US Army Corps
of Engineers
Alaska District

# Navigation Improvements Interim Feasibility Report and Final Environmental Impact Statement

Vol I

## Akutan, Alaska

July 2004

# 1.0 INTRODUCTION

## 1.1. Study Authority

This feasibility study was recommended in an August 1997 report by the Alaska District, U.S. Army Corps of Engineers, entitled "Section 905(b) (WRDA 86) Analysis, Akutan Harbor, Alaska."

This study is authorized by a resolution, adopted on December 2, 1970, by the Committee on Public Works of the U.S. House of Representatives. The resolution states:

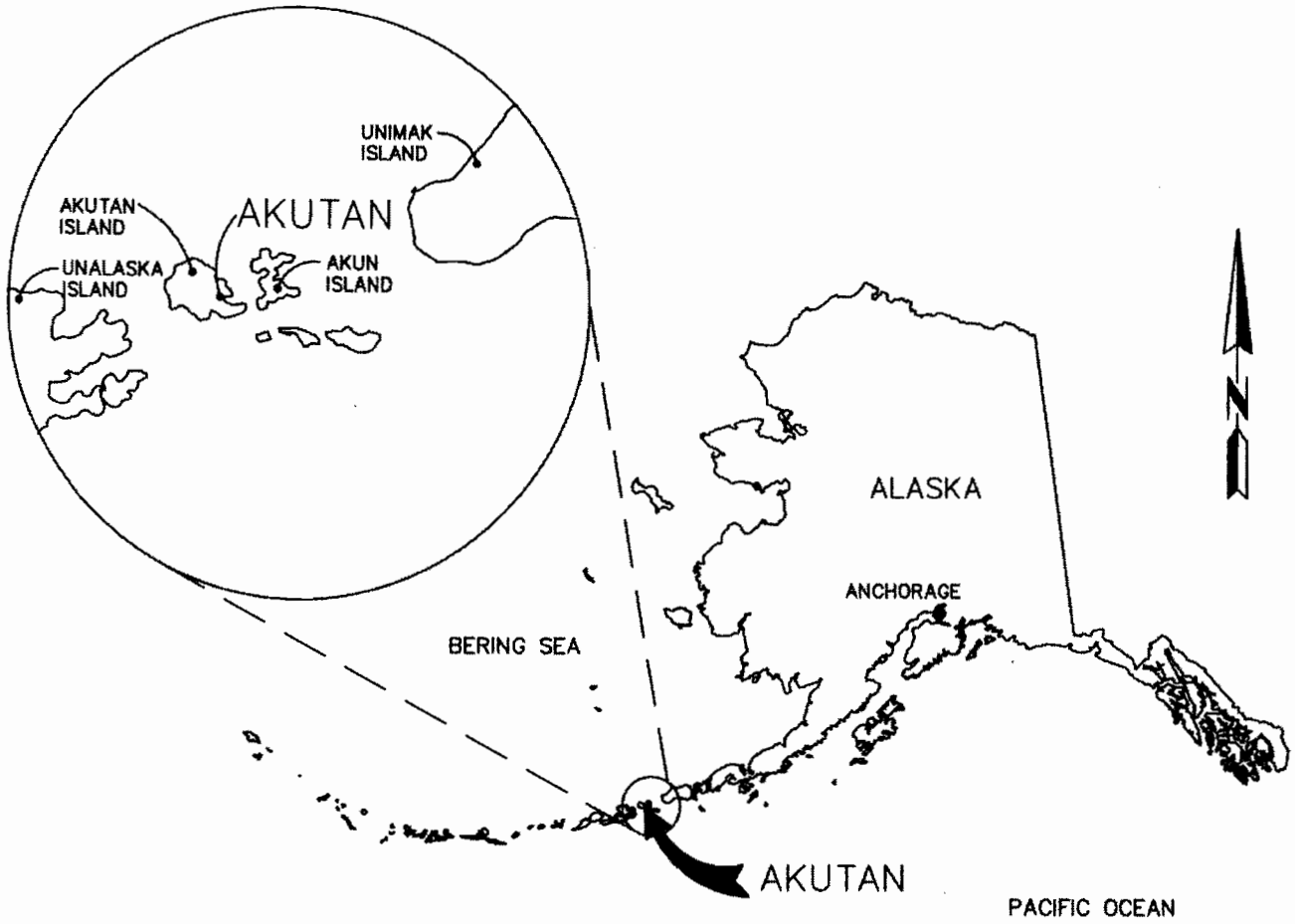
*Resolved by the Committee on Public Works of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors is hereby requested to review the reports of the Chief of Engineers on Rivers and Harbors in Alaska, published as House Document Numbered 414, 83rd Congress, 22nd Session; and other pertinent reports, with a view to determine whether any modifications of the recommendations contained therein are advisable at the present time.*

## 1.2. Scope of Study

This study examines the feasibility of navigation improvements at Akutan, Alaska (figure 1), a community on Akutan Island in the Aleutian Island chain. This study was conducted and the report prepared in accordance with the Principles and Guidelines adopted by the Water Resources Council and the procedures for water resources planning as contained in Engineer Regulation (ER) 1105-2-100. Alternatives are examined for feasibility, considering engineering, economic, environmental, and other criteria. A determination of Federal interest in accordance with present laws and policies is included.

## 1.3. Study Participation

The Alaska District, U.S. Army Corps of Engineers, has primary responsibility for this study. The report was prepared with assistance from many individuals and agencies, including the city of Akutan, the Aleutians East Borough, the U.S. Fish and Wildlife Service (USFWS), and the Alaska Department of Fish and Game (ADF&G). Tryck Nyman Hayes Inc., with its subcontractors under contract to the Alaska District, prepared many of the appendixes.




LOCATION MAP, AKUTAN, AK

NAVIGATION IMPROVEMENTS

AKUTAN, ALASKA

FIGURE 1

## 1.4. Environmental Coordination

The Corps of Engineers began conducting navigation and environmental studies in Akutan Harbor in the early 1980s in conjunction with its bottomfish harbor investigations. Many of the issues raised in the bottomfish reports were applicable when scoping began in 1997 for the Akutan navigation improvements project. A Public Notice, dated February 3, 1997, invited the public to assist the Corps in identifying important cultural and natural resources the project might affect. A Notice of Intent to prepare a Draft Environmental Impact Statement for navigation improvements at Akutan, Alaska was published in the Federal Register on August 5, 1999, (Federal Register Vol. 64, No. 150). Per Executive Order 13175, a letter dated June 7, 2001, was sent to the President of the Akutan Traditional Council initiating government-to-government consultation about the possible effects of the project on tribally recognized rights or protected resources. The Corps conducted a public meeting on the project draft feasibility report and EIS in Akutan, Alaska, on November 6, 2002.

Issues and concerns associated with the Akutan project were defined through public scoping; Federal, State, and local agency coordination; site investigations; and from the review of published and unpublished natural resource information about the region. This scooping effort identified the following issues of concern (see the EIS for details):

- Loss of wetland habitat and the associated ecological repercussions.
- Alterations to the project area's hydrogeology and repercussions on the area's anadromous fish streams and adjacent wetlands.
- Effects of the project on near-shore coastal fishery habitat (i.e., essential fish habitat) and fish movements.
- Petroleum spills impacts on area fish and wildlife resources.
- Destruction of historical and/or archeological resources.
- Loss of subsistence resources.
- Loss of intertidal and subtidal habitat.
- Effects of project-induced activities (e.g. fuel spills, boat traffic, construction and operation of harbor-related business) on over-wintering Steller's eiders, a threatened species.
- Degradation of water quality in Akutan Harbor and the mooring basin because of potential poor water circulation in each of them.

## 1.5. Related Reports and Studies

### 1.5.1. Corps Reports

USACE. 1997. "Akutan Small Boat Harbor Expedited Reconnaissance Study."

USACE. 1993. "Navigation Improvements Preliminary Reconnaissance Report, Section 107, Akutan, Alaska."

### 1.5.2. Reports by Others

Aleutians East Borough. 2000 (February). "Preliminary Engineering Report for Akutan Harbor Access Road," prepared for U.S. Army Corps of Engineers, Alaska District.

Northern Economics. 1997 (June). "Fleet Survey Project," prepared for Aleutians East Borough and North Pacific Fisheries Management Council.

Northern Economics. 1995 (March). "Evaluation of Potential Harbor Improvements, Akutan, King Cove, and Sand Point," prepared for Aleutians East Borough.

Peratrovich, Nottingham & Drage, Inc. 1996 (October). "Aleutians East Borough Wave Study, Akutan, Alaska," prepared for Aleutians East Borough.

# 2.0 DESCRIPTION OF STUDY AREA

## 2.1. General Area

Akutan is in the Aleutian Island chain 766 air miles southwest of Anchorage and 35 miles east of Unalaska/Dutch Harbor. The city of Akutan (See figure 2) is on the north shore of Akutan Harbor on Akutan Island at latitude 54°08' N and longitude 165°46' W. Akutan Harbor opens to Akutan Bay and Akun Strait to the east.

The 2000 census population of Akutan was 713, a combination of 112 village residents living in 38 households, and 601 workers residing in Trident Seafoods' plant group quarters. The number of workers varies with the time of year, rarely less than 100 and up to 1,000 during peak processing periods in February, March, and April.

Boats and amphibious aircraft are currently the only means of transportation into Akutan. The Alaska State ferry *M/V Tustemena* makes one run per month between Homer and Unalaska, stopping in Akutan, May through September. Daily air service is provided from nearby Dutch Harbor airport subject to weather.

Akutan has a state ferry dock, working docks at the Trident plant, and limited fair weather moorage for small boats and skiffs.

Figure 2 Aerial photo of Akutan city area and adjacent Trident Seafoods' plant (Source: City of Akutan and Trident Seafoods, 1989 photo)

## 2.2. Hydrology and Hydraulics

### 2.2.1. Climate and Topography

Akutan has a maritime climate primarily influenced by strong low-pressure centers generated in the Bering Sea and western Pacific Ocean. The high frequency of cyclonic storms crossing the north Pacific and the Bering Sea are dominant factors in the weather at Akutan. These storms account for the persistent high winds and the frequent occurrences of low ceilings and low visibility. Cool summers, mild winters, and year-round rainfall characterize the climate. Snow falls primarily between November and April, with an average annual snowfall of 19.5 inches. Rains occur any time of the year, with average annual precipitation of 79 inches. The wettest month is October, with a record of 13.4 inches and an average of 11.3 inches of

precipitation. Fog is common from September through December. Normal winter temperatures range within a few degrees above and below freezing (32 °F), and summer temperatures range from +39 °F to +60 °F. Temperatures can reach lows of 8 °F and highs of 72 °F.

#### 2.2.2. Winds

No long-term wind record data for Akutan Harbor exists. The nearest long-term wind record is collected at Unalaska Airport. Because of the topography of the harbor, wind directions seem to align with the long axis (east and west) of the harbor. On the north and south sides, the terrain directly adjacent to the bay rapidly ascends to 1,000 feet or more. This severely restricts cross-harbor winds. See appendix A for wind discussions.

#### 2.2.3. Tides and Currents

The mean tide range at Akutan is 2.37 feet and the diurnal range is 4.03 feet. The tides are generally diurnal with two highs and two lows occurring daily. Tide levels, referenced to mean lower low water (MLLW), are shown in table 1. Extreme high water levels result from the combination of astronomic tides and rises in local water levels due to atmospheric and wave conditions.

**Table 1. Akutan tide elevations**

| Level | Elevation (ft MLLW)) |
|---|---|
| Highest Tide (predicted) | +7.15 |
| Mean Higher High Water (MHHW) | +4.03 |
| Mean High Water | +3.74 |
| Mean Low Water | +1.07 |
| Mean Lower Low Water (MLLW) | 0.0 |
| Lowest Tide (predicted) | -2.90 |

Source: NOAA National Ocean Service.

The currents in Akutan Harbor are driven primarily by wind and only partially by the tide. Wind direction is the predominant factor in determining current direction and orientation of the gyre patterns. A study of currents indicates velocities are generally driven by winds and are seasonal in nature. Only during periods of low velocity winds do tidal currents dominate the circulation patterns in the harbor.

## 2.3. Biological Resources

#### 2.3.1. Vegetation

Vegetation in the Akutan Harbor area is primarily moist tundra and alpine tundra/barren ground. Trees are limited to a few low-growing willows near streams and drainages. Plant communities in the project area are generally sedges and grasses. Wetlands occur throughout the Akutan Harbor area with the largest wetland at the head of the bay behind a naturally occurring beach berm.

#### 2.3.2. Wildlife

Akutan Island is used by 33 bird species for feeding, nesting, molting, and over-wintering. The most abundant birds in Akutan Harbor are seabirds and waterfowl, but shorebirds and passerines (wrens, sparrows, etc.) commonly use local wetlands and coastal habitats as well. Bald eagles are year-round residents, and the only known bald eagle nest in the area is at Akutan Point. Terrestrial mammals on Akutan Island include red fox and Norway rat. The Norway rat was introduced to the island. Marine mammals seen in Akutan Harbor include the minke and killer whale, Dall's and harbor porpoise, Steller sea lion, harbor seal, and sea otter.

#### 2.3.3. Freshwater Fish

Few freshwater streams in Akutan Harbor support fish. At the head of the bay, North and South Creeks support pink and coho salmon and Dolly Varden. Central Creek and associated streamlets in the same area support stickleback and Dolly Varden. Near the mouth of Akutan Harbor on the south shore, is a stream supporting salmon.

#### 2.3.4. Threatened and Endangered Species

Steller's eider (*Polysticta stelleri),* listed as federally threatened under the Endangered Species Act in 1997, over-winter in the Akutan Harbor area. In addition, the Alaska Department of Fish and Game (ADF&G) has designated the Steller's eider as a State species of special concern (SSC). Other species of significance observed in Akutan Harbor, include the northern sea otter (candidate species), Steller sea lion (endangered species and SSC), and harbor seal (SSC). Local residents report that humpback whales (endangered species) have entered Akutan Harbor, presumably to forage on large schools of fish.

## 2.4. Economic Base

Commercial fish processing dominates Akutan's cash-based economy primarily thru the Trident Seafoods' plant. None of the plant workers live in the village, instead living and eating in company dormitories and mess hall. Akutan has six small businesses. Much of the community's operating budget is supported by fish taxes paid by the processing facility. Local government accounts for 55 percent of the jobs and commercial fishing, with eight residents holding commercial fishing permits, for 35 percent. All village residents use subsistence resources with 96 percent participating in subsistence harvests.

## 2.5. Existing Navigation Facilities

There are no facilities in Akutan for long-term moorage. There are two primary marine facilities in the Akutan city area, the city/ferry dock and the Trident Seafoods' dock. However these docks are working docks and not long-term moorage facilities. Also these docks do not have protection from storm waves.

The Aleutians East Borough built a fair weather skiff and small boat mooring facility adjacent to the city/ferry dock in 2001. This facility is for a limited number of boats and does not have protection from storm waves. All skiffs and small boats must be taken from the water during inclement weather.

## 2.6. Problem Description

Akutan, Alaska, is a relatively small, remote community. Although it is one of the most important fishing ports in the United States in terms of volume and value of seafood production, it has very little infrastructure. The community, along with the Aleutians East Borough, has worked for many years to address the need for a small boat harbor in the community. The navigation improvements evaluated in this report are focused on resolving several navigation problems currently facing vessels using Akutan Bay. These problems include (1) the necessity to travel to other ports in-season in order to secure safe moorage, (2) the necessity of travel to the Pacific Northwest each year, and (3) problems associated with the practice of rafting. In addition, residents of Akutan are hampered in their ability to develop a small boat commercial fishery and their subsistence harvests are also being constrained by the lack of available moorage.

The large and naturally deep Akutan Harbor is perfect for deep draft navigation and is in proximity to the fishing grounds of the rich waters bordering the Aleutian chain. This encouraged the establishment of the large Trident Seafood's plant, which is serviced by deep draft ships. However, there is no small embayment sufficiently protected from the weather conditions and yet large enough to harbor the size of the fishing fleet needed to supply the fish processing plant. There is no moorage for the small and large vessels comprising the fishing fleet. There is limited fair weather moorage for small boats and skiffs. Small locally owned skiffs are beached and/or taken from the water when not in use and during inclement weather.

Since there is no moorage in Akutan, the fishing fleet must seek shelter at other locations, which are overcrowded and do not have available space. Between seasons, vessels seek shelter in distant harbors, such as the Pacific Northwest. As a result, the fishing fleet is not able to minimize its operating expenses.

# 3.0 PLAN FORMULATION

## 3.1. Planning Criteria

### 3.1.1. National Economic Development Objective

The objective of Federal water and land resources planning is to contribute to the National Economic Development (NED) in a manner consistent with protecting the Nation's environment. NED features increase the net value of goods and services provided to the economy of the United States as a whole. Only benefits contributing to the NED may be claimed for economic justification of the project. For the Akutan navigation improvements, NED features include the breakwaters, channels, basins, and float system.

Resource planning must be consistent with the NED objective and consider engineering and economic factors, as well as environmental and social considerations. Each alternative must be complete, effective, efficient, and acceptable. The following criteria are guidelines for developing alternative plans and are used to evaluate those plans.

### 3.1.2. Engineering Criteria

The plans should be adequately sized to accommodate user needs and provide for development of harbor-related facilities. They should protect against wind-generated waves and boat wakes. Adequate depths and entry are required for safe navigation. The plans must be feasible from an engineering standpoint and capable of being economically constructed.

### 3.1.3. Economic Criteria

Principles and guidelines for Federal water resources planning require a plan to be identified, producing the greatest contribution to the NED. The NED plan is defined as the plan providing the greatest net benefits as determined by subtracting annual costs from annual benefits. The Corps of Engineers' policy requires recommendation of the NED plan unless there is adequate justification to do otherwise. All alternatives considered to meet project needs should be presented in quantitative terms where possible. Benefits attributed to a plan must be expressed in terms of a time value of money and must exceed equivalent economic costs for the project. To be economically feasible each separate portion or purpose of the plan must provide benefits at least equal to the cost of that unit. The scope of development must be such that benefits exceed project costs to the maximum extent possible. The economic evaluation of alternative plans is on a common basis of October 2003 prices, a project life of 50 years, and an interest rate of 5-5/8 percent.

### 3.1.4. Environmental Criteria

Environmental considerations include (1) identifying forms of aquatic life and wildlife that might be impacted by a plan's implementation, (2) minimizing disruption of the area's natural resources, (3) maintaining consistency with the Alaska Coastal Management Program, and (4) using measures to protect or enhance existing environmental values.

#### 3.1.5. Social Criteria

Plans considered must minimize adverse social impacts and must be consistent with state, regional, and local land use and development plans, both public and private. The selected plan must be acceptable to the non-federal sponsor.

#### 3.1.6. Plan Objectives

National Objectives

- Provide protected permanent moorage for commercial fleet operations.
- Reduce damages and operating costs related to rafting.
- Reduce travel related costs for the fishing fleet due to unavailability of moorage.
- Preserve environmental resources to the maximum level consistent with maximizing the net NED benefits and other objectives.

Local Objectives

- Increased access to subsistence resources.
- Increased opportunities to participate in the developing near shore fisheries.

#### 3.1.7. Without-Project Conditions

There will not be any permanent moorage facilities in Akutan for either the resident local small boat fleet or the larger vessel commercial fleet servicing the Trident Seafoods' processing plant. Most vessels in the Bering Sea fleet, including vessels delivering to Akutan or supported by the local plant, will continue to seek moorage in western Alaska on a first-come, first-served basis between fishing seasons. As a result, some vessels will travel to Seattle or other Pacific Northwest ports for moorage because they will be unable to find moorage in western Alaska. Increased operating costs and loss of time for the vessels' crew will continue from travel to distant ports. Increased risk of vessel damage and potential for spills will continue as vessels anchor or cruise Akutan harbor during storms.

Local residents will continue to haul their small vessels from the water to be stored onshore during inclement weather. Local residents will not be able obtain vessels larger than their current skiffs and will not participate in the developing local near shore fisheries.

Currently the Alaska Department of Transportation and Public Facilities (ADOT&PF) and the Federal Aviation Administration (FAA) are preparing an Airport Master Plan for construction of an airport on Akutan Island. Road access between the city of Akutan and either of 2 proposed airport locations require the road to pass by the head of the bay. Completion of a planning level design document for the road and airport is expected sometime in 2005 or early 2006. If adequate funding becomes available, project plans and specifications will be prepared in 2007 and construction could begin as early as 2008.

#### 3.1.8. Plan Constraints

The project constraint is land access to the harbor project. This access translates to costs of implementing a project if lengthy roads must be constructed. Currently the only road in Akutan is between the seaplane ramp next to the village and the Trident Seafoods' plant.

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# INTERIM FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT

# NAVIGATION IMPROVEMENTS AKUTAN, ALASKA

July 2004

#### 3.1.9. Major Planning Assumptions

A new airport will be constructed on Akutan Island. Construction of the airport road from the village to the head of the bay in Akutan Harbor will be complete when the harbor becomes operational.

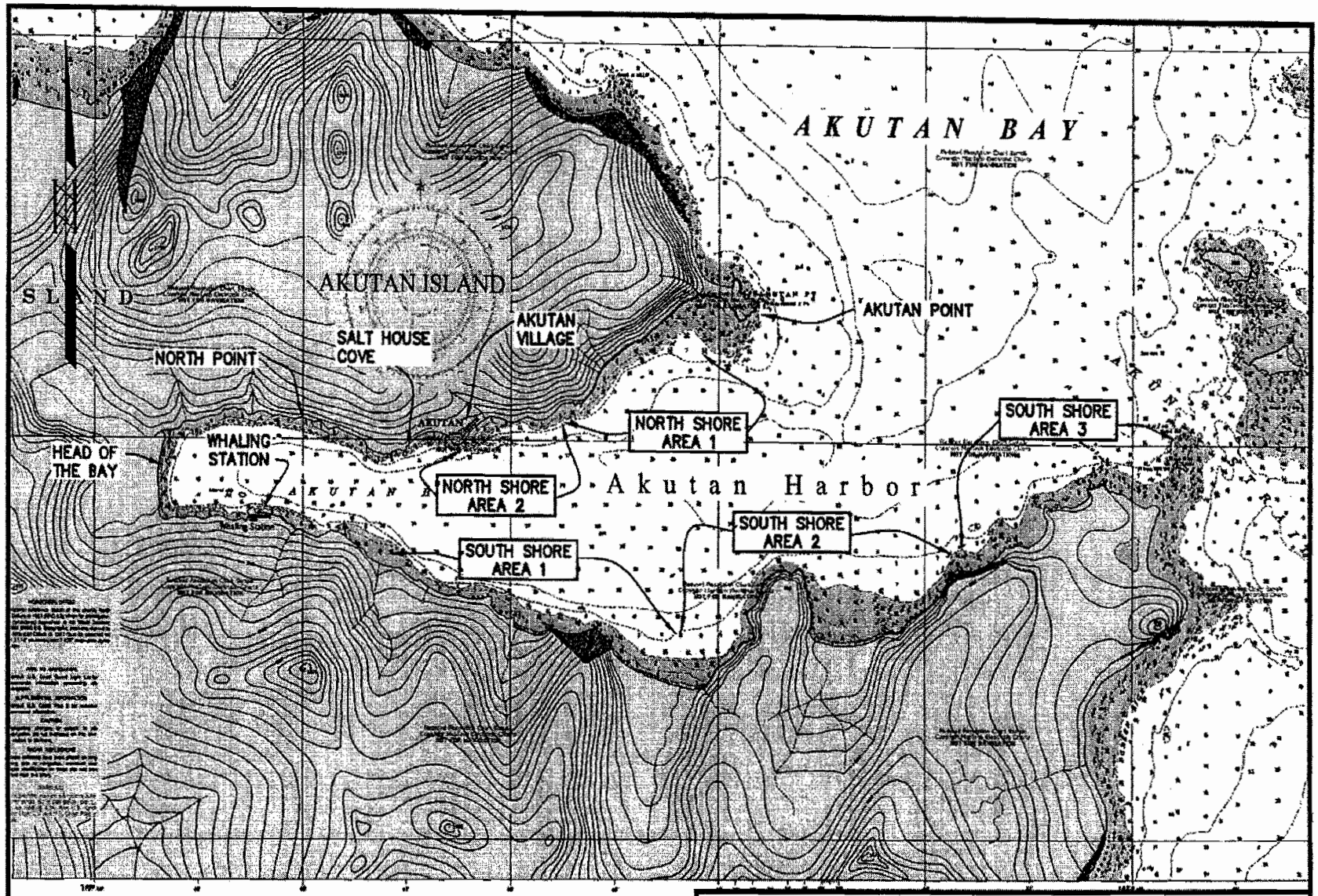
Usable dredge material such as sands can be stockpiled for reuse. Sands are a scarce commodity on the Alaska Peninsula and Aleutian Islands. Dredge material could be used in airport construction or barged to other locations for construction projects.

## 3.2. Initial Site Evaluation

Steep hillsides and rocky cliffs plunging to the sea and rapidly dropping into deep water characterize shorelines in Akutan Harbor. Flat lands within Akutan Harbor are scarce and generally limited in size. Akutan Harbor is subdivided into 10 areas for initial discussion. The 5 shore areas discussed below are not selected as potential harbor locations because of lack of uplands or the distance access roads must be constructed. Within Akutan Harbor five possible locations for a harbor have been identified for initial screening. These are North Point, Akutan Point, Salthouse Cove, Whaling Station, and the head of the bay. Figure 3 shows Akutan Harbor and the 10 areas.

North Shore Area 1 is east of the community of Akutan. The site is bordered by steeply sloping bluffs on the upland side. A relatively shallow bench with depths to 25 feet extends offshore for 400 feet. From there the bottom drops off rapidly in excess of 60 feet.

North Shore Area 2 is between the community of Akutan and North Shore Area 1. The site is bordered by steeply sloping upland terrain and relatively deep water (90 feet deep at 400 feet offshore).




GRAPHIC SCALE

2,500 0 2,500 5,000

(IN FEET)

SITE EVALUATION

NAVIGATION IMPROVEMENTS

AKUTAN, ALASKA

**FIGURE 3**

South Shore Area 1 extends east of the Whaling Station to near the mouth of Akutan Harbor. It is characterized by steeply sloping on shore terrain and relatively deep offshore bathymetry. There is a large landslide area near the east end. South Shore Area 1 receives a lot of wave energy from Akutan Bay to the northeast.

South Shore Area 2 includes the shoreline just west of a small peninsula near the mouth of Akutan Harbor. The area is characterized by a slight cove like feature resulting in an offshore bench. South Shore Area 2 receives a lot of wave energy from Akutan Bay to the northeast.

South Shore Area 3 includes the area just east of a small peninsula near the mouth of Akutan Harbor. This area is outside Akutan Harbor. A slight pocket beach resulting in an offshore bench characterizes the shoreline. South Shore Area 3 is exposed to the full fetch and resultant wave energy from outside of Akutan Harbor to the north and east.

#### 3.2.1. North Point

A rocky coastline, with rock outcrops and rocky points, extends west of the Trident Seafoods' (Trident) plant to the head of the bay. Steep hillsides extend directly to the edge of the high water line and the bathymetry drops off rapidly into deep water. There are two creeks and their alluvial fans along this coastline. The second and larger creek is 4,000 feet west of the Trident plant. Four submerged pipes carry water to the Trident complex from a hillside dam on this creek.

Dredging and filling of nearshore and subtidal areas adversely impacts a limited amount of marine resources. Terrestrial biological resources near the site are sparse and not significantly impacted. Proximity to Trident's seafood wastewater discharge could adversely impact the mooring basin's water quality. The threatened Steller's eider is known to over-winter in the area.

The study team including the City of Akutan and the Aleutians East Borough (local sponsor) considered this location as first choice for a harbor location. The site is fairly close to the village although access is through the Trident plant. Also this location does not impact the wetlands and habitat at the head of the bay.

This site is carried forward for screening of alternative plans.

#### 3.2.2. Akutan Point

Course gravel beaches and sea-cliffs characterize the site's shoreline in a small cove at the entrance to Akutan Harbor 2 miles east of the village. Village residents access the site by boat for recreational and subsistence purposes. Subsistence set nets for salmon are placed in the area.

Of all the sites considered, this location is the most exposed to wind and waves with large ocean waves/swells from the southerly direction. Upland development areas are limited. Bathymetry is not available, however the area appears shallow and will need to be dredged to basin depth. Fixed breakwaters of rubblemound construction appear to be the best wave protection.

A harbor here requires construction of a 2-mile intertidal-fill road past the village connecting to the existing road at Salthouse Cove. Akutan occupies all available flat land so the road will be placed in front of the village or behind the village. The road in front of the village would

disrupt access to the beach and impact the front view of all dwellings. Also, a front road as it approaches Salthouse Cove is constrained by the existing Alaska State Ferry dock and existing buildings. Construction of a front road may require tidal fill and relocation or demolition and replacement of some existing buildings. High steep slopes immediately behind the village require blasting for road construction. The nearest houses are within 50 feet of any blasting. Blasting so close to houses is extremely expensive and unsafe for structures and people. Also the village hydropower and water supply lines must be moved disrupting service. Either road location may require moving one or more buildings.

Akutan Point is one of Akutan Harbor's most environmentally sensitive areas. Project features will eliminate kelp beds and diverse and species-rich nearshore and subtidal habitats. The adjacent terrestrial habitat supports nesting bald eagles and cliff-nesting/burrow-nesting seabirds. This habitat would be either physically destroyed or rendered useless by proximity to harbor-related activities. A few threatened Steller's eider use the site. Anecdotal evidence suggests there may be prehistoric sites in the uplands area.

This site is dropped from further study because of the cost for building road access. Initial study for road access, wave protection, and moorage facilities could not be justified by potential project benefits. Additionally the unique adjacent habitats lead the study team to evaluate other locations.

#### 3.2.3. Salthouse Cove

Salthouse Cove, in a shallow bight, serves as a buffer between the Trident industrial complex on the west and the community of Akutan on the east. Trident Seafoods' Corporation built a church with a large gymnasium in the limited upland of Salthouse Cove. The church/gymnasium is used extensively by villagers and Trident plant workers and serves as the social and recreational interface between the two groups.

The cove is naturally protected from the east and west directions. Water depths are known to be relatively deep although bathymetry is not available. The existing seaplane ramp is in the cove, and the city dock is on the east edge adjacent to the village. The east uplands are occupied by the edge of the village.

Few fish and wildlife resources will be impacted here due to the developed setting of the area. The threatened Steller's eider is known to over-winter in the area, and schools of juvenile pink salmon inhabit the near shore environment in the spring.

Trident Seafoods has a lease for most of the west uplands to the plant and plans to construct expanded dock between Salthouse Cove and the plant. This expansion will likely be completed by the time a harbor could be constructed. Wave protection and moorage facilities will displace access to the seaplane ramp rendering it unusable for air transportation. The limited uplands are already used by the church and seaplane ramp.

Salthouse Cove has bathymetry similar to the rest of Akutan Harbor. Steep hillsides plunge to the sea and rapidly drop into deep water particularly to the west. East is the Akutan city dock and the village. A harbor could be constructed toward the west approaching the Trident plant and avoiding the existing church and seaplane ramp area. However the conditions and harbor here have the same constraints as a harbor at North Creek. The long narrow mooring basin cannot accommodate the number of vessels needed to justify the cost.

The local community for socio-environmental reasons opposes the site. A harbor at this site will impact current upland and adjacent near shore uses and is not economically justified. Therefore Salthouse Cove is not considered for further evaluation.

#### 3.2.4. Whaling Station

Uplands consisting of natural and constructed fill front steep mountain hillsides at the southwest corner at the head of the bay. Originally a whaling station, the U.S. Navy occupied the site during World War II. An individual residing in Seattle, Washington owns the land and apparently leases it to Trident. The area is unused other than for gear storage by Trident boats. The upland area is contaminated with Bunker C fuel oil resulting from military spills.

The Corps' Formerly Used Defense Sites (FUDS) program conducted a cleanup of the site in 1998 and 1999, but deteriorated timber docks and pilings, and abandoned steel and equipment still litter the site. The Corps-installed subsurface bio-remediation venting system is still in place, treating remaining contaminated insitu soils. Subtidal areas may be petroleum hydrocarbon contaminated.

Existing docks were constructed near shore, however bathymetry drops off rapidly into deep water. Deep water limits offshore expansion and cost effectiveness of rubblemound breakwaters and wave barriers. A 2½ mile access road from the village and the Trident plant is needed. Although with the road to the airport being a separate project, the access road to the harbor site is reduce to 1 mile.

Basin areas require chemical testing and careful planning on how to dredge and dispose of contaminated materials. Despite known offshore contamination, the subtidal habitat supports a diverse and species-rich biological community. Because the area has been previously disturbed, environmental considerations will be less restrictive than at undisturbed sites.

This site was not carried into further evaluation because of access road length, contamination concerns, and depth of water. The experience gained in trying to produce a positive project at North Creek under similar bathymetry also indicated this site was not feasible.

#### 3.2.5. Head of the Bay

A vast wetland complex behind a heavily vegetated beach berm characterizes the terrain at the head of the bay. Seaward of the berm is a sandy beach sloping to –60 feet as close as 200 feet offshore and continues to drop to deep water. Anadromous fish streams flow out of two distinct drainages along the northwest and southwest corners of the bay. These creeks are 10–25 feet wide and support seasonal pink and silver salmon, and Dolly Varden fish species. A much smaller third creek drains the middle wetland complex, and supports Dolly Varden and stickleback fish species. The northwest and southwest corners of the bay support resting and foraging Steller's eiders from November to March.

The head of the bay location was the sponsor's and community's second choice for harbor location because of distance from the community and the impacts to the wetlands. A 1½ mile road access from the village and Trident plant is needed. Although with a road to an airport, access for the harbor site is reduced to a few hundred feet. Of all the alternative sites evaluated, this location supports the most potential for upland development.

This site is carried forward for screening of alternatives.

## 3.3. Screening of Alternative Plans

### 3.3.1. No Action

The no action, without-project, and existing conditions are the same. There will continue to be no permanent moorage facilities in Akutan. Larger vessels will continue to travel to other areas or ports for long-term moorage. Small vessels will be pulled out of the water for severe weather and when not in use. The local small boat fleet will continue to miss opportunities for developing the near shore fisheries and CDQs.

Vessels will continue to raft at floats or working docks and seek shelter during storms by jogging back and forth around Akutan Harbor. Vessels will continue to lose moorings and pose a hazard from oil and lubricant spills from potentially running aground.

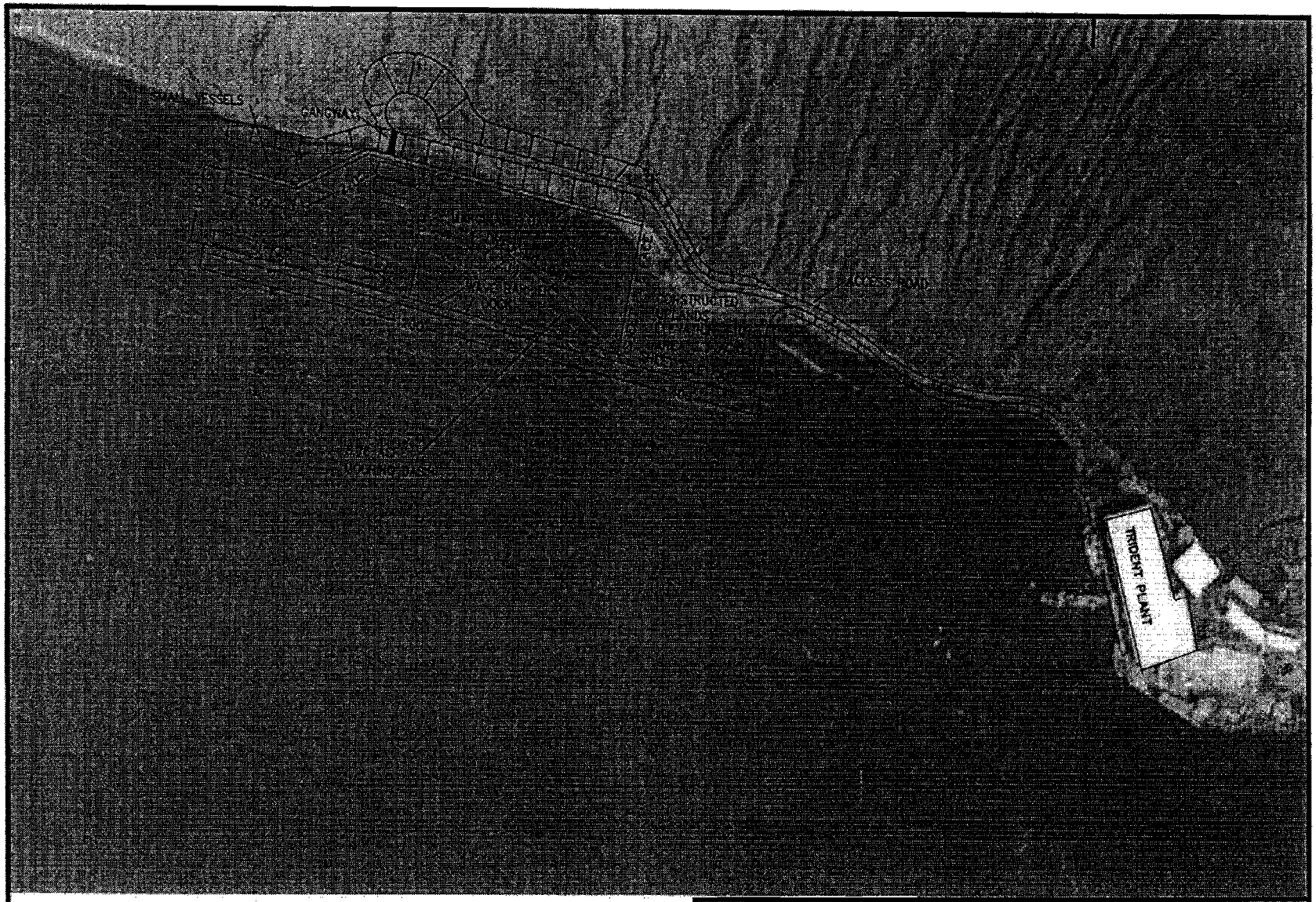
### 3.3.2. Nonstructural Alternatives

There are no nonstructural measures that will in anyway provide solutions to damages, lack of adequate moorage, and other problems identified. The nearest port is Dutch Harbor, 40 miles west of Akutan. Dutch Harbor does not have any permanent moorage for any vessels of the same size operating out of Akutan or Dutch Harbor. Other Alaskan ports from Akutan to the Pacific Northwest do not have permanent moorage for the larger commercial vessels of the Bering Sea fleet. The limited moorage available is on a first-come first-served basis.

### 3.3.3. North Point

Major environmental constraints to development are not as apparent here as they are for some of the other sites. The road to a new airport will probably go along the top of the slope and not go along the beach to reach the head of the bay. Therefore, a ¼-mile access road to the site will be constructed. This road from the existing trail/road system at the west end of the Trident plant will be primarily within the tideland region due to the steep topography of the hillside. Tideland fill contained by structural bulkheads or conventional slopes is required to construct uplands adjacent to the harbor. Deep water in the area limits offshore expansion and cost effectiveness of conventional fill construction for breakwaters.

Alternative wave protection concepts and initial cost estimates indicated it was possible to economically build a harbor at this location. Subsequent to the initial determination, site surveys and geotechnical investigations were performed and preliminary designs were developed. The most cost effective protection was determined to be a pile supported wave barrier (wall) limited to 60 feet of water depth. The steep bathymetry limited the wave barrier to 320 feet offshore.




GRAPHIC SCALE

400 0 200 400

(IN FEET)

NORTH POINT CONCEPT LAYOUT

NAVIGATION IMPROVEMENTS

AKUTAN, ALASKA

**FIGURE 4**

A concept harbor 1200 feet long by 320 feet wide with a moorage basin of 8.8 acres was evaluated at North Point. See figure 4. This basin holds 46 vessels of the identified fleet. The initial construction cost estimate is 16–17 million dollars. Adding Planning, Engineering, and Design (PED), Supervision and Inspection (S&I), and NED investment cost, results in a total cost of $19,400,000 for an annual cost of $1,167,000. Real Estate and O&M costs are not included in the total project cost estimate. The estimated annual benefits are $1,081,000 consisting of (1) reduced travel to Pacific Northwest, –$479,000; (2) in-season moorage travel costs, –$521,000; (3) prevention of rafting damage, –$33,000; (4) increase to subsistence production, –$48,000. This results in a BCR of 0.9 and net annual benefits of –86,000. With negative net annual benefits the number of boats accommodated in this harbor will not justify the cost. Physical constraints limit size increases to linear expansion. Increasing harbor size by linear expansion also results in increasing costs by the same amount, therefore no economies of scale can be realized by lengthening the harbor.

The study team looked at several ideas to expand a harbor at this location, but linear expansions were the lowest-cost concepts. When engineering and economic analyses could not economically justify a harbor at this location, the study team evaluated the second choice location.

#### 3.3.4. Head of the Bay

The head of the bay location was the second choice location because of the presence of wetlands and streams on either side of the harbor site and the accompanying environmental concerns. Operating a harbor at the head of the bay, regardless of the selected design and size, might affect over-wintering, Steller's eiders, as they presently congregate in large flocks at the north and south corners of the bay. Steller's eider is a threatened species.

Tides have little influence on circulation in Akutan Harbor and particularly at the head of the bay. Circulation at the head of the bay is driven primarily by winds. Construction at the head of the bay would impact surface and groundwater flow in the adjacent wetlands through uplands and basin construction. If inland basins are dredged, the saltwater interface would move inland and the wetlands water table would adjust to the basin water elevations. The adjacent North and South Creeks would be impacted depending on the size of harbors and uplands constructed. Central Creek would be impacted by any harbor construction.

The head of the bay insitu materials are clean saturated sands. Study team geotechnical engineers raised concerns about the stability of these materials and the potential for facility damage during an earthquake. Additional geotechnical investigations were performed in the spring of 2001. Three designs (offshore, inland, offshore/onshore) are considered for a harbor at the head of the bay. Head of the bay concepts are screened using 15-acre basins. This allows an initial comparison based on costs.

**Offshore Harbor**. An offshore harbor basin design minimizes direct impacts to adjoining wetlands and anadromous fish streams. This design also directly and adversely impacts the intertidal and subtidal habitat the threatened Steller's eiders rely on for foraging. These birds would be expected to reduce their use of the area for resting and refuge from bad weather due to the proximity of harbor activities. See figure 5.

The depth of water (in excess of 80 feet) points toward the use of floating breakwaters. Generally, floating breakwaters are used in limited fetch areas subjected to waves of less than

a 4 second period and a wave height of 4 feet or less. This type of wave climate is generally found in relatively short fetches. The period of the design wave for this project is 4.7 seconds. The height of the design wave ($H_{10}$) is 3.9 feet. The deep-water wavelength associated with a 4.7 second period is 113 feet. This wavelength requires a 50-foot wide floating breakwater.

In this alternative, (15-acre basin), a floating breakwater, 1,500 feet long, is anchored near the head of the bay to provide protected moorage. Rubblemound breakwaters protect the north and south ends of the basin. Most of the moorage area is offshore with part of the existing shoreline area developed for related upland facilities and access.

A concrete floating breakwater 40 feet wide and 1,500 feet long costs $18,000,000. Add rubblemound breakwaters, docks, dredging, and mob/demob for a total construction cost. Maintenance and inspection is more frequent and involved than with other structures. This is primarily due to the frequent periodic inspection requirement for mooring chain and fixtures.

**Offshore/Onshore Harbor**. An offshore/onshore harbor is offshore wave protection with part of the basin dredged from the beach berm and wetland behind the beach berm. Two alternative methods for the offshore wave protection are a rubblemound breakwater and curtain-wall wave barrier.

Nearshore marine habitat is unavoidably lost and directly impacts habitat at the head of the bay. This habitat is used by Steller's eider over-wintering in the bay. The wetland complex behind the beach berm will be impacted by inland dredging operations.

Rubblemound breakwater. The rubblemound is 1,100 feet long and in 25 feet of water. This is near the maximum economic practical depth normally associated with this type of structure. The centerline of the breakwater is 100 to 150 feet offshore from the existing beach. Ninety percent of the basin is dredged from the beach berm and wetland behind the beach berm. The initial estimated construction cost for this alternative is $17,900,000. See figure 6.

Curtain-wall wave barrier. The curtain-wall wave barrier is 1,000 feet long pile-supported structure consisting of 42,000 square feet of wave barrier panels. The wave barrier is 350 feet offshore from the existing beach and in 60 feet of water. A 450-foot rubblemound jetty traverses the breaking wave zone and connects the wave barrier to the beach. Curtain-wall wave barriers are ideally suited to shorter period, small amplitude waves similar to floating breakwaters. They work best in wave periods less then 4 seconds and in wave heights less then 4 feet. The design wave is 3.94 feet high with a 4.7 second period. Sixty five percent of the basin is dredged from the beach berm and wetland behind the beach berm. The initial estimated construction cost for this alternative is $20,300,000. See figure 7.

ISLAND
ACCESS ROAD BY OTHERS
GRAPHIC SCALE
500 0 250 500 1000
(IN FEET)
OFFSHORE HARBOR
NAVIGATION IMPROVEMENTS
AKUTAN, ALASKA
FIGURE 5

OFFSHORE / ONSHORE RUBBLEMOUND

NAVIGATION IMPROVEMENTS

AKUTAN, ALASKA

**FIGURE 6**

OFFSHORE / ONSHORE WAVE BARRIER

NAVIGATION IMPROVEMENTS

AKUTAN, ALASKA

**FIGURE 7**

**Inland Harbor**. The inland harbor consists of an entrance channel dredged through the beach berm and the entire basin dredged out of the wetlands inland of the beach berm. The entrance channel is protected from waves by two breakwaters (one on each side) perpendicular to the existing shoreline. The wetland complex behind the beach berm is impacted by inland dredging operations. This alternative has the least impact to nearshore marine habitat as only the entrance channel and breakwaters protecting the entrance destroy any marine habitat. Moving harbor activities inland of the beach berm and moving the entrance channel to the north has the least impact to the habitat used by Steller's eider over-wintering in the bay. Dredging quantities are much larger than with the other two alternatives. The initial estimated construction cost for this alternative is $16,800,000. See figure 9.

Initial cost estimates show the inland harbor with a construction cost of $16,800,000 for a 15-acre basin as the least costly of the three head of the bay concepts. The inland harbor also has the least impact to the threatened Steller's eider intertidal and subtidal foraging habitat.

The inland harbor is carried forward for detail consideration and optimization.

## 3.4. National Economic Development Plan

Three inland harbor plans are evaluated for national economic development (NED) costs and benefits. See figures 8, 9, and 10. All three plans have the same entrance channel and breakwater configuration. The basic difference between the plans is basin sizes. The three basin sizes selected are 12, 15, and 20-acre basins. Dredging quantities varies with the basin size resulting in a slight difference in upland area requirements. Dredge material will be disposed of in the adjacent wetlands creating harbor uplands. Material in excess of requirements for upland construction will be stockpiled on the uplands for beneficial use such as in the construction of the planned airport and airport road. Under ideal conditions the airport and road would be constructed at the same time as the harbor reducing stockpile requirements for dredged material.

Resource agencies such as U.S. Fish and Wildlife Service (USFWS) support the selection of a plan with the least impact on marine resources. Also reducing impacts to the threatened Steller's eider habitat is an important concern. The U.S. Environmental Protection Agency (USEPA) desires the least impact to wetlands. Environmental considerations are discussed in detail in the environmental impact statement (EIS).

Comparison of the costs and benefits for the three inland plans (see tables 2 and 3) shows the 20-acre plan having the greatest net benefits and could be the NED plan based on cost/benefit considerations. However environmental considerations must also be evaluated when selecting a plan recommended for construction. Smaller plans have less impact on the anadromous fish streams along the northwest and southwest corners of the bay on both sides of the harbor site and remaining adjacent wetlands.

Mitigation measures include avoidance, minimization, rectification, reduction or elimination of impacts over time, and compensation. The 12-acre basin avoids and minimizes impacts to the wetlands through smaller basin area and less dredged material quantities. Having demonstrated that a 20-acre or larger basin would be selected as the NED plan, selecting the 12-acre harbor for environmental reasons is substantial mitigation in and of itself. The

12-acre basin inland harbor plan is selected as the environmental plan and the locally preferred plan because it has the least environmental impact and has a positive net benefit considering cost and benefits.

Engineering Regulation 1105-2-100 allows selection of a plan smaller than the NED plan. Table 2 demonstrates the net benefits increase with larger basins and indicates the NED plan, if fully developed, would be the 20-acre basin or larger plan. Table 2 also shows that a smaller plan is not likely to have greater net benefits than the 12-acre basin plan.

**Reconfigured 12 Acre Basin.** See figure 11, tables 2 and 3. The U.S. Environmental Protection Agency (USEPA) expressed concerns about impacts to the adjacent wetlands and the Alaska Department of Environmental Conservation (ADEC) had concerns on circulation and water quality within the harbor. The U.S. Fish and Wildlife Service (USFWS) requested benches on the breakwater at –1.0 MLLW to address their concerns regarding passage of migrating fish around the breakwater which were added to the outside of the breakwaters.

The harbor basin area was reconfigured to have rounded sides and corners. Also the entrance channel was made with parallel sides. This theoretically improves the water circulation within the basin. Rounding the sides and corners increases basin area from 12 acres to 14.9 acres to accommodate the same size fleet (58 vessels). Part of the dredge area and quantity are offset by the entrance channel change from flaring into the harbor to a narrow parallel-sided channel. Additional dredge quantity savings were achieved by making the basin side slopes steeper above the mean high water line. The net change in dredged material quantity was a reduction from 850,000 $yd^3$ to 843,000 $yd^3$.

To reduce the area impacted by dredged material disposal the top of the stockpile has been increased from 35 feet to 44 feet. The net effect of the changes from the 12 acre basin to the reconfigured 12 acre basin is an 8 acre decrease to wetlands impacts.

## Table 2. NED Cost and Benefit Comparison of Inland Plans

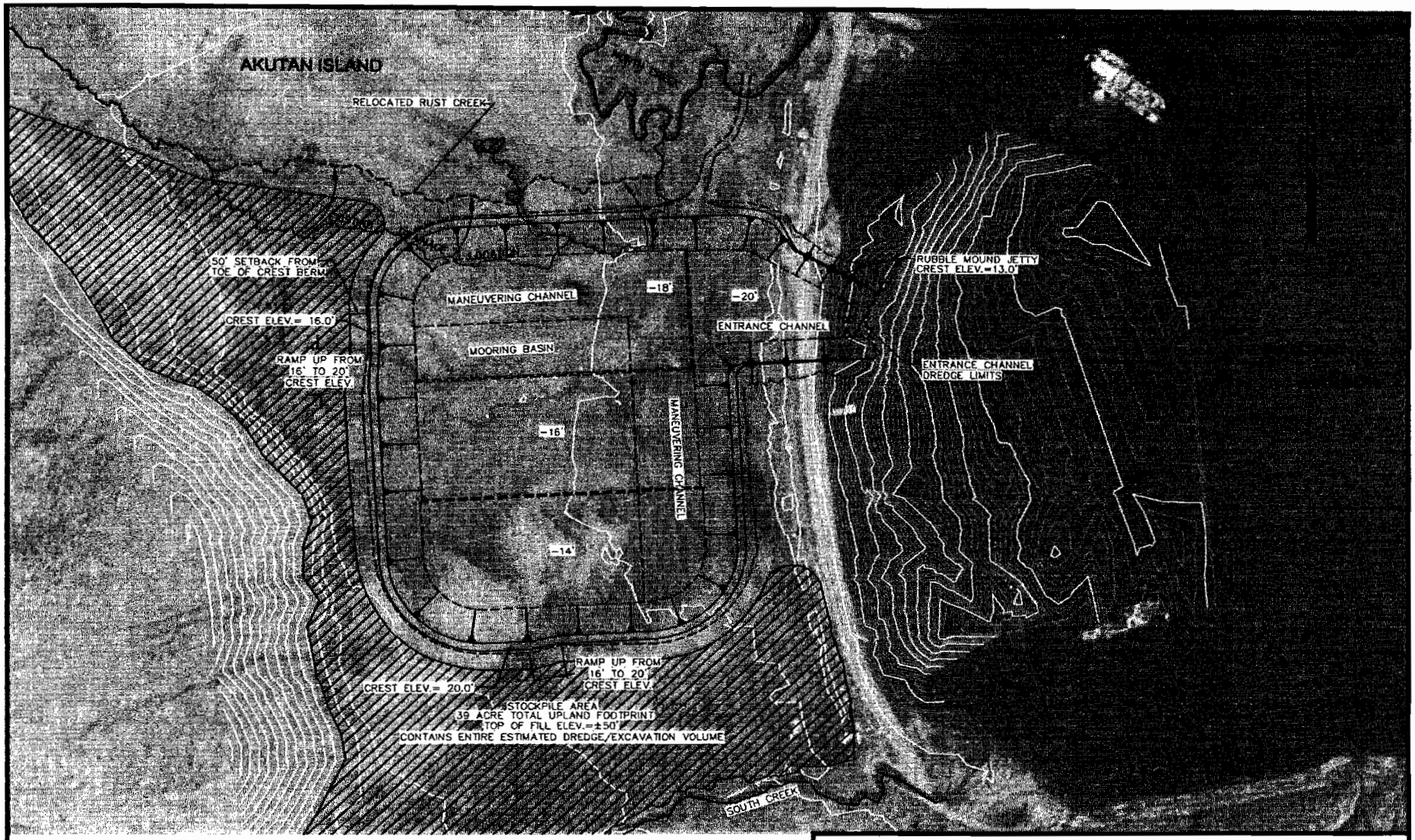
| | 12 Acre Basin | 15 Acre Basin | 20 Acre Basin | Reconfigured 12 Acre Basin |
|---|---|---|---|---|
| Mobilization and Demobilization | 1,347,000 | 1,347,000 | 1,347,000 | 1,347,000 |
| Breakwater and Seawall Construction | 3,857,000 | 3,857,000 | 3,857,000 | 3,857,000 |
| Dredging | 8,054,000 | 9,183,000 | 10,847,000 | 8,264,000 |
| Dock Facilities | 2,477,000 | 3,121,000 | 3,913,000 | 2,477,000 |
| Uplands Requirements[b] | 404,000 | 484,000 | 581,000 | 404,000 |
| Environmental Mitigation[a] | 321,000 | 321,000 | 321,000 | 321,000 |
| Aids to Navigation | 15,000 | 15,000 | 15,000 | 15,000 |
| Construction Contract Cost | 16,475,000 | 18,328,000 | 20,881,000 | 16,685,000 |
| | | | | |
| Lands and Damages | 535,000 | 550,000 | 614,000 | 378,000 |
| Planning, Engineering, and Design | 900,000 | 900,000 | 900,000 | 900,000 |
| Construction Management | 1,050,000 | 1,050,000 | 1,050,000 | 1,050,000 |
| Subtotal | 2,485,000 | 2,500,000 | 2,564,000 | 2,328,000 |
| Project Cost | 18,960,000 | 20,828,000 | 23,445,000 | 19,013,000 |
| | | | | |
| Interest During Construction | 800,000 | 879,000 | 989,000 | 802,000 |
| | | | | |
| NED Investment Cost | 19,760,000 | 21,707,000 | 24,434,000 | 19,815,000 |
| | | | | |
| Annual NED Cost (50 years at 5-5/8%) | 1,189,000 | 1,306,000 | 1,470,000 | 1,192,000 |
| Annual OMRRR | 50,000 | 60,000 | 75,000 | 50,000 |
| Total Annual NED Cost | 1,239,000 | 1,366,000 | 1,545,000 | 1,242,000 |
| | | | | |
| Vessels Accommodated | 58 | 68 | 80 | 58 |
| | | | | |
| Annual Benefits | $1,949,000 | $2,527,000 | $3,187,000 | $2,267,000 |
| Benefits to Cost Ratio | 1.6 | 1.9 | 2.1 | 1.8 |
| Net Annual Benefits | $710,000 | $1,161,000 | $1,642,000 | $1,025,000 |

[a]Rust Creek relocation and removal of waterfall fish barrier.

[b]Access Spur road and uplands gravel surface.

## Table 3. Akutan Harbor Benefit Summary ($000)

| Category | 12 Acre Basin | 15 Acre Basin | 20 Acre Basin | Reconfigured 12 Acre Basin |
|---|---|---|---|---|
| Use of Dredged Materials | 391 | 520 | 690 | 709 |
| Operating Cost Reductions | | | | |
| Reduce Travel to PAC NW | 701 | 885 | 1,106 | 701 |
| In-season Moorage Travel Costs | 761 | 1,014 | 1,268 | 761 |
| Prevention of Rafting Damage | 48 | 60 | 75 | 48 |
| Increase to Subsistence Production | 48 | 48 | 48 | 48 |
| TOTAL | 1,949 | 2,527 | 3,187 | 2,267 |




NOTES

TOTAL DREDGE VOLUME = 1,175,000 CY
BASIN AREA = 192 ACRES
ENTRANCE CHANNEL AREA = 2.6 ACRES
(AREA MEASUREMENTS AT TOE OF EXCAVATION)
TOTAL HARBOR PROJECT AREA = 21.8 ACRES

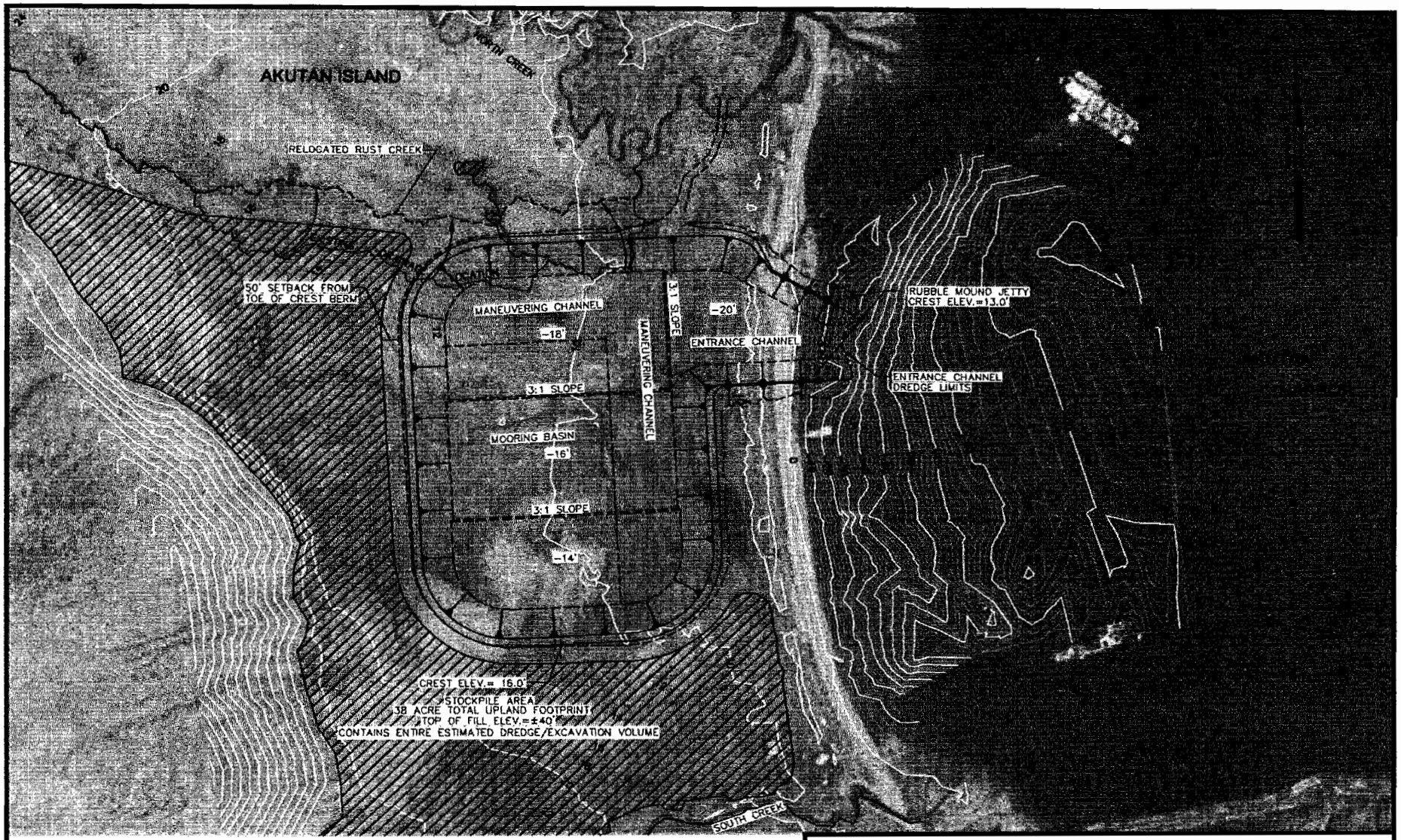
GRAPHIC SCALE
200 0 100 200 400
(IN FEET)
SCALE: 1" = 400'

INLAND HARBOR PLAN
20-ACRE ALTERNATIVE

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE 8




NOTES
TOTAL DREDGE VOLUME = 990,000 CY
BASIN AREA = 15 ACRES
ENTRANCE CHANNEL AREA = 2.6 ACRES
(AREA MEASUREMENTS AT TOE OF EXCAVATION)
TOTAL HARBOR PROJECT AREA = 17.6 ACRES

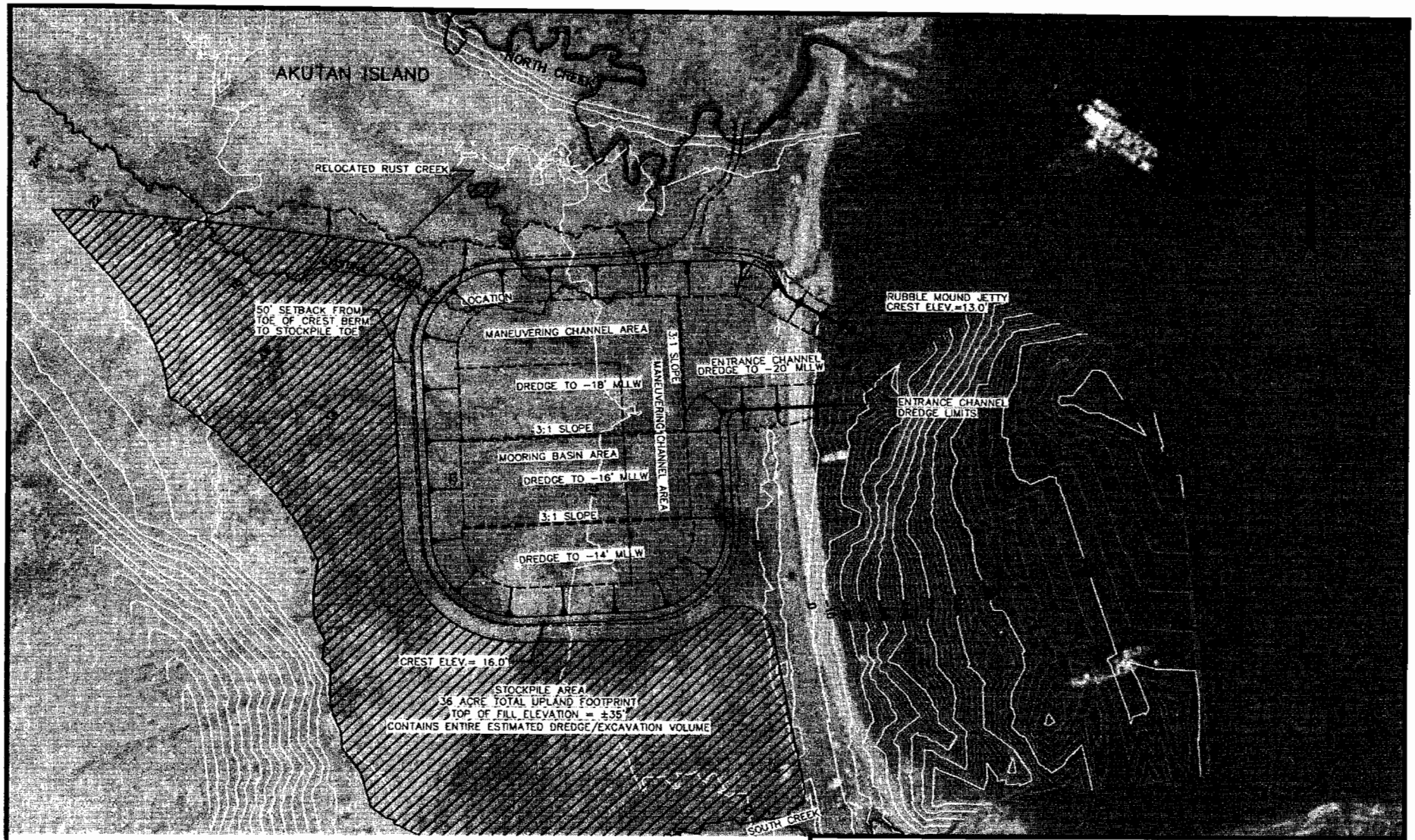
GRAPHIC SCALE
200 0 100 200 400
(IN FEET)
SCALE: 1" = 400'

INLAND HARBOR PLAN
15-ACRE MOORING BASIN

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE 9




NOTES

TOTAL DREDGE VOLUME = 850,000 CY
BASIN AREA = 12.7 ACRES
ENTRANCE CHANNEL AREA = 2.6 ACRES
(AREA MEASUREMENTS AT TOE OF EXCAVATION)
TOTAL HARBOR PROJECT AREA = 15.3 ACRES

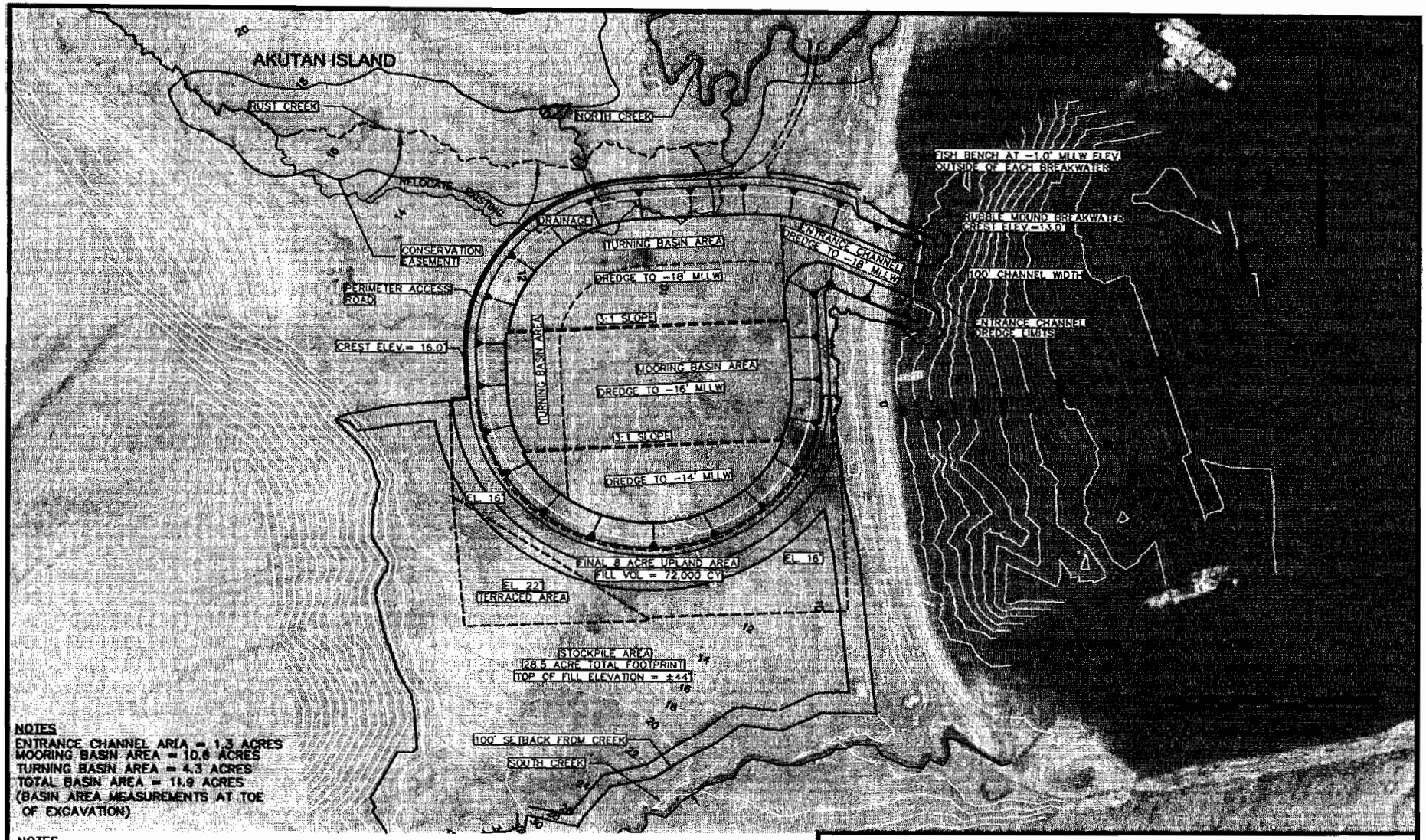
GRAPHIC SCALE
200 0 100 200 400
(IN FEET)
SCALE: 1" = 400'

# INLAND HARBOR PLAN
# 12-ACRE MOORING BASIN

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

**FIGURE 10**




NOTES
ENTRANCE CHANNEL AREA = 1.3 ACRES
MOORING BASIN AREA = 10.6 ACRES
TURNING BASIN AREA = 4.3 ACRES
TOTAL BASIN AREA = 16.9 ACRES
(BASIN AREA MEASUREMENTS AT TOE OF EXCAVATION)

NOTES
TOTAL HARBOR BASIN PROJECT AREA = 16.2 ACRES (TO TOP OF SLOPE)
TOTAL HARBOR USEABLE UPLANDS AREA = 8.0 ACRES (DOES NOT INCLUDE ROADS AND SLOPES)
TOTAL USABLE HARBOR PROJECT AREA = 28.7 ACRES (INCLUDES PERIMETER ROAD, UPLANDS AND SLOPES)
TOTAL STOCKPILE AREA = 28.5 ACRES (INCLUDES 8 ACRES FOR FUTURE USABLE UPLANDS)
TOTAL HARBOR PROJECT AREA =57.2 ACRES (INCLUDES STOCKPILE FOOTPRINT)
TOTAL DREDGE VOLUME = 843,000 CY
VOLUME REQUIRED FOR USABLE UPLAND FILL = 72,000 CY
TOTAL STOCKPILE VOLUME = 771,000 CY

RECONFIGURED
12 ACRE ALTERNATIVE

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE 11

## 3.5. Seismic Considerations

Akutan Island, like much of the Aleutian Islands, was formed by the convergence of the North American and Pacific plates. This convergence produces a seismically active belt where the Pacific Plate is subducted under the North American Plate. This subduction produces frequent earthquakes. The severity of the earthquakes increases with the increasing probability of not being exceeded in a 50-year period. The design earthquake has a 90% probability of not being exceeded in 50 years.

The foundation materials under the breakwater are medium dense, clean to slightly silty sands. These medium dense sands provide sufficient bearing capacity for the breakwater loads under all but severe earthquakes. In order to provide no breakwater damage at the design earthquake, a buttress under the breakwater needs to be constructed. This buttress would be constructed by over-excavating below the breakwater to 20 feet deeper than the adjacent entrance channel, or minus 40 feet MLLW, and backfilling with compacted granular material such as the breakwater core material. Also, breakwater slopes would be constructed at 3H:1V, which increases material quantities.

The geotechnical report also evaluated a breakwater design without a buttress and estimated the amount of damage expected in a design earthquake. Generally, breakwater slopes are designed at 1.5H:1V to reduce quantities of materials, reduce the footprint impacts to the sea floor and reduce costs. Because Akutan is in a seismically active location, the breakwater slopes are designed at 2H:1V to increase stability for moderate earthquakes. The non-buttress design over-excavates below existing ground level under the breakwater for a distance of 50 feet from the breakwater toe in the entrance channel. This over-excavation is set at the same elevation as the dredged entrance channel, –18 feet MLLW. The without-buttress breakwater is estimated to sustain damage in a design earthquake and require 30 percent reconstruction.

An estimate of the increased materials and cost for a breakwater design to provide for no damage at the design earthquake follows.

| Cost of Buttress | $yd^3$ | $\$/yd^3$ | $ |
|---|---|---|---|
| Additional Dredging | 50,000 | 6.43 | 321,500 |
| Core material backfill | 50,000 | 41.72 | 2,086,000 |
| Cost of Buttress | | | 2,407,500 |
| Cost of Breakwater slope 3H:1V vs 2H:1V | | | |
| Additional Armor rock | 1,700 | 61.36 | 104,312 |
| Additional "B" rock | 860 | 49.06 | 42,192 |
| Decrease in Core rock | (3,200) | 41.72 | (133,504) |
| Cost of Flatter Slope | | | 13,000 |
| **Total Cost to add no Damage Design** | | | **2,420,500** |

The annual cost over 50 years @ 5-5/8% is $146,000.

For the purposes of economically comparing a non-buttress breakwater plan to a no-damage plan, the following conditions were assumed after a design earthquake: 30% rebuild, 50% rebuild, and 100% rebuild. It is also assumed the project benefits will be lost during reconstruction, and it will take 2 years for the harbor to become operational after a design

## SUMMARY

This report examines the need for protected harbor space at Akutan, Alaska and determines the feasibility of Federal participation in harbor improvements.

There are no permanent moorage facilities for the fishing fleet operating out of Akutan. Vessels must travel to other locations to find moorage when fishing seasons are closed. Vessels seek protection in Akutan from storms during the fishing season. The current practice is to anchor with engines running in case the anchors drag or cruise around the bay. This increases the risk of vessels running aground and of oil spills from damaged vessels.

Two sites were evaluated, North Point and at the head of the bay. An economically justified project was not possible at North Point, so alternatives at the head of the bay were investigated. Three concepts were developed: offshore harbor, inland/offshore harbor, and inland harbor. The inland concept proved to be most cost effective, and 12-, 15-, and 20-acre basin alternatives were developed. The 20-acre basin had the highest net economic benefits, indicating that the NED plan would be a 20-acre basin or larger. The environmentally and locally preferred plan is the 12-acre basin alternative, because it has the least environmental impact to the adjacent wetlands and avoids anadromous fish streams on either side of the site. The 12-acre basin was reconfigured to with the intent to increase water exchange in the basin and further reduce impacts to the adjacent wetlands. The recommended plan and locally preferred plan is the reconfigured 12-acre basin, which provides protected moorage for 58 vessels ranging in length from under 24 feet up to 180 feet.

The features contributing to the recommended plan have a construction cost of $18,998,000 (October 2003 price level), excluding navigation aids, an annual NED investment cost of $1,242,000, and annual benefits of $2,267,000. The project's benefit-to-cost-ratio is 1.8 with annual net benefits of $1,025,000.

The local sponsor is required to pay the non-federal share of the costs of constructing the general navigation features (GNF) as specified by Section 101 of the Water Resources Development Act of 1986 (Public Law 99-662), as amended. This amount is currently estimated at $2,264,000. The local sponsor must also pay the entire cost of local NED features, including the mooring basin and float system. The current estimate of the total non-federal share of all costs of the project is $9,828,000. The Federal share of the project is $9,170,000, excluding $15,000 for navigational aids. The U.S. Coast Guard provides these navigation aids. The fully funded cost of the NED plan, escalated to the mid-point of construction, is estimated at $20,699,000.

earthquake. Two years of lost benefits averaged over the 50-year project life is $66,000 per year.

*30% rebuild*

| | $yd^3$ | $/$yd^3$ | $ |
|---|---|---|---|
| Mob/Demob | | | 850,000 |
| Armor rock | 4,500 | 61.36 | 276,120 |
| "B" rock | 2,400 | 49.06 | 117,744 |
| Core rock | 13,500 | 41.73 | 563,355 |
| | | Total cost | 1,807,219 |

The cost of a 30% rebuild is less than the cost of construction for a no-damage plan. For a design earthquake in project year six, the rebuild annual cost is $78,000 plus the lost benefit/cost of $66,000 equals an annual cost of $144,000, which is less than the annual cost of the no-damage plan.

*50% rebuild*

| | $yd^3$ | $/$yd^3$ | $ |
|---|---|---|---|
| Mob/Demob | | | 850,000 |
| Armor rock | 7,500 | 61.36 | 460,200 |
| "B" rock | 4,000 | 49.06 | 196,240 |
| Core rock | 22,500 | 41.73 | 938,925 |
| | | Total cost | 2,445,365 |

The 50% rebuild cost is slightly higher than the no-damage plan cost. For a design earthquake in project year 12, the rebuild annual cost is $76,000 plus the lost benefit/cost of $66,000 equals an annual cost of $142,000, which is less than the annual cost of the no-damage plan.

*100% rebuild*

| | $yd^3$ | $/$yd^3$ | $ |
|---|---|---|---|
| Mob/Demob | | | 850,000 |
| Armor rock | 15,000 | 61.36 | 920,400 |
| "B" rock | 8,000 | 49.06 | 392,480 |
| Core rock | 45,000 | 41.73 | 1,877,850 |
| | | Total cost | 4,040,730 |

The 100% rebuild cost is considerably higher than the no-damage plan cost. For a design earthquake in project year 21, the rebuild annual cost is $77,000 plus the lost benefit/cost of $66,000 equals an annual cost of $143,000, which is less than the annual cost of the no-damage plan.

This analysis assumes that under any design earthquake, the harbor will be totally unusable during a two-year breakwater reconstruction period. Smaller vessels will probably use the harbor as soon as entrance to the mooring basin is possible and not wait until completion of breakwater reconstruction. This will reduce the loss of economic benefits resulting in breakeven for earlier events under any damage estimate. Given the low probability of a

design earthquake during the 50-year economic evaluation life of the project, there is no economic justification for recommending a no-damage plan for the design earthquake. Since the breakwater is expected to have people on it infrequently, there is no reason to build a no-damage plan from life safety issues.

There is not economic justification for providing no earthquake damage designed breakwaters. Therefore, breakwaters will be designed with 2H:1V slopes and insitu sands under the breakwaters excavated to channel depth for a distance of 50 feet from the toe.

## 3.6. Optimization of Entrance Channel

Vessel vertical motion due to wave action and vessel speed through the channel dictates additional depth over that required inside the harbor where wave action and vessel speed are reduced. The channel elevation at –20 feet MLLW, allowing unlimited access, is the maximum depth considered. The mooring basin depth of –18 feet MLLW controls the minimum channel depth considered. Mooring basin depth is controlled by the extreme low tidal elevation because vessels cannot be allowed to bottom out at low tide.

Entrance channels can be constructed, which do not allow access for all vessels at extreme low tide by constraining vessels with the deeper drafts to enter the harbor at higher tide levels. Estimating the incremental cost of construction and benefits to be gained for providing additional entrance channel depth does the optimization.

An initial optimization is done with hand calculated material quantities and using total operating cost for the vessel. Inspection of tide tables for one year shows an average of 13.7 occurrences per month when the design vessel will not be able to enter or leave the harbor at low tide. Assuming a one-hour duration for each occurrence, then a vessel could expect a 1.9 percent chance of delay during any month's operations. An estimated 19 vessels could experience delays for an annual cost of $11,700. The estimated annual cost for increasing channel depth from –18 feet to –20 feet MLLW is $13,700. Costs exceed benefits for the initial optimization.

Detailed optimization would consist of detailed material quantity calculations and detailed benefit analysis. Detailed material quantity calculations will result in higher amounts than the hand calculations, resulting in higher construction costs. Detailed benefits calculations will result in fewer benefits through elimination of vessel operating fixed costs and reduction in number of delays. Costs will still exceed benefits.

There is no economic justification for providing an entrance channel depth with no tide restrictions. Therefore an entrance channel depth at –18 MLLW, equal to mooring basin depth, will be provided.

## 3.7. Maintenance Dredging

There are two sources of sediments at the head of the bay, North Creek and South Creek. These sediments are dropped in deltas at the creek mouths. These sediments do not move across the bay, and the perpendicular breakwaters would trap any movement. Therefore maintenance dredging is unlikely to occur. If a minor amount of dredging is needed, barging

material to at sea disposal becomes cost effective if the stockpiles are used and the area is developed. If the stockpile remains, dredged material can be added to the stockpile.

# 4.0 DESCRIPTION OF RECOMMENDED PLAN

## 4.1. Components

The inland reconfigured 12-acre basin harbor alternative is found to have the least environmental impacts and positive net economic benefits. Major construction items of the recommended plan include breakwaters, dredging, and inner harbor facilities. Disposal of dredged material will be in adjacent wetlands, creating upland space. Dredged material will be stockpiled on the created upland space and used for other projects in the Aleutian Islands. See figure 11.

Construction will occur over a two-year period. All dredging is expected to be sands with no boulders and rocks. Test pits and bore holes did not encounter boulders or bedrock. Project specifications will have construction requirements to ensure environmental protection and minimal impact to adjacent anadromous streams and wetlands.

### 4.1.1. Rubblemound Breakwaters

Two rubblemound breakwaters totaling 700 feet will protect the harbor entrance channel. The breakwaters will have a crest elevation of 13 feet MLLW transitioning to 16.0 feet MLLW at the inner harbor. The crest width is 5 feet. Breakwater foundation materials are unconsolidated sands and breakwater slopes are 2H:1V in lieu of 1.5H:1V to increase stability on the unconsolidated foundation. The foundation materials will be excavated to entrance channel depth. Under the breakwater and 50 feet from the toe, the excavation line will slope at 3H:1V. Over-excavation will be backfilled with breakwater core material.

### 4.1.2. Channel and Basin

The project will accommodate 58 vessels in a 12-acre mooring basin. Vessel sizes range from under 24 feet to 180 feet in length. The entrance channel is dredged to an elevation of –18 MLLW. Turning basins and mooring basin are dredged to elevations of –18, –16, and –14 feet MLLW. The shallower depths are away from the entrance channel providing smaller boats more protection from waves coming through the entrance channel. Basin slopes will be 3H:1V and armored with rock to prevent and reduce erosion and sloughing.

### 4.1.3. Dredged Material Disposal

Disposal of dredged materials would occur in uplands and wetlands of the Central Creek watershed, or be incorporated into a marine restoration/enhancement project. The Corps, project sponsors, USFWS, USEPA, and state resource agencies will continue to evaluate ecosystem restoration opportunities for the beneficial use of dredged material, and if proven environmentally, engineeringly, and economically feasible, will incorporate plans to do so during the project's Preconstruction Engineering Design phase (which will occur after project authorization by the U.S. Congress). If during PED the district finds that the beneficial use of dredged material represents the least cost disposal option or pursues such an alternative, if not least cost, under the authority of Section 204 of WRDA 1992, as amended, with appropriate cost sharing, then a beneficial use plan developed during PED could be recommended.

Dewatering of the dredged material will occur in the stockpile areas. This will reduce the need for additional land area for dewatering operations and reduce construction impacts to adjacent wetlands. Water from the dewatering operation will be drained back into the harbor basin and not allowed to drain into Akutan Harbor. The construction contractor will design a dewatering plan based on his equipment and dredging methods. The contractor will submit his dewatering plan for approval prior to the start of dredging and dewatering operations.

#### 4.1.4. Local Service Facilities

The local service facilities consist of the docks and floats necessary to moor the fleet and includes the necessary gangways for access from uplands to the docks. The minimum required uplands are also included in local service facilities.

#### 4.1.5. Mitigation Measures

The head of Akutan Harbor is a biologically productive area. The area contains a vast freshwater wetland complex, fish-bearing (pink and coho salmon, Dolly Varden, and threespine stickleback) streams and ponds, passerine bird and waterfowl habitat, and a diverse near-shore marine habitat that supports juvenile marine and freshwater fish, sea otters, Steller sea lions (an endangered species), and concentrations of over-wintering Steller's eider (a threatened species).

Project-caused impacts to these resources that the Corps is mitigating for include (1) the loss of 43.7 acres of freshwater wetlands; (2) altering the project area's hydrogeology and possible repercussions on the area's anadromous fish streams and adjacent wetlands; (3) breakwater effects on near-shore coastal fishery habitat, fish movements, and the loss of intertidal and subtidal habitat; (4) the effects of project-induced activities (e.g., fuel spills, boat traffic, construction and operation of harbor-related businesses) on over-wintering Steller's eiders; and (5) degradation of water quality in Akutan Harbor and the mooring basin because of incomplete water circulation in each.

The Corps believes that incorporating mitigation measures, good engineering designs in support of environmental principles, and Endangered Species Act-related terms and conditions/conservation measures into the harbor's design and construction, operation, development, and monitoring phases avoids and minimizes adverse impacts to the maximum extent practicable, and that remaining unavoidable impacts have been compensated to the extent justified.

The following list contains items to be constructed or incorporated into the project. Operational items for the local sponsor and for the construction contractor can be found in the EIS.

a. To facilitate containing a petroleum compound spill within the harbor, the Corps will install eye-bolt anchors at the outer and inner ends of the breakwaters for attaching spill containment booms.

b. The spur access road, leading from the harbor to the airport road, will be designed to the minimum size necessary to accommodate the anticipated traffic and be constructed to avoid impacting North Creek. NOTE: The road from the City of

Akutan to the yet-to-be-constructed airport is a State of Alaska project and will be constructed around the harbor site.

c. The Corps will remove a waterfall barrier at the mouth of Rust Creek, a North Creek tributary, to allow anadromous fish access to Rust Creek's upper reaches. Rust Creek will be relocated as needed around the harbor basin.

d. The Corps will require the project sponsor to develop and implement a one-time cleanup of the shoreline between the Old Whaling Station and the Trident Seafoods' processing plant to remove plastics, netting, tires, large pieces of scrap metal, rope, buckets, Styrofoam, etc. and transport them to an approved landfill.

e. As dredged spoils are used for offsite projects, the former stockpile space will be used as harbor parking, staging, and equipment storage areas rather than create these areas in the future.

f. A 41.7 acre mitigation lands (wetlands conservation easement) will be established along Rust Creek and North Creek consisting of 100-foot non-development setbacks from the stream banks. The wetlands conservation easement designation will permanently prohibit any dredge and fill activities within its boundaries.

g. Harbor lighting will be shielded to minimize the hazard of disorienting flying birds and causing them to strike fixed objects.

h. Two, Steller's eider/oil spill-related information signs will be developed in cooperation with the USFWS. One will be posted at the harbor basin, and the second one will be offered to Trident Seafoods to be posted at their fueling facility.

i. The vegetated beach-berm at the head of Akutan Harbor will remain intact.

j. The harbor basin will be constructed and dredged while being isolated from Akutan Harbor. The entrance channel will be dredged last.

k. The toe of the dredged material stockpile will be set back 100 feet from South Creek.

## 4.2. Plan Benefits

### 4.2.1. NED Benefits

NED benefits are used for the economic justification of this project. Benefits for the recommended plan (inland reconfigured 12-acre basin, figure 11) are summarized in table 3. See the Economics Analysis appendix for details of project benefits.

### 4.2.2. Local and Regional Benefits

Although local and regional benefits are not part of the economic justification for the project, these benefits are important to the Aleutians East Borough (non-federal sponsor), the city of Akutan and residents. These include opportunities for residents such as developing tourism, sport fishing, and the developing small boats, inshore waters State fishery. Local and regional benefits have not been quantified, however, the Economics Appendix has more detail and descriptions. The local residents are particularly interested in the creation of year-round jobs,

sheltered moorage for larger boats, better suited to the surrounding ocean, replacing skiffs and resulting increased opportunities to participate in the developing local near shore fishery.

## 4.3. Plan Costs

Table 2 presents the detailed estimated costs of the recommended plan for harbor improvements. This table also includes the benefit/cost analysis, including annual costs and benefits.

Interest during construction (IDC) was added to the initial cost to account for the opportunity cost incurred during the time after the funds have been spent, but before the benefits begin to accrue. IDC was calculated by matching the construction expenditure flow with the interest the funds would have accumulated had they been deposited in an interest-bearing account. Preconstruction, engineering, and design (PED) is assumed to take a minimum of nine months. Construction is expected to last for 24 months. For this analysis, midpoint of construction is assumed. M-CACES cost estimate is shown in appendix G.

## 4.4. HTRW Considerations

During fieldwork, abandoned barrels and old burn pits were discovered. A limited scope field investigation was done during the feasibility study for determining the potential for hazardous materials and waste within the project boundaries. Barrels and burn pits were located and found to be outside the project boundaries. Soil and water samples were taken for testing and some contamination was found, but appears to be outside dredging boundaries. Some questions were raised during quality reviews on the handling of samples from the project site to the testing laboratories and in the laboratories. In particular there appears to be PCE contaminates inland from the beach where none should be expected based on past land uses of the area. Additional fieldwork and testing will be accomplished during the PED phase of the project prior to construction. Cost sharing will be in accordance with ER 1165-2-132. Studies for recognizing existence and extent of HTRW are cost shared. Development of response plan and studies for dealing with HTRW are 100% non-federal responsibility, and response measures to relocate or treat HTRW are 100% non-federal sponsor responsibility (all response costs are excluded from the economic analysis).

## 4.5. Risk and Uncertainty

As in any planning process, some of the assumptions made in this report are subject to error. Elements of risk and uncertainty could affect the design and performance of the project, cost, and benefits. A risk and uncertainty analysis is included in appendix B, Economics Analysis, under sensitivity analysis.

Future use of the proposed harbor will be contingent upon continued demand for secure moorage by vessels operating in the Bering Sea fisheries adjacent to Akutan. Since 1977, the North Pacific Fishery Management Council (NPFMC) has managed these fisheries. The management regulations provided by NPFMC has been conservative and has not resulted in depleting the fishery resource stocks in the Bering Sea.

Moorage demand is subject to change; however, the project provides for a portion of the vessels seeking moorage in Akutan. There are over 200 vessels operating in the region that make at least occasional deliveries to the Trident Seafoods' Akutan plant. The design fleet is made up of the 64 vessels that constantly deliver to the plant. The recommended alternative provides moorage for 38 of the 64 vessels in the design fleet. Therefore fishery stocks and plant capacity would have to be reduced by the amount handled by 26 vessels to affect the recommended harbor project.

It would take a 45% reduction in benefits to bring the benefit cost ratio (BCR) to 1.0. This is an annual benefit reduction of $1,025,000 and could be no "use of dredged materials" and 20% of commercial fishing benefits or some other combination of benefit reduction.

Reducing the BCR to 1.0 through increased costs could be through a $16,000,000 increase in project construction costs—for example the access road to the harbor if the ADOT airport project were cancelled. BCR reductions could be through a $1,025,000 annual increase in operating costs—for example a ferry service if the ADOT airport project were cancelled. A reasonable short-term increase in costs could be a delay in the ADOT airport project and associated road around the head of the bay and resulting costs for limited ferry service to access the harbor.

While rigorous numerical calculations and detail assessments have not been done for benefit reductions or cost increases, the above discussions shows that there would have to be significant changes to impact project justification.

## 4.6. Plan Accomplishment

The recommended plan (inland reconfigured 12-acre basin, figure 11) meets the national and local objectives noted in section 3.1.6, Plan Objectives.

## 4.7. Plan Implementation

### 4.7.1. Construction

**Federal**. The Corps of Engineers would be responsible for construction of the breakwaters and entrance channel. The U.S. Coast Guard would be responsible for installing aids to navigation.

**Local**. The sponsor would be responsible for excavating the mooring basin, constructing the float system, and providing all lands, easements, and rights-of-way necessary for the project. The sponsor is also responsible for funding its share of the Federal general navigational features (GNF).

### 4.7.2. Operation, Maintenance, Repair, Replacement, and Rehabilitation

**Federal**. The Corps of Engineers will conduct periodic inspections of the rubblemound breakwaters and hydrographic surveys of the channels and maintain the breakwaters and channels as needed. The U.S. Coast Guard would maintain navigational aids.

**Local**. The local sponsor will perform maintenance dredging of the mooring basin, if necessary, maintain the floats, utilities, etc., and operate the completed project. The local

sponsor may use dredged material for approved fill activities or other construction activities. The local sponsor will maintain the stockpiled dredged material and capture, contain, and treat runoff from the dredged material as necessary. When dredged material is used, the local sponsor may use the stockpile area for other upland purposes. The dredged material stockpile area will be used for disposal of dredged material during future maintenance dredging operations. Future dredged material may be used for approved fill activities.

**Table 4. Estimated Average Annual OMRR&R Cost For Recommended Plan**

| Item | Interval (yr) | Average Annual Cost (5-5/8%) | | |
|---|---|---|---|---|
| | | Federal ($) | Non-Federal ($) | Total ($) |
| Navigation Aids | 5 | 1,000 | | 1,000 |
| Breakwater Repairs | 25 | 4,000 | | 4,000 |
| Hydrographic Surveys | 5 | 3,000 | | 3,000 |
| Maintenance Dredge (Entrance & Maneuvering Channel) | 25 | 7,000 | | 7,000 |
| Maintenance Dredge (Berthing Area) | 25 | | 15,000 | 15,000 |
| Local Facilities Repair[a] | 1 | | 20,000 | 20,000 |
| TOTAL OMRR&R COST | | 15,000 | 35,000 | 50,000 |

[a]includes minor amounts for mitigation repair/monitoring

#### 4.7.3. Real Property Interests

The real estate requirements include lands owned by the Aleut Corporation and the city of Akutan. The Aleutians East Borough is the sponsor and will acquire all needed real estate rights. Fee simple acquisition of mitigation lands (conservation easement) has been assumed in this feasibility report and Real Estate Plan, although the final decisions on the nature and extent of the required real estate interest may change after project authorization. A summary of estimated real estate costs and a detailed description of required real estate are in appendix E. There are no known relocations of buildings, people, or public utilities at this time.

Approximately 44 acres of wetlands will be destroyed by the project, 11 acres of which will be within the dredged material stockpile footprint. Wetlands will not be restored when the stockpiled material is used for other purposes. Useable uplands will be created as the stockpiled material is used.

#### 4.7.4. Cost Apportionment

Construction costs for the project would be apportioned in accordance with the Water Resources Development Act of 2000 (table 5).

**Table 5. Apportionment Of Construction Costs**

| | Construction cost contribution (%) | |
|---|---|---|
| Portion of project | Federal | Local |
| General navigation features (includes entrance channel, turning basins, and breakwaters) | 80 | 20[a] |
| Local features (includes floats and mooring basin) | 0 | 100 |
| Coast Guard navigation aids | 100 | 0 |

[a]Non-federal interests must provide cash contributions toward the costs for construction of the general navigation features (GNF) of the project, paid during construction (PDC) as follows: For project depths of up to 20 ft–10%; for project depths over 20 ft and up to 45 ft–25%, and for project depths exceeding 45 ft–50%. For all depths, they must provide an additional cash contribution equal to 10% of GNF costs (which may be financed over a period not exceeding 30 years), against which the sponsor's costs for LERRD (except utilities) shall be credited. *Note:* Costs for general navigation features include associated costs, such as mobilization.

The sponsor is also responsible for 100 percent of the construction cost of the inner harbor facilities, which includes dredging the mooring area. A breakdown of the initial costs for the RECOMMENDED PLAN is shown on table 6. The fully funded cost of the RECOMMENDED PLAN (reconfigured 12-acre basin) is estimated as $20,699,000.

The Federal Government would assume 100 percent of the operation and maintenance costs for the breakwaters, turning basins, and entrance channel. The non-federal sponsor would assume all other operation and maintenance costs. The sponsor would be responsible for providing LERRD for construction and future maintenance of the inner harbor facilities and the betterments.

In addition to the sponsor's share of costs for General Navigation Features, the sponsor is responsible for costs associated with other NED and non-NED features. The pertinent data table in the front of this report provides a summary of all shared costs.

The initial construction cost of the General Navigation Features is 90 percent for the initial Federal investment and 10 percent for the initial local share because all dredging is 20 feet or less. The non-federal sponsor must also contribute an additional 10 percent (deferred amount), plus interest, during a period not to exceed 30 years after completion of the General Navigation Features. The sponsor would be credited toward this 10-percent cost with the value of LERRD necessary for construction, operation, and maintenance of the general navigation features. See additional funding requirement in table 6 for estimated deferred amount and GNF LERRD credit.

The cost of the mitigation lands (conservation easement), noted in item f. of section 4.1.5, Mitigation Measures, will be apportioned between GNF and LSF. The reconfigured 12 acre plan has 10.6 acres of LSF basin and 5.6 acres of GNF basin including the entrance channel. Mitigation costs attributed to wetlands impacts will be apportioned on a ratio of the GNF basin and LSF basin area, 35% to GNF and 65% to LSF project features. The sponsor will be allowed credit for the costs of mitigation lands apportioned to GNF as part of the 10% deferred amount. The apportioned mitigation lands estimated costs are included in Table 6 as "LERRD (GNF apportion) – Mitigation Lands" and "LERRD (LSF apportion) – Mitigation Lands."

## PERTINENT DATA

### Recommended Plan (Reconfigured 12-Acre Basin)

| Basin | | Breakwaters | |
|---|---|---|---|
| Area | 14.9 acre | Rubblemound | |
| Basin depth | -14,-16,-18 ft MLLW | Design wave | 3.94 ft |
| Entrance channel depth | -18 ft MLLW | Length, total | 700 ft |
| Dredging volume | | Crest elevation | 13.0 ft MLLW |
| Entrance channel | 82,000 $yd^3$ | Crest width | 5.0 ft |
| Turning basin | 280,000 $yd^3$ | Primary armor | 15,000 $yd^3$ |
| Mooring basin | 481,000 $yd^3$ | Secondary (B) rock | 8,000 $yd^3$ |
| Total | 843,000 $yd^3$ | Core rock | 45,000 $yd^3$ |

### Project Cost[a]

| Item | Federal ($) | Non-federal ($) | Total ($) |
|---|---|---|---|
| General Navigation Features[b] | 9,170,000 | 2,152,000 | 11,322,000 |
| Associated costs[c] | — | 7,564,000 | 7,564,000 |
| LERRD (GNF) | — | 112,000 | 112,000 |
| Navigation aids (U.S. Coast Guard) | 15,000 | — | 15,000 |
| TOTAL NED PROJECT COST | 9,185,000 | 9,828,000 | 19,013,000 |
| | | | |
| NED investment cost (includes interest during construction) | | | 19,815,000 |
| | | | |
| Annualized initial cost plus interest during construction | | | 1,192,000 |
| Annual NED maintenance cost | | | 50,000 |
| Total average annual NED cost | | | 1,242,000 |
| | | | |
| Average annual NED benefits | | | 2,267,000 |
| Net annual NED benefits | | | 1,025,000 |
| Benefit/cost ratio | | | 1.8 |

[a] Basic assumptions: (1) October 2003 price levels; (2) 50-year project life; (3) 5-5/8% interest

[b] Cost sharing reflects provisions of the Water Resources Development Act of 1986 – non-federal initial share 10% of GNF plus reimbursement of 10% GNF minus LERRD credit

[c] NED = National Economic Development

The GNF and LSF dredged material will be co-mingled within one disposal/stockpile area. Cost apportionment for the disposal area will be prorated between GNF and LSF based on the relative quantities of GNF and LSF dredged material and the temporary easement cost for the duration of construction. The sponsor will be allowed credit for the cost apportioned to GNF.

**Table 6. Federal/Non-Federal Initial Cost Apportionment for Recommended Plan**

*(Recommended Plan – October 2003 Price Level)*

| Items | Total Project Cost ($000) | Implementation Costs ($000) | | | |
|---|---|---|---|---|---|
| | | Federal | % | Non-Federal | % |
| General Navigation Features (GNF): | | | | | |
| Mobilization/demobilization | 1,347 | 1,212 | | 135 | |
| Breakwaters | 3,857 | 3,471 | | 386 | |
| Entrance channel and turning basins | 3,823 | 3,441 | | 382 | |
| Mitigation [a] | 321 | 289 | | 32 | |
| Preconstruction, engineering, and design | 900 | 810 | | 90 | |
| Construction management | 1,050 | 945 | | 105 | |
| LERRD (GNF) – Federal administrative costs [c] | 24 | 22 | | 2 | |
| Subtotal GNF | 11,322 | 10,190 | 90 | 1,132 | 10 |
| LERRD (GNF) – Acquisition costs | 59 | | | 59 | |
| LERRD (GNF apportion) – Mitigation Lands | 35 | | | 35 | |
| LERRD (GNF) – Non-federal administrative costs | 18 | | | 18 | |
| Additional Funding Requirement | | | | | |
| 10% of GNF (Deferred amount) | | -1,132 | | 1,132 | |
| GNF LERRD credit | | 112 | | -112 | |
| Post construction contribution | | -1,020 | | 1,020 | |
| Subtotal of GNF Related Items | 11,,434 | 9,170 | | 2,264 | |
| Aids to navigation | 15 | 15 | 100 | 0 | 0 |
| Local Service Facilities (LSF) | | | | | |
| Mooring basin | 4,441 | 0 | | 4,441 | |
| Dock Facilities | 2,477 | | | 2,477 | |
| Uplands Requirements [b] | 404 | 0 | | 404 | |
| LERRD associated with LSF | 177 | 0 | | 177 | |
| LERRD (LSF apportion) – Mitigation Lands | 65 | 0 | | 65 | |
| TOTAL LOCAL SERVICE FACILITIES | 7,564 | 0 | 0 | 7,564 | 100 |
| INITIAL COST REQUIREMENTS | 19,013 | 9,185 | | 9,828 | |

[a] Ruet Creek relocation and removal of waterfall fish barrier

[b] Access Spur road and uplands gravel surface

[c] The local sponsor pays 10% of the Federal GNF LERRD costs.

#### 4.7.5. Financial Analysis

The Aleutians East Borough understands and undertakes the obligation of paying for the local share of the recommended plan including construction of the local service facilities. The Aleutians East Borough is planning general obligation (GO) and revenue bonds to finance part of the local share of project costs. The State of Alaska expects to request funds from the legislature for the balance of the local share of the project. This has been the state practice on harbor projects in recent years. The city of Akutan will provide the lands required for the project. The Aleutian Pribilof Islands Community Development Association (APICDA) will contribute cash in the form of a grant on behalf of its members in the village of Akutan. A letter stating the Borough's financial capability is enclosed in appendix F.

# 5.0 PUBLIC INVOLVEMENT

Since initiation of this feasibility study representatives from the Aleutians East Borough and City of Akutan, have worked closely with the study team, and local concerns have been addressed. Cooperation between the staffs of the Corps of Engineers and the U.S. Fish & Wildlife Service, together with input from representatives of the Aleutians East Borough and City of Akutan and public comments, resulted in the selection of the recommended plan. See section 1.4, Environmental Coordination.

# 6.0 CONSULTATION REQUIREMENTS

This study has been coordinated with all relevant Federal and State agencies, including the U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, and Alaska Department of Environmental Conservation. Information on this coordination is provided in the EIS and is summarized in table 7.

**Table 7. Environmental Compliance Checklist**

| Federal Statute | Status of Compliance |
|---|---|
| Clean Air Act, as amended | Full Compliance |
| Clean Water Act, as amended | Full Compliance |
| Coastal Zone Management Act | Full Compliance |
| Endangered Species Act of 1973, as amended | Full Compliance |
| Estuary Protection Act | Full Compliance |
| Federal Water Project Recreation Act, as amended | Not Applicable |
| Fish and Wildlife Coordination Act | Full Compliance |
| Land and Water Conservation Fund Act, as amended | Full Compliance |
| Magnusen – Stevens Fishery Management Act and Conservation Act | Full Compliance |
| Marine Mammal Protection Act | Full Compliance |
| Marine Protection, Research and Sanctuaries Act, as amended | Not Applicable |
| Migratory Bird Treaty Act | Full Compliance |
| National Environmental Policy Act of 1969, as amended–CEQ Regulations for Implementing the Procedural Provisions of NEPA | Full Compliance |
| National Historic Preservation Act of 1966, as amended | Full Compliance |
| Rivers and Harbors Appropriation Act of 1899 | Full Compliance |
| Watershed Protection and Flood Prevention Act, as amended | Not Applicable |
| Wild and Scenic Rivers Act, as amended | Not Applicable |
| Wilderness Act | Full Compliance |
| Executive Orders, Memorandums, etc. | |
| Floodplain Management (E.O. 11988) | Full Compliance |
| Protection of Wetlands (E.O. 11990) | Full Compliance |
| Environmental Effects Abroad of Major Federal Action (E.O. 12114) | Not Applicable |
| Protection and Enhancement of Environmental Quality (E.O. 11514 and 11991) | Full Compliance |
| Analysis of Impact on Prime and Unique Farmlands (CEQ Memo Aug. 11, 1980) | Not Applicable |
| Protection and Enhancement of the Cultural Environment (E.O. 11593) | Full Compliance |
| Environmental Health and Safety Risks to Children, 1997 (E.O. 13045) | Full Compliance |
| Environmental Justice in Minority and Low-income Populations, 1994 (E.O. 12898) | Full Compliance |
| Environmental and Coordination with Indian Tribal Government, 2000 (E.O. 13175) | Full Compliance |

# 7.0 CONCLUSIONS AND RECOMMENDATIONS

## 7.1. Conclusions

The studies documented in this report indicate Federal construction of navigational improvements with rubblemound breakwaters, as described in the recommended plan, is technically possible, economically justified, and environmentally and socially acceptable. The reconfigured 12-acre basin inland harbor plan is selected as the recommended plan because it has the least environmental impact and has a positive net benefit, considering cost and benefits. The reconfigured 12-acre alternative does not maximize the net NED benefits, however, it does have positive net benefits. As stated in section 3.4, the 20-acre plan has the greatest net benefits and the NED plan is 20 acres or larger. Selection of the reconfigured 12-acre plan is consistent with the Federal objective of water and related land resources planning, contributing to national economic development and protecting the Nation's environment. The Aleutians East Borough is willing to act as local sponsor for the project and fulfill all the necessary local cooperation requirements. Therefore the Federal Government in cooperation with the Aleutians East Borough should pursue alternative (inland reconfigured 12-acre basin), the recommended plan.

## 7.2. Recommendations

I recommend navigation improvements at Akutan, Alaska, be constructed generally in accordance with the plan herein, and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable, at an estimated total Federal cost of $9,185,000 and $15,000 annually for Federal maintenance, provided that prior to construction the local sponsor agrees to the following:

a. Enter into an agreement which provides, prior to execution of the project cooperation agreement, 25 percent of design costs;

b. Provide, during construction, any additional funds needed to cover the non-federal share of design costs;

c. Provide, during the period of construction, a cash contribution equal to the following percentages of the total cost of construction of the general navigation features (which include the construction of land-based and aquatic dredged material disposal facilities that are necessary for the disposal of dredged material required for project construction, operation, or maintenance and for which a contract for the federal facility's construction or improvement was not awarded on or before October 12, 1996;): 10 percent of the costs attributable to dredging to a depth not in excess of 20 feet; plus, 25 percent of the costs attributable to dredging to a depth in excess of 20 feet but not in excess of 45 feet; plus 50 percent of the costs attributable to dredging to a depth in excess of 45 feet;

d. Pay with interest, over a period not to exceed 30 years following completion of the period of construction of the project, up to an additional 10 percent of the total cost of construction of general navigation features. The value of lands, easements, rights-of-way, and relocations provided by the non-Federal sponsor for the general navigation features, described below, may be credited toward this required payment. If the amount of credit

t. Develop and implement a one-time cleanup of the shoreline between the Old Whaling Station and the Trident Seafoods' processing plant to remove plastics, netting, tires, large pieces of scrap metal, rope, buckets, Styrofoam, etc. and transport them to an approved landfill;

u. Maintain project mitigation lands as necessary for the lands purpose, and provide repairs as necessary to the relocated portion of Rust Creek;

The recommendations for implementation of navigation improvements at Akutan, Alaska reflect the policies governing formulation of individual projects and the information available at this time. They do not necessarily reflect the program and budgeting priorities inherent in the local and State programs or the formulation of a national civil works water resources program. Consequently, the recommendations may be changed at higher review levels of the executive branch outside Alaska before they are used to support funding.

Date: 16 June 2004

Timothy J. Gallagher
Colonel, Corps of Engineers
District Engineer

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