Durable andesite of adequate size, short haul
		Ugadaga Pits	Durable granodiorite of adequate size, established quarry
		Imported	May require importation to meet size requirements
Base Course and Aggregate	¾-minus	Ugadaga Pits	Durable granodiorite that meets specification requirements for aggregates
Outer Armor Layer	Manufactured armor stone (Cor-Loc) 3.3 to 10-ton units	Barge to site and/or salvage existing units	Proven to work at site; only reasonable source of material of this size

TABLE 2
Recommended Sources of Rock Fill, Aggregate, and Armor for Runway 30 Extension (South End)

Zone	Rock Type/Size	Potential Quarry or Source	Comments
Core, Below-Water	Shot Rock, either durable granodiorite or andesite, 2-foot minus, or Class III riprap	Airport Excavation	Poor-quality rock; recommend minimum of 24 months to settle and monitor prior to paving
		South America Pit	Durable andesite from established pit, short haul; recommend minimum of 24 months to settle prior to paving
		Ugadaga Pits	Durable granodiorite established quarry, more costly haul; recommend minimum of 24 months to settle prior to paving
Core, Above-Water	Type B Select Fill, mixed lithology Unalaska Formation, or andesite, 4- to 5-inch minus	Airport Excavation	Closest to runway, poor rock; but can be compacted to dense condition
		South America Pit	Established quarry on Amaknak Island, short haul
W2 Underlayer	Andesite or granodiorite 500 lbs and smaller	South America Pit	Durable andesite of adequate size, very close to site
		Ugadaga Pits	Durable granodiorite of adequate size, established quarry
Base Course and Aggregate	¾-minus	Ugadaga PIts	Durable granodiorite that meets specification requirements for aggregates
W1 Armor Layer	Andesite or granodiorite Median = 1,200 lbs	South America Pit	Durable andesite of adequate size, very close to site
		Ugadaga Pits	Durable granodiorite of adequate size, established quarry

6.0 Alternatives for Construction of Rock Fill

6.1 Materials for Construction and Construction Sequence

Several options appear to be available for constructing the rock fills and armor layers required for the runway extensions. The preferred sources for these materials are summarized above in Tables 1 and 2. The general options include:

1. Option 1 is to use general shot rock excavated from the Airport Pit (Ballyhoo) for all core material below the water line and switch to compacted 5-inch minus rock fill 1-foot above mean sea level (MSL). Use Ugadaga rock for armoring underlayers, including U2, U1, W1, and W2 layers. Use Cor-Loc for outer armoring layer.
2. Option 2 would be to use general shot rock from the existing South America Pit (not Arch Rock) for the underwater core and compacted 5-inch minus Airport Pit (Ballyhoo) rock for above water core. The armoring layers would be the same as Option 1.
3. Option 3 would use all Ugadaga rock for core above and below water level, as well as for the armoring layers as in Option 1.

Other options exist for using rock from the South America Pit or Shaishnikoff Pit as part of the underlayment for armor layers. This rock may not be quite as durable as Ugadaga rock, but would still likely be a reasonable source for a portion of the underlayment. The Shaishnikoff Pit does not seem to have any advantage as far as rock quality over the southeast South America Pit and, in fact, is much further away and the haul must pass through privately owned property (OSI). It does offer a competitive pit for bidding purpose and, therefore, would not be eliminated from consideration. For purposes of our estimating cost, however, other pits are closer and probably less costly.

Settlement will occur with any of the above rockfill options because of the non-compacted placement of dumped rockfill underwater. It is likely that Option 1 using local Ballyhoo rock could have total settlement that is slightly greater than if Ugadaga rock is used as a result of breakdown of individual rock particles versus merely shifting of rock particles. However, time will be required to allow settlement of the underwater fill with any of the options. It is recommended that the underwater and above water rockfill placement be completed, as well as placement of the armoring as an initial contract. This includes the runway side and both the north and south end extensions. The surface should be filled to subgrade elevations in areas to be paved and other areas should be filled to final grade. Monitoring points should be established as soon as possible following placement of the rock fill and survey methods used to monitor the settlement with time. The rock fill should be left in place with periodic monitoring (twice a month initially, then 1- to 2-month intervals thereafter) for a minimum of approximately 2 years, as required, to assure that the majority of settlement has ceased. A second contract can be awarded to complete the paving, electrical, drainage, utilities, and other work to finish the project following this period.

6.2 Other Construction Considerations

Barge delivery of fill materials to the site may be an option. To be economical, however, an efficient means of loading the barges is required and the dumping depth is limited to minimum water depths of approximately 15 feet. In shallower water, the rock would probably be placed by barge mounted crane, and the delivered rock could be expected to be more expensive to place into the fill. By comparison, large dump vehicles on land could more efficiently deliver the rock in the shallower zones of the fill.

Our understanding is that the design waves (based on a 100-year return period) may be as large as 28 feet in the areas where the north extension is exposed to the sea. This condition, and the exposed marine setting, sets the stage for difficult construction. Contractors will be reluctant to operate barges in this exposed environment, and, therefore, the window for construction will likely be severely limited as a result of weather and waves. It would be difficult to control the barge in anything other than very calm water, and attempting to bring the barge into the fill placement area if the area is exposed would be difficult to impossible. Contractors would also be reluctant to put a barge next to a floating crane, or to try to tie a barge down in anything but calm conditions. So, to place armor stone the contractors would likely unload in a protected area and then haul armor stone to the site using trucks.

The embankment would be constructed in approximately 30 or 40 feet of water with 1.5H:1V slopes. To place rocks, contractors would set a crane (Manitowoc 4600 ringer crane) on the fill as close to the edge of water (vertically) as possible, as required to lift the large stones and Core-Loc® units from 60 to 80 feet away and place them on the underwater slopes. The crane will have to be moved outside of the runway object-free area during daylight hours each day to reopen the airport for operations (landing and take-off).

6.3 Rock Hauling Considerations

The rock from the Ugadaga Pit will have to be hauled on street-legal trucks through the City of Unalaska, past school zones, over the newly paved roads in Unalaska, through the Dutch Harbor community and its paved roads, and over two bridges to get to the airport.

The rock hauled from Shaishnikoff's Pit would avoid the City of Unalaska and one bridge, as well as the paved roads and schools in those areas, but would still have to be hauled in street-legal trucks over one bridge, through Dutch Harbor and its paved roads to get to the airport.

The rock hauled from Southeast South America Pit would avoid both bridges, City of Unalaska and its paved roads and schools. However, it would still have to be hauled through Dutch Harbor over paved roads to the airport using street-legal trucks.

The rock from Ballyhoo at the airport could use off-road rock trucks, avoid all the local impacts other than some impacts to the airport (but these would likely occur with any of the rock sources used). The haul would be only the short haul from excavation to nearby placement on the runway. The excavated rock would be more fully utilized in the work without additional offsite wasting of excess material.

6.4 Sources of Armor Stone

Adequate sources of large armor rock (at reasonable yields) cannot be found locally. Large armor stone (15 tons and larger) from local sources will be limited to very low yields and questionable durability. Table 3 provides a summary of measurements of armor stone from various sites on Unalaska and Amaknak Islands.

Based on the lack of large armor stone locally, prefabricated concrete armor units (e.g., Dolos or Core-Locs®) appear to be the only choice for armor stone. These manufactured concrete structures are heavy, durable, and form interlocking aprons to protect slopes. These have generally been transported from the nearest production sites in Washington State. Dolos and Core-Locs® have been used successfully at the Unalaska Airport for slope protection and breakwater construction.

TABLE 3
Measured Rock Sizes from Variety of Sources at Unalaska

G Warren and K Green
10 April 2007 through 13 April 2007

Largest Stones Found on Arch Point Beach

Exposure to north wind and generally 5:1 beaches with 1 rock deep
2 to 6 inches cobble size beach gravel and rocks on base around larger rocks
Relatively soft rock to medium hard rock, andesite and breccia

Size (ft)			Vol (cf)	Wt (lb)	Wt (tons)
11	9	4	396	65,340	32.7
8	7	3.5	196	32,340	16.2
6	5	4	120	19,800	9.9

Largest Stones Found on Hillside of Test Blast at Arch Point

Andesite Dike, hard durable material with factures

Size (ft)			Vol (cf)	Wt (lb)	Wt (tons)
3	4	2	24	3,960	2.0
2.5	6	1.5	22.5	3,713	1.9
5	7	2	70	11,550	5.8
7	7	1.8	88.2	14,553	7.3
6	5	3	90	14,850	7.4
5	2.5	1.8	22.5	3,713	1.9

Largest Stones Found on Embankment Fill at Northeast End of Airport

Average size rocks much smaller, 1 rock deep with cobble underlayers
Rock is local granodiorite from Ugadaga Pit, rhyolite, and other soft rock of Unalaska Formation
Some rocks showing signs of severe degradation

Size (ft)			Vol (cf)	Wt (lb)	Wt (tons)
5	5	11	275	45,375	22.7
8	4	5.5	176	29,040	14.5
3	5	3	45	7,425	3.7
4.5	4.5	3.5	70.875	11,694	5.8

TABLE 3 Measured Rock Sizes from Variety of Sources at Unalaska					
7	5	4	140	23,100	11.6
8.5	5	3	127.5	21,038	10.5
1	3	2	6	990	0.5
7	11	6	462	76,230	38.1

Largest Stones Used for Existing Underlayment under Dolos, North End of Airport

Rock from Ugadaga Pit, good durable granodiorite rock generally, few fractures in rocks

Size (ft)			Vol (cf)	Wt (lb)	Wt (tons)
3	2	3	18	2,970	1.5
3	4	3.5	42	6,930	3.5
2.5	3	2	15	2,475	1.2
3	4	3	36	5,940	3.0

Measurement of Several of the Largest Rocks Sorted Out at Ugadaga Pit

Hard granodiorite, but many stones have factures through middle of measured sizes

Green colored rocks hard but generally more fractured

Size (ft)			Vol (cf)	Wt (lb)	Wt (tons)
5	3.5	6	105	17,325	8.7
3.5	4.5	3	47.25	7,796	3.9
4.5	7	4	126	20,790	10.4

7.0 Project Issues and Ideas

7.1 Advantages of Use of Rockfill Material Developed from Hillside Cuts at the Airport

Use of materials from the airport rock excavation to construct proposed underwater fill and embankments is advantageous because of the cost savings associated with re-use of the required excavation. The advantages offer several benefits:

- Development of airport improvements will require excavation to develop greater clearances for aircraft. This excavated material must be hauled to a suitable disposal site.
- Excavation will also be required to provide access along the east side of the airport for a road to private property along the beach, northwest of the airport.
- Use of the rock for embankment fill should avoid a significant cost associated with hauling and payment for a suitable location for disposal of the material as waste excavation.

- Use of the material avoids traffic congestion and road maintenance associated with hauling waste material, as well as hauling suitable new rockfill to and from the airport from alternate sources. It avoids safety issues of hauling large quantities of rock through town and school safety zones.
- The work can be performed by larger, off-road construction equipment that is more suitable for rock hauling work.
- The work can be completed more efficiently since the source of the excavated rock is very close to the area of embankment placement.
- May avoid payment of royalties if the excavation is part of required work on airport-owned land.

7.2 Salvage of Existing Dolos, Cor-Loc® Units, and Armor Stone

Salvage of the existing Dolos and Cor-Loc® units should be considered as the development of design is advanced. The existing shore protection units are generally in good shape and easily accessible for salvage. The size and suitability of the existing units should be evaluated as it relates to the design of the final slope and consideration for which areas would be most suitable for re-use of the existing shore protection units.

In most locations, access is available to easily install slings for lifting the units from the slopes. It is possible that shore improvements could be developed in segments along the shoreline. In this manner, re-handling and storage of armoring could be minimized. With this method it may be possible to initially remove armoring along a selected length (say 200 feet) of shoreline and temporarily stockpile the material somewhere onsite for re-use. At this point, this segment of shoreline could be widened and regraded as needed. Next, the adjacent segment of shore would be selected for removal of armoring and regrading. The armoring could then be directly installed from the adjacent area and re-installed on the first regraded segment of shoreline. The work would proceed in this manner until the entire length is regraded and restored. Additional armoring would be required to supplement the existing units as required. Re-use of the existing Dolos and Cor-Loc® armor units would not only reduce the cost of production and shipping of new units, but would also reduce the need to temporarily store onsite and handle and transport new units.

The existing stone armoring on the slopes appears to be in good condition. Most of the armor stone appears to have originated from the better Ugadaga quarry and is of a size that may typically be required for the new design. This stone has been in use for several years and has withstood the test of time and weathering in the environment. Use of the existing stone, which is readily available on the existing slopes at the airport, avoids development and production of and purchasing new quarry stone. This avoids or reduces the purchase and royalty costs of new stone, as well as hauling through congested areas and wear and tear on streets for the quantity of available stone that presently exists at the site that can be salvaged.

7.3 Use of the Existing City Dock

The existing city dock (located several thousand feet west of the airport along Ballyhoo Road) was used for off-loading the Cor-Loc® units during the last construction period at the airport. The city dock was constructed with cellular cofferdam cells and is capable of heavy loaders and other equipment that would be necessary for handling the large Cor-Loc® units. The city dock is also located close to the airport.

7.4 Potential Waste Areas

Discussion with a local contractor and long-time residents indicate that finding a suitable waste area for unwanted soils and rock will be costly and difficult. There could be significant resistance to filling and regrading in most areas and native corporation approval would likely be required since most land is owned by native corporations. For this reason, it will be most advantageous to utilize the material in the improvements to the extent practicable and identify portions of the site for waste disposal if possible.

7.5 Sequencing of Construction Work and Consideration of Settlement of Proposed Embankments

Proposed embankments will settle regardless of the type or source of rock used for the fill. The underwater portions will be placed without the aid of any compaction other than weight of the overlying rock fill. Some long-term degradation of rocks could occur. Therefore, it is recommended that the new embankment fills be initially completed to the full embankment height and then immediately be monumented for monitoring of settlements with time. It is expected most settlement will occur almost immediately upon placement of the overlying fill, prior to establishing settlement monumentation on the embankments. But continued settlement will occur at a decaying rate with time. The settlement should be periodically monitored and recorded. Time plots should indicate when the embankment becomes stabilized or near stabilized.

The underwater portion of the fill should be constructed to slightly above sea level and then thoroughly compacted and graded. It may be advisable to place a heavy geotextile fabric at this level for separation of the overlying fill. The overlying fill should be screened and/or crushed to provide much finer material than the underwater rock fill. The above water fill should consist of (4- or 5-inch minus) rock and waste fill material so that it can be placed in 8- to 12-inch horizontal lifts and each lift then thoroughly compacted using large vibratory equipment. In this manner, settlement of the above water portion of the fill should be negligible. The above water fill should also act as a stiff, thick layer that would be expected to widely distribute any settlement that continues to occur in the underwater rock fill. This should minimize the affects of differential settlement at the ground surface and might be expected to result in a more general settlement that could be more or less uniform throughout the area of the monumented finished grade. It is expected that the embankment should be constructed and monitored for a minimum period of 1 to 2 years prior to completion of final grading, utilities, and paving of the runway. Settlement monitoring should be used to confirm a stable condition prior to completion of the paving work.

Breaking the work in this manner also allows the majority of the earthwork, including site grading, excavations, and embankment construction, as well as armoring of slopes, to be conducted by an earth moving contractor. The project can then be completed by utility and paving specialty contractors who are most likely to bid on just this portion of the work.

Attachment H-1

Table 1 – Summary of Rock Durability Test Results

Table 1: Summary of Rock Durability Test Results, Unalaska Airport Master Plan Update

Quarry Site (Reference)		Rock Description	Estimated Size Fraction	Degradation	Sodium Sulfate Soundness (% Loss) [ASTM C88-76]	Specific Gravity and Absorption (%) [ASTM C127-77]	Freeze/ Thaw (Avg. % Loss) [AASHTO T103-78]	Los Angeles Abrasion [ASTM C131] % Loss 100 Rev	% Loss 200 Rev	% Loss 500 Rev	% Loss 1000 Rev	Ethylene Glycol/Accelerated Expansion [CRD-C 148-69]
Specification Limits and Reference:				30 min (ADOT)	10% max (<5% COE) 9% max (ADOT)	2.56; 3% max (<1% COE)	10% max (100 cycles) (<10% for 12 cycles COE)	??	??	30% max (<30%/500 revs COE)		No significant breakup (??)
Arch Rock (Appx. D, L. L. Morrison in Dames & Moore, 1980)		Andesite, Volcanic Breccia, Basalt	5% >16 to 24 ton, 15% 7 to 15 ton, 45% 1 to 6 ton, 35% <1 ton		3.9	2.69, 1.1 2.49, 2.8 2.28, 5.2	0.5 2.7 1.3			16.6 26.8		No significant breakup
Airport Pit	(CH2M HILL, 2007)	Andesite, rhyolite, volcanic breccia	2-inch to 1-foot	5	23	2.69; 4.2	In progress			28		0
	(ADOT, 2002)	Volcanic/Sedimentary Andesite	2-inch to 3-ft	3	81 (coarse) 18 (fine)			67				
South America Pit	(CH2M HILL, 2007)	Andesite, Volcanic Breccia,	6-inch to 3-foot	8	5	2.71; 4.0	In progress		20			12.3
	(ADOT, 2002)	Volcanic (Unalaska Fm.) (1-inch minus stockpile)Volcanic (Unalaska Fm.) (proposed quarry)	2-inch to 3-ft	3 6	7 (coarse) 2 (fine) 6 (coarse) 3 (fine)			14 25				
Upper Ugadaga Pit (ADOT, 2002)		Very Sl. to Sl. Wx. Biotite Granodiorite	2-inch to 3-ft	77 – 85	0 -4 (coarse) 1 – 2 (fine)	2.64 – 2.72; 0.2 – 0.8			4 - 8	9 – 19		
Lower Ugadaga Pit	(CH2M HILL, 2007)	Granodiorite	< 3 ton	73	1	2.7; 1.5	In progress			18		0.1
	(ADOT, 2002)	Very Sl. to Sl. Wx. Granodiorite	2-inch to 3-ft	41	3 (coarse) 2 (fine)			20				
OSI Pit (ADOT, 2002)		Volcanics (Unalaska Fm.)	2-inch to 3-ft	67	0 (coarse)	2.68; 1			4		15	
Shaishnikoff Pit (ADOT, 2002)		Non-weathered volcanic wacke Weathered volcanic wacke	<2-inch to 2-ft	15	0 (coarse)	2,47; 3.1			8		19	

Table 1: Summary of Rock Durability Test Results, Unalaska Airport Master Plan Update

Quarry Site (Reference)	Rock Description	Estimated Size Fraction	Degradation	Sodium Sulfate Soundness (% Loss) [ASTM C88-76]	Specific Gravity and Absorption (%) [ASTM C127-77]	Freeze/ Thaw (Avg. % Loss) [AASHTO T103-78]	Los Angeles Abrasion [ASTM C131]				Ethylene Glycol/Accelerated Expansion [CRD-C 148-69]
							% Loss 100 Rev	% Loss 200 Rev	% Loss 500 Rev	% Loss 1000 Rev	

Notes:

COE reference is EM 1110-2-2302 “Construction with Large Stone”

Yellow Highlight indicates FAILING test result

Attachment H-2
Figure 1 – Quarry Site Map

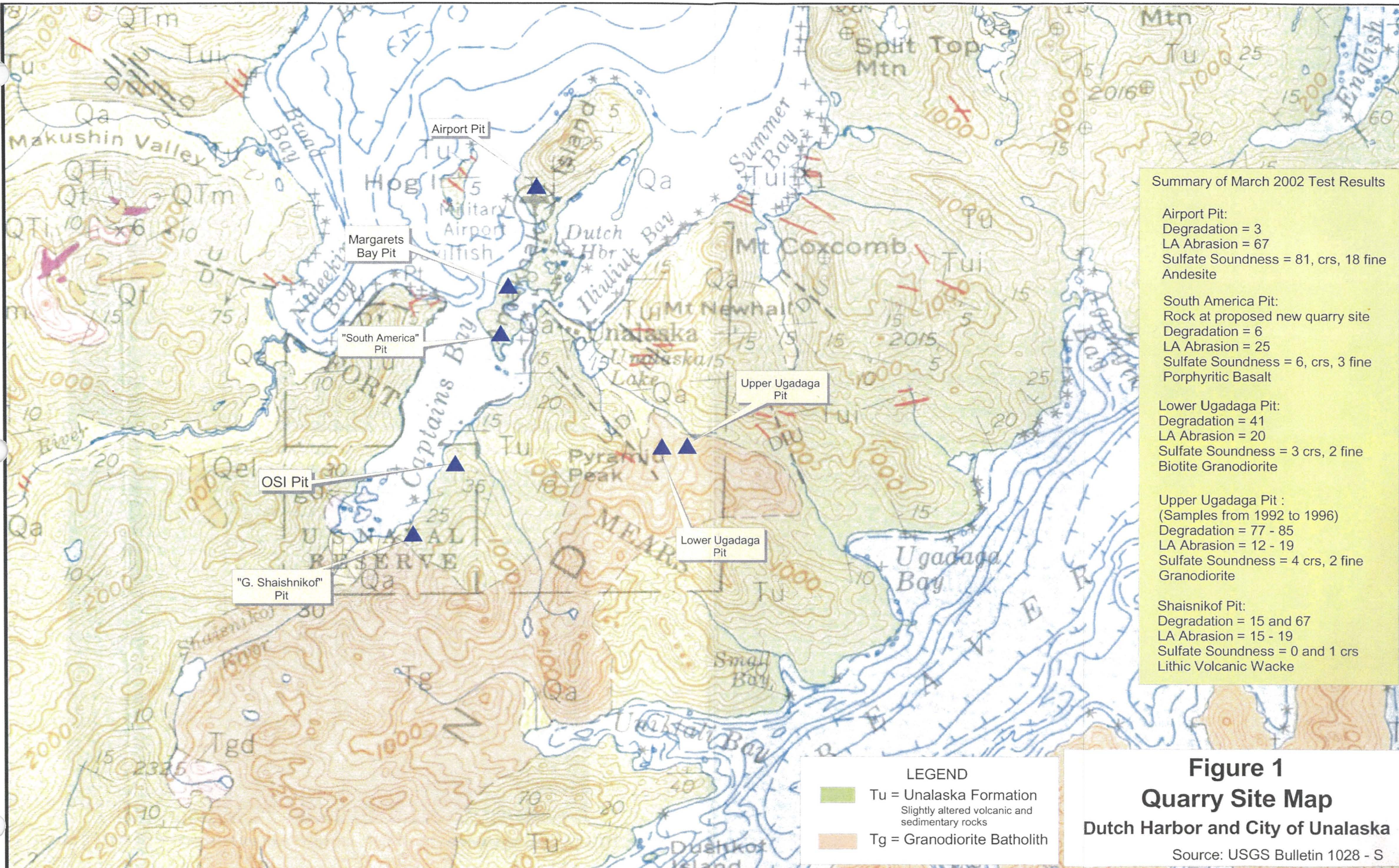
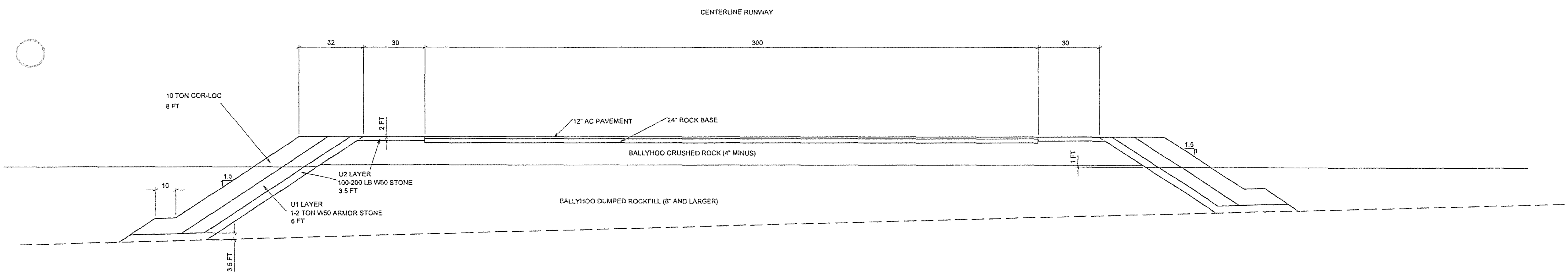


Figure 1
Quarry Site Map
Dutch Harbor and City of Unalaska
Source: USGS Bulletin 1028 - S

Attachment H-3
Figure 2 – Typical Cross Section at North End

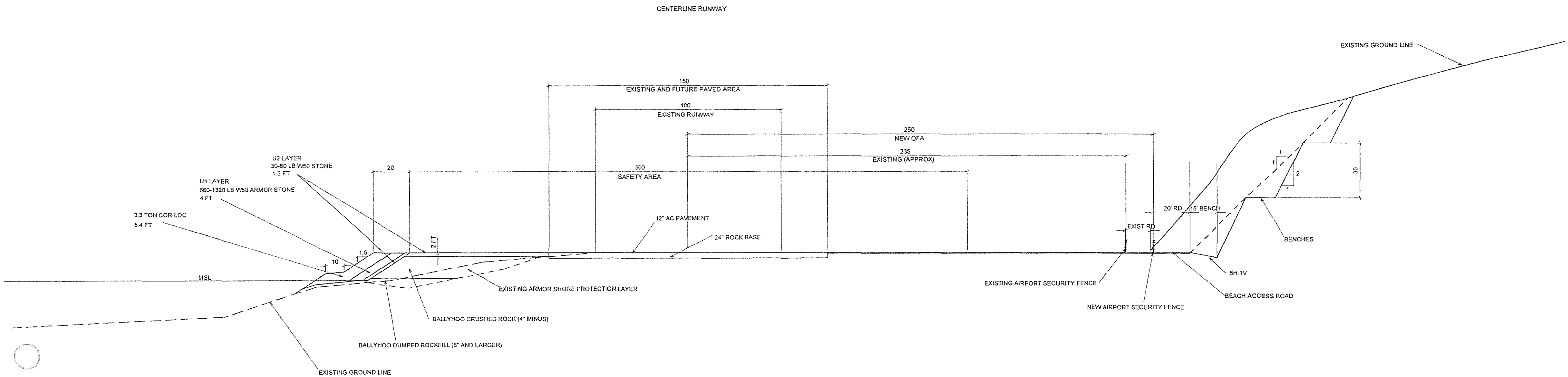


TYPICAL CROSS SECTION AT NORTH END

1"=50FT

FIGURE 2

Attachment H-4
Figure 3 – Typical Cross Section at Rock Cut

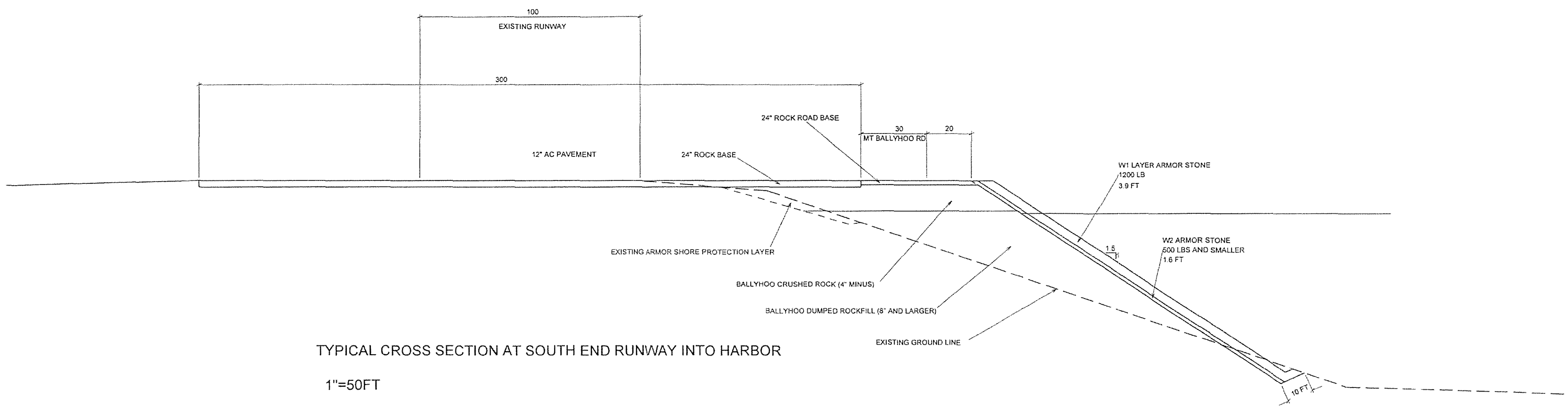


TYPICAL CROSS SECTION AT ROCK CUT

1"=50FT

FIGURE 3

Attachment H-5
Figure 4 – Typical Cross Section at South End Runway into Harbor



TYPICAL CROSS SECTION AT SOUTH END RUNWAY INTO HARBOR

1"=50FT

FIGURE 4

Attachment H-6
Test Results and Standard Test Methods

ALASKA TESTLAB
A Division of DOWL LLC

May 29, 2007
W.O. #A31830

Ms. Ellen Green
Green Engineering
6543 Brayton Drive, Suite B
Anchorage, AK 99507

Project: Unalaska Suitability Testing

Dear Ms. Green:

Alaska TestLab has completed the testing you requested as follows: Specific Gravity, Freeze/Thaw, Soundness of Aggregate by use of Sodium Sulfate, Los Angeles Abrasion, Degradation of Aggregates, and Ethylene Glycol. The results are listed in the table below:

ATL Lab No.	Location	Date Received	Test Method	Results
323	BallyHoo	4/20/07	Specific Gravity and Absorption of Coarse Aggregate ASTM C127	Bulk Specific Gravity (BSG) =2.416 Bulk Specific Gravity (SSD) =2.516 Apparent Specific Gravity =2.685 Absorption =4.2%
323	BallyHoo	4/20/07	Los Angeles Abrasion ASTM C535	Loss =28 %
323	BallyHoo	4/20/07	Freeze/Thaw NPD Method	In Process
323	BallyHoo	4/20/07	Degradation Of Aggregates ATM T-13	Deg Value = 5
323	BallyHoo	4/20/07	Soundness of Aggregate by Sodium Sulfate ASTM C88	Loss = 23%
323	BallyHoo	4/20/07	Ethylene Glycol CRD-C 148-69	Loss = 0%

All test results will be posted to the ATL website for your access. If you have any questions regarding this report or if we can be of further service please call.

Sincerely,

ALASKA TESTLAB

David L. Andersen, P.E.
Senior Materials Engineer

ALASKA
TESTLAB
A Division of DOWL LLC

May 29, 2007
W.O. #A31830

Ms. Ellen Green
Green Engineering
6543 Brayton Drive, Suite B
Anchorage, AK 99507

Project: Unalaska Suitability Testing

Dear Ms. Green:

Alaska TestLab has completed the testing you requested as follows: Specific Gravity, Freeze/Thaw, Soundness of Aggregate by use of Sodium Sulfate, Los Angeles Abrasion, Degradation of Aggregates, and Ethylene Glycol. The results are listed in the table below:

ATL Lab No.	Location	Date Received	Test Method	Results
324	Ugadega	4/20/07	Specific Gravity and Absorption of Coarse Aggregate ASTM C127	Bulk Specific Gravity (BSG) =2.595 Bulk Specific Gravity (SSD) =2.633 Apparent Specific Gravity =2.697 Absorption =1.5%
324	Ugadega	4/20/07	Los Angeles Abrasion ASTM C535	Loss =18 %
324	Ugadega	4/20/07	Freeze/Thaw NPD Method	In Process
324	Ugadega	4/20/07	Degradation Of Aggregates ATM T-13	Deg Value = 73
324	Ugadega	4/20/07	Soundness of Aggregate by Sodium Sulfate ASTM C88	Loss = 1%
324	Ugadega	4/20/07	Ethylene Glycol CRD-C 148-69	Loss = 0.1%

All test results will be posted to the ATL website for your access. If you have any questions regarding this report or if we can be of further service please call.

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ATL Lab No.	Location	Date Received	Test Method	Results
325	LSA	4/20/07	Specific Gravity and Absorption of Coarse Aggregate ASTM C127	Bulk Specific Gravity (BSG) =2.441 Bulk Specific Gravity (SSD) =2.539 Apparent Specific Gravity =2.706 Absorption = 4.0%
325	LSA	4/20/07	Los Angeles Abrasion ASTM C535	Loss =20 %
325	LSA	4/20/07	Freeze/Thaw NPD Method	In Process
325	LSA	4/20/07	Degradation Of Aggregates ATM T-13	Deg Value = 8
325	LSA	4/20/07	Soundness of Aggregate by Sodium Sulfate ASTM C88	Loss = 5%
325	LSA	4/20/07	Ethylene Glycol CRD-C 148-69	Loss = 12.3%

All test results will be posted to the ATL website for your access. If you have any questions regarding this report or if we can be of further service please call.

Sincerely,
ALASKA TESTLAB

David L. Andersen, P.E.
Senior Materials Engineer

Designation: C 88 – 05

Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate[1]

This standard is issued under the fixed designation C 88; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method covers the testing of aggregates to estimate their soundness when subjected to weathering action in concrete or other applications. This is accomplished by repeated immersion in saturated solutions of sodium or magnesium sulfate followed by oven drying to partially or completely dehydrate the salt precipitated in permeable pore spaces. The internal expansive force, derived from the rehydration of the salt upon re-immersion, simulates the expansion of water on freezing. This test method furnishes information helpful in judging the soundness of aggregates when adequate information is not available from service records of the material exposed to actual weathering conditions.

1.2 The values given in parentheses are provided for information purposes only.

1.3 *This standard does not purport to address the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:* [2]

C 33 Specification for Concrete Aggregates

C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates

C 670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

C 702 Practice for Reducing Samples of Aggregate to Testing Size

D 75 Practice for Sampling Aggregates

E 11 Specification for Wire Cloth Sieves for Testing Purposes

E 100 Specification for ASTM Hydrometers

E 323 Specification for Perforated-Plate Sieves for Testing Purposes

3. Significance and Use

3.1 This test method provides a procedure for making a preliminary estimate of the soundness of aggregates for use in concrete and other purposes. The values obtained may be compared with specifications, for example Specification C 33, that are designed to indicate the suitability of aggregate proposed for use. Since the precision of this test method is poor (Section 12), it may not be suitable for outright rejection of aggregates without confirmation from other tests more closely related to the specific service intended.

3.2 Values for the permitted-loss percentage by this test method are usually different for fine and coarse aggregates, and attention is called to the fact that test results by use of the two salts differ considerably and care must be exercised in fixing proper limits in any specifications that include requirements for these tests. The test is usually more severe when magnesium sulfate is used; accordingly, limits for percent loss allowed when magnesium sulfate is used are normally higher than limits when sodium sulfate is used.

NOTE 1—Refer to the appropriate sections in Specification C 33 establishing conditions for acceptance of coarse and fine aggregates which fail to meet requirements based on this test.

4. Apparatus

4.1 *Sieves*—With square openings of the following sizes conforming to Specifications E 11 or E 323, for sieving the samples in accordance with Sections 6, 7, and 9:

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[1] This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.20 on Normal Weight Aggregates.

Current edition approved July 15, 2005. Published August 2005. Originally approved in 1931. Last previous edition approved in 1999 as C 88 – 99a.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

150 μm (No. 100)	8.0 mm (5/16 in.)
	9.5 mm (3/8 in.)
300 μm (No. 50)	12.5 mm (1/2 in.)
	16.0 mm (5/8 in.)
600 μm (No. 30)	19.0 mm (3/4 in.)
	25.0 mm (1 in.)
1.18 mm (No. 16)	31.5 mm (1¼ in.)
2.36 mm (No. 8)	37.5 mm (1½ in.)
	50 mm (2 in.)
4.00 mm (No. 5)	63 mm (2½ in.)
	larger sizes by
4.75 mm (No. 4)	12.5-mm (½-in.)
	spread

4.2 *Containers*—Containers for immersing the samples of aggregate in the solution, in accordance with the procedure described in this test method, shall be perforated in such a manner as to permit free access of the solution to the sample and drainage of the solution from the sample without loss of aggregate.

NOTE 2—Baskets made of suitable wire mesh or sieves with suitable openings are satisfactory containers for the samples.

4.3 *Temperature Regulation*—Suitable means for regulating the temperature of the samples during immersion in the sodium sulfate or magnesium sulfate solution shall be provided.

4.4 *Balances*—For fine aggregate, a balance or scale accurate within 0.1 g over the range required for this test; for coarse aggregate, a balance or scale accurate within 0.1 % or 1 g, whichever is greater, over the range required for this test.

4.5 *Drying Oven*—The oven shall be capable of being heated continuously at 230 ± 9 °F (110 ± 5 °C) and the rate of evaporation, at this range of temperature, shall be at least 25 g/h for 4 h, during which period the doors of the oven shall be kept closed. This rate shall be determined by the loss of water from 1-L Griffin low-form beakers, each initially containing 500 g of water at a temperature of 70 ± 3 °F (21 ± 2 °C), placed at each corner and the center of each shelf of the oven. The evaporation requirement is to apply to all test locations when the oven is empty except for the beakers of water.

4.6 *Specific Gravity Measurement*—Hydrometers conforming to the requirements of Specification E 100, or a suitable combination of graduated glassware and balance, capable of measuring the solution specific gravity within ±0.001.

5. Special Solutions Required

5.1 Prepare the solution for immersion of test samples from either sodium or magnesium sulfate in accordance with 5.1.1 or 5.1.2 (Note 3). The volume of the solution shall be at least five times the solid volume of all samples immersed at any one time.

NOTE 3—Some aggregates containing carbonates of calcium or magnesium are attacked chemically by fresh sulfate solution, resulting in erroneously high measured losses. If this condition is encountered or is suspected, repeat the test using a filtered solution that has been used previously to test the same type of carbonate rock, provided that the solution meets the requirements of 5.1.1 and 5.1.2 for specific gravity.

5.1.1 *Sodium Sulfate Solution*—Prepare a saturated solution of sodium sulfate by dissolving a USP or equal grade of the salt in water at a temperature of 77 to 86 °F (25 to 30 °C). Add sufficient salt (Note 4), of either the anhydrous (Na_2SO_4) or the crystalline ($Na_2SO_4 \cdot 10H_2O$) form,[3] to ensure not only saturation but also the presence of excess crystals when the solution is ready for use in the tests. Thoroughly stir the mixture during the addition of the salt and stir the solution at frequent intervals until used. To reduce evaporation and prevent contamination, keep the solution covered at all times when access is not needed. Allow the solution to cool to 70 ± 2 °F (21 ± 1 °C). Again stir, and allow the solution to remain at the designated temperature for at least 48 h before use. Prior to each use, break up the salt cake, if any, in the container, stir the solution thoroughly, and determine the specific gravity of the solution. When used, the solution shall have a specific gravity not less than 1.151 nor more than 1.174. Discard a discolored solution, or filter it and check for specific gravity.

NOTE 4—For the solution, 215 g of anhydrous salt or 700 g of the decahydrate per litre of water are sufficient for saturation at 71.6 °F (22 °C). However, since these salts are not completely stable and since it is desirable that an excess of crystals be present, the use of not less than 350 g of the anhydrous salt or 750 g of the decahydrate salt per litre of water is recommended.

5.1.2 *Magnesium Sulfate Solution*—Prepare a saturated solution of magnesium sulfate by dissolving a USP or equal grade of the salt in water at a temperature of 77 to 86 °F (25 to 30 °C). Add sufficient salt (Note 5), of either the anhydrous ($MgSO_4$) or the crystalline ($MgSO_4 \cdot 7H_2O$) (Epsom salt) form, to ensure saturation and the presence of excess crystals when the solution is ready for use in the tests. Thoroughly stir the mixture during the addition of the salt and stir the solution at frequent intervals until used. To reduce evaporation and prevent contamination, keep the solution covered at all times when access is not needed. Allow the solution to cool to 70 ± 2 °F (21 ± 1 °C). Again stir, and allow the solution to remain at the designated temperature for at least 48 h before use. Prior to each use, break up the salt cake, if any, in the container, stir the solution thoroughly, and determine the specific gravity of the solution. When used, the solution shall have a specific gravity not less than 1.295 nor more than 1.308. Discard a discolored solution, or filter it and check for specific gravity.

NOTE 5—For the solution, 350 g of anhydrous salt or 1230 g of the heptahydrate per litre of water are sufficient for saturation at 73.4 °F (23 °C). However, since these salts are not completely stable, with the hydrous salt being the more stable of the two, and since it is desirable that an excess of crystals be present, it is recommended that the heptahydrate salt be used and in an amount of not less than 1400 g/litre of water.

5.1.3 *Barium Chloride Solution*—Prepare 100 mL of 5 % barium chloride solution by dissolving 5 g of $BaCl_2$ in 100 mL of distilled water.

6. Samples

6.1 The sample shall be obtained in general accordance with Practice D 75 and reduced to test portion size in accordance with Practice C 702.

[3] Experience with the test method indicates that a grade of sodium sulfate designated by the trade as dried powder, which may be considered as approximately anhydrous, is the most practical for use. That grade is more economically available than the anhydrous form. The decahydrate sodium sulfate presents difficulties in compounding the required solution on account of its cooling effect on the solution.

6.2 *Fine Aggregate*—Fine aggregate for the test shall be passed through a 9.5-mm (3⁄8-in.) sieve. The sample shall be of such size that it will yield not less than 100 g of each of the following sizes, which shall be available in amounts of 5 % or more, expressed in terms of the following sieves:

Passing Sieve	Retained on Sieve
600 µm (No. 30)	300 µm (No. 50)
1.18 mm (No. 16)	600 µm (No. 30)
2.36 mm (No. 8)	1.18 mm (No. 16)
4.75 mm (No. 4)	2.36 mm (No. 8)
9.5 mm (3⁄8 in.)	4.75 mm (No. 4)

6.3 *Coarse Aggregate*—Coarse aggregate for the test shall consist of material from which the sizes finer than the No. 4 sieve have been removed. The sample shall be of such a size that it will yield the following amounts of the indicated sizes that are available in amounts of 5 % or more:

Size (Square-Opening Sieves)	Mass, g
9.5 mm (3⁄8 in.) to 4.75 mm (No. 4)	300 ± 5
19.0 mm (3⁄4 in.) to 9.5 mm (3⁄8 in.)	1000 ± 10
Consisting of:	
12.5-mm (1⁄2-in.) to 9.5-mm (3⁄8-in.) material	330 ± 5
19.0-mm (3⁄4-in.) to 12.5-mm (1⁄2-in.) material	670 ± 10
37.5-mm (1 1⁄2-in.) to 19.0-mm (3⁄4 in.)	1500 ± 50
Consisting of:	
25.0-mm (1-in.) to 19.0-mm (3⁄4-in.) material	500 ± 30
37.5-mm (1 1⁄2-in.) to 25.0-mm (1-in.) material	1000 ± 50
63-mm (2 1⁄2 in.) to 37.5-mm (1 1⁄2 in.)	5000 ± 300
Consisting of:	
50-mm (2 in.) to 37.5-mm (1 1⁄2-in.) material	2000 ± 200
63-mm (2 1⁄2-in.) to 50-mm (2-in.) material	3000 ± 300
Larger sizes by nominal 12.5-mm (1⁄2-in.) spread in sieve size, each fraction	
Consisting of:	
75-mm (3-in.) to 63-mm (2 1⁄2-in.) material	7000 ± 1000
90-mm (3 1⁄2-in.) to 75-mm (3-in.) material	7000 ± 1000
100-mm (4-in.) to 90-mm (3 1⁄2-in.) material	7000 ± 1000

6.4 When an aggregate to be tested contains appreciable amounts of both fine and coarse material, having a grading with more than 10 weight % coarser than the 9.5-mm (3⁄8-in.) sieve and, also, more than 10 weight % finer than the 4.75-mm (No. 4) sieve, test separate samples of the minus No. 4 fraction and the plus No. 4 fraction in accordance with the procedures for fine aggregate and coarse aggregate, respectively. Report the results separately for the fine-aggregate fraction and the coarse-aggregate fraction, giving the percentages of the coarse- and fine-size fractions in the initial grading.

7. Preparation of Test Sample

7.1 *Fine Aggregate*—Thoroughly wash the sample of fine aggregate on a 300-µm (No. 50) sieve, dry to constant weight at 230 ± 9 °F (110 ± 5 °C), and separate into the different sizes by sieving, as follows: Make a rough separation of the graded sample by means of a nest of the standard sieves specified in 6.2. From the fractions obtained in this manner, select samples of sufficient size to yield 100 g after sieving to refusal. (In general, a 110-g sample will be sufficient.) Do not use fine aggregate sticking in the meshes of the sieves in preparing the samples. Weigh samples consisting of 100 ± 0.1 g out of each of the separated fractions after final sieving and place in separate containers for the test.

7.2 *Coarse Aggregate*—Thoroughly wash and dry the sample of coarse aggregate to constant weight at 230 ± 9 °F (110 ± 5 °C) and separate it into the different sizes shown in 6.3 by sieving to refusal. Weigh out quantities of the different sizes within the tolerances of 6.3 and, where the test portion consists of two sizes, combine them to the designated total weight. Record the weights of the test samples and their fractional components. In the case of sizes larger than 19.0 mm (3⁄4 in.), record the number of particles in the test samples.

8. Procedure

8.1 *Storage of Samples in Solution*—Immerse the samples in the prepared solution of sodium sulfate or magnesium sulfate for not less than 16 h nor more than 18 h in such a manner that the solution covers them to a depth of at least 1⁄2 in. (Note 6). Cover the containers to reduce evaporation and prevent the accidental addition of extraneous substances. Maintain the samples immersed in the solution at a temperature of 70 ± 2 °F (21 ± 1 °C) for the immersion period.

NOTE 6—Suitably weighted wire grids placed over the sample in the containers will permit this coverage to be achieved with very lightweight aggregates.

8.2 *Drying Samples After Immersion*—After the immersion period, remove the aggregate sample from the solution, permit it to drain for 15 ± 5 min, and place in the drying oven. The temperature of the oven shall have been brought previously to 230 ± 9 °F (110 ± 5 °C). Dry the samples at the specified temperature until constant weight has been achieved. Establish the time required to attain constant weight as follows: with the oven containing the maximum sample load expected, check the weight losses of test samples by removing and weighing them, without cooling, at intervals of 2 to 4 h; make enough checks to establish required drying time for the least favorable oven location (see 4.5) and sample condition (Note 7). Constant weight will be considered to have been achieved when weight loss is less than 0.1 % of sample weight in 4 h of drying. After constant weight has been achieved, allow the samples to cool to room temperature, when they shall again be immersed in the prepared solution as described in 8.1.

NOTE 7—Drying time required to reach constant weight may vary considerably for several reasons. Efficiency of drying will be reduced as cycles accumulate because of salt adhering to particles and, in some cases, because of increase in surface area due to breakdown. The different size fractions of aggregate will have differing drying rates. The smaller sizes will tend to dry more slowly because of their larger surface area and restricted interparticle voids, but this tendency may be altered by the effects of container size and shape.

8.3 *Number of Cycles*—Repeat the process of alternate immersion and drying until the required number of cycles is obtained.

8.4 After the completion of the final cycle and after the sample has cooled, wash the sample free from the sodium sulfate or magnesium sulfate as determined by the reaction of the wash water with barium chloride ($BaCl_2$). Wash by circulating water at 110 ± 10 °F (43 ± 6 °C) through the samples in their containers. This may be done by placing them in a tank into which the hot water can be introduced near the bottom and allowed to overflow. In the washing operation, the samples shall not be subjected to impact or abrasion that may tend to break up particles.

NOTE 8—Tap water containing sulfates when used for the wash water will cloud when tested with the barium chloride solution. The cloudiness of a solution of tap water and the barium chloride solution should be judged so that tested wash water with the same degree of cloudiness can be assumed to be free of sulfates from the test.

9. Quantitative Examination

9.1 Make the quantitative examination as follows:

9.1.1 After the sodium sulfate or magnesium sulfate has been removed, dry each fraction of the sample to constant weight at 230 ± 9 °F (110 ± 5 °C). Sieve the fine aggregate over the same sieve on which it was retained before the test, and sieve the coarse aggregate over the sieve shown below for the appropriate size of particle. For fine aggregate, the method and duration of sieving shall be the same as were used in preparing the test samples. For coarse aggregate, sieving shall be by hand, with agitation sufficient only to assure that all undersize material passes the designated sieve. No extra manipulation shall be employed to break up particles or cause them to pass the sieves. Weigh the material retained on each sieve and record each amount. The difference between each of these amounts and the initial weight of the fraction of the sample tested is the loss in the test and is to be expressed as a percentage of the initial weight for use in Table 1.

Size of Aggregate	Sieve Used to Determine Loss
100 mm (4 in.) to 90 mm (3 ½ in.)	75 mm (3 in.)
90 mm (3 ½ in.) to 75 mm (3 in.)	63 mm (2 ½ in.)
75 mm (3 in.) to 63 mm (2 ½ in.)	50 mm (2 in.)
63 mm (2 ½ in.) to 37.5 mm (1 ½ in.)	31.5 mm (1 ¼ in.)
37.5 mm (1 ½ in.) to 19.0 mm (¾ in.)	16.0 mm (⅝ in.)
19 mm (¾ in.) to 9.5 mm (⅜ in.)	8.0 mm (5⁄16 in.)
9.5 mm (⅜ in.) to 4.75 mm (No. 4)	4.0 mm (No. 5)

10. Qualitative Examination

10.1 Make a qualitative examination of test samples coarser than 19.0 mm (¾ in.) as follows (Note 9):

10.1.1 Separate the particles of each test sample into groups according to the action produced by the test (Note 9).

10.1.2 Record the number of particles showing each type of distress.

NOTE 9—Many types of action may be expected. In general, they may be classified as disintegration, splitting, crumbling, cracking, flaking, etc. While only particles larger than ¾ in. in size are required to be examined qualitatively, it is recommended that examination of the smaller sizes be made in order to determine whether there is any evidence of excessive splitting.

11. Report

11.1 Report the following data (Note 10):

11.1.1 Weight of each fraction of each sample before test,

11.1.2 Material from each fraction of the sample finer than the sieve designated in 9.1.1 for sieving after test, expressed as a percentage of the original weight of the fraction,

11.1.3 Weighted average calculated in accordance with Test Method C 136 from the percentage of loss for each fraction, based on the grading of the sample as received for examination or, preferably, on the average grading of the material from that portion of the supply of which the sample is representative except that:

11.1.3.1 For fine aggregates (with less than 10 % coarser than the 9.5-mm (⅜-in.) sieve), assume sizes finer than the 300-µm (No. 50) sieve to have 0 % loss and sizes coarser than the 9.5-mm (⅜-in.) sieve to have the same loss as the next smaller size for which test data are available.

11.1.3.2 For coarse aggregate (with less than 10 % finer than the 4.75-mm (No. 4) sieve), assume sizes finer than the 4.75-mm (No. 4) sieve to have the same loss as the next larger size for which test data are available.

11.1.3.3 For an aggregate containing appreciable amounts of both fine and coarse material tested as two separate samples as required in 6.4, compute the weighted average losses

TABLE 1 Suggested Form for Recording Test Data (with Illustrative Test Values)

Sieve Size			Grading of Original Sample, %	Weight of Test Fractions Before Test, g	Percentage Passing Designated Sieve After Test	Weighted Percentage Loss
Soundness Test of Fine Aggregate						
Minus 150 µm (No. 100)			6	...	...	...
300 µm (No. 50) to No. 100			11	...	...	...
600 µm (No. 30) to No. 50			26	100	4.2	1.1
1.18 mm (No. 16) to No. 30			25	100	4.8	1.2
2.36 mm (No. 8) to No. 16			17	100	8.0	1.4
4.75 mm (No. 4) to No. 8			11	100	11.2	1.2
9.5 mm (⅜ in.) to No. 4			4	...	11.2[A]	0.4
Totals			100.0	...	...	5
Soundness Test of Coarse Aggregate						
63 mm (2 ½ in.) to 50 mm (2 in.)	2825 g					
50 mm (2 in.) to 37.5 mm (1 ½ in.)	1958 g }	2 ½ to 1 ½ in.	20	4783	4.8	1.0
37.5 mm (1 ½ in.) to 25.0 mm (1 in.)	1012 g					
25 mm (1 in.) to 19.0 mm (¾ in.)	513 g }	1 ½ to ¾ in.	45	1525	8.0	3.6
19.0 mm (¾ in.) to 12.5 mm (½ in.)	675 g					
12.5 mm (in.) to 9.5 mm (in.)	333 g }	¾ to ⅜ in.	23	1008	9.6	2.2
9.5 mm (⅜ in.) to 4.75 mm (No. 4)	298 g		12	298	11.2	1.3
Totals			100	...	...	8

[A] The percentage loss (11.2 %) of the next smaller size is used as the percentage loss for this size, since this size contains less than 5 % of the original sample as received. See 11.1.3.4.

TABLE 2 Suggested Form for Qualitative Examination (with Illustrative Test Values)

Sieve Size	Qualitative Examination of Coarse Sizes — Particles Exhibiting Distress: Splitting No.	Splitting %	Crumbling No.	Crumbling %	Cracking No.	Cracking %	Flaking No.	Flaking %	Total No. of Particles Before Test
63 mm (2 ½ in.) to 37.5 mm (1 ½ in.)	2	7	...	...	2	7	...	...	29
37.5 mm (1 ½ in.) to 19.0 mm (¾ in.)	5	10	1	2	4	8	...	...	50

separately for the minus No. 4 and plus No. 4 fractions based on recomputed gradings considering the fine fraction as 100 % and the coarse fraction as 100 %. Report the results separately giving the percentage of the minus No. 4 and plus No. 4 material in the initial grading.

11.1.3.4 For the purpose of calculating the weighted average, consider any sizes in 6.2 or 6.3 that contain less than 5 % of the sample to have the same loss as the average of the next smaller and the next larger size, or if one of these sizes is absent, to have the same loss as the next larger or next smaller size, whichever is present.

11.1.4 Report the weighted percentage loss to the nearest whole number.

11.1.5 In the case of particles coarser than 19.0 mm (¾ in.) before test: (*1*) The number of particles in each fraction before test, and (*2*) the number of particles affected, classified as to number disintegrating, splitting, crumbling, cracking, flaking, etc., as shown in Table 2, and

11.1.6 Kind of solution (sodium or magnesium sulfate) and whether the solution was freshly prepared or previously used.

NOTE 10—Table 1, shown with test values inserted for purpose of illustration, is a suggested form for recording test data. The test values shown might be appropriate for either salt, depending on the quality of the aggregate.

12. Precision

12.1 *Precision*—For coarse aggregate with weighted average sulfate soundness losses in the ranges of 6 to 16 % for sodium and 9 to 20 % for magnesium, the precision indexes are as follows:

	Coefficient of Variation (1S %), %[A]	Difference Between Two Tests (D2S %), % of Average[A]
Multilaboratory:		
Sodium sulfate	41	116
Magnesium sulfate	25	71
Single-Operator:		
Sodium sulfate	24	68
Magnesium sulfate	11	31

[A] These numbers represent, respectively, the (1S %) and (D2S %) limits as described in Practice C 670.

12.2 *Bias*—Since there is no accepted reference material suitable for determining the bias for this procedure, no statement on bias is being made.

13. Keywords

13.1 aggregates; magnesium sulfate; sodium sulfate; soundness; weathering

Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone[1]

This standard is issued under the fixed designation C 97; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 These test methods cover the tests for determining the absorption and bulk specific gravity of all types of dimension stone, except slate.

1.2 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 *This standard does not purport to address the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

C 119 Terminology Relating to Dimension Stone[2]

3. Terminology

3.1 *Definitions*—All definitions are in accordance with Terminology C 119.

4. Significance and Use

4.1 These test methods are useful in indicating the differences in absorption between the various dimension stones. These test methods also provide one element in comparing stones of the same type.

5. Sampling

5.1 The sample shall be selected to represent a true average of the type or grade of stone under consideration and shall be of the quality supplied to the market under the type designation to be tested. The sample may be selected by the purchaser or his authorized representative from the quarried stone or taken from the natural ledge and shall be of adequate size to permit the preparation of at least five test specimens. When perceptible variations occur, the purchaser may select as many samples as are necessary for determining the range in properties.

6. Test Specimens

6.1 The specimens may be cubes, prisms, cylinders, or any regular form with least dimension not under 50 mm (2 in.) and greatest dimension not over 75 mm (3 in.) but the ratio of volume to surface area shall not be less than 8 nor greater than 12.5 when measuring in millimetres (0.3 and 0.5 when measuring in inches). All surfaces shall be reasonably smooth. Saw or core drill surfaces are considered satisfactory, but rougher surfaces shall be finished with No. 80 abrasive. No chisels or similar tools shall be used at any stage of preparing the specimens.

6.2 Prepare at least five specimens from each sample.

6.3 The same specimens may be used to determine both water absorption and bulk specific gravity. In this case, follow the procedures in 7.1-7.3 and 10.1, and issue a single report containing all information required in 9 and 13. Alternatively, separate specimens may be prepared from the same or different samples. In this case, follow the applicable procedure for separate determination and reporting of water absorption or bulk specific gravity, or both.

7. Procedure

7.1 Dry the specimens for 48 h in a ventilated oven at a temperature of 60 ± 2°C (140 ± 4°F). At the 46th, 47th, and 48th hour, weigh the specimens to ensure that the weight is the same. If the weight continues to drop, continue to dry the specimens until there are three successive hourly readings with the same weight.

7.2 After drying, cool the specimens in the room for 30 min and weigh. When the specimens cannot be weighed immediately after cooling, store them in a desiccator. Determine the weights to the nearest 0.01 g (0.0005 oz).

7.3 Immerse the specimens completely in filtered or distilled water at 22 ± 2°C (72 ± 4°F) for 48 h. At the end of this period remove them from the water bath one at a time, surface

[1] These test methods are under the jurisdiction of ASTM Committee C18 on Dimension Stone and are the direct responsibility of Subcommittee C18.01 on Test Methods.

Current edition approved April 10, 2002. Published July 2002. Originally published as C 97 – 30. Last previous edition C 97 – 96.

[2] *Annual Book of ASTM Standards*, Vol 04.07.

dry with a damp cloth, and weigh to the nearest 0.01 g (0.0005 oz).

8. Calculation and Report

8.1 Calculate the weight percentage absorption (Note 1) for each specimen as follows:

$$\text{Absorption, weight } \% = [(B - A)/A] \times 100 \quad (1)$$

where:
A = weight of the dried specimen, and
B = weight of the specimen after immersion.

NOTE 1—If the percentage of absorption by volume is desired it will be necessary to determine the bulk specific gravity and multiply each value of percentage absorption by weight by the corresponding bulk specific gravity value.

8.2 Calculate the mean water absorption of the sample as the average of the weight percentage absorption for all specimens.

9. Report

9.1 The report shall contain the following information:
9.1.1 Identity of party providing the sample.
9.1.2 Name of stone.
9.1.3 Identity of sample.
9.1.4 Mean water absorption of sample.
9.1.5 Any variations to the procedure, including specimen dimensions, given in this standard
9.2 The report shall also contain the following information for each specimen:
9.2.1 Weight of dried specimen
9.2.2 Weight of soaked and surface-dried specimen in air.
9.2.3 Percentage water absorption by weight of specimen.

BULK SPECIFIC GRAVITY

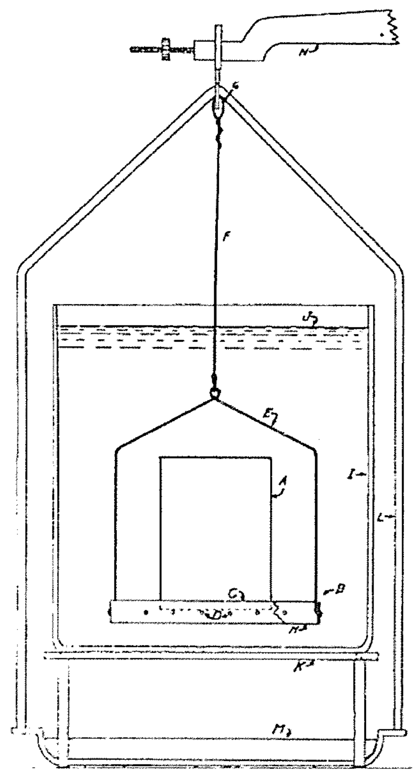
10. Procedure

10.1 When both absorption and bulk specific gravity are to be determined on the same specimens, weigh the saturated specimens suspended in filtered or distilled water at 22 ± 2°C (72 ± 4°F) immediately after the absorption tests are completed. Determine the suspended weights to the nearest 0.01 g (0.0005 oz).

10.2 A satisfactory means of weighing specimens in water is to use a wire basket similar to that illustrated in Fig. 1 to suspend the specimen in a vessel of water. The water vessel shall be large enough so that only the suspending cable of the basket passes through the water surface. Ensure air bubbles are removed from the basket and specimen before recording the weight.

10.2.1 The water vessel can be supported on the balance pan with the basket suspended from a frame also supported on a balance pan, as illustrated in Fig. 1. Determine the weight of the basket when suspended in water to the same depth as when weighing specimens therein. Subtract the weight of the basket to the nearest 0.01 g from the combined weight of the specimen and basket.

10.2.2 The basket can be suspended beneath an electronic balance with the water vessel supported independently, as illustrated in Fig. 2. Zero the balance with the basket suspended in water to the same depth as when weighing specimens.



A—Specimen.
B—Suspension basket.
C—Brass ring.
D— Bottom of basket of 1.83 mm (No. 13 B & S gage) brass wire (all joints soldered).
E— Bail of basket of 1.83 mm (No. 13 B & S gage) brass wire.
F— Suspension wire of 0.812 mm (No. 20 B & S gage) brass wire.
G— Loop for attachment to stirrup of balance.
H—Cutaway section of basket.
I—Water jar.
J—Water level.
K—Water jar support.
L—Balance pan suspension rod.
M—Balance pan.
N—Beam of balance.

FIG. 1 Bulk Specific Gravity Test Assembly: Water Vessel on Balance Pan

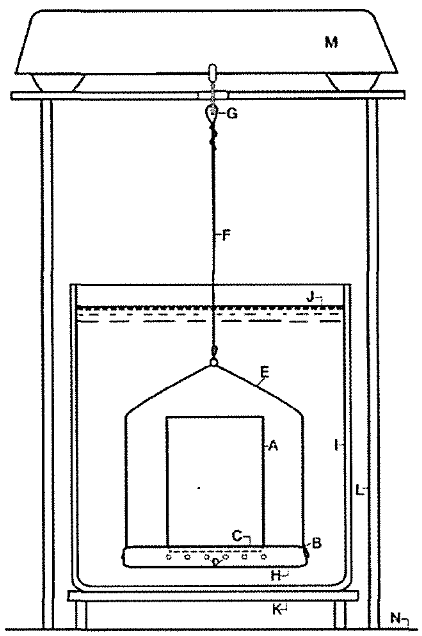
10.3 When the bulk specific gravity test is made on specimens other than those used for absorption, determine the dry weights as in 7.1 and 7.2. Immerse the specimens in filtered or distilled water at 22 ± 2°C (72 ± 4°F) for at least 1 h or until air bubbles do not form on the specimens within 5 min. Surface dry the specimens as in 7.3, weigh to the nearest 0.01 g (0.0005 oz), and return to the water bath. Determine the weights of the specimens suspended in water in accordance with 10.2 before the specimens have stood in the water more than 5 min.

11. Calculation

11.1 Calculate the bulk specific gravity as follows:

$$\text{Bulk specific gravity} = A/(B - C) \quad (2)$$

where:
A = weight of the dried specimen,
B = weight of the soaked and surface-dried specimen in air, and
C = weight of the soaked specimen in water.



A—Specimen.
B—Suspension basket.
C—Brass ring.
D— Bottom of basket of 1.83 mm (No. 13 B & S gage) brass wire (all joints soldered).
E— Bail of basket of 1.83 mm (No. 13 B & S gage) brass wire.
F— Suspension wire of 0.812 mm (No. 20 B & S gage) brass wire.
G— Loop for attachment to stirrup of balance.
H—Cutaway section of basket.
I—Water jar.
J—Water level.
K—Water jar support.
L—Balance support.
M—Balance.
N—Benchtop.

FIG. 2 Bulk Specific Gravity Test Assembly: Water Vessel Below Balance

11.2 Calculate the mean bulk specific gravity of the sample as the average of the bulk specific gravity for all specimens.

NOTE 2—The bulk specific gravity gives a convenient and accurate means of calculating the unit weight of the stone; for example, drystone weight per cubic metre (cubic foot) = bulk specific gravity × 1000 (62.4).

12. Report

12.1 The report shall contain the following information:

12.1.1 Identity of party providing the sample.

12.1.2 Name of stone.

12.1.3 Identity of sample.

12.1.4 Bulk specific gravity of sample.

12.1.5 Any variations to the procedure, including specimen dimensions, given in this standard.

12.2 The report shall also contain the following information for each specimen:

12.2.1 Weight of dried specimen.

12.2.2 Weight of soaked and surface-dried specimen in air.

12.2.3 Weight of soaked specimen suspended in water.

12.2.4 Bulk specific gravity of specimen.

13. Precision and Bias

13.1 Individual variations in a natural product may result in deviation from accepted values. A precision section will be added when sufficient data are available to indicate in repeatability and reproducibility.

14. Keywords

14.1 absorption; bulk specific gravity; dimension stone; stone; test

Designation: C 535 – 03$^{\epsilon 1}$

Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine[1]

This standard is issued under the fixed designation C 535; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

ε[1] Note—Section 8.1 was corrected editorially July 2003.

1. Scope*

1.1 This test method covers testing sizes of coarse aggregate larger than 19 mm (¾ in.) for resistance to degradation using the Los Angeles testing machine (Note 1).

Note 1—A procedure for testing coarse aggregate smaller than 37.5 mm (1½ in.) is covered in Test Method C 131.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.3 The values stated in SI units are to be regarded as the standard. The inch-pound values given in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:*

C 125 Terminology Relating to Concrete and Concrete Aggregates[2]

C 131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine[2]

C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates[2]

C 670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials[2]

C 702 Practice for Reducing Samples of Aggregate to Testing Size[2]

D 75 Practice for Sampling Aggregates[3]

E 11 Specification for Wire Cloth and Sieves for Testing Purposes[4]

3. Terminology

3.1 For definitions of terms used in this test method, refer to Terminology C 125.

4. Summary of Test Method

4.1 This test is a measure of degradation of mineral aggregates of standard gradings resulting from a combination of actions including abrasion or attrition, impact, and grinding in a rotating steel drum containing 12 steel spheres. As the drum rotates, a shelf plate picks up the sample and the steel spheres, carrying them around until they are dropped to the opposite side of the drum, creating an impact-crushing effect. The contents then roll within the drum with an abrading and grinding action until the shelf plate picks up the sample and the steel spheres, and the cycle is repeated. After the prescribed number of revolutions, the contents are removed from the drum and the aggregate portion is sieved to measure the degradation as percent loss.

5. Significance and Use

5.1 The test has been widely used as an indicator of the relative quality or competence of various sources of aggregate having similar mineral compositions. The results do not automatically permit valid comparisons to be made between sources distinctly different in origin, composition, or structure. Assign specification limits with extreme care in consideration of available aggregate types and their performance history in specific end uses.

6. Apparatus

6.1 *The Los Angeles Machine* shall conform to the requirements of Test Method C 131.

[1] This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.20 on Normal Weight Aggregates.

Current edition approved March 10, 2003. Published April 2003. Originally approved in 1964. Last previous edition approved in 2001 as C 535-01.

[2] *Annual Book of ASTM Standards*, Vol 04.02.

[3] *Annual Book of ASTM Standards*, Vol 04.03.

[4] *Annual Book of ASTM Standards*, Vol 14.02.

*A Summary of Changes section appears at the end of this standard.

6.1.1 The operation and maintenance of the machine shall be as prescribed in Test Method C 131.

6.2 *Sieves*, conforming to Specification E 11.

6.3 *Balance*—A balance or scale accurate within 0.1 % of test load over the range required for this test

6.4 *Charge*—The charge (Note 2) shall consist of 12 steel spheres averaging approximately 47 mm (1 27⁄32 in.) in diameter, each having a mass between 390 and 445 g, and having a total mass of 5000 ± 25 g.

NOTE 2—Steel ball bearings 46.0 mm (1 13⁄16 in.) and 47.6 mm (1 7⁄8 in.) in diameter, having a mass approximately 400 and 440 g each, respectively, are readily available. Steel spheres 46.8 mm (1 27⁄32 in.) in diameter having a mass approximately 420 g may also be obtainable. The charge may consist of a mixture of these sizes conforming to the total mass tolerance of 6.4.

7. Sampling

7.1 Obtain the field sample in accordance with Practice D 75 and reduce to an adequate sample size in accordance with Practice C 702.

8. Test Sample Preparation

8.1 Wash the reduced sample and oven dry at 110 ± 5°C (230 ± 9°F) to substantially constant mass, separate into individual size fractions, and recombine to the grading of Table 1 most nearly corresponding to the range of sizes in the aggregate as furnished for the work. Record the mass of the sample prior to test to the nearest 1 g.

9. Procedure

9.1 Place the test sample and charge in the Los Angeles testing machine and rotate the machine at 30 to 33 r/min for 1000 revolutions (Note 3). After the prescribed number of revolutions, discharge the material from the machine and make a preliminary separation of the sample on a sieve coarser than the 1.70-mm (No. 12) sieve. Sieve the finer portion on a 1.70-mm sieve in a manner conforming to Test Method C 136. Wash the material coarser than the 1.70-mm sieve and oven dry at 110 ± 5°C (230 ± 9°F) to substantially constant mass, and determine the mass to the nearest 1 g .

9.1.1 If the aggregate is essentially free of adherent coatings and dust, the requirement for washing after the test is optional. However, in the case of referee testing, the washing procedure shall be performed. Elimination of washing after test will seldom reduce the measured loss by more than about 0.2 % of the original sample mass.

NOTE 3—Valuable information concerning the uniformity of the sample under test may be obtained by determining the loss after 200 revolutions. This loss should be determined by dry sieving the material on the 1.70-mm (No. 12) sieve without washing. The ratio of the loss after 200 revolutions to the loss after 1000 revolutions should not greatly exceed 0.20 for material of uniform hardness. When this determination is made, take care to avoid losing any part of the sample; return the entire sample, including the dust of fracture, to the testing machine for the final 800 revolutions required to complete the test.

10. Calculation

10.1 Calculate the loss (the difference between the original mass and the final mass of the test sample) as a percentage of the original mass of the test sample (Note 4).

NOTE 4—The percent loss determined by this method has no known consistent relationship to the percent loss for the same material when tested by Test Method C 131.

11. Report

11.1 Report the following information:

11.2 Identification of the aggregate as to source, type, and nominal size, and

11.3 Grading designation from Table 1 used for the test, and

11.4 Loss by abrasion and impact of the sample expressed to the nearest 1 % by mass.

12. Precision

12.1 *Precision*—The precision of this test method has not been determined. It is expected to be comparable to that of Test Method C 131.

12.2 *Bias*—No statement is being made about the bias of this Test Method since there is no accepted reference material suitable for determining the bias of this procedure.

13. Keywords

13.1 abrasion; aggregate (coarse; large size); degradation; impact; Los Angeles machine

TABLE 1 Gradings of Test Samples

Sieve Size, mm (in.) (Square Openings)		Mass of Indicated Sizes, g		
		Grading		
Passing	Retained on	1	2	3
75 (3)	63 (2½)	2 500 ± 50	...	...
63 (2½)	50 (2)	2 500 ± 50	...	...
50 (2)	37.5 (1½)	5 000 ± 50	5 000 ± 50	...
37.5 (1½)	25.0 (1)	...	5 000 ± 25	5 000 ± 25
25.0 (1)	19.0 (¾)	...	...	5 000 ± 25
	Total	10 000 ± 100	10 000 ± 75	10 000 ± 50

APPENDIX

(Nonmandatory Information)

X1. MAINTENANCE OF SHELF

X1.1 The shelf of the Los Angeles machine is subject to severe surface wear and impact. With use, the working surface of the shelf is peened by the balls and tends to develop a ridge of metal parallel to and about 32 mm (1¼ in.) from the junction of the shelf and the inner surface of the cylinder. If the shelf is made from a section of rolled angle, not only may this ridge develop but the shelf itself may be bent longitudinally or transversely from its proper position.

X1.2 The shelf should be inspected periodically to determine that it is not bent either lengthwise or from its normal radial position with respect to the cylinder. If either condition is found, the shelf should be repaired or replaced before further tests are made. The influence on the test result of the ridge developed by peening of the working face of the shelf is not known. However, for uniform test conditions, it is recommended that the ridge be ground off if its height exceeds 0.1 in. (2 mm).

SUMMARY OF CHANGES

This section identifies the location of changes to this test method that have been incorporated since the last issue.

(1) Revised 1.3.
(2) Revised Note 2.
(3) Revised 8.1.
(4) Revised 9.1.
(5) Revised 9.1.1.
(6) Revised Note 3.
(7) Revised X1.1.

CRD-C 144-92

Standard Test Method for Resistance of Rock to Freezing and Thawing

1. Scope

1.1 This method covets a procedure for determining the resistance of rock to freezing and thawing. Information developed by use of this method may be applicable in the evaluation of stone for use as slope protection, as concrete aggregate, or for other purposes.

2. Referenced Documents

2.1 ASTM Standards

C 88 Teat Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate (CRD-C 137).

C 295 Guide for Petrographic Examination of Aggregates for Concrete (CRD-C 127).

D 5121-90 Practice for Preparation of Rock Slabs for Durability Testing (CRD-C 165).

3. Apparatus

3.1 **Saw.** A rock-cutting saw, preferably having a diamond blade, of suitable diameter for sawing specimens.

3.2 **Pans.** One or mom pans, each large enough to hold one sample slab, with sides at least 4 in. high made of stainless steel or other suitable noncorroding material.

Note: One freezer that has been used to perform this test will accommodate pans having inside dimensions of 16 by 19 by 4 in. (40.6 by 48.3 by 10.2 cm). If such pans are used, the maximum size of test slab will have an area of approximately 228 sq in. (1471 sq cm) on each sawed surface, assuming a slab 2 in. (5.1 cm) thick, supported 1/4 in. (6 mm) off the bottom, and covered to a depth of 3/4 in. (19 mm) with fluid.

3.3 **Specimens Supports.** Specimen supports to hold specimens above the bottom of the pan shall consist of lengths of noncorroding material approximately 1/4 in. (6 mm) in diameter.

3.4 **Freezer.** A freezer having a refrigeration capacity such that, with the maximum number of pans and specimens under test concurrently, the temperature as measured at the underside of a specimen shall be reduced to at least 5 F (-15 C) in not more than 16 hr. The number of tests that can be conducted concurrently will be limited by the capacity of the freezer. The same number of pans with water shall be in the freezer whenever tests are being made regardless of the number of specimens being tested to achieve a comparable refrigeration load.

3.5 **Thawing Oven or Room.** An oven or room that can be controlled to and maintain 100 ± 10°F (37.8 ± 5.6°C) having a capacity such that when loaded with frozen specimens they will be fully thawed in not more than 8 hr.

3.6 **Drying Oven.** A drying oven, as described in C 88 (CRD-C 137), of sufficient capacity for containing the samples in the pans.

3.7 **Balances or Scales.** Balances or scales having a capacity adequate for weighing the test material to an accuracy of at least 0.1 percent of the weight of the material being weighed.

3.8 **Photographic Equipment.** Equipment suitable for preparing photographs of the test samples before, during, and after test.

4. Test Specimens

4.1 Specimens for use in this test shall be sawed slabs 2 ± 1/4 in. (5.1 ± 0.6 cm) thick, prepared in accordance with the applicable provisions of ASTM D 5121 (CRD-C 165). Specimens shall be prepared to represent each of the principal varieties and conditions of rock present in the sample. Selection of material to use in preparation of specimens shall preferably be accomplished using the procedures described in C 295 (CRD-C 127).

4.2 Slabs should be sawed so as to include at their edges as much of the surface of the material received for testing as possible. Slabs from rock having visible bedding planes or other planar structures should usually be prepared by sawing normal to such structures. Preferably three specimens should be prepared to represent each principal variety or condition of rock Slabs should be as large as the material available for their preparation will allow, up to the capacity of the pans used for the test (see Sec. 3.2).

4.3 Slabs of different materials, the performance of which is to be compared, should preferably be of similar sizes.

4.4 Slabs prepared with sawing equipment and cutting oils shah be carefully cleaned of oil by use of suitable solvents. After having been sawed and cleaned, slabs should be inspected by the same procedures that were employed in selecting material from which the slabs were sawed, to confirm that the slabs adequately represent the types and conditions of material that were intended to be represented. In the event that a sawed slab is found to be nonrepresentative, additional material should be selected and a replacement slab prepared that is representative.

5. Solution

5.1 The test solution shall consist of tap water containing 0.5 percent ethyl alcohol by weight.

6. Procedure

6.1 After having been cleaned of cutting oil, each test specimen shall be examined and preferably photographed.

6.2 One test specimen shall be placed in a pan and covered by test solution so that the depth of the solution over the upper surface of the specimen is 3/4 ± 1/4 in. (19 ± 6 mm). The total volume of a test specimen placed in any one pan shall be such that the volume of rock does not exceed the volume of solution.

6.3 The pans containing the immersed specimens shall be stored at 73 ± 3°F (22.8 ± 1.7°C) for at least 48 hr. They shall then be placed in the freezer for 16 ± 1/2 hr. then removed and placed in a 100 ± 10°F (37.8 ± 5.6°C) room or oven for 8 ± 1/2 hr. When fully thawed, the specimens shall be inspected to observe the effects of the exposure. Any observed changes should be recorded, and if regarded as of sufficient significance, the specimens should be photographed.

6.4 Additional cycles of freezing and thawing, followed by inspection and photographing, as may be appropriate, shall be continued until a total of 20 cycles has been obtained. The solution shall be maintained at the specified depth by adding additional solution as needed. After every 5 cycles, the solution shall be carefully poured off through a 75-µm (No. 200) sieve so as not to displace any of the fragments of the samples, and any material caught on the sieve shall be returned to the pan. New solution shall then be added. When the 16-hr/8-hr cycle is interrupted, as for holidays and weekends, the five specimens shall remain in the frozen condition until the sequence is resumed.

6.5 The exposure of a specimen may be terminated prior to completion of 20 cycles if the largest remaining fragment of the slab amounts to less than half of the original specimen.

6.6 After the freezing-and-thawing cycling has been completed, the solution shall be carefully poured off using the procedure described in 6.4 above, and the contents of the pan, both that remaining in the pan and the material caught on the 75-µm (No. 200) sieve, shall be dried in the drying oven until the loss in weight between successive weighings at intervals of not less than 4 hr does not exceed 0.1 percent of the later weight. The dry mass shall be recorded. The dry mass of the pan and contents, less the mass of the pan, will be taken as the initial dry mass of the specimen. The contents of the pan should be photographed. Each fragment having a mass more than 25 percent of the initial dry mass of the specimen shall have its mass determined, and the sum of the masses of such fragments shall be recorded.

7. Calculation and Report

7.1 The report shall include the following:

7.1.1 Source of material.

7.1.2 Tabulation of data on each test specimen as follows:

(1) Designation of type and condition of rock represented,

(2) Initial dry mass (obtained as described in Sec. 6.6),

(3) Changes observed at each inspection, and

(4) Number and mass of all fragments remaining at conclusion of test that have a mass more than 25 percent of the initial dry mass, and mass of each of these expressed as percentage of initial dry mass of specimen.

7.1.3 Photographs as appropriate.

8. Results

8.1 Results of this and other tests on riprap will be reported to the using agency without any interpretation of results by the laboratory.

9. Interpretation

9.1 The results of this test should generally be employed as a basis for comparing the relative resistance of different types of material, from one or more sources, being considered for the same use. The results of this test as performed on a single material will not ordinarily provide a basis for concluding that the material is "satisfactory" or "unsatisfactory" for a proposed use unless the specimens either are essentially completely unaffected or essentially completely disintegrated by the action of the test. The interpretation of the results will also depend on the nature of the material tested, the degree to which the specimens represent the material, and the intended use.

9.2 **Rock of Uniform Structure and Texture.** Rock of uniform structure and texture intended for use either as a source of protection stone or crushed stone for concrete aggregate will generally be affected by surface scaling, crumbling, flaking, or disaggregation. The total amount of material separated from the largest remaining fragment, i.e., the weight loss, will normally be a suitable basis for quantitative comparison of such materials.

9.3 **Rock with Planar Structures.** Rock with observable bedding planes, joints, seams, stringers, or other planar structures will generally be affected, if at all, by separation into discrete portions along such planes. Such separation may be of little importance when the rock is being considered as crushed stone aggregate to be confined in concrete. Such separation may be of much greater importance in rock proposed for use as protection stone. In the latter instance, however, it will be necessary to estimate the separation distance of the planes such as those at which test specimens have separated in the material from which the specimens were made. If these planes are so closely spaced that the stone, after separating thereon, is in sizes too small to serve its intended purpose, the rock may be unsuitable for such use. If these planes are more widely spaced, or only infrequently closely spaced, the rock may be suitable for such use, even though planes of potential separation are present.

CRD-C 148-69

METHOD OF TESTING STONE FOR EXPANSIVE BREAKDOWN ON SOAKING IN ETHYLENE GLYCOL

1. Scope

1.1 This method covers a procedure for subjecting samples of stone to immersion in ethylene glycol and observation of the effects of such immersion.

2. Principle of Method

2.1 Ethylene glycol is one of the materials that reacts with swelling clays of the montmorillonite group to form an organo-clay complex having a larger basal spacing than that of the clay mineral itself. Hence a sample of stone containing swelling clay of the montmorillonite group will be expected to undergo expansive breakdown upon soaking in ethylene glycol, if the amount, distribution, state of expansion, and ability to take up glycol is such as to cause such breakdown to occur. If such breakdown does occur, it may be expected that similar breakdown may occur if similar rock samples are exposed, for longer times, to wetting and drying or freezing and thawing in a water-soaked condition in service.

3. Reagent

3.1 Ethylene Glycol.- The reagent used in this method shall be ethylene glycol meeting requirements of ASTM Designation: D 2693 of the issue in effect at the time the testing is arranged for (Note 1).

Note 1.- As mentioned in Section 2.1, ethylene glycol is one of the materials that form organo-clay complexes. Another such material is glycerol. Glycerol has a higher viscosity and hence a longer time is required for it to penetrate a susceptible sample of stone and produce equivalent expansive breakdown. However, for research purposes, glycerol or other reagents may be used.

4. Apparatus

4.1 Container.- A container, of glass or suitable plastic, nonreactive with the reagent, of sufficient size to hold the test sample and sufficient reagent to cover all particles of the sample to a depth of not less than 1/2 in. (1 cm, approximately), and with a tight-fitting cover, shall be provided for use in this test.

4.2 Balance or Scales.- A balance or scales having a capacity adequate for weighing the test sample to an accuracy of at least 0.1 percent of the weight of the sample.

4.3 Drying Oven.- An oven as described in CRD-C 115, of the air-circulating type, and of sufficient capacity for containing the sample.

5. Samples

5.1 Samples for use in this test should weigh 11 ± 1 lb (5 ± 2 kg, approximately) and should include no particles that will be retained on a 3-in. (76.1-mm) or will pass a 3/4-in. (19.0-mm) seive (Note 2).

Note 2.- Since, as noted in Section 2.1, this method is based on the reaction of ethylene glycol with clay minerals of the montmorillonite group, it is highly desirable that information on the type, amount, distribution, and state of expansion of such clay minerals in the material of which the sample is composed be known. Information on the physical state, structure, and texture of the material is also important. Such data can be developed using procedures of the sort cited in CRD-C 127.

6. Preparation of Samples

6.1 Samples will be prepared by sieving, crushing, or breaking; or by combinations of these processes as required to meet the requirements of Section 5. When a sample of the stipulated weight and particle size has been prepared, it shall be washed in distilled water to remove dust, loosely adherent coatings, and chips. After being washed, it shall be weighed to at least 0.1 percent of its weight, and then dried in the drying oven to constant weight. Constant weight shall be regarded as having been attained when the loss in weight between successive weighings at intervals of not less than 4 hr does not exceed 0.1 percent of the later weight. The dry weight shall be recorded, and the sample should preferably be photographed (Note 3).

Note 3.- Under certain conditions, it may be desirable to begin the testing of the sample in a moisture condition other than that obtained by drying to constant weight. In such cases, either the washing or the drying, or both procedures, as described in Section 6.1, may be omitted. When only qualitative observation of the effects of the treatment are desired, the weighing of the sample may be omitted. When a greater degree of quantitative evaluation is desired, the sample, after having been prepared as described in Section 6.1, shall be sieved using the 3-, 2-1/2-, 2-, 1-1/2-, 1-, and 3/4-in. (76.1-, 64.0-, 50.8-, 38.1-, 25.4-, and 19.0.mm) sieves and the individual sieve fractions tested separately.

7. Procedure

7.1 A sample shall be placed in the container and immersed in the reagent so that all particles are covered to a depth of at least 1/2 in. (1 cm, approximately).

7.2 At intervals not to exceed 3 days, the sample shall be removed from the container, examined, changes noted, and, if significant changes have taken place, preferably photographed. The normal duration of the test shall be 15 days (Note 4).

Note 4.- Further information of value may be obtained in certain cases by continuing the treatment beyond 15 days; in other cases expansive breakdown may have been so extensive at earlier periods that no information of value will be obtained by continuing the treatment for the full 15 days.

7.3 When the exposure has been terminated, and the sample has been photographed, if desired, the sample shall be thoroughly washed over a 3/4-in. (19.0-mm) sieve to remove the reagent from the surfaces of the particles and to remove fragments that will pass a 3/4-in. (19.0-mm) sieve. The material remaining on the sieve shall be dried to constant weight as described in Section 6.1 and weighed (Note 5).

Note 5.- If the precedure of drying was not used in specimen preparation, it should not be used after the test. If the sample was sieved and tested in sieve fractions, each fraction should he washed over the sieve retained on before test.

8. Report

8.1 The report of the results of this test shall include the following:

8.1.1 Identification and description of the source of material including information developed as suggested in Note 2.

8.1.2 Qualitative and, if obtained, quantitative data on the effect of the treatment on the sample developed as described in Section 7.

9. Results and Interpretation

9.1 The results of this test and the interpretation thereof shall be as described in the applicable portions of Sections 7 and 8 of CRD-C 144.

Attachment H-7
Normally Recognized Rock Soundness & Durability Testing Criteria for Various Test Methods

Normally Recognized Rock Soundness and Durability Testing Criteria for Various Test Methods

Agency	ATM T13 Degradation	ASTM C88 Sodum Sulfate Soundness % loss	ASTM C97 Bulk Sp Gr	ASTM C97 Absorption %	CRD C144 Freezing and Thawing % loss	ASTM C535 LA Abrasion 200 cycles % loss	(wear test) ASTM C131 LA Abrasion 500 cycles % loss	ASTM C535 LA Abrasion 1000 cycles % loss	CRD C148 Ethylene Glycol
ADOT	30 min	9% max surf agg & AC					<50%		
COE		<2% to <5%		<1%	<10% (12 cycles)		<30%		
Literature		10% max	2.56	3% max	<10% (100 cycles)		<30%		no signif breakup
CH2M HILL			2.56				35% max		
WSDOT	15 min (see note)		2.55				50% max		
				monitored but not spec'd for (Ac and concrete) <5%?					

WSDOT does not use an aggregate soundness test but rather uses its own test to determine a "degradation value". This degradation value test determines the susceptibility of an aggregate to degrade into plastic fines when abraded in the presence of water.

Degradation procedure takes a sample of aggregate retained on the 12.5 mm (0.5 inch) sieve and crushes it so that it will then pass the 12.5 mm (0.5 inch) sieve. This crushed material is then placed in a container filled with water and the container is agitated for 20 minutes. The amount of fines generated is measured and the result is reported as a degradation factor. The more fines generated, the lower the degradation factor. Degradation factor values can range from 0 - 100 with higher values representing less degradation.

Attachment H-8
Basis for Unalaska Airport Runway Shore Protection Design

MEMORANDUM CH2MHILL

Basis for Unalaska Airport Runway Shore Protection Design

TO: File

COPIES: Eric Cutbirth

FROM: Don Kingery

DATE: November 7, 2007 revised February 22, 2008

The following provides a summary of the basis for design for the shoreline armor units for the Unalaska Airport runway extension.

Unalaska Bay, shown in Figure 1, is located on the north side of Unalaska Island on the Aleutian Island chain. The mouth of the bay faces north toward the Bering Sea. The Unalaska Airport runway is located on the south side of Amaknak Island inside Unalaska Bay.

The selected runway alternative includes extension of the runway 250 feet to the northwest into Unalaska Bay and 250 feet to the southeast inside of Dutch Harbor. Slope protection is required for the end of the runway extending into Unalaska Bay, the shoreline along the southwest edge of the runway, and the southeast end of the runway extending into Dutch Harbor, shown in Figure 1 as "A", "B", and "C", respectively.

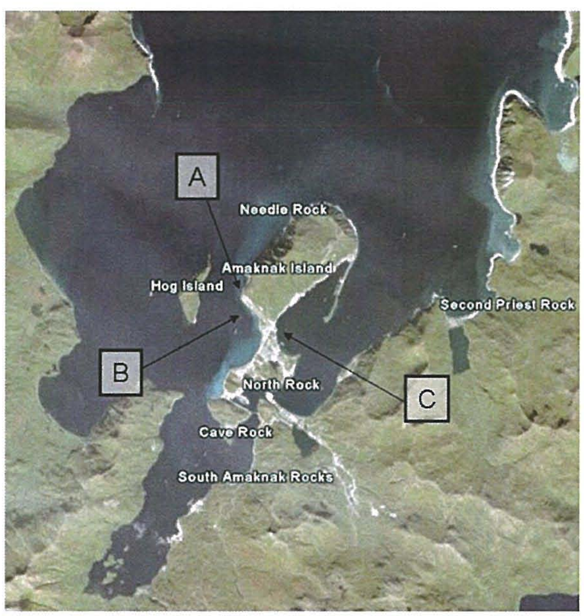


Figure 1. Location of shore protection

The shoreline will be exposed to waves generated by wind locally within Unalaska Bay and by ocean swell that propagates into the harbor. The location of the runway on the south side of Amaknak Island shelters it from direct exposure to swell entering the bay from the north.

Basis for design used for sizing shore protection at each location was as follows:

Head of Runway – "A"

Design wave at the head of the runway was estimated by modeling propagation of swell entering Unalaska Bay to the site. The Corps of Engineers model BOUSS2D was used to model the propagation of a 28 foot, 13 second wave (based on a 1982 Dames & Moore wave hindcast study) into the study area. Modeling results predicted an 18 foot wave at the head of the runway.

Core-loc armor unit sizing was performed using Hudson's equation incorporated into the Core-loc North America web site with a stability coefficient of 13 as recommended for use on breakwater heads. Note: the web-based Core-loc calculator used for preliminary sizing of the armor units uses metric units. All dimensions and weights presented in this document have been converted to English units.

http://www.core-loc.com/cldesign.htm

Resulting 10-ton units are consistent with 8 ton dolos that are on the head of the existing runway and appear to have performed adequately.

Size of first underlayer was based on quarrystone sizes calculated by the Core-loc web based calculator. Subsequent underlayers were sized based on guidance provided in the Coastal Engineering Manual (CEM). The range of median rock sizes for underlayers is provided to allow some flexibility when assessing the ability of local quarries to meet rock size requirements.

Layer	Unit size/Median Rock Weight	Layer thickness
Core-loc	9.9 tons	7.7 feet
Quarrystone Underlayer	1 to 2 tons	4.6 to 5.9 feet
Second Underlayer	99 to 197 lbs	2.9 to 3.6 feet

Southwest Shoreline along Runway – "B"

3.3 ton Core-loc units on the south shoreline of the runway correspond to a 13 foot significant wave based on results of modeling and performance of the existing treatment. Core-loc armor unit sizing was performed using Hudson's equation incorporated into the Core-loc North America web site with a stability coefficient of 16 as recommended for use on breakwater trunks.

Layer	Unit size/Median Rock Weight	Layer thickness
Core-loc	3.3 tons	5.4 feet
Quarrystone Underlayer	0.33 to 0.66 tons	3.2 to 4 feet
Second Underlayer	33 to 66 lbs	1.5 feet

Inside Dutch Harbor – "C"

Discussions with Alaska DOT coastal engineer, Harvey Smith[1], indicate that waves approaching Dutch Harbor from the north are largely spent by the time they enter the harbor due to refraction into the spit. Diffraction into the harbor will reduce this further. Preliminary wave analysis supported this conclusion and therefore it was assumed that worst case conditions for waves in Dutch Harbor were due to locally generated wind waves inside Iliuliuk Bay combined with waves generated inside Dutch Harbor.

A 50-year return period wind speed of 65 mph, based on wind data obtained for the Unalaska Airport, was used for calculation of wave conditions at the harbor end of the runway.

The height of wind waves generated in Iliuliuk Bay and Dutch Harbor were calculated using wave growth equations incorporated into the USACE Automated Coastal Engineering System (ACES).

Waves generated in Iliuliuk Bay

Approximately 4 mile fetch (shown in Figure 2) resulted in a 5.5 foot / 4.4 second wave approaching the mouth of harbor at ~30 deg angle

Wave height will be reduced due to diffraction around the head of the jetty.

Given:

- 3500 foot harbor opening
- Distance to runway ~ 4400 feet at ~120 deg
- Calculated wavelength ~ 99 ft (4.4 sec wave in 20 m deep water)
- Calculated Radius/Wavelength = 44

[1] Phone Conversation between Don Kingery, CH2M HILL and Harvey Smith, Alaska DOT, March 22, 2007

From Figure 2-37 of the Shore Protection Manual, the diffraction coefficient, K < 0.13

Wave height at shoreline from waves generated in Iliuliuk Bay = 5.5 * 0.13 = 0.72 ft

Waves Generated in Dutch Harbor

Fetch down axis of Dutch Harbor ~ 8600 feet

Calculated wave height ~ 3.5 feet

Total design wave height

Estimate 4.8 foot design wave (3.5 foot + 0.72 foot = 4.2 foot + 15%)

Armor Layer Size

Armor sizes were calculated using ACES incorporated into the Coastal Engineering Design and Analysis System (CEDAS), Version 2.01. Underlayers were calculated based on guidance provided in the CEM.

Armor layer, W1 = 1200 lbs, 3.9 feet thick

Underlayer, W2 = 120 lbs, 1.8 feet thick

Core W = 0.2 to 6 lbs

Armor layer size calculated above is consistent with that used at the boat ramp adjacent to the site.

Figure 2. Fetch for waves generated in Iliuliuk Bay

dock"). This site was selected because of it's proximity to the current tank farm, the level of existing infrastructure, the availability of suitable tidelands and uplands, and accessibility for customers. This site would allow Delta Western to continue providing the same services to their customers with a minimum of additional infrastructure and operating expenses. This location would relocate only the dock, and new pipeline would be run below or at grade along Ballyhoo Road to the existing pipeline, preventing the need for relocation of the existing tank farm. A cursory evaluation of this site in relation to the factors previously discussed follows:

1) **Land:** Uplands in this area are owned by the OC, while the tidelands are owned by the City of Unalaska. New leases would need to be created, and the lease on the current property would be terminated. The terms of the lease are unknown and therefore so are any complications related to premature termination of this lease. There is approximately 2,000 feet available between the south end of the UMC and the limits of runway Object Free Area. A replacement of the existing dock would require at least 820 feet of dock face, and it would need to be at least 35 feet wide, with vehicle access. The maximum draft for vessels docking at this facility is 42 feet, which could be accommodated at a distance of approximately 200 feet from shore, the same distance the UMC extends.

   The availability of tideland in this area may be limited, as the Port of Dutch Harbor may seek to expand the UMC to the south in the future. Currently, the UMC is the only public facility in Unalaska that can accommodate vessels longer than 200 feet, and other facilities at this site include a 30-ton crane and rail system used by Horizon Lines for containerized cargo, and North Pacific Fuel's fueling operations. The Port anticipates improvements will be needed to the existing dock in the near future to accommodate new, longer Horizon Line ships (700 to 800 feet), and that the UMC could reach its sustainable practical capacity (80 percent utilization) between 2010 and 2014[3]. In addition, the Port of Dutch Harbor has received a $7.5 million federal grant for a new ferry terminal, which may relocate from the north end of the dock to the south end. [4]

2) **Infrastructure Availability**: This potential dock location is in a developed area with most of the necessary infrastructure already in place. Access to electricity and water are available. Upland infrastructure required by Delta Western would include an approximately 10,000 square foot warehouse and minimal parking. A minimum of five pipelines would be required for different fuel types.

3) **Accessibility for customers**: The proposed location is very close to the current site, and should provide the same accessibility as the current site. The dock would still be in Dutch Harbor, and should provide equivalent access for vessels both offloading fuel and refueling.

4) **Cost**: This potential site is estimated to cost approximately $15 million to develop for the proposed purpose. This estimate includes construction of a new dock and pipelines connecting to the existing pipelines. Not included are costs associated with

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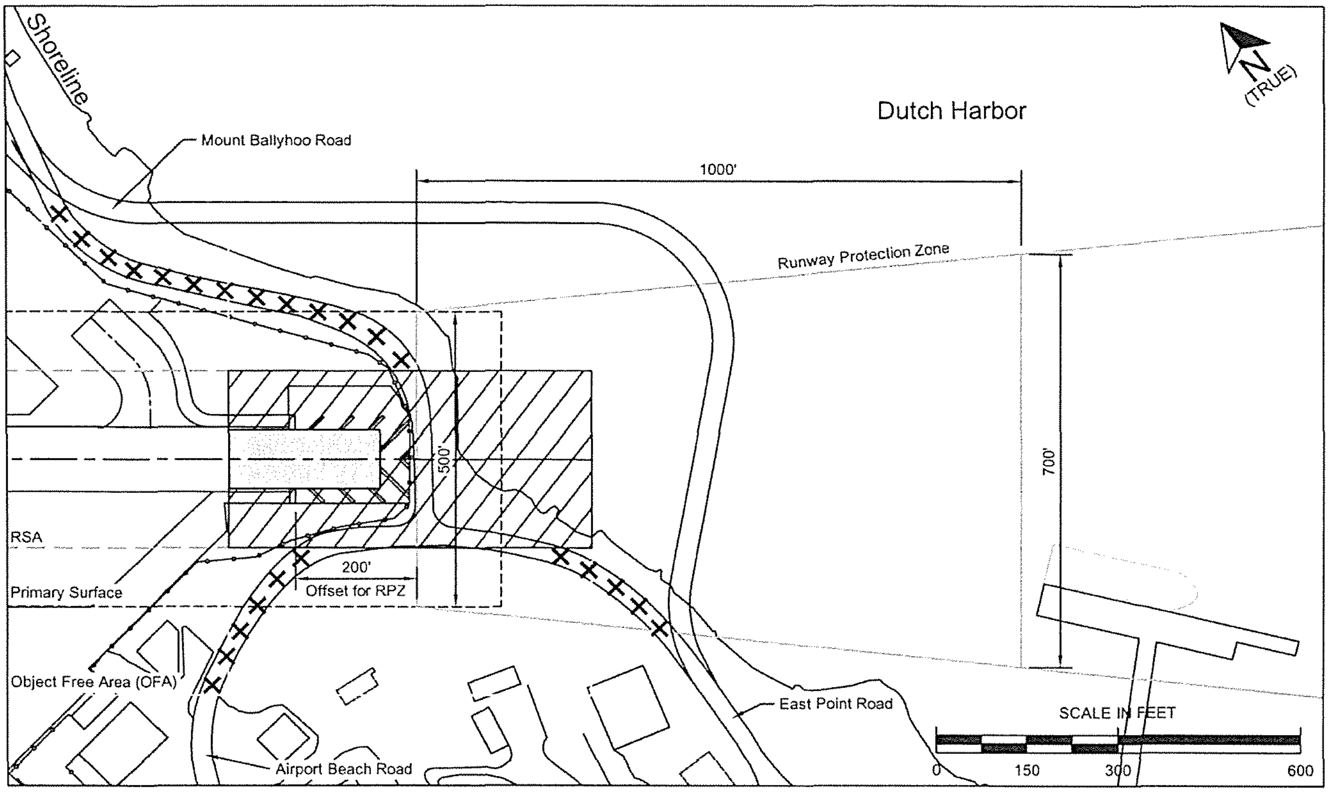
[3] *Technical Memorandum: Port and Harbor Ten-year Development Plan* (City of Unalaska 2004).

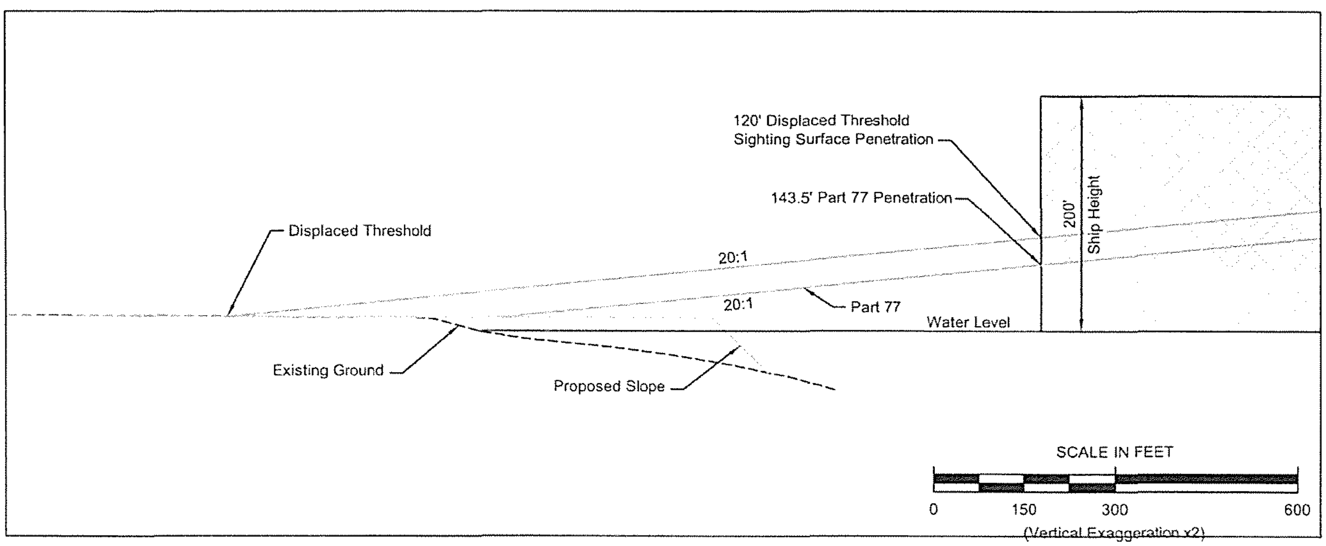
[4] Telephone conversation with Robin Hall, Unalaska Planning Director, May 4, 2007.

engineering, permitting, land lease negotiation and fees, and costs for connecting to existing utilities. This does not include any costs related to construction in areas with known hazardous contamination, such as Ballyhoo Road.

5) **Additional liabilities:** Additional liabilities may include some factors described above, such as expenses for constructing in a contaminated site, or encountering historic or cultural artifacts during construction. Construction of above ground pipelines would help to minimize such liabilities.



RUNWAY 30 - PLAN



RUNWAY 30 - PROFILE

CH2MHILL

Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Runway 30
Plan and Profile

Exhibit X

Source: AC 150/5300-13 R8, Airport Design

May 2007

Unalaska Airport Master Plan
Delta Western Unloading Dock Relocation Study R01
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	UARE Delta Western
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	4/19/2007
Est Log No.	07-0274
PM / Contact Name	K.Green/SEA
Estimate Class 1-5	4
Report format	Sorted by 'Location/System/Bid Item/Phase' 'Detail' summary Paginate

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
Alt 03													
	11 - Delta Western												
		Barge Dock											
			02320.070	**Backfill Soil/Rock Fill**									
				Gravel fill at Slabs	740.74 cy	8.11 /cy	15.60 /cy	-		-	23.71 /cy	17,562	0.117
				Backfill Soil/Rock Fill		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**17,562**	**0.117**
			03060.110	**Curing**									
				Liquid Curing Compounds	120,000.00 sf	0.11 /sf	0.01 /sf	-	-	-	0.12 /sf	14,416	0.096
				Curing		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**14,416**	**0.096**
			03060.120	**Hardener**									
				Seal Floors	120,000.00 sf	0.11 /sf	0.05 /sf	-	-	-	0.16 /sf	19,456	0.130
				Hardener		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**19,456**	**0.130**
			03110.260	**Forms- S-O-G**									
				S.O.G. Edge Form < 1'	1,266.67 sf	8.15 /sf	0.35 /sf	-	-	-	8.49 /sf	10,759	0.072
				Forms- S-O-G		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**10,759**	**0.072**
			03110.560	**Forms- Strip & Oil**									
				Strip & Oil SOG Form	1,266.67 sf	0.27 /sf	-	-	-	-	0.27 /sf	347	0.002
				Forms- Strip & Oil		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**347**	**0.002**
			03150.120	**Vapor Barrier**									
				6 Mil. Vapor Barrier	120,000.00 sf	0.17 /sf	0.01 /sf	-	-	-	0.18 /sf	21,161	0.141
				Vapor Barrier		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**21,161**	**0.141**
			03200.170	**Rebar- SOG**									
				SOG Rebar # 4	29.69 tn	1,153.68 /tn	519.75 /tn	-	-	-	1,673.42 /tn	49,677	0.331
				SOG Rebar # 4	29.45 tn	1,153.68 /tn	519.74 /tn	-	-	-	1,673.42 /tn	49,277	0.328
				Rebar- SOG		**/ton**	**/ton**	**/to n**	**/ton**	**/ton**	**/ton**	**98,954**	**0.659**
			03220.100	**Wire Mesh- Rolls**									
				Mesh Support - bricks	13,651.00 ea	0.17 /ea	0.19 /ea	-	-	-	0.36 /ea	4,844	0.032
				Wire Mesh- Rolls		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**4,844**	**0.032**
			03300.010	**Concrete- Buy**									
				4000 psi Concrete	2,962.96 cy	-	105.00 /cy	-	-	-	105.00 /cy	311,111	2.073
				Concrete- Buy		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**311,111**	**2.073**
			03310.170	**Place- S-O-G**									
				Pump Place Slab on Grade	2,962.96 cy	30.13 /cy	-	-	-	-	30.13 /cy	89,259	0.595
				Place- S-O-G		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**89,259**	**0.595**
			03350.100	**Finish Flatwork**									
				Finish- Hard Trowel	120,000.00 sf	0.92 /sf	0.03 /sf	-	-	-	0.95 /sf	113,646	0.757
				Finish Flatwork		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**113,646**	**0.757**
				Barge Dock								701,515	4.674

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		Dock											
			02320.070	**Backfill Soil/Rock Fill**									
				Gravel fill at Dock	133,333.34 cy	8.11 /cy	2.50 /cy	-		-	10.61 /cy	1,414,511	9.424
				Backfill Soil/Rock Fill		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,414,511**	**9.424**
			02451.118	**Sheetpiling**									
				Sheetpiling Face	60,000.00 sf	-	-	33.68 /sf	-	-	33.68 /sf	2,020,800	13.463
				Sheetpiling Tails	37,800.00 sf	-	-	33.68 /sf	-	-	33.68 /sf	1,273,104	8.482
				Sheetpiling		**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**3,293,904**	**21.945**
			02480.185	**Mooring & Fenders**									
				TWIN CONE PMF, SCN600 (E0.8)	6.00 ea			27,000.00 /ea	-	-	27,000.00 /ea	162,000	1.079
				PNEUMATIC FENDER (10kPa), 2000x3500	4.00 ea			17,000.00 /ea	-	-	17,000.00 /ea	68,000	0.453
				MOORING BOLLARD	8.00 ea			2,000.00 /ea	-	-	2,000.00 /ea	16,000	0.107
				PMF SUPPORT STRUCTURE (1200 LB)	6.00 ea			3,700.00 /ea	-	-	3,700.00 /ea	22,200	0.148
				PNEUMATIC SUPPORT STRUCTURE (7500 LB)	4.00 ea			23,000.00 /ea	-	-	23,000.00 /ea	92,000	0.613
				PMF ANCHOR BOLTS	48.00 ea			500.00 /ea	-	-	500.00 /ea	24,000	0.160
				PNEUMATIC FENDER ANCHOR BOLTS	128.00 ea			500.00 /ea	-	-	500.00 /ea	64,000	0.426
				PMF INSTALLATION	6.00 ea			5,000.00 /ea	-	-	5,000.00 /ea	30,000	0.200
				PNUEMATIC FENDER INSTALLATION	4.00 ea			3,000.00 /ea	-	-	3,000.00 /ea	12,000	0.080
				BOLLARD INSTALLATION	1.00 ea			2,000.00 /ea	-	-	2,000.00 /ea	2,000	0.013
				Mooring & Fenders		**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**492,200**	**3.279**
				Dock								5,200,615	34.649

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		Fuel Xfer											
			02317.000	**Earthwork**									
				Exc Trnch W/hoe Med Hard	1,362.96 cuyd	9.51 /cuyd		-	5.95 /cuyd	-	15.46 /cuyd	21,068	0.140
				Backfill Native Med Hard	939.26 cuyd	7.20 /cuyd		-	6.39 /cuyd	-	13.59 /cuyd	12,763	0.085
				Bobtail (Truck/trailer) 24cy (1 - 3 Mile)	423.70 cuyd	0.56 /cuyd		-	0.60 /cuyd	-	1.16 /cuyd	492	0.003
				Earthwork								**34,323**	**0.229**
			02502.012	**Trench Shoring**									
				Trench Box 8' Deep	4,000.00 lf	-	2.85 /lf	-		-	2.85 /lf	11,400	0.076
				Trench Shoring		/sf	/sf	/sf	/sf	/sf	/sf	**11,400**	**0.076**
			02502.014	**Pipe Bedding**									
				Pipe Bedding - Crushed Rock	205.39 cy	2.19 /cy	15.60 /cy	-		-	17.79 /cy	3,654	0.024
				Pipe Bedding		/cy	/cy	/cy	/cy	/cy	/cy	**3,654**	**0.024**
			02502.016	**Pipe Cover**									
				Pipe Zone - Crushed Rock	205.39 cy	2.19 /cy	15.60 /cy	-		-	17.79 /cy	3,654	0.024
				Pipe Cover		/cy	/cy	/cy	/cy	/cy	/cy	**3,654**	**0.024**
			09960.010	**Painting- Pipe**									
				Coating, Prime & Finish Enamel	13,089.97 sf	1.21 /sf	0.27 /sf	-	-	-	1.48 /sf	19,320	0.129
				Coating, Prime & Finish Enamel	6,937.68 sf	1.21 /sf	0.27 /sf	-	-	-	1.48 /sf	10,239	0.068
				Coating, Prime & Finish Enamel	6,937.68 sf	1.21 /sf	0.27 /sf	-	-	-	1.48 /sf	10,239	0.068
				Coating, Prime & Finish Enamel	4,712.39 sf	1.05 /sf	0.27 /sf	-	-	-	1.32 /sf	6,214	0.041
				Painting- Pipe		/sf	/sf	/sf	/sf	/sf	/sf	**46,013**	**0.307**
			11210.920	**Pumps- Transfer**									
				Pumps Transfer 6" ASME	2.00 ea	1,725.01 /ea	4,500.00 /ea	-	-	-	6,225.01 /ea	12,450	0.083
				Pumps Transfer 6" ASME	1.00 ea	2,874.97 /ea	10,000.00 /ea	-	-	-	12,874.97 /ea	12,875	0.086
				Pumps- Transfer		/ea	/ea	/ea	/ea	/ea	/ea	**25,325**	**0.169**
			15061.013	**CS Std Wt Pipe PE**									
				CS Sch 40 A53 SMLS PE 4"	4,000.00 lf	15.39 /lf	3.80 /lf	-	-	-	19.19 /lf	76,755	0.511
				CS Std Wt Pipe PE		/lf	/lf	/lf	/lf	/lf	/lf	**76,755**	**0.511**
			15061.050	**CS S80 XH Pipe PE**									
				CS Sch 80 A53 SMLS PE 6"	4,000.00 lf	24.01 /lf	13.80 /lf	-	-	-	37.81 /lf	151,226	1.008
				CS Sch 80 A53 SMLS PE 6"	4,000.00 lf	24.01 /lf	13.80 /lf	-	-	-	37.81 /lf	151,226	1.008
				CS Sch 80 A53 SMLS PE 10"	4,000.00 lf	38.78 /lf	35.00 /lf	-	-	-	73.78 /lf	295,118	1.966
				CS S80 XH Pipe PE		/lf	/lf	/lf	/lf	/lf	/lf	**597,570**	**3.981**
			15061.130	**CS Flange WN**									
				CS Std Flange WN 150 RF Sch 40 4	50.00 ea	166.20 /ea	37.41 /ea	-	-	-	203.61 /ea	10,180	0.068
				CS Std Flange WN 150 RF Sch 40 6	50.00 ea	193.90 /ea	56.03 /ea	-	-	-	249.93 /ea	12,496	0.083
				CS Std Flange WN 150 RF Sch 40 6	50.00 ea	193.90 /ea	56.03 /ea	-	-	-	249.93 /ea	12,496	0.083
				CS Std Flange WN 150 RF Sch 40 10	50.00 ea	313.93 /ea	143.79 /ea	-	-	-	457.72 /ea	22,886	0.152
				CS Flange WN		/ea	/ea	/ea	/ea	/ea	/ea	**58,059**	**0.387**
			15101.080	**Valves - Cast Steel Gate**									
				Cast Steel Gate Flg 150# 4"	8.00 ea	120.65 /ea	700.00 /ea	-	-	-	820.65 /ea	6,565	0.044
				Cast Steel Gate Flg 150# 6"	8.00 ea	176.05 /ea	1,120.00 /ea	-	-	-	1,296.05 /ea	10,368	0.069
				Cast Steel Gate Flg 150# 6"	8.00 ea	176.05 /ea	1,120.00 /ea	-	-	-	1,296.05 /ea	10,368	0.069
				Cast Steel Gate Flg 150# 10"	8.00 ea	324.39 /ea	2,810.00 /ea	-	-	-	3,134.39 /ea	25,075	0.167
				Valves - Cast Steel Gate		/ea	/ea	/ea	/ea	/ea	/ea	**52,377**	**0.349**
			15120.005	**Bolt - Nut & Gasket Sets**									
				Bolt - Nut & Gasket Set 150# 4	50.00 ea	9.81 /ea	9.00 /ea	-	-	-	18.81 /ea	941	0.006
				Bolt - Nut & Gasket Set 150# 6	50.00 ea	11.45 /ea	14.00 /ea	-	-	-	25.45 /ea	1,272	0.008
				Bolt - Nut & Gasket Set 150# 6	50.00 ea	11.45 /ea	14.00 /ea	-	-	-	25.45 /ea	1,272	0.008
				Bolt - Nut & Gasket Set 150# 10	50.00 ea	20.44 /ea	30.00 /ea	-	-	-	50.44 /ea	2,522	0.017
				Bolt - Nut & Gasket Sets		/ea	/ea	/ea	/ea	/ea	/ea	**6,008**	**0.040**
			15140.005	**Pipe Support**									
				Pipe Support - Large Bore 2 1/2" - 6"	500.00 ea	123.11 /ea	50.00 /ea	-	-	-	173.11 /ea	86,555	0.577

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
			15140.005	**Pipe Support**									
				Pipe Support - Large Bore 2 1/2" - 6"	500.00 ea	123.11 /ea	50.00 /ea	-	-	-	173.11 /ea	86,555	0.577
				Pipe Support - Large Bore 2 1/2" - 6"	500.00 ea	107.05 /ea	50.00 /ea	-	-	-	157.05 /ea	78,526	0.523
				Pipe Support - Large Bore 8" - 12"	500.00 ea	246.22 /ea	80.00 /ea	-	-	-	326.22 /ea	163,110	1.087
				Pipe Support		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**414,746**	**2.763**
			15300.700	**Non Distructive Pipe Test**									
				Radiographic Inspection 4"	40.00 ea		40.00 /ea	-	30.00 /ea	-	70.00 /ea	2,800	0.019
				Radiographic Inspection 6"	40.00 ea		40.00 /ea	-	30.00 /ea	-	70.00 /ea	2,800	0.019
				Radiographic Inspection 6"	40.00 ea		40.00 /ea	-	30.00 /ea	-	70.00 /ea	2,800	0.019
				Radiographic Inspection 10"	40.00 ea		60.00 /ea	-	30.00 /ea	-	90.00 /ea	3,600	0.024
				Non Distructive Pipe Test								**12,000**	**0.080**
			16001.250	**Misc Site Work**									
				Electrical Utility Allowance	1.00 ls	-	-	50,000.00 /ls	-	-	50,000.00 /ls	50,000	0.333
				Misc Site Work		**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**50,000**	**0.333**
				Fuel Xfer								1,391,884	9.273

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		Mob Demob		Mobilization/Demobilization									
			01910.000	Equipment									
				Construction Equipment Mobilizations	1.00 LS	28,750.00 /LS		300,000.00 /LS		-	328,750.00 /LS	328,750	2.190
				Equipment		/hr	/hr	/hr	/hr	/hr	/hr	328,750	2.190
				Mob Demob								328,750	2.190
				Mobilization/Demobilization									

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		Warehouse											
			02720.100	**Base**									
				Crushed Gravel	92.59 cy	2.03 /cy	8.89 /cy	-	0.86 /cy	-	11.77 /cy	1,090	0.007
				Base		/cy	/cy	/cy	/cy	/cy	/cy	**1,090**	**0.007**
			02740.100	**Asphalt Paving**									
				Asphalt Base Course 2"	555.56 sy	-	-	4.40 /sy	-	-	4.40 /sy	2,444	0.016
				Asphalt Top Course 2"	555.56 sy	-	-	4.00 /sy	-	-	4.00 /sy	2,222	0.015
				Asphalt Paving		/tn	/tn	/tn	/tn	/tn	/tn	**4,667**	**0.031**
			02766.100	**Pavement Marking**									
				Parking Spaces	45.00 ea	-	-	5.00 /ea	-	-	5.00 /ea	225	0.001
				Parking Spaces Handicap	5.00 ea	-	-	10.00 /ea	-	-	10.00 /ea	50	0.000
				Painted Crosswalks	200.00 sf	-	-	1.00 /sf	-	-	1.00 /sf	200	0.001
				Painted Handicap Symbol	5.00 ea	-	-	65.00 /ea	-	-	65.00 /ea	325	0.002
				Painted Arrows	5.00 ea	-	-	10.00 /ea	-	-	10.00 /ea	50	0.000
				Painted Letters	15.00 ea	-	-	10.00 /ea	-	-	10.00 /ea	150	0.001
				Pavement Marking		/lf	/lf	/lf	/lf	/lf	/lf	**1,000**	**0.007**
			05510.200	**Fabricated Steel**									
				Metal Frame Warehouse 150 x 75	11,250.00 sf	-	-	125.00 /sf	-	-	125.00 /sf	1,406,250	9.369
				Fabricated Steel		/ls	/ls	/ls	/ls	/ls	/ls	**1,406,250**	**9.369**
				Warehouse								1,413,007	9.414
				11 - Delta Western								9,035,770	60.200
				Alt 03								**9,035,770**	**60.200**

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	2,268,336		37,576.754 hrs	
Material	1,200,170			
Subcontract	5,548,021			
Equipment	19,244		5,586.112 hrs	
Other				
	9,035,771	9,035,771		
General Conditions	722,862			8.000 %
Material Take-off Allowance	722,862			8.000 %
Labor Overtime	567,084			25.000 %
Bond	75,542			
Overhead & Profit	1,355,366			15.000 %
Contingency	1,807,154			20.000 %
Market Conditions Allowance	722,862			8.000 %
Total		***15,009,503***		

Basis for Unalaska Airport Runway Shore Protection Design

TO: File

COPIES: Eric Cutbirth

FROM: Don Kingery

DATE: November 7, 2007 revised February 22, 2008

The following provides a summary of the basis for design for the shoreline armor units for the Unalaska Airport runway extension.

Unalaska Bay, shown in Figure 1, is located on the north side of Unalaska Island on the Aleutian Island chain. The mouth of the bay faces north toward the Bering Sea. The Unalaska Airport runway is located on the south side of Amaknak Island inside Unalaska Bay.

The selected runway alternative includes extension of the runway 250 feet to the northwest into Unalaska Bay and 250 feet to the southeast inside of Dutch Harbor. Slope protection is required for the end of the runway extending into Unalaska Bay, the shoreline along the southwest edge of the runway, and the southeast end of the runway extending into Dutch Harbor, shown in Figure 1 as "A", "B", and "C", respectively.

Figure 1. Location of shore protection

The shoreline will be exposed to waves generated by wind locally within Unalaska Bay and by ocean swell that propagates into the harbor. The location of the runway on the south side of Amaknak Island shelters it from direct exposure to swell entering the bay from the north.

Basis for design used for sizing shore protection at each location was as follows:

Head of Runway – "A"

Design wave at the head of the runway was estimated by modeling propagation of swell entering Unalaska Bay to the site. The Corps of Engineers model BOUSS2D was used to model the propagation of a 28 foot, 13 second wave (based on a 1982 Dames & Moore wave hindcast study) into the study area. Modeling results predicted an 18 foot wave at the head of the runway.

Core-loc armor unit sizing was performed using Hudson's equation incorporated into the Core-loc North America web site with a stability coefficient of 13 as recommended for use on breakwater heads. Note: the web-based Core-loc calculator used for preliminary sizing of the armor units uses metric units. All dimensions and weights presented in this document have been converted to English units.

http://www.core-loc.com/cldesign.htm

Resulting 10-ton units are consistent with 8 ton dolos that are on the head of the existing runway and appear to have performed adequately.

Size of first underlayer was based on quarrystone sizes calculated by the Core-loc web based calculator. Subsequent underlayers were sized based on guidance provided in the Coastal Engineering Manual (CEM). The range of median rock sizes for underlayers is provided to allow some flexibility when assessing the ability of local quarries to meet rock size requirements.

Layer	Unit size/Median Rock Weight	Layer thickness
Core-loc	9.9 tons	7.7 feet
Quarrystone Underlayer	1 to 2 tons	4.6 to 5.9 feet
Second Underlayer	99 to 197 lbs	2.9 to 3.6 feet

Southwest Shoreline along Runway – "B"

3.3 ton Core-loc units on the south shoreline of the runway correspond to a 13 foot significant wave based on results of modeling and performance of the existing treatment. Core-loc armor unit sizing was performed using Hudson's equation incorporated into the Core-loc North America web site with a stability coefficient of 16 as recommended for use on breakwater trunks.

Layer	Unit size/Median Rock Weight	Layer thickness
Core-loc	3.3 tons	5.4 feet
Quarrystone Underlayer	0.33 to 0.66 tons	3.2 to 4 feet
Second Underlayer	33 to 66 lbs	1.5 feet

Inside Dutch Harbor – "C"

Discussions with Alaska DOT coastal engineer, Harvey Smith[1], indicate that waves approaching Dutch Harbor from the north are largely spent by the time they enter the harbor due to refraction into the spit. Diffraction into the harbor will reduce this further. Preliminary wave analysis supported this conclusion and therefore it was assumed that worst case conditions for waves in Dutch Harbor were due to locally generated wind waves inside Iliuliuk Bay combined with waves generated inside Dutch Harbor.

A 50-year return period wind speed of 65 mph, based on wind data obtained for the Unalaska Airport, was used for calculation of wave conditions at the harbor end of the runway.

The height of wind waves generated in Iliuliuk Bay and Dutch Harbor were calculated using wave growth equations incorporated into the USACE Automated Coastal Engineering System (ACES).

Waves generated in Iliuliuk Bay

Approximately 4 mile fetch (shown in Figure 2) resulted in a 5.5 foot / 4.4 second wave approaching the mouth of harbor at ~30 deg angle

Wave height will be reduced due to diffraction around the head of the jetty.

Given:

- 3500 foot harbor opening
- Distance to runway ~ 4400 feet at ~120 deg
- Calculated wavelength ~ 99 ft (4.4 sec wave in 20 m deep water)
- Calculated Radius/Wavelength = 44

[1] Phone Conversation between Don Kingery, CH2M HILL and Harvey Smith, Alaska DOT, March 22, 2007

From Figure 2-37 of the Shore Protection Manual, the diffraction coefficient, K < 0.13

Wave height at shoreline from waves generated in Iliuliuk Bay = 5.5 * 0.13 = 0.72 ft

Waves Generated in Dutch Harbor

Fetch down axis of Dutch Harbor ~ 8600 feet

Calculated wave height ~ 3.5 feet

Total design wave height

Estimate 4.8 foot design wave (3.5 foot + 0.72 foot = 4.2 foot + 15%)

Armor Layer Size

Armor sizes were calculated using ACES incorporated into the Coastal Engineering Design and Analysis System (CEDAS), Version 2.01. Underlayers were calculated based on guidance provided in the CEM.

Armor layer, W1 = 1200 lbs, 3.9 feet thick

Underlayer, W2 = 120 lbs, 1.8 feet thick

Core W = 0.2 to 6 lbs

Armor layer size calculated above is consistent with that used at the boat ramp adjacent to the site.

Figure 2. Fetch for waves generated in Iliuliuk Bay

Appendix I
Delta Western Fuel Dock Relocation Analysis

Note:

Subsequent to the preparation of this technical memo, it was decided by the FAA and ADOT&PF to focus on other higher priority safety enhancements at DUT. The fuel dock is currently not proposed for relocation.

MEMORANDUM CH2MHILL

Delta Western Fuel Dock Relocation Analysis

TO: Tom Klin/NYC

FROM: Alisa Moffat/SEA

DATE: May 18, 2007

PROJECT NUMBER: 322661.P2.02.PL

The purpose of this memo is to discuss the feasibility of relocating the Delta Western Fuel Dock out of the Unalaska Airport approach. The Delta Western Fuel Dock provides marine fuel for all sizes and types of vessels, as well as offloading fuels (heating oil, diesel, aviation gas, and gasoline) that is stored at an upland tank farm for distribution to residents and businesses in Unalaska. Delta Western also sells packaged fuel products and lubricants at this site. Currently, when boats that are taller than 55 feet are docked at the fuel dock, they are an obstruction of the airport's Part 77 surfaces. At any given time there a typically at least a few ships docked at this facility, usually ranging from 30 to 100 feet in length. Larger fuel tankers and cruise ship vessels, which can reach approximately 800 feet in length and 200 feet in height, call approximately twelve times a year, with approximately six cruise ships arriving between spring and fall, and the fuel tankers calling approximately every other month to offload fuel. The busiest months for this facility are from June to September, during which there may be up to 10 ships per day docked and/or re-fueling at the facility. Ships may be docked for 24 hours up to one week, with their length of stay often affected by weather[1]. Although airport activity does increase from November through March, when additional flights are often chartered for fish processor employees and cargo, scheduled airport activity is consistent throughout the year, and therefore a potential conflict is always present.

In order to remedy this situation, the dock would need to be relocated to outside this approach. Relocation may require moving only the dock, or both the dock and fuel farm facility. A number of factors contribute to the feasibility of this action, including:

1) Land availability (Upland and tidelands)
2) Infrastructure availability
3) Accessibility for customers
4) Cost
5) Additional liabilities

These factors are discussed below in detail, followed by an assessment of a relocation site based on these factors. Information was collected from the City of Unalaska Planning and

[1] Telephone conversations with Scott Posey, Operations Manager of Delta Western, and Tim Hunter, Site Manager, May 11, 2007

Public Utilities departments, Delta Western, and the Alaska Department of Environmental Conservation.

Factors Affecting Feasibility of Delta Western Dock Relocation

1) **Land**: Currently, Delta Western leases their facilities from the Ounalashka Corporation (OC), and FDOC, a subsidiary of the OC. Most upland in Unalaska is owned by either the federal, state or local government, or by the OC. Tideland ownership may belong to any of the above entities as well, and ownership is not always correlated with the adjacent upland ownership. Subsurface rights are owned by the Aleut Corporation. Buildings and other site improvements, including the dock, fuel tank farm, pipelines, warehouse, and a truck loading rack, are owned by Delta Western.

   Delta Western entered into a 30-year lease with the OC for this property approximately 3 years ago[2]. Any new site would likely be leased from the OC and/or state or local government. Land for development, especially along shorelines, is fairly limited in Unalaska due to existing development and topography.

2) **Infrastructure availability**: Existing infrastructure includes approximately 20 fuel tanks with a total capacity of 300,000 barrels. Multiple pipelines run from the tanks to the dock and also on to the City powerhouse and the airport. New above-ground pipelines are planned for installation in 2007 as part of a joint site clean-up effort by Delta Western, Chevron, and the Army Corps of Engineers. This effort also includes removal of the existing subsurface pipelines and utilidors that have contaminated the soil and groundwater and are no longer in use. If a new fuel farm were to be constructed, it would need to meet State of Alaska standards for above-ground tanks. These standards can be found in 18 Alaska Administrative Code (AAC) 75.065-080. Tank farms with a capacity over 420,000 gallons are regulated by the Alaska Department of Environmental Conservation. Electricity and water are currently available on site.

3) **Accessibility for customers**: Delta Western offloads fuels from fuel tankers and barges at its current dock for storage at two tank farms nearby, and provides fuel for marine vessels of various sizes at the dock. They also provide diesel fuel for the City powerhouse and various fuels for use at the airport via pipelines from the tank farm, and distribute heating oil to homes and commercial customers from the tank farm. Proximity to marine traffic and other services is essential for operation of this facility, and therefore only locations directly accessible for traffic coming to and from Dutch Harbor are considered acceptable location sites.

4) **Cost**: Costs related to relocation of the dock and/or tank farm may include, but are not limited to:

   - Construction of new dock
   - Construction of new fuel farm
   - Construction of new pipelines
   - Construction of new infrastructure if not available on site (electricity and water)

[2] Telephone conversation with Kirk Payne, COO of Delta Western, April 13, 2007

- Construction of road access, if not directly located on the road system
- Dredging and/or material excavation for fill material
- Engineering, permitting, and land acquisition (or leasing) costs

5) **Additional liabilities**: This includes items not included in the cost estimate in Item #4. These items include historic significance and existing contamination.

   The site of the Delta Western fuel dock has been used for commercial purposes for well over 100 years. The property was originally platted for purchase by the North American Commercial Company in 1892, at which time it had a dock and a number of associated buildings for operation of the dock and living quarters for employees. Use of this area for marine-oriented commercial purposes has continued since that time, and the dock is considered a contributing structure to the Dutch Harbor Naval Operating Base and Fort Mears National Historic Landmark (NHL). Use of uplands for fuel storage began here prior to WWII. All of Amaknak Island has a long history of human inhabitation, and is within the Dutch Harbor Naval Operating Base and Fort Mears NHL. Subsurface work at any location in this area carries some chance of encountering historic or prehistoric artifacts.

   Due to the historic use of the property and adjacent properties for storage and transport of fuels, as well as the bombing of fuel storage facilities in this area during World War II, contamination of soil, surface water and groundwater in this area is extensive. Clean-up of a number of properties has been ongoing for over a decade, but complete clean-up in most locations is not considered feasible, and higher levels of some contaminants will be allowed to remain under the "the ten times rule", which applies when ADEC and the property owner determine that the site is not a current or future likely source of drinking water. ADEC agreed to these alternate clean-up levels in May 2006. The Delta Western fuel tanks and pipeline are primarily within the "Rocky Point" site, clean-up of which is being funded by Delta Western, Chevron (the previous owner), and the Army Corps of Engineers, because the area is considered a "Formerly Used Defense Site (FUDS)". Contaminants in this area include bunker C oil, diesel fuel, PCBs, gasoline range organics (GRO), diesel range organics (DRO), Jet A fuel, and aviation gas. While clean-up is ongoing at these sites and responsible parties have been identified, contaminated soil and groundwater could potentially affect construction in this area or decommissioning of existing structures.

Potential Relocation Sites

An evaluation of potential locations for a new dock looked at availability of upland and tidelands in Dutch Harbor and Iliuliuk Bay that was outside of the runway approach, while also having the ability to connect to existing infrastructure. Sites outside of Dutch Harbor and Iliuliuk Bay were not considered because it is expected that marine customers are less likely travel to other locations for fuel because Dutch Harbor is the center of the fishing and shipping operations in Unalaska. In addition, sites further away from the Unalaska city center could result in significant additional infrastructure and operating costs.

The location that best met these criteria was determined to be along Ballyhoo Road, north of the airport and adjacent to the south end of the Unalaska Marine Center (UMC, or the "city dock"). This site was selected because of it's proximity to the current tank farm, the level of existing infrastructure, the availability of suitable tidelands and uplands, and accessibility for customers. This site would allow Delta Western to continue providing the same services to their customers with a minimum of additional infrastructure and operating expenses. This location would relocate only the dock, and new pipeline would be run below or at grade along Ballyhoo Road to the existing pipeline, preventing the need for relocation of the existing tank farm. A cursory evaluation of this site in relation to the factors previously discussed follows:

1) **Land:** Uplands in this area are owned by the OC, while the tidelands are owned by the City of Unalaska. New leases would need to be created, and the lease on the current property would be terminated. The terms of the lease are unknown and therefore so are any complications related to premature termination of this lease. There is approximately 2,000 feet available between the south end of the UMC and the limits of runway Object Free Area. A replacement of the existing dock would require at least 820 feet of dock face, and it would need to be at least 35 feet wide, with vehicle access. The maximum draft for vessels docking at this facility is 42 feet, which could be accommodated at a distance of approximately 200 feet from shore, the same distance the UMC extends.

   The availability of tideland in this area may be limited, as the Port of Dutch Harbor may seek to expand the UMC to the south in the future. Currently, the UMC is the only public facility in Unalaska that can accommodate vessels longer than 200 feet, and other facilities at this site include a 30-ton crane and rail system used by Horizon Lines for containerized cargo, and North Pacific Fuel's fueling operations. The Port anticipates improvements will be needed to the existing dock in the near future to accommodate new, longer Horizon Line ships (700 to 800 feet), and that the UMC could reach its sustainable practical capacity (80 percent utilization) between 2010 and 2014[3]. In addition, the Port of Dutch Harbor has received a $7.5 million federal grant for a new ferry terminal, which may relocate from the north end of the dock to the south end. [4]

2) **Infrastructure Availability**: This potential dock location is in a developed area with most of the necessary infrastructure already in place. Access to electricity and water are available. Upland infrastructure required by Delta Western would include an approximately 10,000 square foot warehouse and minimal parking. A minimum of five pipelines would be required for different fuel types.

3) **Accessibility for customers**: The proposed location is very close to the current site, and should provide the same accessibility as the current site. The dock would still be in Dutch Harbor, and should provide equivalent access for vessels both offloading fuel and refueling.

4) **Cost**: This potential site is estimated to cost approximately $15 million to develop for the proposed purpose. This estimate includes construction of a new dock and pipelines connecting to the existing pipelines. Not included are costs associated with

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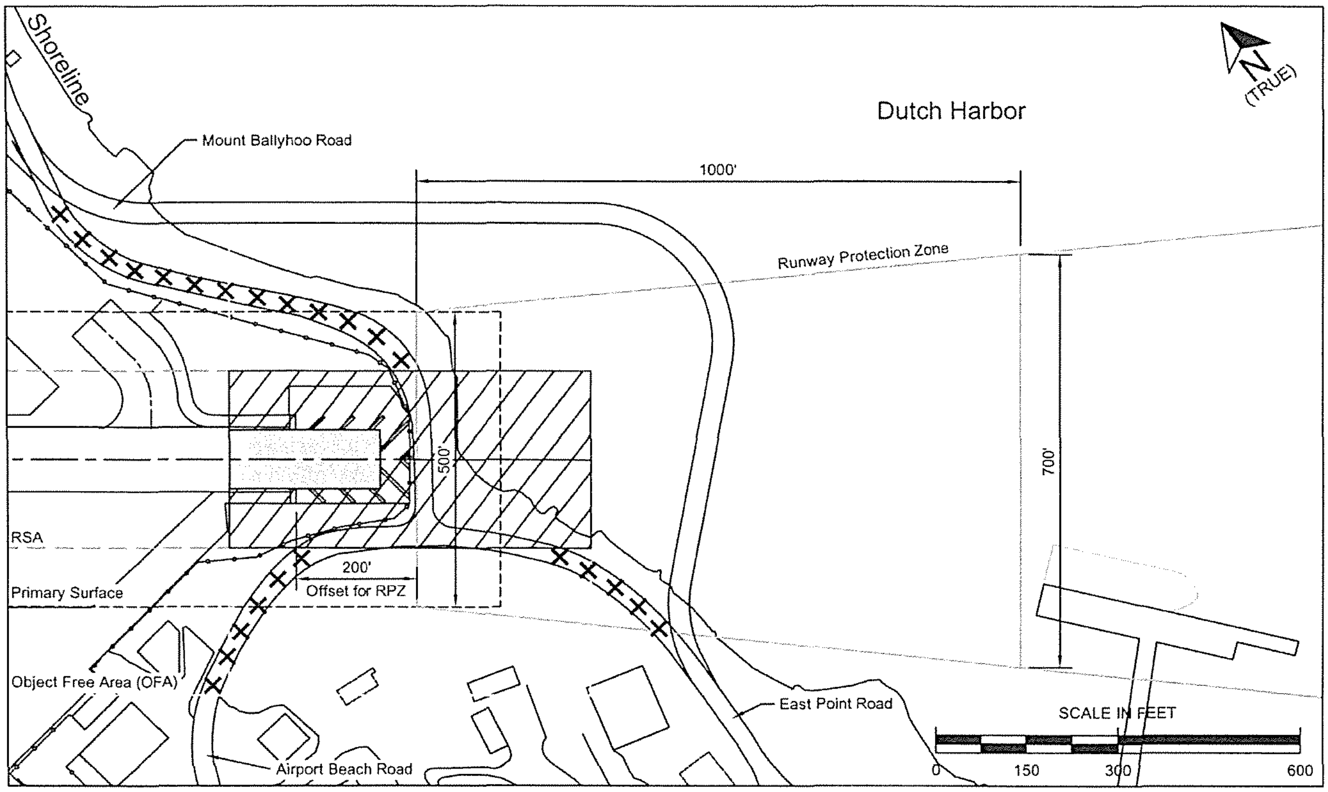
[3] *Technical Memorandum: Port and Harbor Ten-year Development Plan* (City of Unalaska 2004).

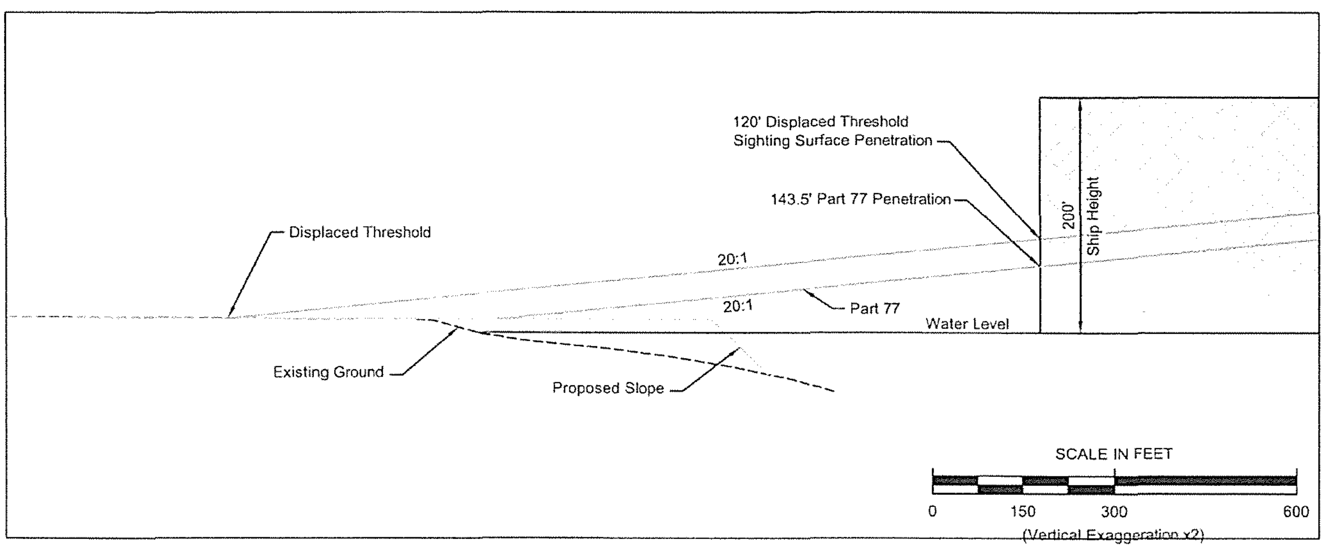
[4] Telephone conversation with Robin Hall, Unalaska Planning Director, May 4, 2007.

engineering, permitting, land lease negotiation and fees, and costs for connecting to existing utilities. This does not include any costs related to construction in areas with known hazardous contamination, such as Ballyhoo Road.

5) **Additional liabilities**: Additional liabilities may include some factors described above, such as expenses for constructing in a contaminated site, or encountering historic or cultural artifacts during construction. Construction of above ground pipelines would help to minimize such liabilities.



RUNWAY 30 - PLAN



RUNWAY 30 - PROFILE

CH2MHILL

Unalaska Airport Master Plan Update

Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091
AIP 3-02-012-2006

Runway 30
Plan and Profile

Exhibit X

Source: AC 150/5300-13 R8, Airport Design

May 2007

Spreadsheet Report

UARE Delta Western

Unalaska Airport Master Plan
Delta Western Unloading Dock Relocation Study R01
FPN # AIP 3-02-0082-1003 AIP 3-02-012-2006 AKAS 53091

Project name	UARE Delta Western
Estimator	R.Edgerton
Labor rate table	2006 Labor Burden
Equipment rate table	Equipment 2006
Bid date	4/19/2007
Est Log No.	07-0274
PM / Contact Name	K Green/SEA
Estimate Class 1-5	4
Report format	Sorted by 'Location/System/Bid Item/Phase' 'Detail' summary Paginate

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
Alt 03													
	11 - Delta Western												
		Barge Dock											
			02320.070	Backfill Soil/Rock Fill									
				Gravel fill at Slabs	740.74 cy	8.11 /cy	15.60 /cy	-		-	23.71 /cy	17,562	0.117
				Backfill Soil/Rock Fill		/cy	/cy	/cy	/cy	/cy	/cy	**17,562**	**0.117**
			03060.110	Curing									
				Liquid Curing Compounds	120,000.00 sf	0.11 /sf	0.01 /sf	-	-	-	0.12 /sf	14,416	0.096
				Curing		/sf	/sf	/sf	/sf	/sf	/sf	**14,416**	**0.096**
			03060.120	Hardener									
				Seal Floors	120,000.00 sf	0.11 /sf	0.05 /sf	-	-	-	0.16 /sf	19,456	0.130
				Hardener		/sf	/sf	/sf	/sf	/sf	/sf	**19,456**	**0.130**
			03110.260	Forms- S-O-G									
				S.O.G. Edge Form < 1'	1,266.67 sf	8.15 /sf	0.35 /sf	-	-	-	8.49 /sf	10,759	0.072
				Forms- S-O-G		/sf	/sf	/sf	/sf	/sf	/sf	**10,759**	**0.072**
			03110.560	Forms- Strip & Oil									
				Strip & Oil SOG Form	1,266.67 sf	0.27 /sf	-	-	-	-	0.27 /sf	347	0.002
				Forms- Strip & Oil		/sf	/sf	/sf	/sf	/sf	/sf	**347**	**0.002**
			03150.120	Vapor Barrier									
				6 Mil. Vapor Barrier	120,000.00 sf	0.17 /sf	0.01 /sf	-	-	-	0.18 /sf	21,161	0.141
				Vapor Barrier		/sf	/sf	/sf	/sf	/sf	/sf	**21,161**	**0.141**
			03200.170	Rebar- SOG									
				SOG Rebar # 4	29.69 tn	1,153.68 /tn	519.75 /tn	-	-	-	1,673.42 /tn	49,677	0.331
				SOG Rebar # 4	29.45 tn	1,153.68 /tn	519.74 /tn	-	-	-	1,673.42 /tn	49,277	0.328
				Rebar- SOG		/ton	/ton	/ton	/ton	/ton	/ton	**98,954**	**0.659**
			03220.100	Wire Mesh- Rolls									
				Mesh Support - bricks	13,651.00 ea	0.17 /ea	0.19 /ea	-	-	-	0.36 /ea	4,844	0.032
				Wire Mesh- Rolls		/sf	/sf	/sf	/sf	/sf	/sf	**4,844**	**0.032**
			03300.010	Concrete- Buy									
				4000 psi Concrete	2,962.96 cy	-	105.00 /cy	-	-	-	105.00 /cy	311,111	2.073
				Concrete- Buy		/cy	/cy	/cy	/cy	/cy	/cy	**311,111**	**2.073**
			03310.170	Place- S-O-G									
				Pump Place Slab on Grade	2,962.96 cy	30.13 /cy	-	-	-	-	30.13 /cy	89,259	0.595
				Place- S-O-G		/cy	/cy	/cy	/cy	/cy	/cy	**89,259**	**0.595**
			03350.100	Finish Flatwork									
				Finish- Hard Trowel	120,000.00 sf	0.92 /sf	0.03 /sf	-	-	-	0.95 /sf	113,646	0.757
				Finish Flatwork		/sf	/sf	/sf	/sf	/sf	/sf	**113,646**	**0.757**
				Barge Dock								701,515	4.674

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		Dock											
			02320.070	**Backfill Soil/Rock Fill**									
				Gravel fill at Dock	133,333.34 cy	8.11 /cy	2.50 /cy	-		-	10.61 /cy	1,414,511	9.424
				Backfill Soil/Rock Fill		/cy	/cy	/cy	/cy	/cy	/cy	**1,414,511**	**9.424**
			02451.118	**Sheetpiling**									
				Sheetpiling Face	60,000.00 sf	-	-	33.68 /sf	-	-	33.68 /sf	2,020,800	13.463
				Sheetpiling Tails	37,800.00 sf	-	-	33.68 /sf	-	-	33.68 /sf	1,273,104	8.482
				Sheetpiling		/ls	/ls	/ls	/ls	/ls	/ls	**3,293,904**	**21.945**
			02480.185	**Mooring & Fenders**									
				TWIN CONE PMF, SCN600 (E0.8)	6.00 ea			27,000.00 /ea	-	-	27,000.00 /ea	162,000	1.079
				PNEUMATIC FENDER (10kPa), 2000x3500	4.00 ea			17,000.00 /ea	-	-	17,000.00 /ea	68,000	0.453
				MOORING BOLLARD	8.00 ea			2,000.00 /ea	-	-	2,000.00 /ea	16,000	0.107
				PMF SUPPORT STRUCTURE (1200 LB)	6.00 ea			3,700.00 /ea	-	-	3,700.00 /ea	22,200	0.148
				PNEUMATIC SUPPORT STRUCTURE (7500 LB)	4.00 ea			23,000.00 /ea	-	-	23,000.00 /ea	92,000	0.613
				PMF ANCHOR BOLTS	48.00 ea			500.00 /ea	-	-	500.00 /ea	24,000	0.160
				PNEUMATIC FENDER ANCHOR BOLTS	128.00 ea			500.00 /ea	-	-	500.00 /ea	64,000	0.426
				PMF INSTALLATION	6.00 ea			5,000.00 /ea	-	-	5,000.00 /ea	30,000	0.200
				PNUEMATIC FENDER INSTALLATION	4.00 ea			3,000.00 /ea	-	-	3,000.00 /ea	12,000	0.080
				BOLLARD INSTALLATION	1.00 ea			2,000.00 /ea	-	-	2,000.00 /ea	2,000	0.013
				Mooring & Fenders		/lf	/lf	/lf	/lf	/lf	/lf	**492,200**	**3.279**
				Dock								5,200,615	34.649

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		Fuel Xfer											
			02317.000	**Earthwork**									
				Exc Trnch W/hoe Med Hard	1,362.96 cuyd	9.51 /cuyd		-	5.95 /cuyd	-	15.46 /cuyd	21,068	0.140
				Backfill Native Med Hard	939.26 cuyd	7.20 /cuyd		-	6.39 /cuyd	-	13.59 /cuyd	12,763	0.085
				Bobtail (Truck/trailer) 24cy (1 - 3 Mile)	423.70 cuyd	0.56 /cuyd		-	0.60 /cuyd	-	1.16 /cuyd	492	0.003
				Earthwork								**34,323**	**0.229**
			02502.012	**Trench Shoring**									
				Trench Box 8' Deep	4,000.00 lf	-	2.85 /lf	-		-	2.85 /lf	11,400	0.076
				Trench Shoring		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**11,400**	**0.076**
			02502.014	**Pipe Bedding**									
				Pipe Bedding - Crushed Rock	205.39 cy	2.19 /cy	15.60 /cy	-		-	17.79 /cy	3,654	0.024
				Pipe Bedding		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**3,654**	**0.024**
			02502.016	**Pipe Cover**									
				Pipe Zone - Crushed Rock	205.39 cy	2.19 /cy	15.60 /cy	-		-	17.79 /cy	3,654	0.024
				Pipe Cover		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**3,654**	**0.024**
			09960.010	**Painting- Pipe**									
				Coating, Prime & Finish Enamel	13,089.97 sf	1.21 /sf	0.27 /sf	-	-	-	1.48 /sf	19,320	0.129
				Coating, Prime & Finish Enamel	6,937.68 sf	1.21 /sf	0.27 /sf	-	-	-	1.48 /sf	10,239	0.068
				Coating, Prime & Finish Enamel	6,937.68 sf	1.21 /sf	0.27 /sf	-	-	-	1.48 /sf	10,239	0.068
				Coating, Prime & Finish Enamel	4,712.39 sf	1.05 /sf	0.27 /sf	-	-	-	1.32 /sf	6,214	0.041
				Painting- Pipe		**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**/sf**	**46,013**	**0.307**
			11210.920	**Pumps- Transfer**									
				Pumps Transfer 6" ASME	2.00 ea	1,725.01 /ea	4,500.00 /ea	-	-	-	6,225.01 /ea	12,450	0.083
				Pumps Transfer 6" ASME	1.00 ea	2,874.97 /ea	10,000.00 /ea	-	-	-	12,874.97 /ea	12,875	0.086
				Pumps- Transfer		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**25,325**	**0.169**
			15061.013	**CS Std Wt Pipe PE**									
				CS Sch 40 A53 SMLS PE 4"	4,000.00 lf	15.39 /lf	3.80 /lf	-	-	-	19.19 /lf	76,755	0.511
				CS Std Wt Pipe PE		**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**76,755**	**0.511**
			15061.050	**CS S80 XH Pipe PE**									
				CS Sch 80 A53 SMLS PE 6"	4,000.00 lf	24.01 /lf	13.80 /lf	-	-	-	37.81 /lf	151,226	1.008
				CS Sch 80 A53 SMLS PE 6"	4,000.00 lf	24.01 /lf	13.80 /lf	-	-	-	37.81 /lf	151,226	1.008
				CS Sch 80 A53 SMLS PE 10"	4,000.00 lf	38.78 /lf	35.00 /lf	-	-	-	73.78 /lf	295,118	1.966
				CS S80 XH Pipe PE		**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**597,570**	**3.981**
			15061.130	**CS Flange WN**									
				CS Std Flange WN 150 RF Sch 40 4	50.00 ea	166.20 /ea	37.41 /ea	-	-	-	203.61 /ea	10,180	0.068
				CS Std Flange WN 150 RF Sch 40 6	50.00 ea	193.90 /ea	56.03 /ea	-	-	-	249.93 /ea	12,496	0.083
				CS Std Flange WN 150 RF Sch 40 6	50.00 ea	193.90 /ea	56.03 /ea	-	-	-	249.93 /ea	12,496	0.083
				CS Std Flange WN 150 RF Sch 40 10	50.00 ea	313.93 /ea	143.79 /ea	-	-	-	457.72 /ea	22,886	0.152
				CS Flange WN		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**58,059**	**0.387**
			15101.080	**Valves - Cast Steel Gate**									
				Cast Steel Gate Flg 150# 4"	8.00 ea	120.65 /ea	700.00 /ea	-	-	-	820.65 /ea	6,565	0.044
				Cast Steel Gate Flg 150# 6"	8.00 ea	176.05 /ea	1,120.00 /ea	-	-	-	1,296.05 /ea	10,368	0.069
				Cast Steel Gate Flg 150# 6"	8.00 ea	176.05 /ea	1,120.00 /ea	-	-	-	1,296.05 /ea	10,368	0.069
				Cast Steel Gate Flg 150# 10"	8.00 ea	324.39 /ea	2,810.00 /ea	-	-	-	3,134.39 /ea	25,075	0.167
				Valves - Cast Steel Gate		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**52,377**	**0.349**
			15120.005	**Bolt - Nut & Gasket Sets**									
				Bolt - Nut & Gasket Set 150# 4	50.00 ea	9.81 /ea	9.00 /ea	-	-	-	18.81 /ea	941	0.006
				Bolt - Nut & Gasket Set 150# 6	50.00 ea	11.45 /ea	14.00 /ea	-	-	-	25.45 /ea	1,272	0.008
				Bolt - Nut & Gasket Set 150# 6	50.00 ea	11.45 /ea	14.00 /ea	-	-	-	25.45 /ea	1,272	0.008
				Bolt - Nut & Gasket Set 150# 10	50.00 ea	20.44 /ea	30.00 /ea	-	-	-	50.44 /ea	2,522	0.017
				Bolt - Nut & Gasket Sets		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**6,008**	**0.040**
			15140.005	**Pipe Support**									
				Pipe Support - Large Bore 2 1/2" - 6"	500.00 ea	123.11 /ea	50.00 /ea	-	-	-	173.11 /ea	86,555	0.577

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
			15140.005	**Pipe Support**									
				Pipe Support - Large Bore 2 1/2" - 6"	500.00 ea	123.11 /ea	50.00 /ea	-	-	-	173.11 /ea	86,555	0.577
				Pipe Support - Large Bore 2 1/2" - 6"	500.00 ea	107.05 /ea	50.00 /ea	-	-	-	157.05 /ea	78,526	0.523
				Pipe Support - Large Bore 8" - 12"	500.00 ea	246.22 /ea	80.00 /ea	-	-	-	326 22 /ea	163,110	1.087
				Pipe Support		**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**/ea**	**414,746**	**2.763**
			15300.700	**Non Distructive Pipe Test**									
				Radiographic Inspection 4"	40.00 ea		40.00 /ea	-	30.00 /ea	-	70.00 /ea	2,800	0.019
				Radiographic Inspection 6"	40.00 ea		40.00 /ea	-	30.00 /ea	-	70.00 /ea	2,800	0.019
				Radiographic Inspection 6"	40.00 ea		40.00 /ea	-	30.00 /ea	-	70.00 /ea	2,800	0.019
				Radiographic Inspection 10"	40.00 ea		60.00 /ea	-	30.00 /ea	-	90.00 /ea	3,600	0.024
				Non Distructive Pipe Test								**12,000**	**0.080**
			16001.250	**Misc Site Work**									
				Electrical Utility Allowance	1.00 ls	-	-	50,000.00 /ls	-	-	50,000.00 /ls	50,000	0.333
				Misc Site Work		**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**50,000**	**0.333**
				Fuel Xfer								1,391,884	9.273

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		Mob Demob		Mobilization/Demobilization									
			01910.000	Equipment									
				Construction Equipment Mobilizations	1.00 LS	28,750.00 /LS		300,000.00 /LS		-	328,750.00 /LS	328,750	2.190
				Equipment		/hr	/hr	/hr	/hr	/hr	/hr	**328,750**	**2.190**
				Mob Demob								328,750	2.190
				Mobilization/Demobilization									

Location	System	Bid Item	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount	Percent of Total
		Warehouse											
			02720.100	**Base**									
				Crushed Gravel	92.59 cy	2.03 /cy	8.89 /cy	-	0.86 /cy	-	11.77 /cy	1,090	0.007
				Base		**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**/cy**	**1,090**	**0.007**
			02740.100	**Asphalt Paving**									
				Asphalt Base Course 2"	555.56 sy	-	-	4.40 /sy	-	-	4.40 /sy	2,444	0.016
				Asphalt Top Course 2"	555.56 sy	-	-	4.00 /sy	-	-	4.00 /sy	2,222	0.015
				Asphalt Paving		**/tn**	**/tn**	**/tn**	**/tn**	**/tn**	**/tn**	**4,667**	**0.031**
			02766.100	**Pavement Marking**									
				Parking Spaces	45.00 ea	-	-	5.00 /ea	-	-	5.00 /ea	225	0.001
				Parking Spaces Handicap	5.00 ea	-	-	10.00 /ea	-	-	10.00 /ea	50	0.000
				Painted Crosswalks	200.00 sf	-	-	1.00 /sf	-	-	1.00 /sf	200	0.001
				Painted Handicap Symbol	5.00 ea	-	-	65.00 /ea	-	-	65.00 /ea	325	0.002
				Painted Arrows	5.00 ea	-	-	10.00 /ea	-	-	10.00 /ea	50	0.000
				Painted Letters	15.00 ea	-	-	10.00 /ea	-	-	10.00 /ea	150	0.001
				Pavement Marking		**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**/lf**	**1,000**	**0.007**
			05510.200	**Fabricated Steel**									
				Metal Frame Warehouse 150 x 75	11,250.00 sf	-	-	125.00 /sf	-	-	125.00 /sf	1,406,250	9.369
				Fabricated Steel		**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**/ls**	**1,406,250**	**9.369**
				Warehouse								1,413,007	9.414
				11 - Delta Western								9,035,770	60.200
				Alt 03								**9,035,770**	**60.200**

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	2,268,336		37,576.754 hrs	
Material	1,200,170			
Subcontract	5,548,021			
Equipment	19,244		5,586.112 hrs	
Other				
	9,035,771	9,035,771		
General Conditions	722,862			8.000 %
Material Take-off Allowance	722,862			8.000 %
Labor Overtime	567,084			25.000 %
Bond	75,542			
Overhead & Profit	1,355,366			15.000 %
Contingency	1,807,154			20.000 %
Market Conditions Allowance	722,862			8.000 %
Total		***15,009,503***		

Appendix J

Public Involvement Summary Report and SRC Minutes

Outreach

J1. Agency Coordination

The agency coordination component of the Master Plan Update consisted of an informal meeting with the Ounalashka Corporation and the Qawalangin Tribe of Unalaska took place on April 24, 2007. The purpose of the meeting was to discuss with the Tribe the master plan process, the goals and objectives of the plan, and also to review the alternatives to date.

J2. Public Involvement

This section summarizes the public involvement activities undertaken to support this Master Plan Update. The primary goal of the public process was to develop a Master Plan Update with the understanding and acceptance of the City of Unalaska, Federal Aviation Administration and other airport stakeholders. The tools selected for the public process included elements of education, coordination, collaboration and data collection. Additional activities in the Unalaska Schools provided a link to the stakeholders most affected by the long term nature of the master plan project's implementation.

J2.1 Website

The project team developed and maintained a web site (www.unalaskaairportmpu.com) for the public to access information, project documents, and updates about the project. The project documents are in portable document format (PDF) and in low resolution, where possible, because Internet access is slow in Unalaska. In addition, the public is able to submit comments about the project to the project team. The web site was updated on a regular basis to include meeting notices, meeting summaries, photos and other project related documents as they were developed. Project team contact information is also on the web site.

J2.2 *Dutch Harbor Fisherman* News Articles

The project team worked with DOT&PF to place news articles in the *Dutch Harbor Fisherman*, a weekly regional newspaper about the Unalaska Airport Master Plan Update. This outreach proved to be an efficient way to reach the regional audience of airport users. Three news articles were published.

News Article #1 – March 15, 2007

The first news article introduced the project, CH2M HILL as the lead consultant, provided a project timeline and outlined the technical steps that will be taken throughout the master plan update process. The article discussed what the project team had heard so far from the community through the Study Resource Committee (SRC) and public meetings held to date. The article also announced an upcoming public meeting on March 21 and invited the public to attend. The public was also encouraged to visit the project web site or contact the project team for more information about the project.

News Article #2 - April 19, 2007

The second news article discussed the development of four alternatives designed to handle the increasing traffic forecast for the Unalaska Airport. The article also announced an upcoming public meeting on April 25 where the community can learn about the alternatives in more detail, ask questions of the project team and weigh-in on the alternatives through the comments and feedback. The team sponsored competitions for Unalaska school children from Kindergarten through 12^{th} grade. The competitions encouraged students to learn about the airport and bring their parents to the public meeting to see who had won the prizes. Unalaska City Schools partnered with the project team to provide prizes for the competition.

News Article #3 - May 17, 2007

As a thank you and follow up from the April 19, 2007 student competition, winners were announced and the team publicly thanked the community for their participation in the competition and sponsorship of the prizes. A picture of a local student was included with the article.

J2.3 Public Meetings

Public Meeting #1 - December 13, 2006

The first meeting, attended by eight residents of Unalaska, was held at the Unalaska Elementary School on December 13, 2006. Meeting outreach consisted of flyers distributed throughout the community via a "blast fax" from the City of Unalaska and public service announcements on the local radio station.

The meeting format was an open house. Attendees were given colored dots and asked to participate in a "dots" exercise, providing the project team with information about their travel and freight shipment needs. At tables scattered around the room were questions for the community visioning exercise for attendees to answer and provide feedback. In addition, an aerial photo and a 1987 Airport Layout Plan were available for folks to review. Project team members held one-on-one conversations with attendees. Following this appendix are complete meeting notes.

Public Meeting #2 - March 21, 2007

The second public meeting, attended by 11 residents of Unalaska, was held in the Makushin Room at the Grand Aleutian Hotel on March 21, 2007. Meeting outreach consisted of e-mail correspondence and a news article in the weekly newspaper, *The Dutch Harbor Fisherman*.

The meeting format was an open house. Stations were scattered throughout the room for the attendees to visit, gain information about the project, have questions answered, and provide feedback to the project team through one-on-one conversations. Following this appendix are complete meeting notes.

Public Meeting #3 - April 25, 2007

The third public meeting was held in the Shishaldin Room at the Grand Aleutian Hotel and was attended by 23 residents of Unalaska. The meeting outreach consisted of three blast faxes to the City's contact list, an article published in the April 24 edition of *The Dutch Harbor Fisherman*, and the student competition.

The meeting format was an open house and presented information about the design Alternatives 1 through 4. Project team members staffed stations around the room and provided detailed information to community members in one-on-one conversations. Input was sought from the public on the specifics of the alternatives.

The winning entries of the student competition were announced at this meeting and the prizes awarded to the winners. Following this appendix are complete meeting notes.

Public Meeting #4 - November 7, 2007

The fourth public meeting, attended by seven residents of Unalaska, was held in the Makushin Room at the Grand Aleutian Hotel. The meeting outreach consisted of two blast faxes to the City's contact list. The Hotel also distributed a flyer to their guests and diners that evening and provided extra signage throughout the Hotel to direct the public to the meeting room.

The meeting format was an open house format with various stations placed throughout the room. The two preferred alternatives were presented and the project team sought feedback from the public through one-on-one conversations with attendees. Following this appendix are complete meeting notes.

J2.4 Study Resource Committee

The Unalaska Airport Study Resource Committee (SRC) was formed to ensure that stakeholders are kept informed about the Master Plan Update as it evolves and to have the opportunity to ask questions and to provide input before decisions are made. The SRC also functioned as a resource group for the project team throughout the master plan process. All committee members have specific knowledge about and interest in the Unalaska Airport. The 17 member SRC was comprised of representatives from the following: ADOT&PF; Alaska Airlines; Alaska Central Express, Inc.; City of Unalaska; FAA Airports Division; Guardian Flight; Ounalashka Corporation; Peninsula Airways, Inc. (PenAir); Qawalangin Tribe of Unalaska; The Aleut Corporation; Unalaska Airport; Unalaska/Port of Dutch Harbor; and, Unisea. Four meetings of the SRC were held to provide input and feedback to the project team. Meeting materials can be found following this appendix.

SRC Meeting #1 - December 13, 2006

The project team was introduced to the SRC. After a brief project history, members where shown the project graphics, which consisted of aerial photos of the airport and a 1987 Airport Layout Plan. Committee members were then led through a visioning exercise, which focused on the Unalaska airport of the future. This began a discussion of the future needs of the airport, what changes need to occur to meet these needs, and what challenges does the airport face.

SRC Meeting #2 - January 24, 2007

The second SRC meeting provided an update of the project progress to date and the preliminary findings of the passenger and cargo enplanement forecast for the airport master plan. The project team sought the community's input on the preliminary forecast prior to finalizing the forecast chapter of the Master Plan Update.

The graphics for the meeting consisted of a PowerPoint presentation with the update and a map showing new topography and video transects.

SRC Meeting #3 - March 21, 2007

The third SRC meeting provided the final draft Aviation Forecast and Preliminary Demand, Capacity and Facility Requirements for the Unalaska Airport. The team wanted to get the committee members' reaction to the forecast and any comments they might have on the forecast and facility requirements. The graphics for the meeting consisted of a PowerPoint presentation and a comparison handout showing the difference between the Saab 340 and the Q400.

SRC Meeting #4 - April 25, 2007

The fourth SRC meeting discussed the project schedule, provided an update on the forecast for the Master Plan Update and looked at the peak month demand and the capacity to meet the demand. Additional information was provided about the facility requirements and the factors and constraints that will be considered during the evaluation process of the preliminary alternatives.

A handout was provided to the SRC showing the four preliminary alternatives that were prepared by the project team. They discussed the process that will be used to evaluate these alternatives. The project team led a discussion and sought feedback from the community about the alternatives.

SRC Meeting #5 - November 7, 2007

The fifth and final meeting of the SRC was held to discuss the preferred alternative for both the airfield and the terminal area. The committee was walked through a re-cap of the project work done to date and the information gained through the analysis of the gathered data.

The project team will complete the Master Plan Update by the end of 2007. Then a discussion was held about what happens next and the next steps needed to complete the project design.

J2.5 Briefings to Unalaska City Council

The project team was able to provide regular updates to the City of Unalaska. The City Manager and Planning Director participated as members of the Study Resource Committee and the team made presentations at City Council meetings. The council briefings took place on December 12, 2006, March 20, 2007 and April 24, 2007. The project team was unable to fly to Unalaska on the day of the March 20th meeting due to poor weather conditions so arrangements were made to call in to the council meeting from Anchorage. The team's meeting notes or city council formal meeting minutes from these meeting are included following this appendix.

J2.6 Other Community Activities

Stakeholder Interviews/Meetings/Teleconferences

The project team was able to provide agency personnel, organizations, and other stakeholders with regular updates about the project and meeting activities through ongoing distribution of flyers and meeting announcements via blast fax; e-mail correspondence; public service announcements; articles in the local newspaper, the *Dutch Harbor Fisherman,* and the project web site. The project team also had a joint meeting with the Ounalashka Corporation and Qawalangin Tribe, as well as a meeting with Alyeska Seafoods. All are key stakeholders in the project. The project team discussed the preferred alternatives, answered any questions they may have and sought their input about the project. In addition, early in the project, the project team went to the Unalaska High School to make classroom presentations about the airport Master Plan Update. Follow-up to this connection was the competition for the students to participate in just before the third public meeting in April. Meeting notes, either from the City Council or prepared by the project team, are found following this appendix.

Student Competition/Scavenger Hunt

Since the airport improvements are long term, the project team looked for ways to engage the young people in the project. The project team came up with age appropriate activities that the local students could complete and then submit to the project team. The project team coordinated with the local school district and other businesses in the area for competition prizes. The prizes were awarded to the students at the April 25 public meeting. Samples of the Competition Entries are found following this appendix.

J2.7 Next Steps

Public involvement will continue as this project progresses into the National Environmental Policy Act (NEPA) phase. The relationships and contacts created during this Master Plan Update will assist the project team in future scoping, environmental analysis and preliminary engineering.

Meeting Notes

SUBJECT:	Unalaska Airport Master Plan Update
PROJECT NO.:	3-02-0082-012-2006
GROUP:	Unalaska City Council
DATE:	March 20, 2007
TIME:	7 pm
LOCATION:	City of Unalaska Council Chambers
MEETING OUTREACH:	Meeting agenda
MEETING ATTENDANCE:	Project team (participating via teleconference):
	ADOT&PF: Mark Mayo
	CH2M Hill: Tom Klin, John van Woensel, Jon Erion
	Brooks & Associates: Anne Brooks
MEETING MATERIALS:	PowerPoint Presentation slides
MEETING INFORMATION:	

The project team was unable to fly to Unalaska on the day of the meeting due to poor weather conditions so arrangements were made to call in to the council meeting from Anchorage.

When the team joined the council meeting, ADOT&PF Project Manager, Mark Mayo, introduced the individuals on the telephone in Anchorage (see above). He then handed over the presentation to John van Woensel who led the council through the slides being viewed at the meeting. The slides were available to the council on Friday and were included in their e-packet.

A record of the meeting can be found in the meeting minutes on the City of Unalaska web site.

The following questions were raised by members of the City Council and of the public present:

Where did you get the cargo figures? The cargo figures in the forecast were developed by the team's cargo expert, Tom Phillips, through his research including conversations with local shippers and carriers. The team has heard that there is a latent demand for cargo. What we heard is that the shippers generally don't ship things out because the market is not there for them. We would welcome additional data to substantiate this demand.

City Councilman Rocky Caldero asked if the team had spoken someone in the seafood industry. John confirmed that Trident and UniSea had provided valuable input to date, but that the team would like to speak with any other representatives who could provide additional information and insight. Rocky suggested the team contact him and he could provide more detail – and a follow-up meeting will be held.

Did the forecast look at cargo requirements in terms of the aircraft landing by month? John van Woensel confirmed that all seasons and the regularly scheduled service were documented and then totaled.

Is the forecast a factor in the decision-making? Yes, once FAA approves the draft forecast and the design aircraft, the facility requirements and alternatives are derived from the needs projected in the forecasts. This enables the team to determine apron sizing, etc.

John van Woensel then provided a summary of next steps noting the team would come to town on March 21st to meet with the Study Resource Committee to go over the facility requirements. He noted the public meeting at the Grand Aleutian Hotel scheduled for March 21st and a series of meetings to be held in April. He noted that the April meeting would be important because it will present initial alternatives for meeting the 20-year needs at Unalaska Airport.

The Chair asked if there were any comments from the public. These comments/questions and team responses are noted below:

- Frank Kelty asked about the Q400 and its schedule to be on line by 2016. Is it still being manufactured or will it be a 10-15 year old aircraft by the time it enters the Unalaska market? John van Woensel responded that it was still being made today; in fact it is one of the hotter selling turbo props. The manufacturer is projecting healthy sales of used planes. The team mentioned that one of the reasons that PenAir selected the Q400 is that many are already flying and there will be an affordable pool of used aircraft to select from when PenAir starts looking to buy them. The planes will be used but they should have good life left on them.

- Frank Kelty commented that the map shows different areas that have to be upgraded on the ramps, buildings in the way, etc. He said that they haven't heard any projection on upgrades to the runway. Do we need longer runway for the Q400? John van Woensel responded that there is a need for an increase to 4200-feet in length plus a 600-foot safety area beyond the runway ends. The team is still analyzing this and developing alternatives to meet these needs.

Related documents on file:
PowerPoint Slides

Unalaska Airport Master Plan Update
Project No: 3-02-0082-012-2006

Meeting Notes

SUBJECT:	Unalaska Airport Master Plan Update
PROJECT NO.:	3-02-0082-012-2006
GROUP:	Ounalashka Corporation/Qawalangin Tribe and Project Team
DATE:	April 25, 2007
TIME:	3:00 PM
LOCATION:	Ounalashka Corporation Conference Room
MEETING OUTREACH:	Email and telephone calls to participants
MEETING ATTENDANCE:	Ounalashka Corporation: Gertrude Svarny, Wendy Svarny-Hawthorne, Vicky Williams
	Qawalangin Tribe: Abby Rankin, Denise Rankin
	DOT&PF: Mark Mayo, Dan Golden
	CH2M Hill Team: Tom Klin, John van Woensel, Jon Erion, Anne Brooks
MEETING MATERIALS:	CH2M Hill PowerPoint Presentation
MEETING INFORMATION:	

Wendy Svarny welcomed the group and started a round of self introductions.

Tom Klin thanked the Corporation and Tribe for their willingness to meet with the project team. Tom indicated that this was an important time to meet because the alternatives are taking shape and some Corporation lands have been identified for potential use.(Wendy had previously indicated that it was acceptable for the team to lay out airport improvement options on OC land) To provide an overview, John van Woensel, walked the group through a series of PowerPoint slides.

The following questions and team responses (in *italics*) followed the John's overview:

Have you talked to the State Historic Preservation Office (SHPO) about the Torpedo building? The community wants it removed. *Yes, DOT&PF had a project to remove the building. At completion of the master plan update, the project will begin a NEPA process to obtain environmental clearance. All the historic issues will be worked out at that time.*

What about the Aerology Building? The feds paid to build it during WW II; the National Park Service paid to restore it. But it is obviously in the way. *We will have to work something out with it too. The environmental phase starts these discussions in earnest.*

The new powerhouse might be in the project area depending on whether they will need scrubbers or not.

Since you were headed to town lots of folks have been talking about the airport – some folks are suggesting that we just land on East Point Road.

Did you look at moving the dock the other way – towards APL? *Yes, however moving the dock to the City Dock location is the shortest distance from the existing pier that relocates the pier out of the Approach surface.*

That means you would extend the pipes across other's land – not tidelands. There are no uplands at the city site.

Is the width of the airport runway ok? *Yes, the width is actually 25' wider than needed. This provides an extra margin of safety.*

You are not considering a larger aircraft? What if a bigger aircraft wants to fly into Unalaska? *The forecast identifies the Q-400 as the future design aircraft. This aircraft is about twice the size of the existing Saab 340B. Other larger aircraft can fly into Unalaska now or the future. They might have to limit their payload to do so.*

Biorka Connector to Delta Way makes sense.

Did you do testing on the rock (Ballyhoo)? *Yes, the rock is suitable for the core of the fill.* The OC owns some of the property above the Ballyhoo material site, when the material was used for the dock project, some of the land collapsed. *Future design stages for airport improvements will look carefully at avoiding any sloughing of Ballyhoo.*

Did you consider the Park (along the road)—check map – It is a national historic landmark. *Yes, we are aware of Sitka and will account for any potential impacts.*

If you move the T-dock and the OC loses the tideland 1) would we get new tideland? Or 2) would we have to pay for clean up of the tideland? *These issues will be addressed, discussed and resolved in the subsequent NEPA phase.*

The Midden site is already affected by development – WW II, pipelines.

We would want to have full tribal meetings to discuss things. *FAA (with DOT&PF's support) will approach the Qawalangin Tribe for formal government to government consultation in the subsequent NEPA phase to identify, discuss and resolve the tribes interests in an amicable way.*

When the jet landed and a boat was at the fuel dock, it was pretty scary.

The alternatives seem logical.

Tom Klin shared the cross section comparison of the Saab 340B and the Q400 with the group.

Related documents on file: PowerPoint presentation slides

Unalaska Airport Master Plan Update

Wrap-Up Survey

On February 13, 2008, a Project Wrap-up Survey was prepared by Brooks and Associates and sent to the Study Resource Committee Members and the public who provided e-mail addresses on the sign-in sheets at the public meetings. The original email went out on February 13th with a follow-up reminder on February 21st. Responses received from four individuals yielded the following input on the process.

1. We used the various public involvement tools listed below to reach residents within the community about the Unalaska Airport Master Plan Update project. In your opinion, how effective was each tool for public involvement.

	Not effective	Somewhat effective	Effective	Very effective	No Opinion	Response count
Chamber Blast Fax	25.0% (1)	25.0% (1)	**50.0% (2)**	(0)	(0)	4
Email Notifications	(0)	25.0% (1)	**50.0% (2)**	25.0% (1)	0.0% (0)	4
Display Ads in the Dutch Harbor Fisherman	(0)	**50.0% (2)**	25.0% (1)	25.0% (1)	(0)	4
Public Meeting at the Elementary School	25.0% (1)	**50.0% (2)**	25.0% (1)	(0)	(0)	4
Public Meetings at the Grand Aleutian	25.0% (1)	(0)	**50.0% (2)**	25.0% (1)	(0)	4
Study Resource Committee Meetings	(0)	(0)	**50.0% (2)**	**50.0% (2)**	(0)	4
Classroom Presentations	(0)	25.0% (1)	**75.0% (3)**	(0)	(0)	4
K-12 Student Activities	(0)	25.0% (1)	**75.0% (3)**	(0)	(0)	4
Dutch Harbor Fisherman Articles	(0)	**50.0% (2)**	25.0% (1)	25.0% (1)	(0)	4
One-on-One Stakeholder Meetings	(0)	(0)	**50.0% (2)**	**50.0% (2)**	(0)	4
City Council Briefings	(0)	(0)	**50.0% (2)**	**50.0% (2)**	(0)	4

2. What went well with the public involvement activities?

- People who where interested could participate, ask questions, and receive information.
- I think one of the most effective public involvement activities was the contests with the school kids.
- Was not involved.

3. What didn't work for the public involvement activities?

- So some reason there was very poor response and attendance at the public meetings - both at the library and at the Grand Aleutian.

4. What should be done differently in future phases, such as during preparation of the environmental document?

- More effective community involvement. Maybe we're dealing with apathy.....but very few people outside of the committee seemed engaged in the process.
- A little more lead time for meetings for participant notification.

5. Any other comments or suggestions?

- It was a good process.
- None at this time.
- I think the process worked well over all.

Appendix K
ALP Plans Set and ALP Checklist

UNALASKA AIRPORT

UNALASKA, ALASKA

Airport Layout Plans

UPDATES

Dec 21, 2007

Sheet List Table	
Sheet	DESCRIPTION
1	COVER SHEET
2	AIRPORT LAYOUT PLAN - EXISTING
3	AIRPORT LAYOUT PLAN - 2016
4	AIRPORT LAYOUT PLAN - 2026
5	AIRPORT AIRSPACE
6	PLAN AND PROFILE RUNWAY 12
7	PLAN AND PROFILE RUNWAY 30
8	PROPERTY MAP
9	LAND USE PLAN
10	ENVIRONMENTAL CONSTRAINTS MAP

LOCATION MAP

ALASKA

UNALASKA

VICINITY MAP

UNALASKA

This drawing set was created in AutoCAD from scanned drawings provided by The State of Alaska Department of Transportation and Public Facilities, Central Region. This ALP Set supercedes the Approved ALP by Floyd H. Pattison dated 9-25-92.

LAST SAVED: 7/10/2008 5:50:31 PM FILENAME: P:\AIRPORTS\DOT-UNALASKA\MASTER PLAN\ALP\COVER SHEET.DWG TAB: LAYOUT1

CH2MHILL

REVISIONS

NO.	DATE	BY	DESCRIPTION	APP'D	NO.
	12-21-2007	RPE	Set created in CAD from scanned drawings. Previous approvals dated: 6-15-81, 3-20-87 and 9-25-92		

APPROVALS

Federal Aviation Administration	Department of Airports
By: ____ -	By: ____ -
Title: ____ - Date	Title: ____ - Date
Case No: ____	

PROJECT MGR: -	SCALE: NA
PLANNER: -	DATE: MARCH 2008
DRAWN BY: RENDRES	CHECKED BY: JE

TRANSPORTATION & PUBLIC FACILITIES • STATE OF ALASKA •

MASTER PLAN UPDATE

COVER SHEET

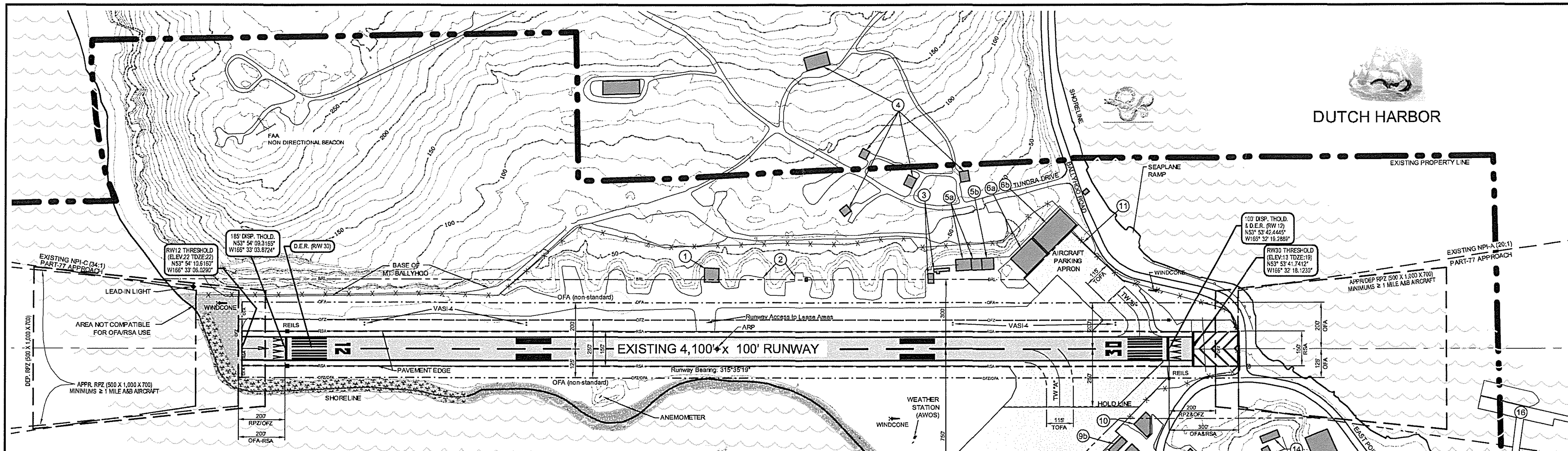
ISSUE DATE ----

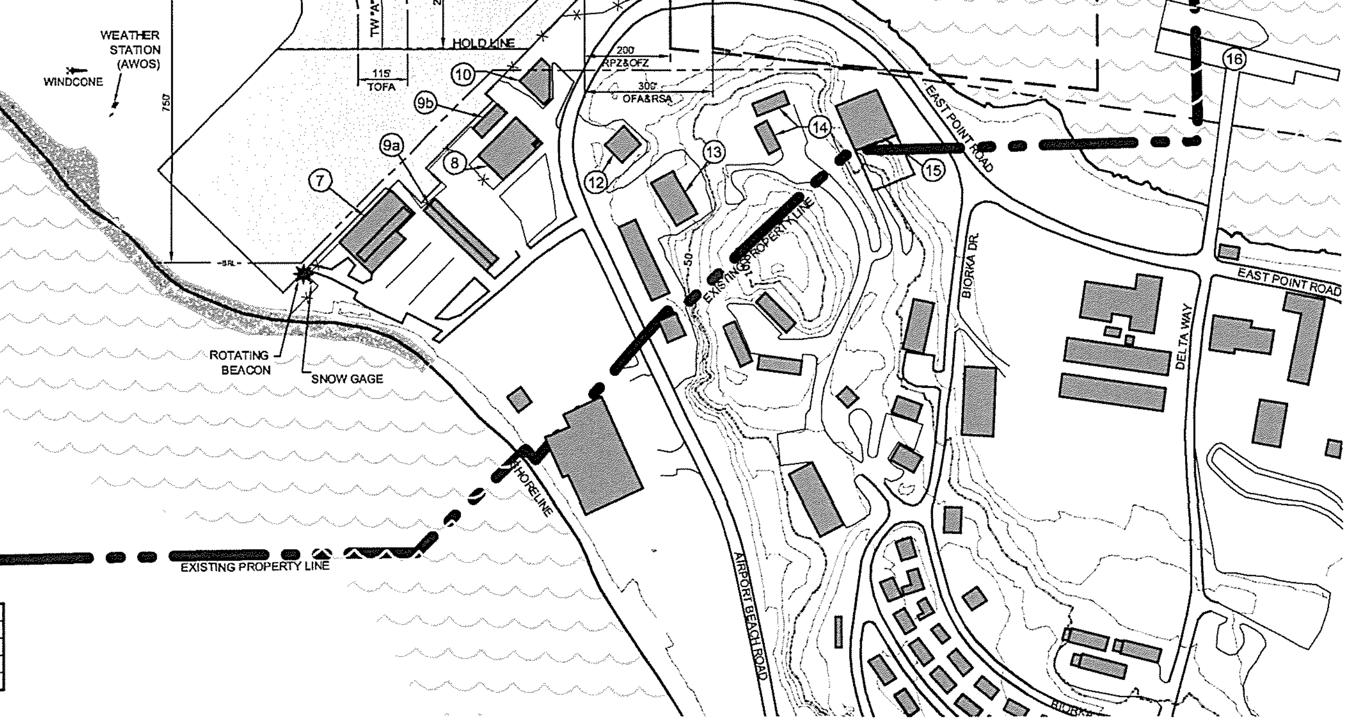
Federal Project No. ---- ----

AKAS Project No. ----

SHEET NO. SHEET 1 of 10

USER: RENDRES PLOT DATE: 10-Jul-08 PLOT TIME: 5:57:58 PM





BUILDING DATA TABLE

ID	EXISTING	TOP EL. (Ft. MSL)
1	REVETMENT HANGAR	61.7
2	MISC. STRUCTURES (REVETMENTS)	39.9
3	AIRPORT STAFF HOUSING	32.0
4	WWII STRUCTURES	43.7
5a	AIRPORT ADMIN BUILDING	38.6
5b	ARFF	55.6
6a	RAMP B HANGAR	59.5
6b	RAMP B HANGAR	69.9
7	PASSENGER TERMINAL BUILDING	41.6
8	TORPEDO BUILDING	54.8
9a	CARGO BUILDING	41.6
9b	CARGO BUILDING	27.7
10	AEROLOGY BUILDING	41.0
11	SECURITY FENCE	-
12	FIREHOUSE	44.6
13	MISCELLANEOUS BUILDING 1	62.1
14	HOUSING UNITS	89.7
15	POWER PLANT (UNDER EXPANSION)	110.1
16	FUEL DOCK AND SHIPPING LANE	12.4/212

RUNWAY DATA TABLE

EXISTING RUNWAY CRITERIA (OTHER THAN UTILITY)	RUNWAY 12	RUNWAY 30
RUNWAY LENGTH (FT)	4,100'	4,100'
RUNWAY WIDTH (FT)	100'	100'
AZIMUTH	135° 34' 40"	315° 35' 19"
PAVEMENT STRENGTH (1000 lbs.)	S-60, T-210	S-60, T-210
PAVEMENT TYPE	ASPHALT	ASPHALT
EFFECTIVE GRADIENT %	-0.2	0.2
RUNWAY END COORDINATES NAD 83/NAVD-88	N53° 54' 10.6160" W166° 33' 06.0290"	N53° 53' 41.8710" W166° 32' 18.0060"
RUNWAY END ELEVATIONS (MSL)	21.7'	13.0'
TOUCHDOWN ZONE ELEVATION (MSL)	21.7'	19.0'
RUNWAY LIGHTING	MIRL/LDIN	MIRL
TAXIWAY LIGHTING	NONE	
RUNWAY MARKING	NON-PRECISION	NON-PRECISION
CRITICAL AIRCRAFT	SAAB 340B	
ARC	B-II	
FAR PART 77 APPROACH SURFACE	34.1 NPI-C	20.1 NPI-A
APPROACH VISIBILITY MINIMUMS	1-1/4 MILE	1-1/4 MILE
NAVIGATIONAL AIDS/APPROACHES	GPS, NDB	GPS, NDB
	VASI-4	VASI-4
	REIL	REIL
RUNWAY SAFETY AREA (RSA) WIDTH	150'	150'
RSA LENGTH BEYOND RUNWAY END	300'	300'
RUNWAY OBJECT FREE AREA (OFA) WIDTH	125'R/200'L	200'R/125'L
OFA LENGTH BEYOND RUNWAY END	300'	300'
RSA OVERALL DIMENSIONS	4,300' x 150'	
OFZ OVERALL DIMENSIONS	4,216' x 250'	

EXISTING AIRPORT DATA TABLE

FAA Identifier: DUT		ICAO Identifier: PADU
FAA Site Number: 50801.*A		
AIRPORT ELEVATION (MSL)		22'
P.A.C.S. USGS Sta. "SOUTH"		S.A.C.S. USGS Sta. "D"
AIRPORT REFERENCE POINT (ARP)		LAT 53°53'56"
		LON 166°32'42"
AIRPORT DATUMS	HORIZONTAL	NAD 83/92 Alaska Stateplane Zone 10
	VERTICLE	NAVD 1988
AIRPORT & TERMINAL NAVAIDS		GPS, NDB
MEAN DAILY MAX. TEMP. HOTTEST MONTH (AUG)		55°
AIRPORT REFERENCE CODE (ARC)		B-II
OWNER		STATE OF ALASKA

TAXIWAY DATA TABLE

TAXIWAY	WIDTH (FT)	LIGHTS
A	50'	NONE
B	50'	NONE

LEGEND

EXISTING	ITEM
— — — — (heavy dashed line)	RUNWAY SAFETY AREA
—— – – —— (dashed line)	OBJECT FREE AREA
(solid shaded block)	EXISTING STRUCTURES
—X—X—X—X—	SECURITY FENCE
(light stipple)	SHORELINE ROCKS
(dense stipple)	SHORELINE EROSION PROTECTION SYSTEM

DECLARED DISTANCES

Appendix 14 (AC 5300-13)	RUNWAY 12	RUNWAY 30
TORA (Take Off Run Available)	4,100'	4,100'
TODA (Take Off Distance Available)	4,100'	4,100'
LDA (Landing Distance Available)	3,815'	3,700'
ASDA (Accelerate & Stop Distance Available)	4,000'	3,800'

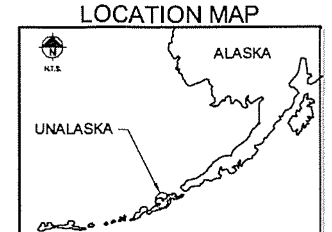
MODIFICATIONS TO STANDARDS

Standard Modified	FAA Standards (B-II)	Existing Condition
Approach Surface over Road R/W-30 (20:1)	15'	0
Fence in Approach Surface R/W-30 (20:1)	0'	4'
FAR PART-77 Surfaces	No Penetrations	Hill & Buildings South of R/W 30 Threshold
Runway OFA (WIDTH)	250' (Left & Right)	200' North 125' South
Runway RSA prior to RW 12 and beyond RW 30	300'	200'
Building Restriction Line	750'	300' North side 170' South side
Runway C.L. to Road Runway 30 Approach	320'	175'
Runway C.L. to Hold Line (T/W "B")	250'	200'

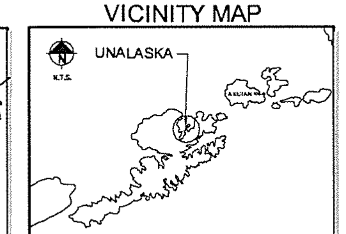
Abbreviations

(E) - Existing	
(F) - Future	
(R) - Relocated	
(D.T.) - Displaced Threshold	
(DER) - Departure End of Runway	

LOCATION MAP



VICINITY MAP



CONSTRUCTION NOTICE REQUIREMENT

TO PROTECT OPERATIONAL SAFETY AND FUTURE DEVELOPMENT, ALL PROPOSED CONSTRUCTION ON THE AIRPORT MUST BE COORDINATED WITH THE FAA AIRPORTS DISTRICT OFFICE PRIOR TO CONSTRUCTION. FAA's REVIEW TAKES APPROXIMATELY 60 DAYS.

NOTES:

1. Planimetric Data derived from Ikonos Satellite Orthophotography from Satellite Imaging Corporation, photography date: August 2005
2. Topography data taken from drawing files mapped by AEROMAP U.S., Inc. from photography dated 10–11–95 for the CITY OF UNALASKA. The Vertical datum has been converted from DOT BM#2 NAVD 27 to NAD 83 using AutoCAD Civil 3D.
3. The Horizontal datum is GPS USGS STA. 'SOUTH' WGS 1984.

SCALE IN FEET
0 200 400

CH2MHILL
4520 Cooper Road - Suite 200
Cincinnati, OH 45242
(513) 745-0079

REVISIONS

NO.	DATE	BY	DESCRIPTION	APP'D	NO.

APPROVALS

Federal Aviation Administration — By: ______ Title: ______ Date
Department of Airports — By: ______ Title: ______ Date
Case No:

UNALASKA AIRPORT
MASTER PLAN UPDATE

PROJECT MGR: -	SCALE: 1"=200'
PLANNER: -	DATE: MARCH 2008
DRAWN BY: RENDRES	CHECKED BY: JE

TRANSPORTATION & PUBLIC FACILITIES — STATE OF ALASKA

MASTERPLAN UPDATE

EXISTING
AIRPORT LAYOUT PLAN

ISSUE DATE	-
Federal Project No.	----
AKAS Project No.	----
SHEET NO.	2 of 10

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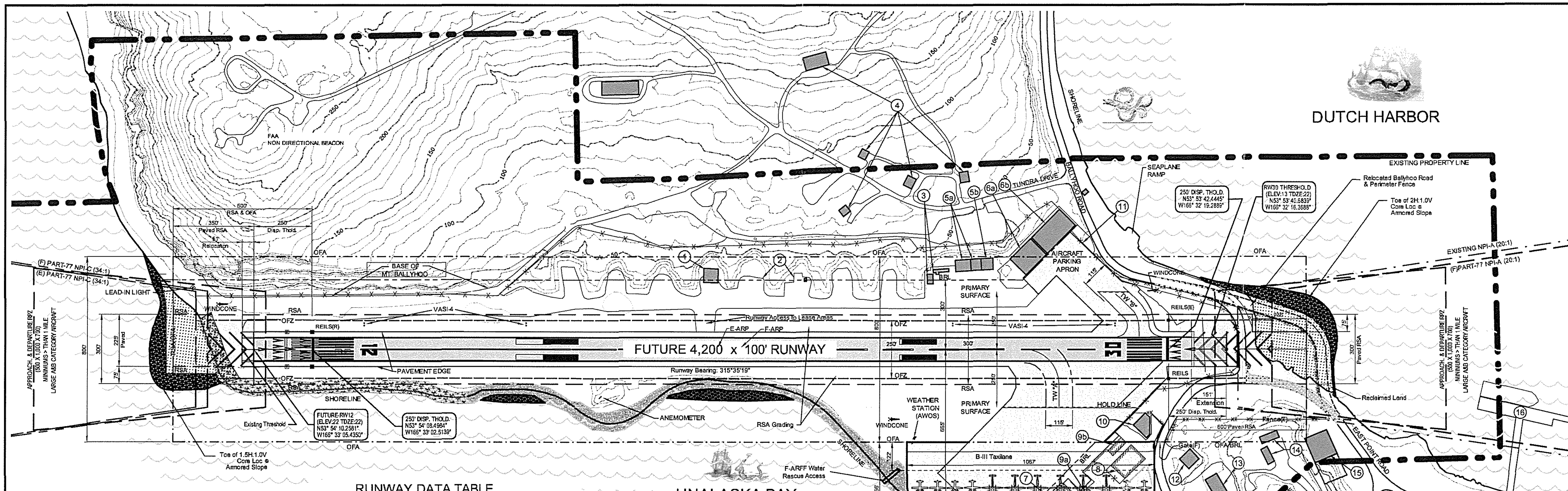

Abbreviations

(E) - Existing
(F) - Future
(R) - Relocated
(D.T.) - Displaced Threshold
(TBR) - TO BE RELOCATED
(TBR-F) - TO BE RELOCATED IN FUTURE TO CLEAR OFA

FUTURE FACILITIES

ID	DESCRIPTION	TOP EL. (Ft. MSL) Est.
F3	AIRPORT STAFF HOUSING	32
F5	AIRPORT ADMIN BUILDING/ARFF	55
F6	HANGAR	69
F7	PASSENGER TERMINAL BUILDING	42
F9	CARGO FACILITY	42
F10	AEROLOGY BUILDING	110

EXISTING FACILITIES

ID	DESCRIPTION	TOP EL. (Ft. MSL)
1	REVETMENT HANGAR (TBR-F)	61.7
2	MISC. STRUCTURES (REVETMENTS) (TBR-F)	39.9
3	AIRPORT STAFF HOUSING (TBR)	32.0
4	WWII STRUCTURES	43.7
5a	AIRPORT ADMIN BUILDING (TBR-F)	38.6
5b	ARFF (TBR-F)	55.6
6a	RAMP B HANGAR (TBR-F)	59.5
6b	RAMP B HANGAR	69.9
7	PASSENGER TERMINAL BUILDING (TBR)	41.6
8	TORPEDO BUILDING (TBR)	54.8
9a	CARGO BUILDING (TBR)	41.6
9b	CARGO BUILDING (TBR)	27.7
10	AEROLOGY BUILDING (TBR-F)	41.0
11	SECURITY FENCE	-
12	FIREHOUSE	44.6
13	MISCELLANEOUS BUILDING 1	62.1
14	HOUSING UNITS (TBR-F)	89.7
15	POWER PLANT (UNDER EXPANSION)	110.1
16	FUEL DOCK AND SHIPPING LANE	12.4/212

RUNWAY DATA TABLE

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PAVEMENT TYPE	ASPHALT	ASPHALT
EFFECTIVE GRADIENT %	-0.2	0.2
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APPROACH VISIBILITY MINIMUMS	1-1/4 MILE	1-1/4 MILE
NAVIGATIONAL AIDS/APPROACHES	GPS, NDB	GPS, NDB
	VASI-4	VASI-4
	REIL	REIL
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RSA LENGTH BEYOND RUNWAY END	600'	600'
RUNWAY OBJECT FREE AREA (OFA) WIDTH	800'	800'
OFA LENGTH BEYOND RUNWAY END	600'	600'
RSA OVERALL DIMENSIONS	4,900' x 300'	
OFZ OVERALL DIMENSIONS	4,600' x 250'	

TAXIWAY DATA TABLE

TAXIWAY	WIDTH (FT)	LIGHTS
A	50'	NONE
B	50'	NONE

LEGEND

EXISTING	FUTURE	ITEM
		RUNWAY SAFETY AREA
		OBJECT FREE AREA
		BUILDINGS / STRUCTURES
		SECURITY FENCE
		SHORELINE ROCKS
		SHORELINE EROSION PROTECTION SYSTEM
		DEMO BUILDINGS
		RECLAIMED LAND

AIRPORT DATA TABLE

2016 CONDITIONS	
FAA Identifier: DUT	ICAO Identifier: PADU
FAA Site Number: 50801.*A	
AIRPORT ELEVATION (MSL)	22'
P.A.C.S. USGS Sta. "SOUTH"	S.A.C.S. USGS Sta. "D"
AIRPORT REFERENCE POINT (ARP)	LAT 53°53'55" LON 166°32'41"
AIRPORT DATUMS — HORIZONTAL	NAD 83/92 Alaska Stateplane Zone 10
AIRPORT DATUMS — VERTICLE	NAVD 1988
AIRPORT & TERMINAL NAVAIDS	GPS, NDB
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Fence in Approach Surface R/W-30 (20:1)	0'	4'
FAR PART-77 Surfaces	No Penetrations	Hill & Buildings Both Side of R/W
Runway Safety Area (LxW)	600' x 300'	600' x 300' with 75' Notch
Runway OFA (LxW)	600' x 800'	Objects allowed per Master Plan. To clear in Future. See Existing Facilities table.
Building Restriction Line	750'	300' North side 275' South side

DECLARED DISTANCES

Appendix 14 (AC 5300-13)	RUNWAY 12	RUNWAY 30
TORA (Take Off Run Available)	4,200'	4,200'
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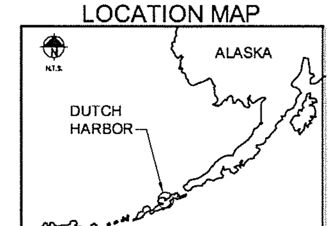
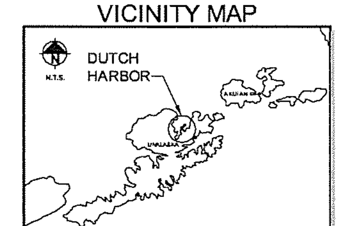


VICINITY MAP



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NOTES:

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2. Topography data taken from drawing files mapped by AEROMAP U.S., Inc. from photography dated 10-11-95 for the CITY OF UNALASKA. The Vertical datum has been converted from DOT BM#2 NAVD 27 to NAD 83 using AutoCAD Civil 3D.
3. The Horizontal datum is GPS USGS STA. 'SOUTH' WGS 1984.

SCALE IN FEET
0 200 400

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(513) 745-0079

REVISIONS

NO.	DATE	BY	DESCRIPTION	APP'D

APPROVALS

NO.	Federal Aviation Administration	Department of Airports
	By:	By:
	Title: Date	Title: Date
	Case No:	

UNALASKA AIRPORT
MASTER PLAN UPDATE

PROJECT MGR: - | SCALE: AS NOTED
PLANNER: - | DATE: MARCH 2008
DRAWN BY: RPE | CHECKED BY: JE

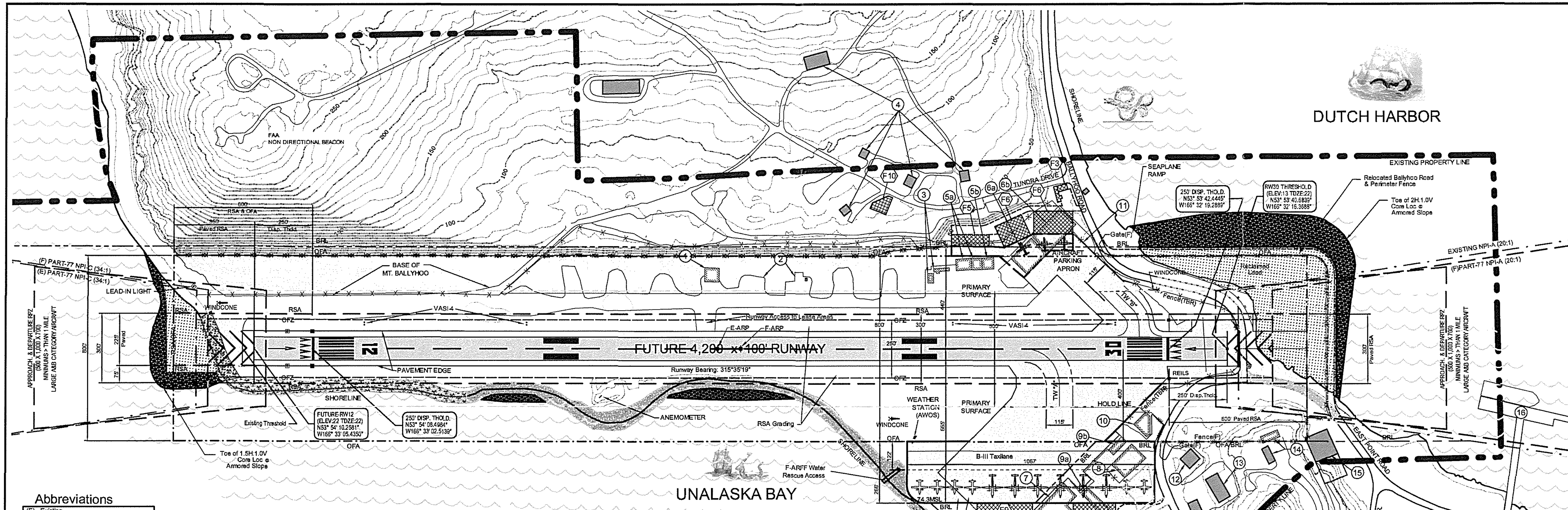
DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES — STATE OF ALASKA

MASTER PLAN UPDATE

FUTURE (2016)
AIRPORT LAYOUT PLAN

ISSUE DATE -
Federal Project No. ---
AKAS Project No. ---
SHEET NO. 3 of 10

LAST SAVED: 7/10/2008 3:52:52 PM FILENAME: P:\AIRPORTS\DUT-UNALASKA\MASTER PLAN\ALP\AIRPORT LAYOUT PLAN 2016.DWG TAB: 2016
USER: RENDRES PLOT DATE: 10-Jul-08 PLOT TIME: 5:59:19 PM



Abbreviations

(E) - Existing
(F) - Future
(R) - Relocated
(D.T.) - Displaced Threshold
(TBR) - TO BE RELOCATED
(TBR-F) - TO BE RELOCATED IN FUTURE TO CLEAR OFA

FUTURE FACILITIES

ID	DESCRIPTION	TOP EL. (Ft. MSL) Est.
F3	AIRPORT STAFF HOUSING	32
F5	AIRPORT ADMIN BUILDING/ARFF	55
F6	HANGAR	69
F7	PASSENGER TERMINAL BUILDING	42
F9	CARGO FACILITY	42
F10	AEROLOGY BUILDING	110

EXISTING FACILITIES

ID	DESCRIPTION	TOP EL. (Ft. MSL)
1	REVETMENT HANGAR (TBR-F)	61.7
2	MISC. STRUCTURES (REVETMENTS) (TBR-F)	39.9
3	AIRPORT STAFF HOUSING (TBR)	32.0
4	WWII STRUCTURES	43.7
5a	AIRPORT ADMIN BUILDING (TBR-F)	38.6
5b	ARFF (TBR-F)	55.6
6a	RAMP B HANGAR (TBR-F)	59.5
6b	RAMP B HANGAR	69.9
7	PASSENGER TERMINAL BUILDING (TBR)	41.6
8	TORPEDO BUILDING (TBR)	54.8
9a	CARGO BUILDING (TBR)	41.6
9b	CARGO BUILDING (TBR)	27.7
10	AEROLOGY BUILDING (TBR-F)	41.0
11	SECURITY FENCE	-
12	FIREHOUSE	44.6
13	MISCELLANEOUS BUILDING 1	62.1
14	HOUSING UNITS (TBR-F)	89.7
15	POWER PLANT (UNDER EXPANSION)	110.1
16	FUEL DOCK AND SHIPPING LANE	12.4/212

RUNWAY DATA TABLE

RUNWAY CRITERIA (other than UTILITY)	RUNWAY 12	RUNWAY 30
RUNWAY LENGTH (FT)	4,200'	4,200'
RUNWAY WIDTH (FT)	100'	100'
AZIMUTH	135° 34' 40"	315° 35' 19"
PAVEMENT STRENGTH (1000 lbs.)	S-60, T-210	S-60, T-210
PAVEMENT TYPE	ASPHALT	ASPHALT
EFFECTIVE GRADIENT %	-0.2	0.2
RUNWAY END COORDINATES NAD 83/NAVD-88	N53° 54' 10.2581" W166° 33' 05.4350"	N53° 53' 40.6839" W166° 32' 16.3688"
RUNWAY END ELEVATIONS (MSL)	21.7'	13.0'
TOUCHDOWN ZONE ELEVATION (MSL)	21.7'	19.0'
RUNWAY LIGHTING	MIRL/LDIN	MIRL
TAXIWAY LIGHTING	NONE	
RUNWAY MARKING	NON-PRECISION	NON-PRECISION
CRITICAL AIRCRAFT	Q-400	
ARC	B-III	
FAR PART 77 APPROACH SURFACE	34:1 NPI-C	20:1 NPI-A
APPROACH VISIBILITY MINIMUMS	1-1/4 MILE	1-1/4 MILE
NAVIGATIONAL AIDS/APPROACHES	GPS, NDB	GPS, NDB
	VASI-4	VASI-4
	REIL	REIL
RUNWAY SAFETY AREA (RSA) WIDTH	75'R/150'L	75'R/150'L
RSA LENGTH BEYOND RUNWAY END	600'	600'
RUNWAY OBJECT FREE AREA (OFA) WIDTH	75'R/150'L	200'R/125'L
OFA LENGTH BEYOND RUNWAY END	600'	600'
RSA OVERALL DIMENSIONS	4,900' x 300'	
OFZ OVERALL DIMENSIONS	4,600' x 250'	

LEGEND

EXISTING	FUTURE	ITEM
		RUNWAY SAFETY AREA
		OBJECT FREE AREA
		BUILDINGS / STRUCTURES
		SECURITY FENCE
		SHORELINE ROCKS
		SHORELINE EROSION PROTECTION SYSTEM
		DEMO BUILDINGS
		RECLAIMED LAND

TAXIWAY DATA TABLE

TAXIWAY	WIDTH (FT)	LIGHTS
A	50'	NONE
B	50'	NONE

AIRPORT DATA TABLE

EXISTING AIRPORT CONDITIONS		
FAA Identifier: DUT	ICAO Identifier: PADU	
FAA Site Number: 50801.*A		
AIRPORT ELEVATION (MSL)	22'	
P.A.C.S. USGS Sta. "SOUTH"	S.A.C.S. USGS Sta. "D"	
AIRPORT REFERENCE POINT (ARP)	LAT 53°53'55"	
	LON 166°32'41"	
AIRPORT DATUMS	HORIZONTAL	NAD 83/92 Alaska Stateplane Zone 10
	VERTICLE	NAVD 1988
AIRPORT & TERMINAL NAVAIDS	GPS, NDB	
MEAN DAILY MAX. TEMP. HOTTEST MONTH (AUG)	55°	
AIRPORT REFERENCE CODE (ARC)	B-II	
OWNER	STATE OF ALASKA	

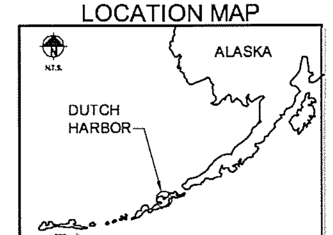
MODIFICATIONS TO STANDARDS

Standard Modified	FAA Standards (B-III)	2026 Conditions
Approach Surface over Road R/W-30 (20.1)	15'	15'
FAR PART-77 Surfaces	No Penetrations	Hill & Buildings @ South Side of R/W
Runway Safety Area (LxW)	600' x 300'	600' x 225' @ RW 12

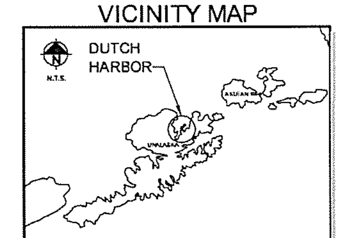
DECLARED DISTANCES

Appendix 14 (AC 5300-13)	RUNWAY 12	RUNWAY 30
TORA (Take Off Run Available)	4,200'	4,200'
TODA (Take Off Distance Available)	4,200'	4,200'
LDA (Landing Distance Available)	3,700'	3,700'
ASDA (Accelerate & Stop Distance Available)	3,950'	3,950'

LOCATION MAP



VICINITY MAP



CONSTRUCTION NOTICE REQUIREMENT

TO PROTECT OPERATIONAL SAFETY AND FUTURE DEVELOPMENT, ALL PROPOSED CONSTRUCTION ON THE AIRPORT MUST BE COORDINATED WITH THE FAA AIRPORTS DISTRICT OFFICE PRIOR TO CONSTRUCTION. FAA's REVIEW TAKES APPROXIMATELY 60 DAYS.

NOTES:

1. Planimetric Data derived from Ikonos Satellite Orthophotography from Satellite Imaging Corporation, photography date: August 2005
2. Topography data taken from drawing files mapped by AEROMAP U.S., Inc. from photography dated 10-11-95 for the CITY OF UNALASKA. The Vertical datum has been converted from DOT BM#2 NAVD 27 to NAD 83 using AutoCAD Civil 3D.
3. The Horizontal datum is GPS USGS STA. 'SOUTH' WGS 1984.

SCALE IN FEET

0 200 400

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REVISIONS

NO.	DATE	BY	DESCRIPTION	APP'D	NO.

APPROVALS

Federal Aviation Administration	Department of Airports
By:	By:
Title: Date	Title: Date
Case No:	

UNALASKA AIRPORT MASTER PLAN UPDATE

PROJECT MGR: -	SCALE: AS NOTED
PLANNER: -	DATE: MARCH 2008
DRAWN BY: RPE	CHECKED BY: RENDRES

TRANSPORTATION & PUBLIC FACILITIES — STATE OF ALASKA

MASTER PLAN UPDATE

FUTURE (2026) AIRPORT LAYOUT PLAN

ISSUE DATE ---

Federal Project No. ---

AKAS Project No. ---

SHEET NO.

LAST SAVED: 7/10/2008 6:00:44 PM FILENAME: P:\AIRPORTS\DUT-UNALASKA\MASTER PLAN\ALP\AIRPORT LAYOUT PLAN 2026.DWG TAB: 2026

USER: RENDRES PLOT DATE: 10-Jul-08 PLOT TIME: 6.00.48 PM

EXISTING RUNWAY 4,100' X 100'

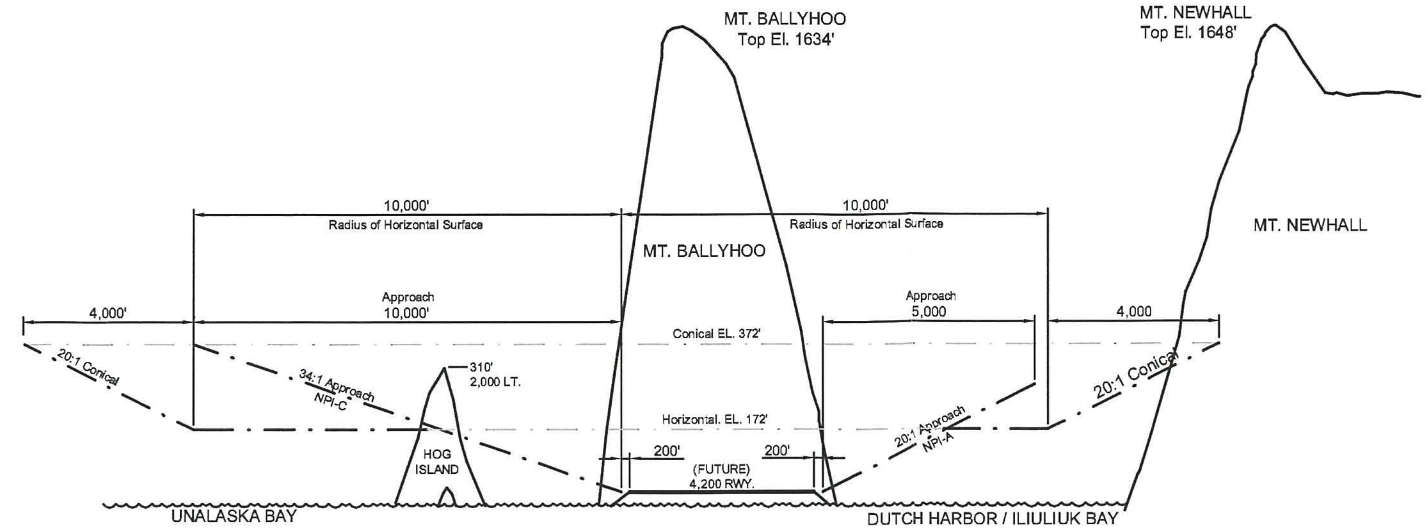
EXISTING R/W12 THRESHOLD
(ELEV:22 TDZE:22)
N53° 54' 10.6160"
W166° 33' 06.0290"

EXISTING R/W30 THRESHOLD
(ELEV:13 TDZE:19)
N53° 53' 41.7412"
W166° 32' 18.1230"

FUTURE RUNWAY 4,200' X 100'

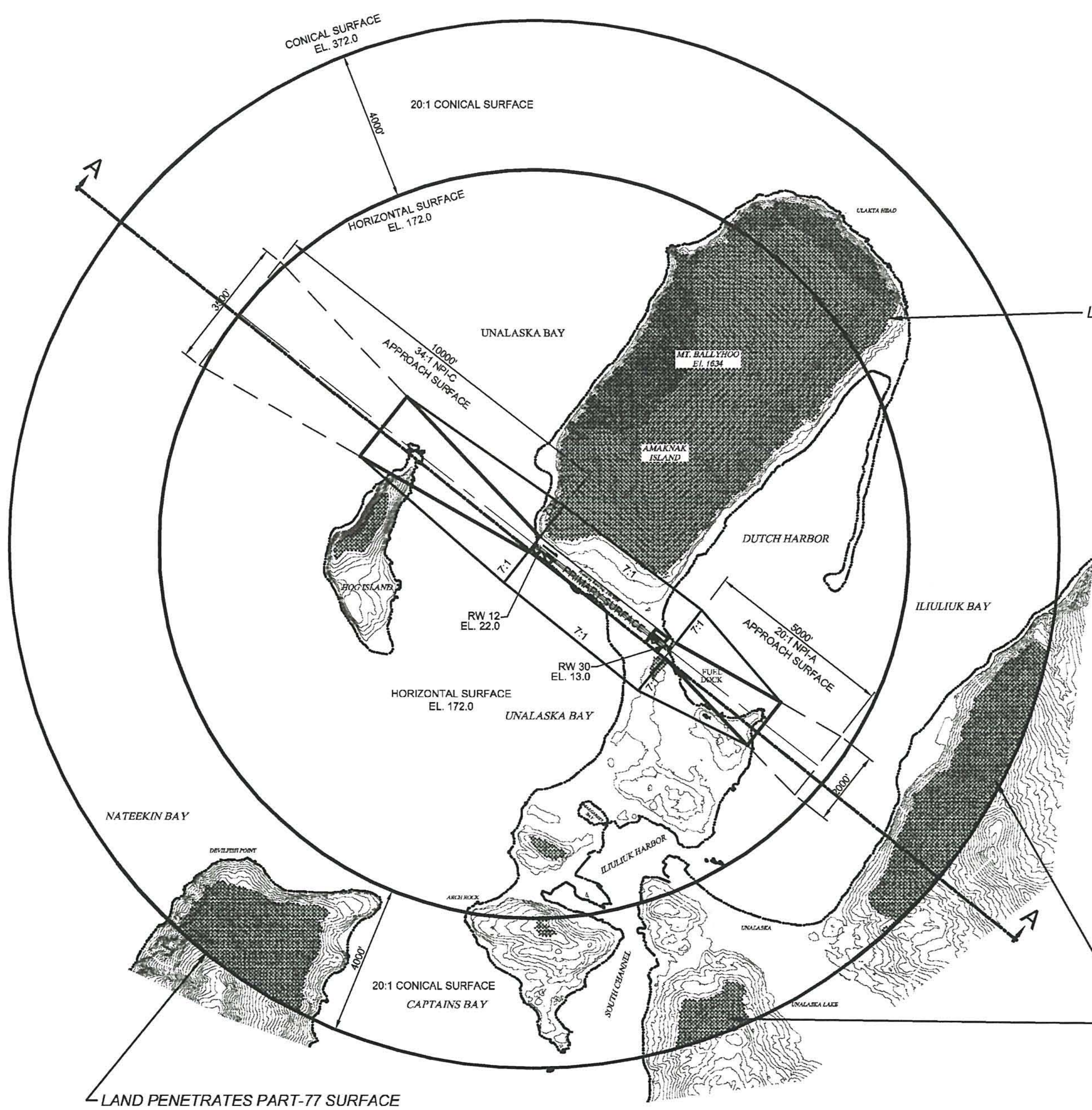
FUTURE R/W12 THRESHOLD
(ELEV:22 TDZE:22)
RELOCATE 51' SOUTH-EAST
N53° 54' 10.2581"
W166° 33' 05.4350"

FUTURE R/W30 THRESHOLD
(ELEV:13 TDZE:22)
RELOCATE 151' SOUTH-EAST
N53° 53' 40.6839"
W166° 32' 16.3688"



RUNWAY APPROACH PROFILE (SECTION "A-A")

HOR: 1" = 2,000'
VER: 1"=200'



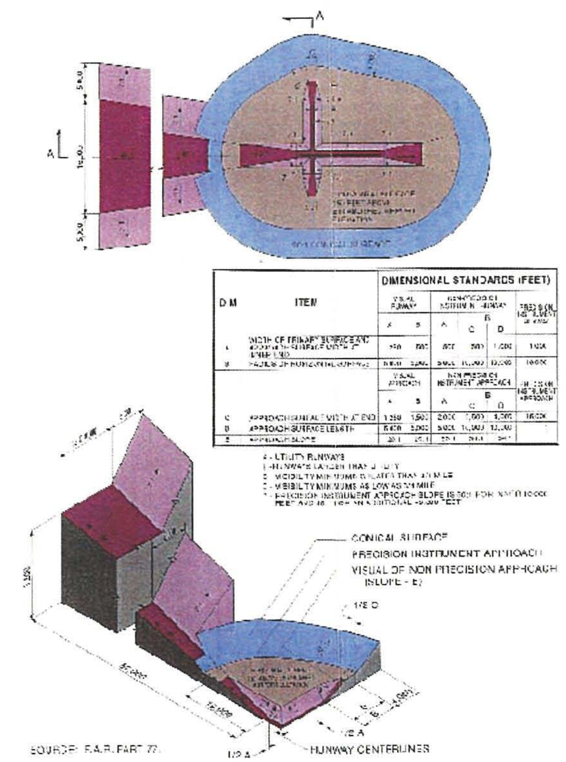
LAND PENETRATES PART-77 SURFACE

LAND PENETRATES PART-77 SURFACE

LAND PENETRATES PART-77 SURFACE

PART-77 AIRSPACE SURFACES

HOR: 1" = 2,000'

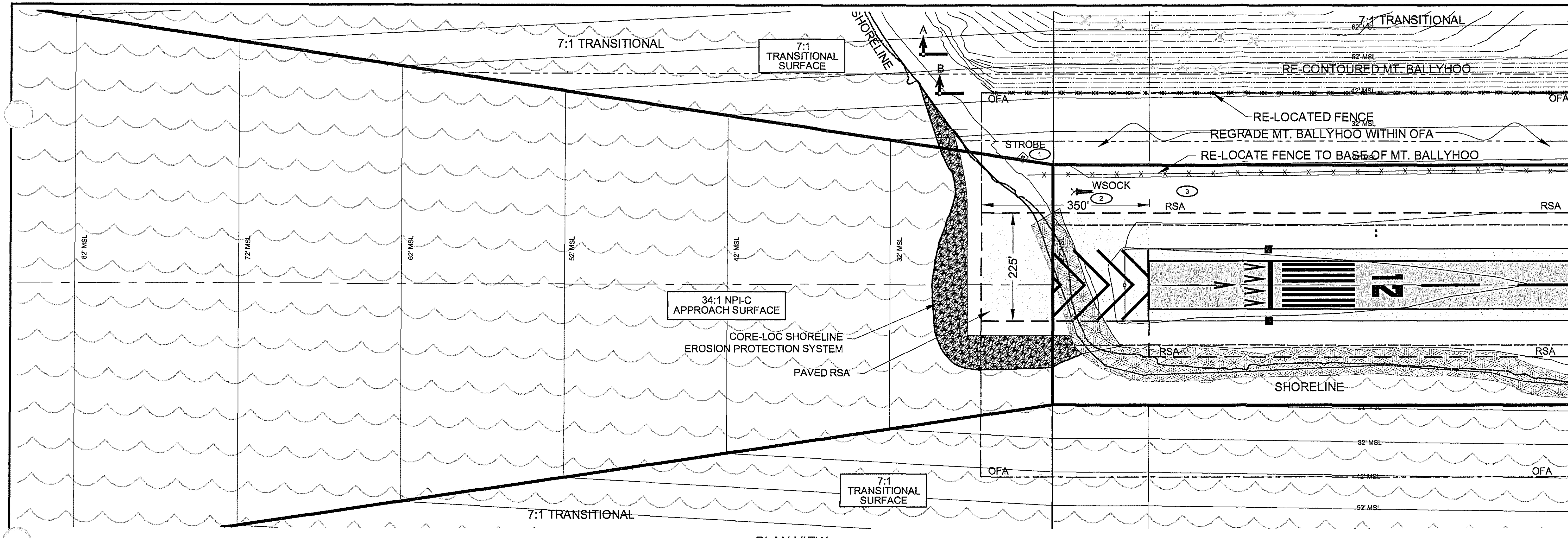


SOURCE: F.A.R. PART 77.

ISOMETRIC VIEW OF SECTION A-A

SCALE IN FEET
0 2000 4000

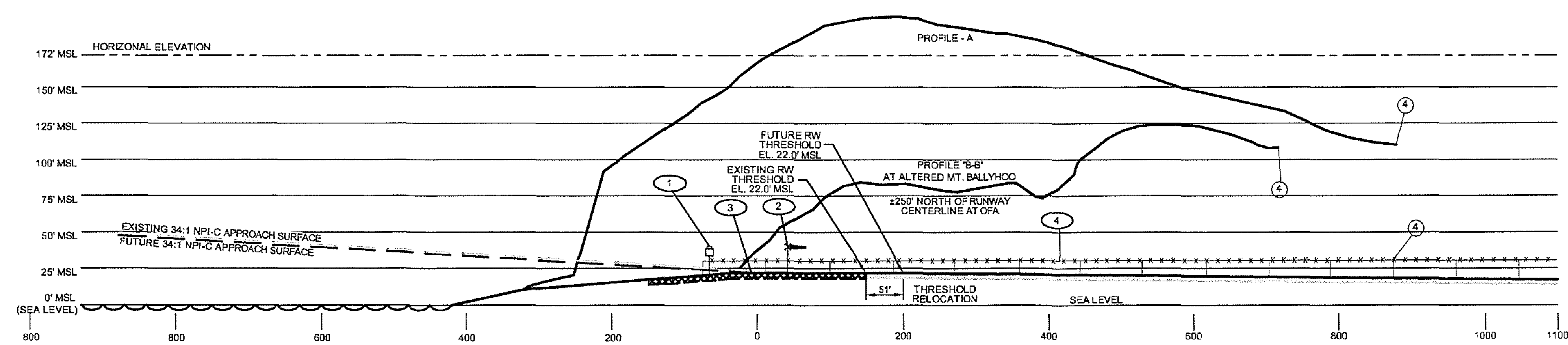
CH2MHILL 4520 Cooper Road - Suite 200 Cincinnati, OH 45242 (513) 745-0079	REVISIONS: NO. / DATE / BY / DESCRIPTION / APP'D / NO.	APPROVALS: Federal Aviation Administration — By: / Title: / Date / Case No: ; Department of Airports — By: / Title: / Date	UNALASKA AIRPORT MASTER PLAN UPDATE	PROJECT MGR: - PLANNER: - DRAWN BY: RPE	SCALE: AS NOTED DATE: MARCH 2008 CHECKED BY: RENDRES	TRANSPORTATION & PUBLIC FACILITIES STATE OF ALASKA	MASTER PLAN UPDATE PART-77 SURFACES OVERALL AIRSPACE	ISSUE DATE ---- Federal Project No. ---- AKAS Project No. ---- SHEET NO. 5 of 10



PLAN VIEW
1"=100'

TABLE OF OBSTRUCTION

ID	Description	Top Elev.	Penetration	Disposition
1	Airport Strobe	24.0	0	None
2	Unlighted Windsock	40.0	18.0 (Primary)	None (Frangible Mount)
3	Airport Service Road (+15)	22.0 \ 37.0	15.0 (Primary)	Airport Controlled Access
4	Airport Security Fence	30.4	±8 (Primary)	To be Relocated outside of OFA



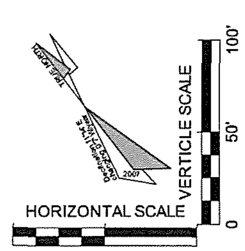
PROFILE VIEW
1"=50'

Abbreviations

(E) - Existing
(F) - Future
(R) - Relocated
(D.T.) - Displaced Threshold

LEGEND

EXISTING	FUTURE	ITEM
		RUNWAY SAFETY AREA
		OBJECT FREE AREA
		BUILDINGS / STRUCTURES
		SECURITY FENCE
		SHORELINE ROCKS
		SHORELINE EROSION PROTECTION SYSTEM
		DEMO BUILDINGS
		RECLAIMED LAND



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NO.	DATE	BY	DESCRIPTION	APP'D	NO.

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Federal Aviation Administration — By: Title: Date — Case No.
Department of Airports — By: Title: Date

UNALASKA AIRPORT
MASTER PLAN UPDATE

PROJECT MGR: - | SCALE: AS NOTED
PLANNER: - | DATE: MARCH 2008
DRAWN BY: RPE | CHECKED BY: RENDRES

TRANSPORTATION & PUBLIC FACILITIES — STATE OF ALASKA

MASTER PLAN UPDATE

PLAN AND PROFILE
FUTURE R/W 12 (2026)

ISSUE DATE
Federal Project No.
AKAS Project No.
SHEET NO. 6 of 10

LAST SAVED: 1/16/2008 5:59:08 PM FILENAME: P:\AIRPORTS\DOT-UNALASKA\MASTER PLAN\A\PLAN-PROFILE.DWG TAB: 2026 RW12

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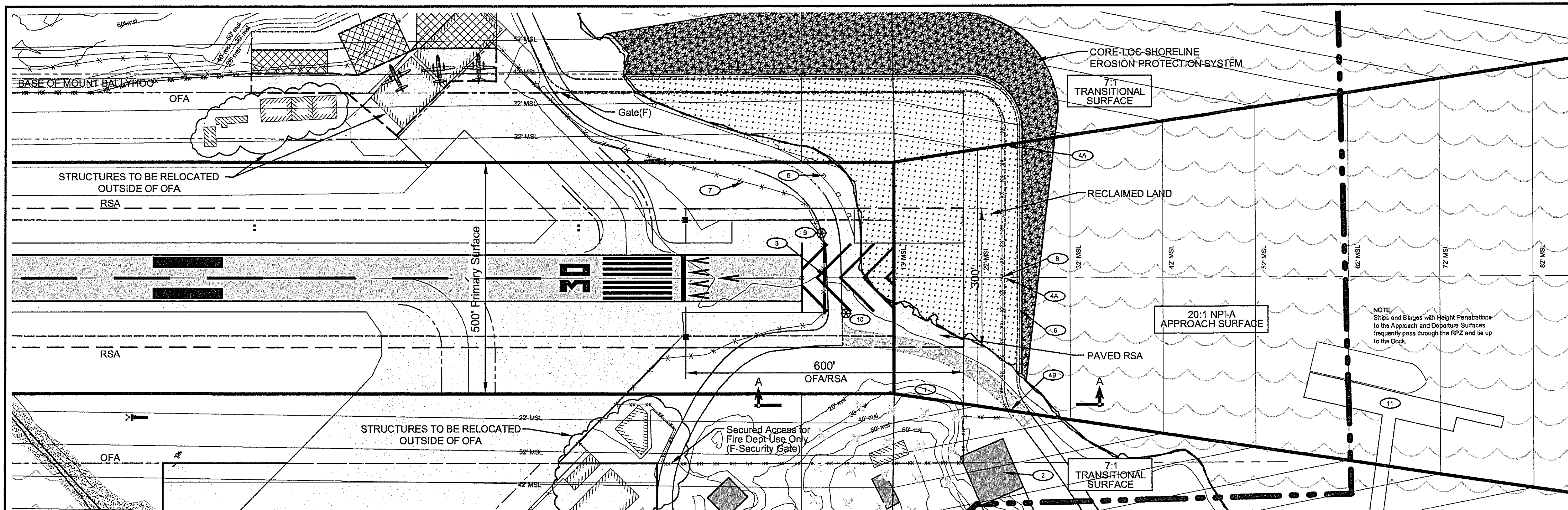
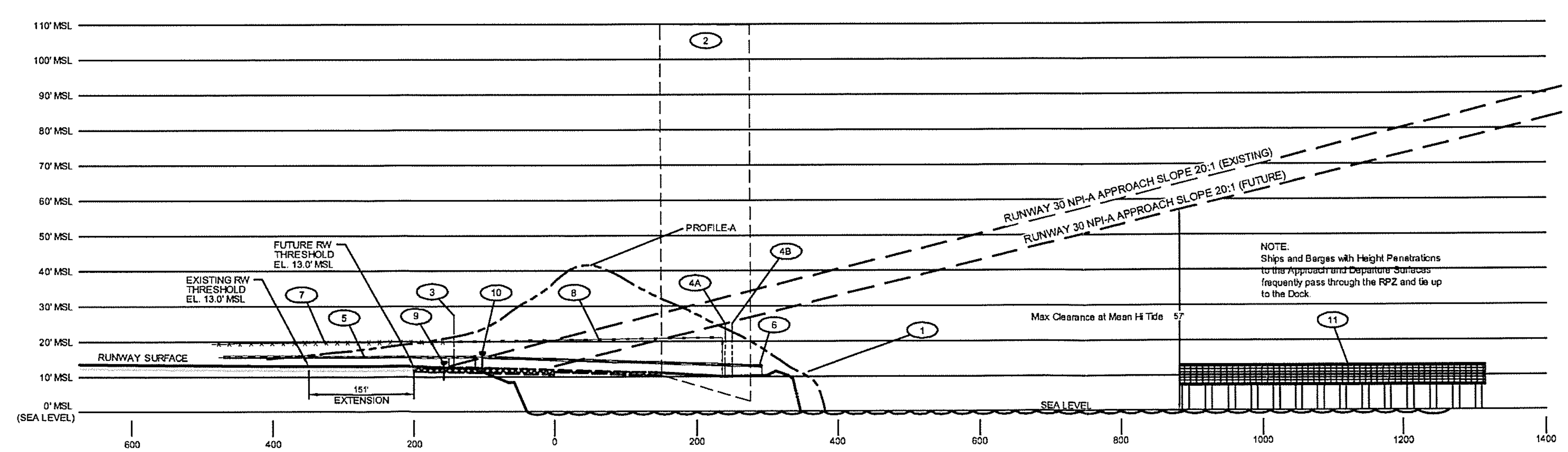


PLAN VIEW
1"=100'

TABLE OF OBSTRUCTION

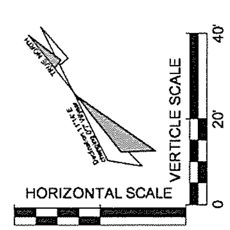
ID	Description	Top Elev.	Penetration	Disposition
1	Ground Profile (South side of Airfield)	Varies	28' Maximum	None
2	Power House	109.7	76 (Transitional)	None
3	Existing Ballyhoo Rd (+15)	12.4 \ 27.4	14.4	Airport Controlled Access for Fire Deptartment use Only
4a	Future Ballyhoo Rd (+15)	9.9 \ 24.9	0.0	
4b	Future Ballyhoo Rd (+15)	9.9 \ 24.9	-0.5	
5	Existing Guardrail	15.6	2.6 (Primary Surface)	
6	Future Guardrail	12.9	-14.6	
7	Existing Security Fence	19.9	6.9 (Primary Surface)	
8	Future Security Fence	21.0	-3.7	
9	Traffic Control Signal	14.3	1.3 (Primary Surface)	To be Removed in Future
10	Traffic Control Signal	16.9	3.9 (Primary Surface)	To be Removed in Future
11	Dock - Ship Loading and Unloading			57' from Leading edge of Dock at the Waterline to the Approach Surface.



PROFILE VIEW
1"=20'

LEGEND

EXISTING	FUTURE	ITEM
		RUNWAY SAFETY AREA
		OBJECT FREE AREA
		BUILDINGS / STRUCTURES
		SECURITY FENCE
		SHORELINE ROCKS
		SHORELINE EROSION PROTECTION SYSTEM
		DEMO BUILDINGS
		RECLAIMED LAND



Abbreviations

(E) - Existing
(F) - Future
(R) - Relocated
(D.T.) - Displaced Threshold

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REVISIONS

NO.	DATE	BY	DESCRIPTION	APP'D	NO.

APPROVALS

Federal Aviation Administration — By: — Title: — Date — Case No:

Department of Airports — By: — Title: — Date

UNALASKA AIRPORT
MASTER PLAN UPDATE

PROJECT MGR: -
SCALE: AS NOTED
PLANNER: -
DATE: MARCH 2008
DRAWN BY: RPE
CHECKED BY: RENDRES

TRANSPORTATION & PUBLIC FACILITIES — STATE OF ALASKA

MASTER PLAN UPDATE

PLAN AND PROFILE FUTURE R/W 30 (2026)

ISSUE DATE ----
Federal Project No. ----
AKAS Project No. ----
SHEET NO. 7 of 10

LAST SAVED 7/10/2008 6:14:46 PM FILENAME: P:\AIRPORTS\DOT-UNALASKA\MASTER PLAN\ALP\PLAN-PROFILE.DWG TAB: 2026 RW30

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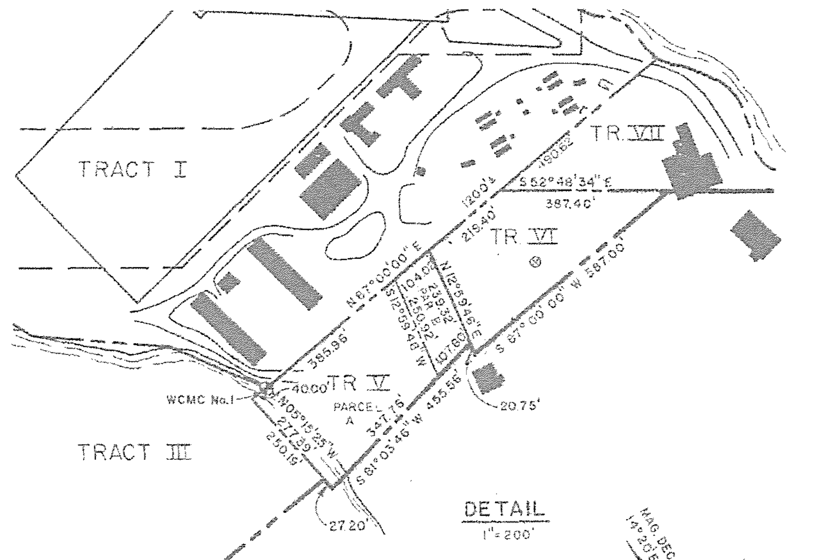
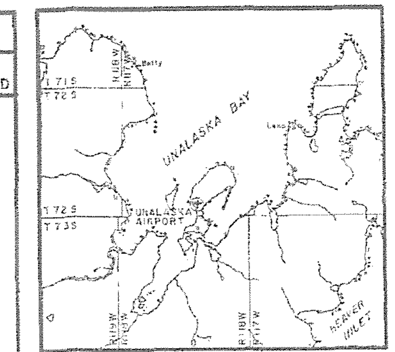


TRACT I MEANDERS ALONG UNALASKA BAY

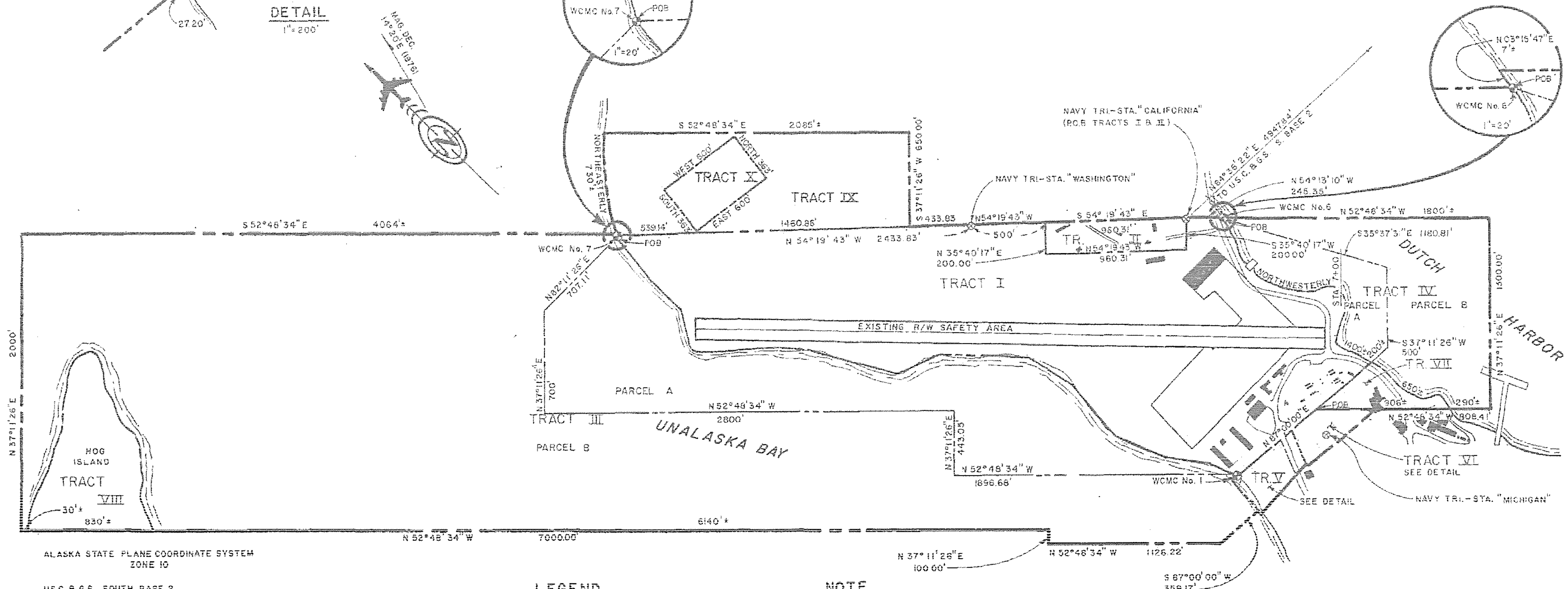
STARTING AT MC No 7:
GO S 02°55' 15" E FOR 370.09'
THEN S 08° 21' 45" E FOR 350.00'
THEN S 23° 21' 45" E FOR 156.40'
THEN S 20° 34' 21" E FOR 126.39'
THEN S 40° 06' 58" E FOR 304.47'
THEN S 46° 53' 49" E FOR 300.43'
THEN S 37° 43' 29" E FOR 306.96'
THEN S 37° 32' 32" E FOR 307.17'
THEN S 75° 26' 07" E FOR 332.34'
THEN S 51° 28' 38" E FOR 300.11'
THEN S 49° 56' 59" E FOR 300.00'
THEN S 20° 50' 47" E FOR 343.35'
THEN S 02° 23' 49" E FOR 444.50'
THEN S 22° 01' 34" E FOR 339.53'
THEN S 45° 25' 20" E FOR 300.11'
THEN S 27° 30' 00" E FOR 226.55'
ENDING AT MC No. 1.

PROPERTY STATUS

TRACT	PARCEL	A.D.A. No.	AREA ACRES	INTERESTS	DATE ACQUIRED
I		11355	105±	QCD, OUNALASHKA CORP. SURFACE ESTATE 14(c)(4) ANCSA	6-18-80
II			4.41		
III	A B	11477 11525	59± 225±	ILMA, DEPT. OF NATURAL RESOURCES	6-5-86
IV	A B	11478 11526	10± 26±	ILMA, DEPT. OF NATURAL RESOURCES AVIGATION & HAZARD EASEMENT-DNR	6-5-86 6-4-86
V	A		2.284		
	B		0.563		
VI			2.314		
VII		11479	3±	AVIGATION & HAZARD EASEMENT	
VIII			3±	AVIGATION & HAZARD EASEMENT	
IX			27±	AVIGATION & HAZARD EASEMENT	
X			500	AVIGATION & HAZARD EASEMENT	



VICINITY MAP
SCALE: 1" = 4 MILES
T 72 S, R 117 W
SEWARD MERIDIAN, ALASKA
U.S.G.S. UNALASKA



ALASKA STATE PLANE COORDINATE SYSTEM
ZONE 10

U.S.C. & G.S. SOUTH BASE 2
N 1192887.73 E 5040166.29
MEAN AZIMUTH CORRECTION = 07° 33' 36.8"

U.S.C. & G.S. SOUTH RADIO TOWER
N 1187962.97 E 5036226.07
MEAN AZIMUTH CORRECTION = 07° 32' 36.3"

RUNWAY MIDPOINT (EXISTING)
N 1192597.38 E 5033768.53
MEAN AZIMUTH CORRECTION = 07° 32' 12.2"

MEAN SCALE FACTOR = 1.00002105

ALL BEARINGS & DISTANCES SHOWN ARE GRID.

LEGEND

- ⊗ U.S. NAVY IRON CAPPED CONCRETE POST
- ▦ EXISTING STRUCTURE
- ⊕ A.D.A. 5/8" REBAR WITH ALUMINUM CAP

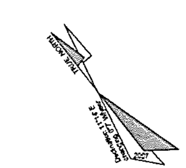
THIS INFORMATION IS BASED ON DIVISION OF AVIATION DUTCH HARBOR SURVEY CONTROL SHEET, 3/6/75

NOTE

1. AIRPORT NAME CHANGED BY VILLAGE RESOLUTION.
2. ALL BEARINGS, DISTANCES & AREAS ARE SUBJECT TO VERIFICATION BY BLM FIELD SURVEY PURSUANT TO ANCSA AS SET FORTH IN 43 CFR 2650.5-4(b).

BY	DATE	CHANGE
DT.	7-24-91	AS BUILT PER PROJECT No. 53261
GW	2/20/96	UPDATE PROP STATUS TR. III PAR. A & B TR. IV PAR. A & B SPLIT TR. V & TR. IV INTO PARCELS A & B
JGW	12/9/03	UPDATE PROPERTY STATUS TRACT I, ADA No. TR. III ADDED POB & DIMENSION TO TRACT VII

REVISIONS

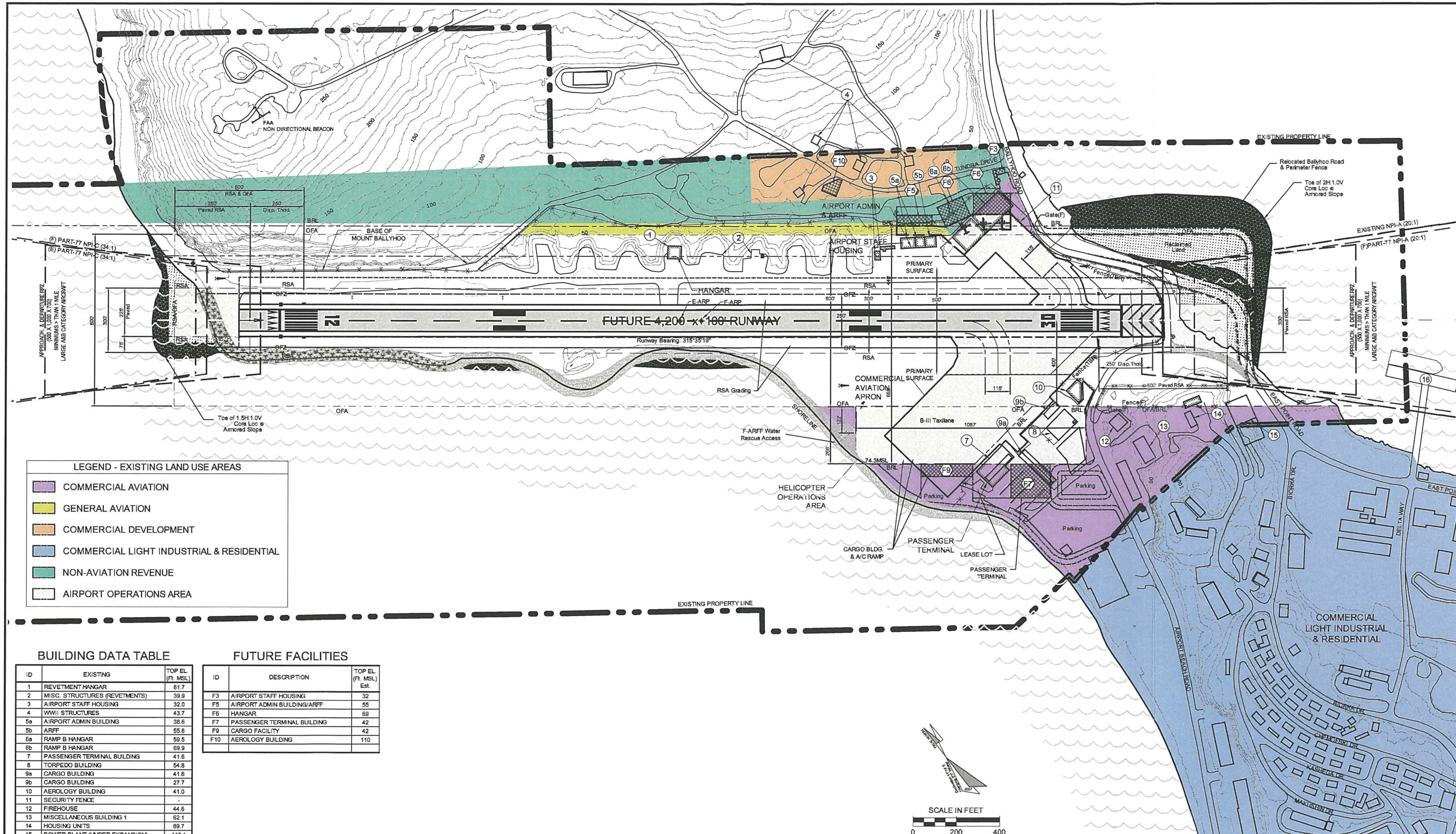


SCALE IN FEET
0 400 800

CH2MHILL 4520 Cooper Road - Suite 200 Cincinnati, OH 45242 (513) 745-0079	REVISIONS: NO. / DATE / BY / DESCRIPTION / APP'D	APPROVALS: Federal Aviation Administration — By: / Title: / Date / Case No: ; Department of Airports — By: / Title: / Date	UNALASKA AIRPORT MASTER PLAN UPDATE	PROJECT MGR: — ; PLANNER: — ; DRAWN BY: RENDRES	SCALE: AS NOTED ; DATE: MARCH 2008 ; CHECKED BY: RENDRES	TRANSPORTATION & PUBLIC FACILITIES — STATE OF ALASKA	MASTER PLAN UPDATE EXISTING PROPERTY MAP	ISSUE DATE: — ; Federal Project No. — ; AKAS Project No. — ; SHEET NO. 8 of 10

LAST SAVED: 1/15/2008 4:37:25 PM FILENAME: P:\AIRPORTS\DUT-UNALASKA\MASTER PLAN\ALP\PROPERTY MAP.DWG TAB: EXISTING LAYOUT

USER: RENDRES PLOT DATE: 10-Jul-08 PLOT TIME: 6:07:04 PM



BUILDING DATA TABLE

ID	EXISTING	TOP EL. (Ft. MSL)
1	REVETMENT HANGAR	61.7
2	MISC. STRUCTURES (REVETMENTS)	39.9
3	AIRPORT STAFF HOUSING	32.0
4	WWII STRUCTURES	43.7
5a	AIRPORT ADMIN BUILDING	38.6
5b	ARFF	55.6
6a	RAMP B HANGAR	59.5
6b	RAMP B HANGAR	69.9
7	PASSENGER TERMINAL BUILDING	41.6
8	TORPEDO BUILDING	54.8
9a	CARGO BUILDING	41.6
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10	AEROLOGY BUILDING	41.0
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12	FIREHOUSE	44.6
13	MISCELLANEOUS BUILDING 1	62.1
14	HOUSING UNITS	89.7
15	POWER PLANT (UNDER EXPANSION)	110.1
16	FUEL DOCK AND SHIPPING LANE	12.4/212

FUTURE FACILITIES

ID	DESCRIPTION	TOP EL. (Ft. MSL) Est.
F3	AIRPORT STAFF HOUSING	32
F5	AIRPORT ADMIN BUILDING/ARFF	55
F6	HANGAR	69
F7	PASSENGER TERMINAL BUILDING	42
F9	CARGO FACILITY	42
F10	AEROLOGY BUILDING	110

CH2MHILL
4520 Cooper Road - Suite 200
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(513) 745-0079

REVISIONS

NO.	DATE	BY	DESCRIPTION	APP'D	NO.

APPROVALS

Federal Aviation Administration	Department of Airports
By: -	By: -
Title: - Date	Title: - Date
Case No:	

UNALASKA AIRPORT MASTER PLAN UPDATE

PROJECT MGR: -	SCALE: 1"=200'
PLANNER: -	DATE: MARCH 2008
DRAWN BY: RENDRES	CHECKED BY: RENDRES

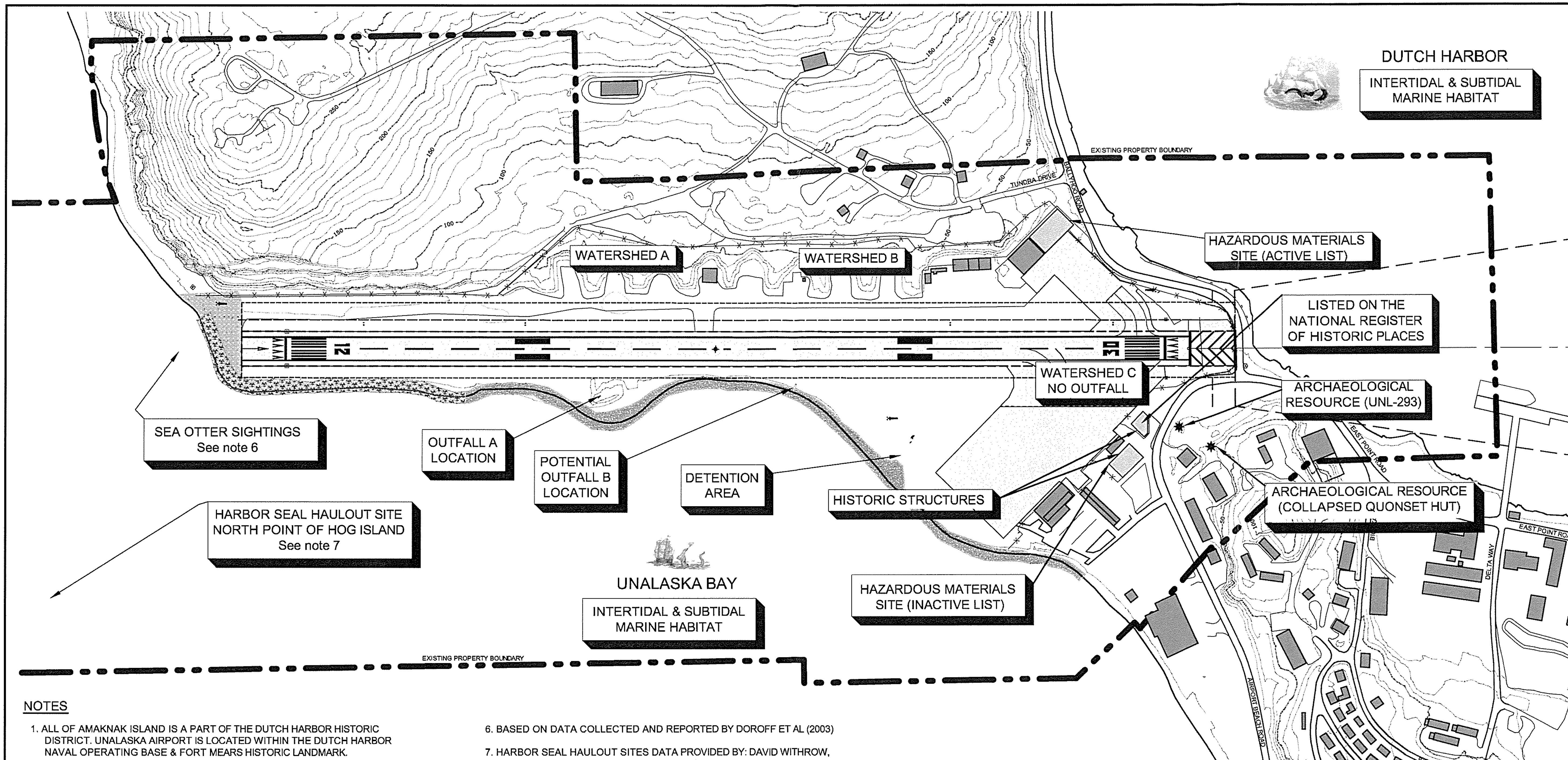
TRANSPORTATION & PUBLIC FACILITIES • STATE OF ALASKA •

MASTER PLAN UPDATE

EXISTING LAND USE PLAN

ISSUE DATE	----
Federal Project No.	---- ----
AKAS Project No.	----
SHEET NO.	9 of 10

LAST SAVED: 1/16/2008 5:13:19 PM FILENAME: P:\AIRPORTS\DUT-UNALASKA\MASTER PLAN\ALP\LAND USE PLAN EXISTING.DWG TAB: FUTURE
USER: RENDRES PLOT DATE: 10-Jul-08 PLOT TIME: 6:09:44 PM



SCALE IN FEET
0 200 400

NOTES

1. ALL OF AMAKNAK ISLAND IS A PART OF THE DUTCH HARBOR HISTORIC DISTRICT. UNALASKA AIRPORT IS LOCATED WITHIN THE DUTCH HARBOR NAVAL OPERATING BASE & FORT MEARS HISTORIC LANDMARK.

2. ALL OF AMAKNAK ISLAND IS WITHIN THE COASTAL ZONE, AS DEFINED BY THE ALASKA COASTAL MANAGEMENT PROGRAM.

3. ARCHAEOLOGICAL RESOURCES ARE COMMON ON AMAKNAK ISLAND, INCLUDING THE AIRPORT AND AIRPORT VICINITY. PROJECTS THAT MAY AFFECT UNDEVELOPED SOILS SHOULD BE ASSESSED FOR ARCHAEOLOGICAL RESOURCES.

4. SOILS AT THE AIRPORT AND IN THE VICINITY OF THE AIRPORT ARE LIKELY TO BE CONTAMINATED BY WW-II ERA FUEL SPILLS AND OTHER EVENTS.

5. MARITIME MAMMALS, STELLAR'S EIDER, AND OTHER SENSITIVE ANIMAL SPECIES ARE KNOWN TO OCCUR IN THE PROJECT AREA.

6. BASED ON DATA COLLECTED AND REPORTED BY DOROFF ET AL (2003)

7. HARBOR SEAL HAULOUT SITES DATA PROVIDED BY: DAVID WITHROW, NATIONAL MARINE MAMMAL LABORATORY

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REVISIONS					
NO.	DATE	BY	DESCRIPTION	APP'D	NO.

APPROVALS

Federal Aviation Administration — By: Title: Date Case No:

Department of Airports — By: Title: Date

UNALASKA AIRPORT
MASTER PLAN UPDATE

PROJECT MGR: -	SCALE: AS NOTED
PLANNER: -	DATE: MARCH 2008
DRAWN BY: TS	CHECKED BY: RENDRES

TRANSPORTATION & PUBLIC FACILITIES — STATE OF ALASKA

MASTER PLAN UPDATE

ENVIRONMENTAL CONSTRAINS

ISSUE DATE ----
Federal Project No. ----
AKAS Project No. ----
SHEET NO. 10 of 10

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USER: RENDRES PLOT DATE: 10-Jul-08 PLOT TIME: 6:10:57 PM

AIRPORT LAYOUT PLAN CHECKLIST

(REVISED FOR ALASKAN REGION –July 13, 2006)
To be used in conjunction with Advisory Circular 150/5300-13 Change 9.

Please refer to the attached Grant Assurances for applicable Federal Legislation, Executive Orders, Federal Regulations and Management and Budget Circulars. All Projects depicted on the ALP are subject to NEPA Environmental Analysis. The proposed project must meet the conditions described in Chapter 3 of FAA Order 1050.1E and/or FAA Order 5050.4A as appropriate.

The Airport Layout Plan is a plan showing the orientation and location of key facilities, such as runways and navigational aids, which must be planned with consideration for approach zones, prevailing winds, airspace utilization, land contours and many other special factors. The dimensional relationships even within the airport boundaries, between operational and support facilities and allocation of reasonable space to allow for orderly expansion of individual functions must be clearly established ir advance. This is essential if such facilities are to be subsequently positioned where they can best serve their intended purposes while conforming to applicable safety and construction criteria.

- All sheets should be standard sized 22" x 34" (D Size).
- All sheets should contain title and revision blocks.
- All sheets shall have the FAA Airspace number shown.
- Are all data element accurate?
- In the case of smaller airports, some of the following sheets may be combined if practical and approved by FAA.
- Submit the final ALP with its original electronic files in a CD-ROM. Include a copy in PDF format.
- How does the information in the Alaska Supplement compare to this ALP set?
  If the information in the Supplement is not accurate, provide 5010 update to FAA.

COMPONENTS

1 Narrative Report
2 Airport Layout Drawing
3 Airport Airspace (Part 77) Drawing
4 Inner Portion of the Approach Surface Drawing
5 Terminal Area Drawing (if applicable, or include a Building Table with top building elevations within the Airport Layout Drawing)
6 Land Use Drawing
7 Airport Property Map (Exhibit A)
8 Declared Distances Drawing (if applicable)

Name of Airport: UNALASKA AIRPORT FAA SITE# 50801.*A

Date of Sponsor Review: N/A

Name of Sponsor Project Manager & Phone #:
Judy Chapman (907) 269-0519

Name of Airport Manager & Phone #:
Steve Berninger ADOT & PF (907) 581-1786

State Airport Safety & Security Officer & Phone #:
Anna Walker (907) 269-0754

AIRPORT LAYOUT PLAN CHECKLIST

Narrative Report	YES	NO	NA
		☑ ?	
Note: The Narrative Report may accompany the final ALP in a mylars sheet or on 8 ½" x 11" paper			
Rationale for proposed development			
Rationale for Non-Standard Conditions and/or Modifications to Standards			
Equivalent Level of Safety			
Summary of staged development with estimated costs (CIP)			
Letters of Coordination with all levels of Govt. units, as needed.			
Adequate documentation with FHWA (If coordination is required)			
Rationale for Non-Standard Conditions and/or Modifications of Standards			
Forecasts (0-5, 6-10, 11-20 years)			
Total annual operations			
Annual Itinerant operations			
Number based aircraft			
Annual Operations of current critical aircraft			
Annual Operations of future critical aircraft			
Critical Aircraft- approach speed, wingspan, weight			
Airport Reference Code- existing/ future			
Enplanements			

AIRPORT LAYOUT PLAN CHECKLIST

Airport Data Sheet	YES	NO	NA
		☑ ?	
Vicinity Map (Current USGS map)		☑	
Scale	☑		
Township, Range, Sections			
Wind Rose and Coverage Analysis			☑
Data Source and time period of data collection			☑
Wind Rose shown with runway orientation depicted		☑	
Individual Coverage 10.5kt, 13kt, 16kt and 20 kt (as applicable)			☑
Combined Coverage 10.5kt, 13kt, 16kt and 20 kt (as applicable)			☑
Airport Data Table			
ICAO Airport Identifier	☑		
National Airport Identifier	☑		
FAA Site Number	☑		
Airport Elevation (NAVD88)	☑		
Airport Reference Point (NAD 83 Datum)	☑		
Airport Reference Code	☑		
Mean Maximum Temperature	☑		
Airport and Terminal Navaids (i.e. VOR, NDB, ASR…)	☑		
Taxiway Lighting & Marking	☑		
Obstruction Survey Source and Type (Appendix 16 pg. 295)	CH2M	?	
Magnetic Declination Year & rate of change	☑		
Survey Source and Type (Appendix 16 pg. 295, TERPS Appendix 2)	**What does this apply to?**		
Runway Data Table	☑		
Identify runway as "Utility" or "Other Than Utility"	☑		
FAR Part 77Approach Category (V, NPI, P)	☑		
Approach Surfaces (Ratio) (PART-77)	☑		
Visibility Minimum (V, 1 SM, ¾ SM, ½ SM, CAT II, CAT III)	☑		
Weight Bearing Capacity (S, T, ST, SBTT, TT, TRT, DDT, TDT, AUW, SWL, etc)	☑		
Aircraft Approach Category	☑		
Airplane Design Group	☑		
Runway Dimensions	☑		
True Mean Bearing (nearest 0.01 degree) (315° 33' 54" per NOAA)	☑		
Effective Grade	☑		
Runway Safety Area Dimensions (overall)	☑		
RSA Length beyond runway ends	☑		
Runway Protection Zone (RPZ) Dimensions	☑		
Runway Object Free Area (ROFA) Dimensions	☑		
Runway Object Free Area Length Beyond Runway End or Stopway	☑		
Runway Obstacle Free Zone (OFZ) Dimensions	☑		

Airport Data Sheet (cont.)	YES	NO	NA
		☑ ?	
Runway Data Table (Cont.)			
Precision Object Free Zone (POFZ) Dimensions if applicable			☑
Runway Lighting Type	☑		
Runway Marking Type	☑		
Runway Visual Approach Aids (i.e. PAPI, VASI, REIL….)	☑		
Runway Touchdown zone elevations (NAVD 88)	☑		
Geographic Coordinates & Elevations Table Existing, Near Term, Ultimate for the following as applicable:			
Airport Reference Point (NAD 83 nearest 0.01 second)	☑	☑	
All Threshold or Displaced Thresholds (NAD 83 nearest 0.01 second)	☑		
Legend Tables (Existing and Ultimate)	☑		
Airport Reference Point (ARP)		☑	
Antenna		☑	
Bluff		☑	
Buildings		☑	
Building Restriction Line (BRL)		☑	
Fence	☑		
PAPI		☑	
Property Line		☑	
REIL		☑	
Roadways		☑	
Rotating Beacon		☑	
Shoreline		☑	
Survey Monument		☑	
Threshold Lights		☑	
Topographic Contours		☑	
Trees (Large single)		☑	
Treeline		☑	
VASI		☑	
Wind Cone		☑	
Wind Cone & Segmented Circle		☑	
Modification to Standards / Non Standard Conditions	☑		
Listed in table	☑		

AIRPORT LAYOUT PLAN CHECKLIST

Airport Layout Plan	YES	NO	NA
		☑ ?	
***Airport Layout Plan Scale** 1"=200' (Preferred) to 1"=600' Horizontal*			
Drawing Elements			
North Arrow with Magnetic Declination & year	☑		
Topographic Contours (2' to 10')	☑		
Elevations (nearest 1/10 of a foot)	☑		
Key RW Stationing	☑		
Runways, Taxiways, Aprons, Navaids	☑		
Buildings	☑		
Traverse ways	☑		
Trees and brush	☑		
Water (ponds, lakes, streams, ocean)	☑		
Runway Orientation (runway numbers)	☑		
Taxiway, Taxi Lane Name (label)	☑		
True (mean) Geodetic Runway Bearing (315º 33' 54" per NOAA)	☑		
Runway Threshold Lights	☑		
Runway Stage Lengths existing & ultimate	☑		
RSA	☑		
ROFZ	☑		
POFZ			☑
ROFA	☑		
RPZ	☑		
TSA			☑
TOFA	☑		
Airport Reference Point (Listed on Data Table - Midpoint of R/W)	☑		
Building Restriction Line (BRL) and associated Part 77 height at the BRL (Height NOT shown but distance from CL is)	☑		
Runway Visibility Zone			☑
Navaid Critical Areas			☑
Monuments (Can Provide)	☑		
Residences and Places of Public Assembly within RPZ or Part 77 surfaces			☑
Hold Position Signs and Markings	☑		
Compass Calibration Pad, 300-foot critical area and last calibration date		Unknown	
Notes "NO OFZ OBJECT PENETRATIONS" or they are shown and listed in a table	☑		
Exterior Property line	☑		
North is to the top or left of the sheet	☑		
Runway Markings	☑		
Elevations (Runway, Thresholds, Intersections)	☑		
Dimensions			
Runway width and length (noted within footprint)	☑		
RSA width and length (Noted or on data table)	☑		
ROFZ width and length (Noted or on data table)	☑		

Airport Layout Plan (Cont)	YES	NO	NA
		☑ ?	
Drawing Elements (Cont)			
POFZ width and length(Noted or on data table)			☑
ROFA width and length (Noted or on data table)	☑		
RPZ width and length (Noted or on data table)	☑		
Taxiway width and length (Noted)	☑		
TSA width (Noted)			☑
TOFA width (Noted)	☑		
Apron width and length (Noted)			☑
Runway Separation Distances			
Aircraft Parking	☑		
Building Restriction Line	☑		
Parallel Runway			☑
Parallel Taxiway/ Taxilane			☑
Taxiway Separation Distances			
Aircraft Parking			☑
Parallel Taxiway			☑
Runway Centerline			☑
Building Data Table (if no terminal drawing)	☑		
Identification Number	☑		
Description	☑		
Station and Offset		☑	
Top Elevation	☑		
Obstruction Marking (existing/future)		Unknown	
Buildings to be Removed or Relocated noted	ADD	☑	

AIRPORT LAYOUT PLAN CHECKLIST

Airport Layout Plan	YES	NO	NA
		☑ ?	
Declared Distance Drawing (if Drawn) *Same scale as ALP* ***Drawing Elements***			
North Arrow with Magnetic Declination & year	☑	2007	
Topographic Contours (2' to 10')	☑		
Elevations (nearest 1/10 of a foot)	☑		
Key RW Stationing is shown			☑
Runways, Taxiways, Aprons, Navaids	☑		
Buildings	☑		
Traverse ways	☑		
Trees and brush	☑		
Water (ponds, lakes, streams, ocean)	☑		
Runway Orientation (runway numbers)	☑		
True (mean) Geodetic Runway Bearing (315º 33' 54" per NOAA)	☑		
Runway Threshold Lights	☑		
Runway Stage Lengths existing & ultimate	☑		
Clearway Identified			☑
Stopway Identified			☑
Displaced Threshold identified	☑		
Relocated Threshold identified	☑		
Takeoff Run Available (TORA)	☑		
Takeoff Distance Available (TODA)	☑		
Accelerated Stop Distance Available (ASDA)	☑		
Landing Distance Available (LDA)	☑		
Approach RPZ	☑		
Departure RPZ	☑		
Runway Object Free Area (ROFA)	☑		
Precision Object Free Area (POFA)	☑		

AIRPORT LAYOUT PLAN CHECKLIST

Airspace Drawings	YES	NO	NA
		☑ ?	
Inner Portion of Approach Surface *1"=200' Horizontal, 1"=20' Vertical*			
Plan View			
North Arrow with Magnetic Declination & year	☑		
Topographic Contours (2' to 10')	☑		
Elevations (nearest 1/10 of a foot)	☑		
Key RW Stationing is shown			☑
Runways, Taxiways, Aprons, Navaids	☑		
Buildings	☑		
Traverse ways	☑		
Trees and brush	☑		
Water (ponds, lakes, streams, ocean)	☑		
Runway Orientation (runway numbers)	☑		
True (mean) Geodetic Runway Bearing (315º 33' 54" per NOAA)	☑		
Runway Threshold Lights	☑		
Runway Stage Lengths existing & ultimate	☑		
Existing and Ultimate Part 77 Surfaces	☑		
USGS Quad or digital mapping to extents shown for base map			☑
Exterior Property line	☑		
Label traverse ways crossing approach with top elevation and computed clearance.	☑		
Obstructions identified by number and are legible	☑		
Obstruction Id matches obstruction table	☑		
Profile View			
Projected View of Plan View	☑		
Existing and Ultimate Part 77 surfaces	☑		
Composite Ground profile	☑		
R/W centerline ground profile	☑		
Depict traverse ways	☑		
Obstruction Data Tables	☑		
Separate Table for each runway end	☑		
Objects that are not obstruction are not included	☑		
Obstruction Identification Number	☑		
Obstruction Id matches Plan View	☑		
Description	☑		
Station & Offset		☑	
Elevation	☑		
Surface penetrated	☑		
Surface Elevation		☑	
Amount of Surface Penetration	☑		
Proposed Disposition of the Obstruction	☑		
General			
Note identifying Highest Threshold Siting Criteria		☑	
Note "No Threshold Siting Surface Object Penetrations"			☑

AIRPORT LAYOUT PLAN CHECKLIST

Airspace Drawings	YES	NO	NA
		☑ ?	
***Inner Portion of Approach Surface** 1"=200' Horizontal, 1"=20' Vertical*			
Plan View			
General (Cont.)			
Note identifying Highest Threshold Siting Criteria		?	
Note "No Threshold Siting Surface Object Penetrations"			☑
Note specifying obstruction clearance slope for each end of the r/w or show in profile		☑	
***Airport Airspace (PART 77)** 1"=2000' Plan View, 1"=1000' Profile*			
Overall View of Airspace			
Plan View			
Part 77 Surfaces based on Ultimate	☑		
USGS Quad for base map			☑
Runway End Numbers	☑		
50' elevation contours on sloping surfaces		☑	
Dashed lines used for less demanding surfaces	☑		
Obstructions identified by number and are legible		☑	
Obstruction Id matches obstruction table			☑
Waste or Sewage facility shown with distance to nearest point on r/w			☑
North Arrow with Magnetic Declination & year	☑		
Profile View		☑	
Ultimate Part 77 surfaces	☑		
Composite Ground profile	☑		
Significant Objects labeled with top elevation	☑		
Obstruction Data Tables (Outer Portion)		☑	
Objects that are not obstruction are not included	☑		
Obstruction Identification Number		☑	
Obstruction Id matches Plan View			☑
Description	☑		
Station & Offset			☑
Elevation	☑		
Surface penetrated	☑		
Surface Elevation		☑	
Amount of Surface Penetration		☑	
Proposed Disposition of the Obstruction		☑	
General			
Note "Refer to the inner portion of the approach surface drawings for close in obstructions"	ADD	☑	
Primary surface width identified by note or on plan view	ADD	☑	
Note specifying height restriction (ordinances/statutes)		unknown	

AIRPORT LAYOUT PLAN CHECKLIST

Miscellaneous Drawings	YES	NO	NA
		☑ ?	
Terminal Area Drawing *1"=50' to 1"=100'*		☑	
Plan View of Aprons, Buildings, Hangars, Parking Lots			
North Arrow with Magnetic Declination & year			
Building Data Table			
Identification Number			
Description			
Station and Offset			
Top Elevation			
Obstruction Marking (existing/future)			
Buildings to be Removed or Relocated noted			
Land Use Drawing *Same Scale as ALP*		☑	
Drawing Details - show Aprons, BRL, Property Boundary, Runways, Taxiways, RPZs, Access Roads & Navaids	☑		
Plan View of Land Uses by Category (Agricultural, Aeronautical, Commercial, Residential, etc.)	☑		
Land Use Legend is provided	☑		
Public Facilities (schools, hospitals, parks, etc.)			☑
Runway Visibility Zones for Intersecting Runways			☑
Show off airport property out to 65 LDN		Unknown	
North Arrow with Magnetic Declination & year	☑		
Airport Property Map Scale same as ALP Drawing (Used a copy from the previously approved ALP set)			
Drawing Details - show Aprons, BRL, Property Boundary, Runways, Taxiways, RPZs, Access Roads & Navaids	☑		
Plan View showing Tracts and Parcels of Land	☑		
North Arrow with Magnetic Declination & year	☑		
Legend	☑		
Exterior property boundary references to r/w c/l		☑	
Property Status Table (Used a copy from the previously Approved ALP)			
Number or Letter for each tract / parcel	☑		
Interest to be acquired			☑
Grantor		☑	
Grantee		☑	
Parcel Size	☑		
Date Property was acquired or property status	☑	☑	
Recorded document number		☑	
Federal Aid Project # under which property was acquired	☑		

Appendix L

Project Definition White Papers

Pre-Scoping Purpose and Need

1. Introduction and Background

The Alaska Department of Transportation and Public Facilities (DOT&PF) completed a Master Plan Update for Unalaska Airport in January 2008. The Master Plan Update addresses the near term (2016) and long term (2026) needs for improvement at the airport. DOT&PF anticipates that near term projects are ripe for decision and will require FAA's preparation of an Environmental Impact Statement (EIS) because of the likelihood of unavoidable significant environmental impacts that would result from the projects.

This Pre-Scoping Purpose and Need document defines, explains and justifies the actions or projects that are proposed for evaluation in the EIS in accordance with the provisions of the National Environmental Policy Act (NEPA), and FAA Orders 1050.1E and 5050.4B.

According to the aviation forecast (Master Plan Update, Chapter 2, *Projected Aviation Demand)*, passenger enplanements (Table 1), cargo, and aircraft operations will grow at Unalaska Airport in the coming 20 years. The forecast projects that over the 20-year planning period, enplaned passengers will increase annually by over three percent in most years, resulting in a 20-year growth rate of approximately 83 percent. Cargo volume is expected to grow 2.7 percent annually or approximately 70 percent total over the planning horizon. Outbound cargo lift consistently remains available for most of the year, reflecting that that demand is being met.

TABLE 1
Forecast of Enplanements for Unalaska Airport - 2006 to 2026

	Estimated	Ave Annual		Ave Annual		Ave Annual		Ave Annual	
Traffic Demand Segment	**2006**	**Inc (%)**	**2011**	**Inc (%)**	**2016**	**Inc (%)**	**2021**	**Inc (%)**	**2026**
Fishing Industry Transient Workforce	13,024	3.25%	15,283	3.25%	17,933	3.25%	21,042	3.25%	24,691
Unalaska Residents	12,900	3.00%	14,955	3.25%	17,337	4.00%	21,093	3.75%	25,355
Connecting Traffic	3,386	-13.86%	1,606	3.75%	1,931	3.75%	2,321	3.75%	2,790
Visitors and Tourists	520	6.80%	723	6.69%	999	6.67%	1,379	6.56%	1,895
Total Enplanements	**29,830**		**32,566**		**38,198**		**45,835**		**54,731**

Unalaska Airport's current design aircraft is the Saab 340B, an Airport Reference Code (ARC) B-II aircraft. The design aircraft is defined as the aircraft with the most demanding performance requirements that flies to an airport at least 250 times a year, and thus drives the airfield design parameters. While larger aircraft periodically fly to Unalaska, none currently exceed the threshold of 250 arrivals and 250 departures (often cited as 500 operations) required to stand as the aircraft around whose performance requirements the airfield must be designed.

The Master Plan Update determined that the Saab 340B fleet will be retired within 15 years as the airframes time out. PenAir plans to replace two of its Saab aircraft in 2016 with the Bombardier Q400, an ARC B-III aircraft. PenAir will continue to replace its entire Saab fleet with the Q400 over the following five years, ending by 2021. When the Q400 first enters service in 2016, it is projected to generate a minimum of 700 operations its first year at Unalaska. As such, the design aircraft for Unalaska Airport will change in 2016 from the Saab 340B to Q400.

Based on the projected growth in passenger and cargo demand, as well as the existing and future design aircraft, Unalaska Airport is currently deficient in numerous areas. These deficiencies will be exacerbated as demand increases and the ARC B-III aircraft initiates service. Key deficiencies include:

Runway Safety Area (RSA) - The existing RSAs at Unalaska Airport do not meet ARC B-II design standards of the current design aircraft (Saab 340B). Beginning in 2016, ARC B-III RSA dimensions will apply as the new design aircraft begins operations (Q400), further exacerbating this deficiency. The standard ARC B-III RSA is 300 feet wide along the entire length of the runway and extends 600 feet beyond each runway end.

Runway Object Free Area (OFA) - At the present time, at least eight different objects lie within the Runway 12/30 OFA and thus not meeting the ARC B-II design standard. Beginning in 2016, ARC B-III dimensions will increase the OFA to 800 feet wide along the entire length of the runway and extend 600 feet beyond each runway end.

Part 77 Imaginary Surfaces — Due to the area's steep terrain, numerous violations exist, some of which can be resolved, and others, such as Mount Ballyhoo, which cannot feasibly be eliminated or resolved.

Runway Length— The existing 4,100 foot runway is too short to accommodate departure operations of the current and future design aircraft at 95 percent of max allowable take off weight. The current design aircraft (Saab 340B) requires 4,375 feet for departure operations. The future design aircraft (Q400) requires 4,200 feet of runway for departures.

Terminal Apron— The terminal apron has the capacity to accommodate projected aviation activity through 2016. Beyond 2016, additional apron space will be required to accommodate up to 12 aircraft during peak periods.

Terminal, Cargo and Other Aviation Support Buildings – While purpose-built, the existing passenger terminal building is too small and functionally obsolete. Cargo processing, car rental, airline office and other aviation support buildings are largely comprised of World War II-era wooden structures built for other purposes, and thus operationally inefficient and functionally obsolete.

Vehicle Parking – The existing vehicle parking is uncontrolled, poorly defined, has severely deteriorated pavement, and is undersized.

The timing of the EIS preparation, permitting, construction and eventually operation of the improved airport is planned to coincide with the introduction of the Q400 into service at Unalaska. DOT&PF's objective is to implement near term projects by 2016. Long term needs will be addressed in subsequent NEPA and permitting processes.

2. Purpose and Need for Projects at Unalaska Airport

Based on the airport deficiencies identified in the Master Plan Update, DOT&PF's goal, and the purpose and need for projects to be evaluated in the EIS, is to **enhance safety, improve capability** and **improve reliability** of air service at Unalaska Airport. DOT&PF anticipates that:

- **Safety** enhancement goals will be met through a variety of projects that meet ARC B-III safety-oriented design standards including RSAs, clear OFAs, and clear Part 77 primary surfaces, to the extent practicable.
- **Capability** improvement goals will be met through a variety of projects including a runway extension, apron expansion, terminal and cargo facility replacement, and increased vehicle parking.
- **Reliability** improvement goals will not be met because FAA has recently verified that reliability is currently optimized at Unalaska Airport. In February 2005, FAA-Anchorage Flight Procedures Office (FPO) conducted a thorough review of Instrument Approach Procedures (IAP) and concluded that due to the high terrain and technological constraints, existing approach and departure procedures cannot be further improved at this time.

The following section explains how the purpose and need for improvements would be fulfilled.

2.1 To Enhance Safety to the Extent Practicable

- **Upgrade and enhance Runway 12/30 Safety Areas (RSA)**

FAA Order 5200.8 *Runway Safety Area Program* necessitates that airports provide standard RSAs for the applicable runway ARC, to the extent practicable. According to Chapter 1, *Inventory* of the Master Plan Update, the RSAs existing at Unalaska Airport are 150 feet by 200 feet off Runway end 12, and 150 feet by 250 feet off Runway end 30.

ARC B-III RSA dimensions will be required to meet ARC B-III runway design standards. These RSA dimensions are 300 feet wide along the entire length of the runway (150 feet from centerline) and 600 feet beyond each runway end.

- **Upgrade Runway 12/30 Object Free Area (OFA)**

FAA Advisory Circular 150/5300-13, Change 11, *Airport Design* necessitates that the OFA be maintained free of any objects. At the present time, at least eight different objects lie within the Runway 12/30 OFA. These eight objects will be removed to the extent practicable to enhance safety at Unalaska Airport.

Currently, the OFA dimensions for Runway 12/30 measure 500 feet wide (250 feet from runway centerline) and extend 250 feet beyond the runway end. Beginning in 2016, ARC B-III OFA dimensions will apply and will need to increase to 800 feet wide and extend 600 feet beyond the runway end.

- **Remove Part 77 Penetrations in the Primary Surface**

Federal Aviation Regulations (FAR) Part 77 establish standards associated with obstructions to navigable airspace in the vicinity of an airport, based on imaginary surfaces surrounding the runway. The regulations require that the primary surface be kept clear of surface penetrations. At the present time, a portion of Mount Ballyhoo Road and Airport Beach Road penetrates the primary surface, thus not meeting the regulation. Therefore, removal of Mount Ballyhoo Road and Airport Beach Road as a penetration to the Part 77 primary surface would enhance safety at Unalaska Airport.

2.2 To Improve Capability

- **Extend Runway 12/30 by 100 Feet**

Chapter 2, *Projected Aviation Demand,* of the Master Plan Update established that the design aircraft for Unalaska Airport is the ARC B-III Bombardier Q400 because it is the aircraft with the most demanding performance characteristics projected to generate at least 500 annual operations by 2016. Chapter 3, *Demand/Capacity and Required Facilities*, established that the Q400 requires 4,200 feet of departure runway at 95 percent of maximum allowable takeoff weight at Unalaska. The departure length of the existing runway is approximately 4,100 feet and cannot accommodate the design aircraft when operating at 95 percent of maximum allowable takeoff weight. Therefore, extension of Runway 12/30 by 100 feet would improve the capability of the Airport.

- **Expand Terminal Apron to Provide Additional Aircraft Parking Positions**

Chapter 2, *Projected Aviation Demand,* projects that up to 12 aircraft will require apron parking adjacent to the passenger terminal during peak operating periods by 2016. Chapter 3, *Demand/Capacity and Required Facilities* states that the existing terminal apron safely accommodates 10 B-II aircraft or 7 B-III aircraft parking positions. By 2026, the apron will be deficient and will require additional space to accommodate the larger Q400. Expansion of the terminal apron to accommodate additional ARC B-III aircraft parking positions would improve the capability of the airport, especially during future peak periods of operation.

- **Replace and Expand Terminal and Cargo Facilities and Vehicle Parking**

Chapter 2, *Projected Aviation Demand* of the Master Plan Update established that passenger and cargo throughput will grow at Unalaska over the next 20 years. Chapter 3, *Demand/Capacity and Required Facilities* documents that the existing terminal is undersized and functionally obsolete to accommodate today's traffic. While the existing cargo and support buildings provide a capacity surplus, these buildings not purpose-built and compromise efficient operations. In addition, the cargo and support buildings are dilapidated wooden structures. Replacement and expansion of the terminal and cargo buildings and vehicle parking lot will improve airport capability, especially during peak periods of operation.

In summary, the following table (Table 2) presents the existing conditions at Unalaska Airport, the required additions to meet ARC B-III safety standards in 2016 and the proposed actions for the EIS.

TABLE 2
Summary of Existing Conditions and Proposed Actions

	Existing Condition	Future (2016) Requirement	Proposed Action
RSA	Runway end 30: 100 feet wide by 200 feet Runway end 12: 100 feet wide by 250 feet	300 feet wide by 600 feet	Enlarge RSAs 200 feet wide and 400/450 feet
OFA	500 feet by 250 feet	800 feet by 600 feet	Enlarge OFAs 300 feet by 350 feet
Part 77	Mount Ballyhoo Road and Airport Beach Road penetrate the primary surface	No obstructions in the primary surface	Relocation of Mount Ballyhoo Road and Airport Beach Road out of primary surface
Runway length	4,100 feet long	4,200 feet long	Extend Runway 100 feet
Terminal Apron	10 B-II parking positions 7 B-III parking positions	Additional parking positions	Add 2 B-III parking positions
Terminal Building	13,000 square feet, functionally obsolete	26,000 square feet	Replace terminal building
Cargo and Support Buildings	5920 square feet, functionally obsolete	2,393 square feet	Replace cargo and support buildings with modern facility
Vehicle Parking (short and long term parking)	3,377 square yards, +/- 105 spaces	6,030 square yards, 201 spaces	Add 2,653 square yards, 96 spaces

3. Required Federal Actions and Approvals

Anticipated Federal actions and approvals include those that would be required prior to any implementation of the Proposed Action. Table 3 inventories those actions and approvals anticipated at this time.

TABLE 3
Potential FAA Actions and Other Approvals

Agency	Action or Approval
Federal Aviation Administration (FAA)	Issuance of Record of Decision (ROD) for Unalaska Airport EIS Unconditional Approval of revised Airport Layout Plan Approval of financial participation projects approved in ROD Approval of changes in navaids and approach documentation
US Coast Guard	Approval of structures in navigable waters
US Environmental Protection Agency	Approval of Clean Water Act; General Storm Water Permit for Construction Activities Approval of a Multi-Sector General Permit Approval of activities that could affect air quality (Clean Air Act)
US Army Corps of Engineers (USACE)	Agreement to serve as Cooperating Federal Agency for EIS Approval of Clean Water Act Section 404 Permit Approval of placement of material in navigable water (Rivers and Harbors Act, Section 10)
US Fish and Wildlife Service (USFWS)	Agreement to serve as Cooperating Federal Agency for EIS Issuance of Biological Opinion for listed species under USFWS authority (Endangered Species Act) Approval of Incidental Take Permit for listed species under USFWS authority
National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS)	Agreement to serve as Cooperating Agency for EIS Issuance of Biological Opinion for listed species under NMFS authority (Endangered Species Act and Marine Mammal Protection Act) Approval of Incidental Take Permit for listed species under NMFS authority Approval actions that could have an adverse effect on designated Essential Fish Habitat (Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act)
Federal Highway Administration (FHWA)	Agreement to serve as Cooperating Agency for EIS

TABLE 3
Potential FAA Actions and Other Approvals

Agency	Action or Approval
Alaska Department of Conservation	Approval of Clean Water Act Section 401 Certification
National Park Service Alaska Department of Natural Resources (DNR): State Historic Preservation Officer	Concur with or comment on determination of potential adverse effects on cultural or historic resources (Section 106; National Historic Preservation Act)
Alaska DNR: Office of Program Management and Permitting Aleutians West Coastal Resources Service Area	Determination of the consistency of an activity with the Coastal Zone Management Program and district regulations.

4. Timeframe for Proposed Action

The timeframe for the Proposed Action is based on major phases of work or milestones. These timeframes (provided in Table 4) provide insight into the pace of the project as well as confirm that actions will commence within the 3-year window in which a Final EIS is considered valid (per FAA Order 1050.1E, paragraph 514b).

TABLE 4
Anticipated Timeframe for Proposed Action

Action	Start	Complete
Draft EIS	June 2008	June 2010
Final EIS	July 2010	March 2011
Record of Decision	April 2011	June 2011
Environmental Permitting	July 2009	July 2012
Final design and bidding/award to contractor for fill/armor improvements in EIS	July 2011	December 2012
Construction – Mobilization, fill source development and stockpiling	January 2013	December 2013
Construction – Dutch Harbor fill, road relocation, runway extension	April 2013	June 2014
Construction – Unalaska Bay fill	January 2014	December 2014
Final design and bidding/award to contractor for terminal, cargo and parking improvements in EIS	January 2013	January 2014
Construction – Terminal, cargo and parking	April 2014	December 2015
Construction – Final airfield paving	June 2016	August 2016

Pre-Scoping EIS Alternatives

1. Introduction and Background

The alternatives described in this Pre-Scoping EIS Alternatives document represent a range of options that satisfy the purpose and need for improvements at Unalaska Airport and are based the Master Plan Update for Unalaska Airport (January 2008). These alternatives have been developed to facilitate the most comprehensive agency and public scoping possible. The intent of conducting scoping at the onset of an EIS is to communicate the FAA's purpose and need and initial thoughts on how to satisfy that need, and to encourage tribal, agency and public input about the purpose and need and environmental resources that could be affected by any of the alternatives under consideration.

FAA depends on a successful scoping phase at the start of an EIS to identify and flesh out issues and concerns about known environmental resources that could be affected by a Proposed Action and its alternatives. A successful scoping phase begins dialogue and yields substantive feedback from federal, state, regional and local regulatory and resource management agencies and from the public about known baseline conditions in the project vicinity, about areas of potential conflict, and about the regulatory programs protecting the environmental resources under an agency's purview. FAA also depends on formal government to government consultation with federally recognized tribes within the project area to identify all issues of interest at scoping.

Following completion of the scoping phase, FAA and DOT&PF will evaluate the feedback and input received from agencies, tribes and the public to inform and shape the breadth and depth of the investigation and analysis to be undertaken in the EIS. FAA and DOT&PF may also adjust the purpose and need for projects at Unalaska Airport as well as the range of initial alternatives in response to new information obtained through Scoping.

2. Purpose and Need for Projects at Unalaska Airport

According to the aviation forecast (Master Plan Update, Chapter 2, *Projected Aviation Demand)*, passenger enplanements, cargo, and aircraft operations will grow at Unalaska Airport in the coming 20 years. The forecast projects that over the 20-year planning period, enplaned passengers will increase annually by over three percent in most years, resulting in a 20-year growth rate of approximately 83 percent. Cargo volume is expected to grow 2.7 percent annually or approximately 70 percent total over the planning horizon.

During the Master Plan Update process, it was determined that the Saab 340B fleet will be retired within 15 years as the airframes time out. PenAir plans to replace two of its Saab aircraft in 2016 with the Bombardier Q400, an ARC B-III aircraft. PenAir will continue to replace its entire Saab fleet with the Q400 over the following five years, ending by 2021.

When the Q400 first enters service in 2016, it is projected to generate a minimum of 700 operations its first year at Unalaska. As such, the design aircraft for Unalaska Airport will change in 2016 from the Saab 340B to Q400.

Based on the projected growth in passenger and cargo demand, as well as the existing and future design aircraft, the Master Plan Update also identified several current deficiencies at Unalaska Airport. These deficiencies will be exacerbated as demand increases and the ARC B-III aircraft initiates service. The key deficiencies include:

- Existing Runway Safety Area (RSA) do not meet ARC B-II or ARC B-III design standards
- Several objects exist in the Runway Object Free Area (OFA)
- Part 77 Imaginary Surface violations
- Inadequate runway length to accommodate departure operations of the current and future design aircraft
- Terminal apron undersized to accommodate aircraft fleet beyond 2016
- Small and functionally obsolete terminal, cargo and other aviation support buildings
- Uncontrolled, undersized poorly defined vehicle parking with deteriorating pavement

Based on the airport deficiencies identified in the Master Plan Update, DOT&PF's goal, and the purpose and need for projects to be evaluated in the EIS, is to **enhance safety, improve capability** and **improve reliability** of air service at Unalaska Airport. DOT&PF anticipates that:

- **Safety** enhancement goals will be met through a variety of projects that meet ARC B-III safety-oriented design standards including RSAs, clear OFAs, and clear Part 77 primary surfaces, to the extent practicable.

- **Capability** improvement goals will be met through a variety of projects including a runway extension, apron expansion, terminal and cargo facility replacement, and increased vehicle parking.

- **Reliability** improvement goals will not be met because FAA has recently verified that reliability is currently optimized at Unalaska Airport. In February 2005, FAA-Anchorage Flight Procedures Office (FPO) conducted a thorough review of Instrument Approach Procedures (IAP) and concluded that due to the high terrain and technological constraints, existing approach and departure procedures cannot be further improved at this time.

The following section explains how the purpose and need for improvements would be fulfilled through development alternatives for airfield improvements, terminal and apron expansion, obstruction removal, airport access improvements, and RSA feasibility.

3. Pre-Scoping EIS Alternatives

3.1 Alternatives Eliminated from Consideration

The Master Plan Update evaluated a broad range of alternatives to identify feasible on-site and off-site options for meeting the purpose and need for improvements. These alternatives included:

- Close Airport
- Relocate Unalaska Airport
- Use of Other Airports as a Connecting Hub
- Reorient Existing Runway 12/30

These alternative concepts were ultimately eliminated from further consideration due to overall infeasibility, including high costs, surrounding terrain constraints, and a general lack of developable land. Chapter 3 of the Master Plan Update documents the details of this analysis.

3.2 Airfield Alternatives

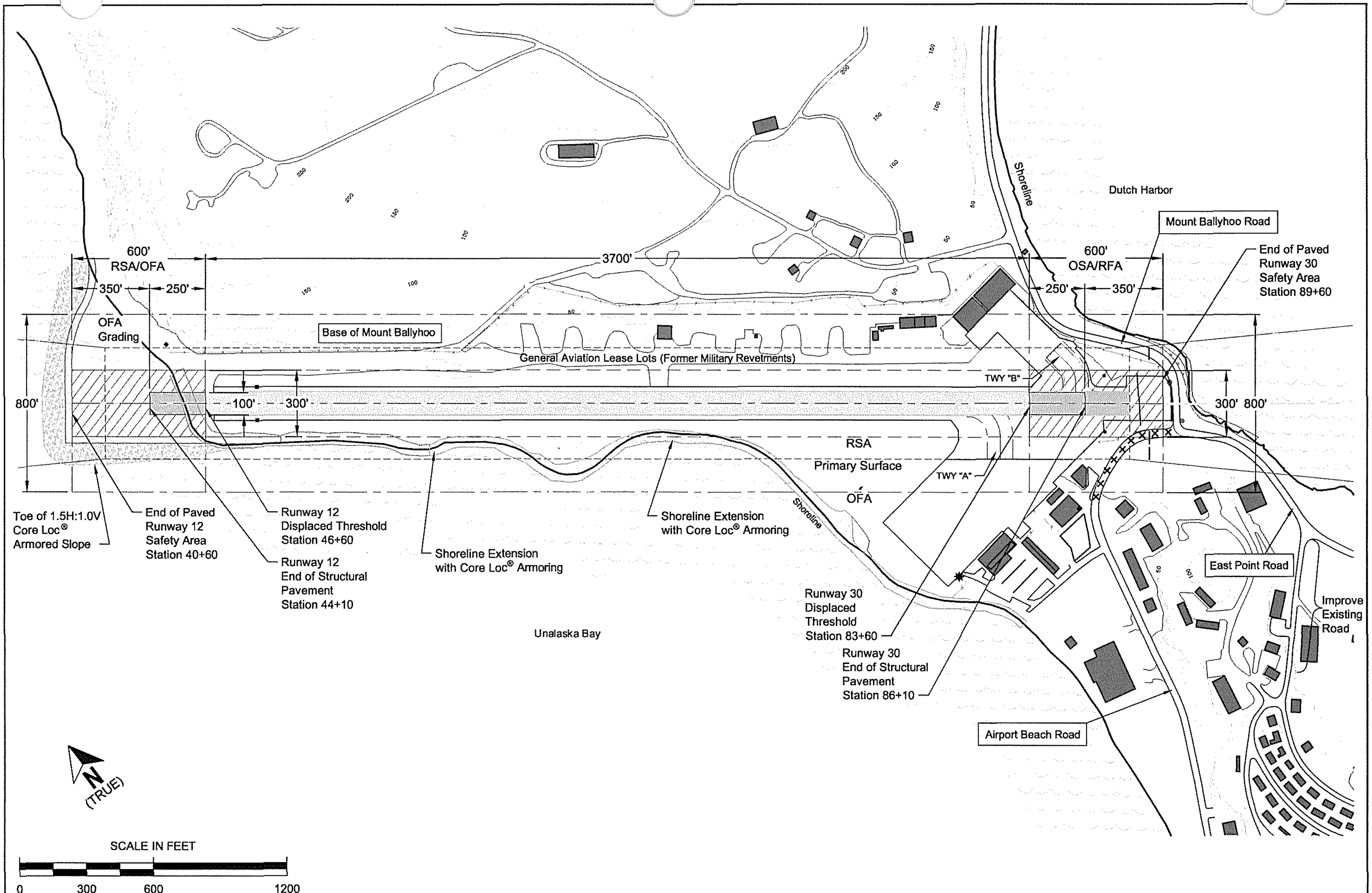
Four airfield concepts were developed along the orientation of the existing runway to accommodate the critical aircraft (Bombardier Q400), the FAA-required full standard RSAs, and other facility requirements supported by the purpose and need. To minimize the total airfield footprint, this analysis evaluated airfield alternatives that lengthened the runway by 100 feet, used declared distances and full standard RSAs. By declaring a portion of the runway as RSA, the amount of physical space needed to extend the RSA beyond the runway ends is reduced by the distance declared, while still meeting airfield length and ARC B-III RSA requirements. Each airfield alternative concept equally fulfills the operational requirements of the Bombardier Q400 aircraft.

Alternative 1: Northwest Extension- Runway 30 End Shift

The design concept for Alternative 1, presented in **Exhibit 1,** was achieved by shifting Runway 30 and its associated RSA/OFA northwest, and extending the approach end of Runway 12 into Unalaska Bay. This alternative provides 4,200 feet of takeoff and 3,700 feet of landing length in both directions using declared distances. Alternative 1 involves the least amount of rock fill and armoring in Dutch Harbor, but a includes the highest amount of rock fill and armoring in Unalaska Bay due to the expanded reach of the runway and RSA expansion

Alternative 2: Northwest Extension- Retaining Existing Runway 30 End

Alternative 2, presented in **Exhibit 2**, retains the existing Runway 30 approach end while extending the runway to the northwest along the centerline. This alternative provides 4,200 feet of take-off length and a landing distance of 3,700 feet in both directions. Alternative 2



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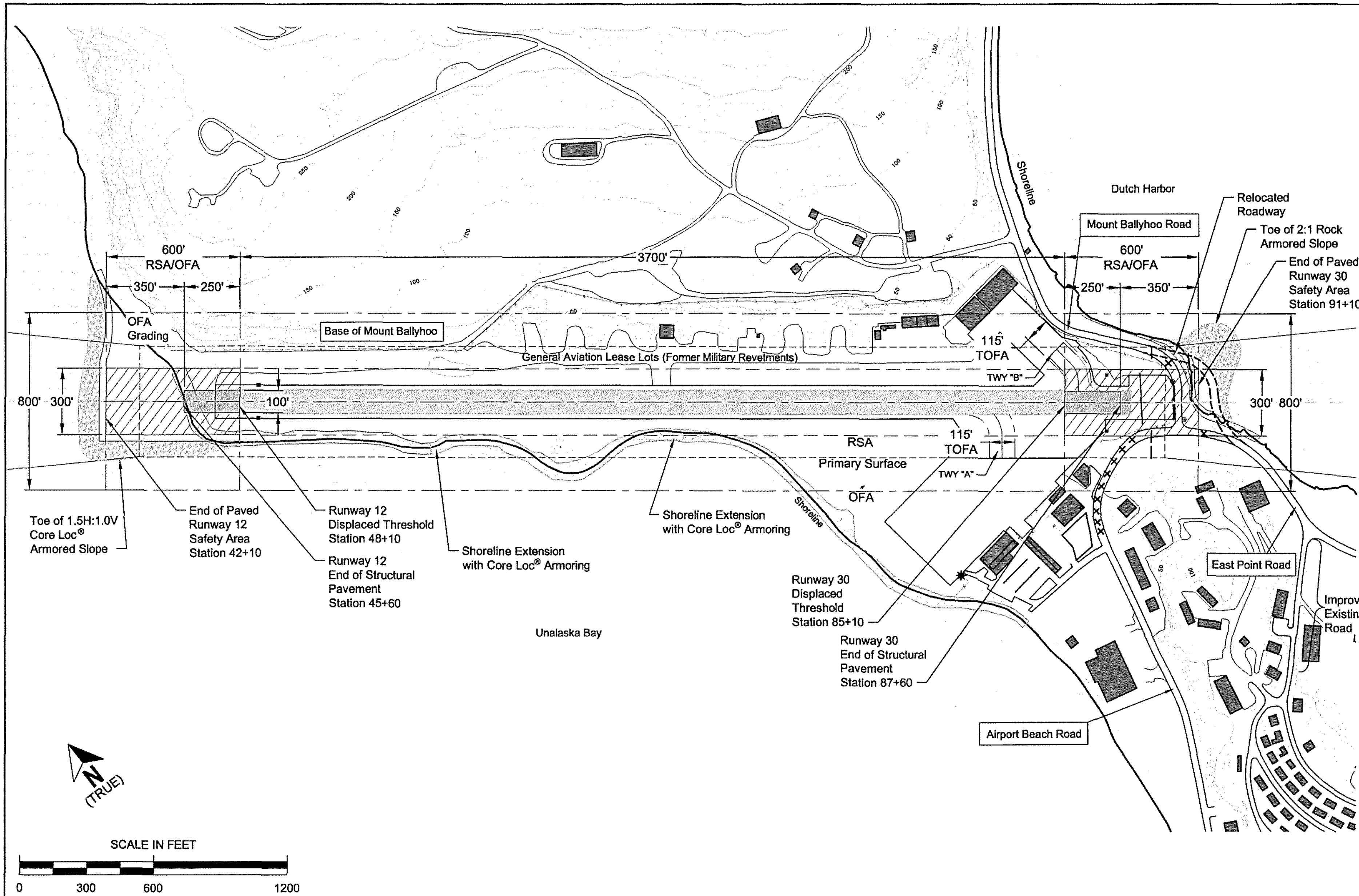
Alternative 1
Northwest Extension

Retain Existing Mt. Ballyhoo Road Alignment

Exhibit 1

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008



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Alternative 2
Northwest Extension

Retain Existing Runway 30 End

Exhibit 2

Source: A[illegible]300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to [illegible]eclared distances); Photogrammetric Data (January 2007) [illegible]ebruary 2008 entails extensive rock fill and armoring in Dutch Harbor and Unalaska Bay to accommodate the RSA.

Alternative 3: Southeast Extension— Maximize Use of Existing Configuration

The design concept for Alternative 3, presented in **Exhibit 3**, maximizes the use of the existing runway configuration by providing the entire runway shift on the Runway 30 end while retaining the current Runway 30 landing threshold. The purpose for this approach is to minimize costs by building more into Dutch Harbor and less into Unalaska Bay, as the latter requires additional rock fill and armoring for wave protection. As with the previous alternatives, Alternative 3 provides 4,200 feet of take-off length and a landing distance of 3,700 feet in both directions. Alternative 3 also entails rock fill and armoring in Dutch Harbor and Unalaska Bay to accommodate runway and RSA expansion.

Alternative 4: Southeast Extension- Minimal Northwest Shoreline Change

The design concept for Alternative 4, presented in **Exhibit 4**, retains the existing Runway 12 approach end while extending the runway southeast towards Dutch Harbor. Alternative 4 provides 4,200 feet of take-off length and a landing distance of 3,700 feet in both directions. Alternative 4 involves a relatively minor amount of rock fill and armoring in Unalaska Bay, but a significantly increased amount of rock fill and armoring in Dutch Harbor due to the expanded reach of the runway and RSA expansion.

Airfield Alternatives Summary

Table 1 below summarizes the evaluation of airfield alternatives to improvements at Unalaska Airport.

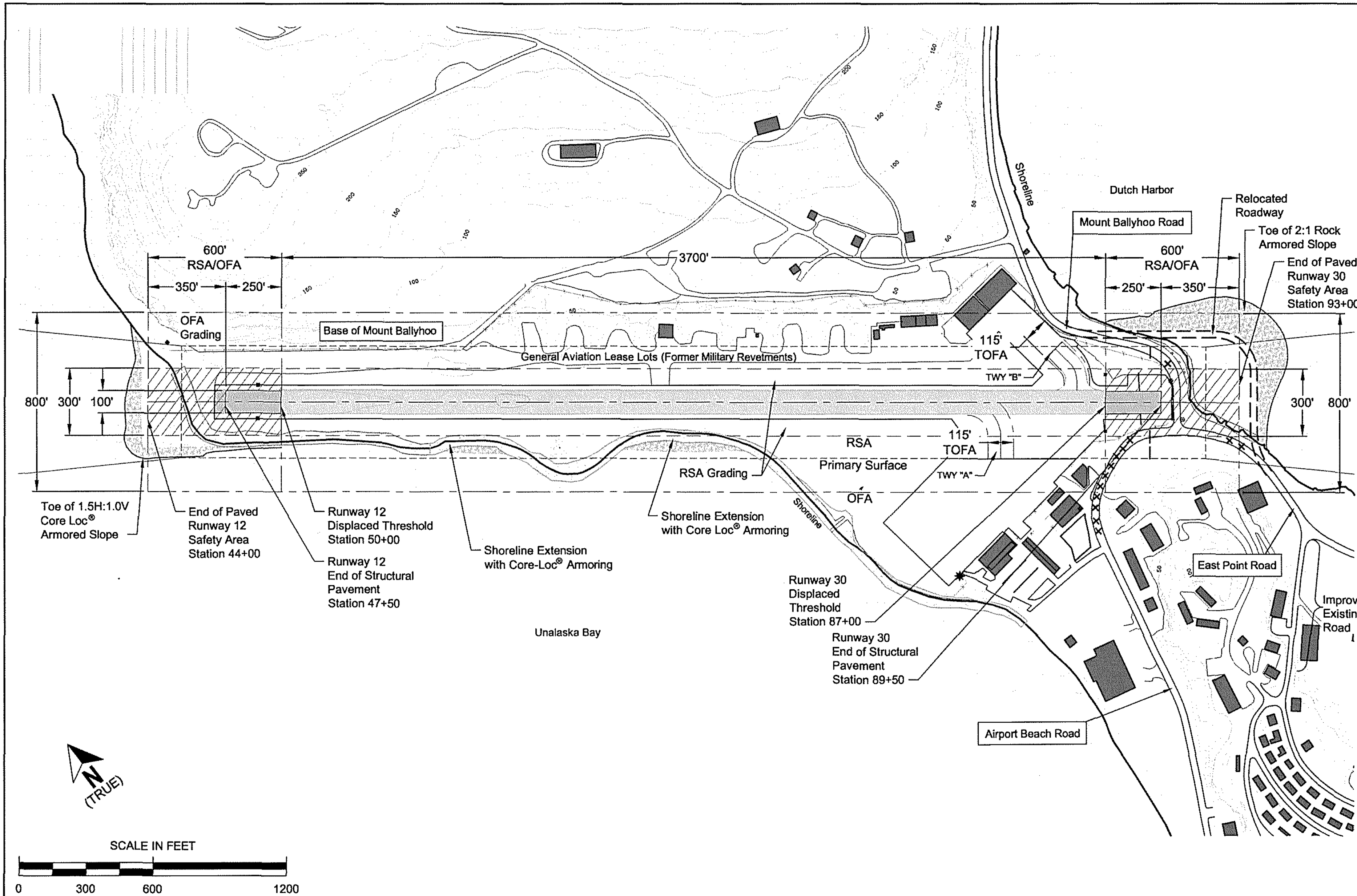
TABLE 1
Airfield Alternatives Evaluation Summary

	Alternative 1 Northwest Ext	Alternative 2 Northwest Ext	Alternative 3 Southeast Ext	Alternative 4 Southeast Ext
Ability to Meet Need	✓	✓	✓	✓
Construction Cost*	3 - $85M	2 - $80M	**2 - $80M**	1 - $71M
Constructability	4	3	**1**	2
Airspace (Part 77 Surfaces)	4	3	**1**	2
Environmental Fatal Flaws	None	None	**None**	None

1=best, 4=worst

*- Includes mobilization, design, contingency

All of the alternatives evaluated meet the need for airfield improvements for the Unalaska Airport and are generally constructible. Alternative 3, which maximizes the use of the existing runway configuration and makes no existing aeronautical condition worse, was the recommended Master Plan Update alternative for meeting the airfield needs at Unalaska Airport.



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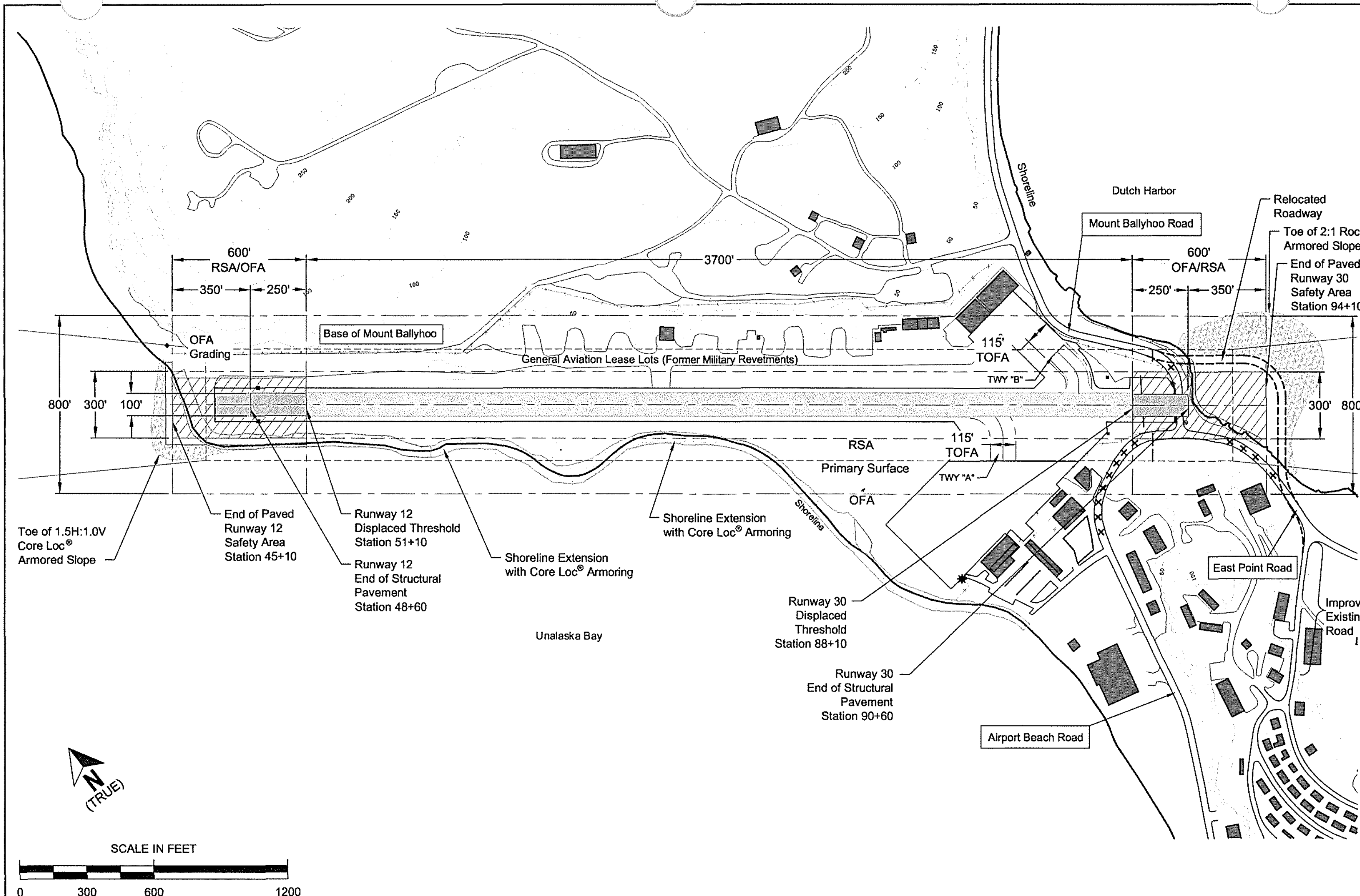
Federal Project No.: AIP 3-02-0082-1003 AKAS Project No.: 53091

Alternative 3
Maximize Use of Existing Runway Area

Retain Existing Runway 30 Arrival Threshold

Exhibit 3

Source: A[illegible]300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to [illegible]eclared distances); Photogrammetric Data (January 2007) [illegible]ebruary 2008



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Alternative 4
Southeast Extension

Minimal Northwest Shoreline Change

Exhibit 4

Source: AC/150 5300-13 Chg 11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008

3.3 Roadway Alternatives

Vehicles traveling on Mt. Ballyhoo Road penetrate the Primary Surface and OFA under ARC B-III airfield alternative concepts described in the previous section, and thus Airport Beach Road must be closed to public vehicle traffic at the Aerology building. Alternative access to Mt. Ballyhoo Road was analyzed by function, including airport access and airport bypass. Alternatives analyzed in the Master Plan Update included:

- Use of the Existing Roadways Alternative
- Airport Beach Road/Biorka Road Connector
- Airport Beach Road/Mt. Ballyhoo Road Tunnel

Roadway Alternatives Summary

The closure of Airport Beach Road near the fire station and the realignment of Mt. Ballyhoo Road are necessitated by FAA regulations requiring a clear RSA and OFA. The Airport Beach Road/Biorka Road Connector concept would require a cut through the hill south of East Point Road, a bridge connection to existing roads, and demolition and relocation of a substantial number of buildings. This concept was determined infeasible due to the high cost and community disturbance that would result. The airport tunnel concept would cost more than $20 million, not including maintenance and operation costs, and therefore was also determined infeasible due to high cost.

Given the extremely constrained setting and lack of developable land, alternative roadway construction options are limited, and any attempt to create new thoroughfares would impact traffic flow, no matter the location. As such, the Use of Existing Roadways Biorka Road to East Point Road to Mt. Ballyhoo Road) alternative was determined to be least disruptive and most cost-effective option, and was selected as the preferred roadway alternative. This alternative will include minor improvements in geometry connecting to the segment of Mt. Ballyhoo Road that encircles the end of Runway 30.

3.4 Terminal Alternatives

As determined in the Master Plan Update chapter *Demand Capacity and Required Facilities,* the current apron configuration is capable of handling approximately ten B-II aircraft or seven B-III aircraft. Currently, up to nine large aircraft use the terminal apron at one time during peak periods.

Four terminal area alternatives were developed to accommodate a projected increase in traffic as determined in the *Projected Aviation Demand* chapter. Each alternative consists of demolishing and relocating the terminal and cargo facilities, as well as an expanded or reconfigured aircraft apron. However, the land in which the terminal area facilities are currently situated is not capable of accommodating the proposed facility improvements. As a result, the development footprint will need to be enlarged and each alternative concept assumes the use of available lease land south of the existing landside facilities. All alternatives require the demolition of the historic Torpedo Building, but retain the Aerology Building through the 2016 implementation phase.

Passenger Terminal Area Alternative 1

This alternative, presented in **Exhibit 5,** rotates the current apron configuration to a position parallel with the ARC B-III OFA boundary expanding eastward towards Airport Beach Road, and relocates the terminal and cargo processing facilities.

Passenger Terminal Area Alternative 2

This alternative, presented in **Exhibit 6,** maintains the current apron configuration, relocates the terminal and cargo processing facilities, and adds a centrally located ARC B-III taxi lane running southwest from the runway exit (Taxiway A) to the far reaches of the apron adjacent to Unalaska Bay.

Passenger Terminal Area Alternative 3

This alternative, presented in **Exhibit 7,** rotates the current apron configuration to a position parallel with the ARC B-III OFA boundary extending west to Unalaska Bay and east towards Airport Beach Road, relocates the terminal and cargo processing facilities, and adds an ARC B-III taxi lane positioned lengthwise running east to west adjacent to the OFA boundary.

Terminal Area/Landside Alternative 4

This alternative, presented in **Exhibit 8,** rotates the current apron configuration to a position that utilizes all existing available land adjacent to Unalaska Bay parallel to the ARC B-III OFA boundary, and constructs a new terminal and cargo processing facility.

Terminal Alternatives Summary

Table 2 below summarizes the evaluation of terminal area alternatives to improvements at Unalaska Airport.

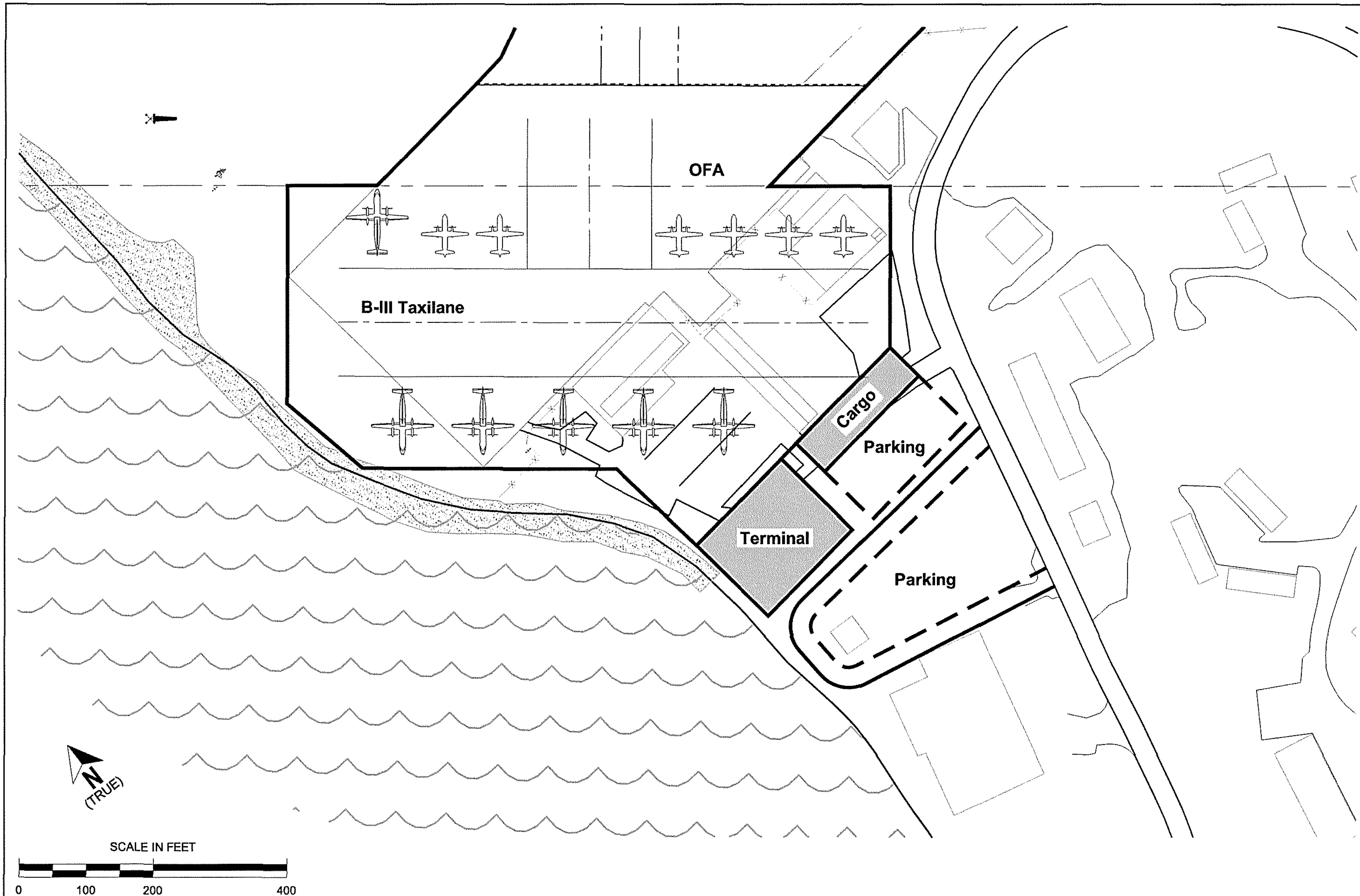
TABLE 2
Terminal Area Alternatives Evaluation Summary

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Ability to Meet Need	No	No	***Yes***	*Yes*
Construction Cost*	2 - $29M	1 - $24M	**2 - $29M**	3 -$32M
Constructability	NA	NA	**NA**	NA
Environmental Fatal Flaws	None	None	**None**	Yes- Avoidable Impact to Waters of the U.S.

1=best, 3=worst

*- Includes mobilization, design, contingency

Alternatives 3 and 4 meet all the identified aviation requirements (needs). Alternative 4 is environmentally fatally flawed because of the construction in the bay. Alternative 3 ranks in the middle of the range of costs, and offers the most efficient and flexible flight line supporting up to 6 B-III and 5 B-II aircraft. Lastly, a benefit of this alternative is that it provides revenue-generating lease lots beyond the minimum requirement. For these



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Terminal/Apron/Landside Layout Alternative 1

Exhibit 5

Source: A[illegible]300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to [illegible]eclared distances); Photogrammetric Data (January 2007) [illegible]ebruary 2008

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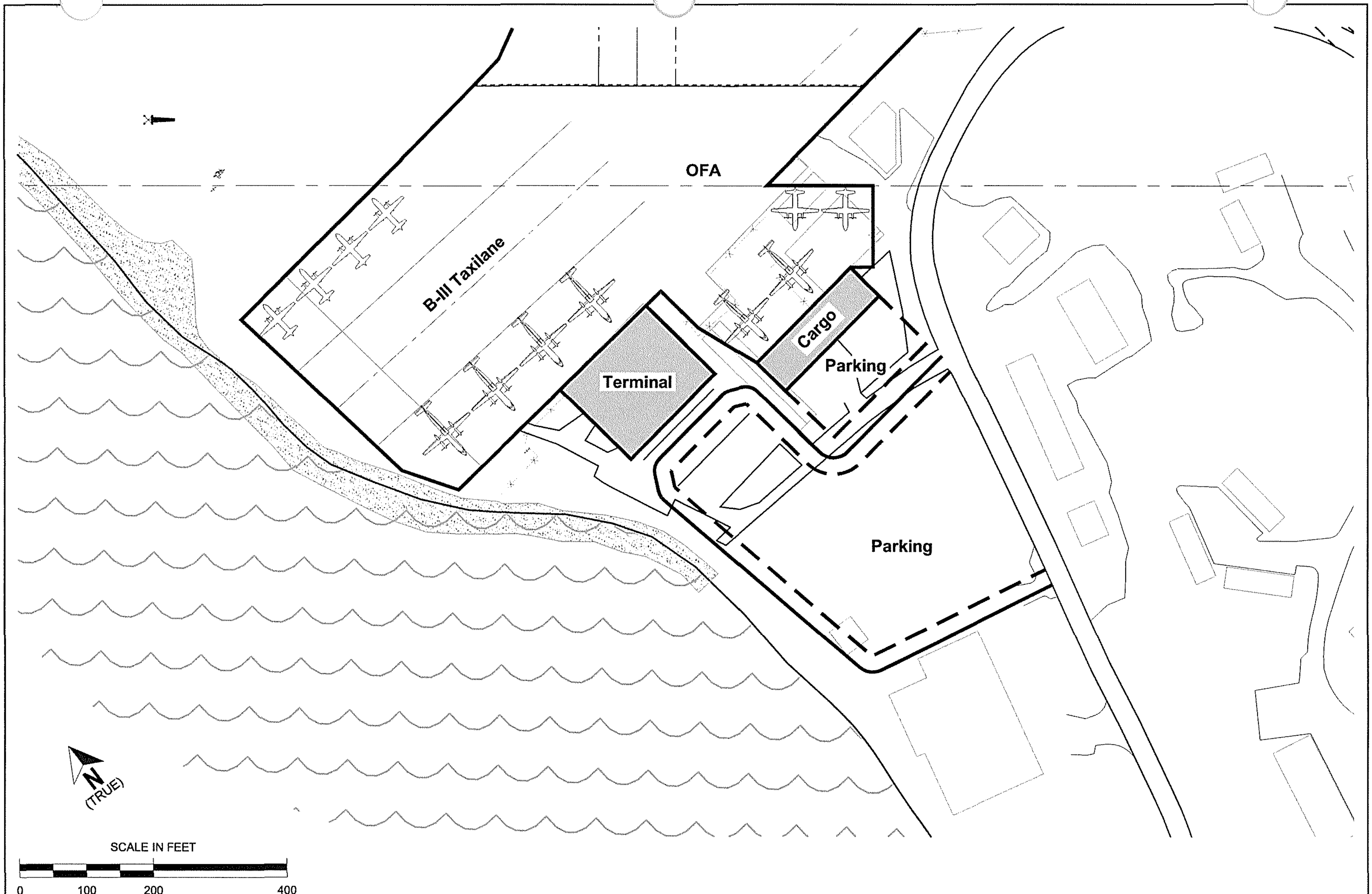

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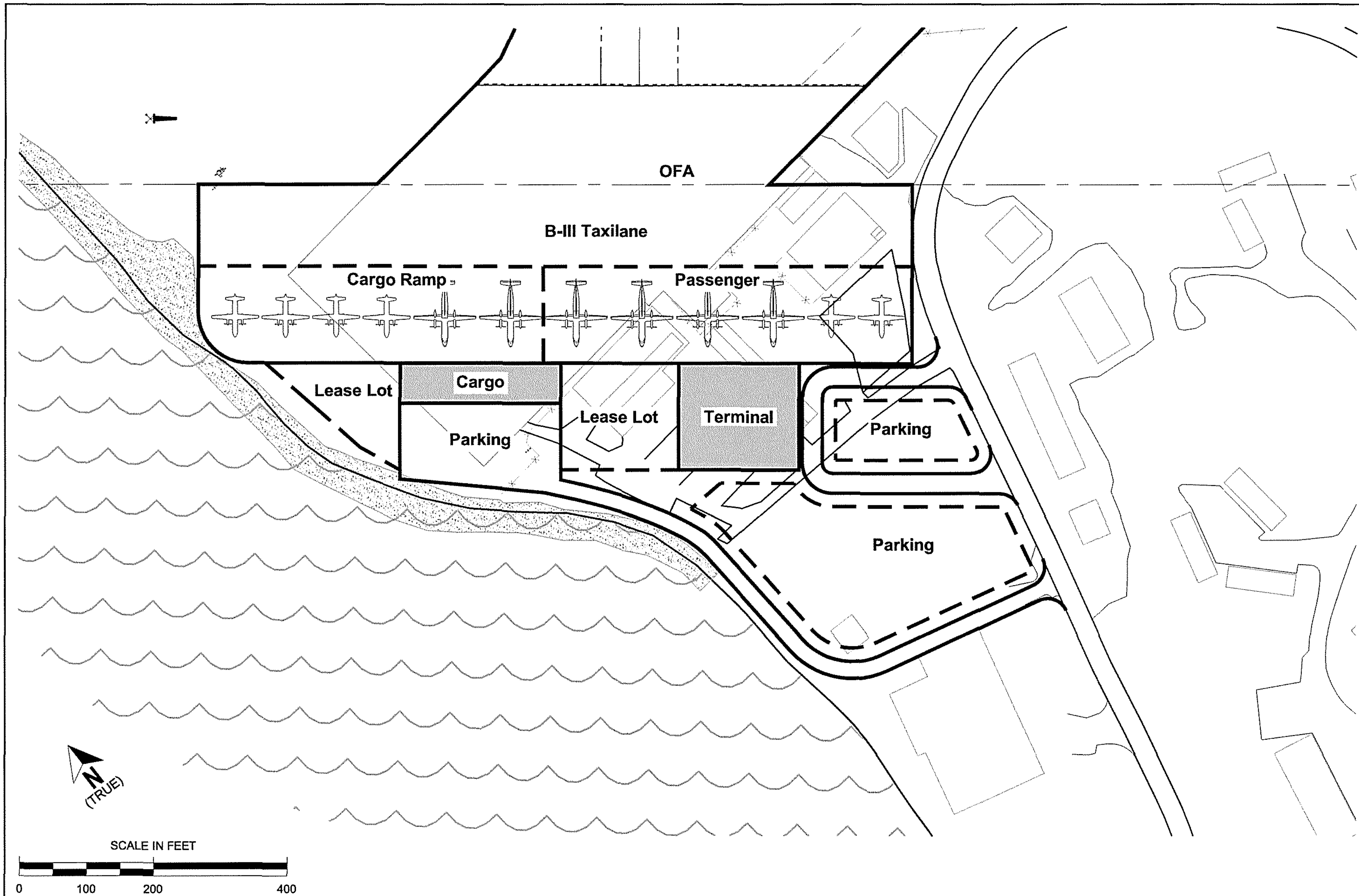
Terminal/Apron/Landside Layout Alternative 2

Exhibit 6

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008



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Terminal/Apron/Landside Layout Alternative 3

Exhibit 7

Source: A( )300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to ( )eclared distances); Photogrammetric Data (January 2007) ( )ebruary 2008

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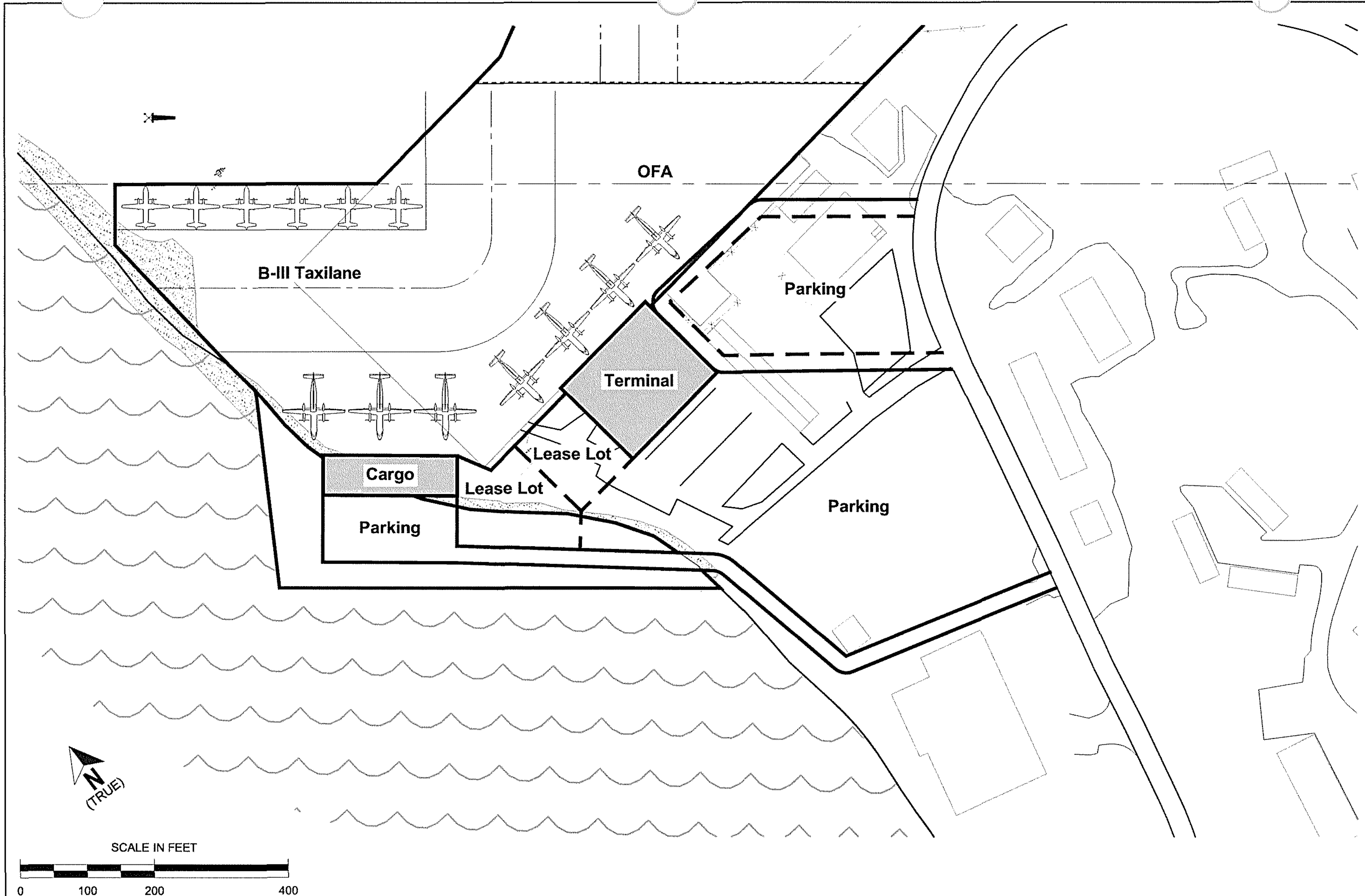

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Terminal/Apron/Landside Layout
Alternative 4

Exhibit 8

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008

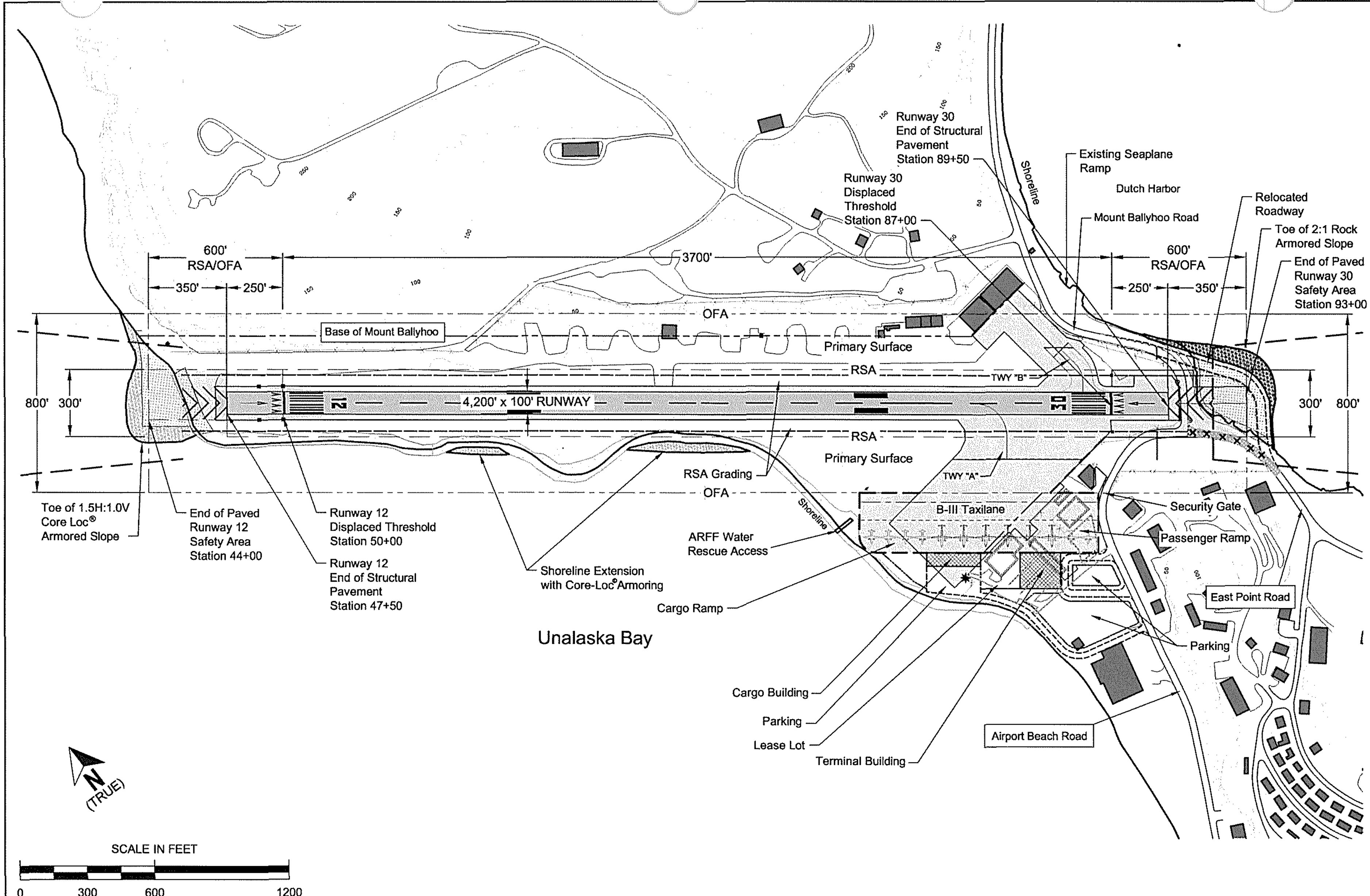
reasons, the Master Plan Update recommended Alternative 3 as the preferred terminal alternative

4. Proposed Action Alternative Refinement

The alternative that best meets the purpose and need is a composite of airfield alternative 3 and terminal alternative 3. This alternative would entail use of existing roads to provide public vehicle access to Mt. Ballyhoo Road and would require a successful long-term lease of +/- 3 acres of land to accommodate the terminal area redevelopment.

The alternative was further refined to reflect the RSA funding limitation for Unalaska Airport of $25 million (per FAA in a letter from Byron Huffman to Kip Knudsen dated August 24, 2004). Several options for achieving the highest degree of safety that an RSA provides for $25 million were evaluated in the Master Plan Update. The selected $25 million RSA provides full-length RSAs at both runway ends, but narrows the width to 75 feet at both ends to achieve the FAA-mandated cost target.

Exhibit 9 shows the Proposed Action that would best fulfill the purpose and need for improvements at Unalaska Airport by 2016.



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Preferred Alternative (Airfield Alternative 3) 2016 Buildout

Exhibit 9

Source: AC/150 5300-13 Chg-11, CH2M Hill Inc., 1987 Unalalaska Airport Airport Layout Plan (revised in 2002 to reflect declared distances); Photogrammetric Data (January 2007)

February 2008

Evaluation of Connected Actions

1. Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF) completed a Master Plan Update for Unalaska Airport in January 2008. The Master Plan Update addresses the near term (2016) and long term (2026) needs for improvement at the airport. DOT&PF anticipates that near term projects are ripe for decision and will require FAA's preparation of an Environmental Impact Statement (EIS) because of the likelihood of unavoidable significant environmental impacts that would result from the projects. Chapter 3, *Demand/Capacity and Required Facilities* of the Master Plan Update establishes the list of projects that will be required at Unalaska Airport over the 20-year planning horizon.

This document evaluates the recommendations of the Master Plan Update to establish which projects are ripe for decision and should be grouped together in an EIS, which projects are ripe for decision but qualify for separate environmental processing, and which projects are not ripe for decision and require future NEPA processing prior to implementation. This document establishes the list of projects that will comprise the Proposed Action in the forthcoming EIS because they are connected actions. Connected actions are those actions (or projects) that enable or facilitate the core Proposed Action (or the 'main' project under consideration in an EIS). FAA Order 1050.1E, Paragraph 500c, defines how connected actions are to be considered in an EIS:

> *(1) Connected actions should be considered in the same EIS. Connected actions are closely related actions that: (a) automatically trigger other actions which may require environmental impact statements; (b) cannot or will not proceed unless other actions are taken previously or simultaneously; or (c) are interdependent parts of a larger action and depend on the larger action for their justification (40 CFR 1508.25(a)(1)). Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts (40 CFR 1508.27(b)(7)). Proposed actions or parts of proposed actions which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement (40 CFR 1508.25(3)).*

Actions (or projects) of independent utility are those actions that stand on their own and do not require other actions for justification for implementation. Actions with independent utility may be included in the EIS or they may be evaluated through a separate NEPA environmental review.

2. Methodology for Evaluating Connected Actions

The Master Plan Update evaluated all airport facilities at Unalaska Airport and determined that existing airfield and landside infrastructure is deficient for current airport operations and that future operations will further exacerbate these deficiencies. Current and future deficiencies include runway length, runway safety areas (RSA), object free areas (OFA), Part 77 surfaces, terminal apron area, passenger terminal building, cargo buildings and vehicle parking lots. Master Plan Update Chapters 2 and 3 establish the need for a 100-foot extension of Runway 12/30 required by the Critical Aircraft (Bombardier Q400). Therefore the core Proposed Action is comprised of the 100-foot runway extension and other airfield modifications to meet ARC B-III standards, and RSA and other safety enhancements. Other projects identified to meet the airport needs will be evaluated to assess whether they enable the Proposed Action in any way or whether they would have completely independent utility. Furthermore, some projects may not be ripe for decision, and will not be included in the upcoming EIS.

Each of these projects will be evaluated to test for:

1. Precedent/dependent actions: Activities that must precede the action to meet the project purpose and need, assuming existing conditions at Unalaska Airport

2. Interdependent actions: An action that is reasonably a small part of a larger action and dependent on the larger action for justification (through purpose and need)

3. Triggered actions: Activities that must occur after implementation of the proposed action for purpose and need to be met, for the project to have functional utility, or for continued satisfactory operation of Unalaska Airport

4. Independent utility actions: An action that does not depend on or trigger another action

The outcome of this evaluation will consolidate connected actions into the Proposed Action for the EIS. Actions not necessarily connected will be identified as ones of independent utility. Actions not ripe for decision will be listed also. The anticipated NEPA documentation level for connected actions, actions of independent utility, and future actions will also be noted.

3. Inventory of Projects Derived from Required Facilities

Master Plan Update Chapter 3, *Demand/Capacity and Required Facilities* establishes the list of projects that will be required at Unalaska Airport over the 20-year planning horizon. This section describes whether the projects have/are precedent/dependent actions, interdependent actions, or triggered actions, or whether these projects are independent.

3.1 Runway Length Extension by 100 Feet

This project would extend the runway length by 100 feet from 4,100 feet to 4,200 feet to accommodate the Critical Aircraft (Bombardier Q400). Extending the runway does not require any other projects to precede its construction. The extension of this runway will trigger changes to the RSA and OFA because runway threshold locations will change.

Other potentially triggered projects include two projects intended to remove FAR Part 77 Imaginary Surface penetrations: moving portions of Mount Ballyhoo Road and Airport Beach Road and terminal apron expansion to accommodate the larger aircraft. While the road relocations stand as independent projects because they currently penetrate the primary surface, the runway extension may relocate the Runway 30 threshold, thus changing the Part 77 penetration conditions. These triggered projects are not considered interdependent because the RSA, OFA, and Part 77 actions would be necessary to meet ARC B-III standards without the addition of a runway extension.

Status: Triggers Actions

3.2 Terminal Apron Expansion

This project would add two aircraft parking spaces and increase the width of Taxiway A to accommodate projected future ARC B-III aircraft. The terminal apron expansion is interdependent because it provides aircraft parking spaces and the taxiway needed by the Critical Aircraft.

Status: Interdependent Action

3.3 Runway 12 RSA Enhancement

This project would enhance the RSA at the end and along the sides of Runway 12 to meet ARC B-III standards to the extent practicable. This project is interdependent with the other RSA project as well as the two OFA projects because they would reasonably be considered smaller portions of a larger project to enhance safety at Unalaska Airport. This project would be a dependent action triggered by the runway extension project, since the runway extension could involve changes to Runway 12 and would require changes in the RSA.

Status: Interdependent and Dependent Action

3.4 Runway 30 RSA Enhancement

This project would enhance the RSA at the end and along the sides of Runway 30 to meet ARC B-III standards to the extent practicable. This project is interdependent with the other RSA project as well as the two OFA projects because they would reasonably be considered smaller portions of a larger project to enhance safety at Unalaska Airport. This project would be a dependent action triggered by the runway extension project, since the runway extension could involve changes to Runway 30 and would require changes in the RSA.

Status: Interdependent and Dependent Action

3.5 Runway 12 OFA Enhancement

This project would address objects in the OFA for Runway 12 to the extent practicable. This project is interdependent with the other OFA project as well as the two RSA projects because they would reasonably be considered smaller portions of a larger project to enhance safety at Unalaska Airport. This project would be a dependent action triggered by the runway extension project, since the runway extension could involve changes to this end of the runway and would potentially reveal additional objects that would need to be addressed. Moreover, the OFA enhancement is dependant on the runway extension because the runway is being extended to accommodate ARC B-III, which expands the OFA.

Status: Interdependent and Dependent Action

3.6 Runway 30 OFA Enhancement

This project would address objects in the OFA for Runway 30 to the extent practicable. This project is interdependent with the other OFA project as well as the two RSA projects because they would reasonably be considered smaller portions of a larger project to enhance safety at Unalaska Airport. This project would be a dependent action triggered by the runway extension project, since the runway extension could involve changes to this end of the runway and would potentially reveal additional objects that would need to be addressed. Moreover, the OFA enhancement is dependant on the runway extension because the runway is being extended to accommodate ARC B-III, which expands the OFA.

Status: Interdependent and Dependent Action

3.7 Federal Aviation Regulations (FAR) Part 77 Imaginary Surface Penetrations

This project would address penetrations to several FAR Part 77 Imaginary Surfaces. As described in Master Plan Update Chapter 3, *Demand/Capacity and Required Facilities*, there are numerous Part 77 penetrations at and in the vicinity of the airport. These penetrations are segregated into two groups – Primary Surface penetrations (those primarily related to and affected by the runway extension and airfield safety enhancements), and Transitional Surface penetrations.

Mount Ballyhoo Road and Airport Beach Road currently penetrate the Runway 30 Primary Surface and would have to be resolved independent of any future changes to the airfield. However, because the 100-foot runway extension could change the location of the Runway 30 threshold, the extension concurrently triggers resolution of these two primary surface penetrations. Because the RSA and OFA projects are intended to enhance safety at Runway 30, it is reasonable to assume that these projects would be interdependent with additional correction of safety hazards in the primary surface. Penetrations of the Primary Surface are FAA's highest priority Part 77 projects warranting corrective action.

Penetrations in Transitional Surfaces that should be resolved over time, include the base of Mount Ballyhoo, obstructions from Airport Beach Road outside of the Primary Surface, the defensive fighting position bunker, the Aerology building airside fence, the hill located south of the Runway 30 blastpad, and other buildings penetrating the Transitional Surface. These actions support a longer term objective of addressing Part 77 penetrations that are of secondary importance to aviation safety. Each of these actions would have independent utility and would not depend on the others for justification or implementation. While it may be prudent to combine these actions for efficiency and cost savings, this does not create a dependent situation. As such, these actions have independent utility.

To summarize this analysis, there are two sets of actions in this project. The first set (Mount Ballyhoo Road and Airport Beach Road relocations) is triggered by and interdependent with the runway extension. The remaining Part 77 penetration resolution actions would be considered independent utility actions because they would not be triggered by nor would they trigger other actions. These two sets of actions are separately considered in the evaluation of projects discussed below.

Status: Mount Ballyhoo Road and Airport Beach Road relocations are Triggered and Interdependent with the runway extension. All other known Part 77- related projects are Independent Utility Actions.

3.8 Passenger Terminal Building Expansion

Master Plan Update Chapter 3, *Demand/Capacity and Required Facilities* identifies current and future deficiencies in the passenger terminal size. The introduction of the Critical Aircraft in 2016 will exacerbate the terminal size constraints because the larger aircraft will accommodate approximately twice as many passengers per flight. The passenger terminal building expansion is interdependent with the airfield projects that will accommodate the ARC B-III Critical Aircraft.

Passenger terminal improvement projects are commonly grouped together as a single action with other landside projects because they meet similar needs to provide improved passenger accommodations and to improve the level of service (LOS). Therefore the terminal expansion is an interdependent action, as a smaller element of an overall larger project to improve landside facilities. That said, both the airside and landside projects are justified by the same existing and projected aviation demand, as documented in Master Plan Update Chapter 2, *Aviation Forecast*.

Status: Interdependent with the runway extension and terminal apron expansion. Interdependent with other landside projects (aviation support area, airport access road and vehicle parking).

3.9 Aviation Support Area (Cargo) Expansion

Master Plan Update Chapter 3, *Demand/Capacity and Required Facilities* projects a future demand for approximately double the cargo handling facilities at Unalaska Airport. While current cargo demand is being met, future aviation support area expansion would involve development of facilities with airfield access. Because this and other landside improvements would occur on a different schedule from the airfield projects and would address a different type of deficiency compared with the airfield projects, landside improvements would have independent utility from the airfield projects and would not depend on the airfield projects for justification.

Status: Interdependent with other landside projects (terminal building expansion, airport access road and vehicle parking).

3.10 Airport Parking Expansion – Short Term and Long Term

Master Plan Update Chapter 3, *Demand/Capacity and Required Facilities* identifies deficiencies in vehicle parking. Vehicle parking demands are commonly grouped together as a single action with other landside projects because they meet similar needs to provide an improved LOS and decrease congestion. Therefore these landside actions will be considered interdependent actions, as smaller elements of an overall larger project to improve landside facilities.

Status: Interdependent with other landside projects (passenger terminal, aviation support area and airport access road).

3.11 Existing Airfield Security Improvement

Master Plan Update Chapter 3, *Demand/Capacity and Required Facilities* notes that the existing airport perimeter fence does not adequately protect the aircraft operating area (AOA) from incursions by unauthorized pedestrians, vehicles or animals. Furthermore, a gate that closes Mount Ballyhoo Road in the vicinity of Runway 30 during aircraft operations no longer functions automatically. Existing security voids must be corrected to ensure a safe AOA as part of the sponsor's ongoing operations and maintenance activities at Unalaska Airport. Correction of existing security voids is independent of airside or landside projects identified and must be addressed to protect the current AOA – independent of other airport enhancement/improvement projects. All future airside and landside projects will incorporate contemporary security measures including fencing and other access control.

Status: Independent Utility

4. Evaluation of Projects

4.1 Airfield Connected Actions

Table 1 summarizes the relationships of projects discussed above. This table shows the grouping of connected airfield projects and connected landside projects.

The group of connected airfield projects includes:

- Runway length extension by 100 feet
- Terminal apron expansion
- Runway 12 RSA enhancement
- Runway 30 RSA enhancement
- Runway 12 OFA enhancement
- Runway 30 OFA enhancement
- Resolution of FAR Part 77 Primary Surface penetrations resulting from Mount Ballyhoo Road and Airport Beach Road

4.2 Landside Connected Actions

Connected landside actions:

- Passenger terminal building expansion
- Aviation support area (cargo) expansion
- Airport parking expansion; short and long term

These projects represent connected actions based on the overall goal to meet ARC B-III requirements, including the runway extension to accommodate the Critical Aircraft and to enhance safety. Because significant environmental impacts could result from these improvements, particularly the runway expansion component, an Environmental Impact Statement (EIS) is anticipated.

	Runway Length Extension	Terminal Apron Parking Expansion	Runway 12 RSA Enhancement	Runway 30 RSA Enhancement	Runway 12 OFA Enhancement	Runway 30 OFA Enhancement	FAR Part 77 Imaginary Surfaces (a)	FAR Part 77 Imaginary Surfaces (b)	Passenger Terminal Building Expansion	Aviation Support Area Expansion	Existing Airfield Security Improvement	Airport Parking Expansion
Runway Length Extension												
Terminal Apron Parking Expansion	●											
Runway 12 RSA Enhancement	⊙	●										
Runway 30 - RSA Enhancement	⊙	●	●									
Runway 12 - OFA Enhancement	⊙	●	●	●								
Runway 30 - OFA Enhancement	⊙	●	●	●	●							
FAR Part 77 Penetrations (a)	⊙	●	⊙	⊙	⊙	⊙						
FAR Part 77 Penetrations (b)	○	○	○	○	○	○	○					
Passenger Terminal Building Expansion	●	●	●	●	●	●	●	○				
Aviation Support Area Expansion	●	●	●	●	●	●	●	○	●			
Existing Airfield Security Improvement	○	○	○	○	○	○	○	○	○	○		○
Airport Parking Expansion	●	●	●	●	●	●	●	○	●	●	○	

●	Interdependent Action
⊙	Precedent or Triggered Action
○	Independent Action

Notes:

a. Primary Surface: Mount Ballyhoo Road and Airport Beach Road

b. Transitional Surfaces: including Base of Mount Ballyhoo; Airport Beach Road; defensive fighting position bunker; the Aerology and other buildings penetrating transitional surfaces; surrounding hills

4.3 Independent Utility Actions

Two projects from Master Plan Update Chapter 3, *Demand/Capacity and Required Facilities* are considered projects of independent utility. As noted above, even though these projects support the general goal of meeting FAA design criteria for ARC B-III aircraft, these projects were determined to be functionally independent of the other projects and from each other. These projects include:

- Resolution of FAR Part 77 Imaginary transitional surface penetrations (base of Mount Ballyhoo, obstructions from Airport Beach Road outside of the Primary Surface, the defensive fighting position bunker, the Aerology building airside fence, the hill located south of the Runway 30 blastpad, and all buildings penetrating the transitional surface
- Existing airfield security improvement

The recommended level of NEPA environmental review for these projects is discussed below.

4.3.1 FAR Part 77 – Penetrations of Transitional Surfaces

This group of projects would entail resolution of numerous FAR Part 77 penetrations of transitional surfaces. These include penetrations resulting from surrounding hills, the Aerology Building and other structures, roads and a defensive fighting position bunker. Each Part 77 penetration resolution project would have independent utility, and it does not appear that they would be tied to the connected actions identified above. In some cases, there may be environmental resource issues that would need to be addressed in a NEPA review, such as possible wildlife associated with the surrounding hills or cultural resource issues associated with the Aerology Building or the former defensive fighting position bunker. For purposes of this working paper, these actions should be considered independent actions and evaluated individually to determine the appropriate NEPA level of environmental review based on the anticipated environmental impacts associated with each individual action.

4.3.2 Existing Airfield Security Improvement

This project would entail installation of a perimeter fence that provides positive control over the AOA, while not introducing a hazardous object to the OFA or an additional penetration of Part 77 surfaces. This improvement is needed to protect the existing airfield and is thus of independent utility. This project should qualify for Categorical Exclusion if no extraordinary circumstances are encountered.

5. Actions Carried Forward in EIS

The connected actions listed in Sections 4.1 and 4.2 form the basis of the Proposed Action to be analyzed in the EIS. Master Plan Update Chapter 4, *Planning Alternatives* compares different options that incorporate these actions and other actions. *PreScoping EIS Alternatives*, refines the planning alternatives and focuses on elements of the Proposed Action.

In summary, the Proposed Action for the Unalaska Airport EIS consists of:

- Runway length extension by 100 feet
- Terminal apron expansion
- Runway 12 RSA enhancement
- Runway 30 RSA enhancement
- Runway 12 OFA enhancement
- Runway 30 OFA enhancement
- Resolution of FAR Part 77 Primary Surface penetrations resulting from Mount Ballyhoo and Airport Beach Roads
- Passenger terminal building expansion
- Aviation support area (cargo) expansion
- Airport parking expansion; short and long term

Other projects identified in the Master Plan Update should be addressed under separate NEPA evaluations, as either connected actions or projects of independent utility when they are ripe for decision and implementation.

Appendix M

Bathymetric Data

Bathymetric Data

Bathymetric data for the Master Plan study area was collected. It is provided digitally within the attached CD, labeled Bathymetric Data, collected 2005.

A reconnaissance-level bathymetric survey was conducted using single beam hydrographic sounding equipment along track-lines in the following areas:

- A track-line at approximately 100 feet left and 100 feet right of runway centerline, extended in the water to the limit of the Master Plan study area to the south east (Runway 30 approach).
- A track-line at approximately 100 feet left and 100 feet right of runway centerline, extended in the water to the limit of the Master Plan study area to the northwest (Runway 12 approach).
- Two track-lines near at the existing ramp. A track-line will be extended into the water to the extent of the Master Plan study area at the approximate north and south boundaries of the ramp.

Bathymetric surveys of the remainder of the Master Plan study area were conducted using single beam hydrographic sounding equipment along a series of track-lines spaced at nominal 50-foot intervals oriented generally perpendicular to the shoreline.

As part of the bathymetric survey, benthic and aquatic habitat as well as cultural resources were qualitatively mapped and characterized to take advantage of this in-water mobilization.

Appendix N

FAA Forecast Approval Letter

Erion, Jon/CIN

From: Katrina.Moss@faa.gov
Sent: Monday, April 09, 2007 6:18 PM
To: Mark Mayo
Cc: van Woensel, John/CIN; Erion, Jon/CIN; Klin, Thomas/NYC; debbie.roth@faa.gov; Leslie.Grey@faa.gov
Subject: Re: Unalaska Master Plan Update: Forecast for approval
Follow Up Flag: Follow up
Flag Status: Green

Hello Mark,

I've reviewed the updated forecast for Unalaska Airport for the period 2006-2026 as further described in the attached documents. FAA concurs with the forecast of aviation activity as presented. Please contact me if you have questions or concerns on this matter.

Regards,
Katrina Moss
Airports Division, AAL-616
Federal Aviation Administration
222 West 7th Avenue Box #14
Anchorage AK 99513-7587
907-271-5439

Mark Mayo <mark_mayo@dot.state.ak.us>

04/03/2007 08:17 AM

To Katrina Moss/AAL/FAA@FAA
cc Thomas.Klin@CH2M.com, jon.erion@ch2m.com, john.vanwoensel@ch2m.com
Subject Unalaska Master Plan Update: Forecast for approval

Katrina;

I am attaching the updated forecast for your review and approval. Please let me know if you have any questions or concerns.

Thanks.

Mark[attachment "Chapter2DUTMPUForecastv8-FINALtoClient-CLEAN.doc" deleted by Katrina Moss/AAL/FAA] [attachment "Chapter2TOCv1-ToClient (2).doc" deleted by Katrina Moss/AAL/FAA]