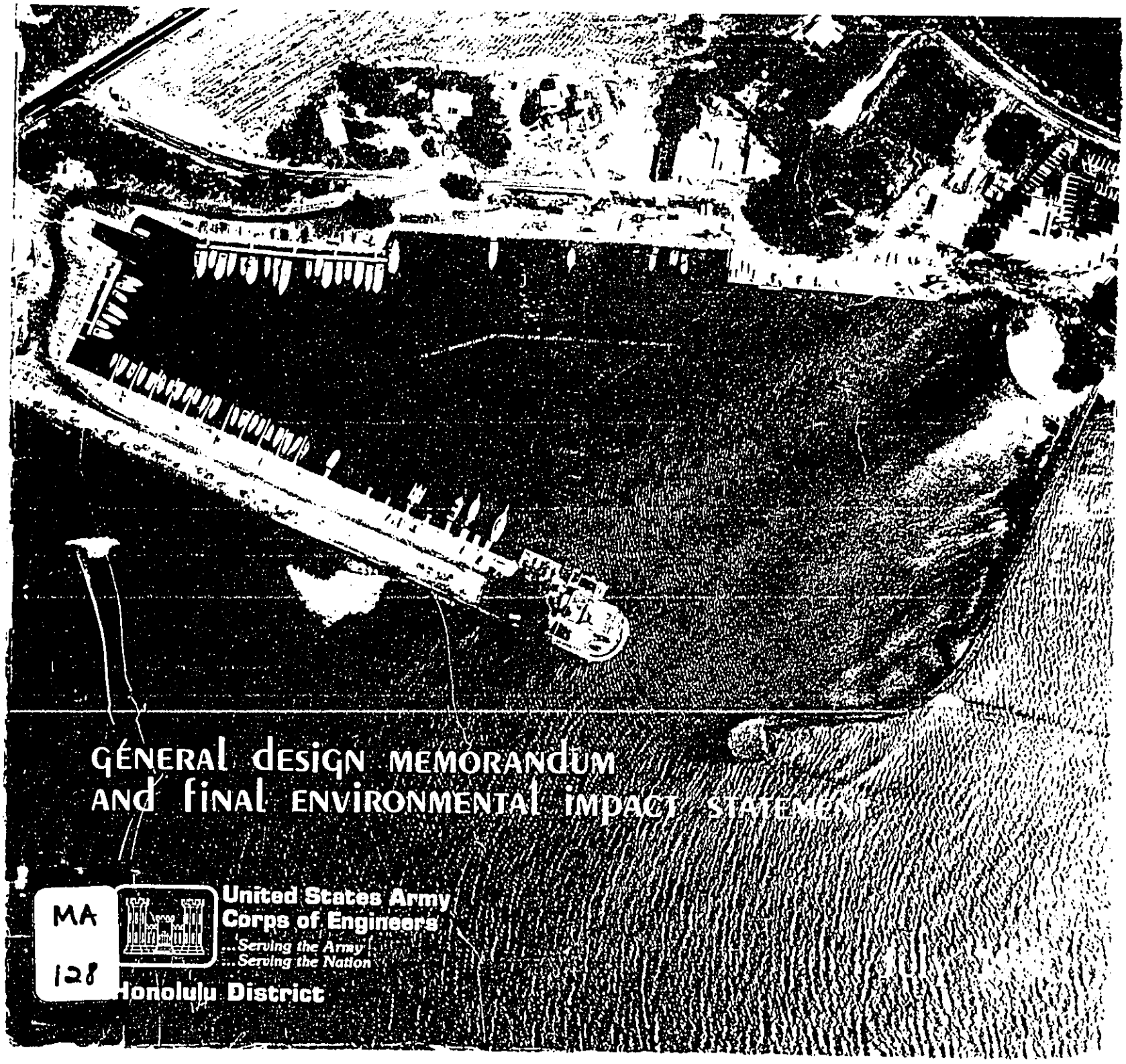
MAALAEA HARBOR

FOR

LIGHT - DRAFT VESSELS

MAUI, HAWAII



GENERAL DESIGN MEMORANDUM
AND FINAL ENVIRONMENTAL IMPACT STATEMENT

United States Army
Corps of Engineers
...Serving the Army
...Serving the Nation
Honolulu District

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DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED-PJ

31 July 1980

SUBJECT: Maalaea Harbor for Light-Draft Vessels, Maui, Hawaii - General Design Memorandum No. 1

Division Engineer
US Army Engineer Division,
Pacific Ocean
Building 230
Ft Shafter, HI 96858

Twenty copies of subject General Design Memorandum including the final Environmental Statement are forwarded for your review and approval in accordance with ER 1110-2-1150 and ER 1105-2-507. The draft Environmental Statement was forwarded to the Environmental Protection Agency on 30 April 1980 and was published in the Federal Register on 16 May 1980. Two copies of the Record of Public Meeting are forwarded for your information.

Alfred J. Thiede

ALFRED J. THIEDE
COL, Corps of Engineers
District Engineer

2 Incl
1. GDM (20 cys)
2. Record of Pub Mtg (2 cys)

PODDE (31 Jul 80) 1st Ind

DA, Pacific Ocean Division, Corps of Engineers, Building 230, Ft Shafter, HI 96858, 31 Jul 80

TO: HQDA, ATTN: DAEN-CWE-B, WASH, DC 20314

I concur in the views and recommendations of the District Engineer.

HENRY J. HATCH
Brigadier General, US Army
Division Engineer

2 Incl
nc

SYLLABUS

The purpose of this document is to describe the feasibility and the impacts of navigation improvements for Maalaea harbor, Maui, Hawaii. The proposed improvements are designed to alleviate adverse navigation conditions and to provide for addition of berthing space.

The scope of the report includes problem identification, examination of various alternative plans of improvement, and evaluation of plans in terms of technical, economic, environmental, and social acceptability. The evaluation and plan selection process is guided by the dual national objectives of national economic development and environmental quality. The report presents three alternative plans and selects one of the plans as the recommended plan. A complete description of the recommended plan of improvement is provided. The scope of the Environmental Impact Statement (EIS) includes the purpose and need for undertaking the proposed action, evaluation of the environmental impacts of reasonable alternatives, the existing environment of the area, and the direct and indirect effect of the alternatives on the ecological, cultural, economic, and social resources of the study area. The Final Environmental Impact Statement is included as an appendix.

The recommended plan of improvement provides for the dredging of a 610-foot-long, 150- to 180-foot-wide, 15- to 12-foot-deep entrance channel, a 1.7 acre, 12-foot-deep turning basin, and a 720-foot-long, 80-foot-wide, 8-foot-deep access channel; and provides for construction of a 620-foot-long, 13-foot-high extension to the existing south breakwater, including a 400-foot-long exterior revetted mole. The recommended plan also includes nonfederal features including a 720-foot-long, 50-foot-wide interior revetted mole and a 2.0 acre, 8-foot-deep addition to the existing berthing area. Installation of necessary aids to navigation would also be included in the federal project.

This report is submitted to the Office of the Chief of Engineers for approval. The project would be implemented after approval by the Chief of Engineers, completion of local responsibility requirements, and receipt of project construction funds.

Rev. 26 Sep 80

GENERAL DESIGN MEMORANDUM
MAALAEA HARBOR FOR LIGHT-DRAFT VESSELS
MAALAEA, MAUI, HAWAII

PERTINENT DATA

PROJECT FEATURES		
1.	BERTHING CAPACITY	310 boats
2.	ENTRANCE CHANNEL	
a.	Length	610 feet
b.	Width	150 to 180 feet
c.	Depth	15 to 12 feet
d.	Turns	45° right
3.	TURNING BASIN	
a.	Area	1.7 acres
b.	Depth	12 feet
4.	ACCESS CHANNEL	
a.	Length	720 feet
b.	Width	80 feet
c.	Depth	8 feet
5.	SOUTH BREAKWATER EXTENSION	
a.	Length	620 feet
b.	Crest Elevation	+13 feet MLLW
c.	Crest Width	15 feet
d.	Side Slopes	2H to 1V
e.	Armor	6-ton Dolos
6.	EXTERIOR REVETMENT	
a.	Length	400 feet
b.	Crest Elevation	+13 feet MLLW
c.	Side Slopes	2H to 1V
d.	Armor	7- to 10-ton stone
7.	EAST BREAKWATER	
a.	Length Removed	80 feet
b.	Interior Mole (Nonfederal)	720 feet
8.	BERTHING AREA ADDITION (NONFEDERAL)	
a.	Area	2.0 acres
b.	Depth	8 feet

Rev. 26 Sep 80

PROJECT COST	
Federal Portion of CoE Work Cost	$ 2,995,000
Nonfederal Portion of CoE Work Cost	1,645,000
TOTAL CORPS OF ENGINEERS WORK COST	$ 4,640,000
US Coast Guard Cost	20,000
TOTAL FEDERAL WORK COST	$ 4,660,000
ANNUAL CHARGES1/	
Total Annual Federal Charges Based on a 7-1/8 Percent Interest Rate and a 50-Year Project Life	$ 380,000
ANNUAL BENEFITS	
Total Annual Benefits Based on a 7-1/8 Percent Interest Rate and a 50-Year Project Life	$ 744,000
NET ANNUAL BENEFITS	$ 364,000
BENEFIT-COST RATIO	2.0

1/ Based on Total Federal Work Cost only.

Rev. 26 Sep 80

GENERAL DESIGN MEMORANDUM
NAVIGATION IMPROVEMENTS FOR
MAALAEA LIGHT-DRAFT HARBOR
ISLAND OF MAUI, HAWAII

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SECTION A

INTRODUCTION

1. PROJECT AUTHORIZATION.

1.1 This General Design Memorandum (GDM) presents the results of the post-authorization studies for modification of the small boat harbor at Maalaea, Maui, Hawaii. Construction of harbor modifications was authorized by Section 101 of the River and Harbor Act of 13 August 1968 (Public Law 90-483) in accordance with House Document No. 353, 90th Congress, 2nd Session, which contained the Chief of Engineers' report on Coasts of the Hawaiian Islands, Harbors for Light-Draft Vessels, in response to the authorizations contained in the River and Harbor Act of 17 May 1950. Applicable portions of this section are as follows:

> "SEC. 101. That the following works of improvement of rivers and harbors and other waterways for navigation, flood control, and other purposes are hereby adopted and authorized to be prosecuted under the direction of the Secretary of the Army and supervision of the Chief of Engineers, in accordance with the plans and subject to the conditions recommended by the Chief of Engineers in the respective reports hereinafter designated. The provisions of section 1 of the River and Harbor Act approved March 2, 1945 (Public Law Numbered 14, Seventy-ninth Congress, first session), shall govern with respect to projects authorized in this title; and the procedures therein set forth with respect to plans, proposals, or reports for works of improvement for navigation or flood control and for irrigation and purposes incidental thereto, shall apply as if herein set forth in full.
>
> NAVIGATION
>
> Coasts of Hawaiian Islands, Harbors for Light Draft Vessels".

2. DESCRIPTION OF AUTHORIZED PLAN.

2.1 The authorized plan for construction of harbor improvements at Maalaea Harbor, Maalaea, Island of Maui, is described in detail in the Chief of Engineers' report, dated 11 April 1968. The report is contained in House Document No. 353, 90th Congress, 2nd Session, which is referred to in this design memorandum as the project document. The pertinent features of the project are shown on Figure A-1 and described below:

a. A 650-foot-long extension to the existing south breakwater;

b. A 780-foot-long, 150-foot-wide, 15-foot-deep main entrance channel; including a 150-foot-long transition area providing a change in depth from 15 feet to 12 feet and flaring of width from 150 feet to about 300 feet;

c. A 6.9 acre turning basin;

d. A 700-foot-long, 80-foot-wide, 8-foot-deep access channel;

e. Removal of the east breakwater from the head to station 2+00; and

f. Tree plantings for project beautification.

2.2 The harbor, as authorized, would accommodate about 260 boats.

3. REQUIRED LOCAL COOPERATION.

3.1 Federal participation in the construction and maintenance of the harbor project recommended in this report will be subject to the conditions that local interests will satisfy the following requirements:

a. Provide without cost to the United States all lands, easements, and rights-of-way required for the construction and subsequent maintenance of the project and aids to navigation upon the request of the Chief of Engineers, including suitable areas determined by the Chief of Engineers to be required in the general public interest for the initial and subsequent disposal of spoil, and also provide necessary retaining dikes, bulkheads, and embankments therefor or the costs of such retaining works;

b. Hold and save the United States free from damages due to the construction work or subsequent maintenance of the project when not due to the fault or negligence of the United States or its contractors;

c. Assure continued public ownership and use of the facilities upon which the amount of federal participation is based during the economic life of the project;

d. Provide and maintain without cost to the United States necessary berthing or mooring facilities and attendant utilities, including a public landing with suitable supply facilities open to all on equal terms;

e. Provide and maintain without cost to the United States depths in the berthing and mooring areas, and in the local access channels commensurate with the depths provided in the related project areas;

f. Provide and maintain without cost to the United States all appropriate onshore structures, access roads, parking areas, public restrooms, and boat launching and retrieving facilities as necessary to insure a complete and adequate project;

g. Accomplish without cost to the United States such utility, drainage, or other relocations or alterations as necessary for project purposes;

h. Establish regulations prohibiting discharge of untreated sewage, garbage, and other pollutants in the waters of the harbor by users thereof, which regulations shall be in accordance with applicable laws or regulations of Federal, State, and local authorities responsible for pollution prevention and control; and

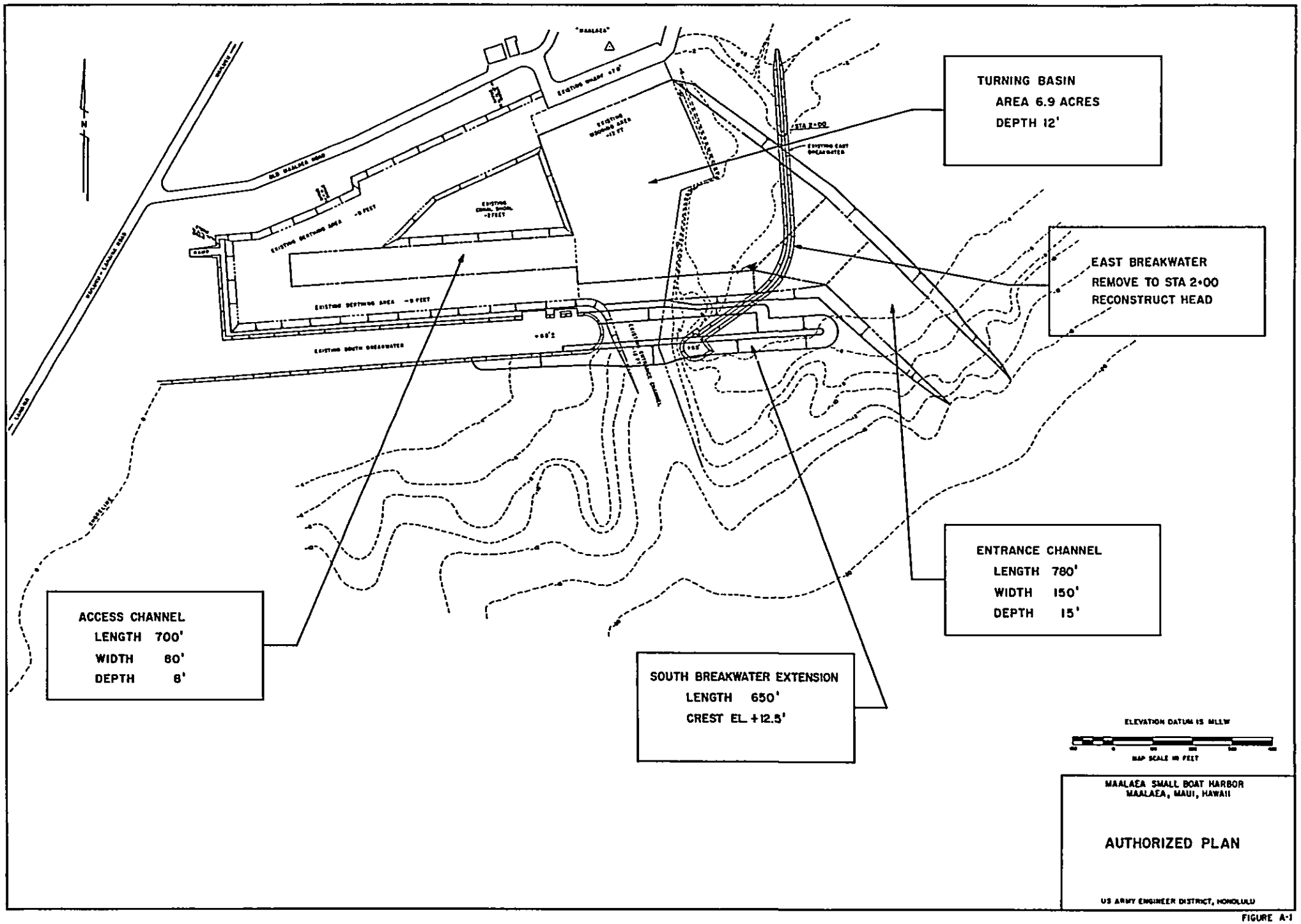

TURNING BASIN
AREA 6.9 ACRES
DEPTH 12'
EAST BREAKWATER
REMOVE TO STA 2+00
RECONSTRUCT HEAD
ENTRANCE CHANNEL
LENGTH 780'
WIDTH 150'
DEPTH 15'
ACCESS CHANNEL
LENGTH 700'
WIDTH 80'
DEPTH 8'
SOUTH BREAKWATER EXTENSION
LENGTH 650'
CREST EL +12.5'
ELEVATION DATUM IS MLLW
MAP SCALE IN FEET
MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII
AUTHORIZED PLAN
US ARMY ENGINEER DISTRICT, HONOLULU

FIGURE A-1

i. Contribute in cash prior to construction of the project a lump sum payment in the estimated amount of $1,645,000 which is 35.5 percent of the estimated first cost of construction by the Corps of Engineers, the final contribution to be adjusted after actual costs have been determined.

3.2 The Harbors Division, Department of Transportation, State of Hawaii, the local cooperating agency, has reviewed plans of the harbor project and has indicated full support of the proposed project. Additionally, the Harbors Division, as the representative of the State of Hawaii, has assured the District Engineer that it is willing and able to fulfill the necessary requirements of local cooperation as enumerated in this report and desires to undertake the project upon federal approval. The most recent letter of assurance, dated 30 June 1980, is included in Appendix K.

3.3 The principal officer presently responsible for compliance with the local cooperation requirements of the project is:

R. Higashionna, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, HI 96813

4. SCOPE OF POST-AUTHORIZATION STUDIES

4.1 The purpose of the post-authorization studies described in this report is to reaffirm the basic planning decisions made during the preauthorization studies, while responding to changes in the physical, social, economic or environmental conditions related to the project, and to changes in Corps water resources planning policies which have occurred since the project was authorized. Because of the long time interval between project authorization in 1968 and initiation of post-authorization studies in 1978, post-authorization studies included reevaluation of problems and needs, public attitudes regarding the authorized plan of improvement, possible alternatives, oceanographic analyses, navigation requirements, social and economic conditions, and desires of the local sponsor. In addition to reevaluation of the above items, assessment and evaluation of environmental impacts were required by various laws and regulations which have been enacted since project authorization. A study classification report prepared during the problem identification stage classified this study as a reaffirmation study in accordance with Engineer Regulations.

5. STUDY PARTICIPANTS AND COORDINATION

5.1 The U.S. Army Corps of Engineers, Honolulu Engineer District is responsible for conducting and coordinating the study. The studies and investigations were performed in cooperation with the Harbors Division, Department of Transportation, State of Hawaii.

5.2 Information and comments received from the following agencies and organizations, as well as from numerous individuals, were considered in the identification of problems and needs and the development of alternate plans:

Departments of the State of Hawaii
U.S. Fish and Wildlife Service
National Marine Fisheries Service
Maui Cooperative Fishermen's Association
Maalaea Boat and Fishing Club
Maui Surfers (unorganized)

6. PUBLIC INVOLVEMENT PROGRAM

6.1 Public involvement has been an integral part of post-authorization studies throughout the study period. The program has included public meetings where testimony was received regarding Corps plans, a series of public workshops where interested individuals and organizations participated fully in the development of alternatives, and informal conversations and correspondence with local interests. Post-authorization studies could not have been successfully conducted without the ideas and cooperation of the many individuals and organizations who so enthusiastically participated in the planning process. Details of the public involvement program are discussed throughout this report.

7. STUDIES OF OTHERS

7.1 In accordance with the Fish and Wildlife Coordination Act, a Planning Aid Report was prepared by the U.S. Fish and Wildlife Service and was utilized in the development of the alternate plans of improvement shown in this report. The final FWS 2b Report is included in this report as Appendix D.

8. THE REPORT AND STUDY PROCESS

8.1 This General Design Memorandum (GDM) has been prepared sequentially in the order of the study process stages. The sections of the draft report describe the authorized project, identify problems and needs, discuss the plan formulation process, assess and evaluate alternate plans of harbor improvement, compare alternate plans, present and discuss the selected plan, and present study conclusions and study recommendations.

SECTION B

PROBLEM IDENTIFICATION

1. Although the primary purpose of this study is to reaffirm the planning decisions made during preauthorization studies, the initial study task was to update the problems and needs related to the authorized project. The results of the update serve as the basis for translating the identified problems, needs, concerns and constraints into the planning objectives which provide a guide and focus for the post-authorization planning activities which follow.

2. NATIONAL OBJECTIVES.

2.1 The planning objectives which emerge from the problem identification process are specifically directed to the need for navigation improvements. In accordance with the U.S. Water Resources Council's Principles and Standards for Planning Water and Related Land Resources, these objectives are also those that can be directed to achieve the co-equal National Objectives: National Economic Development (NED) and Environmental Quality (EQ).

2.2 The achievement of NED is accomplished by increasing the value of the national output of goods and services and improving national economic efficiency. Planning to achieve the EQ objective encompasses the management, conservation, preservation, creation, restoration, or improvement of the quality of the natural and cultural environment.

3. PROFILE OF EXISTING CONDITIONS.

3.1 GENERAL DESCRIPTION. The island of Maui is the second largest island in the Hawaiian chain, supporting a total resident population of approximately 52,900 persons in 1978. Maalaea Harbor is located on the southwest shore of the island (Figure B-1), about 7 miles south of the County seat in Wailuku, and about 8 miles south of the commercial and business center of Kahului. The shoreline of Maalaea Bay is part of an isthmus connecting two large inactive volcanos which form the geologically older west Maui and the more recent East Maui. The East Maui volcano, called Haleakala, rises to an elevation of 10,023 feet above sea level. The shoreline of Maalaea Bay is characterized by a long narrow coral-sand beach which attracts many tourists from around the world. Maalaea Harbor is located at the extreme west end of this beach. Figure B-2 shows the existing harbor and highlights some of the prevailing conditions which are described in this section.

3.2 LAND USE. Land use in the vicinity of Maalaea Harbor includes agriculture and hotel-condominium development. Until recently, sugarcane lands dominated the landscape near Maalaea. At present many medium-rise, hotel-condominiums are seen along the shoreline directly adjacent to the harbor. The State of Hawaii Land Use Plan designates the immediate harbor area for urban development. Adjacent landward areas are designated for agricultural use and for conservation use.

3.3 DEVELOPMENT AND ECONOMY. Tourism and agriculture form the basis of the economy on Maui island. At the time of project authorization in 1968, revenues from tourism and agriculture were about equal, but at present tourism heavily dominates the economy. The sugar industry, which is the major agricultural producer, shows a 1978 revenue of $67 million out of a total crop and livestock revenue of $92 million. However, tourism boasted a 1978 revenue of $283 million. The 1978 visitor count for Maui totaled 1.4 million persons, which is a 25 percent increase since 1977 and nearly a 600 percent increase since project authorization. At present more than 1000 hotel-condominium units are under construction to accommodate the increased tourist demands.

3.4 NATURAL FORCES:

3.5 WINDS. The predominant winds in the Hawaiian islands are the northeast tradewinds, which usually occur on more than 70 percent of the days in each year. The tradewinds are most constant during the spring and summer with typical speeds of 10 to 20 miles per hour. Local low pressure systems frequently replace the tradewinds during the winter months. These low pressure systems, called "Kona" storms or "Kona" weather typically produce conditions ranging from gale-force southerly winds with heavy rain to calm, humid or rainy weather.

3.6 On Maui the tradewinds are strongly influenced by topographic conditions. The wind diagram shown for Puunene Naval Air Station (Figure B-3), located 4 miles northeast of Maalaea, is most representative of the tradewinds at Maalaea Harbor. At Maalaea Harbor, the northeast tradewinds become northerly as they are funneled between the mountains of East and West Maui. Tradewind speeds at Maalaea are frequently greater than 25 miles per hour due to the funneling effect.

3.7 WAVES. Maalaea Harbor is affected primarily by two types of wave conditions: southern swell and "Kona" storm waves.

3.8 Southern swell is generated in the southern hemisphere, most frequently during the Antarctic winter months between April and November. After traveling over thousands of miles of open ocean, these waves arrive at the southern shores of the Hawaiian islands as long-period swell. Periods typically range between 14 and 22 seconds with heights generally 1 to 4 feet. Occasionally the southern swell produces waves at Maalaea Harbor which exceed 10 feet, rendering the existing entrance channel unsafe for navigation and causing severe surge within the harbor basin. In any year, southern swell may occur about 50 percent of the time.

3.9 Kona storm waves generally approach Maalaea Harbor from the south or south-southwest. These storms may generate waves which can adversely affect the existing harbor. Periods usually range from 8 to 10 seconds, with heights of 10 to 15 feet. In any year, Kona storms may occur several times or not at all. They most frequently occur during the winter months. In January 1980 a severe Kona storm resulted in damages totalling more than $10 million on Maui, although no damages were reported in Maalaea Harbor

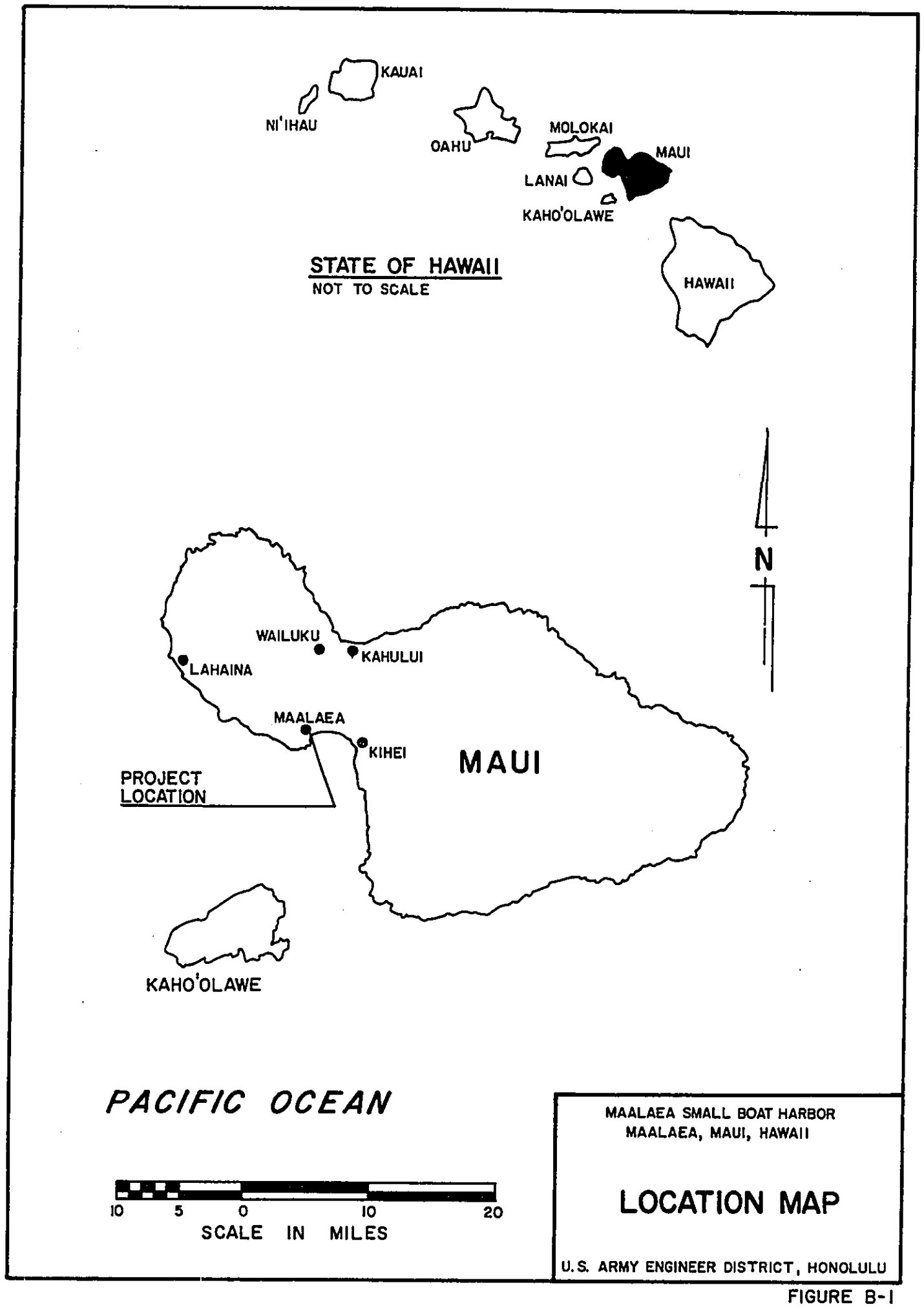
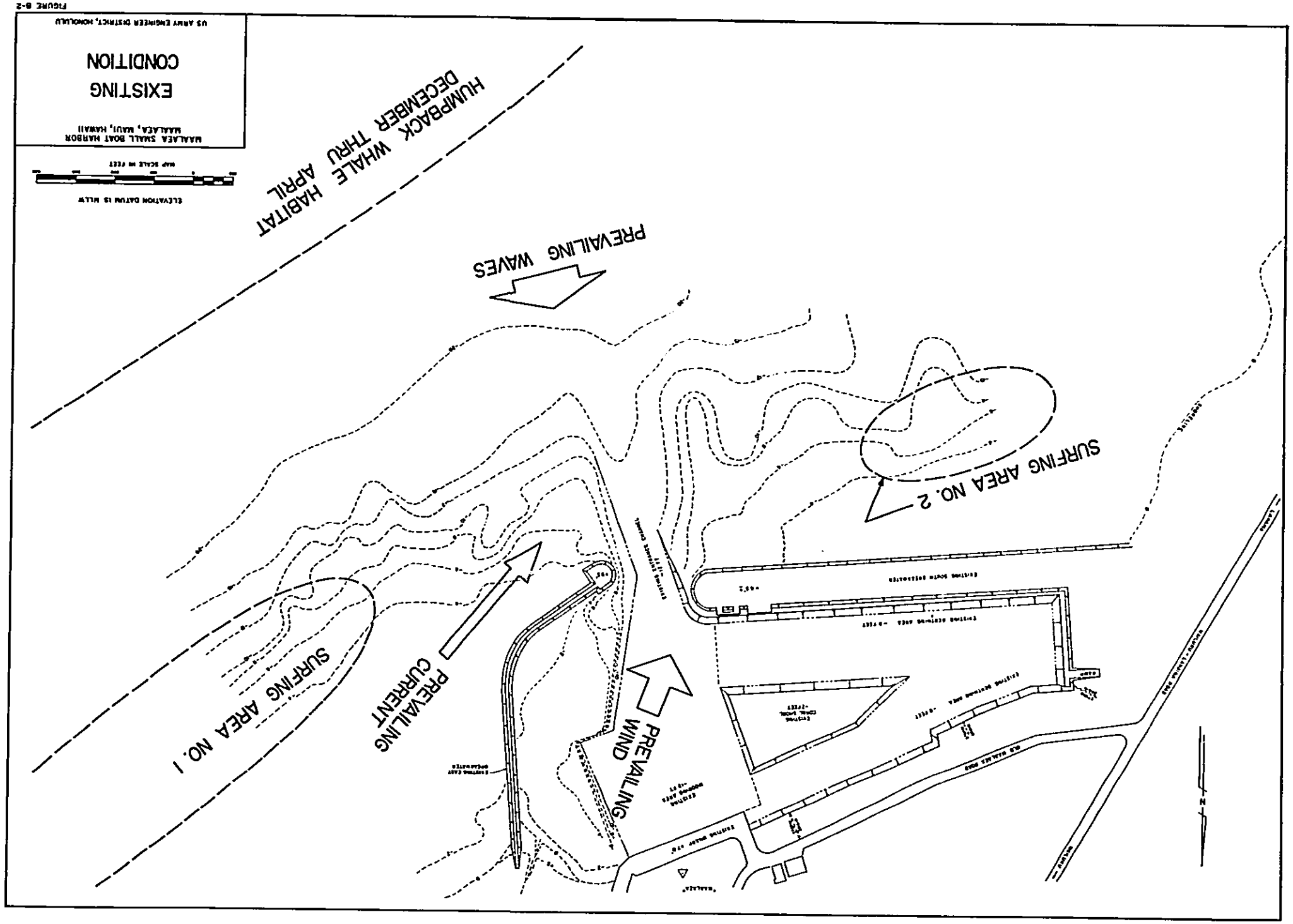

KAUAI
NI'IHAU
OAHU
MOLOKAI
MAUI
LANAI
KAHO'OLAWE
HAWAII
STATE OF HAWAII
NOT TO SCALE
N
WAILUKU
KAHULUI
LAHAINA
MAALAEA
KIHEI
MAUI
PROJECT LOCATION
KAHO'OLAWE
PACIFIC OCEAN
10 5 0 10 20
SCALE IN MILES
MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII
LOCATION MAP
U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE B-1

FIGURE B-2


U.S. ARMY ENGINEER DISTRICT, HONOLULU
EXISTING CONDITION
MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII
MAP SCALE IN FEET
ELEVATION DATUM IS MLLW
HUMPBACK WHALE HABITAT DECEMBER THRU APRIL
PREVAILING WAVES
SURFING AREA NO. 2
SURFING AREA NO. 1
PREVAILING CURRENT
PREVAILING WIND
EXISTING SOUTH BREAKWATER
EXISTING ENTRANCE CHANNEL
EXISTING DREDGED AREA -8 FEET
EXISTING ANCHORAGE AREA -6 FEET
EXISTING CHANNEL DEPTH -7 FEET
EXISTING BOAT RAMP
EXISTING CAUSEWAY
EXISTING BOAT RAMP
EXISTING BREAKWATER -12 FT
EXISTING WATER LINE
MAALAEA
OLD MAALAEA ROAD
HONOAPIILANI HWY
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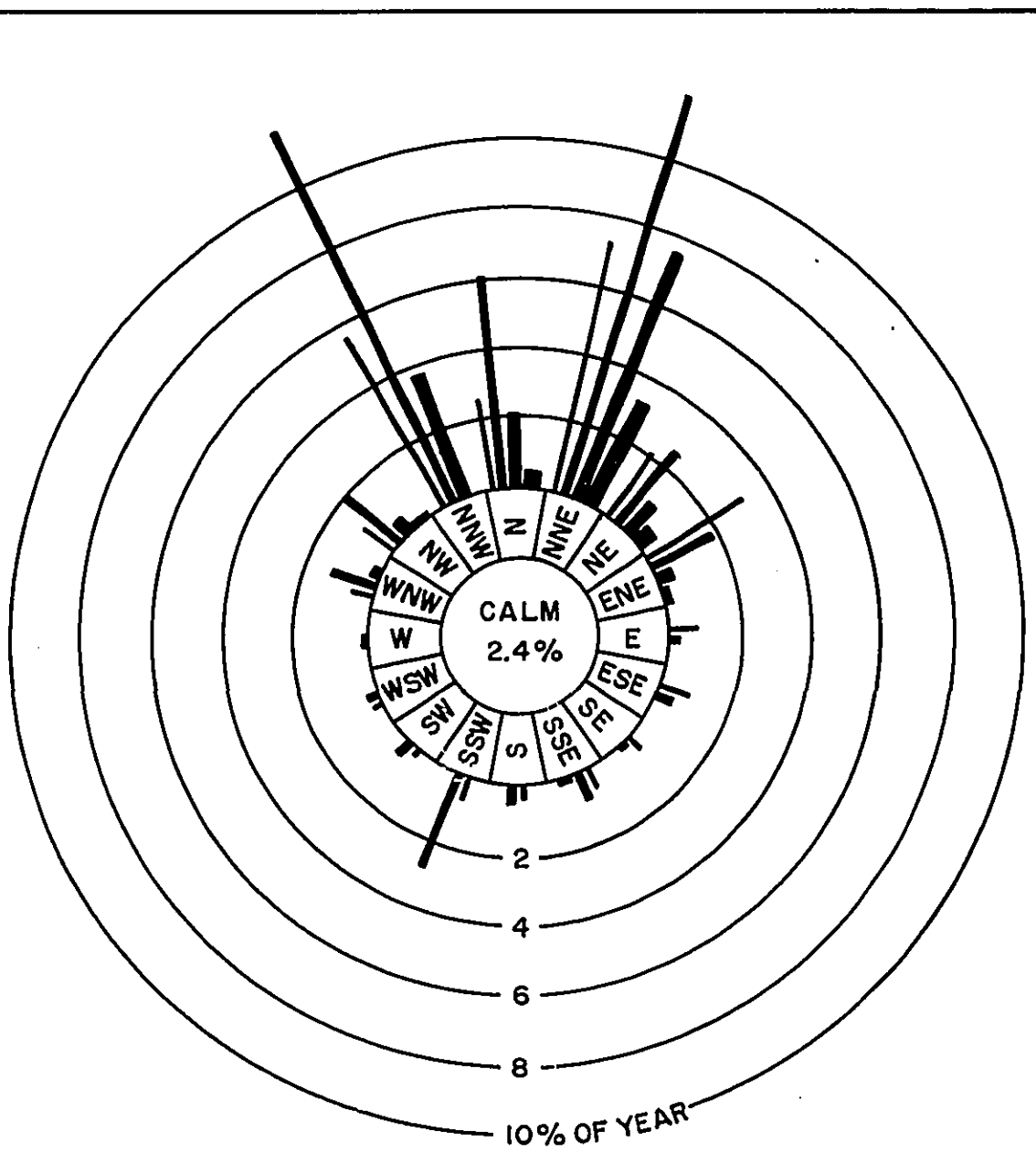


LEGEND:

- 3-7 MPH
- 8-18 MPH
- 19-24 MPH
- 25 MPH OR GREATER

DATA FROM U.S. WEATHER BUREAU
AT PUUNENE NAVAL AIR STATION
PERIOD OF RECORD - 2 YEARS

MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII

WIND DIAGRAM

U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE B-3

3.10 An infrequent source of large destructive waves is hurricanes. Damaging hurricanes passed through the Hawaiian chain in December 1957, August 1959, and most recently in July 1978. Theoretical calculations by Dr. C.L. Bretschneider indicate that a significant deepwater wave height of 27 feet can be expected for a typical 50-year hurricane having the following parameters: (a) central pressure reduction of 1 inch of mercury, (b) radius of maximum winds of 20 nautical miles, and (c) forward speed of 12 knots. This results in a maximum sustained wind speed of 62 knots and a corresponding maximum deepwater wave height of 46 feet.

3.11 Wave refraction analysis, described in the Design Analysis, Appendix B, was performed to aid in locating zones of high energy concentration in the vicinity of the harbor, and to determine the probable approach alignment of waves critical to project design.

3.12 TIDES. The tides in the Hawaiian islands are semi-diurnal with small but pronounced diurnal inequalities. Tidal data are from U.S. Department of Commerce, National Oceanic and Atmospheric Administration, and National Ocean Survey. The nearest tidal bench marks are at Olowalu, Maui and Makena, Maui, about 7 miles west and 11 miles southeast of Maalaea, respectively. Tidal data for Maalaea, based on data from Olowalu and Makenna, are as follows:

Tide Level	Feet
Highest Tide (estimated)	3.5
Mean Higher High Water	2.3
Mean High Water	1.8
Half Tide	1.0
Mean Low Water	0.2
Mean Lower Low Water	0.0
Lowest Tide (estimated)	-1.0

Elevation data in this report are referenced to Mean Lower Low Water (MLLW) unless otherwise stated.

3.13 CURRENTS. Currents near Maalaea Harbor are dominated by the southwest setting, tradewind-generated surface current. Current speed is estimated to be typically less than 1 knot under normal tradewind conditions and does not cause navigation problems. Significant wave-generated rip currents may exist when high waves are breaking, but this phenomenon has not been documented. Tidal currents in Maalaea Bay are weak and insignificant with regard to navigation considerations.

3.14 TSUNAMI. Maalaea Bay is subject to potential tsunami or seismic sea wave inundation as are most low-lying coastal areas in the Hawaiian islands. The nature of tsunami are not fully understood. An occurrence may be nearly imperceptible or may cause catastrophic destruction of coastal areas. Typically in the Maalaea Bay area a severe tsunami may cause abnormal rising and falling of the sea level, resulting in flooding of low-lying areas, and grounding of boats in the harbor. The 100-year tsunami inundation elevation at Maalaea is estimated to be about 13 feet above the mean lower low water datum. Since Maalaea Harbor lies within the 100-year tsunami inundation zone,

compliance with Presidential Executive Order 11988 is required. Compliance includes dissemination of information concerning the consequences of locating in the tsunami zone. Adverse impacts resulting from locating in the tsunami flood zone include the risks of destruction of property and loss of life. The proposed action will require development in the inundation zone such as harbor backup facilities. There is no alternative location for these facilities, however, utilizing construction practices which meet requirements of the National Flood Insurance Program will minimize tsunami damages. Adverse impacts resulting from increased use of the tsunami flood zone can be minimized by adequate tsunami warning. A State-wide tsunami warning system is presently in existence. Maalaea Harbor should be evacuated in the event of a tsunami warning. Boats should not re-enter the harbor until the tsunami warning has been cancelled. Additional Executive Order compliance requirements are discussed in Appendix H of this report.

3.15 NATURAL RESOURCES:

3.16 CLIMATE. The Maalaea Bay area has a mean annual rainfall of approximately 13.8 inches. Most of the rainfall occurs during "Kona" weather in the winter months between October and April. The mean annual temperature is 75°F. The daily temperature ranges between 60°F and 90°F, the warmest weather occurring between May and September.

3.17 GEOLOGY. Maalaea Bay is at the southern edge of an isthmus which was formed when lava flows from two prehistoric volcanic islands ran together. As the volcanic formation stabilized, coral reefs began to develop along the fringes of the isthmus. At present, much of the upper layer of the ancient lava flow has weathered and decomposed into soil. The process of reef formation and destruction has caused a long, narrow, white-sand beach to develop along the shoreline of Maalaea Bay. To the immediate west of the harbor, the heavily eroded West Maui volcanic dome abruptly enters the sea. The shoreline becomes rugged and steep. Only small pocket beaches are found at various locations. Many high, basalt rock cliffs dominate the coastline. The ocean floor in the vicinity of Maalaea Harbor is gently sloping seaward about 1 vertical to 50 horizontal. It is composed of coral materials ranging from live coral communities to decomposed coral rubble and sand. Much of the bottom adjacent to the harbor is lightly cemented into a thin surface crust. Thin patches of coral sand fill depressions in the surface crust. Directly east of the harbor a live coral reef community extends toward the east for several hundred yards.

3.18 FLORA AND FAUNA. Natural vegetation in the Maalaea Harbor area is characterized by kiawe and haole koa trees and dryland grasses and shrubs. However, most of the land on the central Maui plain is being cultivated for sugarcane. Dominant wildlife forms in the area are introduced species such as mongooses, rats, mice, doves and mynah birds. Feral pigs, dogs, and cats are also found in nearby areas. Several species of seabirds can be found along the coastal areas.

3.19 Marine life at Maalaea Bay includes most of the species common to coral reef ecosystems in Hawaii. Endangered Humpback whales winter in Hawaiian waters including Maalaea Bay. Maalaea Bay abounds with commercial tuna and other big game fishes common to Hawaiian waters. Additional information on natural resources is contained in Appendices C, D and F.

3.20 RECREATIONAL RESOURCES: Surfing waves are found near Maalaea Harbor. Two surfing areas in particular were identified by local surfers as being important and are shown on Figure B-2. Area No. 1 is the location of the world renowned Maalaea Pipeline. Although surfing waves at this site do not occur frequently, they have been acclaimed by professional surfers as some of the best waves in the world. Area No. 2, called "Off-the-Wall", is of lesser importance, but is a popular surfing site. The long, coral-sand beach bordering Maalaea Bay and adjacent to Maalaea Harbor is a prime sunbathing and beachcombing area and is a major tourist attraction in the State of Hawaii. Recreational snorkeling, scuba diving and spear-fishing is popular in the usually calm waters of Maalaea Bay. Additional information on recreational resources is contained in Appendices C, E and F.

3.21. HISTORIC SITES. There are no historic sites listed on or eligible for the current National Register of Historic Places. A recent reconnaissance study further confirmed the absence of significant historic or cultural sites in the project area. Appendix E in this report details the results of the historic and cultural reconnaissance.

3.22 EXISTING HARBOR FACILITIES. Maalaea Harbor was first developed by the Territory of Hawaii in 1952. The project was modified in 1955, 1959 and 1979 to its present configuration, shown in Figure B-2. The existing facility consists of a 90-foot-wide, 12-foot-deep entrance channel; a 1000-foot-long, 90-foot-wide breakwater and mole structure on the south side of the basin; an 870-foot-long breakwater on the east side of the basin; a 300-foot-long, 50-foot-wide paved wharf on the north side of the basin. Dredged basin area is 11.3 acres. Various problems, discussed later, limit the capacity of the harbor to 93 boats. Local interests have constructed a 100,000-pound capacity cold storage plant for use by commercial fishermen operating out of Maalaea Harbor. There is a haulout and repair facility at the west end of the harbor basin. The one lane haulout ramp also serves as a trailer-boat launching ramp. A U.S. Coast Guard cutter is stationed at Maalaea Harbor.

4. PROBLEMS AND NEEDS

4.1 Problems and needs related to Maalaea Harbor are numerous and are vigorously expressed by harbor users, potential harbor users, and persons and organizations concerned with recreational and other uses of the Maalaea Harbor area. Serious navigation problems include severe harbor surge, entrance channel navigation difficulties, and shortage of berths and adequate harbor facilities. Related problems and needs include other recreational uses of the harbor and nearby area, and related environmental problems.

4.2 Reduction of surge within the existing harbor basin is the primary concern of boat owners who presently occupy berths at Maalaea Harbor. During wave attack periods when wave heights exceed about 2 feet at the harbor entrance, significant surge is reported at various locations within the harbor basin. The surge results from the present configuration and alignment of the harbor entrance which allows direct wave attack through the channel opening. When wave heights exceed about 6 feet in the entrance channel, surge within the basin is severe. Local boaters relate many instances of damages to boats in recent years. One-inch mooring lines have reportedly been broken during periods of heavy surge. Boat owners are occasionally forced to remain with

their boats throughout the day and night. Some vessels, including the 95-foot-long U.S. Coast Guard cutter stationed at Maalaea, must leave the harbor when heavy surge occurs. Commercial fishermen and others have pointed out that the U.S. Coast Guard is forced to abandon the Maalaea station at times when emergency assistance is most likely to be needed. When this has happened the commercial fishermen have been left as the only means of emergency assistance to distressed vessels. Harbor users estimate that surge is a significant problem between 10 and 20 days out of each year. Surge problems also seriously limit the berthing capacity of the existing facility by effectively preventing safe berthing in some portions of the harbor.

4.3 Entrance channel navigation becomes hazardous when wave heights exceed about 6 feet in the channel. The deeper draft vessels which use the harbor may be in danger of hitting the channel bottom. In addition, vessels may broach and ground on the breakwater structures when attempting to enter the harbor under high wave conditions. On occasion surfers have been observed riding breaking waves through the harbor entrance, creating an additional hazard to navigation.

4.4 A shortage of berthing space for light-draft vessels in the Hawaiian islands has existed for many years. The shortage on Maui island is no exception. Many large expensive boats can be seen moored offshore at various locations around the island at any time of the year. In 1979 there were 280 boats on the waiting lists for the 2 State-owned, light-draft harbors in the southwest Maui area at Lahaina and Maalaea. Demand for berths at Maalaea in 1990 will probably exceed the physical limitations for harbor space at the Maalaea Harbor site.

4.5 Attendant facilities at the existing harbor are not adequate according to a survey made by the Corps of Engineers in 1979. Complaints from harbor users indicate an inadequate availability of fresh water, electricity, fuel, and equipment storage space. Complaints of other boat owners focus on the inadequate boat launching and retrieving capacity and the shortage of parking spaces for automobiles and trailers.

4.6 Conflicting recreational uses of the Maalaea Harbor area surfaced when the Corps of Engineers announced initiation of post-authorization studies for improvement of Maalaea Harbor. At the initial public meeting, held on 23 January 1979, surfing organizations and individual surfers loudly protested the entrance channel location for the authorized plan as shown in the project document. Investigations and public testimony confirm that the authorized location of the entrance channel would probably cause extensive alteration of a nearby surfing area (Surfing Area No. 1 on Figure B-2).

4.7 Environmental problems regarding compliance with recently enacted legislation are numerous but are not unique with respect to harbor improvement at Maalaea except for the possible conflict with the endangered Humpback whale, Megaptera novaeangliae. The relatively shallow offshore areas in the Hawaiian Islands, including the waters of Maalaea Bay, are an annual breeding, calving and nursing ground for this species. The species is protected by federal law. Certain aspects of harbor construction as well as increased boating activity resulting from harbor improvement could adversely impact the whales. Blasting during dredging operations would probably be the most damaging aspect of harbor construction with regard to the Humpback whale. Several whales are usually present in Maalaea Bay during the winter months between December and May. See Appendices C, D, F and J for further discussion and information regarding Humpback whales.

5. THE "WITHOUT" CONDITION PROFILE.

5.1 The future of Maalaea Harbor, without implementation of authorized improvements will mean little or no change from the existing condition, except that demand for berthing spaces is expected to increase beyond existing demand. Navigation problems would remain unchanged. Berthing capacity would remain at about 93 craft.

6. PLANNING CONSTRAINTS

6.1 The most significant planning constraint for Maalaea Harbor is that the site of the project is fixed. Because a harbor has already been constructed by the State at the existing site, alternate sites are not considered in this report. A related constraint, mandated by harbor users, is that existing breakwater structures should remain essentially intact, and that changes to the structures should be additive if possible. This constraint reflects concern over problems associated with the relocation of existing berths. An additional constraint is that harbor plans must allow construction of modifications to be accomplished without serious interruption of harbor navigation.

6.2 The location of nearby surfing sites places constraints on the location of additional harbor structures. Discussions between local boaters and surfers resulted in a consensus that additional harbor structures should not extend further east than the present eastern boundary of the harbor, if possible, in order to avoid impacts on surfing area No. 1, described previously.

7. PLANNING OBJECTIVES.

7.1 The objectives of the pre-authorization studies, as describe in the project document, were: (a) to analyze the remaining requirements for additional base harbors to satisfy most of the State's projected light-draft vessel needs to the year 2020, and (b) to study the need for harbors intended exclusively for refuge purpose. Maalaea Harbor was selected as an additional base harbor to satisfy boating demand for the south-central Maui area.

7.2 The updated planning objective is to contribute to navigation improvement for commercial and recreational purposes at Maalaea Harbor for the 1985 to 2035 period of analysis. Detailed assessment of problems and needs have resulted in specific goals which, if achieved, would satisfy the planning objective. These specific goals are:

a. to significantly reduce surge within the harbor basin;

b. to significantly reduce navigation hazards in the entrance channel; and

c. to provide opportunity for addition of berthing space and attendant harbor facilities.

SECTION C

FORMULATION OF ALTERNATE PLANS

1. PLAN FORMULATION CONCEPTS AND CRITERIA

1.1 The formulation and analysis of alternative solutions to achieve the planning objective are based on the Water Resources Council's Principles and Standards for Planning Water and Related Land Resources. The evaluation and assessment of economic, social, and environmental effects also follow the guidelines of Section 122 of the River and Harbor Act of 1970 (Public Law 91-611) and the National Environmental Policy Act of 1969 (Public Law 91-190).

1.2 The formulation of alternate plans of improvement is guided by the following technical, economic, and environmental criteria:

a. Technical Criteria:

(1) Harbor improvements should provide safe navigation and protection for the design vessel, whose length is 110 feet, beam is 24 feet, and draft is 7.5 feet, during all reasonably expected weather and sea conditions;

(2) The improvements should include a turning basin adequate for manuevering of the design vessel, and berthing areas suitable for commercial fishing boats and pleasure boats;

(3) The entrance channel should be of adequate depth and width to safely permit navigation by the design vessel concurrent with navigation by a typical 55-foot-long recreation craft;

(4) Protective structures should be designed to withstand the most severe combination of weather and sea conditions that are reasonably characteristic of the study area.

b. Economic Criteria:

(1) Net benefits which result from implementation of the recommended plan should be maximized;

(2) The benefits and costs should be expressed in comparable quantitative economic terms to the fullest extent possible. Annual costs should be based on a 50-year amortization period and should be evaluated at the authorized discount rate of 3-1/4 percent as well as at the prevailing discount rate of 7-1/8 percent. Annual costs should also include estimated annual maintenance costs.

c. Environmental Criteria:

(1) Long-term disturbances to the physical environment should be minimized;

(2) Short-term disturbances to the physical environment should be controlled to prevent long-term effects;

(3) Environmental protection guidelines should be followed to the maximum extent practicable;

(4) Impacts on surfing sites should be minimized;

(5) Impacts on the endangered Humpback whale should be minimized.

1.3 The following general concepts were also used to guide the formulation, assessment, and evaluation of alternatives:

a. Both adverse and beneficial impacts of the alternatives should be identified and measured and evaluated for each plan;

b. Alternatives which maximize net economic benefits (the National Economic Development Plan), and those which make positive contributions to preserving, maintaining, restoring, or enhancing cultural or natural resources (the Environmental Quality Plan) should be identified and designated;

c. The plans should be developed to minimize conflicts and maximize compatibility with existing conditions as described in Section B in this report, and to insure a complete and adequate project;

d. The desires of local interests should be given full consideration;

e. The alternatives should be evaluated with respect to their effectiveness in meeting the established planning objectives.

2. PLAN FORMULATION RATIONALE

2.1 Information received and developed during the problem identification stage of post-authorization planning confirmed the need for an investigation of possible alternative locations for the authorized entrance channel. In addition, local interests expressed a desire to minimize changes to existing structures, particularly with regard to relocation of any existing berths. As a result of these needs and desires, an array of alternatives was developed which attempted to meet the planning objective and other public desires while attempting to minimize changes to the existing structures.

2.2 Investigation of alternate sites was not performed because of the substantial investment already committed at the authorized site, and because of the expressed desire of harbor users to upgrade the existing harbor.

3. THE NONSTRUCTURAL ALTERNATIVE. Nonstructural alternatives were not investigated because of the failure of nonstructural plans to meet the planning objective. Nonstructural alternatives cannot reduce surge or navigation hazards in the entrance channel, nor can they provide for the addition of berthing spaces. No further consideration will be given to nonstructural alternatives in this report.

4. DESCRIPTION OF PRELIMINARY PLANNING

4.1 The focus of preliminary planning during advanced engineering and design of the authorized project was on determining an alternative location for the authorized entrance channel which would meet the planning objective, and would be feasible from an engineering standpoint while conforming as closely as practicable with the authorized plan.

4.2 Several conceptual plans with different entrance channel locations were developed early in the study. As many variations as could reasonably be presented were discussed with the public at the first workshop on 5 April 1979. Conceptual plans were then developed into an array of preliminary alternate plans and again presented to the public at a workshop on 13 June 1979, where the plans were further modified.

4.3 The present array of alternate plans, which resulted from detailed engineering analysis and prior public input, was presented to the public at a final workshop on 24 January 1980. The results of all the public input and the planning studies were considered with the desires of the local sponsor in the tentative selection of the recommended plan of improvement which was presented to the public at the final public meeting, held on 13 May 1980.

5. PLANS OF OTHERS.

5.1 Early in the study process, a plan of improvement was submitted to the Corps of Engineers by the Maalaea Boat and Fishing Club. The plan had been prepared by an informal group of Maalaea fishermen and surfers who worked together to arrive at a plan which was acceptable to both groups.

5.2 The Corps of Engineers modified the plan to conform to engineering standards and adopted the modified plan as Alternate Plan 2 discussed later in this report. Popularity of Plan 2 among workshop participants was nearly unanimous at the final public workshop where three alternate plans were presented prior to presentation in the draft report.

6. RESULTS OF PRELIMINARY PLANNING

6.1 Preliminary planning resulted in a set of four alternative plans, each of which could be implemented as a plan of improvement for Maalaea Harbor. One of the four plans which included an additional 5-acre basin and a more extensive breakwater and mole structure was discarded because of conflicts with surfing sites. The remaining three plans are fully evaluated in Section D of this report.

SECTION D

ASSESSMENT AND EVALUATION OF THE ALTERNATE PLANS

1. Based on the identified problems and needs, the planning objectives, and the formulation and evaluation concepts discussed in Section C, alternate plans for harbor improvement for Maalaea Harbor were developed and evaluated in order to determine the best plan of improvement. The alternate plans are discussed in the following paragraphs.

2. ALTERNATE PLAN 1:

2.1 DESCRIPTION. Alternate Plan 1, shown on Plate D-1, would provide berthing for about 310 boats when fully developed. This plan would include a 620-foot-long extension to the existing south breakwater; addition of a 400-foot-long revetted mole on the seaward side of the existing south breakwater; a 610-foot-long entrance channel, varying in width from 150 feet to 180 feet, and varying in depth from 15 feet to 12 feet; and a 1.7 acre, 12-foot-deep turning basin. About 80 feet of the existing east breakwater head would be removed. In addition, the plan would include a 50-foot-wide, 720-foot-long interior revetted mole and an 8-foot-deep berthing area adjacent to the existing east breakwater. The interior revetted mole and the berthing area would be the responsibility of the local sponsor. The total harbor area of approximately 27 acres would include 13.5 acres of water area available for berthing and access. About 55 trees would be planted on the revetted moles. Trees would be indigenous or exotic species common to the Hawaiian Islands and would be tolerant of saline soils. The U.S. Coast Guard would provide necessary modification to the navigation aids.

2.2 IMPACT ASSESSMENT. The new breakwater would effectively reduce surge within the harbor basin by preventing waves from directly entering the basin. Wave heights in berthing areas are expected to be less than 2 feet during all reasonably expected sea conditions.

2.3 The new entrance channel would provide for safe navigation by the design vessel and other vessels reasonably expected to use the harbor during all but the most severe conditions.

2.4 The number of boats berthed within the harbor basin would increase from 93 boats to about 310 boats, a 333 percent increase. A possible berthing layout is shown on Plate E-1 in Section E of this report. Boat traffic and fishing pressures in Maalaea Bay and nearby areas would be expected to increase accordingly. Increased boat traffic may impact the endangered Humpback whale. Vehicular traffic would also be expected to increase at the harbor.

2.5 The southwesterly-setting, wind-driven surface currents which frequently occur near the existing entrance channel would be diffused and deflected by the presence of the new breakwater.

2.6 Approximately 5.32 acres of coral reef and sand bottom and associated benthic organisms would be destroyed by placement of the breakwater and dredging of the entrance channel: about 2.76 acres would be covered and 2.56 acres would be dredged. About 20,000 cubic yards of coral reef and sand would be dredged from the new entrance channel. Within the existing harbor basin,

an additional 0.96 acres of coral reef bottom would be covered by structures and 1.90 acres would be dredged. About 24,000 cubic yards of reef material would be dredged within the existing harbor.

2.7 The new breakwater extension would provide a large and diverse habitat for many reef dwelling species. A marked increase in the populations of such species would be expected in the harbor vicinity after completion of construction. Increased net, spear, and pole fishing activity would be expected near the new structures.

2.8 Surfing areas of minor importance located adjacent to the existing entrance channel would be destroyed or modified by the placement of the new structures and dredging of the new entrance channel. A new surfing site may develop on the east edge of the new entrance channel. Surfing areas identified by local surfing interests as being of major importance would not be affected by the new structures and channel.

2.9 *Impacts of harbor construction on the endangered Humpback whale are* unknown. However, the National Marine Fisheries Service through the Endangered Species Act formal consultation process, has issued a Biological Opinion which evaluates the possible effects of the project on the whales. The Biological Opinion is presented in Appendix K.

2.10 Dredging during harbor construction would temporarily stimulate predator feeding as prey organisms are exposed or attracted to the dredging activities. Dredging noise would attract some species while it may disturb others such as the endangered humpback whale. Blasting during dredging, if required, would kill and injure some marine organisms, and would probably disturb the Humpback whale if that species were present.

2.11 Increased harbor usage would tend to degrade the water quality within the basin, although enforcement of existing water quality regulations should minimize this impact. Harbor circulation and flushing would not be expected to change from the existing condition.

2.12 Suspended fine coralline material resulting from dredging activities during construction would temporarily increase water turbidity. A turbid plume would be expected to be driven offshore in a southwesterly direction by the prevailing wind-driven surface currents. The stresses associated with the turbidity would be temporary and would not last appreciably longer than the dredging activity.

2.13 Dredged material would be utilized as fill material in the construction of the revetted moles previously described. About 11,000 cubic yards of excess dredged material would be disposed at a land fill site to be provided by the local sponsor.

2.14 Real property in the harbor area would probably increase in value after completion of the harbor project. Associated tax revenues would also increase.

2.15 Social well-being would be enhanced because of the safer berthing and navigation conditions resulting from harbor improvement.

2.16 Groundwater resources would not be affected by construction of the project. However, increased freshwater demand would probably result from increased harbor usage.

2.17 Construction of the east revetted mole as shown on Plate D-1 would require construction of a storm drain to conduct rainwater through the mole. Construction of the storm drain would not affect flooding chracteristics of the related drainage area.

2.18 MITIGATION REQUIREMENTS. In response to recommendations of the National Marine Fisheries Service, construction-related blasting would be prohibited during times when Humpback whales are expected to be present in Maalaea Bay. Possible adverse effects of increased boat traffic on the whales would be mitigated by implementation of federal and local laws and regulations which are already established and in effect. Mitigation of temporary turbidity impacts during construction would require the contractor to employ construction methods which do not cause excessive or unnecessary turbidity. Damages to coral reef areas and associated ecosystems would be limited by establishing a construction easement beyond which construction activity would be prohibited. Excess dredged material may have to be stabilized against wind erosion if it is disposed in such a manner as to be exposed to the high winds common near Maalaea.

3. ALTERNATE PLAN 2:

3.1 DESCRIPTION. Alternate Plan 2, shown on Plate D-2, is the same as Alternate Plan 1 except that the 400-foot-long revetted mole on the seaward face of the existing south breakwater is not included. Instead, a 200-foot-long wave absorber would be provided at the same location.

3.2 IMPACT ASSESSMENT. Impacts of Alternate Plan 2 would be the same as for Alternate Plan 1 with the following exceptions:

3.3 Approximately 0.84 fewer acres of coral reef and sand bottom would be covered by structures.

3.4 Land area available for attendant harbor facilities, in particular for automobile and boat trailer parking, would be reduced by 0.77 acres due to the absence of the 400-foot-long revetted mole.

3.5 Approximately 22,000 cubic yards of dredged material would be disposed of at a land site in addition to the 11,000 cubic yard requirement of Alternate Plan 1, for a total of 33,000 cubic yards. If this quantity of material were stockpiled 15 feet high it would cover about 1.4 acres of land. If the dredged material were to be disposed near Maalaea, wind erosion and resulting dust pollution would be a significant problem requiring mitigative action.

3.6 MITIGATION REQUIREMENTS. Mitigation of adverse impacts for Alternate Plan 2 would be the same as for Alternate Plan 1 except that the disposed dredged material would require more extensive stabilization against wind erosion if the disposal site is exposed to high winds.

4. ALTERNATE PLAN 3:

4.1 DESCRIPTION. Alternate Plan 3, as shown on Plate D-3, is the same as Alternate Plan 1 except that the 400-foot-long revetted mole on the seaward face of the existing south breakwater is not provided, and the breakwater is detached from the existing structure. The length of the breakwater is extended from 620 feet to 650 feet. The 650-foot-long detached breakwater would provide an additional 150-foot-wide, 4-foot-deep unmarked and undesignated channel which could be utilized by small boats with very shallow drafts such as small outboards.

4.2 IMPACT ASSESSMENT. Impacts of Alternate Plan 3 would be the same as those for Alternate Plan 2 with the following exceptions:

4.3 Some boat traffic congestion in the entrance channel may be relieved due to the use of the unmarked, undesignated channel to the west of the detached breakwater by very shallow draft boats.

4.4 Diffusion and dispersion of the prevailing southwest-setting, wind-driven currents would occur in a slightly different pattern.

4.5 Construction, maintenance, and annual inspection of the detached breakwater would be significantly more difficult and costly.

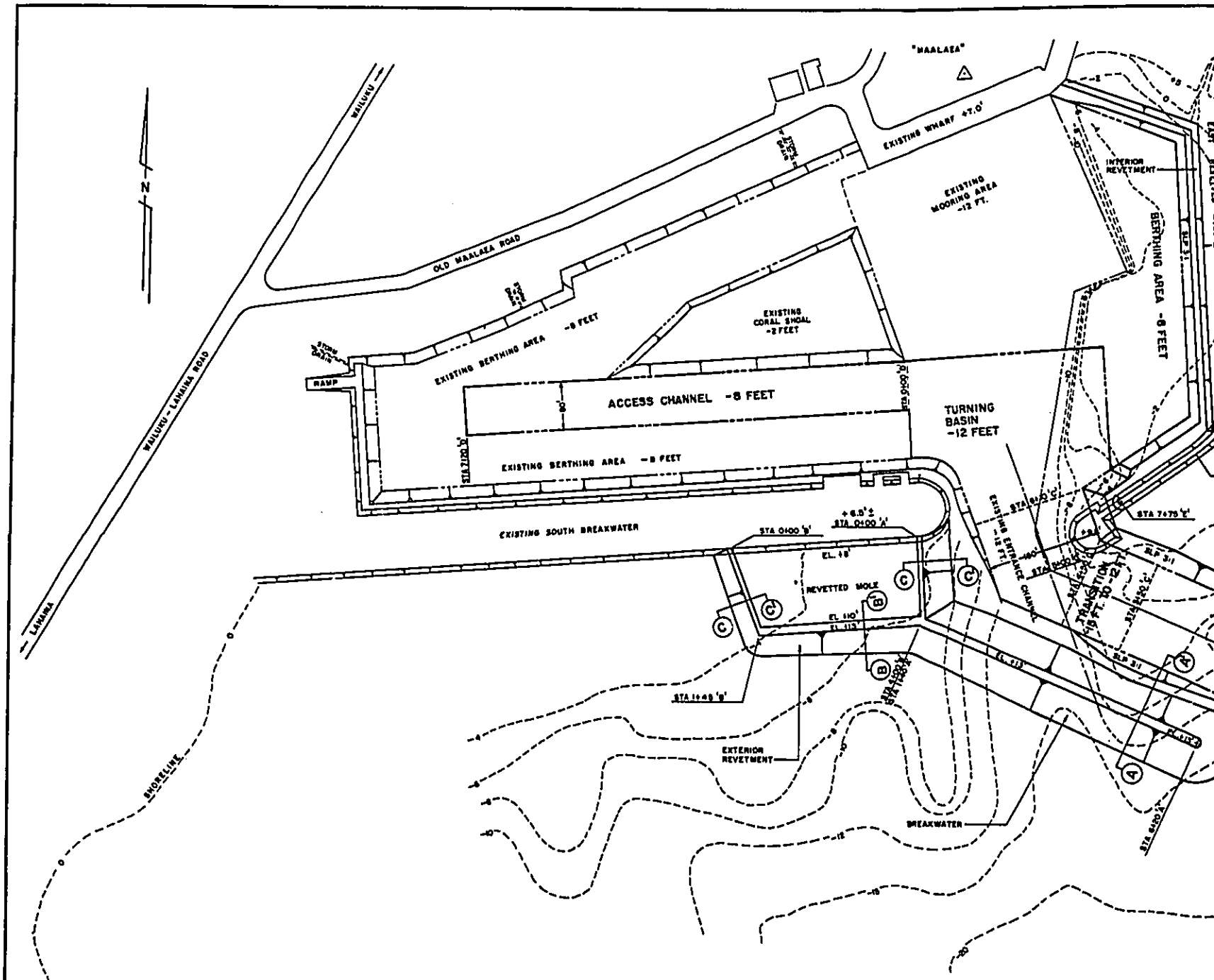
4.6 Additional harbor expansion into the area on the seaward side of the existing south breakwater would be possible without removal or relocation of any structures.

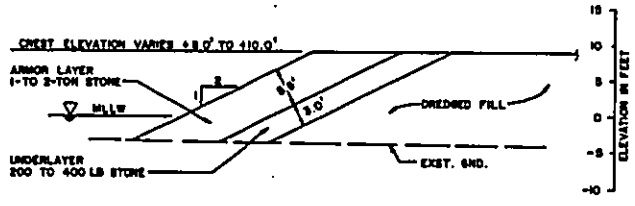
4.7 MITIGATION REQUIREMENTS. Mitigation requirements would be the same as for Alternate Plan 2.

5. ECONOMICS OF THE ALTERNATE PLANS

5.1 PROJECT FIRST COSTS. Estimated first costs for the alternate plans of improvement for Maalaea Harbor are shown in Table D-1. The cost estimates are based on January 1980 price levels in the project area. The estimates for dredging include the cost of land disposal of dredged material within 5 miles of the project site, drilling and blasting for 25% of the material although recent subsurface borings indicate that blasting may not be necessary, and allowance for 1-foot of overdepth dredging. Total costs include a contingency amount of 15 percent of the estimated construction costs and also include a factor to account for price inflation during construction. First costs also include the costs of post-authorization planning, engineering and design, supervision and administration, engineering during construction, project beautification, and U.S. Coast Guard costs for navigation aids.

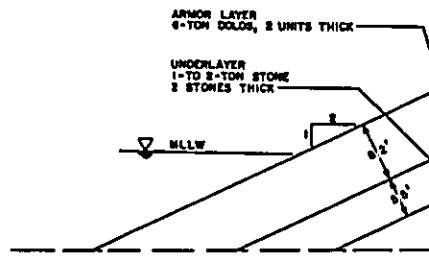
5.2 APPORTIONMENT OF FIRST COSTS. Federal legislative and administrative authority governing construction of navigation improvement projects requires that the first costs of the federal (Corps of Engineers) portion of the project be shared between federal and nonfederal interests in direct proportion to the general and local benefits as established in the authorizing document. For the project at Maalaea Harbor, the Corps of Engineers will be responsible for 64.5 percent of the cost of the federal work, excluding U.S. Coast Guard costs, and the local interests will be responsible for 35.5 percent of the cost. In addition, the local interests are responsible for 100

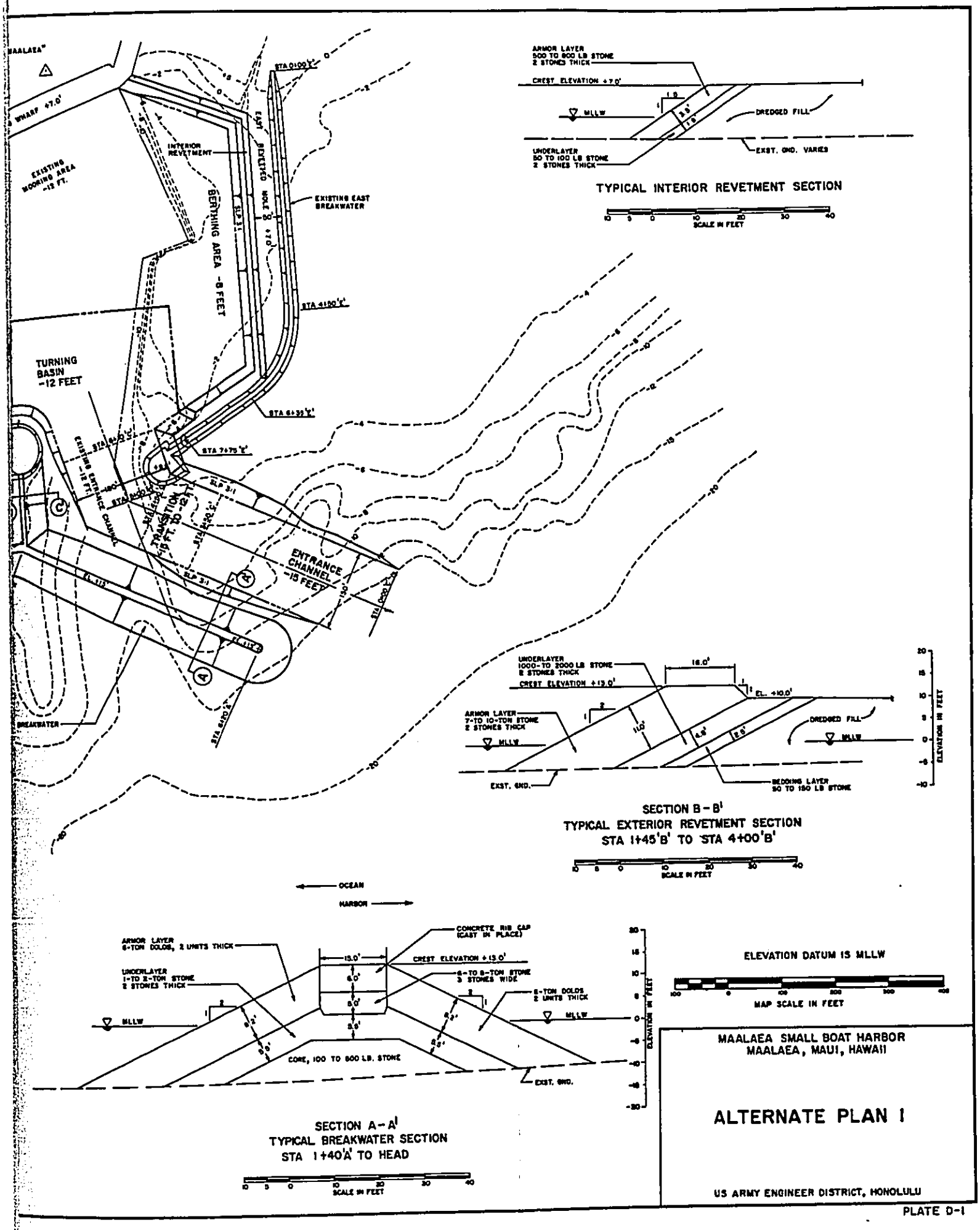




SECTION C-C'
TYPICAL EXTERIOR REVETMENT SECTION
STA 0+00'B' TO STA 1+45'B'
STA 0+00'A' TO STA 1+40'A'

SCALE IN FEET





TYPICAL INTERIOR REVETMENT SECTION

ELEVATION DATUM IS MLLW

SECTION B - B'
TYPICAL EXTERIOR REVETMENT SECTION
STA 1+45'B' TO STA 4+00'B'

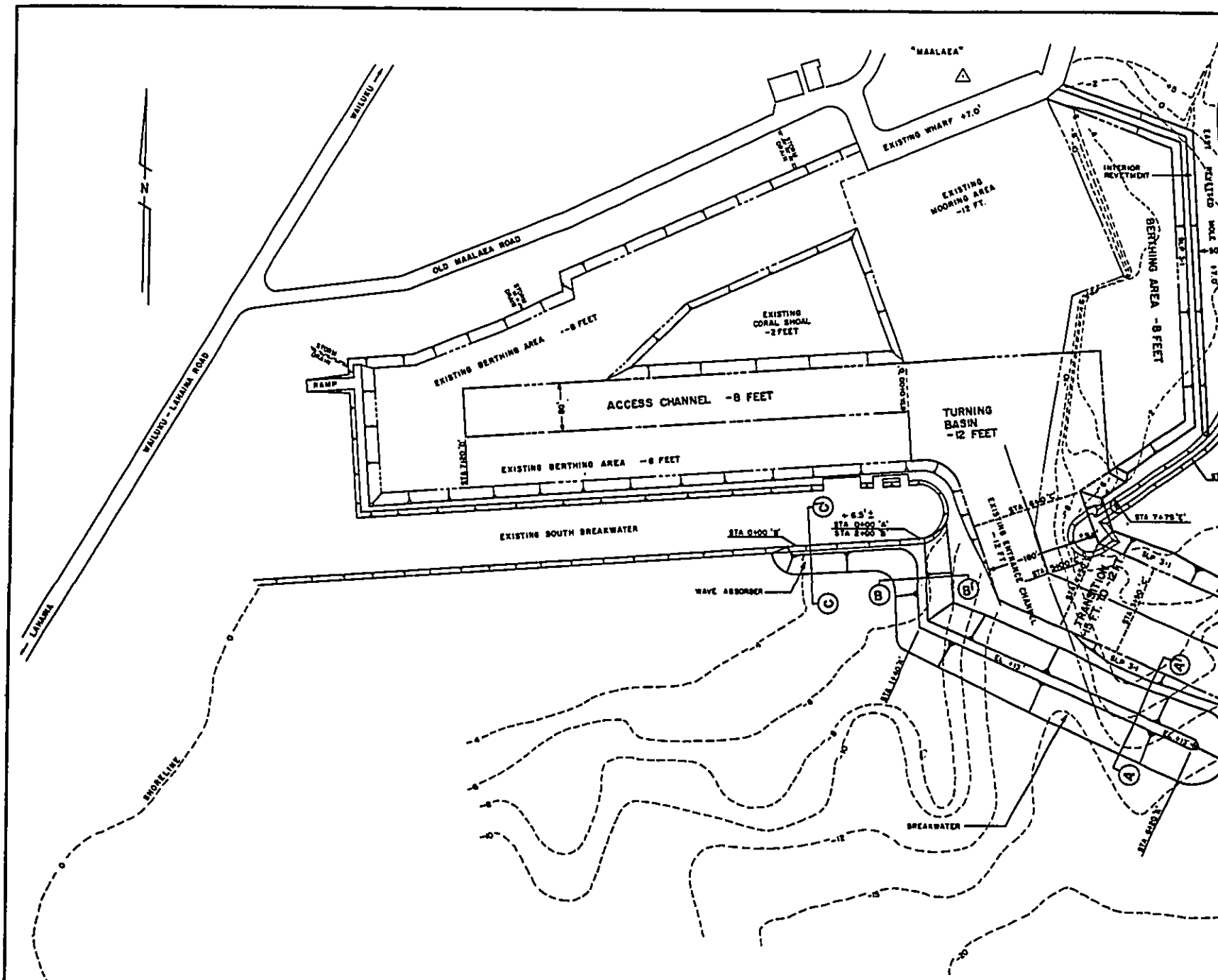
SECTION A - A'
TYPICAL BREAKWATER SECTION
STA 1+40'A' TO HEAD

MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII

ALTERNATE PLAN I

US ARMY ENGINEER DISTRICT, HONOLULU

PLATE D-1



SECTION C-C'
TYPICAL WAVE ABSORBER SECTION
STA 0+00'B' TO STA 2+00'B'

10 5 0 10 20 30 40
SCALE IN FEET

TYP
ST

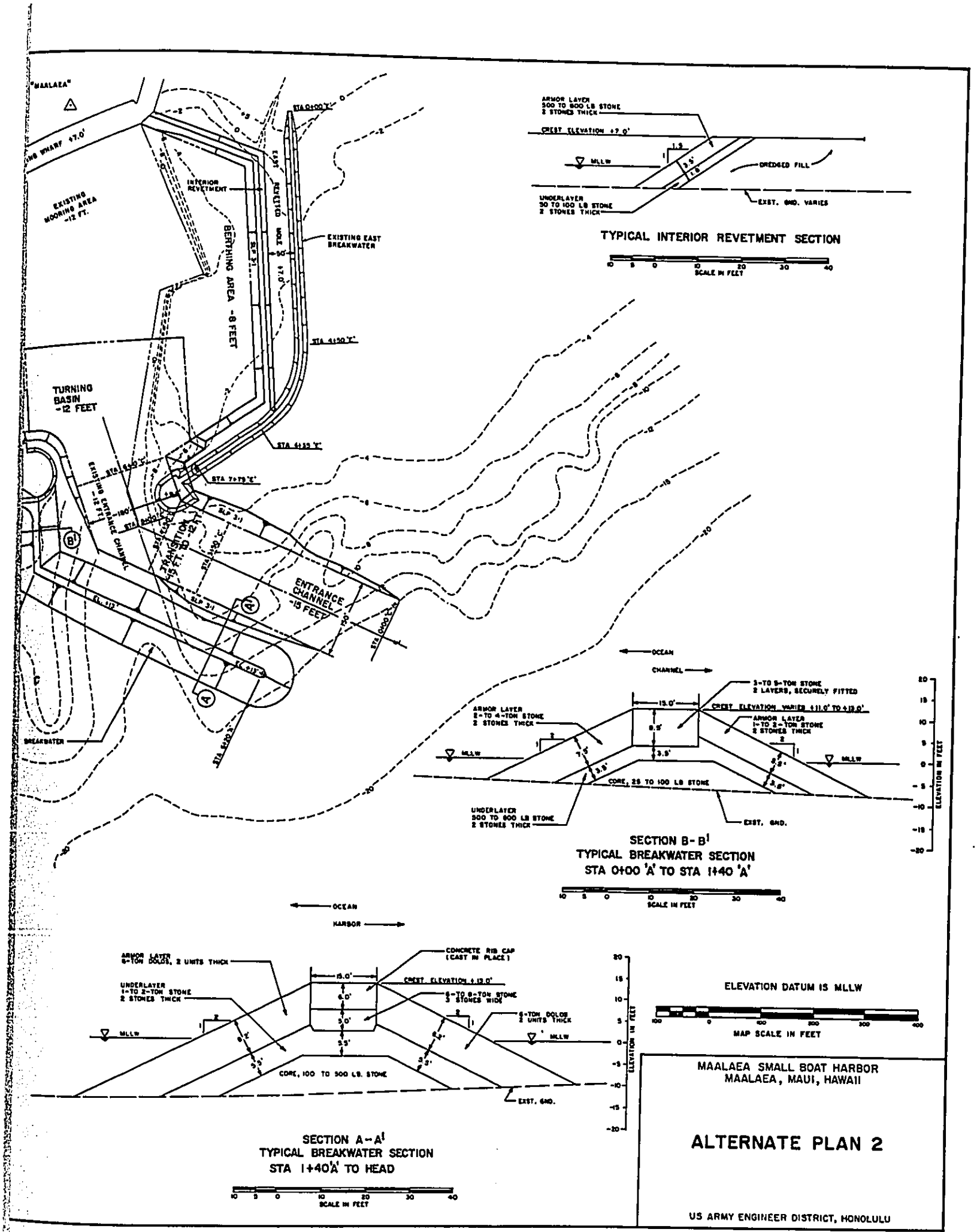
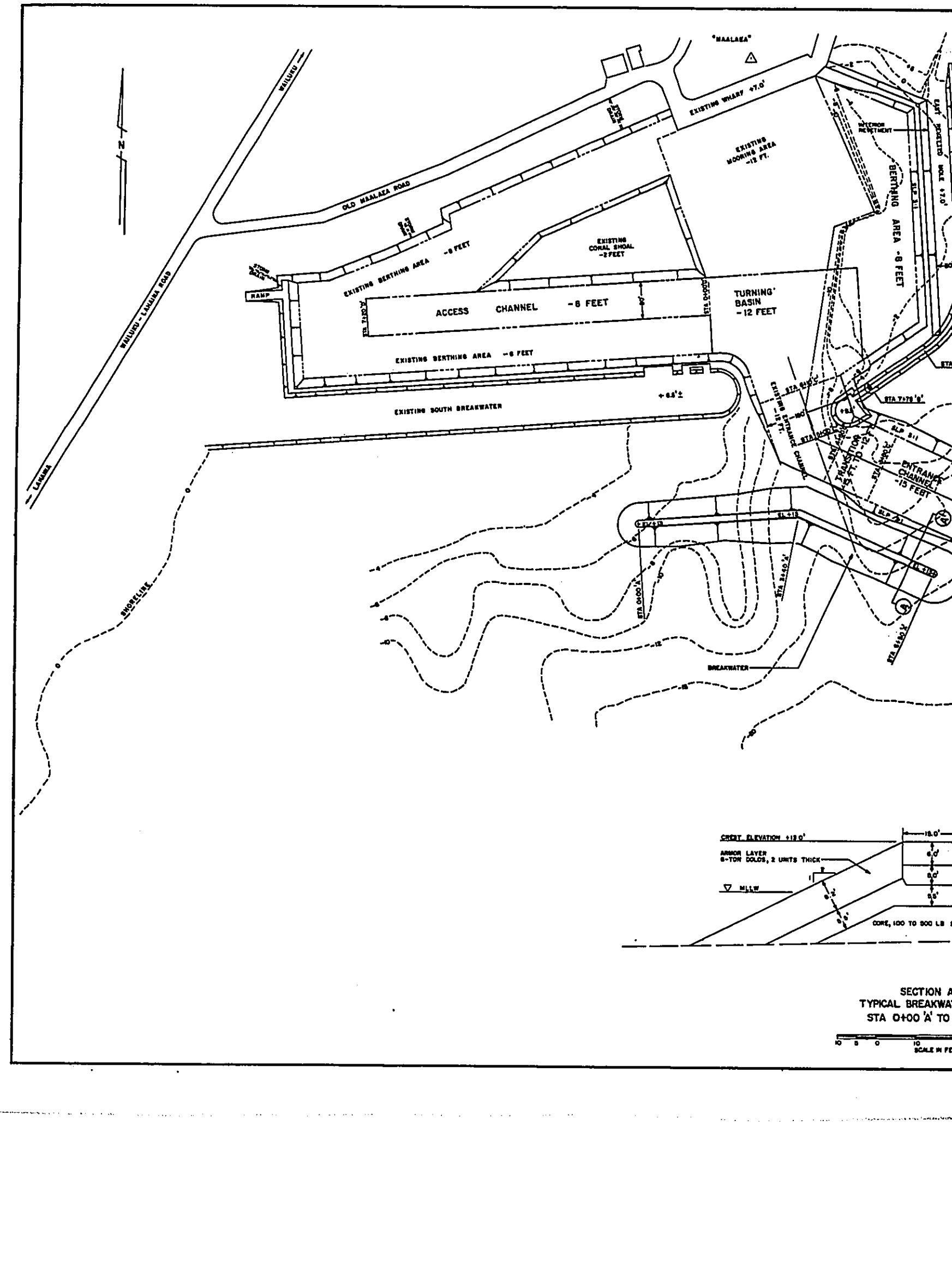
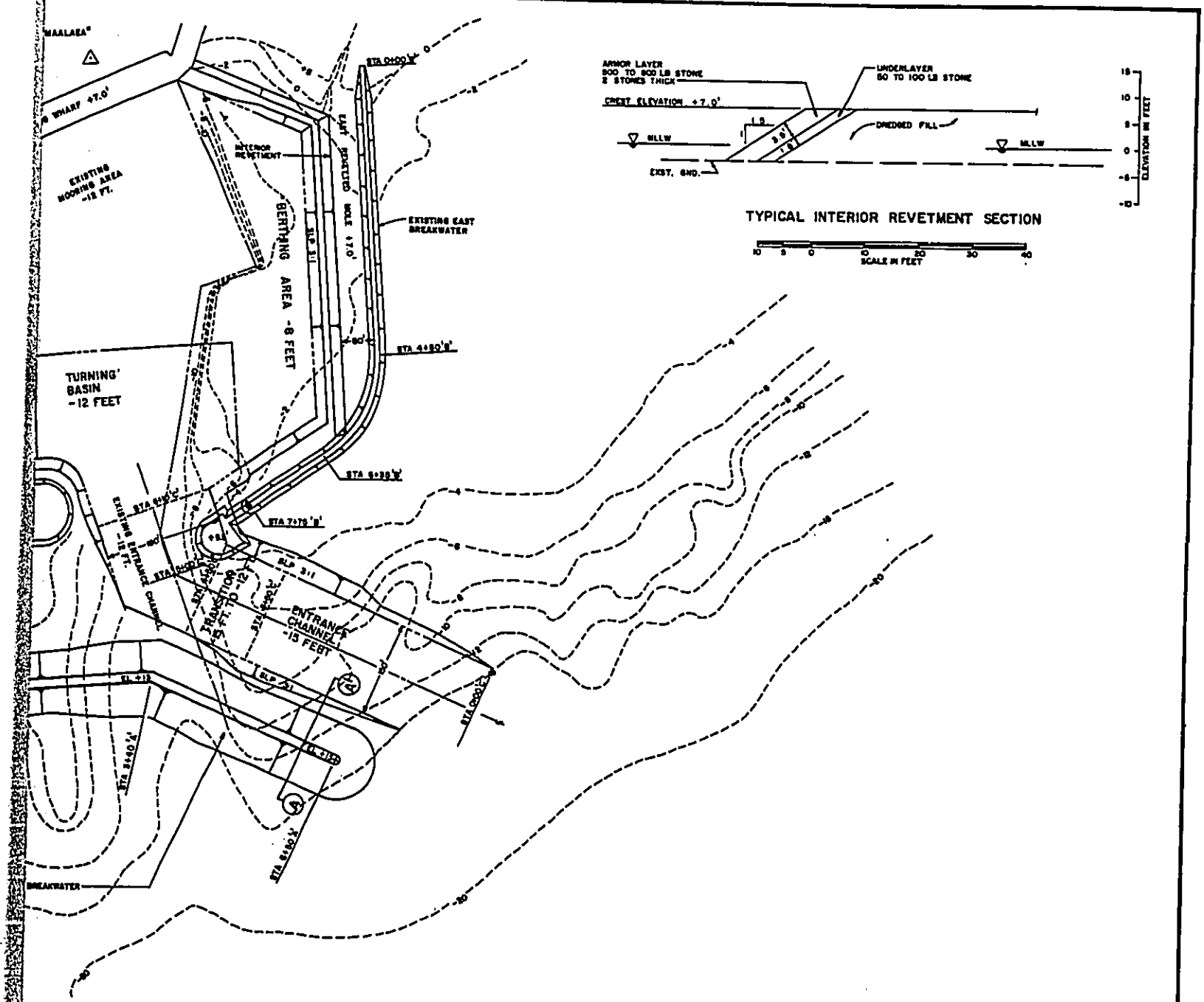

"MAALAEA"
INB WHARF 47.0'
EXISTING MOORING AREA -12 FT.
INTERIOR REVETMENT
EXISTING REVETED SLOPE
EXISTING EAST BREAKWATER
BERTHING AREA -8 FEET
TURNING BASIN -12 FEET
EXISTING ENTRANCE CHANNEL -12 FT.
TRANSITION 12 FT. TO -15 FT.
ENTRANCE CHANNEL -15 FEET
BREAKWATER
STA 0+00 'A'
STA 4+50 'A'
STA 6+35 'A'
STA 7+79 'C'
STA 8+00 'A'
STA 9+39 'C'
STA 0+00 'C'
EL -12.0'
SLP 3:1
ARMOR LAYER
500 TO 900 LB STONE
2 STONES THICK
CREST ELEVATION +7.0'
MLLW
DREDGED FILL
UNDERLAYER
50 TO 100 LB STONE
2 STONES THICK
EXIST. GND. VARIES
TYPICAL INTERIOR REVETMENT SECTION
SCALE IN FEET
OCEAN
CHANNEL
3-TO 9-TON STONE
2 LAYERS, SECURELY FITTED
CREST ELEVATION VARIES +11.0' TO +13.0'
ARMOR LAYER
2-TO 4-TON STONE
2 STONES THICK
ARMOR LAYER
1-TO 2-TON STONE
2 STONES THICK
CORE, 25 TO 100 LB STONE
UNDERLAYER
500 TO 900 LB STONE
2 STONES THICK
EXIST. GND.
ELEVATION IN FEET
SECTION B-B'
TYPICAL BREAKWATER SECTION
STA 0+00 'A' TO STA 1+40 'A'
SCALE IN FEET
OCEAN
HARBOR
ARMOR LAYER
6-TON DOLOS, 2 UNITS THICK
UNDERLAYER
1-TO 2-TON STONE
2 STONES THICK
CONCRETE RIB CAP
(CAST IN PLACE)
CREST ELEVATION +13.0'
6-TO 8-TON STONE
3 STONES WIDE
6-TON DOLOS
2 UNITS THICK
CORE, 100 TO 500 LB. STONE
EXIST. GND.
ELEVATION IN FEET
SECTION A-A'
TYPICAL BREAKWATER SECTION
STA 1+40 'A' TO HEAD
SCALE IN FEET
ELEVATION DATUM IS MLLW
MAP SCALE IN FEET
MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII
ALTERNATE PLAN 2
US ARMY ENGINEER DISTRICT, HONOLULU

PLATE D-2


"MAALAEA"
EXISTING WHARF +7.0'
OLD MAALAEA ROAD
WAILUKU - LAHAINA ROAD
WAILUKU
LAHAINA
N
EXISTING MOORING AREA -12 FT.
EXISTING CORAL SHOAL -2 FEET
EXISTING BERTHING AREA -8 FEET
RAMP
ACCESS CHANNEL -8 FEET
TURNING BASIN -12 FEET
BERTHING AREA -8 FEET
EXISTING BERTHING AREA -8 FEET
EXISTING SOUTH BREAKWATER
+6.8'±
EXISTING ENTRANCE CHANNEL -12 FT.
TRANSITION -8 FT. TO -12 FT.
ENTRANCE CHANNEL -12 FEET
EAST ROOSTER MOLE +7.0'
STA 0+00 'A'
STA 2+40 'A'
STA 6+80 'A'
STA 7+79 'A'
BREAKWATER
SHORELINE
CREST ELEVATION +12.0'
ARMOR LAYER 6-TON DOLOS, 2 UNITS THICK
MLLW
CORE, 100 TO 500 LB
15.0'
6.0'
5.0'
5.5'
SECTION A
TYPICAL BREAKWA
STA 0+00 'A' TO
SCALE IN FE



MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII

ALTERNATE PLAN 3

US ARMY ENGINEER DISTRICT, HONOLULU

PLATE D-3

percent of the nonfederal work cost, and for the additional cost incurred by the Government required for the construction of the revetted mole adjacent to the existing south breakwater in Plan 1. The apportioned project costs, U.S. Coast Guard costs, and nonfederal costs are shown in Table D-2.

5.3 AVERAGE ANNUAL COSTS. Estimates of the average annual project costs include amortization of project first costs over a 50-year economic life at an interest rate of 7-1/8 percent, and estimated average annual maintenance costs. Annual maintenance costs include maintenance dredging and breakwater repair. Estimated federal and nonfederal dredging requirements are 8,000 cubic yards and 1,000 cubic yards, respectively, expected to be required every 10 years. Nonfederal dredging is in addition to existing dredging requirements. The average annual cost of breakwater repair is based on 1 percent of the armor layer cost for both Plan 1 and Plan 2. Since Plan 3 includes a detached breakwater, 1.5 percent was used for that plan. Average annual costs are shown in Table D-3.

TABLE D-1. ESTIMATED PROJECT FIRST COSTS

	Plan 1	Plan 2	Plan 3
A. Federal Work			
Dredging	$534,000	$534,000	$534,000
Protective Structures	3,029,000	2,911,000	3,415,000
Contingency (±15%)	534,000	520,000	592,000
Subtotal	$4,097,000	$3,965,000	$4,541,000
Engineering & Design	210,000	210,000	210,000
Supervision & Administration	278,000	270,000	304,000
Project Beautification	55,000	55,000	55,000
Corps of Engineers Cost	$4,640,000	$4,500,000	$5,110,000
USCG Navigation Aids	20,000	20,000	20,000
Total Federal Work Cost	$4,660,000	$4,520,000	$5,130,000
B. Non-Federal Work			
Dredging	$145,000	$145,000	$145,000
Protective Revetment	83,000	83,000	83,000
Contingency (±15%)	34,000	34,000	34,000
Subtotal	$262,000	$262,000	$262,000
Indirect Costs	28,000	28,000	28,000
Total Non-Federal Work Costs	$290,000	$290,000	$290,000
C. Total First Costs	$4,950,000	$4,810,000	$5,420,000

TABLE D-2. APPORTIONED FIRST COSTS

	PLAN 1	PLAN 2	Plan 3
A. Federal Portion			
64.5% of Corps of Engineers Cost	$2,995,000	$2,900,000	$3,300,000
Additional Nonfederal Cash Contribution1/	(145,000)	0	0
U.S. Coast Guard Costs	20,000	20,000	20,000
Total Federal Portion	$2,870,000	$2,920,000	$3,320,000
B. Non-Federal Portion			
35.5% of Corps of Engineers Costs	$1,645,000	$1,600,000	$1,810,000
Additional Nonfederal Cash Contribution1/	145,000	0	0
Non-Federal Work Costs	290,000	290,000	290,000
Total Non-Federal Portion	$2,080,000	$1,890,000	$2,100,000

1/ Additional nonfederal cash contribution includes $140,000 for costs incurred by the Government to construct the exterior revetted mole which will benefit the local sponsor, and $5,000 for a land enhancement cash contribution.

TABLE D-3. ESTIMATED AVERAGE ANNUAL COSTS1/

	PLAN 1	PLAN 2	PLAN 3
Interest & Amortization	$343,000	$332,000	$378,000
Maintenance	37,000	36,000	52,000
Average Annual Costs	$380,000	$368,000	$430,000

1/ Average annual costs for federal work only are used in computation of the benefit-cost ratio. Nonfederal costs are excluded. Interest and amortization are based on a 7-1/8 percent interest rate and are calculated on the amount of $4,660,000 which is the total Federal work cost.

5.4 AVERAGE ANNUAL BENEFITS. A detailed discussion of average annual benefits is presented in Appendix A. A summary of the results of the benefit analysis is shown in Table D-4.

TABLE D-4. ESTIMATED AVERAGE ANNUAL BENEFITS

Benefit Category	Plan 1	Plan 2	Plan 3
Recreation Navigation	$255,000	$255,000	$255,000
Charter Operations	128,000	128,000	128,000
Commercial Fishing	328,000	328,000	328,000
Damage Reduction	12,000	12,000	12,000
EDA Benefits	11,000	11,000	11,000
Land Enhancement	13,000	0	0
Total Average Annual Benefits	$744,000	$731,000	$731,000

5.5 BENEFIT TO COST RATIO. Based on the estimated average annual federal costs and benefits, the benefit-cost ratios and net annual benefits for each of the alternate plans are as follows:

	B/C Ratio	Net Annual Benefits
Plan 1	2.0	$364,000
Plan 2	2.0	$363,000
Plan 3	1.7	$301,000

6. EVALUATION OF ALTERNATE PLANS

6.1 The impacts of the alternate plans have been identified and assessed. A summary of the evaluation of each plan is presented in Table D-5, Summary Comparison of Alternate Plans and System of Accounts. The table displays the significant contributions, beneficial and adverse effects, and the extent to which various planning objectives and evaluation criteria are met by each plan.

6.2 All of the alternate plans meet the planning objective, however, Plan 1 provides for additional harbor backup space due to the added revetted mole area, and Plan 3 allows for relatively easy harbor expansion on the south side of the existing south breakwater. Other impacts of the alternate plans are similar except that Plan 2 and Plan 3 require that a larger area of land be utilized for disposal of dredged material than would be required for Plan 1.

6.3 THE NATIONAL ECONOMIC DEVELOPMENT (NED) PLAN. The economic benefits derived from all three alternate plans of improvement exceed the costs of those plans. However, Plan 1 maximizes economic development because of its maximization of net economic benefits. Plan 1 is therefore designated as the NED plan.

6.4 THE ENVIRONMENTAL QUALITY (EQ) PLAN. All of the alternate plans result in a net positive contribution to the quality of the marine environment, due to the large artificial reef habitat which is provided by the improved breakwater structure. However, all of the plans result in excess dredged material which must be disposed at a land site, and all of the plans produce temporary and long-term environmental disturbances which are impossible to quantify on comparable terms with positive contributions. It is not clear therefore whether or not any of the plans has a net positive contribution to the total environment, nor is it clear if there is a least environmentally damaging plan. Therefore no plan has been designated as the EQ plan.

7. PUBLIC VIEWS

7.1 VIEWS OF FEDERAL AGENCIES. Comments on the proposed navigation improvements were received from the Environmental Protection Agency; the Department of the Interior; the U.S. Coast Guard, 14th District; and the Department of Commerce, National Marine Fisheries Service via the issuance of a Biological Opinion in response to formal consultation as provided for in Section 7 of the Endangered Species Act of 1973, as amended. The majority of the comments concerned the effects of the project on the endangered Humpback whale. Other comments related to general impacts of the proposed expanded facilities on the physical and social environment. The Environmental Protection Agency has stated a lack of objections to the project and has rated the Environmental Impact Statement as adequate. Letters of comment with appropriate responses are included in Appendix J.

7.2 VIEWS OF NON-FEDERAL AGENCIES. Comments were also received from State of Hawaii Departments of Planning and Economic Development, Land and Natural Resources, Office of Environmental Quality Control and the University of Hawaii Environmental Center. Comments were generally related to the effects of the project on the Humpback whales and expressed concern over possible changes related to the increased berthing capacity of the improved harbor. Comments and responses are included in Appendix J.

7.3 VIEWS OF THE GENERAL PUBLIC AND PRIVATE ORGANIZATIONS. Strong public interest in the study and in the proposed harbor improvement has been demonstrated throughout the study period. Public interest was immediately apparent when the initial public meeting was held 23 January 1979 with over 200 persons in attendance. Three design workshops, described in Section C of this report, were well attended with 40-50 persons at each meeting. About 50 persons attended the final public meeting held on 13 May 1980. The overall public response has been enthusiastic and favorable toward the project.

7.4 Several predominant public views have been expressed throughout the study, and have significantly influenced project planning. The strongest public concern, clearly stated throughout the study, is that harbor improvements be made as quickly as possible to reduce wave action and resultant surge within the harbor basin. In addition, strong concern was expressed for a solution to navigational problems being experienced in the entrance channel during high seas. Strong concern has also been expressed throughout the study by surfers who fear the loss of a prime surfing site located several hundred feet east of the existing harbor entrance.

Table D-5. Summary Comparison of the Alternate Plans and System of Accounts

	No Improvements "Without" Condition	Plan 1	Plan 2	Plan 3
A. Plan Description	Existing 300' long, 90' wide, 12' deep entrance channel; 11.3 acre basin: 11.3 acre basin: protected by a 1000' long south breakwater and a 870' long east breakwater.	610' long, 150' to 180' wide, 15' to 12' deep entrance channel; a 15.2 acre basin; a 620' long extension to the south breakwater; a 400' long exterior mole; a 700' long interior mole.	Same as Plan 1 except a 200' long wave absorber replaces the 400' long exterior mole.	Same as Plan 1 except 650' long detached breakwater replaces the 620' long extension and the 400' long exterior revetment.
B. Significant Impacts				
1. Economic				
Local Govt Finance*	No impact on property values or tax revenues.	Would increase property values and tax revenues around harbor.	Same as Plan 1.	Same as Plan 1.
Land Use	No change.	No change.	No change.	No change.
Public Facilities and Services	Continued unsafe berthing and channel navigation. Insufficient berth capacity.	Significantly improved berthing and channel navigation safety. Enlarged berthing capacity.	Same as Plan 1.	Same as Plan 1.
Regional Growth*	Poor harbor facilities hamper regional growth.	Would contribute toward increased regional growth.	Same as Plan 1.	Same as Plan 1.
Employment*	No change.	Would contribute to increased employment.	Same as Plan 1.	Same as Plan 1.
Business & Industrial	No change.	Would be enhanced by improved harbor.		

* Items specifically required by Section 221, Public Law 91-611.

Table D-5. Summary Comparison of the Alternate Plans and System of Accounts (Cont)

	No Improvements "Without" Condition	Plan 1	Plan 2	Plan 3
2. ENVIRONMENTAL				
General:				
Marine Environment	No change	Would modify about 8.3 acres of reef area: 4.5 acres dredged to -15,or -12, or -8 ft. 3.8 acres covered by harbor structures.	Same as Plan 1 except reef area covered is 0.8 acres less.	Same as Plan 2.
Terrestrial	No change	About 11,000 cubic yards of dredged material would be disposed at a land site.	About 33,000 cubic yards of dredged material would be disposed at a land site.	Same as Plan 2.
Fish & Wildlife	No Change.	Loss of corals and other sessile benthic organisms. Temporary displacement of motile organisms during construction. Increase in numbers and species of marine organisms after project completion due to new artificial reef habitat.	Same as Plan 1.	Same as Plan 1.
Water Quality*	No change.	Temporary increase in turbidity during construction. Permanent increase in harbor basin turbidity due to increased usage.	Same as Plan 1.	Same as Plan 1.
Circulation & Flushing	No Change	No change.	Same as Plan 1.	Same as Plan 1.

* Items specifically required by Section 122, Public Law 91-611.

Table D-5. Summary Comparison of the Alternate Plans and System of Accounts (Cont)

	No Improvements "Without" Condition	Plan 1	Plan 2	Plan 3
Air Quality*	No change.	Temporary increase in dust and emissions during construction. Permanent increase in harbor related emissions after project completion. Disposed dredged coral could cause dust pollution if improperly maintained.	Same as Plan 1.	Same as Plan 1.
Natural Resources*	No change.	Stone and materials used in harbor construction will be irreversibly committed.	Same as Plan 1.	Same as Plan 1.
Man-Made Resources*	No Change.	Improved harbor facilities.	Same as Plan 1.	Same as Plan 1.
Environmental Quality Enhanced:				
Amount of Reef Habitat Increased	None	About 3 acres of artificial reef will be created by breakwater construction. Habitat will be superior to natural reef due to extensive intersticial space.	Same as Plan 1.	Same as Plan 1.
Environmental Quality Destroyed:				
Amount of Reef and Sand Bottom Habitat Destroyed	None	About 3.5 acres of natural coral reef and sand bottom will be replaced by sand- and silt-covered dredged bottom.	Same as Plan 1.	Same as Plan 1.

* Items specifically required by Section 122, Public law 91-611.

Table D-5. Summary Comparison of the Alternate Plans and System of Accounts (Cont)

	No Improvements "Without" Condition	Plan 1	Plan 2	Plan 3
3. SOCIAL				
Noise*	No change.	Temporary increase due to construction and long-term increase due to additional harbor activity.	Same as Plan 1.	Same as Plan 1.
Population*	No impact.	Would enhance population growth in the harbor vicinity. No displacement of people.	Same as Plan 1.	Same as Plan 1.
Aesthetic Values*	No change	Would add to the visual impact of the existing harbor.	Same as Plan 1.	Same as Plan 1.
Historic, Cultural & Archeologic Resources.	No change.	No change.	Same as Plan 1.	Same as Plan 1.
Transportation	Continued unreliable & unsafe sea transportation.	Would provide more reliable and safer sea transportation.	Same as Plan 1.	Same as Plan 1.
Recreation Opportunities	No change.	Would enhance recreational boating opportunities. New mole would provide easier access to surfing sites.	Same as Plan 1.	Same as Plan 1.
Community Growth & Well-Being	Continued danger and emotional stress during high wave conditions.	Would enhance community growth and development. Would enhance community well-being due to increased opportunities and safety.	Same as Plan 1.	Same as Plan 1.

* Items specifically required by Section 122, Public Law 91-611.

Table D-5. Summary Comparison of the Alternate Plans and System of Accounts (Cont)

	No Improvements "Without" Condition	Plan 1	Plan 2	Plan 3
C. PLAN EVALUATION				
1. Contributions to Planning Objective.				
Reduce Surge in Harbor	No change.	Significantly reduces wave energy which enters harbor.	Same as Plan 1	Same as Plan 1.
Reduce Navigation Hazard.	No change.	Significantly reduces navigation hazard in the entrance channel during high waves.	Same as Plan 1.	Same as Plan 1.
Provide for Additional Berthing.	No change.	Provides additional berthing area. Allows development of presently unusable berthing areas.	Same as Plan 1.	Same as Plan 1.
2. Response to Acceptability Criteria.				
Engineereering Effectiveness	Poor	Good	Same as Plan 1.	Same as Plan 1.
Economically Justified	Not applicable.	Yes	Yes	Yes
Environmentally Acceptable	Yes	Yes	Yes	Yes
Socially Acceptable.	No	Most Acceptable	Acceptable	Least Acceptable

Table D-5. Summary Comparison of the Alternate Plans and System of Accounts (Cont)

	No Improvements "Without" Condition	Plan 1	Plan 2	Plan 3
3. Response to Formulation Criteria				
Technical:				
Safe Navigation Conditions	Unsafe when waves exceed about 6'.	Would be safe during all but severe storms, hurricanes or tsunami conditions.	Same as Plan 1.	Same as Plan 1.
Structural	Existing structures are stable.	Structures designed for maximum breaking wave conditions.	Same as Plan 1	Same as Plan 1.
Design Vessel	Fair weather only.	Design vessel is accommodated under severe storm conditions. Not accommodated during tsunami conditions. Turning basin and berthing areas are adequate.	Same as Plan 1.	Same as Plan 1.
Economics:				
Economically Feasible	Not applicable.	Yes	Yes	Yes
Benefits Greater Than Costs	Not applicable.	Yes	Yes	Yes
Maximizes Net Benefits	Not applicable	Yes	No	No
Environmental:				
Minimizes Reef Modification	No change	No	Yes	No
Minimizes Long-Term and Short-Term Effects.	No change	Yes	Yes	Yes

Table D-5. Summary Comparison of the Alternate Plans and System of Accounts (Cont)

	No Improvements "Without" Condition	Plan 1	Plan 2	Plan 3
4. Relationship to National Accounts				
National Economic Development:				
Average Annual Benefits	Not applicable	$744,000	$731,000	$731,000
Average Annual Costs	Not applicable	$380,000	$368,000	$430,000
Average Annual Net Benefits	Not applicable	$364,000	$363,000	$301,000
Benefit to Cost Ratio	Not applicable	2.0	2.0	1.7
Environmental Quality	See Item B.1 in this table.			
Social Well-Being	See item B.3 in this table.			
Regional Development	See Item B.1 in this table.			
5. Response to Evaluation Criteria				
Acceptability	Not applicable	Most Acceptable	Acceptable	Least Acceptable
Completeness	Not applicable	Complete	Complete	Complete
Effectiveness	Not applicable	Effective	Effective	Effective
Reversibility	Not applicable	Irreversible	Irreversible	Irreversible
Efficiency	See Item C.4. in this table.			
Benefit-Cost Ratio	See Item C.4. in this table.			
Certainty	Not applicable	Yes	Yes	Yes
Stability	Least Stable	Most Stable	Stable	Stable
Scope	Not Applicable	Relevant	Relevant	Relevant

7.5 A public view of special environmental concern, expressed strongly by a few individuals and private environmental organizations, including Greenpeace, The American Cetacean Society, and the Maui Whale Research Institute, is for the prevention of adverse impacts on the endangered and protected Humpback whales which winter in the Hawaiian Islands. Particular areas of concern are the effects of construction activities and the effects of increased boating activity on the whales. Several letters regarding this concern were received during the public review of the draft report and are shown in Appendix J. A complete description of the relationship of the project to Humpback whales is presented in the Environmental Impact Statement in Appendix F of this report.

7.6 Concern was also expressed, though to a lesser extent, for improvements within the existing harbor, including a need for increased berthing capacity, and improved availability of facilities and necessities including fuel, water, electricity, storage, automobile parking, and trailer-boat launching and retrieving capability. Also of lesser concern was the effect of the proposed harbor improvements on minor surfing sites directly adjacent to the existing harbor entrance channel.

7.7 A newly developed public concern surfaced at the last design workshop and again at the final public meeting. Some individuals fear that implementation of Alternate Plan 1, with the revetted mole provided for additional harbor backup area, will introduce conflicts at the harbor. Some of these individuals withheld their endorsement of the additional backup area because of a fear that the area would be utilized by commercial and tourist-oriented interests instead of by fishermen and other private boat owners. Testimony at the final public meeting indicated, however, that the majority of the persons in attendance felt that they could solve any problems related to usage of the improved harbor in the future. Several persons testified, with inferred majority concurrence, that the need for improved berthing and navigation conditions far outweigh any problems related to harbor backup areas, and that speedy implementation of harbor improvements is of utmost importance.

SECTION E

THE RECOMMENDED PLAN OF IMPROVEMENT

1. The choice of a recommended plan of improvement results from an evaluation of all of the information gathered during the planning studies. After all of the planning, engineering, environmental, and economic criteria have been satisfied, the primary considerations in plan selection are the desires of the local sponsor, and the desires and expressed opinions of the general public.

2. THE SELECTED PLAN. All of the alternate plans presented in this report satisfy the technical, environmental and economic requirements for project approval and construction. Plan 2 has received the strongest public support, based on responses at three public workshops and the final public meeting. However, Plan 1 is favored by the local sponsor because it provides for needed additional harbor backup area and provides most of the dredged material disposal needs. Accordingly, Plan 1 has been selected as the recommended plan. The selected plan and a possible berthing layout are shown on Plate E-1. The berthing layout is not a part of the plan, and is only shown as an example of a possible layout. The local sponsor is responsible for implementing a berthing plan.

2.1 DESCRIPTION. The selected plan, shown on Plate E-1, would provide berthing for about 310 boats when fully developed. This plan would include a 620-foot-long extension to the existing south breakwater; addition of a 400-foot-long revetted mole on the seaward side of the existing south breakwater; a 610-foot-long entrance channel, varying in width from 150 feet to 180 feet, and varying in depth from 15 feet to 12 feet; and a 1.7 acre, 12-foot-deep turning basin. About 80 feet of the existing east breakwater head would be removed. In addition, the plan would include a 50-foot-wide, 720-foot-long interior revetted mole and an 8-foot-deep berthing area adjacent to the existing east breakwater. The interior revetted mole and the berthing area would be the responsibility of the local sponsor. The total harbor area of approximately 27 acres would include 13.5 acres of water area available for berthing and access. About 55 trees would be planted on the revetted moles. Trees would be indigenous or exotic species common to the Hawaiian Islands and would be tolerant of saline soils. The U.S. Coast Guard would provide necessary modification to the navigation aids.

3. ECONOMICS OF THE SELECTED PLAN

3.1 PROJECT FIRST COSTS. Estimated first costs for the plan of improvement for Maalaea Harbor are shown in Table E-1. The cost estimate is based on January 1980 price levels in the project area. The estimates for dredging includes the cost of land disposal of dredged material within 5 miles of the project site, drilling and blasting for 25% of the material although recent subsurface borings indicate that blasting may not be necessary, and allowance for 1-foot of overdepth dredging. Total cost includes a contingency amount of 15 percent of the estimated construction cost and also includes a factor to account for price inflation during construction. First cost also includes the cost of post-authorization planning, engineering and design, supervision and

administration, engineering during construction, project beautification, and U.S. Coast Guard costs for navigation aids. A detailed construction cost estimate is presented in Appendix B.

3.2 APPORTIONMENT OF FIRST COSTS. Federal legislative and administrative authority governing construction of navigation improvement projects requires that the first costs of the federal (Corps of Engineers) portion of the project be shared between federal and nonfederal interests in direct proportion to the general and local benefits as established in the authorizing document. For the project at Maalaea Harbor, the Corps of Engineers will be responsible for 64.5 percent of the cost of the federal work, excluding U.S. Coast Guard costs, and the local interests will be responsible for 35.5 percent of the cost. In addition, the local interests are responsible for 100 percent of the nonfederal work cost, and for the additional cost incurred by the Government required for the construction of the revetted mole adjacent to the existing south breakwater. The apportioned project costs, U.S. Coast Guard costs, and nonfederal costs are shown in Table E-2.

3.3 AVERAGE ANNUAL COSTS. Estimates of the average annual project costs include amortization of project first costs over a 50-year economic life at an interest rate of 7-1/8 percent, and estimated average annual maintenance costs. Annual maintenance costs include maintenance dredging and breakwater repair. Estimated federal and nonfederal dredging requirements are 8,000 cubic yards and 1,000 cubic yards, respectively, expected to be required every 10 years. Nonfederal dredging is in addition to existing dredging requirements. The average annual cost of breakwater repair is based on 1 percent of the armor layer cost. Average annual costs are shown in Table E-3.

TABLE E-1. ESTIMATED PROJECT FIRST COST

A.	Federal Work	
	Dredging	$534,000
	Protective Structures	3,029,000
	Contingency (±15%)	534,000
	Subtotal	$4,097,000
	Engineering & Design	210,000
	Supervision & Administration	278,000
	Project Beautification	55,000
	Corps of Engineers Cost	$4,640,000
	USCG Navigation Aids	20,000
	Total Federal Cost	$4,660,000
B.	Non-Federal Work	
	Dredging	$145,000
	Protective Revetment	83,000
	Contingency (±15%)	34,000
	Subtotal	$262,000
	Indirect Costs	28,000
	Total Non-Federal Costs	$290,000
C.	Total First Costs	$4,950,000

TABLE E-2. APPORTIONED FIRST COST

A.	Federal Portion	
	64.5% of Corps of Engineers Cost	$2,995,000
	Additional Nonfederal Cash Contribution[1/]	(145,000)
	U.S. Coast Guard Costs	20,000
	Total Federal Portion	$2,870,000
B.	Non-Federal Portion	
	35.5% of Corps of Engineers Costs	$1,645,000
	Additional Nonfederal Cash Contribution[1/]	145,000
	Non-Federal Work Costs	290,000
	Total Non-Federal Portion	$2,080,000

1/ Additional nonfederal cash contribution includes $140,000 for costs incurred by the Government to construct the exterior revetted mole which will benefit the local sponsor, and $5,000 for a land enhancement cash contribution.

TABLE E-3. ESTIMATED AVERAGE ANNUAL COSTS[1/]

Interest & Amortization	$343,000
Maintenance	37,000
Average Annual Costs	$380,000

1/ Average annual costs for federal work only are used in computation of the benefit-cost ratio. Nonfederal costs are excluded. Interest and amortization are based on a 7-1/8 percent interest rate and are calculated on the amount of $4,660,000 which is the total Federal work cost.

3.4 AVERAGE ANNUAL BENEFITS. A detailed discussion of average annual benefits is presented in Appendix A. A summary of the results of the benefit analysis is shown in Table E-4.

TABLE E-4. ESTIMATED AVERAGE ANNUAL BENEFITS

Benefit Category	
Recreation Navigation	$255,000
Charter Operations	128,000
Commercial Fishing	328,000
Damage Reduction	12,000
EDA Benefits	11,000
Land Enhancement	13,000
Total Average Annual Benefits	$744,000

3.5 BENEFIT TO COST RATIO. Based on the estimated average annual federal costs and benefits, the benefit-cost ratios and net annual benefits for each of the alternate plans are as follows:

B/C Ratio	Net Annual Benefits
2.0	$364,000

4. CONSTRUCTION ACTIVITIES. Construction of the proposed navigation improvements will impact temporarily on harbor activities. Work and storage area requirements will temporarily reduce available harbor backup area but should not seriously affect access berths nor seriously disrupt harbor activities. Designation of work and storage areas will be coordinated with the State Harbors Division in order to minimize disruptions. Dredging of the new channel and construction of the new protective structures should not cause serious disruption of channel navigation. Construction specifications will restrict necessary channel closures to reasonable periods of time. The construction period will be approximately 18 months. A construction work schedule is shown in Figure E-1.

5. MITIGATION REQUIREMENTS. Mitigation of adverse impacts on Humpback whales have been coordinated with the National Marine Fisheries Service (NMFS). NMFS has recommended that underwater blasting be prohibited during the months when Humpback whales are expected to be in waters near Maalaea Harbor (see NMFS correspondence in Appendix J). Construction specifications would prohibit underwater blasting during the months of December through May. Possible adverse effects of increased boat traffic on the whales would be mitigated by implementation of federal and local laws and regulations which are already established and in effect. Mitigation of temporary turbidity impacts during construction would require the contractor to employ construction methods which conform to State of Hawaii water quality standards. Damages to coral reef areas and associated ecosystems would be limited by establishing a construction easement beyond which construction activity would be prohibited. Excess dredged material may have to be stabilized against wind erosion if it is disposed in such a manner as to be exposed to the high winds common near Maalaea.

6. DEPARTURES FROM THE AUTHORIZED PLAN.

6.1 Several changes to the authorized plan have resulted from post-authorization studies. The departures involve engineering, economic, and environmental aspects of the project. None of the changes are defined as significant by Engineer Regulations.

6.2 ENGINEERING DEPARTURES. Certain engineering aspects of the selected plan are different from the plan presented in the authorizing document. The changes result primarily from relocation of the entrance channel. The channel was relocated to avoid alteration of a popular surfing area, as discussed earlier in this report. Channel relocation requires that a larger and relatively more costly breakwater extention be utilized because of the greater water depths at the new location. Relocating the entrance channel results in a reduction in the amount of dredging required, a reduction in entrance channel length, a reduction in the length of the existing east breakwater portion to be removed, and an increase in available berthing area space. Table E-5 highlights the engineering departures. There is no significant change in scale or scope of the project.

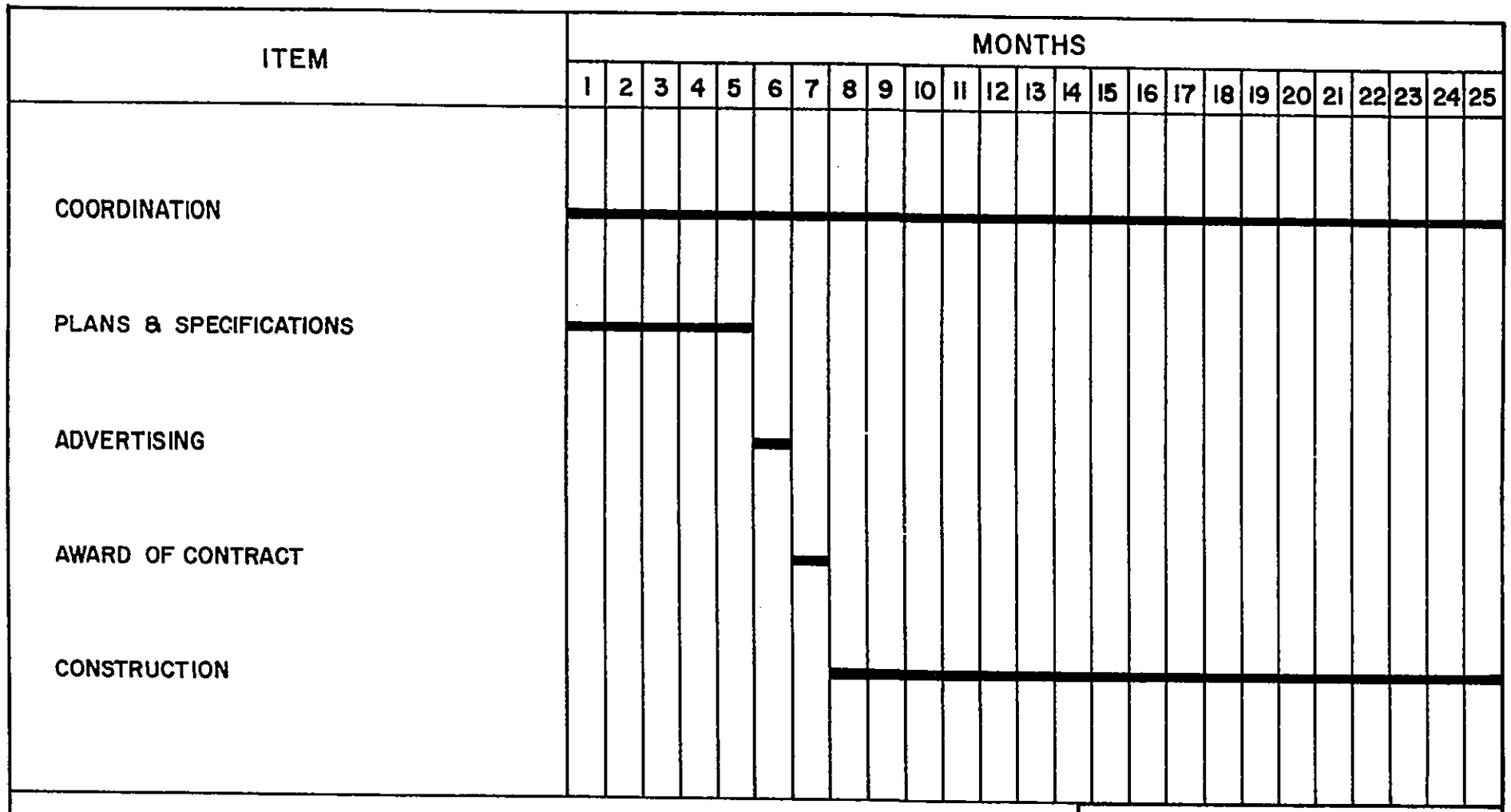
6.3 ECONOMIC DEPARTURES. Many changes in project economics have occurred since authorization. Changes have occurred to both estimated costs and benefits as explained in the following paragraphs, including a change in the interest rate used for calculations. The authorized interest rate is 3-1/4 percent, whereas the current rate used in this report is 7-1/8 percent.

6.4 Changes in estimated project costs have occurred since project authorization. Table E-6 shows a comparison between costs presented in the project document, updated costs for the authorized plan, and estimated costs for the selected plan. Cost increases revealed in the update of the authorized plan reflect price inflation. Comparison of the selected plan costs with the updated authorized plan costs, excluding non-federal work, reflects increases due to plan changes of $2,138,000, which is an 87 percent increase. Table E-7 compares the average annual federal costs which are used in the benefit-cost ratio calculations.

6.5 Average Annual Benefits have grown substantially above the estimates presented in the authorizing document. The average annual benefits as presented in the authorizing document, then updated to January 1980, and as shown in this report are displayed in Table E-4. The 29 percent increase in average annual benefits of the selected plan over the 1980 update of the authorized plan is attributed primarily to increased berthing capacity. Major changes in benefit amounts can be attributed to the following conditions:

a. The market value of boats has increased greatly due to a shift to more expensive craft, particularly in the outboard and trailer-mounted categories. The average value per craft for these two categories has increased by more than double the amount attributed to inflation, due to increased sophistication in boat designs and equipment.

b. Charter operations were not anticipated in the authorizing document, but are now a significant component of the demand at Maalaea Harbor.



NOTE

ADVERTISING DATES FROM RECEIPT OF CONSTRUCTION FUNDS.

MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII

WORK SCHEDULE

U.S. ARMY ENGINEER DISTRICT
HONOLULU

FIGURE E-1

FIGURE E-1

TABLE E-5. ENGINEERING DEPARTURES OF PROJECT FEATURES FROM THE AUTHORIZED PLAN

Project Features	Authorized Plan	Selected Plan
Berthing Capacity	260 boats	310 boats
Entrance Channel		
Length	780'	610'
Width	150' to 300'	150' to 180'
Depth	-15' to -12'	-15' to -12'
Turns	20° left	45° right
Turning Basin		
Area	6.9 acres	1.7 acres
Depth	-12'	-12'
Access Channel		
Length	700'	720'
Width	80'	80'
Depth	-8'	-8'
South Breakwater Extension		
Length	650'	620'
Crest Elevation	+12.5'	+13'
Protective Revetment		
Length	None	400'
Crest Elevation		+13'
East Breakwater		
Length Removed	670'	80'
Interior Revetted Mole 1/	None	720'
New Berthing Area 1/		
Area	None	2 acres
Depth		-8

1/ Nonfederal project features.

TABLE E-6. PROJECT FIRST COST COMPARISON

		1968 Project Document1/	Jan 1980 Update of Authorized Plan2/	Selected Plan3/
A.	Federal Work			
	Dredging	$296,000	$1,264,000	$534,000
	Protective structures	222,000	545,000	3,029,000
	Contingency4/	103,000	271,000	534,000
	Subtotal	$621,000	$2,080,000	$4,097,000
	Engineering & Design	27,000	210,000	210,000
	Supervision & Administration	52,000	155,000	278,000
	Beautification	14,000	55,000	55,000
	Corps of Engineers Costs	$714,000	$2,502,000	$4,640,000
	USCG Navigation Aids	10,000	20,000	20,000
	Total Federal Costs	$724,000	$2,522,000	$4,660,000
B.	Non-Federal Work			
	Dredging	0	0	$145,000
	Protective Revetment	0	0	83,000
	Contingency4/	0	0	34,000
	Subtotal	0	0	$262,000
	Indirect Costs	0	0	28,000
	Total Non-Federal Costs	0	0	$290,000
C.	Total Project First Cost	$724,000	$2,522,000	$4,950,000

1/ The Project Document is the Chief of Engineers' Report on Coasts of the Hawaiian Islands, Harbors for Light-Draft Vessels, contained in House Document No. 353, 90th Congress, 2nd Session.

2/ This update reflects price level increases since project authorization. Prices are at January 1980 level.

3/ Prices are at January 1980 level.

4/ Contingency for Project Document is ±20 percent. Contingency for Authorized Plan Update and for Selected Plan is ±15 percent in accordance with Engineer Regulations.

TABLE E-7. AVERAGE ANNUAL COST COMPARISON

	1968 Project Document 1/	Jan 1980 Update of Authorized Plan 2/	Selected Plan 3/
Interest and Amortization	$ 29,500	$186,000	$343,000
Maintenance	5,700	13,000	37,000
Average Annual Costs	$ 35,200	$199,000	$380,000

1/ Calculated using the authorized interest rate of 3-1/4 percent.

2/ Calculated using the current interest rate of 7-1/8 percent. At the authorized interest rate of 3-1/4 percent, average annual costs are $116,000.

3/ Calculated using the current interest rate of 7-1/8 percent. At the authorized interest rate of 3-1/4 percent, average annual federal costs are $227,000. Nonfederal costs are excluded for comparison purposes.

c. The expected number of full-time, moored fishing craft is much larger than anticipated in the authorizing document.

d. The total demand for berthing space at Maalaea has grown much more than anticipated. In addition, the new base year of 1985, as compared to 1970 in the authorizing document, means that initial year benefits are larger. Current projections indicate that the improved harbor will be filled to capacity within 3 years of the base year, whereas the project document estimated maximum capacity to be reached 50 years after project completion.

e. Prevented damages for recreation craft are relatively larger, and for fishing craft are relatively smaller than was estimated in the authorizing document. This shift is a result of reclassifying part-time fishing craft as recreational. This reflects the indicated net loss the part-time fishing fleet is now experiencing. Although these persons continue to fish, probably to enjoy the lifestyle, they are now classified as recreational boaters.

f. EDA benefits, not applicable at the time of authorizing document, have been included in this report.

g. Land enhancement benefits are calculated for the tentatively selected plan.

6.6 Benefit-cost ratios resulting from the cost and benefit comparisons are as follows:

	3-1/4 percent Interest Rate	7-1/8 percent Interest Rate
1968 Project Document	2.3	Not applicable
1980 Update	5.4	3.0
Selected Plan	3.4	2.0

6.7 ENVIRONMENTAL DEPARTURES. The project was authorized in 1968, prior to the enactment of the National Environmental Policy Act. The resulting environmental concerns have required changes in the authorized plan. The plan shown in the project document contained a dredged material fill which was to be placed in the existing entrance channel as an artificial bottom. Excess dredged material was to be dumped from a barge into the offshore waters of Maalaea Bay. This practice is also no longer feasible because of the time and cost involved in complying with permit requirements under Section 103 of the Marine Protection, Research and Sanctuaries Act, and requirements that ocean disposal sites be designated by the Environmental Protection Agency in accordance with Section 102 of the Act.

TABLE E-8. AVERAGE ANNUAL BENEFIT COMPARISON

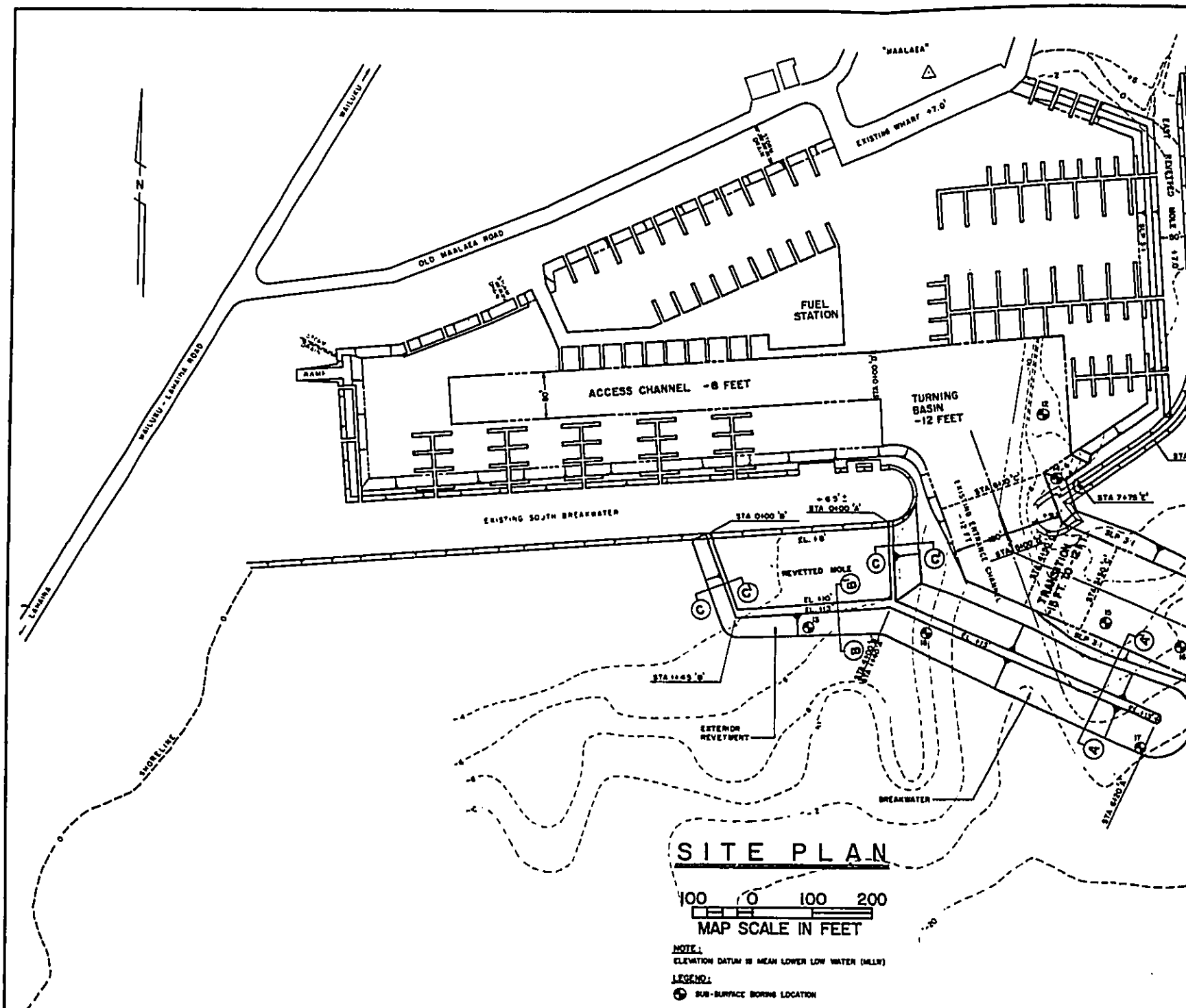
Benefit Category	1968 Project Document 1/	Jan 1980 Update of Authorized Plan 2/	Selected Plan 3/
Recreation Navigation	$52,700	$208,000	$252,000
Charter Operations4/	0	102,000	128,000
Commercial Fishing	20,000	250,000	328,000
Damage Reduction to Existing Craft:			
Recreation	4,600	8,000	8,000
Charter4/	0	2,000	2,000
Fishing	3,000	2,000	2,000
EDA Benefits	0	6,000	11,000
Land Enhancement	0	0	13,000
Total	$80,700	$578,000	$744,000

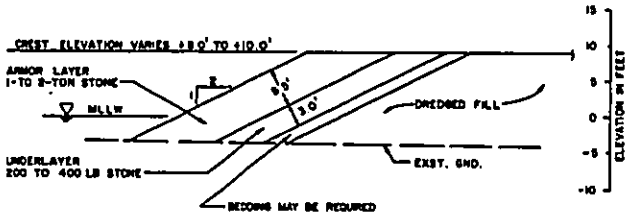
1/ The Project Document is the Chief of Engineers Report on Coasts of the Hawaiian Islands, Harbors for Light-Draft Vessels, contained in House Document No. 353, 90th Congress, 2nd Session. Authorized interest rate is 3-1/4 percent.

2/ This update reflects value and demand increases to current levels and conditions, and fleet composition shifts (charter operations are now included). EDA benefits are also included. Dollar values are those in effect for January 1980. Interest rate used in benefit update is the current rate of 7-1/8 percent. At the authorized interest rate of 3-1/4 percent, updated average annual benefits are $575,000.

3/ Dollar values are those in effect for January 1980. Interest rate is 7-1/8 percent. At the authorized interest rate of 3-1/4 percent, current average annual benefits are $735,000.

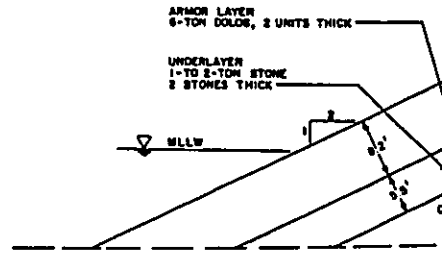
4/ Benefits from charter operations were not anticipated in the Project Document.





SECTION C-C'
TYPICAL EXTERIOR REVETMENT SECTION
STA 0+00'B' TO STA 1+45'B'
STA 0+00'A' TO STA 1+40'A'

10 5 0 10 20 30 40
SCALE IN FEET



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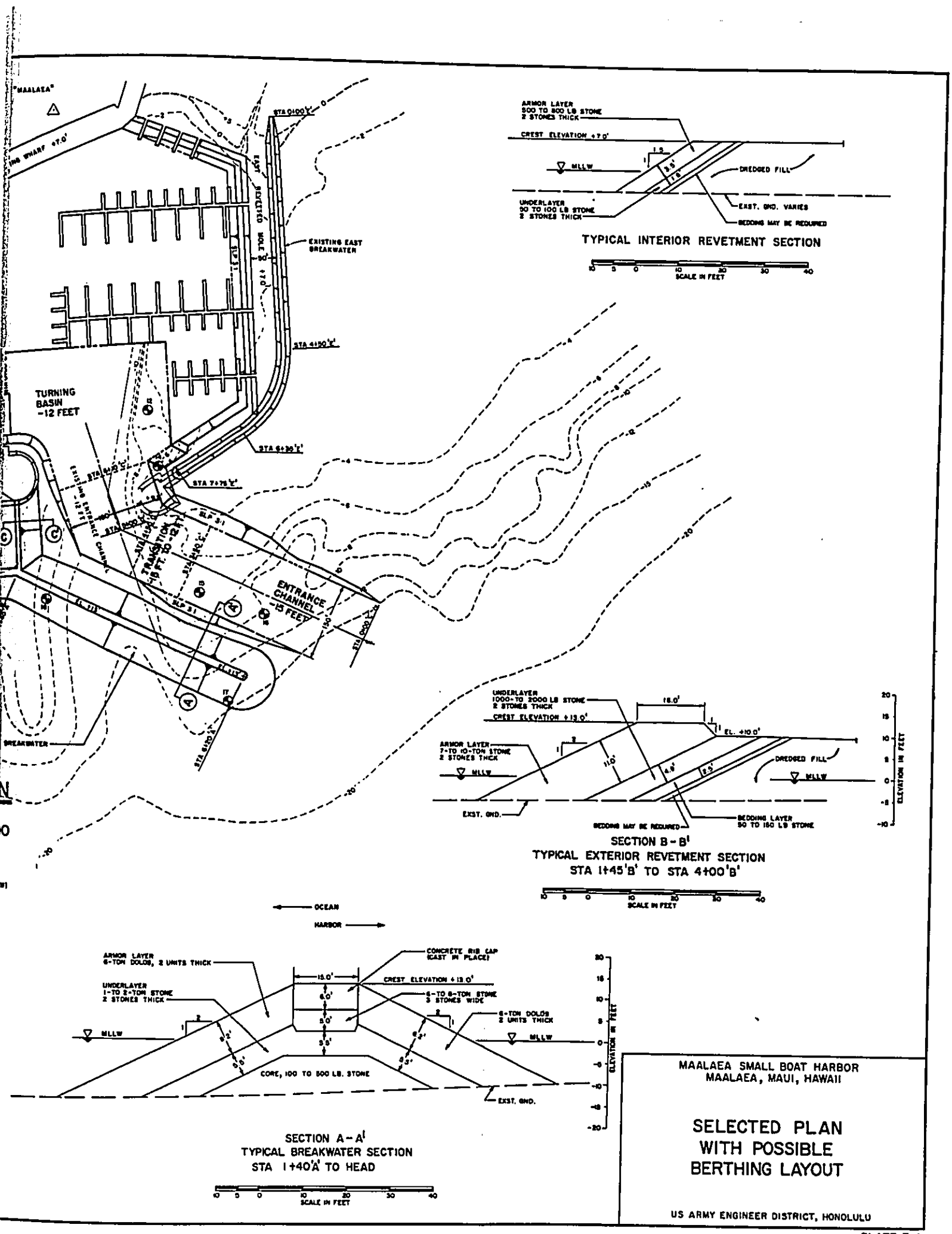

TYPICAL INTERIOR REVETMENT SECTION

SECTION B - B'
TYPICAL EXTERIOR REVETMENT SECTION
STA 1+45'B' TO STA 4+00'B'

SECTION A - A'
TYPICAL BREAKWATER SECTION
STA 1+40'A' TO HEAD

MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII

SELECTED PLAN WITH POSSIBLE BERTHING LAYOUT

US ARMY ENGINEER DISTRICT, HONOLULU

PLATE E-1

SECTION F

ENVIRONMENTAL IMPACT STATEMENT SUMMARY1/

1. MAJOR CONCLUSIONS AND FINDINGS. The alternate plans are discussed in detail in Section D of this report. All three plans meet the primary objective of reducing surge and navigational hazards and increasing berthing capacity in the harbor, and provide economic benefits that exceed the project costs. Plan 1 maximizes economic development due to its greatest net economic benefit. It is therefore designated the National Economic Development (NED) Plan. All of the plans result in a net positive contribution to the quality of the marine environment due to the significant increase in the amount of valuable fish and shellfish habitat provided by the improved breakwater structure. However, all of the plans result in excess dredged material which must be disposed at a land site. This impact and other temporary and long-term environmental disturbances common to the three plans are difficult to quantify on comparable terms with postive contributions. Hence, it is uncertain that any of the alternatives would result in a net positive contribution to the total environment, which is the criteria for designation of an Environmental Quality (EQ) Plan.

2. All plans require the discharge of fill material for breakwater and revetment structures. A "Section 404" evaluation (see Appendix G) finds that materials to be used in breakwater construction are suitable for discharge into navigable waters. None of the alternatives involve wetland areas or wildlife refuges or federal sanctuaries, nor will they affect ground water resources. The proposed project may temporarily affect endangered Humpback whales in the proximity of the harbor during construction of harbor improvements. Increased boating activity resulting from the improved harbor could adversely affect Humpback whales. Coordination with the National Marine Fisheries Service relating to potential impacts on the Humpback whale resulted in the recommendation that underwater blasting only be permitted during the months of May through December. The project does not affect a riverine flood plain; however the coastal area is subject to tsunami inundation hazards.

3. AREAS OF CONTROVERSY. Controversy over conflicting recreational uses of the Maalaea Harbor area arose early in the study during the initial informational meeting held in January 1979. Surfing interests identified the potential impacts of the authorized plan channel alignment on one of the most valued surfing sites on Maui called the Maalaea Pipeline. A second surfing site of lesser importance was also identified on the south side of the existing harbor. During the course of the study, efforts were made to minimize project related impacts on these surfing areas. The alternate harbor plans include a plan submitted by the Maalaea Boat and Fishing Club in May 1979, which is acceptable to both boating and surfing interests. The selected plan presented in this report accommodates to the greatest extent practicable the interests of both groups while satisfying the needs and desires of the local sponsors.

1/ The Final Environmental Impact Statement is presented in Appendix F of this report.

4. The National Marine Fisheries Service and individual cetacean biologists and researchers pointed out potential adverse effects of project related construction activity and increased boating activity on the endangered Humpback whale which winters in Maalaea Bay. Formal consulation with the National Marine Fisheries Service under Section 7 of the Endangered Species Act resulted in the submittal of a Biological Opinion by NMFS. The Biological Opinion and related correspondence is included in Appendix J.

5. UNRESOLVED ISSUES. None.

6. RELATIONSHIP TO ENVIRONMENTAL REQUIREMENTS. A brief outline of the relationship of the alternate plans to environmental laws and regulations affecting this study are presented in Table XF-1 in Appendix F.

SECTION G

CONCLUSIONS AND RECOMMENDATIONS

1. CONCLUSIONS. The proposed navigation improvements at Maalaea harbor, Maui, as described in this report, are the most efficient means of improving navigation conditions at the harbor. The plan of improvement will provide safe navigation and berthing conditions for vessels using the harbor. The plan of improvement satisfies the planning objectives established in the authorizing document and in this report. The proposed improvements were developed in accordance with accepted engineering, economic, environmental and social criteria and involved detailed assessment and evaluation of alternative solutions to navigation problems in accordance with the Water Resources Council's Principles and Standards. Three alternate plans were coordinated with interested Federal and local government agencies as well as with the general public. The recommended plan of improvement is favored by the local sponsor and is consistent with existing land use plans developed by the State of Hawaii. The local sponsor has indicated by letter and by public testimony that it is willing and able to provide local cooperation requirements as established in the authorizing document and amended by statutory requirements. Any adverse effects which may result from implementation of the recommended plan are substantially outweighed by other considerations of national interest. On the balance, the total public interest would best be served by implementation of the recommendation.

2. RECOMMENDATIONS. The District Engineer recommends that the plan of improvement presented in this General Design Memorandum be approved and implemented subject to the condition that the local sponsor provides the required local cooperation. The recommended plan of improvement provides for the dredging of a 610-foot-long, 150- to 180-foot-wide, 15- to 12-foot-deep entrance channel, a 1.7 acre, 12-foot-deep turning basin, and a 720-foot-long, 80-foot-wide, 8-foot-deep access channel; and provides for construction of a 620-foot-long, 13-foot-high extension to the existing south breakwater, including a 400-foot-long exterior revetted mole. The recommended plan also includes nonfederal features including a 720-foot-long, 50-foot-wide interior revetted mole and a 2.0 acre, 8-foot-deep addition to the existing berthing area. Installation of necessary aids to navigation would also be included in the federal project.

APPENDIX A

BENEFIT ANALYSIS

APPENDIX A

BENEFIT ANALYSIS

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APPENDIX A

BENEFIT ANALYSIS

1. GENERAL. The benefits derived from the selected plan of improvement consist of navigation benefits to recreation and charter craft; damage prevention to recreation, charter and fishing craft that would be moored even without a project; and increased fish catch. The computations are made with a 7-1/8 percent interest rate and a 50-year project life. The project base year, 1985, is when benefits are expected to begin accruing to the proposed improvements.

2. METHOD OF ANALYSIS. Without the project the capacity of Maalaea small craft harbor will remain at its current level of 93 spaces for mooring craft, including 91 spaces for officially moored craft and two spaces for transients. With the proposed improvements, it will be possible to develop 310 spaces for mooring craft. It is estimated that 7 spaces will then generally be available for transient craft.

2.1 Table XA-1 shows the historical and projected demand determinants for wet stored craft using or wanting to use Maalaea Harbor.

3. POPULATION. The Hawaii State Department of Planning and Economic Development (DPED) is the source for both the historical population figures and the basis for the projected population figures for the island of Maui except for 1979 which was extrapolated. The OBERS-E projections for the non SMSA portion of economic region 173 (Hawaii) would be applicable to the growth of the islands in Hawaii other than Oahu. However, this projection, made in 1972, forecasts a declining population for this segment. In view of the rapid growth that these other islands have experienced since 1972 and which seems to be continuing into the future, the OBERS-E projections will not be used. The island population projection based on DPED County growth rate forecasts is consistent with the historical trend, and is based on econometric projection component for the State and the island. It is also consistent with independent studies of employment trends by industry for the island of Maui, conducted by the Corps (POD) a few years ago.

4. REGISTERED CRAFT. The State Department of Transportation, Harbors Division, maintains records of small craft registrations by island. Comparing the number of these registered craft with the population for Maui, it is shown that the ratio of boats per thousand persons has been increasing rather steadily. Plotting this ratio using semi-log scale indicates that this rate of increase is slowing down. A reasonable extension of the growth curve indicates that the growth should reach a plateau of about 20 registered craft per thousand population by 1990. Using this information and the projected population for Maui, a projection of registered small craft is constructed (see Table XA-1).

5. MOORED CRAFT AND WAITING LIST. The State Department of Transportation also maintains records of number of craft moored at State harbors as well as a registry of persons waiting for a space to moor their craft for each harbor. On Maui there are two harbors run by the State for the use of small craft. They are located at Maalaea and at Lahaina. Both of these harbors have about the same size waiting list. It can be seen in Table XA-1 that from 1974 to 1977 there were an extraordinary large number of craft on the Maalaea waiting list. This resulted from harbor alterations on Oahu which displaced moored craft there, plus continuing growth in the number of persons seeking mooring space, plus free waiting list registration. In 1978 the State imposed a waiting list fee which effectively eliminated multiple waiting list applications by boat owners. Current waiting lists are believed to represent actual effective demand for spaces at individual harbors.

5.1 Most of the persons on the waiting list are waiting for a mooring space before they buy a boat for there is a statewide shortage of harbor space and waiting lists for almost all of the State harbors. Private facilities are also filled to their capacity. For those few on the waiting list that may now have a space at another harbor but want to move to Maalaea when a space there becomes available, their current space, when vacant, will allow someone on another waiting list to obtain a boat. Increasing the spaces at Maalaea, as proposed, will not take any user benefits from other harbors.

5.2 The information in Table XA-1 shows that the waiting list total for Maalaea Harbor as a percent of registered craft for Maui has been increasing somewhat even when the anomalous years of 1974 to 1977 are left out. However, freezing the ratio at its current level results in a conservative projection of the waiting list for Maalaea if no improvements are made to expand the available space there.

5.3 Combining the Maalaea moored craft plus the waiting list give a series that represents effective demand (except for the 1974 to 1977 period). This series, shown as the last column on Table XA-1 provides a reasonable measure of the future utilization of the proposed improvements at Maalaea Harbor. Graphic extrapolation of the series indicates that the demand in the project base year of 1985 is 281 mooring spaces plus 7 transient spaces. By 1988 the proposed capacity of 310 spaces would be fully utilized..

6. DISTRIBUTION OF CRAFT TYPES. The types of craft now using the harbor plus tne types of craft on the waiting list when combined yield a percentage distribution as shown on Table XA-2. This information was derived from a survey of boat owners on Maui and individuals who have their names on the Maalaea waiting list. Information from this same survey yielded the average depreciated value for craft as also shown on Table XA-2. The future distribution of craft will certainly reflect the current distribution of effective demand, by type, for the near future including the base year 1985 and the full utilization year of 1988. It is probably a conservative estimate for the remainder of the project life because there is a continuing trend throughout the State for an upgrading of the fleet to more expensive craft.

TABLE XA-1. HISTORICAL AND PROJECTED DEMAND DETERMINANTS FOR WET-STORED CRAFT

Year	July 1, Maui Population in Thousands	Maui Registered Craft	Registered Craft per 1,000 Population	Maalaea Hbr Waiting List	Waiting List as Percent of Registered Craft	Moored Maalaea Hbr	Moored Plus Waiting List
1970	39.1	378	9.7	9	2	43	52
1971	40.7	420	10.3	13	3	47	60
1972	43.2	507	11.7	24	5	50	74
1973	44.2	579	13.1	28	5	59	87
1974	45.0	579	12.9	81[4]	14	57	138
1975	47.5	666	14.0	157[4]	24	63	220
1976	50.6	696	13.8	253[4]	36	62	315
1977	51.6	764	14.8	356[4]	47	58	414
1978	52.9	834	15.8	160[5]	19	62[6]	222
1979	(55.5)[1]	(888)[2]	(16.0)[3]	128[6]	(14)[8]	91[6]	219
1980	(59.1)	(975)	(16.5)	(136)[7]	(14)[9]	(91)[10]	(227)
1985	(71.3)	(1,355)	(19.0)	(190)	(14)	(91)	(281)[11]
1990	(83.2)	(1,664)	(20.0)	(233)	(14)	(91)	(324)
1995	(96.4)	(1,928)	(20.0)	(270)	(14)	(91)	(361)
2000	(109.3)	(2,186)	(20.0)	(306)	(14)	(91)	(397)

( ) Projected or extrapolated.

1/ Projections for 1980 - 2000 based on IIF projections by County made by State Dept of Planning & Economic Development; 1979 extrapolated graphically using semi-log scale.

2/ Projected using population and craft per 1,000 projections.

3/ Projected graphically using a semi-log scale; historical data indicates a decreasing rate of increase that will likely level off at 20 craft per 1,000 population by 1990.

4/ Maalaea waiting list increased markedly between 1974 and 1977 due to harbor alterations on Oahu which resulted in displacement of large numbers of moored craft.

5/ In 1978 the State imposed a waiting list fee which effectively eliminated multiple waiting list applications by boat owners.

6/ Increase in harbor capacity by State action in 1979 reduced Maalaea waiting list; capacity increased from 63 to 93.

7/ Waiting list (without improvements) projection based on projection of registered craft and projection of waiting list as a percent of registered craft.

8/ Estimate based on 1979 waiting list and 1979 estimated registered craft (actual not published as of Jan 1980).

9/ Ratio of waiting list as percent of registered craft expected to remain at current level.

10/ Harbor capacity is locked at this level without basic navigation improvements to channel and breakwater.

11/ Graphically extrapolated new harbor capacity of 310 will be reached in 1988.

TABLE XA-2. NAVIGATION AND FISHING

		Total Harbor Mooring	COMMERCIAL Fishing	COMMERCIAL Charter	Outboard	Sail	Sail w/Power	Cruisers and Other Inboards	Sampans	Transient	Trailer
Distribution % of Moored Craft[1/]		--	23%	9%	15%	6%	26%	18%	3%	--	--
Prospective Fleet without improvements											
	1980	93	21	8	14	5	24	16	3	2	234
	1985	93	21	8	14	5	24	16	3	2	234
	1988	93	21	8	14	5	24	16	3	2	234
	2035	93	21	8	14	5	24	16	3	2	234
Prospective Fleet with improvements											
	1985	288	65	25	42	17	73	51	8	7	234
	1988	310	70	27	45	18	79	55	9	7	234
	2035	310	70	27	45	18	79	55	9	7	234
Returns Per Craft											
Avg Depreciated Value[1/]			$22,600	$70,476	$5,153	$3,850	$19,030	$17,371	$6,667	$17,271[3/]	6,122
% Annual Return (ideal cond)			[2/]	[2/]	15%	12%	9%	9%	12%	9%	15%
Net Annual Return (w/imps)			$6,744	$6,800	$773	$462	$1,713	$ 1,563	$800	$ 1,554	$918
Net Annual Return (w/o imps)			$6,744	$6,800	80%	80%	85%	85%	85%	85%	80%
Returns w/o imps	1985		141,624	54,400	8,658	1,848	34,945	21,257	2,040	2,642	171,850
	1988		141,624	54,400	8,658	1,848	34,945	21,257	2,040	2,642	171,850
	2035		141,624	54,400	8,658	1,848	34,945	21,257	2,040	2,642	171,850
Returns w/imps	1985		438,360	170,000	22,466	7,854	125,049	79,713	6,400	10,878	214,812
	1988		472,080	283,600	34,785	8,316	135,327	85,965	7,200	10,878	214,812
	2035		472,080	283,600	34,785	8,316	135,327	85,965	7,200	10,878	214,812
Total Benefit Gain	1985		296,736	115,600	23,808	6,006	90,014	58,456	4,360	8,236	42,962
	1988		330,456	129,200	26,127	6,468	100,382	64,708	5,160	8,236	42,962
	2035		330,456	129,200	26,127	6,468	100,382	64,708	5,160	8,236	42,962

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

TABLE XA-2. NAVIGATION AND FISHING

		Total Harbor Mooring	COMMERCIAL Fishing	COMMERCIAL Charter	Outboard	Sail	Sail w/Power	Cruisers and Other Inboards	Sampans	Transient	Trailer
Distribution % of Moored Craft[1]		--	23%	9%	15%	6%	26%	18%	3%	--	--
Prospective Fleet without improvements											
	1980	93	21	8	14	5	24	16	3	2	234
	1985	93	21	8	14	5	24	16	3	2	234
	1988	93	21	8	14	5	24	16	3	2	234
	2035	93	21	8	14	5	24	16	3	2	234
Prospective Fleet with improvements											
	1985	288	65	25	42	17	73	51	8	7	234
	1988	310	70	27	45	18	79	55	9	7	234
	2035	310	70	27	45	18	79	55	9	7	234
Returns Per Craft											
Avg Depreciated Value[1]			$22,600	$70,476	$5,153	$3,850	$19,030	$17,371	$6,667	$17,271[3]	6,122
% Annual Return (ideal cond)			[2]	[2]	15%	12%	9%	9%	12%	9%	15%
Net Annual Return (w/imps)			$6,744	$6,800	$773	$462	$1,713	$ 1,563	$800	$ 1,554	$918
Net Annual Return (w/o imps)			$6,744	$6,800	80%	80%	85%	85%	85%	85%	80%
Returns w/o imps	1985		141,624	54,400	8,658	1,848	34,945	21,257	2,040	2,642	171,850
	1988		141,624	54,400	8,658	1,848	34,945	21,257	2,040	2,642	171,850
	2035		141,624	54,400	8,658	1,848	34,945	21,257	2,040	2,642	171,850
Returns w/imps	1985		438,360	170,000	22,466	7,854	125,049	79,713	6,400	10,878	214,812
	1988		472,080	283,600	34,785	8,316	135,327	85,965	7,200	10,878	214,812
	2035		472,080	283,600	34,785	8,316	135,327	85,965	7,200	10,878	214,812
Total Benefit Gain	1985		296,736	115,600	23,808	6,006	90,014	58,456	4,360	8,236	42,962
	1988		330,456	129,200	26,127	6,468	100,382	64,708	5,160	8,236	42,962
	2035		330,456	129,200	26,127	6,468	100,382	64,708	5,160	8,236	42,962

TABLE XA-2. NAVIGATION AND FISHING (Cont)

		Total Harbor Mooring	COMMERCIAL Fishing	COMMERCIAL Charter	Outboard	Sail	Sail w/Power	Cruisers and Other Inboards	Sampans	Transient	Trailer
Average Annual Benefit @7-1/8%			328,190	128,286	25,971	6,437	99,691	64,291	5,060	8,236	42,962
(Rounded)			328,000	128,000	26,000	6,000	100,000	64,000	5,000	8,000	43,000
Commercial Benefits	456,000										
Recreation Benefits	252,000										

1/ Derived from survey of boat owners on Maui whose craft are at Maalaea and individuals wanting to use Maalaea.
2/ Estimated returns for moored fishing and charter craft were derived from information provided by operators of these types of craft at Maalaea Harbor; the returns for with and without improvement conditions are expected to remain the same as these professional operators are probably not significantly affected by the channel conditions as are the recreation craft operators.
3/ This average value is a weighed average of the types of craft expected to stop as transients and require temporary mooring (i.e., powered sail boats, cruisers and other inboards, and sampans)

6.1 TRAILER-MOUNTED CRAFT. An expansion of the survey results indicate there are 234 trailer-mounted craft using the launching facilities at Maalaea. The indicated launchings at Maalaea for these craft is 31.5 per year. The average number of trips per year for the Maalaea moored recreation craft is 32.3 trips per year. Because of the similarity in number of uses per craft per year, the 234 trailer craft indicated by the survey return are considered full-time equivalent craft. The average indicated depreciated value per trailer-mounted craft is $6,122.

6.2 TRANSIENT CRAFT. Maui is a popular weekend trip destination for craft from Oahu and also a rest stop for people taking their boats between the island of Hawaii and Oahu. In addition, craft coming from overseas often make Maui their "land fall" in the islands. The demand for transient slips is substantial with boats often anchoring offshore on the lee coast of Maui because of lack of harbor space. The demand for transient slips is expected to exceed the number of spaces set aside for them in the proposed Maalaea Harbor improvement, but the demand for permanent slips is so large that a tradeoff is necessary. The value of craft expected to use the transient slips was compiled as a weighted average of values of craft large enough to negotiate the seas between the islands. The distribution of moored craft using and wanting to permanently moor at Maalaea was used to calculate the weighted value shown in Table XA-2.

7. ANNUAL RETURNS. The annual return that accrues to recreation craft under ideal conditions is shown on Table XA-2 as a percentage of investment or average depreciated value for recreation craft. Estimated returns for moored fishing and charter craft were derived from information provided by operators of these types of craft at Maalaea Harbor. Without improvements the returns on moored fishing and charter craft are expected to be the same as under ideal conditions as these craft are operated by professional seamen and are probably not significantly affected by navigation conditions. Most recreation craft owners use their craft less often and tend to restrict their operations to periods of fairer weather because of the existing channel conditions. Recent comments from the boaters tend to support the survey conclusions used in the authorizing document study which showed that outboard craft, sail boats and trailer craft restrict their use by 20 percent and larger recreation craft restrict their use by 15 percent because of poor navigation conditions.

7.1 CHARTER CRAFT RETURNS. Using inhouse data combined with information from four charter craft operators which indicates 206 trips per year and revenues of $375 per trip; labor costs of $10,000 per year, estimating operator wages of $30,900 per year; assuming 25 percent overhead on direct labor costs; indicated other expenses of $11,264; depreciation based on remaining life of $5,350 per craft and state excise taxes of 4 percent; the rate of return on investment of craft is about 9 percent at Maalaea or $6,800 per year. An analysis of similar data from preliminary returns of a survey being done on the island of Hawaii indicates returns of 17 percent for charter craft on that island. This may reflect the excellent deep sea billfish sport fishing along the Kona coast of that island.

7.2 MOORED FISHING CRAFT RETURNS. The survey of fishing craft operators, which included eleven full-time moored fishing vessels indicated that the average trips per year for this group is 78, with a catch of 155 lbs per trip selling at an average of $1.53 per lb. Their expenses including estimated wages, depreciation, fuel, gear, supplies, maintenance and repair, and other came to $11,754 per craft. This means the average full-time moored fishing craft yielded a net catch value of $6,744 per boat. Preliminary results from a survey of craft in this type operation on the island of Hawaii indicate net catch values of over $100,000 per craft. This largely results from more average trips per boat (285) and pounds per trip caught (380). Ten craft were included in the Hawaii island preliminary analysis.

7.3 An analysis of survey responses from 12 full-time trailer-mounted commercial fishing craft (about half of the fleet) indicates that they made only 37 trips per year on an average and catch an average of 40 lbs per trip. Combining their gross catch value with their expenses shows a net loss for these operators. Because they are probably also deriving rewards from the life style of these operations, they are treated as recreation craft for benefit analysis. The same is also found to be the case when the records of moored, part-time fishing operations at Maalaea are examined.

8. DAMAGE PREVENTION BENEFITS. The damage prevention benefits are shown in Table XA-3. The size of the fleet without a new harbor is expected to remain constant so that the damages calculated for the existing fleet are also the average annual damages. The average annual damages prevented to the moored recreation, charter, and fishing fleets are $2,147, $1,536, and $1,663, respectively. Trailer boat damages prevented are estimated at $5,429. It is expected that the proposed improvements will prevent 80 percent of the reported damages. This is consistent with the studies made for the authorizing document and with the types of damages reported by current owners of craft moored at Maalaea. These include grounding, hitting bottom, collisions and other hazards often involved with the harbor or channel conditions.

TABLE XA-3. ANNUAL DAMAGES PEVENTED TO EXISTING FLEET1/
(Rounded to Nearest Hundred Dollars)

	NUMBER OF BOATS	AVERAGE ANNUAL DAMAGE PER BOAT	TOTAL ANNUAL DAMAGE	ANNUAL DAMAGES PREVENTED (80%)
Recreation Craft	61	$44	$2,684	$2,147
Charter	8	240	1,920	1,536
Commercial Fishing	21	99	2,079	1,663
Trailer Boats	234	29	6,786	5,429

1/Figures for average damage per boat are from interviews.

9. LAND ENHANCEMENT BENEFITS. Alternate Plan 1, discussed in Section D of the report includes a revetted mole structure adjacent to the south breakwater extension which would have land enhancement value. An area of about 0.8 acres would be created by placement of about 21,500 cubic yards of dredged material. Excess dredged material, composed of mixed limestone reef material and terrigenous sediments, would be disposed at a land site and would be expected to have no market value on Maui. The recent market value of a land lease at the harbor is capitalized at $550,000 per acre. The created 0.8 acre parcel would have a value of about $440,000. The cost of equivalent fill material is about $15 per cubic yard (in place) for a total cost of $322,500 for the required volume of 21,500 cubic yards. Using the equivalent fill value of $322,500, and deducting the extra cost of $143,000 incurred by placing the revetted fill area instead of disposing on land, the equivalent average annual benefit of $13,000 is generated at the current interest rate of 7-1/8 percent.

10. EMPLOYMENT (EDA) BENEFITS. EDA benefits have been derived in accordance with Part IX of the Water Resources Council final rule, 14 December 1979. Maui has been an area of prolonged and substantial unemployment. The proposed improvement construction would have labor costs of 10.48 percent of total construction contract cost. The construction work force has been estimated to be 23.5% skilled, 76.1% unskilled and 0.4% other categories of workers. These were multiplied by 30, 47 and 35 percent, respectively to compute the NED portion of the wages (Case 1). The number of insured unemployed construction industry workers averaged 125 per month in Maui for 1979. One skilled, six unskilled and one other worker previously unemployed are expected to be employed by this project. Their respective wages would total $25,000, $126,000 and $5,000. The total NED appropriate wage benefits were then amortized over the 50-year project life at the 7-1/8 percent rate which yields EDA average annual benefits of $11,000.

11. SUMMARY AND ALLOCATION OF BENEFITS. The various benefits anticipated for the proposed 310 boat harbor are summarized in Table XA-4. The benefits have been rounded to the nearest $1000 for the summary table. The average annual benefits for the tentatively selected plan (Plan 1) are $744,000.

TABLE XA-4. BENEFIT SUMMARY AND ALLOCATION OF BENEFITS

Benefit Category	Average Annual Benefit Total	General	Local
Recreation Navigation	$252,000	$126,000	$126,000
Charter Operations	128,000	128,000	
Commercial Fishing	328,000	328,000	
Damage Reduction to Existing Craft			
Recreation1/	8,000	4,000	4,000
Charter	2,000	2,000	
Fishing	2,000	2,000	
Land Enhancement2/	13,000	6,500	6,500
Employment (EDA) Benefits	$11,000		
TOTAL AVERAGE ANNUAL BENEFIT3/	$744,000	$596,500	$136,500

1/ Includes trailer craft.
2/ Land enhancement benefits apply to Alternate Plan 1 only.
3/ Average annual benefit of $744,000 applies to Alternate Plan 1 only. Average annual benefit for Alternate Plans 2 and 3 excludes land enhancement for a total of $731,000.

APPENDIX B

DESIGN ANALYSIS

APPENDIX B

DESIGN ANALYSIS

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APPENDIX B

DESIGN ANALYSIS

1. WAVE EXPOSURE AND REFRACTION ANALYSIS

1.1 The location of the existing Maalaea Harbor is sheltered from direct wave exposure from nearly all directions by the islands of Maui and Kahoolawe. The harbor is, however, directly exposed to wave attack from the south and indirectly exposed from the southwest (see Figure B-1 in Section B of the main report). The indirect exposure from the southwest can produce large waves at the harbor, but waves must refract and diffract around MacGregor Point, 1.5 miles southwest of the harbor, reducing the probability of severe wave conditions. The wave attack corridor from the south is more likely to produce maximum severity. A detailed, computer-aided refraction analysis was performed for this wave attack corridor. Results of the refraction analysis are used to help locate and quantify energy convergence zones near the harbor, and to help determine critical wave crest alignment at existing and proposed entrance channels. Critical wave crest alignment is used in the wave diffraction analysis discussed later.

1.2 Examination of the southern attack corridor indicated a range of possible attack directions from about 165°N azimuth to about 180°N azimuth, where azimuths are measured clockwise from true north, and indicate the direction from which waves are coming. The waters through which the waves in this corridor must pass are located between the southern end of East Maui and the military target island of Kahoolawe. Water depths are shallow enough to cause wave refraction effects as far as 15 miles from Maalaea for the typical southern swell. This results in extremely complex refraction characteristics. A computer program (number 743-F3-R0015) from the U.S. Army Engineers' Waterways Experiment Station in Vicksburg, Mississippi, was employed in a two step analysis to aid the study.

1.3 Waves with periods of 12, 14, 16, and 18 seconds for azimuths of 165°N, 170°N, 175°N, and 180°N were investigated. Step one of the analysis carried wave rays to north latitude 20°44', about 4 miles from the harbor. Step two carried rays from 20°44'N to the harbor area.

1.4 Results of step one indicate that all of the above directions can cause waves at Maalaea. Waves from 175°N, however, appear to be most likely to cause critical wave attack because of higher refraction coefficients resulting from that direction.

1.5 Wave rays with the highest refraction coefficients and with directions likely to carry them to the harbor area were transferred to a larger scale grid for step two of the analysis. To account for possible inaccuracies, and to provide adequate coverage, each transferred ray was replaced by 3 sets of 5 to 7 rays each. The approach directions of the 3 sets were based on the direction of the ray from step one: directions of the 3 sets were 2° apart in azimuth with the center direction being that of the transferred ray.

1.6 Results of the refraction analysis are shown in Figure XB-1 and in Table XB-1. Zones A, B and C in the Figure were selected to allow comparison of adjacent offshore areas which could affect harbor performance and design. Each zone is 500 feet wide and is aligned with the expected predominant wave approach direction of about 160°N azimuth indicated by the computer analysis and confirmed by aerial photography and actual wave observations by Corps personnel. Table XB-1 shows average refraction coefficients and approach directions for the various periods:

Table XB-1. Wave Refraction Data

Zone	Wave Period (Sec)	Average Refraction Coefficient	Avg Azimuth at -15' Contour
A	12	0.66	160°N
	14	0.63	162°N
	16	0.59	159°N
	18 1/	Not Computed	Not Computed
B	12 1/	Not Computed	Not Computed
	14	0.85	163°N
	16	0.59	161°N
	18	0.50	158°N
C	12 1/	Not Computed	Not Computed
	14	0.52	160°N
	16	0.45	158°N
	18	0.56	163°N

1/ Orthogonals from the refraction analysis did not terminate in this zone for this wave period.

1.7 In addition to the above results, the computer analysis indicated that a shoal area about 1 mile directly south of Maalaea Harbor is likely to cause strong wave energy convergence resulting in higher than normal seas and possibly hazardous conditions near the shoal. Focusing of wave energy near the harbor could possibly result from some combinations of wave period and direction, but was not revealed by the computer analysis.

1.8 Conclusions from the refraction analysis are that large southern swell waves, especially those originating from about 175°N azimuth, are likely to cause critical wave attack at Maalaea Harbor for wave periods of 12 to 18 seconds, critical wave attack being that which is most likely to produce the largest and most potentially damaging waves. Since maximum breaking wave conditions are known to occur at the project site, depth-controlled design wave criteria should be used for selection of design wave height. The proposed entrance channel location is unlikely to be a zone of wave energy convergence. Critical wave direction at the harbor entrance, to be used in the wave diffraction analysis, should be 160°N azimuth.

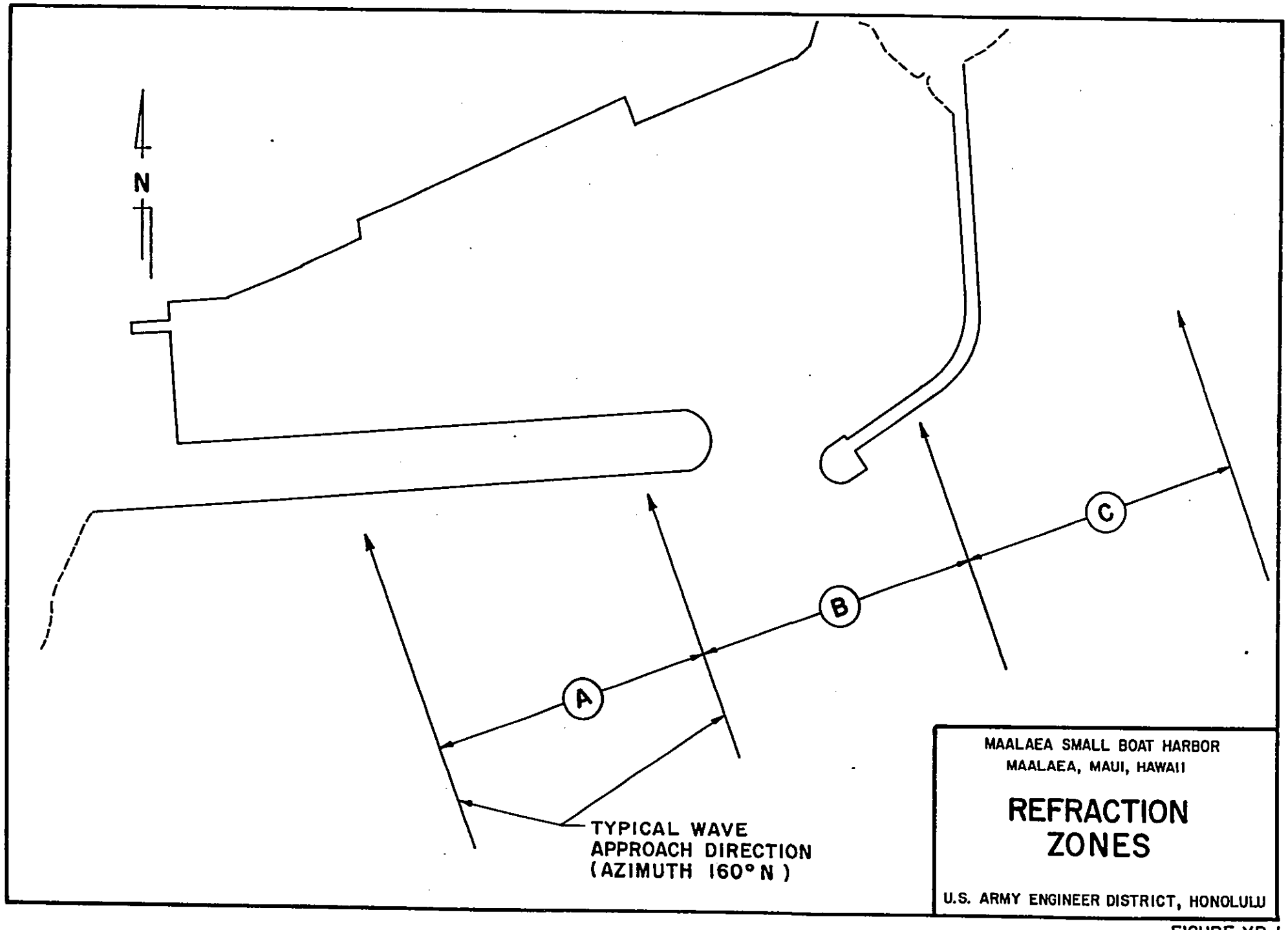

N
A
B
C
TYPICAL WAVE
APPROACH DIRECTION
(AZIMUTH 160° N)
MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII
REFRACTION
ZONES
U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE XB-1

2. DESIGN STILLWATER LEVEL. The design stillwater level (SWL) is defined as the level of water above the elevation datum plane, when no waves are present. Components of the SWL are astronomical tide level (S_a), wave setup (S_w), atmospheric pressure induced level (S_p), and storm surge (S_s). Still water level components are calculated as follows:

a. Astronomical tide level, S_a: The maximum expected astronomical tide is estimated to be about 0.2 feet above the inerpolated mean higher high water level of 2.3 feet, discussed in Section B of the main report. Total astronomical tide level is 2.3' + 0.2' = 2.5 feet.

b. Wave setup, S_w: Wave setup is estimated from calculated theoretical values, considering that the location of the primary protective structure is not in the zone of maximum wave setup. Under certain wave conditions the structure may be in a zone of wave setdown, resulting in a relatively lower water level. For engineering calculations, a value of 0.5 feet will be used for S_w.

c. Atmospheric pressure induced level, Sp: The following storm parameters were used in the calculation of S_p: a central pressure drop of 1 inch of H_g, a radius of maximu winds of 20 miles, and a distance to the storm center of 35 miles. The resulting water level rise is calculated to be 0.5 feet.

d. Storm surge, S_s: Storm is estimated rather than calculated because of the difficulty in assessing storm surge values for complex hydrographic conditions, and in evaluating parameters for an island embayment surrounded by a large, deep body of water. The estimated value is 0.5 feet.

SWL = Design Stillwater level
SWL = $S_a + S_w + S_p + S_s$
SWL = 2.5' + 0.5' + 0.5' + 0.5'
SWL = 4.0'

3. DESIGN VESSELS

3.1 The design vessel dimensions are based on the largest vessel expected to use the harbor, and on a typical medium-sized vessel expected to use the harbor most frequently.

3.2 The length dimension for the larger design vessel is representative of a large commercial tuna sampan. The related beam and draft dimensions are proportioned to the known dimensions of the U.S. Coast Guard cutter which is stationed at Maalaea Harbor. The dimensions for the large design vessel are:

a. length: 110 feet
b. beam: 24 feet
c. draft: 7.5 feet

3.3 The dimensions of a typical medium-sized vessel expected to use the harbor most frequently are estimated to be:

a. length: 55 feet
b. beam: 12 feet
c. draft: 4 feet

4. CHANNEL AND BASIN DIMENSIONS

4.1 CHANNEL DEPTH. Required depth for safe navigation of the large design vessel is computed as the sum of the following items at the calculated and estimated values shown:

a.	Loaded draft of the design vessel	7.5 feet
b.	Expected water level below MLLW	0.5 feet
c.	Vessel squat at 5 knots	1.0 feet
d.	Pitch and roll due to wave action	4.0 feet
e.	Bottom clearance	2.0 feet
	Total Channel Depth	15.0 feet

4.2 Channel depth is decreased to 12.0 feet where wave action has been reduced by the breakwater structures.

4.3 CHANNEL WIDTH. Required channel width is based on concurrent, 2-way passage of the large- and the medium-sized design vessels. Total channel width is the sum of 1) the manuevering lane width for each vessel, 2) the ship clearance lane based on the large design vessel, and 3) the bank clearance lane widths for each vessel. Width factors are calculated from Corps of Engineers design guidance assuming good vessel operators, presence of strong and gusty winds, and rough sea conditions. Lane widths and total channel width are:

Lane	Factor	Beam (feet)	Width (feet)
Manuevering lane (large)	2.0	24	48
Manuevering lane (medium)	2.0	12	24
Ship clearance (large)	1.0	24	24
Bank clearance (large)	1.5	24	36
Bank clearance (medium)	1.5	12	18
Total Channel Width			150

4.4 Channel width is increased to 180 feet at the 45° turn into the harbor basin.

4.5 BASIN DIMENSIONS. Basin dimension calculations are restricted to determination of adequate turning basin requirements since the overall basin dimensions are already fixed for the existing facility. Turning basin dimensions were kept to a minimum to allow for as much berthing space as possible. The width of the turning basin is 1.8 times the length of the large design vessel and 3.6 times the length of the medium design vessel.

The length of the turning basin is 2.9 times the length of the large design vessel and 5.8 times the length of the medium design vessel. Total turning basin area is 1.7 acres.

5. WAVE DIFFRACTION ANALYSIS.

5.1 Diffraction analysis was performed on both the existing harbor and the improved harbor. The analysis for the improved harbor applies equally to Alternate Plans 1, 2 and 3.

5.2 Incident wave direction was determined from the refraction analysis described previously. Critical wave approach at the harbor entrance was determined to be from 160°N azimuth.

5.3 The diffraction analysis was performed in accordance with procedures, techniques, and diagrams described in the CERC Shore Protection Manual.

5.4 Lines of equal diffraction coefficient are plotted and labeled on Figures XB-2 and XB-3. Wave height at any point within the harbor channel and basin is determined by multiplying the diffraction coefficient by the incident wave height. Direct comparison of wave heights in the existing harbor and the improved harbor can be made on the Figures.

6. BREAKWATER DESIGN AND STABILITY ANALYSIS.

6.1 Breakwater design is based on depth-controlled wave breaking criteria, assuming that the structure will be subjected to the maximum breaking wave condition at some time in the life of the project. Also considered is the fact that the maximum breaking wave rarely occurs at the project location, since the area is well protected from most directions.

6.2 Stability analysis for the armor protection was performed in accordance with procedures, techniques, and diagrams described in the CERC Shore Protection Manual.

6.3 Armor unit weight at critical locations along the breakwater extension was determined by a trail-and-error process to find the largest wave which could break on that section of the structure. The stability coefficient was varied within acceptable limits to arrive at a final choice of armor unit size for the section being analyzed. Underlayer stone weights are designed to be about W/5, where W is the weight of an individual dolos armor unit, or W/10 where stone armor units of weight W are utilized. Core or bedding layer stones are about W/15 or W/20, depending on underlayer size and structure characteristics.

6.4 Table XB-2 identifies critical locations and shows the various design parameters and the resulting armor unit weights for each location. Specific weight of concrete is assumed to be 147 lbs/cu ft. The dolos armor unit utilized in all three alternate plans is shown in Figure XB-4. Specific weight of armor stone is assumed to be 165 lbs/cu ft, based on a bulk, saturated, surface-dry specific gravity of 2.65.

6.5 Crest elevation of the south breakwater extension was designed below the "non-overtopping" requirement because of the infrequency of occurrence of high wave conditions at Maalaea. Existing wave data does not permit a useful evaluation of wave height exceedance probability for Maalaea Harbor, but the area is well known by harbor users and by personnel of the State Harbors Division. Testimony indicates that the overtopping occurrences of a breakwater crest at elevation +13.0 feet (MLLW) will be few. This elevation will provide adequate entrance channel protection under all but the most extreme sea conditions.

6.6 Flume tests of three alternate main breakwater cross section designs were conducted by the Waterways Experiment Station in Vicksburg, Mississippi. Tests were conducted at an undistorted linear scale of 1:27.5, model to prototype, in a 5-foot-wide, 250-foot-long flume. Test Section 1 is shown on Plate E-1 in the main report as Section A-A'. Test Section 2 was similar to Test Section 1 except the harbor-side armor was 7- to 10-ton stone instead of 6-ton dolos. Test Section 3 was similar to Test Section 2 except the structure side slopes were steepened to 1.5H:1V. Tests were conducted for wave periods of 12, 14, and 16 seconds at the design water level of +4.0 feet above mean lower low water (MLLW) and at -1.0 feet MLLW to investigate stability during the most severe overtopping conditions and during the worst toe stability conditions, respectively. Additional tests were conducted for Test Sections 2 and 3 at water levels of +6.0 feet MLLW and +8.0 feet MLLW in an attempt to determine a "factor of safety" value.

6.7 Results of the flume testing indicate that all three test sections are stable when subjected to the most severe gravity wave conditions expected to occur at the project site during the life of the project. Some intermittent, minor rocking of the seaside armor units (6-ton dolos) was observed on all the test sections during some phases of the testing; however, this is considered to be permissible. During "factor of safety" testing, no catastrophic failure occurred, but an increased level of armor unit movement was observed with each increase in water level. Noticeably higher wave transmission was observed, but not measured, for Test Section 3 than for Test Sections 1 and 2, due to the reduced cross sectional area of Test Section 3.

6.8 Since all test sections were structurally stable, selection of a cross section design for prototype construction becomes a matter of engineering judgment and economic consideration. It appears that 6-ton dolos armor units should be used on the seaside of the main breakwater at either the 2H:1V or the 1.5H:1V slope, the 1.5H:1V being less expensive. The choice of armor unit on the harborside should be specified as a contractor's option, the stone being less expensive if it can be readily obtained in sufficient quantity. The harborside slope should be 2H:1V to minimize wave transmission if the seaside slope is specified at 1.5H:1V.

6.9 East breakwater modification includes removal of about 80 feet of the head of the existing structure. The rebuilt head would utilize armor stone from the removed portion. Two layers of stone larger than 3 tons are required at a slope of 1.5 horizontal to 1 vertical, assuming maximum breaking wave conditions.

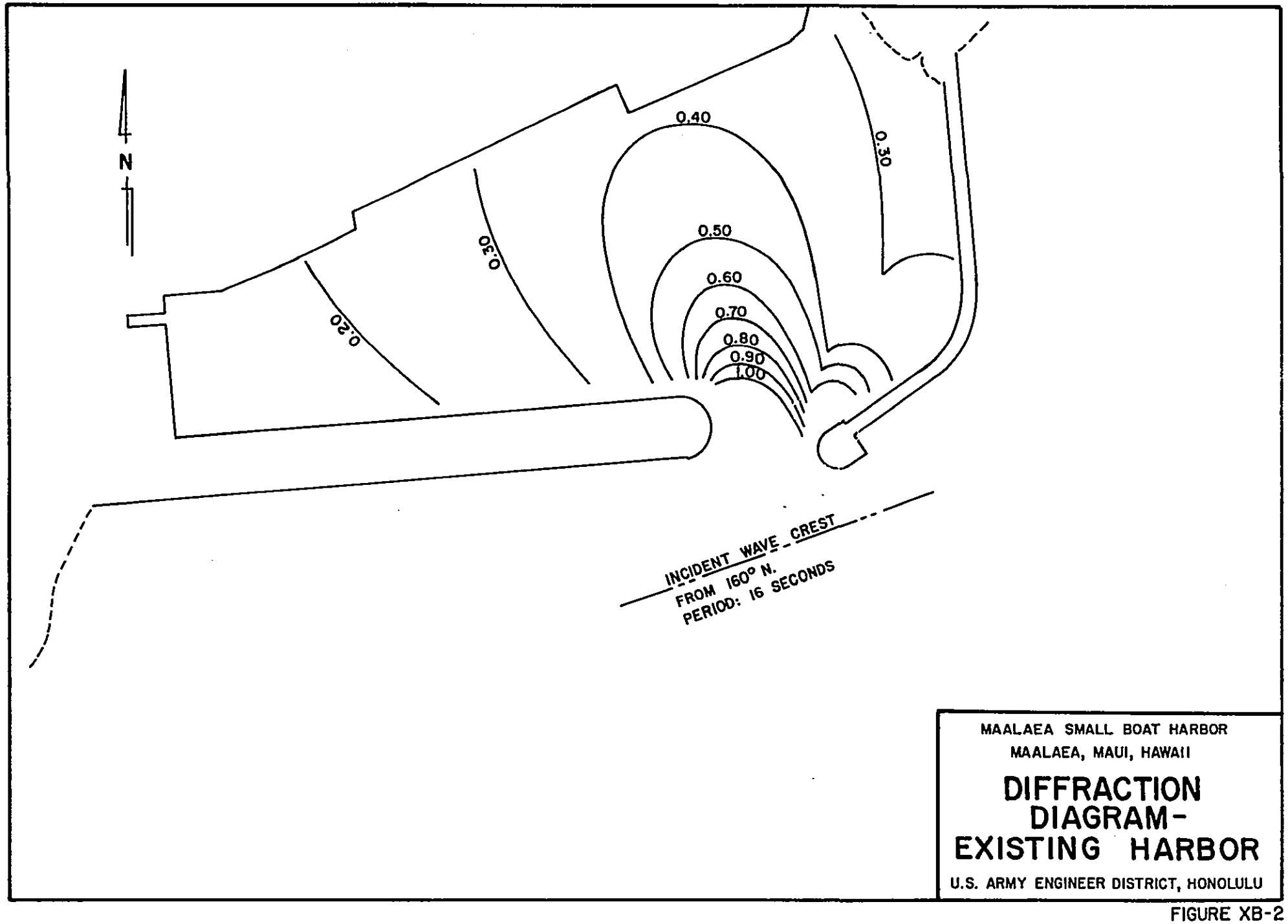

N
0.40
0.30
0.50
0.60
0.70
0.80
0.90
1.00
0.30
0.20
INCIDENT WAVE CREST
FROM 160° N.
PERIOD: 16 SECONDS
MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII
DIFFRACTION DIAGRAM-
EXISTING HARBOR
U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE XB-2

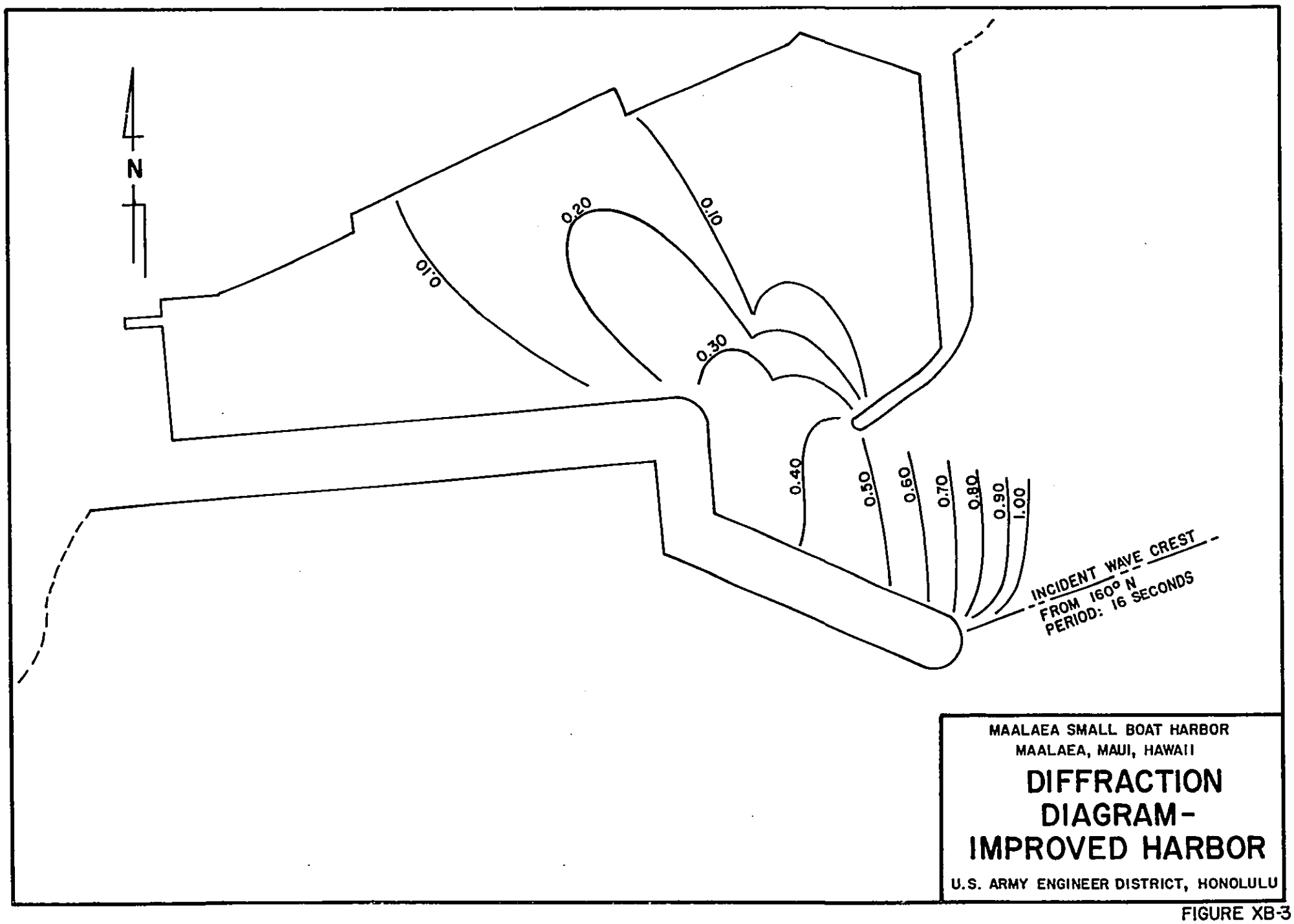
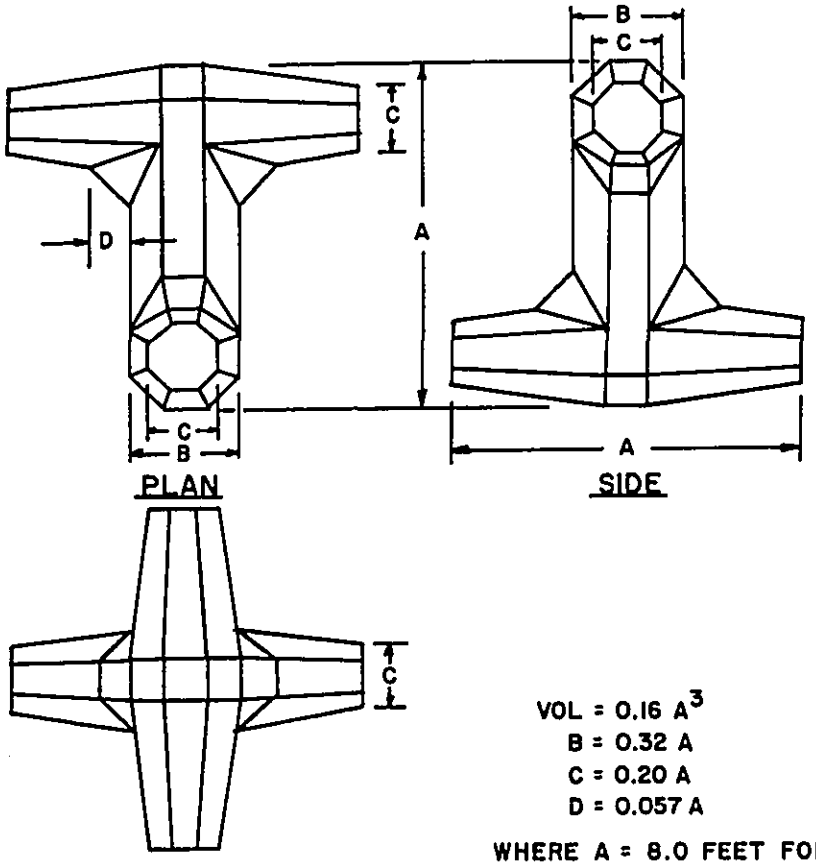

N
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
INCIDENT WAVE CREST
FROM 160° N
PERIOD: 16 SECONDS
MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII
DIFFRACTION DIAGRAM- IMPROVED HARBOR
U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE XB-3



VOL = 0.16 A^3
B = 0.32 A
C = 0.20 A
D = 0.057 A

WHERE A = 8.0 FEET FOR 6-TON DOLOS

MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII

DETAILS OF DOLOSSE ARMOR UNIT

U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE XB-4

Table XB-2. Design Parameters and Armor Unit Weights for Various Breakwater Sections

Alternate Plan No.	Location (see Plans)	Bottom Slope[1]	Design Water Depth[2]	Design Breaker Height[3]	Cotangent of Structure Slope	Stability Coefficient[3]	Armor Unit Weight	Armor Unit Type
1, 2, 3	Head 'A'	0	20.0'	15.6'	2	10.8	6-Tons	Dolos
1, 2, 3	Sta 5+00 'A'	0.030	16.0'	17.1', 16.5'	2	14.0, 12.6	6-Tons	Dolos
1, 2, 3	Sta 3+80 'A'	0.020	19.0'	18.4', 17.7'	2	17.5, 15.6	6-Tons	Dolos
1	Sta 3+00 'B'	0.030	10.0'	11.0', 10.6'	2	3.5	7-to 10-Ton [4]	Stone
1	Sta 1+40 'B'	0.014	7.5'	6.9'	2	2.5	1- to 2-Ton	Stone
1	Sta 0+50 'A'	-	-	6.0'[5]	2	3.5	1- to 2-Ton	Stone
2	Sta 0+50 'A'(ext)	0.013	10.0'	9.0'	2	2.8	2- to 4-Ton	Stone

1/ Bottom slopes are calculated from detailed hydrographic surveys not shown in this report.
2/ Water level used in calculations is 4.0 feet above MLLW level.
3/ Where two values appear, the first is calculated for wave period, T, equal to 18 seconds, which is assumed to be the probable worst condition excluding tsunami. The second value is for T=12 seconds, representing severe "Kona" storm conditions. Where only one value appears, wave height is not dependent on wave period. Computations employ figure 7-4, Shore Protection Manual, CERC, 1977.
4/ Weight has been increased by 40 percent over calculated value to account for overtopping.
5/ Wave height determined from diffraction analysis.

6.10 Also included in east breakwater modification is the addition of a revetted mole on the interior site of the existing structure. The 500 to 800 pound armor stone was designed for a breaking 4-foot-high wave. The crest elevation of the existing structure between Station 4+50 and Station 6+00 was checked for overtopping and found to be subject to wave splash under some conditions. Historically, the structure has been subject to occasional minor overtopping during high wave conditions. However, no modification to the east breakwater crest elevation has been provided because, construction of the south breakwater extension is expected to reduce the frequency of these minor overtopping occurrences at the east breakwater.

7. SUBSURFACE CONDITIONS. A subsurface investigation consisting of 7 borings was conducted at Maalaea Harbor in April-May 1980. Boring locations are shown on Plate E-1 in Section E of this report. Boring logs are presented on Figure XB-5 in this appendix. The three probings were attempted within the existing harbor entrance channel, perpendicular to the channel alignment at Boring 15, using a one-inch pipe and a 150 gpm water pump. No penetration could be achieved at any of the three locations. Samples were tested for gradation, Atterburg limits, specific gravity, and water content. Test results are shown in Table XB-3.

7.1 Borings found that a lightly cemented coral limestone breccia crust, about a foot thick, covers most of the bottom adjacent to the existing harbor. Unconsolidated clastic marine sediments with coral sands, gravels, cobbles and boulders underlie the surface crust. Clay, silt and sand from terrigenous sources cover the floor of the existing harbor basin. In two borings in the inner harbor, reddish-brown clay was encountered below the coral limestone sediments.

7.2 FOUNDATIONS. No foundation problems are anticipated for any of the proposed structures. However, the breakwater toe, along sections which would be constructed on uncemented coral limestone sediments, particularly in the area of the existing entrance channel, should be protected against scour by extending suitable bedding material beneath and five feet beyond the armor toe. Where the structure rests on the lightly cemented crust, special bedding material is not required under the toe.

7.3 DREDGING. Conventional dredging equipment such as heavy duty backhoes, clamshells, and hydraulic cutter heads should be able to remove the crust layer and underlying coral rubble without blasting. However, isolated spot blasting may be required to initiate excavation. Blasting will not be permitted during the winter months when Humpback whales may be in the Maalaea Bay area. Excavation slopes of 1 vertical to 3 horizontal are expected to be stable. Bench width of 20 feet from the top of the excavated slope to the toe of the protective structure should provide for sufficient structural stability including an allowance for some additional slope flattening due to scour.

8. SAND MOVEMENT AND SHOALING. Underwater reconnaissance of the harbor area indicates that relatively small quantities of sand are present on the surface of the limestone reef down to depths of about 15 feet, where more sand is present. Based on shoaling rates within the mouth of the existing harbor, developed from information from the State Harbors Division, and estimates of maintenance dredging requirements for the authorized plan, a

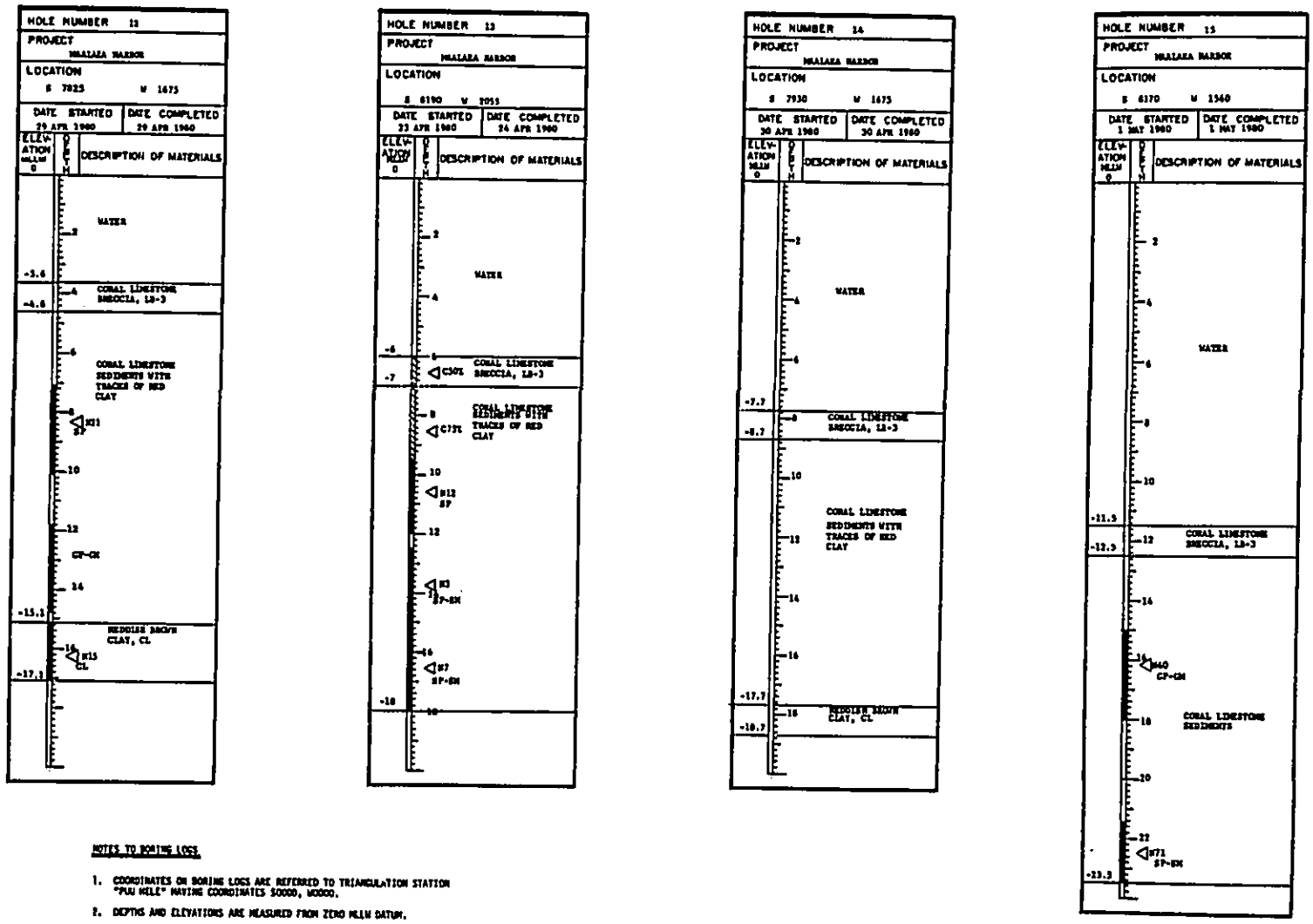
revised estimate for the plans shown in this report was developed. Maintenance dredging requirements for the plans in this report are higher than the authorized plan requirements because the structure extends into deeper water and will tend to intercept littoral drift. The resulting shoaling is expected to occur primarily in the entrance channel in the lee of the breakwater extension. Shoaling within the harbor basin is expected to continue at about its present rate due to continuing deposition of terrigenous sediments which arrive via the four storm drains which enter the basin. Periodic maintenance dredging of the areas adjacent to each of the drains will be the major requirement within the basin. It is estimated that about 1,000 cubic yards every 10 years will be added to the existing non-federal dredging requirement, due to the creation of the new berthing area adjacent to the existing east breakwater. Federal derdging is estimated to be about 8,000 cubic yards every 10 years.

9. BASIN CIRCULATION. Circulation within the existing harbor basin is adequate and is not expected to change significantly as a result of the proposed improvements.

10. CONSTRUCTION MATERIALS. Construction materials will consist of basalt stone and concrete. These materials and their availability are as follows:

10.1 Stone construction material can be obtained from two commercial quarries on Maui. Bulk, saturated, surface-dry specific gravity ranges from 2.6 to 3.0. The two quarries are Concrete Industries (Puunene Quarry) and Maui Concrete Aggregates (Waikapu Quarry). Rock outcrops exposed along Highway 30 between Maalaea and Lahaina, and fieldstone at various locations on Maui are potential sources for stone. Piles of fieldstone resulting from land clearing operations by sugar companies are located on hillsides between Maalaea and Lahaina, north of Maalaea Bay in the vicinity of the Old Puunene Airport, and west of Highway 30 between Maalaea and Wailuku. Arrangements for obtaining stones from the above locations will be the responsibility of the construction contractor. A nominal charge may be assessed by sugar companies for rock removed from their fields. Sugar company representatives have indicated that selective borrowing of individual rock pieces will not be permitted (the entire stockpile must be removed).

10.2 About 7,300 cubic yards of concrete will be required for construction of dolos armor units and the rib cap on the main breakwater, if dolos are used on the harborside of the structure instead of stone. Compressive strength of 5,000 psi (water-cement ratio of 0.40) will be required for concrete. Type II cement will be specified due to seawater exposure conditions. Cement conforming to ASTM C-150, Type II is produced by the manufacturers on Oahu island, Kaiser Cement and Gypsum Corp. and Hawaiian Cement Corp. Concrete coarse aggregate (basalt) conforming to ASTM C-33 is available at both Concrete Industries and Maui Concrete and Aggregate in maximum nominal sizes of 3/4-inch, 1-inch, and 2-1/2 inches. In addition, 1-1/2 inch maximum nominal size aggregate is available at Concrete Industries. Bulk, saturated, surface-dry specific gravity averages about 2.70, and absorption is about 3.2, for concrete aggregate obtained from Maui Concrete and Aggregate. Aggregate obtained from Concrete Industries would have an average bulk, saturated, surface-dry specific gravity of 2.80 and absorption



NOTES TO BORING LOGS

1. COORDINATES ON BORING LOGS ARE REFERRED TO TRIANGULATION STATION "PUU HILE" HAVING COORDINATES S0000, W0000.
2. DEPTHS AND ELEVATIONS ARE MEASURED FROM ZERO MLLW DATUM.
3. DESCRIPTION OF MATERIALS SHOWN ON THE LOGS ARE BASED ON VISUAL CLASSIFICATION OF SAMPLES IN THE FIELD. ALL SOIL CLASSIFICATIONS ARE BASED ON ASTM D-2487-69.
4. ALL HOLES THROUGH CORAL SEDIMENTS WERE CASED.
5. FOR BORING LOCATIONS SEE PLATE ____.

LEGEND

PENETRATION RESISTANCE IN BLOWS PER FOOT, ASTM D-1586-67

PERCENT 4" DIAMETER CORE RECOVERED

STANDARD PENETRATION TEST RESULTS

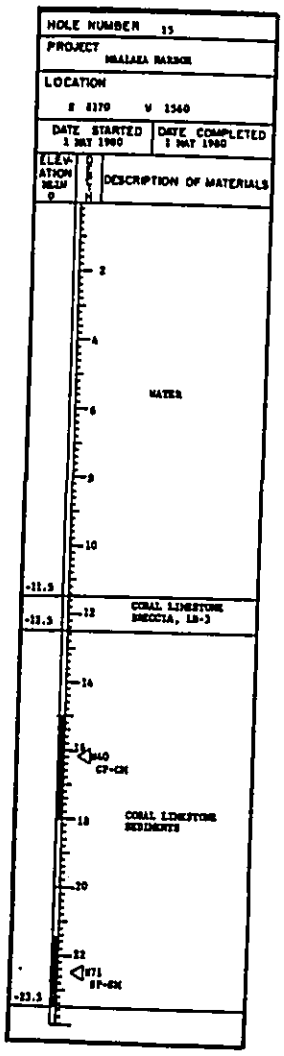
CORE DRILLING (4" x 5")

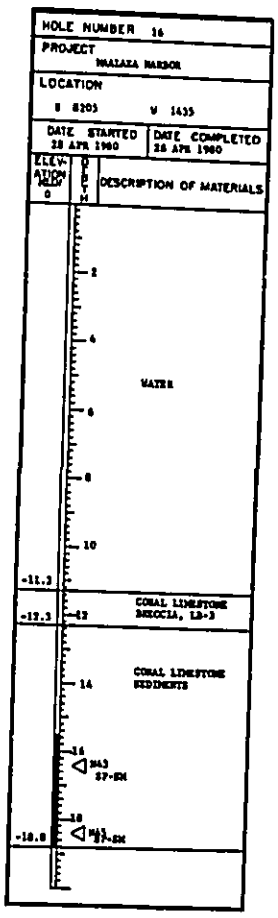
GENERAL DESCRIPTION OF MATERIALS

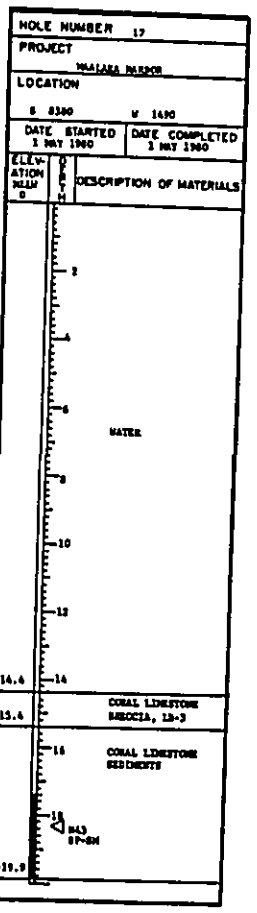
CORAL LIMESTONE BRECCIA: TAN TO REDDISH BROWN; ANGULAR FRAGMENTS RANGE FROM SAND AND GRAVEL TO COBBLE SIZES; CALCAREOUS FOSSILIZED SKELETAL PARTS (POLYPS, TENTACLES, COLUMELLA, TESTS, SPINES, SHELLS); CEMENTED SAND SIZE PIECES BOTH ROUNDED AND ANGULAR; ALL IN A FINE GRAINED CEMENTING MATRIX OF CALCIUM CARBONATE; SECONDARY GROWTHS OF CALCITE AND ARAGONITE CRYSTALS; WHITE LIME SECONDARY COATING ON WALLS OR VOIDS AND CRACKS; DEGREE OF CEMENTATION AND NUMBER OF SURFACE CAVITIES (VOIDS) VARIES WITH THE CORE AND IS INFLUENCED BY WEATHERING, EXPOSURE TO AIR, DISSOLUTION, PRECIPITATION RATES OF CALCIUM CARBONATE, ETC.

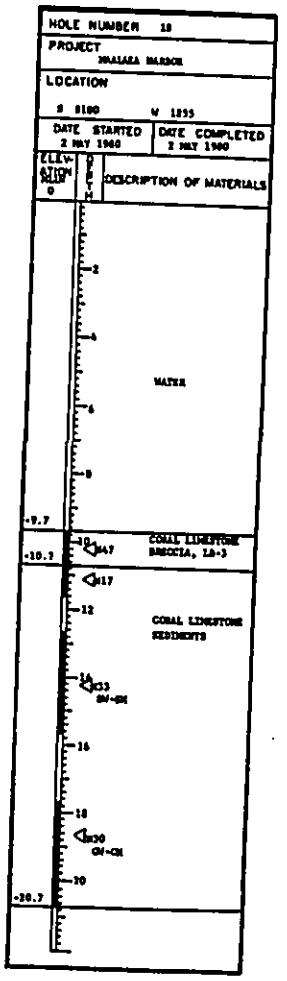
LB-3 SKELETAL CORAL, CAVITIES (VOIDS, HONEY-COMB STRUCTURE, VUGS) COMPRISE MORE THAN 30 PERCENT OF CORE SURFACE. SAMPLES CRUMBLE WHEN REMOVED FROM CORE BARREL. CEMENTING MATRIX WEATHERED AND SOFT. CAVITIES OR VOIDS ARE FILLED OR PARTLY FILLED WITH UNCONSOLIDATED CORAL SEDIMENTS.

CORAL LIMESTONE SEDIMENTS:









...M FRAGMENTS RANGE
...LE SIZES; CALCAREOUS
...CLYPS, TENTACLES,
...KELS); CEMENTED
...D AND ANGULAR; ALL
...MATRIX OF CALCIUM
...T OF CALCITE AND
...HE SECONDARY COATING
...); DEGREE OF CEMENTA-
...ARTICLES (VOIDS)
...INFLUENCED BY
...DISSOLUTION,
...ON CARBONATE, ETC.

...TIDS, HONEY-COMB
...RE THAN 30 PERCENT
...RUBBLE WHEN REMOVED
...MATRIX WEATHERED
...ARE FILLED OR
...CRETED CORAL

CORAL LIMESTONE SEDIMENTS: WHITE, TAN AND SHADES OF REDDISH BROWN, DEPENDING UPON COMBINATION OF SEDIMENT MIXTURES WHICH CONSIST OF FRAGMENTS OF CORAL LIMESTONE MIXED WITH ALLUVIUM (TERRESTRIAL RESIDUAL BASALT FRAGMENTS TRANSPORTED BY STREAMS, SHEET FLOW AND WINDS AND DEPOSITED AS A MUD FLAT); MINERAL COMPOSITION, GRADATION, SHAPE AND TEXTURE VARIES WIDELY DEPENDING UPON THE AMOUNT OF SORTING AND THE DISTANCE PIECES HAVE BEEN MOVED BY WAVES AND CURRENT; SEDIMENTS RANGE IN SIZE FROM CLAY-SILT-SAND TO FRESHLY BROKEN ANGULAR GRAVEL, COBBLE AND BOULDER SIZE PIECES; SOIL COMPONENTS ARE SOFT AND CONSIST OF CELLULAR CALCITE AND ARAGONITE WITH MARINE SHELLS AND CALCAREOUS FOSSIL-SKELETAL PARTS; COMPACTNESS GENERALLY RANGES FROM VERY LOOSE TO DENSE; CLASSIFICATION INCLUDES DECOMPOSED CORAL LIMESTONE BRECCIA TOOSOFT TO CORE; SOIL COMPONENTS ARE SUBDIVIDED IN ACCORDANCE WITH ASTM D 2487-69.

MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII

BORING LOGS

U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE XB-5

TABLE XB-3: SUMMARY OF SUBSURFACE INVESTIGATION TEST DATA

BORING NO./ SAMPLE NO.	CLASS	MLLW ELEVATION (FT)	CUMULATIVE % PASSING												SPECIFIC GRAVITY	WATER CONTENT %	NATURAL DRY DENSITY PCF	ATTERBURG LIMITS		
			1½	1	3/4	1/2	3/8	4	8	16	30	50	100	200				LL	PL	PI
B-12/S-1	SP	7.1-9.8	100	79.1	78.2	70.9	64.3	53.7	47.4	41.4	27.7	18.8	8.5	3.4	2,489	23.2	98		NP	
S-2A	GP-SM	11.8-14.8			100	82.2	66.3	48.0	40.8	34.3	27.9	22.7	13.7	5.1	2,568	32.7	87		NP	
S-2B	CL	15.1-17.1								100	99.9	99.0	96.2	94.4	2,981	29.9	98	40.8	24.9	15.9
B-13/S-1	SP	9.5-12.0	100	97.4	94.7	91.6	84.6	73.9	68.2	62.9	53.9	35.5	10.5	4.7	2,760	28.4	97		NP	
S-2	SP-SM	12.5-15.5		100	95.2	90.2	82.3	64.8	52.7	46.1	40.9	36.7	18.2	6.6	2,695	24.2	102		NP	
S-3	SP-SM	15.5-18.0			100	93.7	89.2	80.4	75.9	72.1	68.1	64.6	24.1	5.8	2,736	23.5	104		NP	
B-15/S-1	GP-GM	15.0-18.0	100	71.7	69.2	62.7	57.4	49.9	44.9	41.0	37.1	28.2	7.5	3.4	2,367	28.3	88		NP	
S-2	SP-SM	21.5-23.5			100	96.4	93.5	87.5	79.8	68.1	57.5	49.4	34.9	10.8	2,789	23.5	105		NP	
B-16/S-1	SP-SM	15.5-18.0		100	86.2	73.7	69.2	58.5	49.6	42.8	37.0	29.6	13.5	6.6	2,564	23.5	100		NP	
S-2	SP-SM	18.0-18.8		100	97.9	86.0	78.8	65.0	56.2	48.7	42.7	34.6	20.2	8.8	2,608	22.9	102		NP	
B-17/S-1	SP-SM	17.4-19.9		100	92.2	89.1	85.9	73.8	64.1	54.6	45.6	37.1	15.2	5.9	2,750	23.9	104		NP	
B-18/S-1	GW	9.7-11.7	100	90.1	79.3	68.1	57.0	41.9	31.2	25.0	21.3	17.1	6.1	3.2	2,431	36.9	80		NP	
S-2	SW-SM	12.7-15.7		100	96.1	86.5	77.0	58.8	49.1	42.8	37.0	29.3	13.0	5.9	2,621	26.7	96		NP	
S-3	GW-SM	17.7-20.7		100	95.1	77.8	65.9	47.1	37.7	31.4	26.4	21.7	13.1	6.1	2,693	19.3	111		NP	

of about 2.8. Concrete aggregates produced by these two suppliers have been used satisfactorily on various Corps of Engineers flood control and breakwater rehabilitation projects on the island of Maui.

11. CONSTRUCTION COST ESTIMATE. The detailed construction cost estimate presented in this paragraph supplements the estimate for the selected plan shown in Table E-2 in Section E of the main report. Prices are at a January 1980 level. An escalation factor has been applied to account for inflation during the construction period. Contractor mobilization and demobilization has been shown as a separate item. Dredging estimates assume that blasting will be required for 25 percent of the work although subsurface borings now indicate that blasting may not be necessary. Dredging estimates also include the cost of hauling excess dredged material to a land disposal site assumed to be within a 5 mile radius of the project site. Estimates for the main breakwater armor assume that concrete dolos will be used exclusively. Model tests have confirmed that stone may safely be used on the harborside of the main breakwater at a substantially lower cost. The option to use stone would be left to the contractor. Table XB-4 presents the detailed construction cost estimate.

TABLE XB-4. DETAILED CONSTRUCTION COST ESTIMATE

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	ITEM COST	
CORPS OF ENGINEERS WORK					
Mobilization & Demobilization	1	Job	Lump Sum	$ 117,400	
Channel & Basin Excavation					
Dredging	29,300	Cubic Yards	$ 14.70	$ 430,700	
Compacting Fill	21,500	Cubic Yards	2.00	43,000	
Hauling Excess	7,800	Cubic Yards	2.00	15,600	$ 489,300
Breakwaters & Revetments					
6-Ton Concrete Dolos	2,110	Each	$640.00	$1,350,400	
Concrete Rib Cap	850	Cubic Yards	490.00	416,500	
7- to 10-Ton Stone	6,900	Tons	25.20	173,900	
6- to 8-Ton Stone	2,180	Tons	25.20	54,900	
1- to 2-Ton Stone	15,510	Tons	23.60	366,000	
1000-2000 lbs Stone	2,600	Tons	19.90	51,700	
100-500 lbs Stone	9,280	Tons	21.20	196,700	
200-400 lbs Stone	1,950	Tons	21.20	41,300	
50-150 lbs Stone	1,440	Tons	18.10	26,100	
Modify East Breakwater	1	Job	Lump Sum	76,800	$2,754,300
Inflation Escalation Estimate			Lump Sum	$ 202,000	
Contingency (15 percent)			Lump Sum	$ 534,000	$ 736,000
TOTAL CORPS OF ENGINEERS CONSTRUCTION COST					$4,097,000
NON-FEDERAL WORK					
Channel & Basin Excavation					
Dredging	15,000	Cubic Yards	$ 7.10	$ 106,500	
Compacting Fill	11,500	Cubic Yards	2.00	23,000	
Hauling Excess	3,500	Cubic Yards	2.00	7,000	$ 136,500
Revetment					
500-800 lbs Stone	2,680	Tons	$ 19.90	$ 53,500	
50-100 lbs Stone	1,380	Tons	18.10	25,000	$ 78,500
Inflation Escalation Estimate			Lump Sum	$ 13,000	
Contingency (15 percent)			Lump Sum	$ 34,000	$ 47,000
TOTAL NON-FEDERAL CONSTRUCTION COST					$ 262,000
TOTAL ESTIMATED CONSTRUCTION COST					$4,359,000

APPENDIX C

RECREATIONAL AND NATURAL RESOURCES

APPENDIX C

RECREATIONAL AND NATURAL RESOURCES

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APPENDIX C

RECREATIONAL AND NATURAL RESOURCES

1. RECREATIONAL RESOURCES.

1. Recreation problems and needs have been previously documented in the County of Maui Open Space and Outdoor Recreation Planning Study, January 1974. One of the major problems in recreational resource management pointed out in the study is the increased demand for shoreline areas for large resort developments and high density residential development. Many of the most popular beaches on Maui are lined with resort complexes and have minimal public access. Popular fishing and surfing areas have been lost or access denied through development of shoreline areas.

1.2 The Maalaea Bay region is considered to have high potential for public recreation. The coastline east of Maalaea comprises an almost continuous white sand beach with immediate public access. The ocean is generally calm with no strong longshore currents, permitting swimming and safe entry into the water. Nearshore waters are seasonally clear for snorkling and diving, especially off Palalau where a rich, diverse coral reef area is located. Shell collecting within the bay is considered excellent and is a widely practiced recreational activity. Numerous surfing sites exist along the coast. Surf is seasonal, being dependent upon the south swell. One of the most notable of Maui's surf sites, commonly called the "Maalaea Pipeline" is located just east of Maalaea Boat Harbor. Another popular surf site, called "Off-the-Wall" is located off the harbor's south breakwater. Maalaea Harbor provides mooring facilities for commercial and recreational fishing and pleasure craft. Recreational fishing at Maalaea Harbor consists of pole and line fishing from the breakwater. In addition, spear and torch fishing are done near the breakwaters. Within the harbor, Nehu are occasionally caught for bait. Fish and shell fish taken by local fishermen from this area include manini, papio, oama, o'io, mullet, aholehole, weke, lobster, octopus and grapid crabs.

1.3 SCENIC AND WILD RIVERS: None are present in the Maalaea area.

1.4 NATIONAL TRAILS: None are present in the Maalaea area.

1.5 NATIONAL SHORELINE, PARKS OR BEACHES: None are present in the Maalaea area.

2. NATURAL RESOURCES.

2.1 TERRESTRIAL RESOURCES. A survey of the major terrestrial vegetation and the fauna utilizing the habitat adjacent to the existing small boat harbor was performed by U.S. Fish and Wildlife personnel. The survey area has been altered by harbor and ancillary road development and the introduction of exotic vegetation. Kiawe (Prosopis pallida), and bristly foxtail (Setaria verticillata), both exotic introductions, are among the dominant plants

present along the shoreline. Coconut (Cocos nucifera) and ironwood (Casuarina equisetifolia) have been planted along the south breakwater. The ground cover in this area consists principally of Sesuvium portulacastrum and Scaevola taccada. According to local boaters, large kiawe (50'+) found along the western portion of the harbor area act as windbreaks reducing, to a slight degree, navigational difficulties in high winds.

2.2 Although Ma'o (Gossypium tomentosum Nutt.), an endemic wild cotton proposed for Federal endangered species status, was not sighted in this area, it has been reported for the general project vicinity.

2.3 Biologists observed two species of exotic passerine birds in the proposed project area, the common mynah (Acridotheres tristis) and house sparrow (Passer domesticus). Although some gamebirds including the ring-necked pheasant (Phasianus colchicus torguatus), grey francolin (Francolinus pondicerianus) and lace-necked and barred doves (Streptopelia Geopelia striata, respectively) occasionally may be found inland of the proposed project area, this vicinity is not high quality habitat for these species (10). No endangered forest birds are found in the proposed project area. No waterbirds, including endangered species, were sighted by Service biologists. Condominium construction in the area adjoining the harbor may prevent its limited beach from being used by such common migratory species as the wandering tattler (Heteroscelus brevipes) and golden plover (Pluvialis dominica fulva).

2.4 Terrestrial mammals found in the vicinity are limited to exotic introductions. They include the domestic cat (Felis domesticus) and dog (Canis familiaris), house mouse (Mus musculus domesticus), roof or black rat (Rattus rattus), brown rat (Rattus norvegicus), Hawaiian rat (Rattus exulans hawaiiensis), and mongoose (Herpestes auropunctatus) (10). Introduced reptiles are also found in the project vicinity. While only representatives of the family Scincidae were observed during the Services field reconnaissance, members of the Gekkonidae and Iquanidae probably are also present (10).

2.5 MARINE RESOURCES. During a survey conducted by Corps personnel in April 1979, observations were made of the marine biota within the nearshore waters of the study area and are summarized in the following paragraphs. A species lists of observed marine organisms is provided in Table XC-1.

2.6 In the area directly offshore from the existing south breakwater, extending approximately 150 to 200 feet seaward, the bottom grades from smooth rounded rocks and cobbles adjacent to the breakwater, to a flat limestone reef with scattered patches of coral rubble. Water depth in this area is 2 to 4 feet. Wave energy here is high, probably limiting the establishment of corals other than flat encrusting forms (Montipora, Porites, Leptastrea). Marine algae, both encrusting coralline and frondose forms cover the submerged boulders of the revetment and persist for some distance seaward of the revetment. Dominant invertebrate forms observed in this zone were the urchings, haukiuki (Colobocentotus atrata) on the wave washed boulders and short-spined urchin (Tripneustes gratilla) which occurred abundantly throughout the zone. Other echinoids were also present but in fewer numbers. Fishes were essentially limited to the protective interstices of the breakwater. Topographic relief providing shelter and habitat for reef fishes

was lacking elsewhere in this zone. Manini, aholehole, maomao, kupipi and upapala were most abundant fish species. Aholehole (Kunlia) were remarkably abundant in the recesses at the tip of the east breakwater. Kumu and aweoweo also occurred in fair numbers here.

2.7 Beyond this inshore, high-energy zone extending from approximately 200 feet to 600 feet seaward of the south breakwater, in water depths from -4 to about -12 feet, the bottom consists of limestone reef with scattered patches of mixed sand and rubble usually occurring in depressions. The bottom relief is relatively flat with occasional shallow depressions, some of these fairly large in extend. A few small overhangs and ledges were observed in the zone. Corals through the area were relatively abundant comprising roughly 5-10% of the total bottom cover. Pocillopora meandrina and P. damicornis were the dominant coral species. Montipora, Porites and Pavona were also present. Again, sea urchins were the most abundant invertebrate forms observed. Echinometra mathaei, Echinothrix diadema, Tripneustes gratilla and Heterocentrotus mammillatus were the dominant echinoids, in that order. A few sea cucumbers were observed. Fishes were generally absent in this zone except in the proximity of the few ledges and overhangs where populations were concentrated. Manini (Acanthurus triostegus) and other surgeon fishes, several varieties of goat fish, damsel fish and cardinal fish were the most abundant fish species.

2.8 The existing harbor entrance channel extends from the breakwater seaward (south) approximately 500 feet and laterally approximately 150-200 feet. The channel appears to be a natural feature, becoming gradually deeper than adjacent areas. No abrupt side slopes or other evidence of previous dredging were observed. The bottom here is relatively flat. It appears to be composed of the same hard limestone reef materials as adjacent areas. Much of the bottom is covered with a thin veneer of calcareous sand and some rubble. Local boaters stated that sand deposition i the channel increases during certain seasons. Biologically, this area is depauperate. No live corals were observed. Lack of live corals can probably be attributed to the periodic infilling of sand which would have a smothering effect and to abrasion during periods of heavy surf. Benthic invertebrates were not observed in the channel. No fishes were observed except near the harbor mouth where a school of goatfish (Mulloidichtys samoensis) were seen foraging on the sand bottom.

2.9 A narrow band about 100 feet wide parallel to and just seaward of the breaker zone (during usual light surf periods) occurs to the east of the east breakwater. The bottom appears well scoured by surf. The depth is shallow averaging about -3 feet. The bottom is basically flat, but instead of a smooth pavement that might be expected, the limestone reef is honeycombed with shallow (1-3 inch) channels creating a reticulated effect. This is the result of the burrowing sea urchin (Echinometra mathaei) which occurred here in exceedingly dense numbers (USFWS observed 62/m^2). Other macro-invertebrates were not observed and fish fauna was sparse in this zone.

2.10 Beyond this area, commencing in 5-6 feet of water and extending south (seaward), gradually sloping to a depth of -15 feet, is another distinct zone. On the west it is bounded by the entrance channel. Its extent in the easterly direction was not determined during this recon. The greatest variation in bottom relief occurs within the zone. Extensive ledge systems, depressions, raised knobs and large Porites coral heads contribute to the more interesting visual aspects of this area. In terms of biological resources (abundance and diversity) this is the richest and decidedly the most valuable area adjacent to the harbor. Live corals are well developed and ubiquitous, comprising approximately 20% of the total bottom cover. Porites lobata and Pocillopora meandrina are the most abundant varieties but at least six other species are common and several others including some large colonies of Pocillopora eydouxi are present in the area, other common macro-invertebrates include several varieties of sea urchins and sea cucumbers. Fish populations are well developed and diverse. Surgeon fish (Acanthuridae) are the most abundant family. Large schools of palani (A. dussumieri), pualu (A. guttatus), manini (A. triostegus) and others, including parrot fish and goat fish range throughout this zone. In the ledges and depressions more cryptic varieties are prevalent. These include mempachi, aweoweo, buttterfly fish, morey eels, spiny puffers, etc. Although crustaceans and gastropods were rarely encountered during the recon due to their general diurnal inactivity and preference for concealment, these organisms are most likely well represented in this zone and throughout the survey areas.

2.11 Only very cursory observations were made in the offshore area where the bottom gradually slopes to depths of -15 feet and greater. The substrate here is limestone reef much of which is covered with sand. The sand deposits did not appear to be very deep but were fairly extensive areally. The bottom is relatively flat, lacking ledges and crevasses providing cover and habitat for fish and crustaceans. Live corals occur in this zone but the biota observed was not as abundant as in some of the other more shallow reef areas.

TABLE XC-1. SPECIES LIST

1. Corals:

Order Scleractinia

Leptastrea purpurea
Montipora verrilli
M. verrucosa
Pavona duerdeni
Pocillopora damicornis
P. eydouxi
P. ligulata
P. meandrina
Porites compressa
P. labata
P. (synaraea) irregularis
Psammacrora (Stephanaria) stellata

TABLE XC-1. SPECIES LIST (Cont)

Order Zanthinaria

Palythoa tuberculosa

2. Other Macro-Invertebrates

Phylum Echinodermata

Colobocentrotus atrate
Echinometra mathaei
Echinometra oblonga
Echinothix diadema
Heterocentrotus mammillatus
Tripneustes gratilla

Class Holothuroidea

Holothuria atra
Stichops sp.

Class Gastropoda

Cyprea caputserpentis
C. maculifera
C. isabella
Littorina pintado
Morula granulata
Nerita picea

3. Fishes

Acanthurus triostegus
A. guttatus
A. dussumieri
A. nigroris
A. mata
A. xanthopterus
Naso brevirostris
N. lituratus

Balistidae

Rhinecanthus rectangulatus

Cathigasteridae

Canthigaster jactator

TABLE XC-1. SPECIES LIST (Cont)

Chaetodontidae

Chaetodon auriga
C. lunula
C. miliaris

Cirrhitidae

Cirrhitus alternatus
Paracirrhites forsteri

Diodontidae

Diodon hysterix

Kuhliidae

Kuhlia sandvicensis

Labridae

Halichoeres ornatissumis
Stethojulis balteata
Thalassoma duperryi

Mullidae

Mulloidichthys auriflauma
M. samoensis
Parupeneus poyphereus
P. bifasciatus
P. multifasciatus

Monocathidae

Pervagor spilosoma

Muraenidae

Gymnothorax flavimarginatus

Pomacentridae

Abudefduf abdominalis
A. sordidus
Dascyllus albisella
Chromis ovalis
Pomacentrus jenakensi

TABLE XC-1. SPECIES LIST (Cont)

Priancanthidae

Priacanthus cruentatus

Synodontidae

Saurida gracilis

Tetraodontidae

Arathron hispidus

2.12 COASTAL WATER QUALITY.

2.13 The existing State Water Quality classification (Chapter 37A) for the coastal waters of Maalaea is Class A. Under the recently adopted revisions to the standards these waters are classified as seasonal wet and dry open coastal waters. Existing water quality data for Maalaea Bay consists of nutrient and turbidity measurements (Cattell and Miller, 1972). During the 1972 survey the eastern side of the bay was characterized by high turbidity; water clarity was much greater in the western part of the bay. Ammonia and phosphate concentration throughout the bay were relatively stable. Nitrate values were highly variable indicating groundwater seepage into the marine environment. Water within Maalaea Harbor is moderately turbid due to accumulated fine sediments from terrestrial sources that are resuspended by wind and harbor boat traffic.

2.14 ENDANGERED SPECIES.

2.15 The endangered Humpback whale, *Megaptera novaengliae*, is present in Maalaea Bay in the proximity of the Maalaea Harbor project area during approximately 6 months of the year from December through May. Maalaea Bay has been identified as one of four major whale breeding, calfing and nursing areas in Hawaii. A proposal to include Maalaea Bay as apart of a federal marine sanctuary under the Marine Protection Research and Sanctuaries Act of 1972 has been submitted to the Office of Coastal Zone Management for consideration. As yet, no formal action has been taken on this proposal. Maalaea Bay, from Hekili Point to Puuolai, is at present designated by Maui County as a Humpback whale sanctuary. Regulations under the Endangered Species Act of 1973 and Marine Mammal Protection Act of 1972 prohibiting harassment of the Humpback whale are being enforced by National Marine Fisheries Service personnel at Maalaea. The Hawaiian Humpback whale population was recently estimated at approximately 290 whales (Shallenberger, E.W., 1977 "Humpback Whales in Hawaii, Population and Distribution"). The north Pacific population of Humpbacks is estimated at 850 whales (Rice, D., 1977, "The Humpback Whale in the North Pacific: Distribution, Exploration and Numbers"). Shallenberger (1977) estimated the number of humpback whales in the Maui-Molokai-Lanai-Kahoolawe assembly area (about 700 square miles) at 90-100 whales. Maalaea Bay represents a small portion of this area.

TABLE XC-2

LIST OF REFERENCES

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APPENDIX D

US FISH AND WILDLIFE REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P.O. BOX 50167
HONOLULU, HAWAII 96850

IN REPLY REFER TO:
ES
Room 6307

June 16, 1980

Colonel B. R. Schlapak
U.S. Army Engineer District Honolulu
Building 230
Fort Shafter, Hawaii 96858

Re: Detailed Report
Maalaea Small Boat Harbor
Maalaea, Maui, Hawaii

Dear Colonel Schlapak:

The Detailed 2(b) Report of the U.S. Fish and Wildlife Service is enclosed.

We appreciate this opportunity to comment.

Sincerely yours,

Nevin D. Holmberg
Field Supervisor
Division of Ecological Services

Enclosure

cc: OEC, Washington, D.C. (2)
ARD-E, Portland (2)
Public Affairs Office, Portland
ES Field Offices, Region 1
Boise
Olympia
Laguna-Niguel
Sacramento
EPA, San Francisco
National Marine Fisheries Service, Hawaii
Hawaii Division Fish and Game
Endangered Species, FWS, Honolulu & Portland

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MAALAEA HARBOR
FOR LIGHT-DRAFT VESSELS
NAVIGATION IMPROVEMENT PROJECT
MAALAEA, MAUI, HAWAII

Detailed Report

Department of the Interior

U.S. Fish and Wildlife Service

Division of Ecological Services

Honolulu, Hawaii

June 1980

TABLE OF CONTENTS

1.0 Introduction

This is the detailed report of the U.S. Fish and Wildlife Service on plans developed by the Honolulu District of the U.S. Army Corps of Engineers for navigation improvements at the Maalaea small boat harbor, Maalaea, Maui, Hawaii. This report has been prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). It is also consistent with the intent of the National Environmental Policy Act. This report fulfills the responsibility of the Fish and Wildlife Service under Section 2(b) of the Fish and Wildlife Coordination Act.

Federal participation in this project was authorized under Section 110 of the River and Harbor Act of 1968 in response to a feasibility study which was completed in 1967 (1). A formal public meeting was held on January 23, 1979, to present the authorized plan to the public and receive testimony from the public regarding the proposed project. As a result thereof, planning objectives were determined and development of alternative plans was initiated. Planning objectives for Maalaea Harbor include reduction of surge within the harbor basin, reduction of hazards to navigation in the entrance channel during high wave conditions, provision for additional berthing spaces, and minimization of adverse impacts on nearby surfing sites and on the endangered humpback whale (2).

The objectives of the Service for participating in this study are 1) to obtain basic biological data for the project area, 2) to evaluate and analyze the impact of project alternatives on fish and wildlife resources and their habitat, 3) to identify the alternative least damaging to fish and wildlife resources, and 4) to recommmend methods of preserving and compensating for loss of these resources due to project implementation. This evaluation is based on the recommend plan as specified by the Corps in a letter dated May 16, 1980, using information contained in Corps reports and engineering data provided by Corps personnel. Biological information presented in this report was obtained from a review of pertinent literature and from a field survey conducted by the U.S. Fish and Wildlife Service with the cooperation of the State of Hawaii, Division of Fish and Game, and assistance of the National Marine Fisheries Service.

2.0 Study Area

Maalaea small boat harbor is located in the northwestern corner of Maalaea Bay on the island of Maui, approximately 6 and 9 statute miles distant from the population centers of Kahului and Wailuku, respectively, and 14 nautical miles from the nearest other small boat harbor at Lahaina (Fig. 1).

Maui is the second largest island in area (729 sq. mi.) in the Hawaiian archipelago with a tidal shoreline of 158.8 miles. The shoreline of Maalaea Bay is approximately 7.6 miles in length; however, access problems exist along about one third of this length (3).

At present Maalaea is one of only two small boat harbors on Maui, and it is the only public access point to Maalaea Bay in the western end of the bay. Present facilities at Maalaea include an 835-foot-long east breakwater and a 1070-foot-long south revetted mole, locally known as the west breakwater (Fig. 2). These two breakwaters enclose a 17.3-acre basin utilized by both commercial and recreational boats. The maximum depth of the harbor and entrance channel is -12 feet with respect to mean lower low water (MLLW) (1).

Projected demand for small boat harbor facilities for the county of Maui indicate that there will be additional needs by 1990 (4). The Lahaina area has been identified as a potential site for additional small boat harbor development. However, the Maalaea facility is the only existing small boat harbor on the island with the potential for expansion from its present berthing capacity of 93 boats to 310 boats (3, 5).

Maalaea Bay has been identified as one of the five potential State marine park sites on the Island of Maui (3). However, to date only two such parks have been established in the State of Hawaii. It also has been proposed for federal marine sanctuary status under the Marine Protection, Research and Sanctuaries Act of 1972. However, to date no formal action has been taken on this proposal.

During periods of high rainfall, the sediment load of nearshore waters increases significantly as a result of drainage from erosion-prone uplands (6). The greatest increase occurs in the eastern portion of Maalaea Bay where Waiakoa Gulch empties directly into the bay. In the mid-portion of the bay, Kealia Pond and adjacent wetland areas act as a settling basin for four major drainages, all potential contributors to the sediment load of the bay (6, 7). In the western portion of the bay only two drainage channels of significant size contribute to the sediment load. They empty into Maalaea small boat harbor which acts, to some degree, as a sediment trap.

3.0 Project Description

In order achieve the planning objectives previously described, the Corps of Engineers formulated three alternative plans for further development and evaluation. Although Alternative Plan 2 received the most positive public response, Alternative Plan 1 has been selected in deference to the desire of the local sponsor for additional harbor backup area. In addition, Plan 1 has the largest net economic benefit of the three plans, and it has been designated the National Economic Development (NED) plan. Since none of the plans could be proven to enhance environmental quality (EQ), an EQ plan was not designated (5).

3.1 Selected Plan

The selected plan (Fig. 3) includes the following features:

1) A 610-foot-long entrance channel, varying in width from 150 feet to 180 feet, and varying in depth from -15 feet to -12 feet MLLW.

2) A 1.7-acre turning basin, dredged to a depth of -12 feet.

3) Removal of approximately 80 feet of the east breakwater head to allow for entrance channel widening and realignment.

4) A 720-foot-long by 80-foot-wide access channel, dredged to a depth of -8 feet.

5) A 620-foot-long extension of the existing south breakwater constructed along the southern margin of the new entrance channel.

6) A 400-foot-long, 0.8-acre revetted mole, composed of dredged coralline material along the seaward side of the existing south breakwater and adjacent to the proposed breakwater extension.

7) A 50-foot-wide interior revetted mole constructed along the existing east breakwater and an 8-foot-deep berthing area dredged adjacent to this structure by the local sponsor.

The total harbor area of 27 acres would include 13.5 acres of water area available for berthing and access. The selected plan would provide for incremental expansion of berthing capacity to 310 boats.

A total of approximately 44,000 cubic yards of coral reef material, sand, and silt would be dredged from an area of about 4.5 acres for creation of an entrance channel, turning basin, and access channel. Blasting may be required in conjunction with harbor dredging. Fills would be constructed of suitable dredged material, basaltic armor stone, and concrete dolosse (breakwater only) and would cover approximately 3.7 acres of benthic reef habitat. The breakwater extension would be topped with a cast-in-place concrete rib cap. The selected plan would create 11,500 cubic yards of excess dredged material which would be disposed at an upland landfill site to be provided by the local sponsor. To date, this spoil disposal site has not been identified.

4.0 Environmental Setting Without-the-Project

Maciolek, Kinzie and consultants for the U.S. Army Corps of Engineers reported on the marine biological resources of Maalaea Bay area (6, 7, 8). However, only Kinzie performed part of his survey in the immediate project area (7). No previous surveys of terrestrial biota have been done at this location.

4.1 Methodology

4.1.1 Terrestrial Survey

A brief field reconnaissance was made of the terrestrial floral and faunal composition within a radius of about 200 feet around the proposed project area. Service Endangered Species personnel were interviewed to determine the potential presence of federally proposed or listed threatened and endangered species within the proposed project vicinity. This data was supplemented with published and unpublished information.

4.1.2 Marine Survey

On March 27, 1979, Service biologists began a two-day marine survey to classify habitat types and their species composition, diversity and relative abundance. Salinity, temperature and visibility were recorded for the areas surveyed. Eight major physiographic distinctions were identified within and adjacent to the proposed project vicinity by slowly snorkeling over the area (Fig. 4). These physiographic classifications are listed below and illustrated in Figure 5:

Zone 1: Depth 5'; visibility 3' (turbid); temperature 23°C; salinity 32 o/oo.

Zone 2: Depth 3-6'; visibility 6' (cloudy); temperature 23.5°C; salinity 34 o/oo.

Zone 3: Depth 6-15'; visibility 12'(cloudy); temperature 23.5°C.; salinity 34 o/oo.

Zone 4: Depth 0-2.5'; visibility 2.5'; temperature 24° C; salinity 32 o/oo.

Zone 5: Depth 1-3'; visibility 2.5'; temperature 23.5°C; salinity 34 o/oo.

Zone 6: Depth 1-3'; visibility 3'; temperature 23.5°C; salinity 34 o/oo.

Zone 7: Depth 3-8'; visibility 8'; temperature 23.5°C; salinity 34 o/oo.

Zone 8: Depth 8-20'; visibility 20' (cloudy); temperature 23.5°C; salinity 34 o/oo.

Twenty-meter transects were laid in each of Zones 3, 4, and 6 (Fig. 4 and 5). Algae was collected for identification. Percent of coral coverage by species was estimated and recorded for each zone and transect. Counts were also made of other visible invertebrates found within the transect boundaries. Observations of fish species composition and abundance were made by slowly snorkeling over each transect and recording species presence and abundance for two meters on either side of the line. Species diversity indices (H') were calculated for fish encountered within the transect boundaries using the Shannon-Wiener index presented in Pielou (1975) (9):

$$H' = p_i \log p_i$$

where p_i = proportion of the i^{th} species in the sample,

and log = natural logarithm

These quantitative observations were supplemented by additional random fish and benthic organism sightings made within the eight zones.

4.1.3 Fishery Utilization

Fishery utilization of the project vicinity was estimated and projected over the project life from information obtained by interviewing local fishermen using

the project area during the marine survey period, by interviewing the attendant at Maalaea Harbor and by reviewing available published and unpublished information on fishery utilization in the proposed project vicinity (10).

4.2 Terrestrial Resources

A survey of the major terrestrial vegetation and the fauna utilizing this habitat was performed adjacent to the existing small boat harbor. This site has been altered by harbor and ancillary road development and the introduction of exotic vegetation. "Kiawe" (Prosopis pallida), and bristly foxtail (Setaria verticillata), both exotic introductions, are among the dominant plants present along the shoreline. Coconut (Cocos nucifera) and ironwood (Casuarina equisetifolia) have been planted along the south breakwater. The ground cover in this area consists principally of seaside purslane (Sesuvium portulacastrum) and beach "naupaka" (Scaevola taccada). According to local boaters, large "kiawe" (50'+) found along the western portion of the harbor area act as windbreaks reducing, to a slight degree, navigational difficulties in high winds. Although "ma'o" (Gossypium tomentosum Nutt.), an endemic wild cotton proposed for federal endangered species status, was not sighted in this area, it had been previously reported in the general project vicinity (Herbst, personal communication). However, extensive agricultural and commercial development in the Maalaea area may have eliminated this species.

Biologists observed two species of exotic passerine birds in the proposed project area, the common mynah (Acridotheres tristis) and house sparrow (Passer domesticus). Although some gamebirds including the ring-necked pheasant (Phasianus colchicus torquatus), grey francolin (Francolinus pondicerianus) and lace-necked and barred doves (Streptopelia chinensis and Geopelia striata, respectively), occasionally may be found inland of the proposed project area, this vicinity is not high quality habitat for these species (11). No endangered forest birds are found in the proposed project area. No waterbirds, including endangered species, were sighted by Service biologists. Condominium construction in the area adjoining the harbor may prevent its limited beach from being used by such common migratory species as the wandering tattler (Heteroscelus incanus) and golden plover (Pluvialis dominica fulva).

Terrestrial mammals found in the vicinity are limited to introduced species, including the domestic cat (Felis catus) and dog (Canis familiaris), house mouse (Mus musculus domesticus), roof or black rat (Rattus rattus), brown rat (Rattus norvegicus), Polynesian rat (Rattus exulans hawaiiensis), and mongoose (Herpestes auropunctatus). Introduced reptiles are also found in the project vicinity. While only representatives of the family Scincidae were observed during the Service's field reconnaissance, members of the families Gekkonidae and Iguanidae probably are also present (11).

4.3 Marine Resources

The species composition, distribution and abundance of marine algae and macrofauna found in the Maalaea small boat harbor area are presented in Appendix A.

Kinzie described Maalaea Bay as an entire ecosystem composed of hard and soft substrates (7). The hard bottom substrate is a reef platform; the soft

bottom habitat is composed of terrigenous sediment originating from the naturally eroding mountains and more directly from agricultural activities in the Kealia floodplain (6). Rubble mounds created by the dredging of Maalaea small boat harbor add to the habitat diversity within the bay.

Kinzie attributed reef building within the Maalaea Bay ecosystem primarily to calcareous algae rather than stony corals. Bryozoans and sponges also contribute to this process. Several algae and stony corals, rarely found in Hawaii, are relatively abundant in the bay. The bay also has a rich fish and invertebrate fauna and is a favorite area for shell collectors (7).

Mobile species utilizing the rubble mounds and hard bottom relief for shelter feed on the burrowing food organisms found in the adjacent soft bottom areas. Kinzie indicated that although the bay may be potentially very productive in terms of biomass, productivity may be limited by the effects of siltation and sedimentation. He further indicated that the reasons for the uniqueness are unknown and cautioned against any activity which would result in a resuspension of its sediments (7).

The existing harbor acts as a silt trap for two upland drainage channels emptying into this basin. Its water was muddy during the survey period with a visibility of less than four feet and salinity slightly lower than seawater. Even so it does provide habitat for species tolerant of estuarine conditions, such as barracuda (Sphyraena barracuda), "aholehole" (Kuhlia sandvicensis) and "nehu" (Stolephorus purpureus). Gastropods such as limpets or "opihi" and nerites were collected along its eastern periphery.

The platform reef gently slopes seaward from the shoreline and existing harbor area. Wave action is high along the unprotected south breakwater.

Coral rubble covered by red crustose coralline algae and an eroded platform reef dominate the nearshore area in Zone 2 (Fig. 5). Relatively little live coral was observed seaward of the south breakwater and, although visibility was generally good, the water was cloudy. This is characteristic of water in which coralline fines are suspended. Marine algae, primarily composed of Pterocladia sp., covered the wave washed boulders of the breakwaters in Zones 2, 5, 6 and 7.

Marine habitat composition varies most markedly along the east breakwater. Here the shoreline area is protected by a narrow reef crest approximately 600 feet offshore. Substrate in the shoreward area (Zone 4) was composed primarily of loose crustose red algae-covered coral rubble to which several species of Ulva were attached. One of these species, Ulva lactuca, is indicative of biological stress on the marine environment caused by freshwater inflow or nutrient "enrichment". Freshwater seepage was observed in this zone.

Seaward from shore the depth decreases (Zone 5) and the reef platform is relatively free of coral rubble. Small stony coral patches comprised primarily of Pocillopora damicornis and isolated colonies of Porites sp., less than 36 centimeters in diameter, were observed. Coral coverage was highest along the narrow ridge comprising the reef crest. Porites sp. was dominant in this high energy zone (Zone 6). Seaward of the crest, the reef gradually slopes

down to about -20 feet, the maximum depth surveyed. Although seven species of stony and soft coral were recorded for Zone 7, their total coverage was estimated at less than 10 percent. Pocillopora meandrina and isolated heads of Porites lobata provided the greatest relief along the otherwise eroded reef slope. At depths of 12 feet or more, the consolidated reef was interspersed with patches of sand.

The visibility in the boat channel entrance was about 5 feet and the water noticeably turbid during the survey period. Prolonged winter storms ending about 1-1/2 weeks before the survey period had contributed to decreased visibility within the proposed project area. This channel had been dredged to a depth of -15 feet during harbor construction. No fish or macroinvertebrates were observed inhabiting the channel itself, and there was a noticeable scarcity of any algae or organisms up to about 15 feet on either side of the entrance channel.

The principal invertebrates, other than corals, encountered in the project vicinity were sea urchins (5 species) and crabs. Of these, the burrowing sea urchin (Echinometra mathaei) was the most prevalent with an estimated maximum density of 62/m^2 in Zone 7 and 46/m^2 in Zone 3. The short-spined sea urchin (Tripneustes gratilla) and long-spined sea urchin (Echinothrix diadema) were most abundant in Zones 2 and 5 although they were common in nearly all the zones surveyed. The pencil sea urchin (Heterocentrotus mammillatus) also was found in Zones 2, 5, and 6.

Few live molluscs were observed during the field survey, however, shells of cones (Conidae), cowries (Cypraeidae) and other molluscs were seen in the area. Most of the molluscs observed were found in the protected confines of the harbor (eastern portion of Zone 1) and on the breakwater in Zone 4. Species found in the former area included "opihi" (Cellana exarata), the granulated morula (Morula granulata) and the common nerite (Nerita picea); those found in the latter area were predominantly the common nerite and the dotted periwinkle (Littorina pintado).

Thirty-six species of fish were observed by Service biologists during the two-day survey of the project area. This was more than double the number recorded during a 1977 survey in east Maalaea Bay (8). Fish species diversity was greatest in Zones 3 with 17 species recorded and Zone 8 with 14 species recorded. Abundance was highest in Zone 8 where two schools of mixed tangs and a school of "manini" (Acanthurus triostegus sandvicensis) were observed. Of the seaward zones, Zone 4 had both the fewest numbers and least diversity of fish observed. Only an occasional wrasse (Labridae) and hawkfish (Cirrhitidae) were encountered. Fish species diversity indices calculated for Transects 1, 2, and 3 in Zones 2, 5, and 7 respectively, were highest for Zone 2. However, this calculation is an artifact. Random observations in Zone 7 revealed the presence of 11 species while similar observations in Zone 2 revealed only 6.

The proposed project area supports a sport and subsistence fishery. Service biologists interviewed sport fishermen who were fishing from the breakwater with hook and line. In addition, spear fishing and torch fishing are done off the breakwaters. Although no fishing is officially permitted within the existing

harbor basin, "nehu" are occasionally caught for bait. Fish and shellfish taken by a local fisherman include "manini" (Acanthurus triostegus sandvicensis), "papio" (Caranx ignobilis), "o'io" (Albula vulpes), mullet (Mugil cephalus), "aholehole" (Kuhlia sandvicensis), "weke" (Mulloidichythys spp.), "oama" (juvenile Mulloidichthys), lobster, octopus, and grapsid crabs. Although occasional inshore runs of fish such as "'opelu" (Decapterus pinnulatus) may occur, they do not do so with any regularity. One species of edible seaweed or "limu" (Gracilaria coronopifolia) was found on the seaward face of the south and east breakwaters.

Based on existing information and observations, current fishing effort at the Maalaea small boat harbor is conservatively estimated to be about 5,060 mandays per year (Kamai, personal communication). The fishing effort expended here constitutes about 0.83 percent of the nearshore recreational fishing effort on Maui and 2.2 percent of the fishing effort along the shoreline from Makena to Puunoa Point, the most heavily fished shoreline area in the County of Maui. This fishing pressure is expected to increase as the population increases. Based on current population projections, fishing pressure could more than triple by 2020 (10, 12, 13).

On March 18, 1979, Service biologists sighted six humpback whales (Megaptera novaeangliae) within Maalaea Bay. Three of these endangered marine mammals were sighted within one-half mile of the proposed project site. The National Marine Fisheries Service (NMFS) estimates that 50-70% of the North Pacific population of humpbacks may winter in the relatively shallow, subtropical waters off the main Hawaiian islands (14). Approximately 500-700 whales concentrate in this area for breeding and calving activities between the months of December and May. They are particularly numerous in the waters over Penguin Bank, off the coast of the Island of Hawaii between Upolu and Keahole Points, and in the area bounded by Molokai, Maui, Kahoolawe, and Lanai. In recent years, boating has contributed, either willfully or inadvertently, to harassment of these animals. According to John Naughton of NMFS (personal communication), whales have exhibited avoidance behavior in response to turbid plumes which result from stormwater runoff and upland erosion. Furthermore, whales, particularly the humpback, are acoustically oriented animals, and any sudden, unfamiliar, erratic, high-intensity noises, such as those caused by blasting, could cause the whales to abandon this area (14).

5.0 Environmental Impact With the Project

5.1 Terrestrial Resources

Extension of the south breakwater and excavation of the entrance channel are not expected to adversely impact terrestrial biological resources within the immediate construction area. However, acquisition of armor stone for breakwater construction and disposal of excess dredged spoil on land could result in adverse impacts on both wildlife and federally proposed or listed endangered or threatened species outside the immediate project vicinity. However, since upland spoil disposal or borrow sites have not been designated to date, the Service cannot evaluate these impacts.

5.2 Marine Resources

5.2.1 Beneficial Environmental Impacts

Project dredging may have minor, short-term beneficial impacts on fishery resources in the project area. Fish may be attracted to the dredge site to feed on benthic organisms exposed by dredging. However, high turbidity caused by dredging and other project-related disturbances may limit or preclude this use.

Reduction of surge is one of the objectives of proposed harbor modifications. This may improve the efficiency of the harbor as a sediment trap, reducing siltation impacts on marine habitat outside the harbor basin. However, this is a dubious benefit, since deposition of terrigenous sediments in the harbor basin will continue to degrade harbor waters and would require more frequent maintenance dredging and its associated impacts.

A new harbor entrance channel would provide additional "edge" habitat, increasing habitat diversity within the project vicinity. However, similar habitat found at the existing harbor entrance is relatively devoid of marine organisms, probably due to the impacts of high turbidity and sedimentation.

Fisheries may be locally enhanced as a result of the placement of breakwater and revetment structures on an otherwise featureless reef surface. The hard substrate and interstices created thereby would provide intertidal and subtidal habitat for a variety of mobile and sessile marine organisms, including algae. Improved pole, net, and spear fishing are expected to result. Because Maalaea Harbor breakwaters provide the only pedestrian access to deep water in the western portion of Maalaea Bay, the new breakwater extension would be attractive to fishermen who desire access to deeper waters outside the harbor basin. However, the breakwater design includes no provision for safe access and may result in serious personal injury unless such a provision is made.

5.2.2. Adverse Environmental Impacts

Project construction will result in certain unavoidable, short-term adverse impacts. Dredging and discharge of fills for breakwater construction will temporarily degrade water quality nearshore. Impacts of turbidity and siltation can be minimized and confined to the immediate vicinity of operations through the use of silt curtains and the curtailment of operations during adverse sea conditions. Furthermore, fills should be protected from erosion with armor stone as soon after completion as practicable.

Blasting and other project activities which propagate high-intensity noise in the marine environment are likely to disturb endangered humpback whales during their winter breeding, calving, and nursing activities in the Maalaea area. Prohibition of these project activities during the period between December and May should minimize these impacts, however.

Use of the Maalaea Harbor area by fishermen will be restricted for safety reasons during the construction period. Fishing effort is expected to return to projected levels following project completion.

Some small boats now moored in Maalaea Harbor may be displaced during construction. Adequate provision should be made for temporary mooring of these vessels in a protected area.

Long-term adverse impacts will result from alteration and elimination of marine habitat directly related to project construction. In addition, adverse impacts are anticipated from an increase in boat traffic due to improved harbor safety and increased berthing capacity.

Approximately 4.5 acres of marine benthic habitat will be permanently altered by dredging, and 3.7 acres will be eliminated by the placement of fills. Part of the area to be dredged includes highly-productive coral reef habitat (Zone 8 on Figure 5). Normally, the fresh surfaces exposed by dredging would eventually be recolonized by reef-building organisms. However, poor water quality in the harbor basin and entrance channel resulting from the unabated discharge of terrigenous sediments may prevent normal recovery of this area and may preclude its use by reef-dwelling species. Furthermore, the breakwater extension probably will deflect longshore currents, and the eddy thereby created could disperse these suspended sediments over a wide area of productive reef.

The turbulence caused by increased boat traffic within the harbor basin will resuspend fine sediments, reducing water clarity. Increased boat traffic in Maalaea Bay will unavoidably increase the risk of harassment of humpback whales. This latter impact could be reduced through the rigorous enforcement of existing State and Federal laws protecting this species; however, manpower and funding limitations may hamper this effort. Public education, awareness, and respect for this unique biological resource is perhaps the best preventative.

6.0 Discussion

Proposed modifications at Maalaea Harbor will result in the irreversible loss of some marine habitat. The breakwater extension and other revetments will not provide "in-kind" replacement of lost habitat, but should improve habitat diversity and improve local fisheries.

Although the proposed revetted mole adjacent to the breakwater extension will eliminate 0.85 acres of benthic habitat, this particular area has no significant value for fishery resources. It provides a convenient site for disposal of suitable dredged coralline material which would otherwise be disposed at an upland site.

The continued, uncontrolled discharge of sediments into Maalaea Harbor and the additional impacts of increased harbor usage will probably negate any net benefits to fishery resources which would otherwise result from harbor construction. Alteration of longshore currents by the breakwater extension could spread these impacts over a productive reef area east of the proposed entrance channel location.

Although direct, construction-related impacts on wintering humpback whales are considered "short-term", the National Marine Fisheries Service states, "Due to the already reduced numbers of humpback whales in the North Pacific

population and their apparently low recruitment rate, the abandonment of a preferred and probably important habitat area and interruption of calving and nursing activities by a portion of the population for only one season would not be conducive to the conservation of the species." (14).

7.0 Recommendations

The U.S. Fish and Wildlife Service recommends that the following measures be applied to minimize, mitigate, or compensate for adverse impacts on fish and wildlife resources:

1. Excess dredged spoil be placed in upland disposal sites acceptable to the Service, and appropriate erosion control measures, such as vegetative cover, be applied.

2. If temporary storage of spoils at the project site is required, spoils be placed behind watertight berms above the influence of the tide.

3. No dredged spoil be stockpiled in the marine enviroment.

4. Breakwater and other fills be protected from erosion using armor stone as soon as practicable.

5. Silt curtains be used, when necessary, to control turbidity, when and where sea conditions permit.

6. If blasting is required, shaped or directional charges be used to minimize impacts on marine organisms. No blasting be done between the months of December and May, inclusive, to minimize adverse impacts on the humpback whale population.

7. Breakwaters and revetments be constructed of large boulders and/or dolosse to dissipate wave energy and resist erosion. Breakwater extension should be flat-topped to permit safe access for fishermen.

8. Land treatment measures be applied to control the discharge of sediments into Maalaea Harbor from agricultural runoff and to mitigate adverse impacts on water quality due to project implementation.

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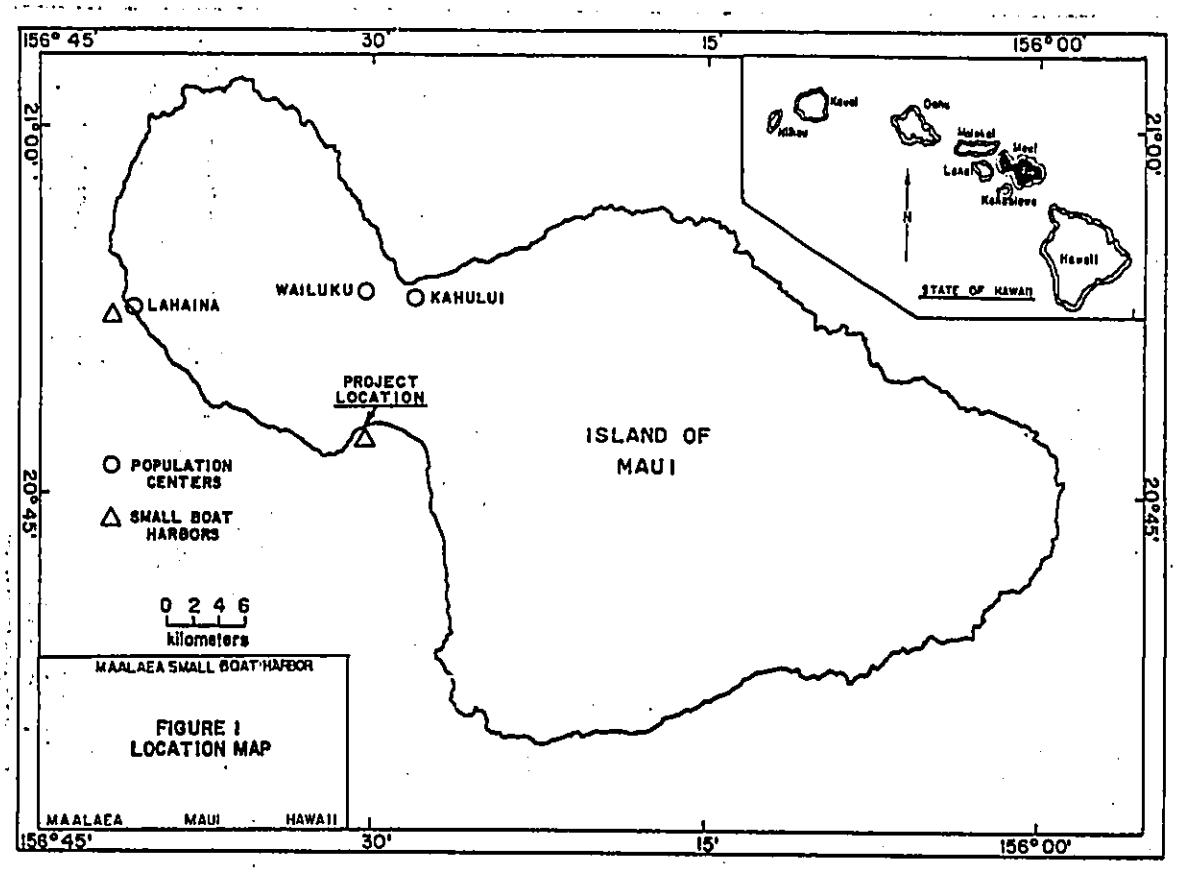
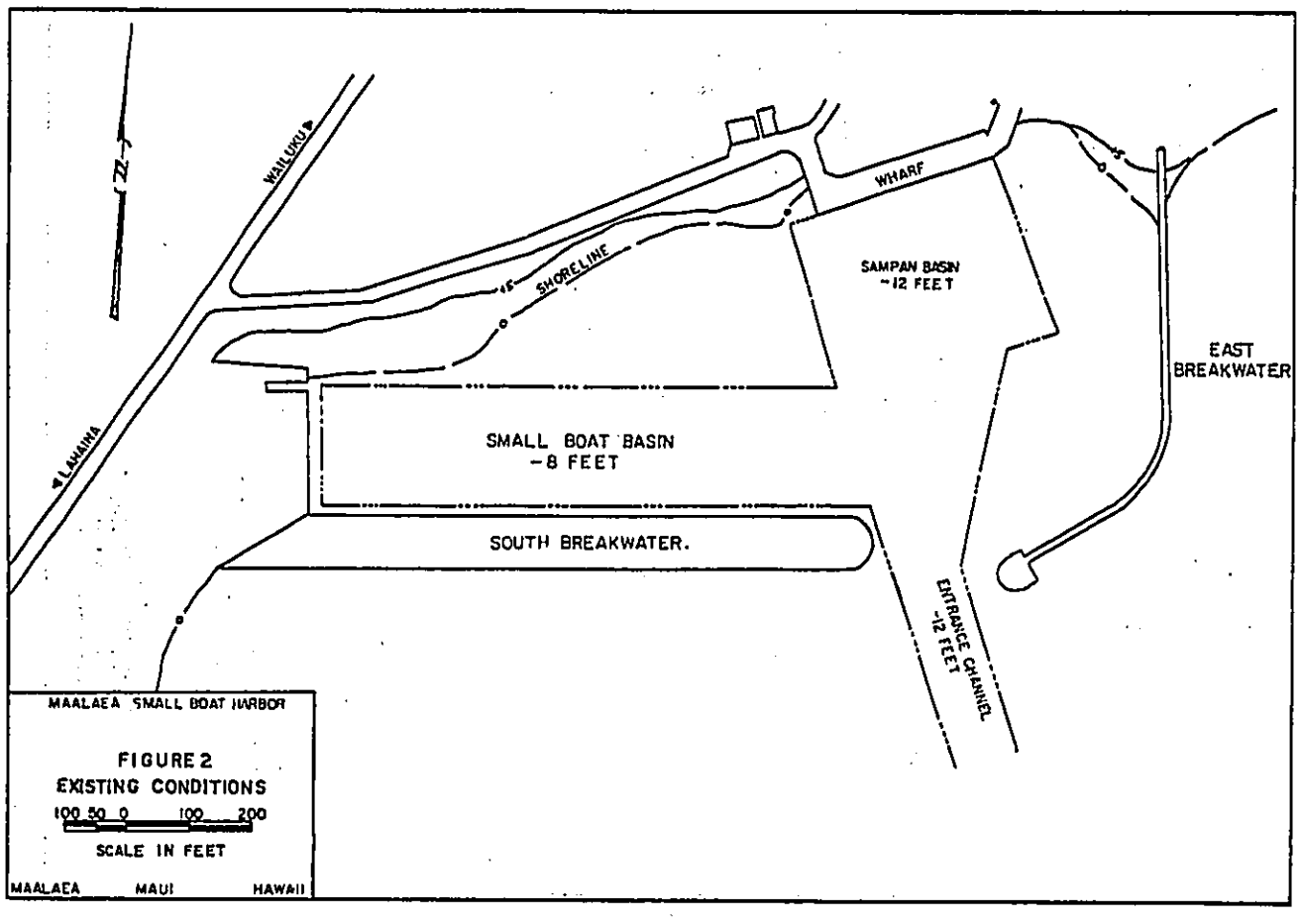
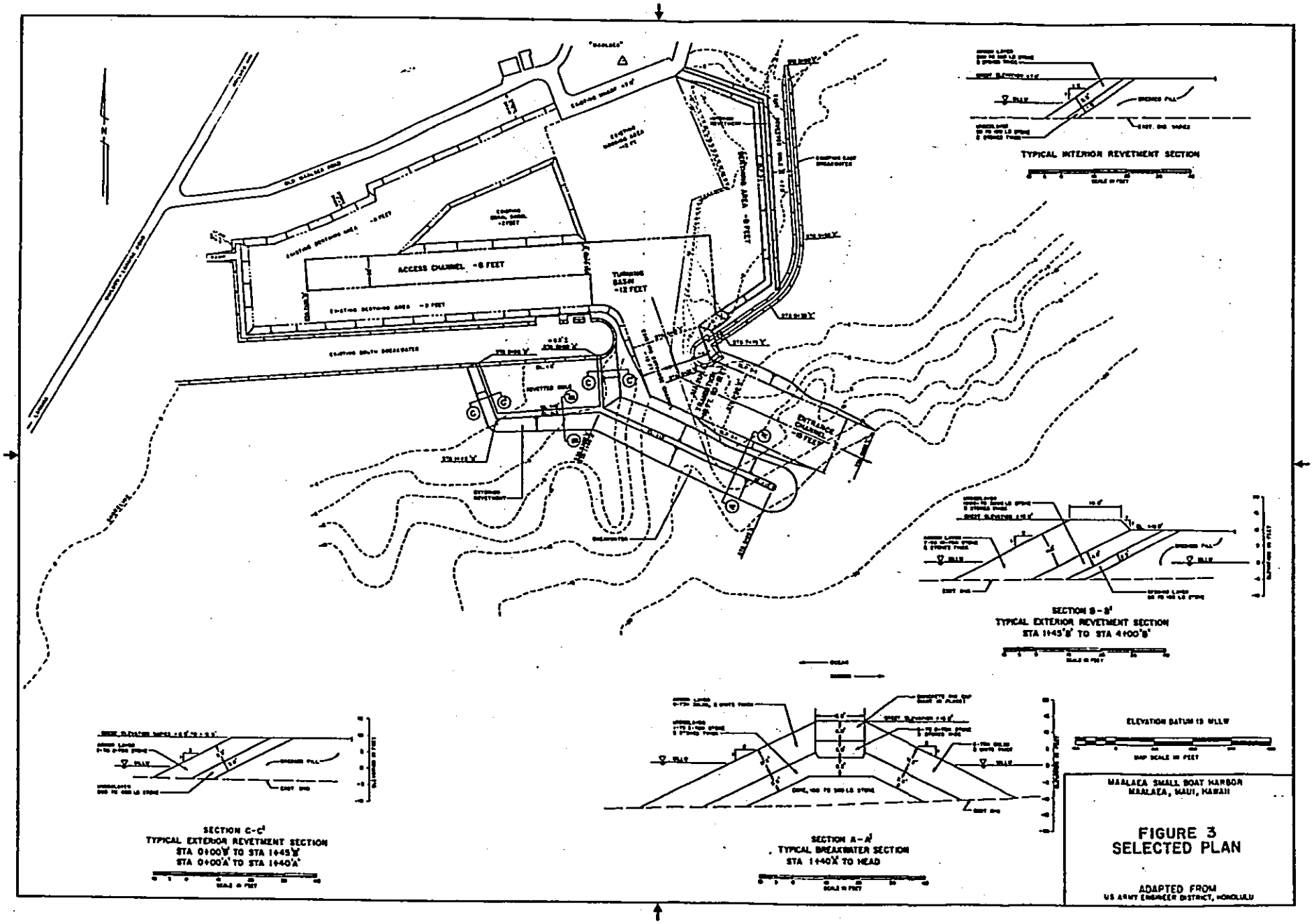

156° 45'
30'
15'
156° 00'
21° 00'
20° 45'
Kauai
Oahu
Molokai
Maui
Lanai
Kahoolawe
Hawaii
N
STATE OF HAWAII
LAHAINA
WAILUKU
KAHULUI
PROJECT LOCATION
ISLAND OF MAUI
POPULATION CENTERS
SMALL BOAT HARBORS
0 2 4 6
kilometers
MAALAEA SMALL BOAT HARBOR
FIGURE 1
LOCATION MAP
MAALAEA MAUI HAWAII


WAILUKU
WHARF
SHORELINE
SAMPAN BASIN
-12 FEET
EAST
BREAKWATER
LAHAINA
SMALL BOAT BASIN
-8 FEET
SOUTH BREAKWATER.
ENTRANCE CHANNEL
-12 FEET
MAALAEA SMALL BOAT HARBOR
FIGURE 2
EXISTING CONDITIONS
100 50 0 100 200
SCALE IN FEET
MAALAEA MAUI HAWAII


ACCESS CHANNEL -8 FEET
TURNING BASIN -12 FEET
EXISTING SOUTH BREAKWATER
EXISTING EAST BREAKWATER
EXISTING CAMPING AREA +8 FEET
EXISTING BOATING AREA -8 FEET
EXISTING CAMPING AREA +7 FEET
OLD HANA ROAD
HANA HIGHWAY
EXISTING BOATING AREA +8 FEET
EXISTING BOATING AREA -8 FEET
EXISTING SOUTH BREAKWATER
EXISTING EAST BREAKWATER
EXTENSION -8 FEET
EXTENSION
REVETMENT WALL
EXTERIOR REVETMENT
BREAKWATER
OCEAN
HARBOR
TYPICAL INTERIOR REVETMENT SECTION
SCALE IN FEET
SECTION B-B'
TYPICAL EXTERIOR REVETMENT SECTION
STA 1+45'B' TO STA 4+00'B'
SCALE IN FEET
SECTION C-C'
TYPICAL EXTERIOR REVETMENT SECTION
STA 0+00'B' TO STA 1+45'B'
STA 0+00'A' TO STA 1+40'A'
SCALE IN FEET
SECTION A-A'
TYPICAL BREAKWATER SECTION
STA 1+40'A' TO HEAD
SCALE IN FEET
ELEVATION DATUM IS MLLW
MAP SCALE IN FEET
MAALAEA SMALL BOAT HARBOR
MAALAEA, MAUI, HAWAII
FIGURE 3
SELECTED PLAN
ADAPTED FROM
US ARMY ENGINEER DISTRICT, HONOLULU

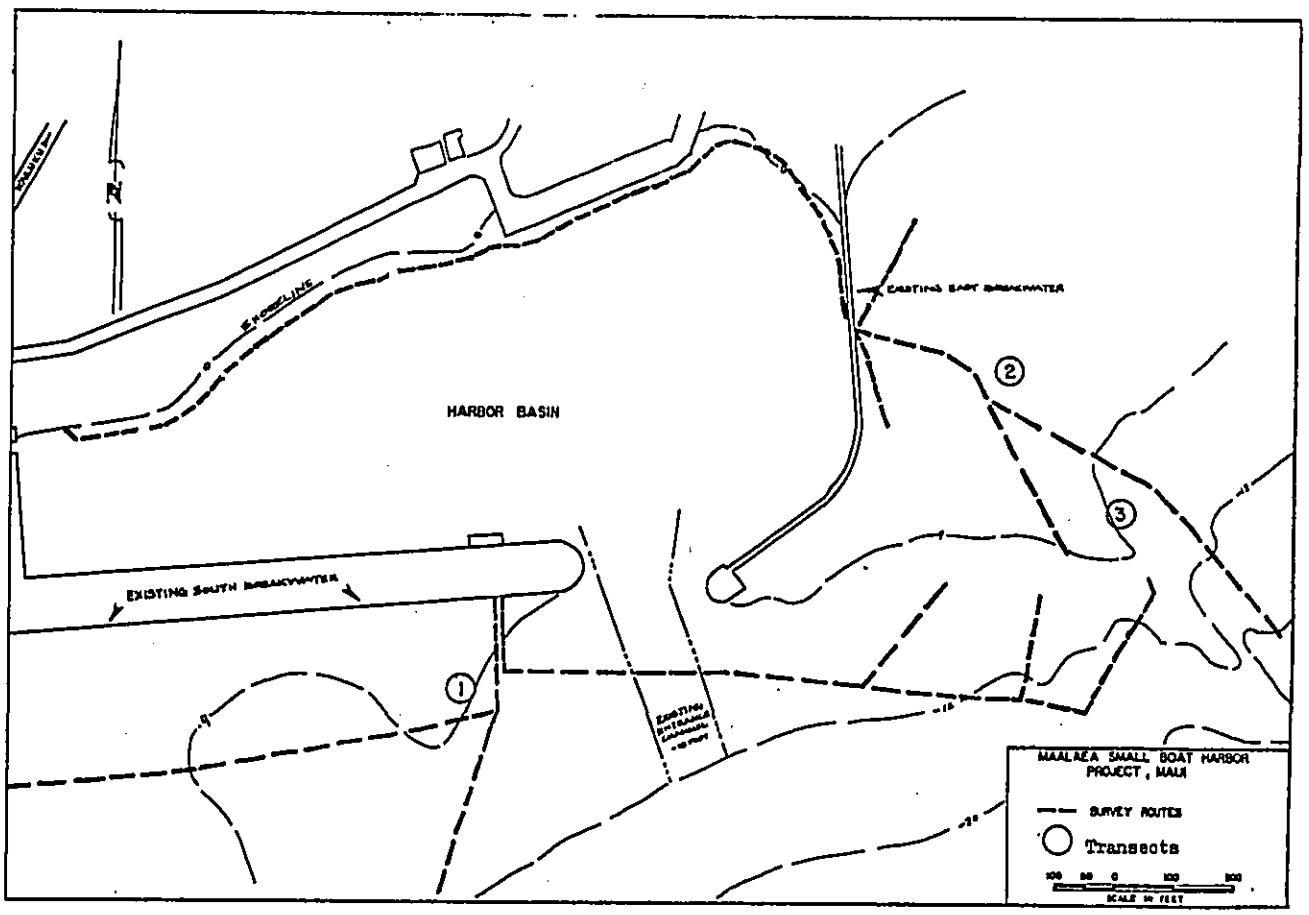


FIGURE 4

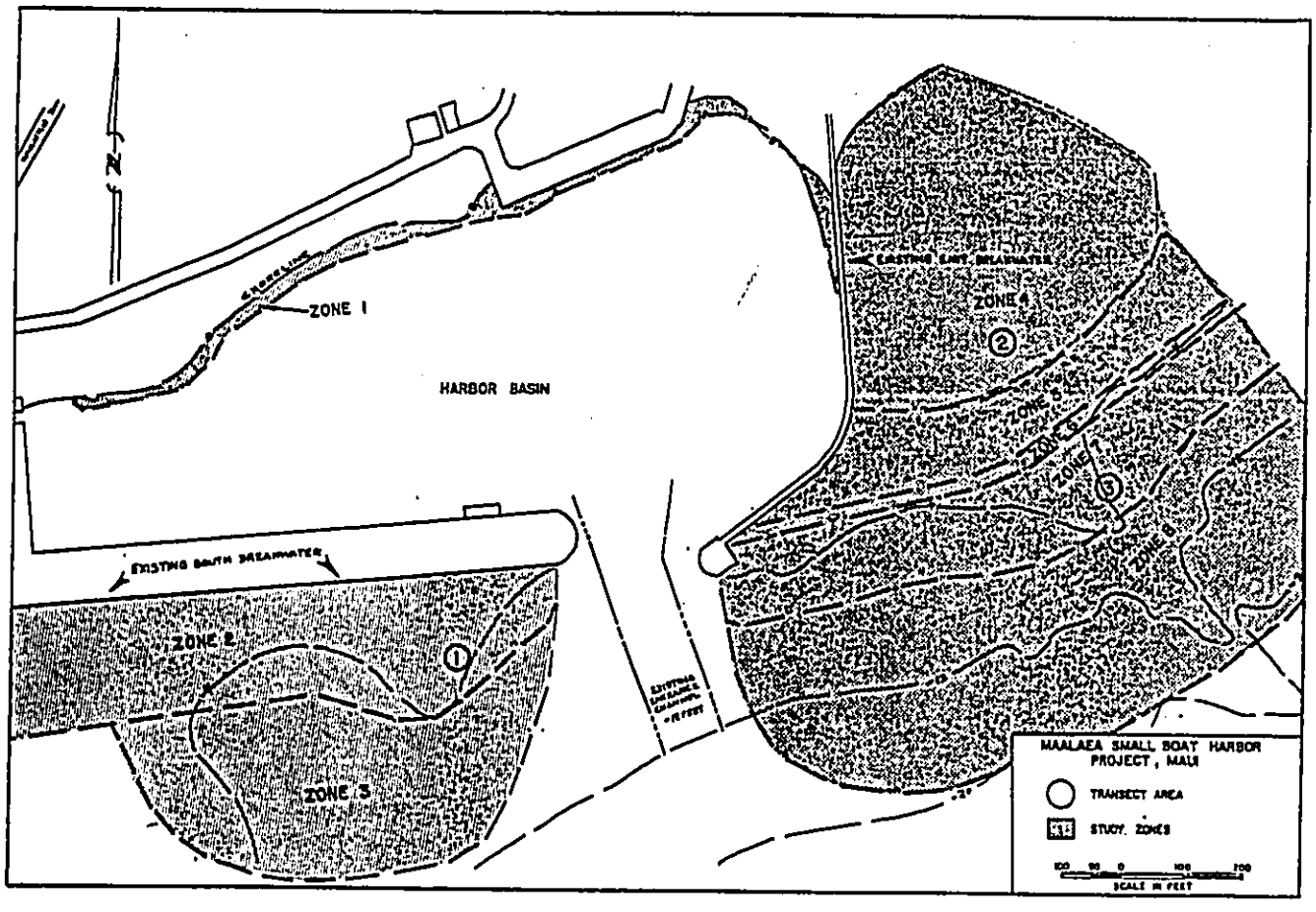


FIGURE 5

TABLE A-1
List of marine algae found in the Maalaea Harbor vicinity, Maalaea, Maui, Hawaii.

PHYLUM / Genus:species	Occurrence and Abundance*											
	Transects			Zones								
	1	2	3	1	2	3	4	5	6	7	8
CHLOROPHYTA												
Ulva fasciata	-	A	-	-	-	-	A	-	-	-	-
U. lactuca	-	A	-	-	-	-	A	O	-	-	-
U. reticulata	-	A	-	-	-	-	A	O	-	-	-
RHODOPHYTA												
Corallina sp.	-	-	-	-	A	A	O	C	-	-	-
*Gracilaria coronopifolia***	-	-	-	-	C	-	-	-	-	-	-
Gracilaria sp.**	-	-	-	-	-	-	A	A	-	-	-
*Grateloupia hawaiiana***	-	-	-	-	-	-	-	-	-	-	-
Pterocladia sp.**	-	-	-	-	A	-	O	C	C	A	-
unidentified coralline alga	A	A	A	-	A	A	A	A	A	C	C

*Abundance is indicated for each zone and transect surveyed using the following symbols: O = occasional; C = common; and A = abundant.

**Species found on breakwater only.

APPENDIX A

TABLE A-2
Substrate composition within Maalaea Bay in the vicinity of Maalaea Harbor, Maalaea, Maui, Hawaii

Substrate Type	Percent (%) Areal Coverage										
	Transects			Zones							
Live Corals	1	2	3	1	2	3	4	5	6	7	8
Order Scleractinia (stony corals)											
Montipora verrilli	-	-	1	-	-	-	-	-	2	3	3
Pocillopora damicornis	1	-	1	-	1	1	-	1	1	1	1
P. meandrina	-	-	3	-	1	3	-	4	5	2	2
Porites compressa	-	-	-	-	-	-	-	1	2	5	3
P. (*Synaraea*) *convexa**	-	-	-	-	-	-	-	1	-	-	-
P. lobata	-	-	2	-	3	4	1	5	80	5	3
Order Zoanthinaria (soft corals)											
Palythoa tuberculosa	1	-	-	-	1	-	1	1	-	1	1
Zoanthus sp.	-	-	-	-	1	-	-	-	-	-	-
Platform reef **	94	10	93	-	34	90	-	90	10	83	84
Coral rubble **	4	85	-	-	59	-	78	-	-	-	-
Sand	-	5	-	-	-	2	20	-	-	-	3
Dredged reef	-	-	-	100	-	-	-	-	-	-	-

*Only one specimen (colony) found.

**About 90% of substrate covered with crustose coralline algae.

APPENDIX A

TABLE A-3
List of macroinvertebrates observed in Maalaea Harbor and vicinity, Maalaea, Maui, Hawaii

PHYLUM / CLASS / FAMILY / Genus:species	Transects 1	2	3	Zones 1	2	3	4	5	6	7	8
ARTHROPODA											
GRAPSIDAE											
Grapsus g. tenuicrustatus	-	-	-	A	A	-	A	A	-	-	-
Sesarma augustifrons	-	-	-	O	-	-	-	-	-	-	-
OCYPODIDAE	-	-	-	O	-	-	-	-	-	-	-
XANTHIDAE											
Carpilius maculatus	-	-	-	-	O	-	-	-	-	-	-
ANNELIDA											
CHAETOPTERIDAE	-	-	-	-	-	C	C	-	-	-	C
ECHINODERMATA											
ECHINOIDEA											
Colobocentrotus atrata	-	-	-	-	A	-	-	-	-	-	-
Echinothrix diadema	18	2	3	-	A	A	A	A	A	C	-
Echinometra mathaei	65	-	72	-	A	A	O	C	A	A	A
Heterocentrotus mammillatus	2	-	3	-	A	O	-	O	C	C	-
Tripneustes gratilla	50	8	2	-	A	A	A	A	A	C	O
ASTEROIDEA											
Linckia multiflora	-	-	-	-	O	-	-	-	-	-	-
HOLOTHUROIDEA											
Holothuria atra	4	-	3	-	A	-	A	O	-	-	-
Opheodesoma godeffroyi	-	-	-	-	-	-	-	-	-	O	-
MOLLUSCA											
PELECYPODA											
Crassostrea gigas	-	-	-	A	-	-	-	-	-	-	-
GASTROPODA											
Cellana exarata	-	-	-	A	-	-	-	-	-	-	-
Nerita picea	-	-	-	A	-	-	A	-	-	-	-
Morula granulata	-	-	-	A	-	-	-	-	-	-	-
Littorina pintado pintado	-	-	-	A	-	-	A	-	-	-	-

TABLE A-4
List of Fishes Observed in Maalaea Harbor Vicinity, Maalaea, Maui, Hawaii

FAMILY / Genus:species	Transects 1	2	3	Zones 1	2	3	4	5	6	7	8
ACANTHURIDAE											
Acanthurus achilles	-	-	-	-	-	O	-	-	-	-	-
A. nigrofuscus	-	-	-	-	-	-	-	-	-	-	A
A. nigroris	-	-	-	-	-	-	-	-	-	-	A
A. olivaceus	1	-	-	-	-	A	-	-	-	-	A
A. triostegus sandvicensis	3	-	-	A	A	A	O	A	A	A	A
Ctenochaetus strigosus	-	-	-	-	-	C	-	-	-	-	C
Naso brevirostris	-	-	-	-	-	-	-	-	-	-	O
N. lituratus	-	-	-	-	-	C	-	-	-	-	C
N. unicornis	-	-	-	-	-	O	-	-	-	-	-
BALISTIDAE											
Rhinecanthus rectangulus	-	-	1	-	-	O	-	-	-	O	-
BLENNIIDAE											
Cirripectus variolosus	-	1	-	-	-	-	O	-	-	-	-
Plagiotremus goslinei	-	-	14	-	-	-	-	-	C	A	A
CANTHIGASTERIDAE											
Canthigaster amboinensis	-	-	-	-	-	-	-	-	-	O	-
C. jactator	-	-	1	-	-	O	-	-	-	O	-
CHAETODONTIDAE											
Chaetodon lunula	-	-	-	-	-	-	-	-	O	-	O
C. miliaris	-	-	-	-	-	-	-	-	-	-	O
CIRRHITIDAE											
Cirrhitops fasciatus	-	1	-	-	-	-	-	-	-	-	-
Paracirrhites forsteri	-	-	-	-	-	-	-	-	-	O	-
CARANGIDAE											
Caranx sp.	-	-	-	-	-	-	-	-	-	A	-
DIODONTIDAE											
Diodon hystrix	-	-	-	-	-	O	-	-	-	-	-
ENGRAULIDAE											
Stolephorus purpureus	-	-	-	A	-	-	-	-	-	-	-
ELEOTRIDAE											
Asterropteryx semipunctatus	-	-	-	-	-	-	C	A	-	-	-

TABLE A-4 cont'd

FAMILY	Transects			Zones							
Genus:species	1	2	3	1	2	3	4	5	6	7	8
KUHLIIDAE											
Kuhlia sandvicensis	-	-	-	0	-	0	-	-	-	-	-
LABRIDAE											
Halichoeres ornatissimus	-	-	-	-	-	0	-	-	-	-	-
Stethojulis balteata	1	-	-	-	C	0	-	C	C	-	-
Thalassoma duppereyi	8	2	18	-	A	A	-	C	A	A	A
T. fuscum	-	-	-	-	-	-	-	-	-	0	-
MUGILIDAE											
Mugil cephalus	-	-	-	-	-	0	-	-	-	-	-
MULLIDAE											
Parupeneus multifasciatus	-	-	-	-	-	C	-	-	-	C	C
POMACENTRIDAE											
Abudefduf imparipennis	-	-	-	-	C	-	-	C	-	-	-
Plectroglyphidodon johnstonianus	-	-	-	-	0	-	-	0	-	-	-
Pomacentrus jenkinsi	2	-	-	-	0	-	-	0	..		-
SCORPAENIDAE											
Scorpaena coniorta	-	-	16	-	-	-	-	0	0	A	C
SPHYRAENIDAE											
Sphyraena barracuda	-	-	-	0	-	-	-	-	-	-	-
ZANCLIDAE											
Zanclus canescens	1	-	-	-	-	0	-	-	-	-	-
Total Number	16	4	50								
Number of Species	6	3	6	4	6	16	3	7	6	11	14
Species Diversity Index	1.44	1.03	1.24								

*Transect observations are recorded as numbers of fish observed; abundance in Zones 1 through 8 are recorded using the following symbols: 0 = occasional (1 - 4); C = common (5 - 10); and A = abundant (11 or more).

APPENDIX E

SOCIAL AND CULTURAL RESOURCES

APPENDIX E

SOCIAL AND CULTURAL RESOURCES

1. Introduction.

a. Part I of the social and cultural resources appendix summarizes pertinent socioeconomic profile data on the study area and assesses the social well-being components of the three alternative plans. The social-well being component analysis derives from the Water Resources Council's "Principles and Standards for Planning Water and Related Land Resources" (P&S), 38 Federal Register 24778-24869, 10 September 1973. The social well-being components required by P&S consist of (1) Real Income Distribution; (2) Life, Health, and Safety; (3) Educational, Cultural, and Recreational Opportunities and Other Community Services; and (4) Emergency Preparedness. The U.S. Army Corps of Engineers have added two additional components--Community Conesion and Other Population Characteristics. Part I includes a separate "List of References."

b. Part II of Appendix E summarizes the findings of the Corps in identifying prehistoric sites, historic structures, or other cultural resources in the study area and assessing the effects of the alternatives on the sites or resources. Identification of historic sites is required by the Reservoir Salvage Act of 1960 as amended and Executive Order 11593 (1971). The Federal agency must evaluate the significance of the sites in order to determine possible eligibility for the National Register of Historic Places. If any sites in the project area were determined eligible for or already listed on the National Register, they would be protected by Federal law and regulation to the extent that the Federal agency must consult with the State Historic Preservation Officer and the U. S. Advisory Council on Historic Preservation to determine the effect of the Federal project and to identify measures to either avoid or mitigate for any adverse effects.

PART I

2. The social well-being appendix identifies the social and economic characteristics of Maui Island and the Maalaea region, and evaluates the alternatives in relation to the social well-being components pertinent to the problem and region. Attendance at the first public meeting and subsequent workshops held in conjunction with the small boat harbor project study indicates that existing or potential users of tne harbor or tne adjacent surfing sites come from virtually every community on Maui Island, except for Hana. Furthermore, the level of past and anticipated use of the harbor facilities is related to the overall growth of the island's economy. Although harbor users are distributed island wide, there would be direct and indirect consequences of harbor improvements which would be most felt in the immediate community of Maalaea.

3. Social and Profile of Maui Island

a. Population information contained in Economic Base Study Maui Island 1980-2035 by Environmental Capital Managers, Inc., 1978, provides an overall

view of the characteristics of the population of Maui island as of 1975 (Ref. 17). In general, the resident population was evenly divided between males and females, at 50 percent each. The average age was 33; 50.2 percent of the population were under 29 years of age and 49.8 percent were over 30. Residents of school age represented 34.5 percent of the population while those 60 and over accounted for 14.7 percent. The primary work force, those over 20 and under 60, were 50.8 percent of the population.

b. Residents of Japanese extraction made up the largest segment of Maui's population with 27 percent of the total. Caucasians made up the second largest group with 23.5 percent, followed by Hawaiians and part-Hawaiians at 19.8 percent. With Filipinos at 12.3 percent of the population, these ethnic groups accounted for 82.6 percent of the total population. The remainder included Chinese, blacks, Koreans, Puerto Ricans, Samoans and mixtures. About 62 percent of the Japanese lived in Kahului-Wailuku and accounted for 40 percent of the area's population. Most of the Caucasians, 83 percent lived in either the Lahaina-Kapalua or Kihei-Kula areas and made up 35 percent of those populations. Since 1970, the proportion of Caucasians in these areas in relation to total number of Caucasians has risen from only 28 percent. The Hawaiians and part-Hawaiians were evenly distributed throughout the island. The single largest segment, 46 percent lived in the northeast sector of the island, in the Makawao to Hana area.

The majority of Maui's residents, 66.7 percent had a high school education or less. Some 28 percent did not go beyond the eighth grade. About 9 percent had a college degree or had done post-graduate work. And 2.6 percent had completed business or trade schools. Table 1 shows the characteristics of Maui island's population as of 1975.

Table 1 Population Characteristics, Maui Island, 1975

		Total Number 1/	Percent 2/
Sex	Male	23,800	50%
	Female	23,800	50
		47,600	100%
Age	0-9	7,140	15.0%
	10-10	9,282	19.5
	20-29	7,473	15.7
	30-39	5,522	11.6
	40-49	5,141	10.8
	50-59	6,045	12.7
	60-69	4,332	9.1
	Over 69	2,665	5.6
		47,600	100.0%
Ethnicity			
	Japanese	12,852	27.0
	Caucasian	11,186	23.5
	Hawaiian & Part Hawaiian	9,425	19.8
	Filipino	5,855	12.3
	Mixed	4,284	9.0
	Portugese	2,380	5.0
	Black	571	1.2
	Chinese	381	0.8
	Other	333	0.7
	Korean	143	0.3
	Puerto Rican	143	0.3
	Samoan	47	0.1
		47,600	100.0%
Education			
	Under 6 Years Old	4,522	9.5%
	No Schooling	714	1.5
	Grades 1-8	12,709	25.7
	Grades 9-11	6,521	13.7
	High School Graduate	11,757	24.7
	Some College	5,807	12.2
	Bachelor's Degree	2,999	6.3
	Some Graduate Work	476	1.0
	Graduate Degree	857	1.8
	Business/Trade School	1,238	2,6
		47,600	100.0%

1/ Environment Capital Managers, Inc., based upon most recent 1975 population estimates for Maui Island.

2/ Obtained for Maui Island from: Survey and Marketing Services, Inc., OEO 1975 Census Update Survey - Maui County, Honolulu, Hawaii, February 1976.

Source: Environment Capital Manager, Inc., Economic Base Study, Maui Island 1980-2035. Prepared for U.S. Army Engineer Division, Pacific Ocean, 1978.

4. Economic Profile of Maui Island

a. The economy of Maui island has been in a state of flux over the past 25 years. In 1953, Maui was strictly a one-industry community: agriculture in the form of sugar, pineapple, cattle and diversified truck crops. With 14,852 persons employed, about 47 percent worked on three sugar and six pineapple plantations in the County. Maui island had a population 37,966, and there were 15,065 registered motor vehicles. The remainder of the business community on the island supported the agricultural industry and resident population. There were 18 construction companies; 13 hotels; 26 small restaurants; 45 doctors, lawyers and dentists; one architect; 149 "mom 'n pop" retail stores (Kahului Shopping Center was started in 1951); and 7,400 telephones. With little expansion in the basic agricultural sector, the growth in the service industries was non-existent. As a result, the majority of young people were forced to leave the island in search of employment elsewhere, either in Honolulu or on the U. S. mainland. Between 1940 and 1960, Maui experienced net out-migration of 11,200, over 23 percent of the 1940 population.

b. Prior to 1954, the 13 small hotels on the island catered primarily to commercial travelers. In the winter of 1954, three individuals opened the first real tourist-oriented hotel, the 103-room Maui Palms. Tourism has now become the dominant industry on Maui island. In 1964, the Sheraton and Royal Lahaina hotels opened as the initial phase of the State's first master planned resort destination area; Kaanapali. Just prior to their opening, in 1962, Maui island had a total of 61,320 visitors. During 1977, Maui was visited by more than 1.2 million tourists who stayed in 7,898 visitor-plant units (hotel rooms and condominium-hotel units).

c. The visitor industry has changed the employment distribution and affected population growth on the island. In 1952, 7,015 of the 14,852 jobs in the County, or 49 percent were in sugar and pinapple cultivation and processing. The total number of jobs had increased 87 percent to 27,700 by the end of 1977; but, of this, only 2,550, 9 percent were in sugar and pineapple. In 1952, 53 percent of the job count was required to support the agricultural industry and population in community service, or about 7,837. Using the same ratio of 53 percent to 47 percent and with only 2,550 jobs in sugar and pineapple, the work force of community support may have been reduced to 2,875. The calculated direct and support jobs in pineapple and sugar, 5,425, when subtracted from the current job count of 27,700, indicates that 22,275 jobs may have been created both directly and indirectly by the visitor industry.

d. The effects of the growth of tourism are evident in other Maui characteristics. Resident population increased by 45 percent during the period 1953 to 1975, up from 37,966 to 55,000 (Ref. 17). By July 1978, the resident population had risen to about 52,800 (Ref. 3). The percent of residents of Maui Island born out of the State increased from 20.2 percent in 1970 to 31.6 percent in 1975. The effect of tourism is seen even clearer in the districts of Lahaina (including Kaanapali and Honolua) and Kula-Kihei where most new hotels and visitor-oriented condominiums have been built. From 1970 to 1975, resident populaltion of these district increased from 5,524 to 9,278 in the Lahaina area and from 3,760 to 9,347 in Kula-Kihei (Refs. 8 and 4). Over the longer 1953-1975 period, the growth of the number of vehicles for transient use and number of vehicles per family is reflected in the

ownership level of 1.3 residents per vehicle in 1975 compared with 2.5 residents per vehicle in 1953 (Ref. 17). Likewise, the prime commercial tax base has risen from $39.9 million in 1953 to $356 million in 1975, a growth of 792 percent. During the same time period, gross property valuations have increased almost 14 times from $26.3 million to $694 million.

e. As stated earlier, the export crops of sugar and pinapple have been decreasing in importance while the visitor industry has been expanding. Total state pineapple acres in crops has fallen from 75,000 in 1960 to 48,000 in 1976. Currently about 11,000 acres are in pineapple production on Maui island; there has been a loss of about 1,000 acres since 1972. Total Maui County pineapple employment has also been decreasing, with a loss of 450 jobs during the period 1972 through 1977 (Ref. 17). Both sugar production and acres in crops have increased slightly on Maui since 1960. With 42,300 acres in crop and a harvest of 20,500 acres in 1960, 1.8 million tons of cane for sugar were harvested. The production figures had increased slightly by the end of 1976, with 46,900 acres in crop, 22,200 acres harvested and 2.0 million tons of cane for sugar harvested. However, employment in sugar processing has been decreasing. Maui island sugar employment has fallen from 4,414 in 1953 to 2,103 in 1975, a decrease iof 52 percent.

5. Current Personal Income and Labor Force Characteristics

a. Of the four counties in the State, the City and County of Honolulu has the highest personal and per capita iincome levels. However, Maui County has the fastest growing personal and per capita income levels, according to the 1978 Economic Base Study (Ref. 17). Total personal income increased 121 percent between 1970 and 1975 in Maui compared with only a 59 percent increase in Honolulu. Table 2 show these increases for Maui Island between 1972 and 1976. Maui's remarkable growth in income levels is a direct result of the growth of the visitor industry. The trade and service sectors of the economy, which largely comprise the tourist industry, have been shown in an inter-industry study of the Maui County economy to have the highest industrial multipliers. This means that these sectors generate comparatively greater economic impact in terms of sales, employment and income than agricultural industries (including, for satistical purpose, fishing).

TABLE 2

PERSONAL AND PER CAPITA INCOME
MAUI ISLAND
1972-1976
(CURRENT DOLLARS)

	Maui County Personal Income ($Millions) 1/	Maui Island Percent Share 2/	Maui Island Personal Income ($Millions)	Maui Island Per Capita Income
1972	$ 208.7	90%	$ 187.8	$ 4,348
1973	240.8	91	219.1	4,872
1974	286.4	90	257.8	5,793
1975	331.7	89	295.2	6,228
1976	379.3	88	333.8	6,597

1/ State of Hawaii, Department of Planning and Economic Development, The State of Hawaii Data Book 1979, Honolulu, Hawaii, November 1979 (Ref.10).

2/ Based upon Maui island's share of county wages. The wage share is based upon county average annual earnings per industry and the number of jobs per industry by island. Sources of wages and job information:

State of Hawaii, Department of Labor and Industrial Relations, Employment and Payrolls in Hawaii 1972-1976, Honolulu, Hawaii, 1973-1977.

State of Hawaii, Department of Labor and Industrial Relations, Labor Force Data Book, Honolulu, Hawaii, March 1978.

b. Employment and civilian labor force levels have also increased remarkably. Between 1970 and 1975, the island labor force increased by 44.4 percent (Refs. 8 and 17). Table 3 shows these increases for Maui Island between 1972 and 1978.

TABLE 3

LABOR FORCE, EMPLOYMENT AND WAGES
MAUI ISLAND
1972-1978

	Labor Force	Employment	Total Wages 1/ ($Millions)	Unemployment Percent
1972	19,400	17,600	$111.4	9.3%
1973	20,400	18,650	125.9	8.7
1974	21,300	19,400	148.4	8.8
1975	23,250	21,150	179.9	8.9
1976	24,800	22,350	197.9	9.9
1977	26,150	24,300	225.0	7.0
1978	26,150	24,350		6.9

1/ Estimate by Environment Capital Managers, Inc. (Ref. 17)

Original Source: State of Hawaii, Department of Labor and Industrial Relations, Labor Force Data Book, Honolulu, Hawaii, March 1978, as revised (Ref. 6).

6. The Community of Maalaea

a. Community Characteristics. Maalaea is a small shoreline community, which because of its protected bay and accessibility has been a fishing village for decades. According to the "Civic Development Plan for Kihei" prepared in 1970, "it is an ideal commercial fishing base," due to its proximity to Honoapiilani Highway, the main vehicular artery that links Lahaina to Wailuku-Kahului and to the Kihei-Kula area (Ref. 12). In the early 1970's all that marked the village were a few residence, a small market, a gas pump, the small boat harbor and U. S. Coast Guard Station, Buzz's Restaurant and Cocktail Lounge, and the Hale Kini-Polynesia, a small cottage resort (Ref. 15). No population figures are available for the community of Maalaea. In 1970, it was described as a "picturesque and promising residential community (Ref 12).

b. Maalaea Small Boat Harbor and most of the existing community lie within a State-designated "Urban" District which hugs the shoreline extending about one mile north and west of the small boat harbor (Ref. 14). Nortn of Maalaea across the low ithsmus of Central Maui extends "Agricultural" land, principally in sugar cane and to the west up the mountain slopes of Puu Kukui lies a large "Conservation Zone." The County's "Kihei Civic Development Plan" classifies the harbor breakwater and revetment for "Public Use" (Ref. 12). Most of the land directly surrounding the harbor is classified "Industrial" and there is a narrow strip of "Apartment (A-2)" land running northeastward along the shoreline. North of the harbor and extending partially into Stated-designated Agricultural land are two parcels classified for "Business" and "Residential (R-2)." As of 1980, the latter two areas have not been developed

and remain in sugar cane cultivation. Extending up the mountain slope west of Maalaea is a large "Residential (R-3)" zone which has also remained undeveloped. Immediately to the southwest of the harbor is a small parcel classified as "Park" where the undeveloped Kapoli Park is located.

c. By 1973, two additional resort condominiums had been constructed at Maalaea in the strip classified for "Apartment" use. By July 1975, this number had increased to 6 condominiums totalling 307 units and by June 1979, there were 8 condominiums with a total of 445 units (Ref. 2). Of the latter, 297 units were classified as transient-resort rental units. During 1980 two more condominiums were built and a third is under construction immediately abutting the small boat harbor. The growth of Maalaea as a resort community is also reflected in the consumption of water which has risen from 19.5 million gallons in fiscal year 1973 to 44.3 million gallons in fiscal year 1978, an increase of 127 percent (Ref. 11).

d. Community Services. Except for the U. S. Coast Guard (see below), public safety is provided by County police and fire departments located in Wailuku and Kihei, respectively. The nearest hospital is in Wailuku and clinics are located in Wailuku and Lahaina. Ambulance service is available to Maui Memorial Hospital in Wailuku (Ref. 15). Maalaea, lying as it does near a junction between Lahaina, Wailuku-Kahului and Kihei areas, acts as a transfer point for commuters going to work from Central Maui and Kihei to the resort hotels in the Lahaina-Kaanapali region. Commuters either pool rides or catch employer-supplied transport at Maalaea and park their cars (numbering 10-20) alongside the road (Ref. 1). Sewage disposal facilities consist of private cesspools and as of 1977, eight private small sewage treatment plants (STP) were designed primarily to service individual resort condominiums. According to the State and County "208 Water Quality Management Plan for the County of Maui," the 8 STP's at Maalaea serviced an average population of 950 in 1977 (Ref. 5).

e. Recreational Opportunities. There are three significant recreational resources at Maalaea: the small boat harbor, surfing sites, and Kapoli Park. Stretching for 4 miles to the northeast and east of Maalaea also lies the Maalaea Bay Beach which has become a major tourist destination. The Bay is usually calm and snorkling, scuba, and spearfishing are common and popular activities. The State-operated Maalaea Small Boat Harbor has both recreational and commercial significance. It has a capacity for 93 boats and one launch-haulout ramp. A 100,000 pound capacity cold storage plant is operated by a firm called Fresh Island Fish for the use by commercial fishermen working out of Maalaea Harbor. At present, fuel must be trucked out to the berths, but according to the "State Fisheries Plan," recommendations have been made to the State Department of Transportation to design and construct fuel docking facilities by Fiscal Year 1984 (Ref. 7). Likewise the Plan also calls for one additional haul-out facility to be constructed by Fiscal Year 1985.

f. The U. S. Coast Guard moors its 95-foot rescue boat, the CAPE NEWAGEN, at the Maalaea Harbor (Ref. 18). An additional 21-foot utility boat is also moored there by the Coast Guard. Seventeen U. S. Coast Guard personnel are assigned to CAPE NEWAGEN. In 1979, the Coast Guard lost the lease on their original Small Boat Station facility and are preparing to construct a new facility on State-controlled land adjacent to the harbor.

g. There are two surfing areas adjacent to Maalaea Harbor and are identified on Figure B-2 in the Main Report. Area No. 1, east of the harbor is the location of the "Maalaea Pipeline" which is considered "a classic and unique wave...it is unique in all the world" according one local, long-time surfer (Ref. 16). According to the former publisher and editor for Surfer magazine, "it is one of the greatest waves in the world; it is one of the fastest waves and one of the most beautiful tubes. It wasn't created by the harbor" (Ref. 16). The other, less significant surfing area is about 40 yards south of the revetted mole, called"Off-the-Wall."

h. The undeveloped area on the mountain side of Maalaea Small Boat Harbor and just southwest of the revetted mole was once apparently designated as Kapoli Park according to old maps of the area. It is not now listed as either a State or County park, but the 1974 County of Maui "Open Space and Outdoor Recreation Plan" recommended development of a Maalaea Harbor Park, including the historic Kapoli Springs (Ref. 13). This recommendation was not carried forward into the 1975 "State Comprehensive Outdoor Recreation Plan" (Ref. 9).

7. Evaluation of Alternatives.

a. None of the social well-being components are critical in selecting one alternative over another, but the implementation of any of the construction (structural) alternatives would be based heavily on its capability of improving safe navigation and storage of boats within the harbor area and enhancing boating-dependent recreational and commercial fishing (real income) opportunities.

b. Health, Safety and Community Well-Being. The most significant beneficial effect of providing improvements to Maalaea Small Boat Harbor should be to improve the health and safety of boaters and indirectly the general community. Boating safety and the health of boat operators should improve under storm conditions because of owners of boats should less often feel the requirements to risk injury to save craft moored within the harbor when surge conditions are at a dangerous level. Improved passage through the harbor entrance channel should enhance boating safety. As one long-time boater puts it: "I think we are farmers of the sea; we've been here for years and years, and we've spent a lot of sleepless nights trying to take care of the vessels out here" (Ref. 16). The health and safety problems at Maalaea not only affect the boaters using Maalaea Small Boat Harbor, but also the entire south shore of Maui and even Lanai island. The reason for this is that the U. S. Coast Guard Cutter Newagen cannot remain moored within the harbor when surge conditions become unweildy. The following quote from one of the boat owners at the Public Meeting held 23 February 1979 succinctly presents the issue:

.....whenever we have the Kona storms and the south swells coming in, the United States Coast Guard has to go to Kahului Harbor, which leaves all the boaters that use the harbor of Maalaea, that use the harbor of Manele Bay in Lanai, that use the harbor of Lahaina, in complete distress if they have problems. You want me to tell you why? Because it would take them approximately three hours to run around from Kahului to Kahoolawe if they had to. Now you tell me, how much is it worth for two, three, four five lives? Would you expect the ambulance and the rescue team from the Fire Department to go over to Kahului every time there is a Kona storm? No. What we want is to have this entrance channel changed so that there is no surge and so that the United Coast Guard can stay exactly where they are right now at all times. Now, I don't think this is asking too much. The public safety has just got to be corrected, and this is something that is one of our biggest problems--and it happens every single year. Every time the boat leaves the harbor, they don't just leave for the day. They leave until the Kona storm is over, which might mean four or five days a week. Now all it takes is one accident. Somebody calls for distress off of the island of Kahoolawe; they don't make it back, four lives are lost. How much is that worth? I say it's worth the change of the entrance of that harbor. That is all I have to say.

c. Knowledge that a safe anchorage and fully navigable harbor is available should impart to the general community and to those families and relatives of boaters more of a feeling of security and community well-being than at present during storm and high surge conditions. This fact, together with the proposed enlargement of berthing spaces, may also encourage nonboaters to make the initial investment for a boat due to the knowledge of enhanced safety conditions and that losses due to surge-induced damage would be lessened on the average.

d. Recreational Opportunities and Distribution of Real Income. All plans enhance recreational boating opportunities including individually-owned boats used solely for personal use and commercially-operated dive and fishing charter boats. If the number of charter boats or their frequency of use increases as a result of implementation of any of the alternatives, this would represent increased recreational opportunities for tourists and State-residents alike. Surfing opportunities sould not be significantly affected. The world-famous "Maalaea Pipeline" would not be affected by any of the alternatives.

e. Implementation of any of the improvements should stimulate greater development in Maalaea, contribute to increased work-time devoted to commercial and semi-commercial fishing, encourage larger numbers of individuals to enter the fishing industry (full-time or part-time), and indirectly benefit various marine-related industries and retailers on Maui. Moderate growth of Maalaea can be anticipated, but this may place strains on utilities such as water supply, sewage disposal and roadway use and parking. Provision of increased parking facilities as part of Plan 1 may encourage commuters to use this facility instead of parking alongside the highway. Use of the parking area by tourists and tourist-buses utilizing commercial charters would probably also occur. Although there are no hotels at Maalaea, the construction of resort-oriented condominiums within areas zoned for

apartment use has brought a marked increase of transients to the Maalaea community. Some advertisements of these condominiums either for short-term rental or for sale, explicitly mention the availability of a marina nearby. Increased expenditures by boaters will contribute to over sixty local businesses selling marine-related products and services. This should have direct and indirect effects on levels of employment in these and other visitor-plants units (hotels, restaurants, and tour companies). Increased growth of Maalaea and increased business revenues should generate larger tax revenues for both the State of Hawaii and County of Maui. These benefits will be offset by irreversible changes to the quiet, rural character of Maalaea, yet most of these trends are already in evidence.

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PART II

8. Cultural Resources

a. A review of the most recent list of sites included in or determined eligible for the National Register of Historic Places (44 Federal Register 7416, February 6, 1979 and and more recent issues) shows no sites located in the vicinity of Maalaea Harbor, Maui. A similar search of the State Register of Historic Places showed no sites listed for the project area.

b. Summary. A cultural history overview of Maalaea Small Boat Harbor Project was conducted for the Corps of Engineers by Hawaii Marine Research, Inc. The following report, prepared in September 1979, found that Maalaea Bay had been mentioned in prehistoric Hawaiian myths as a traditional landing site for canoes. By the end of the 19th century, a pier had been constructed at Maalaea, but until the 1940's, it appears that Maalaea did not play any significant role in the maritime history of Maui. The original harbor was constructed in 1952 and has been modified several times afterward. A world-renowned surfing site is situated adjacent to Maalaea Harbor. The cultural history overview examined the possible historic significance of this surfing site. The report found, however, no historic documentation nor memory among local residents of any traditional surfing site near the harbor.

A Cultural History Overview of the Kahoma Stream Flood Control Project, Lahaina, Maui and the Maalaea Small Boat Harbor Project, Maalaea, Maui, Hawaii.*

By
Pauline King Joerger
Michael W. Kaschko

*Report edited to omit references to the Kahoma Stream Flood Control Project.

Prepared for the

Corps of Engineers, Pacific Ocean Division
Department of the Army
Contract No. DACW89-79-C-0012

September 1979

Hawaii Marine Research, Inc., Honolulu

CONTENTS

LIST OF FIGURES

INTRODUCTION

The U. S. Army Corps of Engineers, Pacific Ocean Division, requested that Hawaii Marine Research conduct a historical study of the Maalaea Small Boat Harbor Surfing Site. The intent of this study was to provide sufficient information for the U. S. Army Corps of Engineers to assess the probable impacts of proposed harbor improvements at Maalaea on significant cultural resources. The study area is evaluated below as to the eligibility for inclusion on the National Register of Historic Places.

This report was prepared from informant data and existing reports, published and unpublished, in depositories on Oahu and Maui. No archaeological field work was conducted. The Maalaea Small Boat Harbor is depicted in Figure 1.

MAALAEA SMALL BOAT HARBOR

Maalaea Bay has had an important place in Hawaiian history as a stopover or transit place for travelers. One recorded event told by Kamakau was the procession which took the remains of the chief Kekaulike by canoe to Maalaea and then by land to Wailuku and Iao Valley (Kamakau, 1961:69). Other references in the writings of travelers were made to their arrival by canoe or small boat at Maalaea. At the end of the 19th Century a pier extended out from the shore into the sea (Figure 2).

By 1902 this pier was in a "condition of extreme dilapidation" (Superintendent of Public Works, 1902:78-79). For reasons which were not stated, the Superintendent of Public Works of the Territory of Hawaii did not believe that Maalaea was suitable for the construction of a wharf. Instead he made plans for the Territory to build one near McGregor's Point (Superintendent of Public Works 1902:78-79, 1904:11, 1905:5-6; Maui News, 1906).

During World War II Maalaea Bay was used by the 4th and 5th Marine Divisions in joint ship-to-shore rehearsals before the 1945 battle of Iwo Jima (Allen, 1950:190). Maalaea was also used for amphibious landing practice (Allen 1950:190).

By the 1950s modern construction of a small boat harbor was begun (Board of Harbor Commissioners, 1951:9, 1952:8, 1953:8). By March of 1953 a breakwater and dredging were completed. By 1958 a second breakwater was constructed. On maps and drawings these are designated as the west breakwater and the east breakwater (Hill, 1979:1).

In 1975 Pacific Sea Transportation, Ltd., began its interisland ferry service with the use of hydrofoils. The first boat, the Kamehameha, arrived at Maalaea and docked at a SeaFlite terminal which the company had constructed near the west breakwater (Department of Transportation, 1975:18, 20). SeaFlite continued to operate its ferry until the end of 1977.

The small boat harbor has been used as a mooring place for commercial fishing boats, charter boats and pleasure craft. The Coast Guard cutter Cape Newagen, a search and rescue vessel, is based at the harbor. There is a

waiting list for mooring space at the harbor. In 1974 50 boats were on the list. By 1975 the number had increased to 131 (Department of Transportation, 1974:27, 1975:23)

Captain Percy A. Lilly, Jr. (Personal Communication), noted that Maalaea dry dock was used extensively. The small boat harbor would continue to be used, he felt, for small operations of commercial fishermen, charter boats and private vessels.

An interesting cultural attribute has become associated with Maalaea Small Boat Harbor and its breakwaters. Two areas in front of the jetty at Maalaea harbor and at Maalaea reef on the Kihei side of the harbor have been described as surfing areas (Facilities Manual, 1975:151-152).

While both areas are used today, it is off the west and east breakwaters where the experienced and expert surfers ride the waves. It is, however, off the east breakwater where "the best, fastest, and most beautiful tubes in the world" exist, according to John Severson, editor of Surfer magazine (Hill, 1979:8). Thus, changes in the entrance to the harbor could alter this surfing site.

It appears that the best surfing site at Maalaea is modern and possibly a site created by the construction of the breakwaters of the harbor.*

A quick review of the works on surfing in the Hawaiian Collection at Hamilton Library did not identify Maalaea as an important surfing site in the first half of the 20th Century. Similary, a review of the articles on surfing in Paradise of the Pacific brought about the same result. Maps showing ancient and modern surfing sites did not include Maalaea (Finney, 1959:48 passim). Residents of Maui, when questioned, stated that they remembered surfing at Maalaea every weekend and all summer about 30 years ago. With further questioning it became apparent that the most commonly used surfing area was at the reef on the Kihei side of the harbor.

Surfing and Hawaii have an ancient partnership. Surfboard riding was common and a popular sport in prehistoric Hawaii. It diffused throughout Oceania, was developed in Eastern Polynesia and most highly refined in the Hawaiian Islands, reaching the level of development of a "cultural peak" (Finney, 1959:21-23).

For various reasons, the sport declined in importance in Hawaii in the 19th Century. Early in the 20th Century, it was revived again and the center of surfing activity was at Waikiki Beach. Between 1911 and 1959 the sport grew, developed and changed (Finney, 1959:74-76). It also spread out from Hawaii to California, Australia, Peru, New Zealand, South Africa, Israel, France and Tahiti. Innovations in board construction and surfing techniques have developed in some of these new surfing centers and were soon adopted in others.

*[Editorial Comment: Based on analysis in the Main Report, the surfing site off the East Breakwater was not created by harbor construction.]

EVALUATIONS OF ELIGIBILITY AND RECOMMENDATIONS

MAALAEA SMALL BOAT HARBOR SURFING SITE

It does not appear from our investigations that Maalaea Small Boat Harbor is eligible for inclusion on the National Register of Historic Places. The currently used surfing site immediately adjacent to the harbor has probably become popular within the last 15 years and as such it is not now, nor has it been in the past, a site important in Hawaii's history in terms of the criteria detailed in 36 C.F.R. 63. Further Maalaea Small Boat Harbor as a whole has not been a significant part of Hawaii's maritime activities.

REFERENCES

The material gathered for this project was accumulated by standard historical research methods. Important depositories on Oahu and Maui were visited and two and one-half days were spent on Maui where both project areas were inspected, informants were interviewed and a bibliography was collected.

The depositories used were the Archives of Hawaii; the Hawaiian Collection, Hamilton Library, University of Hawaii; Bernice P. Bishop Museum Library; State of Hawaii Survey Office, Maui Historical Society; Kahului Public Library; Makawao Public Library, Wailuku Public Library and Lahaina Restoration Foundation. While not all depositories yielded pertinent information, at least one unexpected source was found at Makawao Public Library where Mrs. Gail Bartholomew had prepared an index of the Maui News from 1900 through 1930.

Two governmental officials were interviewed: Mr. Jeffrey Chang, Planner, Planning Department, County of Maui; and Captain Percy A. Lilly, Jr., District Manager, Maui, Water Transportation Facilities Division, Department of Transportation, State of Hawaii.

One informant was interviewed about Maalaea: Mrs. Inez Ashdown, who formerly served as a Maui County historic preservation advisor.

About one-quarter of the bibliography compiled proved useful as citations. The bibliography included printed works, manuscript and unprinted material, newspapers and periodicals, maps and photographs.

Printed works included, in the main, standard works on a subject. The annual reports of the Superintendent of Public Works and the Board of Harbor Commissioners of the Territory of Hawaii and the Department of Transportation of the State of Hawaii were used to follow the sequence of construction at Maalaea. Hawaii's War Years, 1941-1945 (Allen, 1950), was the major reference for World War II material.

Newspapers and periodicals were used where indexes exist. Thus, the Honolulu Star Bulletin and Honolulu Advertiser were checked for the period 1929 through 1978; Paradise of the Pacific and Hawaiian Annual and Alamanac and Maui News from 1900 through 1923. Single or individual articles were used when found in files or scrapbooks. For example, an article in Hawaii Coastal Zone News was an important source.

Among the manuscript and unprinted material used were land records in the State Department of Taxation, the Survey Division of the State Department of Accounting and General Services, and the Bureau of Conveyances and Land Management of the State Department of Land and Natural Resources. Archives of Hawaii documents were used extensively. The Master of Arts thesis of Ben R. Finney, "Hawaiian Surfing, A Study of Cultural Change," was an important source in regard to ancient and modern surfing.

The maps that illustrate this report were found at the Archives of Hawaii and the Survey Division of the Department of Accounting and General Services, State of Hawaii.

Photograph were looked for the at the Archives of Hawaii, the Maui Historical Society, the Kahului and Makawao Public Libraries, and in various issues of Paradise of the Pacific. No photographs were found which would illustrate the subject matter of this report.

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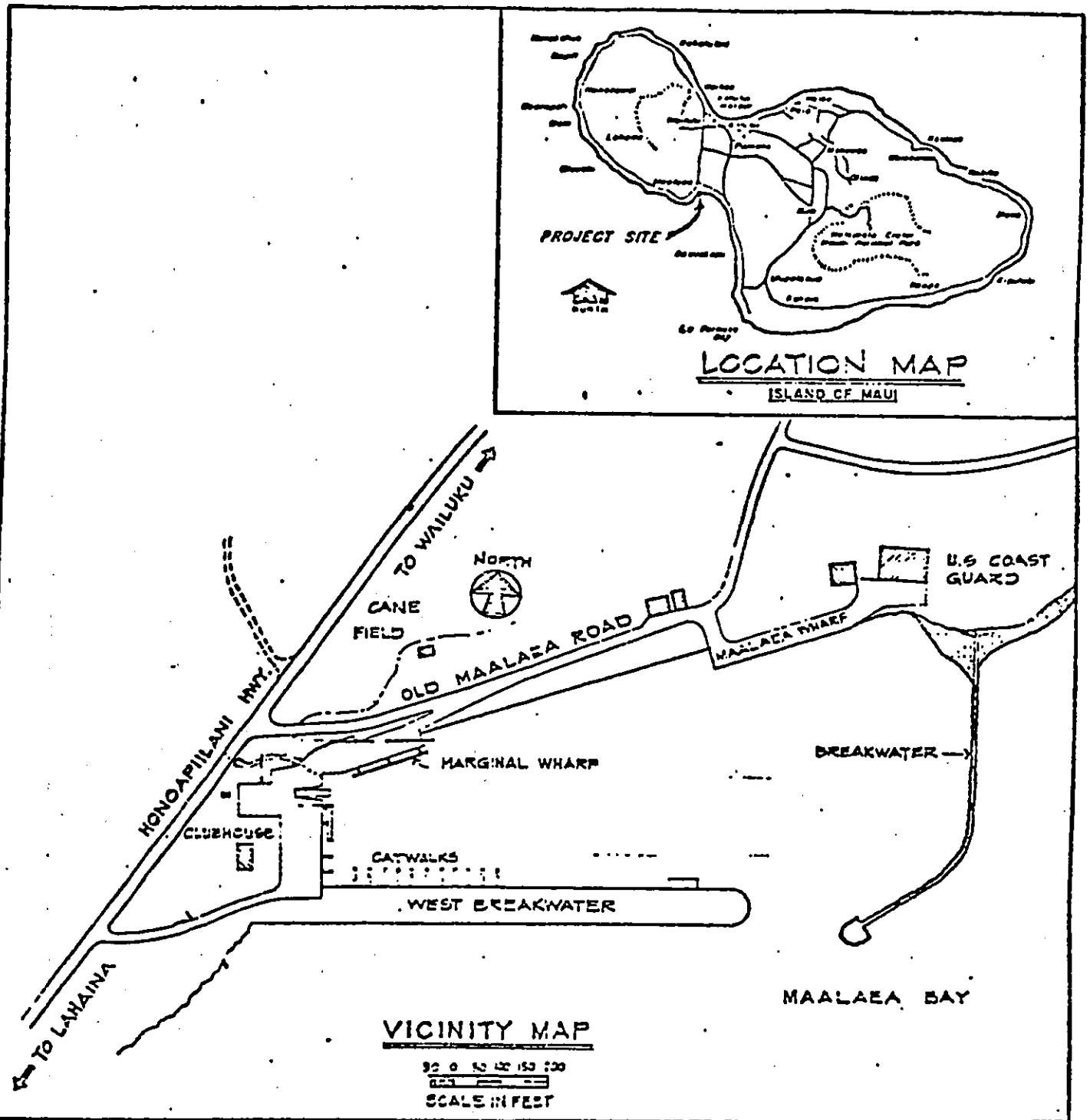
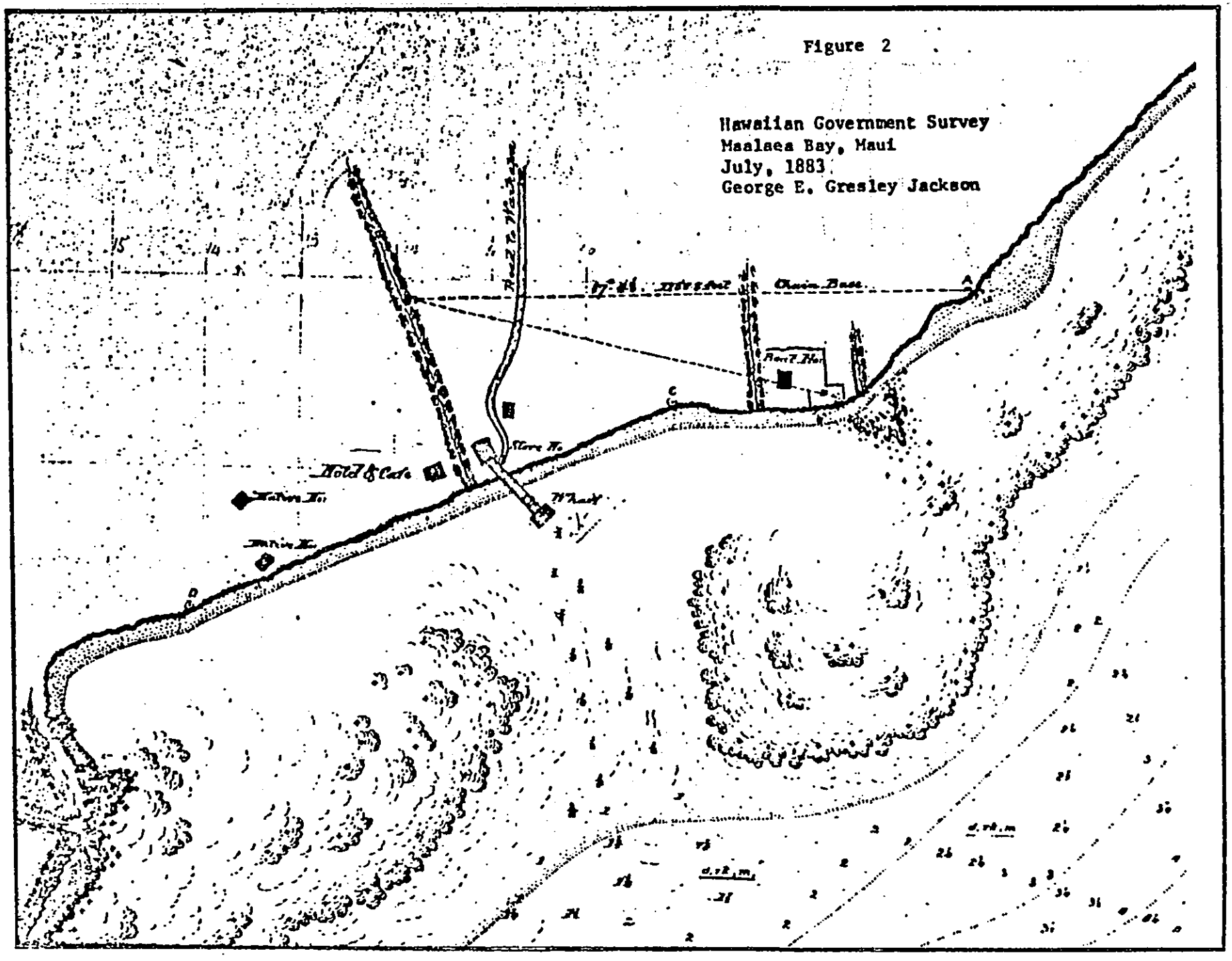


Figure 1 Maalaea Small Boat, Maalaea, Maui

Figure 2


Hawaiian Government Survey
Maalaea Bay, Maui
July, 1883
George E. Gresley Jackson

APPENDIX F

ENVIRONMENTAL IMPACT STATEMENT

FINAL ENVIRONMENTAL IMPACT STATEMENT
MAALAEA HARBOR NAVIGATION IMPROVEMENTS
MAUI, HAWAII

The responsible lead agency is the U.S. Army Corps of Engineers, Honolulu Engineering District.

The responsible cooperating agencies are the U.S. Fish and Wildlife Service, Hawaii Region, and National Marine Fisheries Service, Southwest Region.

Abstract

Post-authorization studies for navigational improvements to Maalaea Harbor were conducted by the U.S. Army Corps of Engineers in cooperation with the Harbors Division, Department of Transportation, State of Hawaii. Based on an assessment of public needs and concerns, three alternative plans of improvement were developed for detailed investigation. Plan 1 consists of a 620-foot extension of the south breakwater; a 800-foot-long revetted mole on the seaward side of the south breakwater; a 610-foot-long entrance channel 150-180 feet wide and a 1.7 acre turning basin. Plan 2 is similar to plan 1 except that the 800-foot-long revetted mole is not included. A 200-foot-long wave absorber would be provided at the same location. Plan 3 is similar to Plan 1 except that the 800-foot-long mole is not included and, instead of the breakwater extension, a 650-foot-long detached breakwater is provided 150 feet seaward of the south breakwater. None of the alternative plans has a significant impact on important surfing areas, marine resources, or cultural resources.

Further technical information concerning the statement may be obtained from:

Dr. James E. Maragos
US Army Engineer District, Honolulu
Building 230
Fort Shafter, Hawaii 96858
Telephone (808) 438-2263/64

NOTE: Information, displays, maps, etc., discussed in the main report are incorporated by reference in the EIS.

Rev. 26 Sep 80

APPENDIX F

ENVIRONMENTAL IMPACT STATEMENT
Maalaea harbor
Maui, Hawaii.

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LIST OF PREPARERS

The following people were primarily responsible for preparing this Environmental Impact Statement:

NAME	EXPERTISE	EXPERIENCE	PROFESSIONAL DISCIPLINE
Mr. Dave C. Sox	M.A., Historical and Cultural Geography	2 years Geography; 4 years EIS Studies U.S. Army Engineer District, Honolulu	Social Environmental Specialist
Mr. Robert Moncrief	B.A., Zoology	7 Years Biologist, National Marine Fisheries Service; 4 Years Biologists, U.S. Navy; 2 Years EIS Studies, U.S. Army Engineer District, Honolulu	Ecologist
Dr. James Maragos (EIS Coordinator)	PhD, Marine Ecology	2 Years Post Doctoral Research; 8 Years Environmental Consultant; 4 Years EIS Studies, U.S. Army Engineer District, Honolulu	Supervisory Environmental Biologist
Mr. Gary Wible (Study Manager)	B.S. Civil Engineering	5 Years, Hydraulic Engineer, U.S. Army	Hydraulic Engineer

1. SUMMARY

1.1 MAJOR CONCLUSIONS AND FINDINGS. The alternate plans are discussed in detail in Section D of this report. All three plans meet the primary objective of reducing surge and navigational hazards and increasing berthing capacity in the harbor, and provide economic benefits that exceed the project costs. Plan 1 maximizes economic development due to its greatest net economic benefit. It is therefore designated the National Economic Development (NED) Plan. All of the plans result in a net positive contribution to the quality of the marine environment due to the significant increase in the amount of valuable fish and shellfish habitat provided by the improved breakwater structure. However, all of the plans result in excess dredged material which must be disposed at a land site. This impact and other temporary and long-term environmental disturbances common to the three plans are difficult to quantify on comparable terms with positive contributions. Hence, it is uncertain that any of the alternatives would result in a net positive contribution to the total environment, which is the criteria for designation of an Environmental Quality (EQ) Plan.

1.2 All plans require the discharge of fill material for breakwater and revetment structures. A "Section 404" evaluation (see Appendix G) finds that materials to be used in breakwater construction are suitable for discharge into navigable waters. None of the alternatives involve wetland areas or wildlife refuges or federal sanctuaries, nor will they affect groundwater resources. The proposed project may temporarily affect endangered Humpback whales in the proximity of the harbor during construction of harbor improvements. Increased boating activity resulting from the improved harbor could adversely affect Humpback whales. Coordination with the National Marine Fisheries Service relating to potential impacts on the Humpback whale resulted in the recommendation that underwater blasting only be permitted during the months of May through December. The project does not affect a riverine flood plain; however, the coastal area is subject to tsunami inundation hazards.

1.3 AREAS OF CONTROVERSY. Controversy over conflicting recreational uses of the Maalaea Harbor area arose early in the study during the initial informational meeting held in January 1979. Surfing interests identified the potential impacts of the authorized plan channel alignment on one of the most valued surfing sites on Maui called the Maalaea Pipeline. A second surfing site of lesser importance was also identified on the south side of the existing harbor. During the course of the study, efforts were made to minimize project related impacts on these surfing areas. The alternate harbor plans include a plan submitted by the Maalaea Boat and Fishing Club in May 1979, which is acceptable to both boating and surfing interests. The selected plan presented in this report accommodates to the greatest extent practicable to the interests of both groups while satisfying the needs and desires of the local sponsors.

1.4 The National Marine Fisheries Service and individual cetacean biologists and researchers pointed out potential adverse effects of project related construction activity and increased boating activity on the endangered Humpback whale which winters in Maalaea Bay. Formal consulation with the National Marine Fisheries Service under Section 7 of the Endangered Species Act resulted in the submittal of a Biological Opinion by NMFS. The Biological Opinion and related correspondence is included in Appendix J.

1.5 UNRESOLVED ISSUES. None

1.6 RELATIONSHIP TO ENVIRONMENTAL REQUIREMENTS. A brief outline of the relationship of the alternate plans to environmental laws and regulations affecting this study are presented in Table XF-1.

2. NEED FOR AND OBJECTIVES OF THE ACTION

2.1 STUDY AUTHORITY. Post-authorization studies for navigation improvements to Maalaea Harbor are authorized under Section 101 of the River and Harbor Act of 1968. The purpose of the studies is to reaffirm the basic planning decisions which were made during the pre-authorization studies. The purpose of the project is to improve navigation conditions in Maalaea Harbor and to provide for expanded berthing capacity.

2.2 PUBLIC CONCERNS. Boat owners using Maalaea Harbor have stressed the need to reduce the surge within the basin. The existing entrance channel is exposed to ocean swells from the south and to waves generated by local Kona (southerly) storms, creating a hazard to navigation. The existing entrance channel alignment allows excessive wave energy to enter the harbor basin. Mooring lines have been broken and boats severely damaged. During these periods boat owners are forced to stay with their boats throughout the day and night, some of them electing to take their boats out of the harbor until the surf has subsided. The U.S. Coast Guard is occasionally forced to relocate its vessel at Kahului Harbor during periods of heavy surge, leaving the entire south Maui fishing area without emergency assistance. Individual surfers and surfing organizations have expressed strong objections to the entrance channel alignment as described in the authorized plan. This alignment would seriously alter what is considered to be one of the best surfing sites in the islands. Potential effects of harbor construction activities and increased boating activity on the endangered Humpback whale, which winters in the relatively shallow protected waters bounded by Maui, Molokai, Kauai and Kahoolawe, were also of concern to whale watchers and researchers.

2.3 PLANNING OBJECTIVE. The updated planning objective is to contribute to navigation improvement for commercial and recreational purposes at Maalaea Harbor for the 1985 to 2035 period of analysis. Detailed assessment of problems and needs have resulted in specific goals which, if achieved, would satisfy the planning objective. These specific goals are:

a. to significantly reduce surge within the harbor basin;

b. to significantly reduce navigation hazards in the entrance channel; and

c. to provide opportunity for addition of berthing space and attendant harbor facilities.

Table XF-1
Relationship of Plans to Environmental Requirements

Federal Statutes	
National Environmental Policy Act (NEPA)	In full compliance
Prime Agricultural Lands	Not applicable
National Historic Preservation Act	In full compliance
National Landmarks	Not applicable
Fish and Wildlife Coordination Act of 1958	In full compliance
Endangered Species Act of 1973, as amended	In compliance. Coordination with National Marine Fisheries Service Completed
Migratory Bird Treaty Act of 1918	Not applicable
Marine Mammal Protection Act of 1972	In full compliance
Marine Protecion, Research and Sanctuaries Act	Not applicable
Section 102 - EPA Permit	Not applicable
Section 103 - Dredged Material	Not applicable
Title III - Marine Sanctuaries	Not applicable
Federal Water Project Recreation Act of 1965	Not applicable
Coastal Zone Management Act	In full compliance
Scenic and Wild River Act	Not applicable
Water Resources Planning Act	In full compliance
Clean Water Act	
Section 404 - Dredged or Fill Materials	In full compliance
Section 402 - NPDES Permit	Not required. Exempted under Section 404(r)
Executive Orders, Memoranda, Etc.	
E.O. 11593 - Protection and Enhancement of of the Cultural Environment	In full compliance
E.O. 11990 - Protection of Wetlands	Not applicable
E.O. 11987 - Exotic Organisms	Not applicable
E.O. 11988 - Flood Plain Management	In full compliance
State and Local Laws	
Chapter 343, HRS: State EIS Law, State CZMA	In full compliance

3. ALTERNATIVES.

3.1 PLANS ELIMINATED FROM FURTHER STUDY. The authorized plan as shown in the project document was eliminated from further consideration during post-authorization studies for the following reasons. The extensive dredging required to create a new entrance channel through the shallow limestone reef platform would be unnecessarily destructive to the reef ecosystem. In addition, the proposed channel alignment would have destroyed one of the most valued surfing sites on Maui.

3.2 One of the alternatives formulated during the preliminary planning phase included an additional 5 acre basin and a more extensive breakwater and mole structure. It was eliminated because of conflicts with surfing sites.

3.3 WITHOUT CONDITION. Without Federal implementation of authorized improvements at Maalaea Harbor, little change from existing physical conditions can be expected. Navigation difficulties during storm conditions and adequate berthing capacity would continue to be problems. Demand for berths would be expected to increase.

3.4 PLANS CONSIDERED IN DETAIL. Detailed treatment of three alternate plans is provided in Section D of the report and Appendix B, Design Analysis.

3.5 COMPARATIVE IMPACTS OF ALTERNATIVES. Comparative impacts of the three plans are presented in Table XF-2. Additional comparison of alternate plans is contained in the Summary of Comparison of Alternative Plans and System of Accounts (Table D-5 of the report).

4. AFFECTED ENVIRONMENT

4.1 ENVIRONMENTAL CONDITIONS. Maalaea Harbor is located on the western end of Maalaea Bay which forms the southern shoreline of the central isthmus of Maui (Figure B-1). The shoreline is steep and rocky to the west of Maalaea Harbor. East of the harbor the shoreline consists of a long almost continuous white sand beach. The beach and nearshore waters, including a number of surfing sites, provide major recreational resources for both residents and visitors. Inland of the shoreline the developed land is agricultural, primarily sugarcane. The area between Maalaea and Kihei includes conservation, urban and agricultural lands. Coastal areas adjacent to and including Maalaea Harbor are classified urban. A condominium apartment complex is located along the eastern boundary of the harbor and a residential community continues to the east along the shoreline.

4.2 Natural vegetation in the Maalaea Harbor area is characterized by kiawe and haole koa trees and dryland grasses and shrubs. However, most of the land on the central Maui plain is being cultivated for sugarcane. Dominant wildlife forms in the area are introduced species such as mongooses, rats, mice, doves and mynah birds. Feral pigs, dogs, and cats are also found in nearby areas. Several species of seabirds can be found along the coastal areas.

4.3 Marine life at Maalaea Bay includes most of the species common to coral reef ecosystems in Hawaii. Endangered Humpback whales winter in Hawaiian waters including Maalaea Bay. Maalaea Bay abounds with commercial

tuna and other big game fishes common to Hawaiian waters. Additional, more detailed informaton on flora and fauna in the Maalaea areas are contained in Appendix C, Recreational and Natural Resources, and Appendix F, U.S. Fish and Wildlife Report.

4.4 Maalaea is a small shoreline community, which because of its protected bay and accessibility has been a fishing village for decades. According to the "Civic Development Plan for Kihei" prepared in 1970, "it is an ideal commercial fishing base," due to its proximity to Honoapiilani Highway, the main vehicular artery that links Lahaina to Wailuku-Kahului and to the Kihei-Kula area. In the early 1970's all that marked the village were a few residence, a small market, a gas pump, the small boat harbor and U.S. Coast Guard Station, Buzz's Restaurant and Cocktail Lounge, and the Hale Kini-Polynesia, a small cottage resort. No population figures are available for the community of Maalaeaa.

By 1973, two additional resort condominiums had been constructed at Maalaea in the strip classified for "Apartment" use. By July 1975, this number had increased to 6 condominiums totalling 307 units and by June 1979, there were 8 condominiums with a total of 445 units. Of the latter, 297 units were classified as transient-resort rental units. During 1980 two more condominiums were built and a third is under construction immediately abutting the small boat harbor.

4.5 Tourism and agriculture form the basis of the economy on Maui island. At the time of project authorization in 1968, revenues from tourism and agriculture were about equal, but at present tourism heavily domintes the economy. The sugar industry, which is the major agricultural producer, shows a 1978 revenue of $67 million out of a total crop and livestock revenue of $92 million. However, tourism boasted a 1978 revenue of $283 million. The 1978 visitor count for Maui totaled 1.4 million persons, which is a 25 percent increase since 1977 and nearly a 600 percent increase since project authorization. At present more than 1000 hotel-condiminium units are under construction to accommodate the increased tourist demands.

4.6 SIGNIFICANT RESOURCES:

4.7 ENDANGERED SPECIES. The endangered Humpback whale, Megaptera novaengliae, is present in Maalaea Bay in the proximity of the Maalaea harbor project area during approximately 6 months of the year from December through May. Maalaea Bay has been identified as one of four major whale breeding, calfing and nursing areas in Hawaii. A proposal to include Maalaea Bay as part of a marine sanctuary under the Marine Protection Research and Sanctuaries Act of 1972 has been submitted to the Office of Coastal Zone Management for consideration. As yet, no formal action has been taken on this proposal. Maalaea Bay, from Hekili Point to Puuolai, is at present designated by Maui County as a Humpback whale sanctuary. Regulations under the Endangered Species Act of 1973, as amended, and Marine Mammal Protection Act of 1972 prohibiting harassment of the Humpback whale are being enforced by National Marine Fisheries Service personnel at Maalaea. The Hawaiian Humpback whale population was recently estimated at approximately 290 whales (ref 5). The north Pacific population of Humpbacks is estimated at 850 whales (ref 6). Ed Shallenberger (1977) estimated the number of Humpback whales in the Maui-Molokai-Lanai-Kahoolawe assembly area (about 700 square miles) at 90-100 whales. Maalaea Bay represents a small but significant portion of this area.

Table XF-2. Comparative Impacts of Alternatives on Significant Resources

Base Condition and Alternatives	Endangered Species Humpback Whale	Surfing Sites	Reef Resources	Plan Economics
Base Condition	Approximately 60-70 humpback whales aggregate during the months of December through May in the offshore area between the islands of Maui, Lanai and Kahoolawe.	Two major surf sites and one or more minor sites are located in the vicinity of Maalaea Harbor.	Approximately 10 acres of coral reef area between the existing breakwater structures and the -12 foot MSL contour. Approximately 5 acres of reef comprise a productive coral reef community. The remaining area including the existing channel is relatively barren.	Not applicable.
Without Condition	No substantive change. Possible slow increase in numbers as Hawaiian humpback population recovers.	No change.	No change.	Not applicable.
Plan 1	Effects are unknown. Formal consultation with National Marine Fisheries Service has resulted in the submittal of a biological opinion recommending that blasting during construction be permitted only during the months of May through December to mitigate possible effects.	No effect on major sites. Minor sites destroyed. New site possibly created adjacent to new channel.	Approximately 2.6 acres of productive reef area destroyed by dredging new entrance channel. Limited recovery expected. Approximately 2.8 acres of relatively unproductive reef area covered by breakwater structure. Breakwater will provide significant increase in available habitat for reef fish and invertebrate organisms.	Average annual Cost: $380,000 Annual Benefit: $744,000. B:C Ratio: 2.0.
Plan 2	Same as Plan 1.	Same as Plan 1.	Area dredged: 2.6 acres; impacts same as Plan 1. Area covered with breakwater: 1.9 acres; impacts same as Plan 1.	Average Annual Cost: $368,000. Annual Benefit: $731,000. B:C Ratio: 2.0.
Plan 3	Same as Plan 1.	Same as Plan 1.	Area dredged: 2.6 acres; impacts same as Plan 1. Area covered with breakwater: 1.8 acres; impacts same as Plan 1.	Average Annual Cost: $430,000. Annual Benefit: $731,000. B:C Ratio: 1.7.

4.8 SURFING SITES. Two surfing sites within the Maalaea Harbor project area have been identified by surfing interests. One site known as "Off the Wall" is located 30-40 yards offshore of the middle of the south breakwater. The other break known popularly as "Maalaea Pipeline" is located east of the harbor entrance and breaks in an easterly direction. This break is considered to be exceptional, attracting surfing enthusiasts from all over the world. Both surfing sites are seasonal, dependent upon the south swell that normally occurs during the summer months.

4.9 REEF RESOURCES. The reef seaward of Maalaea Harbor is comprised of several discrete zones varying in degree of biological diversity and value (see Appendix D of the report). The most diverse, well developed coral reef community begins approximately 100 feet south of the east breakwater head in depths of -6 feet MLLW and extends seaward approximately 200 feet before transitioning into a sand-rubble bottom at -15 feet MLLW. On th west the reef is bounded by the entrance channel. Its extent in the easterly direction continues well beyond the project limits. The greatest variation in bottom relief occurs within this zone. Extensive ledge systems, depressions, raised knobs and large Porites coral heads contribute to the more interesting visual aspects of this area. Live corals are well developed and ubiquitous, comprising approximately 20% of the total bottom cover. Porites lobata and Pocillopora meandrina are the most abundant varieties but at least six other species are common and several others including some large colonies of Pocillopora eydouxi are present in the area. Other common macro-invertebrates include several varieties of sea urchins and sea cucumbers. Fish populations are well developed and diverse. Surgeon fishes (Acanthuridae) are the most abundant family. Large schools of palani (A dussumieri), pualu (A. guttatus), manini (A. triostegus) and others, including parrot fish and goat fish range throughout this zone. In the ledges and depressions more cryptic varieties are prevalent. These include u'u,, aweoweo, butterfly fish, moray eels, spiny puffers, etc. Although crustaceans and gastropods were rarely encountered due to their general diurnal inactivity and preference for concealment, these organisms are most likely well represented in this zone.

4.10 RESOURCES AND VALUES IDENTIFIED IN SECTION 122 OF PUBLIC LAW 91-611. The following resources and environmental values have been fully considered with respect to possible adverse economic social and environmental effects resulting from implementation of the proposed project (Table D-5. Summary Comparison of Alternative Plans and System of Accounts):

a. Air, Noise and Water Pollution. Adverse impacts related to air, noise and water would be temporary impacts during construction of harbor improvements. Minimization of these impacts would be effected by employment of construction methods that do not cause excessive or unnecessary turbidity, dust, hydrocarbon emmission or noise.

b. Man-made or natural resources, esthetic values, community cohesion and availability of public facilities and service: Destruction or disruption of the above resources as a result of project implementation would be minimal and are not considered significant.

c. Employment effects and tax and property value: adverse employment effects and/or tax and property value losses would not result from project implementation.

d. Displacement of people, businesses and farms: no injurious displacement of people businesses and farms would result from project implementation.

5. ENVIRONMENTAL EFFECTS.

5.1 HUMPBACK WHALES. The effects of harbor construction and increased boat traffic on Humpback whales is unknown. However, noise generated by underwater blasting during harbor construction would probably have a disruptive effect on whale activity in the vicinity of the harbor. Potential impact of the project on Humpback whales was evaluated via formal consultation with the National Marine Fisheries Service. A Biological Opinion, issued by NMFS on 25 April 1980, is included in Appendix J. Potential adverse impacts on whales resulting from increased boat traffic due to expanded harbor capacity can be minimized through rigorous enforcement of existing Federal regulations. Potential impacts on the whales are the same for all three alternate plans.

5.2 SURFING SITES. None of the alternate plans would affect the two surfing sites of major importance identified by local interests during the study. Minor sites adjacent to the existing channel would be destroyed. However, a new site will probably be created along the east edge of the proposed channel.

5.3 REEF RESOURCES. Adverse impacts to reef resources in the vicinity of the harbor will result from dredging a new entrance channel alignment for all of the alternate plans is the same, traversing a relatively rich coral reef area. Dredging would eliminate approximately 2.6 acres of reef habitat, destroying corals and other non-mobile reef organisms and displacing fish and mobile organisms to adjacent reef areas. Turbidity during dredging oprations may temporarily stress organisms immediately adjacent to the area being dredged. The new entrance channel will initially be barren, but recolonization of dredged surfaces by benthic organisms is expected to commence once harbor construction is completed.

5.4 New breakwater structures will cover and destroy reef habitat on which they are placed. Non-mobile organisms occurring on the reef area affected will perish. Location of the breakwater is the same for plans 1 and 2. Both are tied into the existing south breakwater. Plan 1 includes a 400-foot-long revetted mole and consequently covers more reef area than the other plans. The new breakwater in plan 3 is detached from the south breakwater and extends further seaward along its western end than plans 1 or 2. In all three plans the breakwater is located in a relatively barren, unproductive reef area (refer to Appendix C). The new breakwaters would cover 2.8, 1.9, and 1.8 acres of reef, respectively, for plans 1 through 3.

5.5 Although initially the breakwater will destroy the reef community on which it is placed, it will utimately provide valuable habitat for a variety of reef organisms in an area largely devoid of ledges, overhangs and other features that provide cover and shelter. Fish and shellfish populations in the harbor area would increase substantially as a result of the presence of the breakwater, based on observations of the effects of breakwater elsewhere in Hawaii. The overall effect would be enhancement of reef fish and shell fish resources in the immediate vicinity of the harbor, and a corresponding increase in recreational and subsistence fishing opportunity.

5.6 RESOURCE AND VALUES IDENTIFIED IN SECTION 122 OF PUBLIC LAW 91-611: Project related impacts on the environmental resources and values identified in Section 122 of P.L. 91-611 have been fully considered. Potential adverse impacts upon these resources resulting from project implementation are not significant.

6. PUBLIC INVOLVEMENT.

6.1 PUBLIC INVOLVEMENT PROGRAM. Early planning coordination involved informal discussions with members of participating government agencies and an initial public meeting at which testimony was received on the Corps proposed harbor improvement plan. A series of workshops were held to determine problems and needs related to potential harbor improvements and obtain input on alternative designs as they evolved during the course of the study. The final public meeting was held on 13 May 1980 at which time the results of the Corps investigations were presented for public review and comment. Additional information concerning the public involvement program is contained in Sections A and C of this report. A Notice of Intent to Prepare Draft Environmental Impact Statement was published in the Federal Register on 23 July 1979.

6.2 REQUIRED COORDINATION. Coordination was initiated with the U.S. Fish and Wildlife Service at the inception of the study to fulfill the requirements of the Fish and Wildlife Coordination Act. A preliminary report was submitted by FWS describing fish and wildlife in the project area, and was utilized as a planning aid during the study. The final FWS 2(b) Report discusses potential project impacts and recommends appropriate mitigation measures. The final report is included as Appendix D. Endangered species coordination with the National Marine Fisheries Service is complete. Formal consultation was initiated by the Corps in January 1980. A Biological Opinion was submitted by NMFS in April 1980, and is included in Appendix K. Coordination with the State Historic Preservation Officer (SHPO) has been completed. A cultural reconnaissance survey was conducted, and a Determination of Effect based on survey findings was fowarded to SHPO for his review and concurrence. A letter of concurrence was received on 29 February 1980.

6.3 STATEMENT RECIPIENTS. A list of agencies, groups and individuals who received copies of the draft EIS and report for review is included in Appendix J.

6.4 PUBLIC VIEWS AND RESPONSES. Strong public interest in the study and possible harbor improvements was demonstrated in the initial public meeting, held 23 January 1979 with over 200 persons in attendance, and subsequent workshops described in Section C of this report. The overall response to the study has been enthusiastic and favorable. Several public views were expressed that had a major influence on the study. An immediate need for harbor improvements to reduce surge and navigational hazards was unequivocally stated. Surfing interests pointed out that the channel alignment in the authorized plan would destroy a highly valued surfing area. Boaters also objected to this plan because it appeared to be similar to the pre-1955 harbor configuration which was proven ineffective in preventing waves and surge within the harbor. Concern was expressed regarding the potential effects of construction-related underwater noise and increased boating activity on the endangered Humpback whales that reside in Hawaiian waters including Maalaea Bay during part of the year. Alternate plans were developed based on these views and

further refined with additional input during three public workshops, where attendees fully participated in plan development. Results of this study were presented at the final public meeting, held on 13 May 1980 at Maalaea. General agreement was expressed that the recommended plan is acceptable and should be implemented as quickly as possible. Letter of comment on the Draft EIS and responses to these comments are included in Appendix K of this report.

Table XF-3
INDEX, REFERENCES AND APPENDICES

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Affected Environment	p F-5-F-6, para 4	p 5-9, para 3 app C, D, E, G, H, I
Alternatives	p F-5, para	sec D app A
Areas of Controversy	p F-2, para 1.3 & 1.4	p 10, para 4.6, 4.7 app J
Comparative Impacts of Alternatives	p F-5, para 3.5	sec D app E
Cover Sheet	p i	Not applicable
Environmental Conditions	p F-5, para 4.1	p 5-9, para 3 app C, D, E
Environmental Effects	p F-6, para 5	app C, D, E, J
List of Preparers	p F-1	Not applicable
Major Conclusions and Findings	p F-2, para 1.1	p 35
Need for and Objectives of the Action	para 2	p 9-11
Planning Objectives	p F-3, para 2.3	p 11
Plans Considered in Detail	p F-5, para 3.3	sec D, E app B
Plans Eliminated From Further Study	p F-5, para 3.1	p 13, para 3 p 14, para 6
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Subject	Environmental Statement	Main Report & Appendices
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Required Coordination	p F-8, para 6.2	p 3-4, para 5, 6, 7
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Surfing Sites	p F-6, para 4.8	p 10, para 4.6 app C, E
Reef Resources	p F-6, para 4.9	p 8, para 3.17 app C, D
Resources and Values Identified in Section 122 of Public Law 91-6111	p F-7, para 4.10	table D-5
Statement Recipients	p F-8, para 6.3	app J
Study Authority	p F-3, para 2.1	p 1
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Unresolved Issues	p F-3, para 1.5	p 34
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APPENDIX G

"SECTION 404" EVALUATION

APPENDIX G

EVALUATION OF THE EFFECTS OF THE DISCHARGE OF FILL MATERIAL INTO WATERS OF THE U.S. USING "SECTION 404(B)" GUIDELINES

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APPENDIX G

EVALUATION OF THE EFFECTS
OF THE DISCHARGE OF FILL MATERIAL INTO
WATERS OF THE U.S. USING "SECTION 404(b)" GUIDELINES

1. Project Description.

a. Description of the proposed discharge of fill materials.

(1) General characteristics of material. Basalt stone: 25 lb-10 ton; concrete: 6 ton units; dredged material: limestone reef material.

(2) Quality of material proposed for discharge.

	Basalt stone	Concrete	Dredged Material
Plan 1	20,000 cu yds	6,800 cu yds	32,000 cu yds
Plan 2	19,000 cu yds	6,800 cu yds	11,500 cu yds
Plan 3	15,000 cu yds	9,000 cu yds	11,500 cu yds

(3) Source of material to be discharged. Basalt stone: quarry and fieldstone; dolos: fabricated on Maui and trucked to the project site; dredged fill: reef at project site.

b. Description of the proposed discharge site(s) for dredged or fill material.

(1) Location of the discharge site. Maalaea Small Boat Harbor, Southwest Maui, Hawaii.

(2) Type of discharge site(s) involved. The site is an existing light-draft harbor on the island of Maui.

(3) Method of discharge: Stone, dolos and coral fill will be placed by crane, truck, loader and bulldozer.

(4) Date and length of time when discharge will occur: Project construction scheduled to commence in FY82. Duration of discharge would be one year.

(5) Life of discharge site(s): Project life is 50 years.

(6) Bathymetry (if open water discharge site(s) is used). Bathymetry varies from -2 to -17 MLLW.

2. Physical Effects (40 CFR 230.4-1(a)).

a. Potential Destruction of Wetlands (40 CFR 230.4-1(a)(1)). Not applicable; no wetlands are present at the discharge site.

b. Other Physical Effects (40 CFR 230.4-1(a)(1)).

(1) Area of bottom covered by the discharge. Plan 1: 3.8 acres; Plan 2: 2.9 acres; Plan 3: 2.8 acres.

(2) Changes in bottom geometry and substrate composition. Breakwater structures will create a rubble mound of basalt rock and concrete with sideslopes of 1:2.

(3) Water circulation and flushing characteristics. No significant changes.

(4) Salinity distribution and gradients. No effect.

(5) Natural drainage characteristics and flood and stormwater storage areas. Not affected by the federal project.

(6) Groundwater levels and recharge. Not applicable. Project is not located in a recharge area. No effect to groundwater levels anticipated.

3. Chemical Biological Interactive Effects (40 CFR 230.4-1(b)).

a. The material proposed for discharge meets the exclusion criteria promulgated by the Environmental Protection Agency under Section 404(b)(1) of the Clean Water Act. Thus, no further testing under 40 CFR 230-4-2(b)(2) (Elutriates) and (3) Bioassay is required. Breakwater and revetment material is larger than silt size and obtained from sources which are not expected to be contaminated by pollutants. The fill material used in the moles will be similar to the existing substrate, and will be confined to the discharge site.

b. Impacts on the Water Column (40 CFR 230.4-1(b)(2).

(1) Reduction in light transmission: Placement of field stone and quarried rock may cause a temporary increase in turbidity.

(2) Degradation in water aesthetic values: Turbidity resulting from the discharge would temporarily discolor the water.

(3) Direct destructive effects on nektonic and planktonic populations: The discharge does not contain toxic pollutants that could have a direct destructive effect on nekton and plankton populations.

(4) Contaminants found in the material: Fill material is expected to be free of contaminants. The rock is naturally occurring field stone or quarried rock from local sources. The dredged material would be from the adjacent reef. Concrete dolos are free from contaminants.

(5) Elutriate testing results: Material excluded from testing.

(6) Compare constituent concentrations with applicable water quality standards: Material excluded from testing.

(7) Mixing zone: Not required.

c. Impacts on the Benthos (40 CFR 230-4-1(b)(3)).

(1) Area actually covering the benthic communities. Plan 1: 3.8 acres; Plan 2: 2.9 acres; Plan 3: 2.8 acres.

(2) Changes in community structure or function. Breakwater and revetment structures will provide large increase in available habitat for fish, shellfish and benthic algae. Increase in reef fish population, especially cryptic and nocturnal species, and in crabs and lobsters would be expected.

(3) Benthic bioassay results: Material excluded from benthic bioassay or bioaccumulation testing.

d. Site comparision (40 CFR 230.4-1(c)): The material proposed for discharge is excluded from chemical-biological interaction testing and meets criteria promulgated by the Environmental Protection Agency. The material is not expected to contain critical amounts of contaminated or prohibited materials necessitating selection of another discharge site.

4. Impacts of the Discharge at the Discharge Site (40 CFR 230.5).

a. Need for the proposed activity: Harbor improvements are needed to reduce surge and navigational hazards at Maalaea Harbor.

b. Availability of alternate discharge sites and methods of discharge. The site is an existing light-draft harbor, hence alternative sites are not feasible. Practical alternative methods of discharge not available.

c. Description of Impacts:

(1) Chemical, physical and biological integrity of the aquatic ecosystem: Chemical and physical integrity not affected. Biology of ecosystem will be modified. Long-term effect would increase biological productivity at the discharge site.

(2) Food chain and trophic level: Revetment and breakwater habitat may alter trophic levels, increasing proportion of carnivores and planktivores.

(3) Diversity of plant and animal species: Long-term increase in diversity of plant and animal species resulting from breakwater and revetment structures.

(4) Movement into and out of feeding, spawning, breeding and nursery areas: No effect anticipated. Breakwater will become feeding, spawning, breeding and nursery area.

(5) Wetlands: No wetlands occur at discharge site.

(6) Areas that serve to retain natural high waters or flood waters: Not applicable. Discharge site is a small boat harbor.

(7) Degradation of water quality: Discharge is not expected to degrade water quality. Discharge material does not contain contaminants or prohibited material and consists of material larger than silt size.

d. Methods to minimize turbidity (40 CFR 230.5(a)(7)):

(1) Discharge will consist of material larger than silt size.

(2) Protective measures will be utilized to prevent erosion of material from the dredged causeway.

(3) The material will be confined to the discharge site.

e. Methods to minimize degradation of water aesthetic, recreation and economic values: Same as those in item d.

f. Other methods investigated to minimize possible harmful effects.

(1) Scientific literature developed by EPA, National Water Quality Criteria: None.

(2) Alternatives to open water discharge: Not applicable.

(3) Disposal sites where physical environmental characteristics are most amenable to the type of dispersion desired: Not applicable. Discharge site is not a disposal site.

(4) Discharge beyond the baseline of the territorial seas: The discharge does not affect the baseline from which the territorial seas are measured.

(5) Covering contaminated dredged material with cleaner material: Alternative not applicable to the project purpose or design.

(6) Any EPA monitoring requirement specified during the coordination process: None.

g. Impact on water use (40 CFR 230.5(b)):

(1) Municipal water supply intakes: None. No intakes exist at the discharge site.

(2) Shellfish: None. Commerical, harvestable shellfish beds are absent at the discharge site.

(3) Fisheries: The discharge forms structures which should increase localized fish and crustacean abundance.

(4) Wildlife: None. Wildlife is absent at the discharge site.

(5) Recreation: Recreational fishing from breakwater would be enhanced by project. Increased boating activity expected.

(6) Benthic life: Placement of breakwater and revetment structures will destroy all benthic life in the discharge site. Recolonization of the new breakwater and revetments should result in increased species diversity and biomass.

(7) Wetlands: None. Wetlands are absent at the discharge site.

(8) Threatened and endangered species: None. Discharge will not effect endangered humpback whale.

(9) Submerged vegetation: Benthic algae should increase in biomass and diveristy resulting from increased substrate and vertical zonation.

(10) Size of disposal site: The discharge site is a one time construction activity. Future maintenance activities will not increase the size of the discharge site.

(11) Coastal zone management programs: Project is consistant with coastal zone management plans. CZM consistency determination will be prepared during preconstruction planning.

5. Determination.

a. An ecological evaluation has been made following the guidance in 40 CFR 230.4 in conjuntion with the evaluation considerations in 40 CFR 230.5 (40 CFR 230.3(d)).

b. Appropriate measures have been identified and incorporated in the proposed plan to minimize adverse effects on the aquatic environment as a result of the discharge (40 CFR 230(d)(1)).

c. Consideration has been given to the need for the proposed activity, the availability of alternative sites, methods of discharge that are less damaging to the environment, and such water quality standards as are appropriate and applicable by law (40 CFR 230.5).

d. No wetlands are affected by the proposed action.

APPENDIX H

EXECUTIVE ORDER 11988

COMPLIANCE STATEMENT

APPENDIX H

EXECUTIVE ORDER 11988 COMPLIANCE STATEMENT

1. The objective of the Executive Order on Floodplain Management is to avoid adverse impacts associated with the occupancy and modification of the base floodplain and to avoid direct and indirect support of development in the base floodplain if there is a practicable alternative. Under the order, the Corps of Engineers is required to provide leadership and take action to:

a. Avoid development in the base floodplain unless it is the only practicable alternative;

b. Reduce the hazard and risk associated with floods;

c. Minimize the impact of floods on human safety, health and welfare; and

d. Restore and preserve the natural and beneficial values of the base floodplain.

2. The following paragraphs describe the responses to the general compliance procedures as outlined in Engineering Regulation 1165-2-26, dated 15 May 1979.

2.1 The proposed harbor improvement project will probably require construction of typical harbor backup facilities including fuel station, harbor master office, U.S. Coast Guard station office, boat haulout and repair facilities, and possibly clubhouses, restaurants, retail shops and other harbor-related enterprises.

2.2 There is no practicable alternative to locating harbors within the tsunami inundation zone in the State of Hawaii. All of Hawaii's low-lying shorelines are subject to potential tsunami inundation.

2.3 The primary natural and beneficial value of the tsunami inundation zone is its action as a buffer zone between the ocean and inland areas not subject to potential tsunami inundation. The harbor improvement project will not impact on the natural and beneficial value of the tsunami inundation zone.

2.4 Although the harbor improvement project will require development within the tsunami inundation zone, implementation of harbor improvements is in the National interest because the developed harbor will provide for safer navigation and berthing conditions, and will enhance commercial and recreational boating opportunities.

2.5 The most viable method of minimizing adverse impacts on development within the tsunami inundation zone is utilization of an adequate tsunami warning system. The existing system now being utilized in Hawaii is an effective system and should give adequate warning to Maalaea residents for most tsunami occurrences. Proper structural design now required by the National Flood Insurance Program should adequately reduce the damages to structures in the tsunami inundation zone.

2.6 The general public is being advised of tsunami danger on a continuing basis in Hawaii. In addition, public meetings held in conjunction with the harbor improvement project at Maalaea have informed the public that proposed improvements will require development within the tsunami inundation zone.

APPENDIX I

COASTAL ZONE MANAGEMENT

CONSISTENCY DETERMINATION

APPENDIX I

FEDERAL CONSISTENCY DETERMINATION
STATE OF HAWAII, COASTAL ZONE MANAGEMENT PROGRAM
MAALAEA HARBOR IMPROVEMENT PROJECT

1. The Maalaea Harbor navigation improvement project, located on the southwest coast of the island of Maui, is proposed for construction in the coastal zone management area. The project involves construction of a 620-foot-long extension to the existing south breakwater, a 400-foot-long exterior revetted mole, and dredging of a 610-foot-long, 150- to 180-foot-wide, 12- to 15-foot-deep entrance channel. This construction will modify the existing State-owned, light-draft vessel harbor at Maalaea. The improvements were requested by the State of Hawaii, and were authorized by the United States Congress in 1968. The project will be undertaken in a manner consistent to the maximum extent practicable with the Hawaii State Coastal Zone Management Program. The following consistency determination summarizes the project's conformance with policies of the Hawaii State Coastal Zone Management Program.

2. The project meets the objectives and policies of the CZM program as follows:

SECTION 205A-2(b)(1). Recreational Resources.

OBJECTIVE: "Provide coastal recreational opportunities accessible to the public."

POLICIES:

a. "Improve coordination and funding of coastal recreation planning and management."

The project document and subsequent Congressional authorization have resulted in the coordination and funding of harbor planning.

b. "Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area."

Additional harbor capacity resulting from harbor improvement will provide for adequate and accessible recreational boating opportunity in the southwest Maui area.

SECTION 205A-2(b)(2). Historic Resources.

OBJECTIVE: "Protect, preserve, and where desirable, restore those natural and man-made historic and pre-historic resources in the coastal zone management area that are significant in Hawaiian and American history and culture."

POLICIES:

a. "Identify and analyze significant archaeological resources."

No archaeological resources have been identified during project planning, however, construction specifications will detail procedures for dealing with archaeological resources should they be discovered during project construction.

b. "Maximize information retention through preservation of remains and artifacts or salvage operations."

Construction specifications will detail methods of maximizing preservation of any remains or artifacts which may be discovered during construction activities.

c. "Support State goals for protection, restoration, interpretation and display of historic resources."

State goals regarding historic resources will be supported via active coordination throughout the planning and construction phases of the project with the State Historic Preservation Officer.

SECTION 205A-2(b)(3). Scenic and Open Space Resources.

OBJECTIVE: "Protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources."

POLICIES:

a. "Identify valued scenic resources in the coastal zone management area."

No scenic resources will be affected by harbor modifications.

b. "Insure that new developments are compatible with their visual environment by designing and locating such development to minimize the alteration of natural land forms and existing public views to and along the shoreline."

The project modifies an existing harbor facility and therefore is compatible with the existing visual environment. No natural land forms will be altered along the shoreline.

c. "Preserve, maintain and, where desirable, improve and restore shoreline open space and scenic resources."

The project does not affect shoreline open space or scenic resources.

d. "Encourage those developments which are not coastal dependent to locate in inland areas."

The harbor project is coastal dependent.

SECTION 205A-2(b)(4). Coastal Ecosystems.

OBJECTIVE: "Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems."

POLICIES:

a. "Improve the technical basis for natural resources management."

Subsurface borings being performed as part of project planning will improve technical knowledge of the offshore area in the vicnity of the harbor and will aid in the management of that resource.

b. "Preserve valuable coastal ecosystems of significant biological or economic importance."

Although project construction may temporarily disturb the nearby coastal ecosystems, those ecosystems will be enhanced after project completion due to the large and diverse marine habitat which will be provided by the project.

c. "Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs."

Coastal waters will be temporarily degraded during dredging activities, but this degradation will be minimized by the enforcement of specified standards during the construction activites.

d. "Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate State water quality standards."

Construction specifications and State and local laws will promote planning and management practices which reflect the tolerances of marine ecosystems and prohibit uses which violate State water quality standards. A water quality certification will be obtained from the State Department of Heath prior to the start of construction.

SECTION 205A-2(b)(5). Economic Uses.

OBJECTIVE: "Provide public or private facilities and improvements important to the State's economy in suitable locations."

POLICIES:

a. "Concentrate in appropriate areas the location of coastal dependent development necessary to the State's economy."

The project modifies an existing State-owned harbor. The project will enhance commercial fishing opportunities which aids the State's economy.

b. "Insure that coastal dependent development such as harbors and ports, visitor industry facilities and energy generating facilities are located, designed, and constructed to minimize adverse social, visual and environmental impacts in the coastal zone management area."

The project will add to an existing facility and thus will minimize the social, visual and environmental impacts in the coastal zone. No new shoreline areas will be affected by the harbor improvement.

c. "Direct the location and expansion of coastal dependent developments to areas presently designated and used for such development and permit reasonable long term growth at such areas and permit coastal dependent development outside of presently designated areas when a) utilization of presently designated locations is not feasible; b) adverse environmental effects are minimized; and c) important to the State's economy."

The project is confined to an area already committed to harbor activities.

SECTION 205A-2(b)(6). Coastal Hazards.

OBJECTIVE: "Reduce hazard to life and property from tsunami, storm waves, stream flooding erosion and subsidence."

POLICIES:

a. "Develop and communicate adequate information on storm wave, tsunami, flood, erosion, and subsidence hazard."

The planning studies and project report develop and communicate detailed information on storm waves and on the risk of coastal flooding due to tsunami.

b. "Control development in areas subject to storm wave, tsunami, flood, erosion and subsidence hazards."

The harbor project may encourage harbor-related development, however, such development is subject to coastal zone building requirements. The improved harbor will offer improved storm wave protection for areas with the harbor basin.

c. "Insure that developments comply with requirements of the Federal Flood Insurance Program."

Not applicable to the project.

d. "Prevent coastal flooding from inland projects."

Not applicable to the project.

SECTION 205A-2(b)(7). Managing Development.

OBJECTIVE: "Improve the development review process, communication, and public participation in the management of coastal resources and hazards."

POLICIES:

a. "Effectively utilize and implement existing law to the maximum extent possible in managing present and future coastal zone development."

The project planning process utilizes and implements existing federal, state and county laws and ordinances as well as existing federal and US Army Corps of Engineers regulations.

b. "Facilitate timely processing of application for development permits and resolve overlapping or conflicting permit requirements."

The implementation of project planning facilitates timely processing of permit applications to the maximum extent practicable.

c. "Communicate the potential short- and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the general public to facilitate public participation in the planning and review process."

The project report thoroughly discusses all aspects of short- and long-term impacts relative to the project. Significant impacts are discussed at the final public meeting held before commencement of project construction.

APPENDIX J

LIST OF REVIEWERS

AND PERTINENT CORRESPONDENCE

APPENDIX J

LIST OF REVIEWERS AND RECIPIENTS
AND PERTINENT CORRESPONDENCE 1/

FEDERAL GOVERNMENT

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WASH DC 20001

HQDA (DAEN-PAO)
WASH DC 20314

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Waterways Experiment Station
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*Deputy Assistant Secretary
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Washington, DC 20230

Pacific Region Manager
Office of Coastal Zone Management
3300 Whitehaven Street, N.W.
Washington, DC 20235

Secretarial Representative, Region IX
U.S. Department of Commerce
Federal Bldg, Box 36135
450 Golden Gate Avenue

Director, Environmental Protection
Agency
Office of Field Activities
EIS Filing Section
401 M. Street, S.W.
Washington, DC 20460

*EIS Coordinator, Region IX
U.S. Environmental Protection Agency
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San Francisco, CA 94105

*Executive Director
Advisory Council on Historic
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P. O. Box 25085
Denver, CO 80225

Assistant Secretary, Program Policy
Office of Environmental Project Review
U.S. Department of the Interior
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*Administrator, Southwest Region
National Marine Fisheries Service
U.S. Department of Commerce
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Regional Director, SW Region
National Marine Fisheries Service, NOAA
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Regional Director, Fish & Wildlife Svc
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Portland, OR 97232

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Field Supervisor, Ecological Services
Fish and Wildlife Service
U.S. Department of the Interior
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District Chief
Water Resources Division
U.S. Geological Survey
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Honolulu, HI 96850

Office of Environmental Analysis
Federal Maritime Commission
1100 "L" Street N.W., Room 9102
Washington, D.C. 20573

1/ Asterisk (*) denotes an agency or organization which commented on the draft report. Important comments and Corps of Engineers response are included in the second part of this Appendix.

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San Francisco, CA 94102

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ATTN: Aids to Navigation Branch
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Honolulu, HI 96850

*Commander
Fourteenth Coast Guard District
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DOT, Harbors Division
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Department of Land & Natural
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Administrator, State Parks
Outdoor Recreation & Historic
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Office of Marine Affairs
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Program Planning Coordinator
Planning Office
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*State Historic Preservation Officer
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Director
Water Resources Research Center
University of Hawaii
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Director
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Director
Department of Parks & Recreation
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Wailuku, Maui, HI 96793

Director
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PUBLIC OFFICIALS

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300 Ala Moana Blvd, Room 4104
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Honorable George R. Ariyoshi
Governor of Hawaii
Honolulu, HI 96813

Honorable Herbert J. Honda
Hawaii House of Representatives
Honolulu, HI 96813

Honorable Daniel K. Inouye
United States Senator
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Honorable Daniel K. Akaka
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Hawaii House of Representatives
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Honorable Anthony Takitani
Hawaii House of Representatives
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Honorable Hannibal Tavares
Mayor of the County of Maui
Wailuku, Maui, Hi 96793

Honorable Mamoru Yamasaki
Hawaii Senate
Honolulu, HI 96813

Councilman Robert H. Nakasone
Maui County Council
Wailuku, Maui, HI 96793

PUBLIC LIBRARIES

U of H Library
Serial Records
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Honolulu, HI 96822

Maui Public Library
Regional Library
Wailuku, Maui, Hi 96793

Maui Public Library
Lahaina Branch
Lahaina, Maui, Hi 96761

Hawaii State Library
Document Center
478 S. King Street
Honolulu, HI 96813

Maui Public Library
Kahului Branch
Kahului, Maui, HI 96732

Maui Public Library
Makawao Branch
Makawao, Maui, HI 96768

OTHERS

Maalaea Boat & Fishing Club
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Valley Isle Boat & Fishing Club
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Wailuku, Hawaii 96793

Lightning Bolt, Inc.
Old Kahului Shopping Center
Kahului, Maui, HI 96732

Lahaina Surf Center
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Lahaina, Maui, HI 96761

Save Our Surf
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Maui Boat & Yacht Club
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Paia Surf & Sea
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*Greenpeace Foundation
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*Life of the Land
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*American Cetacean Society
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Kihei, Maui, Hawaii 96753

*Monitor
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Washington, D.C. 20036

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

RYOKICHI HIGASHIONNA PH.D
DIRECTOR

DEPUTY DIRECTORS
JACK K. SUWA
JAMES R. CARRAS
JAMES B. McCORMICK
JONATHAN K. SHIMADA PH.D

IN REPLY REFER TO

HAR-EP 4571

June 30, 1980

Colonel B. R. Schlapak
District Engineer
U. S. Army Engineer District, Honolulu
Building 230
Fort Shafter, Hawaii 96858

Dear Colonel Schlapak:

Maalaea Boat Harbor Navigation Improvement
Project - Job H. C. 4086

In response to your letter dated May 29, 1980, we hereby intend to comply with the provisions of the condition of local cooperation. These conditions were listed and enclosed with your letter and also previously documented in the draft Design Memorandum No. 1.

Further adjustments may be required depending upon the source of funding for this project. We are presently studying the boating program and the findings of this study may have additional impact on this project.

Your continued fine cooperation on this matter is appreciated.

Very truly yours,

Ryokichi Higashionna
Director of Transportation

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
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JAMES B. McCORMICK
JONATHAN K. SHIMADA, PH.D.
JACK K. SUWA

IN REPLY REFER TO

HAR-EP 4586

June 27, 1980

Mr. Kisuk Cheung
Chief, Engineering Division
U.S. Engineer District,
Honolulu
Building 230
Fort Shafter, Hawaii 96858

Dear Mr. Cheung:

Draft Design Memorandum No. 1 with Draft
Environmental Statement for the Maalaea
Harbor Navigation Improvement Study

We have reviewed the subject document and find ourselves in general concurrence with the findings contained therein.

At this time, we wish to reiterate our support for the "Tentatively Selected Plan." We believe the boaters who attended your May 13, 1980 public meeting were convinced that the implementation of this plan would be in the best interest of all concerned.

Please be informed that we are planning to request matching and State work funds for our Fiscal Year 1982. It should be noted, however, that this request is still being formulated and, in the budgetary process, must be approved by higher authority and the Legislature. Further adjustments may be required depending upon the source of funding for this project. We are presently studying the boating program and the findings of this study may have additional impact on this project.

We appreciate this opportunity to provide comments and would like to acknowledge the fine cooperative efforts of your staff, in particular Mr. Gary Wible, during the preparation of the report.

Very truly yours,

Ryokichi Higashionna
Department of Transportation

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

Project #D-COE-K32023-HI

Mr. Kisuk Cheung, Chief
Engineering Division
U.S. Army Engineer District, Honolulu
Building 230
Fort Shafter, HI 96858

23 JUN 1980

Dear Mr. Cheung:

The Environmental Protection Agency (EPA) has received and reviewed the Draft Environmental Impact Statement (DEIS) titled MAALAEA BOAT HARBOR FOR LIGHT-DRAFT VESSELS, MAUI, HAWAII.

The EPA's comments on the DEIS have been classified as Category LO-1. Definitions of the categories are provided by the enclosure. The classification and the date of the EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal Actions under Section 309 of the Clean Air Act. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and the adequacy of the environmental statement.

The EPA appreciates the opportunity to comment on this DEIS and requests three copies of the Final Environmental Impact Statement when available.

If you have any questions regarding our comments, please contact Susan Sakaki, EIS Coordinator, at (415)556-7858.

Sincerely yours,

Jake Mackenzie, Director
Surveillance and Analysis Division

Enclosure

Comments

1. Paragraph 5.1 of the DEIS states that harbor construction could have potential adverse impact on the endangered humpback whales. Therefore, a formal consultation has been initiated with the National Marine Fisheries Service for their evaluation. Pursuant to EPA Regulations 40 CFR 230.5(b)(6), it states: "No discharge will be allowed that will jeopardize the continued existence of threatened or endangered species or destroy or modify the habitat of those species determined critical in accordance with the Endangered Species Act." Therefore the Final Environmental Impact Statement (FEIS) should include mitigation measures recommended by the National Marine Fisheries Service as part of the proposed project in order to be in conformance with the regulations cited above and to avoid any adverse impact to the humpback whales.

2. The DEIS indicates that harbor construction could have potential adverse impact on water quality due to turbidity. The FEIS should include mitigation measures, including the use of silt curtains to control turbidity during placement of fill material and dredging operations.

EIS CATEGORY CODES

Environmental Impact of the Action

LO—Lack of Objections

EPA has no objection to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER—Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these aspects.

EU—Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1—Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2—Insufficient Information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3—Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft impact statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

PODED-PV

30 June 1980

Mr. Jake MacKenzie, Director
Surveillance and Analysis Division
US Environmental Protection Agency
Region IX
215 Fremont Street
San Francisco, CA 94105

Dear Mr. MacKenzie:

This is in response to your letter of 23 June 1980 commenting on our Draft Environmental Impact Statement (DEIS) for Maalaea Boat Harbor for Light-Draft Vessels, Maui, Hawaii. Recommendations made by the National Marine Fisheries Service in their Biological Opinion issued 25 April 1980 will be included in the proposed project to avoid adverse impacts to endangered humpback whales, seasonally present in Maalaea Bay. Project plans and specifications will require that the contractor maintain State water quality standards in the coastal waters adjacent to the project site during the construction period. Methods employed to achieve compliance with this requirement will be determined by the contractor.

Sincerely,

KISUK CHEUNG
Chief, Engineering Division

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

COMMANDER (oan)
Fourteenth Coast Guard District
Prince Kalanianaole Federal Bldg.
300 Ala Moana Blvd.
Honolulu, Hawaii 96850
Tel: (808) 546 7130

16500
Serial 32089
23 JUN 1980

From: Commander, Fourteenth Coast Guard District
To: District Engineer, U. S. Army Engineer District, Honolulu
Building 230, Fort Shafter, Hawaii 96858

Subj: Maalaea Harbor Navigation Improvement Study; comments concerning

1. The Maalaea Harbor Draft General Design Memorandum has been reviewed to evaluate the tentatively selected harbor design and determine aids to navigation requirements.

2. Due to the selected plan changing the harbor entrance channel, the Coast Guard has developed a tentative plan to discontinue the existing harbor range lights and establish two breakwater lights to mark the improved harbor. One breakwater light to be established at the end of the south jetty is planned. A light to be established at the end of the existing south breakwater is also planned.

3. In reviewing the alternate plan indicated on plate D-1 of the Study, it was noted that a coral shoal at a depth of two feet exists to the north of the access channel. In the event that the fuel station is not built over the existing shoal as indicated on plate E-1, it is recommended that this area be dredged to a depth of eight feet to conform to the surrounding area.

4. The opportunity to comment is appreciated.

V. R. ROBILLARD
By direction

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

COMMANDER
Fourteenth Coast Guard District
Prince Kalanianaole Federal Bldg.
300 Ala Moana Blvd.
Honolulu, Hawaii 96850

19 JUN 1980

Department of the Army
Pacific Ocean Division
Corps of Engineers, Building 230
Fort Shafter, Hawaii 96858

Dear Sir:

The Fourteenth Coast Guard District has completed its review of the Draft EIS for Maalaea Harbor for Light Draft Vessels. We have the following comments to offer:

1. The Coast Guard concurs with the $20,000 estimated cost of the aids to navigation recommended for the light draft harbor. The range lights will remain and only one breakwater light will be required to improve the navigability of the harbor.

2. In Appendix E, section 6(f) of the Draft EIS, the Coast Guard is said to have 14 Coast Guard personnel stationed at Maalaea Harbor and up to 30 additional personnel attached to the CAPE NEWAGEN. There are only 17 personnel assigned to the CAPE NEWAGEN and these 17 are the only Coast Guard personnel stationed on the Island of Maui.

3. The Coast Guard is still proposing to construct a mooring facility adjacent to the harbor. The plans for the mooring facility are in the Project Notification and Review stage at the State Clearinghouse.

4. The Plate E-1 berthing layout example would not provide the CAPE NEWAGEN with the necessary space to turn around in order to enter or depart the harbor. The space provided for turning in the example is 100 feet. The CAPE NEWAGEN is 95 feet long. I understand the berthing layout shown on Plate E-1 is not part of the plan and is only shown as an example of a possible layout.

5. The CAPE NEWAGEN suffers substantial damage to its hull from the surging in the present harbor. The cost to repair this damage could be included in Table XA-3 of the Draft EIS. Cost estimates for the damage will be forwarded to your office by 30 June 1980.

Sincerely,

R. S. ILLMAN
Lieutenant Commander, U. S. Coast Guard
Acting District Planning Officer
Fourteenth Coast Guard District
By Direction of the District Commander

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Productivity, Technology, and Innovation
Washington, D.C. 20230
(202) 377-3111

June 17, 1980

Mr. Kisuk Cheung
U. S. Army Engineer District, Honolulu
Department of the Army
Buidling 230
Ft. Shafter, Hawaii 96858

Dear Mr. Cheung:

This is in reference to your draft environmental impact statement entitled, "Maalaea Harbor for Light-Draft Vessels, Maalaea, Maui, Hawaii." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving eight (8) copies of the final environmental impact statement.

Sincerely,

John B. Cin, for
Bruce R. Barrett
Acting Director
Office of Environmental Affairs

Enclosure Memo from: Jim Rote
National Marine Fisheries Service
NOAA

1. Gates D
2. Toorish
3. File (Maui-Corps)

March 16, 1979 FSW1:JJN

Mr. Kisuk Cheung
Chief, Engineering Division
U. S. Army Engineer District,
Honolulu
Building 230
Ft. Shafter, Hawaii 96858

Dear Mr. Cheung:

This is in response to your letter to Regional Director Gerald V. Howard, dated 2 March 1979, requesting information on the status of the endangered humpback whale, Megaptera novaeangliae, in and around Maalaea Bay, Maui. Your letter was referred to this office for comment. We understand the requested information will be utilized by your office in formulating proposed improvements to the Maalaea Small Boat Harbor. The following is offered for your consideration.

The relatively shallow water between Maui, Kahoolawe, Lanai and Molokai, which includes Maalaea Bay and other waters along the south coast of Maui, appears to be second only to Penguin Bank as the most important humpback whale habitat throughout the Hawaiian Islands. Within this area, Maalaea Bay has been identified as being especially important as calving and nursing grounds in that a comparatively high proportion of humpback whale calves are consistently sighted there.

In light of the above, the National Marine Fisheries Service (NMFS) has designated Maalaea Bay as one of two important calving areas needing special protection. Specific guidelines for human activities within these areas have been published and are presently being enforced by NMFS agents. Enclosed are three copies of our recently published brochure which defines these calving and breeding areas and the specific guidelines to minimize human harassment of humpback whales.

Although no formal designation of critical habitat has been enacted for Maalaea Bay, there is no doubt that the area is of considerable importance to these endangered whales. A proposal to include Maalaea Bay as part of a marine sanctuary under the Marine Protection Research and Sanctuaries Act of 1972 has been submitted to the Office of Coastal Zone Management for consideration. To date, however, no formal action has been taken on this proposal.

The Western Pacific Program Office, NMFS, is directly responsible for the management and protection of humpback whales while they are in Hawaiian

waters. Consequently, we are concerned with potential impacts the planned improvement for Maalaea Small Boat Harbor may have on the whales and their habitat. Although this office has not seen any plans for the proposed work, we strongly recommend against construction, particularly if it involves blasting and dredging, during the months of December through May when humpback whales are in Hawaiian nearshore waters.

Thank you for allowing us to comment at this early stage of planning. Please keep this office informed as the proposed project develops.

Sincerely yours,

Doyle E. Gates
Administrator

Enclosures

cc: Gerald V. Howard, FSW (w/o encl.)
Richard S. Shomura, F142 (w/o encl.)
Maurice Taylor, FWS, Honolulu (w/encl.)
Hawaii State Div. of Fish & Game
(W/encl.)

Rec'd 6/5/80
PP/EC

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
Western Pacific Program Office
P. O. Box 3830
Honolulu, Hawaii 96812

May 23, 1980 F/SWR1:JJN

TO: PP/EC

6/4/80

THROUGH: Jim Rote, Office of Habitat Protection, F/HP

FROM: Doyle E. Gates, Administrator, Western Pacific Program Office, F/SWR1

SUBJECT: Draft Environmental Impact Statement, Maalaea Harbor for Light-Draft Vessels, Maui, Hawaii (CE) (DEIS #8005.05)

The National Marine Fisheries Service (NMFS) was consulted during the planning stages of the proposed project and during development of the DEIS. Resources for which NMFS bears a responsibility and alternatives to reduce adverse impacts on these resources have been addressed to our satisfaction. Therefore, we have no additional comments.

Background Information

The Corps of Engineers (CE) requested early input from NMFS when developing plans for improvements to the Maalaea Small Boat Harbor. We were particularly concerned about possible impacts on the endangered humpback whale (Megaptera novaeangliae) and presented our position in a letter to CE dated March 16, 1979 (attached).

Subsequently, we concluded that the proposed project would likely jeopardize the recovery of the humpback whale population that winters in Hawaiian waters. A biological opinion was prepared by NMFS which included an alternative to avoid jeopardizing the Hawaiian population of humpback whales (attached) and was submitted to CE on April 25, 1980.

Attachments

cc: F/SWR3 (with attachments)
District Engineer, Honolulu
District (with attachments)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Washington, D.C. 20235

APR 2 6 1980

F/SWR31:JHL
F/NM:CK

Mr. Kisuk Cheung
Chief, Engineering Division
Department of the Army
Corps of Engineers
Building 230
Fort Shafter, Hawaii 96858

Dear Mr. Cheung:

On January 11, 1980, the formal consultation process described in Section 7 of the Endangered Species Act of 1973, as amended, was initiated for the purpose of evaluating the potential impacts of the Maalaea Harbor project on humpback whales (Megaptera novaeangliae). Enclosed is the biological opinion we issued as the result of that consultation.

The biological opinion relates our conclusion that the project described in your Biological Assessment is likely to jeopardize the recovery of the humpback whale population that winters in Hawaiian waters and may jeopardize the continued existence of this population.

We recommend, as a reasonable and prudent alternative, that all subsurface construction activities involving blasting for the Maalaea Bay Small Boat Harbor be limited to the period of May through December.

We look forward to continued cooperation in future consultations.

Sincerely yours,

for Terry L. Leitzell
Assistant Administrator
for Fisheries

Enclosure

ENDANGERED SPECIES ACT
SECTION 7 CONSULTATION - BIOLOGICAL OPINION

Agency: Department of the Army, Corps of Engineers.

Activity: Small boat harbor improvement project, Maalaea Bay, Maui, Hawaii.

Consultation Conducted By: National Marine Fisheries Service.

Results of Consultation:

On October 4, 1979, the Corps of Engineers, Pacific Ocean Division, submitted a Biological Assessment to the Southwest Region, National Marine Fisheries Service (NMFS) regarding the impact of a proposed harbor improvement project on the stock of humpback whales (Megaptera novaeangliae) that winter in Hawaiian waters.

After review of the Biological Assessment which indicated potential adverse impacts on the humpback whales, it was determined that consultation, pursuant to Section 7 of the Endangered Species Act of 1973, as amended, was required. The Corps of Engineers informally was notified of our decision and intention to request consultation on January 10, 1980. Subsequent to that notification the U.S. Army Corps of Engineers, Pacific Ocean Division requested, in a letter dated January 11, 1980, formal consultation pursuant to Section 7 of the Endangered Species Act of 1973, as amended, with the Southwest Region, NMFS.

Biological Background

At the turn of the century the North Pacific population of humpback whales numbered approximately 15,000. The commercial whaling industry reduced this population to levels from which the species has not yet recovered.

Currently the population numbers approximately 1,000 individuals of which 500-700 winter around the main Hawaiian Islands. Other known North Pacific wintering grounds include the shallow subtropical waters along the west coast of Mexico, and in the Western Pacific around the Mariana, Bonin, and Ryukyu Islands.

In 1966 humpback whales recieved protection from intensive commercial whaling from the International Whaling Commission. In 1969 they were listed as "endangered" under the Endangered Species Conservation Act. They are presently protected by the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973.

The Hawaiian humpback population migrates between higher latitude North Pacific summer feeding grounds and winter breeding/calving areas in nearshore shallow waters around the main Hawaiian Islands. Their numbers peak in late January through February and remain fairly constant through mid-March. In April they begin migrating out of Hawaiian waters and by late May or early June the last whales usually have departed.

Humpback whales concentrate during the winter breeding season in shallow waters, usually less than 100 fathoms, and particularly are attracted to broad bank areas. In the Hawaiian Islands, major areas of concentration are Penguin Bank, the waters bounded by the islands of Molokai, Maui, Lanai, and Kahoolawe, and the nearshore waters of Hawaii Island between Upolu Point and Keahole Point. They are found consistently, although in smaller numbers, in several other areas of the main Hawaiian Islands.

Sighting data and observations from various researchers since 1976 indicate that during the winter months both humpback calves and adults regularly are found in and around the Maalaea Bay project area, suggesting that the area is utilized as a calving and nursing ground by the whales.

The major activities of the harbor improvement project would include dredging and filling, and possible breakwater removal and construction.

The Biological Assessment prepared by the Corps of Engineers for the proposed project, described potential impacts on the humpbacks as "...underwater noise generated by dredging and breakwater construction. The intensity and frequency range of underwater noise generated by these acitivties is not known." The assessment also stated that "Similarly, no data are available with which to predict humpback whale responses to the noise impacts." Although there are indications that some species of whales, for example, the gray whale (Eschrichtius robustus) in California may tolerate low level background noise from ships of passage, new, sudden, erratic, or high intensity noises have been known to disturb most species of large whales, including the humpback. Furthermore, it has been shown that the humpback whale is an extremely acoustically oriented species. This is indicated by their vocalization, fluke and pectoral slaps on the water's surface and body breaches. Although the functions of these activities and the sounds they generate are not known, it has been postulated that they may be involved in mating, identifying territories, and recognition of individuals.

Despite the paucity of behavioral information, the Assessment indicates the "worst case" possibility of all humpbacks within hearing range of the project-related noise vacating the Maalaea Bay area for a single winter.

Due to the already reduced numbers of humpback whales in the North Pacific population and their apparently low recruitment rate, the abandonment

of a preferred and probably important habitat area and interruption of calving and nursing activities by a portion of the population for only one season would not be conducive to the conservation of the species.

Conclusions

The available data indicate that noise generated by harbor improvement construction activities when humpback whales are present may lead to temporary abandonment of a preferred habitat area by humpback whales in Maalaea Bay. We conclude that such a change in the distribution and behavior of the humpback whales inhabiting Maalaea Bay probably would jeopardize the continued existence of the humpback whale population that winters in Hawaiian waters.

Recommendations

Until further research reveals the need for more specific action, we offer the following reasonable and prudent alternative to avoid jeopardizing the continued existence of the Hawaiian population of humpback whales. All subsurface construction activities involving blasting for the Maalaea Bay small boat harbor project be limited to the period of May through December. Consultation must be reinitiated if additional information becomes available indicating other potential adverse impacts on humpback whales or any other listed species.

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

FOOEN-PV

30 June 1980

Mr. Bruce R. Barrett, Acting Director
Office of Environmental Affairs
US Department of Commerce
The Assistant Secretary for Productivity,
Technology, and Innovation
Washington, DC 20230

Dear Mr. Barrett:

This is in response to your letter of 17 June 1980 forwarding comments from the National Oceanic and Atmospheric Administration on our Draft Environmental Impact Statement entitled, "Maalaea Harbor for Light-Draft Vessels, Maalaea, Maui, Hawaii." Recommendations provided in the National Marine Fisheries Service Biological Opinion issued 25 April 1980 have been incorporated in the final report and environmental impact statement. These recommendations will insure that adverse impacts to humpback whales resulting from project construction activities will be minimal.

Sincerely,

KISUK CHANG
Chief, Engineering Division

DISPOSITION FORM

For use of this form, see AR 340-15, the proponent agency is TAGCEN.

REFERENCE OR OFFICE SYMBOL: PODED-PV

SUBJECT: Clarification of National Marine Fisheries Service Biological Opinion Evaluating the Potential Impacts of th Maalaea Harbor Project on the Endangered Humpback Whale

XX THRU Chief, Env Res Sec
Actg Asst Chief, Plng Br
Chief, Plng Br

FROM R. Moncrief, Actg Asst Chief, Plng Br Sec
DATE 7 May 80
CMT 1
Moncrief/jmd/2264

TO MEMORANDUM FOR RECORD

In a telephone conversation of 6 May 80 between Mr. Gene Nitta (NMFS Marine Mammal Biologist) and the undersigned, I requested clarification of the phrase, "All subsurface construction activities involving blasting...." in the "Recommendations" section of the Biological Opinion. I asked specifically whether this referred only to subsurface blasting or to other subsurface construction activities such as dredging which may be construed as being related to or involving blasting. Mr. Nitta replied that it referred only to blasting; other subsurface construction activity is permissable.

Robert Moncrief
ROBERT MONCRIEF
Ecologist

CF:
Mr. Gerald V. Howard, FSW
Mr. Doyle Gates, F142

DA FORM 4 PEB 81 2496 REPLACES DD FORM 96, WHICH IS OBSOLETE. ☆U.S.GPO:1978-0-665-041/144

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
PACIFIC SOUTHWEST REGION
BOX 36098 • 450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102
(415) 556-8200

June 18, 1980

ER 80/440

Colonel Peter D. Stearns
Corps of Engineers, Honolulu District
Building 230
Ft. Shafter, Hawaii 96858

Dear Colonel Stearns:

The Department of the Interior has reviewed the Draft General Memorandum Number 1, Maalaea Harbor for Light-Draft Vessels, Maui, Hawaii, and offers the following comments.

General Comments

The lack of field surveys and the limited scope of consultation with the State Historic Preservation Officer do not represent compliance with Section 106 of the National Historic Preservation Act and Executive Order 11593. In regard to the cultural resources, side-scan sonar surveys, conducted by qualified underwater archeologists, are suggested for the offshore areas to be dredged. The literature search conducted and described in Appendix E is considered inadequate to minimize potential damage to significant cultural resources (such as shipwrecks) that may be discovered. Alterations to the construction and dredging project may be appropriate if potentially significant cultural resources are identified during the sonar survey or during construction.

Results of the survey and any mitigation measures proposed should be provided to the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP) for review and comment. Response from the SHPO and the ACHP should be included in the final environmental statement.

The U.S. Army Corps of Engineers, Pacific Ocean Division, and the National Marine Fisheries Service (NMFS), Southwest Region, recently concluded formal consultations under Section 7 of the Endangered Species Act regarding the impacts of the proposed Maalaea Harbor project on the humpback whale (Megaptera novaeangliae). NMFS finds that certain construction activities, particularly underwater blasting, are "...likely to jeopardize the recovery of the humpback whale population that winters in Hawaiian waters and may jeopardize the continued

existence of this population." In view of this, NMFS recommends that "...all subsurface construction activities involving blasting... be limited to the period of May through December." We concur in this recommendation. The text of the opinion rendered by NMFS should be included in toto as an appendix to the General Design Memorandum (GDM) and the findings and recommendations therein addressed in the body of that document and in the final Environmental Impact Statement.

Fisheries will be enhanced as a result of the placement of a breakwater structure on an otherwise featureless reef surface. Improved pole, net, and spear fishing is expected to result. The breakwater structure will be attractive to fishermen who desire access to the best fishing areas.

However, the breakwater provides no safe access for fishermen and may result in serious injury unless such a provision is made. Consideration of such access should be included in both the GDM and EIS.

The U. S. Fish and Wildlife Service has recommended that erosion control measures be applied to reduce the discharge of sediments from upland sources into Haalaea Harbor. Inasmuch as a reduction in water quality will result from increased harbor usage (Page 16, Paragraph 2.11), such measures are justifiable and appropriate to mitigate the adverse impact. This should be discussed in both the GDM and EIS.

The locations of spoil disposal and quarry sites must be identified and related impacts addressed in the final documents.

Summary

Historic and cultural resources have not received full and proper consideration in the planning leading up to the Draft GDM and DEIS. Before these documents are finalized, consultation and coordination should be completed with SHPO and ACHP, including consideration of the results of side-scan sonar surveys of off-shore areas slated for dredging.

Inasmuch as formal consultation has been completed on the endangered humpback whale, the findings of NMFS should be included in the final GDM and FEIS and specific provisions included in the construction schedule to limit all subsurface construction activities involving blasting to the period May through December.

The reduction of sediment from upland sources into Haalaea Harbor is a reasonable and feasible approach to mitigating reduction in water quality resulting from the project and should be included as a feature of the project.

Safe access to the breakwater should be provided so that the fishery opportunities provided by the project can be enjoyed by the public without serious risk of injury.

Thank you for the opportunity to comment on this document. If you have any questions about our review, please contact me directly.

Sincerely,

Patricia A. Port

Patricia Sanderson Port
Regional Environmental Officer

cc: Director, OEPR (w. copy incoming)
Director, Fish and Wildlife Service
Director, Heritage Conservation & Recreation Service
Director, National Park Service
Director, Geological Survey
Director, Bureau of Mines.
Reg. Dir., FWS
Reg. Dir., HCRS
Reg. Dir., NPS
Reg. Dir., GS
Reg. Dir., BM
SHPO

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED-PV

10 July 1980

Ms. Patricia Sanderson Port
Regional Environmental Officer
U.S. Department of the Interior
Office of the Secretary
Pacific Southwest Region
450 Golden Gate Ave., Box 36098
San Francisco, CA 94102

Dear Ms. Port:

This is in response to your letter of 18 June 1980 commenting on our Draft Design Memorandum 1, Maalaea Harbor for Light-Draft Vessels, Maui, Hawaii. It is our opinion that historical coordination for the proposed project has been adequately conducted and is in full compliance with Section 106 of the National Historic Preservation Act and Executive Order 11593. A cultural reconnaissance survey was conducted and a Determination of Effect based on survey findings was forwarded to the State Historic Preservation Officer (SHPO) for his review and concurrance. A letter of concurrance was received from SHPO on 29 February 1980 (Incl 1). Additionally, a letter form the Advisory Council on Historic Preservation, dated 15 May 1980 (Incl 2), noted that the proposed project will not affect properties included in or eligible for inclusion in the National Register of Historic Places. We do not feel that the suggested side-scan sonar surveys are appropriate or necessary. Offshore areas that would be affected by dredging or placement of new breakwater structures do not exceed a depth of 20 feet. Underwater visibility frequently is greater than 30 feet. Biological reconnaissance surveys conducted during the study by U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers personnel revealed no indication of shipwrecks or other cultural remains existing in the offshore project area; nor are we aware of reports by snorkelers, scuba divers, etc. of any cultural or archeological resources existing here.

We have received the National Marine Fisheries Service Biological Opinion regarding potential impacts of the harbor project on the humpback whale, concluding formal consultation under the Endangered Species Act. We concur with their recommendation limiting under water blasting to the

period of May to December. The Biological Opinion has been included as an appendix in the final General Design Memorandum. NMFS findings and recommendation have been incorporated in the final report and environmental impact statement. Although the breakwater structure will attract fishermen, they will not be permitted on the structure. Fishing will only be permitted from the water. It is the Corps of Engineers policy to prohibit public access to breakwater structures.

Water quality at Maalaea is expected to remain within the parameters set forth in the State Water Quality Standards for harbors. The Corps of Engineers is not the agency responsible for implementing erosion control measures in areas other than those directly affected by Corps projects. Upland erosion control measures are not considered appropriate mitigation of water quality impacts in this case.

Possible quarry and borrow sites have been identified in the final report. Choice of a stone source will be left to the contractor. Provision for spoil disposal sites is the responsibility of the local sponsor. The local sponsor must satisfy environmental requirements pertaining to those sites as necessary.

Sincerely,

2 Incl
As stated

KISUK CHEUNG
Chief, Engineering Division

Advisory Council On Historic Preservation

1522 K Street, NW
Washington, DC 20005

Reply to:

Lake Plaza South, Suite 816
44 Union Boulevard
Lakewood, CO 80228

May 15, 1980

Mr. Kisuk Cheung
Chief, Engineering Division
Corps of Engineers, Honolulu District
Department of the Army
Building 230
Ft. Shafter, Hawaii 96858

Dear Mr. Cheung:

This is in response to your request of April 30, 1980, for comments on the draft environmental statement (DES) for the Maalaea Harbor Navigation Improvement Study, Maui, Hawaii.

The Council has reviewed the DES and notes that the Corps of Engineers has determined that the proposed undertaking will not affect properties included in or eligible for inclusion in the National Register of Historic Places. Accordingly, the Council has no further comment to make at this time. It is suggested, however, that the final environmental statement contain the Hawaii State Historic Preservation Officer's concurrence in the determination of no effect.

Should you have any questions or require additional information, please contact Mrs. Jane King of the Council's staff at (303) 234-4946, an FTS number.

Sincerely,

Louis S. Wall
Chief, Western Division
of Project Review

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

February 29, 1980

Mr. Kisuk Cheung, Chief
Engineering Division
Department of the Army
U.S. Army Engineer District, Honolulu
Building 230
Fort Shafter, Hawaii 96858

Dear Mr. Cheung:

Subject: Maalaea Small Boat Harbor
TMK 3-6-01

Thank you for your letter of February 11, 1980, concerning the Maalaea Small Boat Harbor report prepared for you by Hawaii Marine Research, Inc. on September 1979.

Upon inspection of our files, we were not able to find any additional information concerning this area. We are therefore in agreement with the conclusions of this report as it applies to the Maalaea area.

In the event that any unanticipated sites or remains such as shell, bone or charcoal deposits; human burials; rock or coral alignments, pavings, or walls are encountered during construction, please inform the applicant to stop work and contact this office immediately.

Sincerely yours,

Susumu Ono
Chairman of the Board and
State Historic Preservation
Officer

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

June 24, 1980

REF. NO.: CPO-1783

Mr. Kisuk Cheung, Chief
Engineering Division
Department of the Army
U.S. Army Engineer District, Honolulu
Building 230
Fort Shafter, Hawaii 96858

Dear Mr. Cheung:

We have reviewed the Draft Design Memorandum No. 1 for Maalaea Harbor and have the following comments to offer:

1. A Conservation District Use Permit is necessary prior to the commencement of construction due to the proposed expansion or use from 93 berthing paces (p. 11) to 260 boats. (p. 2).

2. The Maalea Small Boat Harbor does not appear to be eligible for inclusion on the National Register of Historic Places. The proposed undertaking will have no effect on significant cultural resources.

3. We regard as precarious the statement that, "the overall effect would be enhancement of reef fish and shell fish resources in the immediate vicinity of the harbor" (p. 37), inasmuch as part of the seafloor to be destroyed is rich coral reef (p. 36). However, we also recognize the needs of the boating public and tend to agree that those needs may be best met by expansion of existing facilities. Since Alternate Plan 2 would leave intact an additional 0.84 acres of prime reef habitat while providing benefits and exacting costs virtually identical to the Tentatively Selected Plan (Table D-5), we prefer Alternate Plan 2 from the standpoint of marine fisheries resources and environmental protection.

4. The adverse environmental impacts of the proposed project, which we believe are to some degree inherent regardless of the alternative plan finally chosen, should be largely transitory and can

be minimized, provided that: 1) construction and fabrication (e.g., of dock assemblies and dolosse units) take place in so far as is possible on fast land; 2) construction practices and special mitigative measures be employed to prevent persistent turbidity and sediment transport into areas of significant living coral coverage; 3) lumber and other construction materials treated with creosote or other preservative substances are not permitted to contact the water until after at least one week of drying; 4) construction materials, petroleum products, human wastes, debris, and landscaping substances (herbicides, fertilizers, pesticides) are not permitted to fall, flow, or leach into the ocean.

Thank you for the opportunity to comment. If you have any questions please contact Mr. Roger C. Evans or my Staff at 548-7837.

Very truly yours,

SUSUMU ONO, Chairman
Board of Land and Natural Resources and
State Historic Preservation Officer

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED-PV

22 July 1980

Mr. Susumu Ono, Chairman
Board of Land and Natural Resources
State of Hawaii
PO Box 621
Honolulu, HI 96809

Dear Mr. Ono:

This responds to your comments dated 24 June 1980 on the Maalaea Small Boat Harbor project. The local sponsor, State Department of Transportation, Harbors Division, is responsible for obtaining all necessary permits, approvals, clearances, etc., prior to project construction. This would be accomplished during the plans and specifications phase of the project. We acknowledge your conclusion that the proposed harbor improvement project would have no effect on significant cultural resources.

We feel that the new breakwater structure, because of its massive size, will provide significantly more productive habitat (vertical relief, shelter, hard substrate, etc.) for fish and shellfish than will be destroyed by the project. This penomenon has been observed at other light-draft harbors within the State. Alternative Plan 1, the tentatively selected plan, would cover an additional 0.84 acres of bottom habitat with a revetted mole. The reef area which would be destroyed by the mole is of low to moderate value in terms of fish and shellfish resources. The State of Hawaii, Department of Transportation, considers Plan 1 the most feasible for implementation because the mole would provide an additional 0.75-acre area for automobile and boat trailer parking and would utilize approximately 22,000 cubic yards of dredged material generated by the project. This would reduce by approximately 70 percent the volume of dredged material to be stockpiled at a land disposal site. Thus, in terms of overall environmental impacts, the two plans are not substantially different.. We concur that environmental impacts of the proposed project would be largely transitory and could be minimized through incorporation and implementation of your recommended environmental controls.

Sincerely,

KISUK CHEUNG
Chief, Engineering Division

DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

GEORGE R. ARIYOSHI
Governor
HIDETO KONO
Director
FRANK SKRIVANEK
Deputy Director

Kamamalu Building, 250 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

June 26, 1980

Ref. No. 1613

Mr. Kisuk Cheung
Chief, Engineering Division
U.S. Army Engineer District, Honolulu
Building 230
Fort Shafter, Hawaii 96858

Dear Mr. Cheung:

Subject: Draft General Design Memorandum Number 1 and Draft Environmental Statement, Maalaea Harbor Navigation Improvement Study

We have reviewed the subject document and offer the following comments for your consideration.

1. Under the three alternative plans for improvements to the harbor, surfing sites will be destroyed or modified. Although the extent of damage has been reduced from that of earlier harbor expansion proposals, a significant recreational resource will be unavoidably damaged by the development. In consideration of Hawaii's Coastal Zone Management policies, potential replacement alternatives for the damaged areas should be addressed.

2. The project location is in an area of significant importance for the continued survival of the endangered Humpback whale. The impacts of construction activities, associated turbidity plumes, and increased boating activity on the whale habitat should be thoroughly addressed and considered prior to any final decisions concerning the proposed project.

3. Boating activities and fishing pressures in the area will increase dramatically due to expansion of the harbor's berthing capacity by an estimated 333 percent. The current and anticipated levels of both commercial and public fishing activities should be identified to afford adequate consideration of potential impacts upon the resource.

4. Proposed land based facilities including those required for non-fishing commercial activities such as hydrofoil vessels should be discussed. This will facilitate early identification of potentially conflicting uses within the harbor basin.

We appreciate the opportunity to comment on this study. Should you have any questions concerning this matter, please feel free to contact us at any time.

Sincerely,

Frank Skirvanek
for Hideto Kono

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED-PV

18 July 1980

Mr. Hideto Kono, Director
Department of Planning and
Economic Development
State of Hawaii
Kamamalu Building
250 South King Street
Honolulu, Hawaii 96804

Dear Mr. Kono:

We are replying to your letter of 26 June 1980 commenting on our Draft General Design Memorandum Number 1 and Draft Environmental Statement, Maalaea Harbor, Maui. Specific responses to your comments are provided below:

1. Impacts on surf sites:

a. One siguificant surfing site is expected to be modified by the dredging of the new channel and construction of the breakwater extension. It is the site called "Impossibles" by surfers attending our public workshop series in 1979-80. The site is located immediately adjacent to the existing east breakwater. It is occasionally used by surfers, although surfers testified that it is not a unique site, and is often not surfable due to poor wave-breaking characteristics.

b. Harbor modification will probably result in the creation of a new surfing site directly east of the new entrance channel. The new site would be expected to be a "bowl-break" with both left- and right-breaking characteristics. The quality of the expected new site is impossible to predict but it could be superior to the existing "Impossibles" site.

c. Since a new surfing site is expected to replace the loss of the existing site, an attempt to build a new site should not be necessary, and was not addressed in the report.

2. Impacts on the Humpback Whale:

a. Impacts of the proposed project on the endangered humpback whale have been evaluated by the National Marine Fisheries Service (NMFS) during formal consultation under Section 7 of the Endangered Species Act. In their Biological Opinion issued 25 April 1980 (Incl 1), NMFS concluded that noise generated by underwater blasting could adversely affect whales in the proximity of Maalaea Harbor and thereby jeopardize the continued existence of the Hawaiian population of humpback whales. NMFS recommended that underwater blasting be limited to the period of May through December.

b. NMFS did not address potential impacts on humpback whales resulting from construction-generated turbidity. The Hawaiian population of humpback whales spends several months each year feeding in the rich but turbid waters of the North Pacific subarctic region. Thus, it seems unlikely that localized turbidity in coastal areas around Hawaii would have any effect on the humpbacks. During construction of the harbor improvements, the contractor would be required to comply with state water quality standards, employing appropriate construction techniques to achieve compliance. Therefore, turbidity would be limited to the immediate project area.

c. Increased boating activity resulting from additional berthing capacity at Maalaea Harbor would represent only a fraction of the anticipated increase in the number of registered boats on Maui. Presently, boats and whales coexist off Maalaea with no apparent adverse impacts on the whales. Eventually, with the continued increase in boating activity in this area, the situation could change. NMFS is responsible for monitoring human activities in the designated area of special significance at Maalaea between Hekili Point and Puu Olai. If more stringent regulation of boat and human activity in this area becomes necessary, it would be incumbent upon NMFS to initiate appropriate action which would provide adequate protection of Hawaiian humpback whales.

3. Impact on fishery resources: The Department of Land and Natural Resources (DLNR) "Hawaii Fisheries Development Plan," 1979, concluded that a shortage of adequate dock space for commercial fishing vessels is the major constraint inhibiting growth of Hawaii's commercial fisheries. The plan recommended, among its developmental strategies, expansion of five recreational/commercial small craft facilities, including Maalaea Harbor, to accommodate projected increases in Hawaii's commercial fishing fleet. A comprehensive assessment of Hawaiian fishery resource potential is contained in the DLNR report. Many of the potential resources occur in the Leeward, or Northwestern Hawaiian Islands (NWHI). Others depend on deployment of additional fish aggregation devices. It is projected that the commercial fishing fleet would expand to the point where the

sustainable yield of these new fisheries and existing under-exploited fisheries would be achieved. Public fishing activities affecting near-shore fishery resources in the vicinity of the harbor would be expected to increase slightly as a result of harbor expansion. Projected increases in trailered boats on Maui would have a much more significant effect on near-shore fishery resources than would the increase in boats resulting from harbor expansion at Maalaea. For more detailed information on the subject, we suggest you refer to the DLNR report cited above.

4. Land based facilities: Planning, impact assessment and evaluation, and implementation of harbor facilities such as berths, fuel stations, ramps, repair facilities, and commercial facilities such as shops, restaurants, tourist operations, interisland ferries or any other facilities are the responsibility of the State Harbors Division. An attempt was made early in the navigation improvement study to conduct a joint U.S. Army Corps of Engineers-Harbors Division study including a joint State-Federal Environmental Impact Statement, but the State of Hawaii could not furnish funds to Harbors Division on a timely schedule. Thus, we were forced to proceed with an independent study in order to meet our funding obligations. Hopefully, future studies of this nature can be conducted jointly as they should be.

Sincerely,

1 Incl
As stated

KISUK CHEUNG
Chief, Engineering Division

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801

GEORGE A. L. YUEN
DIRECTOR OF HEALTH
~~Audrey W. Mavis, M.D., M.P.H.~~
Deputy Director of Health
Henry N. Thompson, M.A.
Deputy Director of Health
~~James S. Homoge, Ph.D., P.E.~~
Deputy Director of Health

In reply, please refer to
File EPHS -SS

May 27, 1980

MEMORANDUM

To: Mr. Kisuk Cheung, Chief, Engineering Division
Department of the Army

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement (EIS) for Maalaea Harbor for Light-Draft Vessels, Maui

Thank you for allowing us to review and comment on the subject EIS. On the basis that the project will comply with all applicable Public Health Regulations, please be informed that we do not have any objections to this project.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

for MELVIN N.I KOIZUMI

cc: Office of Environmental Quality Control

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
OFFICE OF THE GOVERNOR
550 HALEKAUWILA ST.
ROOM 301
HONOLULU, HAWAII 96813

RICHARD O'CONNELL
DIRECTOR

TELEPHONE NO.
548-6915

May 19, 1980

Dr. Ryokichi Higashionna
Director
State Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Higashionna,

As you may be aware, the U.S. Army Corps of Engineers has recently completed an environmental impact statement on proposed improvements to Maalaea Harbor, where the state is also planning improvements. Since the state project is subject to Chapter 343 HRS, the state environmental impact statement law, it appears that a second statement on these closely related improvements may be necessary. This would be a most unfortunate duplication of effort and, furthermore, would be contrary to the intent of both the pertinent federal regulations and state law. (see attached)

I recognize that certain timing problems exist in coordinating your efforts. However, I would hope that in the future these problems could be solved ao that a single joint state-federal environmental impact statement could be produced. This result would be in the best interests of the public as well as the government agencies involved.

If we can be of any assistance to you in achieving this objective, we would be pleased to do so.

Sincerely,

Richard L. O'Connell
Director

Attachment

cc: District Engineer
U.S. Army Engineer District,
Honolulu

REGULATORY PROVISIONS RELATING TO
JOINT STATE-FEDERAL EIS PREPARATION

Council on Environmental Quality Regulations
(40 CFR1506.2)

"Agencies shall cooperate with State and local agencies to the fullest extent possible to reduce duplication between NEPA and State and local requirements...(S)uch cooperation shall to the fullest extent possible include:

(1) Joint planning processess.
(2) Joint environmental research and studies.
(3) Joint public hearings (except where otherwise provided by statute).
(4) Joint environmental assessments."

Chapter 343-5(f) HRS:

"Whenever an action is subject to both the National Environmental Policy Act of 1969 (Public Law 91-190) and the requirements of this chapter, agencies shall cooperate with federal agencies to the fullest extent possible to reduce duplication between federal and state requirements. Such cooperation shall to the fullest extent possible include joint environmental impact statements with concurrent public review and processing at both levels of government."

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
OFFICE OF THE GOVERNOR
550 HALEKAUWILA ST
ROOM 301
HONOLULU, HAWAII 96813

RICHARD O'CONNELL
DIRECTOR

TELEPHONE NO
548-6915

June 20, 1980

Mr. Kisuk Cheung
Chief, Engineering Division
Department of the Army
Building 230
Fort Shafter, Hawaii 95868

SUBJECT: Draft Design Memorandum No. 1 and Environmental Impact Statement for Maalaea Harbor for Light-Draft Vessels, Maui

Dear Mr. Cheung,

We have reviewed the above document and offer the following comments for your consideration:

Draft Design Memorandum

Page 6

Section 3.3. The figure given for tourism does not reflect the most current data available. It should also be noted that the tourism growth rate for the neighbor islands has declined in recent months.

Page 10

Section 4.4. The document states, "In 1979 there were 280 boats on the waiting list for two State-owned, light-draft harbors in the southwest Maui area at Lahaina and Maalaea." How many of the 280 persons are on the waiting list for the Maalaea Harbor? More importantly, it should be indicated how many of the people on the waiting list are residents of Maui, residents within the state, and residents elsewhere. By breaking down the type of people

on the waiting list, one can more readily identify the critical need of berthing space for local residents. A discussion of this is recommended.

Page 10

Section 4.7. The discussion of the possible conflict with the Humpback whale, Megaptera novaeangliae, is inadequate and needs further elaboration. Recently, the National Park Service issued regulations (May 15, 1980 Federal Register)which provide protection for the humpback whales at Glacier Bay National Monument, Alaska. In their formal response to the consultation process in accordance with provisions of the Endangered Species Act, the National Marine Fisheries Service concluded, " . . . that uncontrolled increase of vessel traffic, particularly of erratically travelling charter/pleasure craft, probably has altered the behavior of the humpback whales in Glacier Bay. . ." and " . . . that continued increase in the amount of vessel traffic . . . is likely to jeopardize the continued existence of the humpback whale population . . ." NMFS recommended that, " . . . total vessel use of the Bay be restricted to 1976 levels, at the very least . . ." Further, that " . . . regulations should address vessel routing and vessel manuvering . . ." and " . . . the system should be flexible enough to accommodate changes of areas of concentrated feeding activity."

It is important to recognize that many of these whales being protected at Glacier Bay, Alaska are the same whales which migrate to Hawaii and have been observed off the coast of Maui. Accordingly, it seems incongruous to protect these whales in Alaska by regulating and reducing vessels traffic there, while promoting an increase in vessel traffic in Hawaii. Therefore, an expanded discussion is needed to fully and adequately consider the impacts of this project on the humpback whales.

Page 16

Section 2.8. "Surfing areas identified by local surfing interests as being of major importance would not be affected by the new structures and channels." Does this statement also refer to public access to the surfing areas?

Page 19

Section 5.2. The estimated costs do not consider shoreside facilities, parking lot expansion, utilities, and other improvements to be provided by the State. These costs should be given to reflect actual costs of the entire project.

Environmental Impact Statement

The total harbor improvements proposed consist of state and federal project features, all of which should be described in a single joint state-federal EIS. It is recognized that there are timing problems in trying to prepare a joint federal-state EIS. If a separate federal EIS is believed to be necessary, then it should describe and analyze the total project, including the state project features and not be limited to just the federal portion. Otherwise the total impact of the overall project cannot be understood.

Vessel Traffic. Quantification of vessel traffic should be given in the EIS. What is the present and projected vessel traffic?

Ciguatera. During dredging and construction of the Waianae boat harbor, poisoning of fish by ciguatera toxin was encountered. What is the likelihood that this phenomenon will also occur on this project? What preventive measures can be taken?

Sewage Discharge from Boats. How will sewage disposal from the vessels be handled?

Humpback Whale. As indicated above, we believe that the section on the humpback whale needs to be expanded.

Secondary Impacts. Discussion should be given of the secondary impacts that may be generated from the expanded harbor. With urban zoning around the harbor and the desirability of a harbor atmosphere, development will most likely occur as seen at other harbors in the state. Will this project lead to an expansion of harbor service facilities? Will this harbor design be able to

further expand beyond 310 berths? How will this project contribute to the urbanization of the area? What population growth can be expected to be supported by the harbor?

We trust that these comments will be helpful to you in preparing the final document. We would like to request 22 copies of the final EIS when it becomes available.

An attached sheet lists the commenting agencies and organizations. Comments are being forwarded to your agency for your response.

We thank you for the opportunity to review this EIS and look forward to the final statement.

Sincerely,

Richard L. O'Connell
Director

Attachment

LIST OF COMMENTING AGENCIES/ORGANIZATIONS

STATE	
Department of Defense	June 4, 1980
Department of Accounting & General Services	June 4, 1980
*Department of Health	May 27, 1980
COUNTY OF MAUI	
Department of Water Supply	May 22, 1980
PRIVATE	
*Maui Whale Research Institute	June 2, 1980
*American Cetacean Society	June 2, 1980

*Denotes comment previously forwarded to Corps by reviewer or OEQC.

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED-PV

23 July 1980

Mr. Richard L. O'Connell, Director
Office of Environmental Quality Control
Office of the Governor
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, HI 96813

Dear Mr. O'Connell:

We are replying to your letter of 20 June 1980 commenting on our Draft Design Memorandum and Environmental Impact Statement for Maalaea Harbor, Maui. Responses to your specific comments are provided below:

a. Tourism. Tourism data from 1978 was the most recently available at the time the draft report was prepared. 1978 data is adequate to represent the scope of the growth of tourism on Maui over the last 20 years. Annual variations in the rate of growth of the tourist industry are not significant when planning for long-range public projects.

b. Demand for berthing spaces.

(1) Historical waiting list figures as well as projected figures for Maalaea Harbor are tabulated in Table XA-1 in the Benefit Analysis, Appendix A. However, total waiting list numbers for both Maalaea and Lahaina Harbors are a better indicator of total demand for berths in the southwest Maui area. Construction of large-scale public facilities must consider this broader approach in order to effectively accommodate public needs. Critical need for additional berths in the State of Hawaii and on the island of Maui is widely perceived as fact. Persons typically wait 3 to 4 years to get access to the limited number of berths at State-owned harbors. Many boats can be seen moored offshore along the shoreline of south and southwest Maui at any time of the year. These boats are subject to extreme danger as became tragically apparent during the storm of January 1980 when approximately 20 craft were totally destroyed and many others heavily damaged. The need for additional berthing space is readily apparent.

(2) In order for the Corps of Engineers to participate in navigation improvements, a project must be open to all on an equal basis. Berthing spaces in State-owned harbors are made available on a first-come, first-served basis by the State Harbors Division without discriminating against persons with regard to their address, except that nonresidents pay a higher waiting list fee. More details about waiting list procedures and constituents can be obtained from the State Harbors Division.

c. Humpback Whales. The potential impacts on whales, seasonally present in Maalaea Bay, resulting from increased boat traffic due to expanded harbor capacity were not addressed because of the present lack of scientific information on the subject and the proportionally small increase in total boat population resulting from the project. Presently, boats and whales co-exist in Maalaea Bay with no apparent adverse effects on the whales. Although the proposed project will increase the berthing capacity of the harbor and consequently the number of boats operating in Maalaea waters, this increase would represent only a fraction of the anticipated increase in the number of registered boats on Maui. The State Department of Transportation, Harbors Division, maintains records of small craft registration by island. Comparing the number of registered craft with the population of Maui shows that the ratio of boats per thousand persons has been increasing steadily in recent years. The rate of increase is slowing down and Corps projections indicate that a plateau of about 20 registered vessels per thousand population will be reached by 1990. According to State Department of Transportation records for 1978, 653 registered craft on Maui (78.5% of the total) are stored on land. According to the Statewide Boat Launching Facilities Master Plan (Koebig & Koebig 1972) in Maui, the principal method of launching dry-stored boats is from a trailer, using one of six boat ramps. Boat ramps at Maalaea Harbor, Kihei and Lahaina account for 70 percent of the launches from ramps on Maui. The southwest shore between Maalaea and Lahaina and extending offshore to Kahoolawe, Lanai and Molokai is the preferred boating area. This is attributable to more prevalent calmer waters and proximity to diving and fishing grounds. The number of boats operating in Maalaea Bay and adjacent, preferred humpback whale wintering areas, will continue to increase irrespective of the expansion of Maalaea Harbor berthing capacity. Boats using slips provided by the harbor expansion would be primarily larger, slower fishing boats and yachts. Cetacean researchers feel that these classes of boats are less likely to disturb or otherwise stress humpback whales. It would seem that the problem of possible harassment resulting from increased boat traffic lies more in a rapidly expanding, affluent population on Maui than with the proposed harbor improvements at Maalaea.

d. Access to surf sites. New structures and channels would not affect public access to surfing areas off Maalaea Harbor.

e. Shoreside facilities costs. The costs of harbor backup facilities, piers, berths, utilities, etc., are self-liquidating and are not considered to be part of the cost of harbor improvement by the Corps of Engineers.

f. Joint State-Federal EIS. We agree that a joint State-Federal EIS would have been desirable. Early in the planning process, we made a genuine effort to accomplish this. At our request, a meeting was held on 20 August 1979 between representatives of State Department of Transportation and Corps of Engineers to explore the possibility of preparing a joint State-Federal EIS. An informal agreement to this end was reached in which the State would develop a harbor master plan based on Corps master plan. The State would attempt to meet Corps planning schedules. Unfortunately, the State was unable to meet our planning obligations and the attempt at a joint EIS was abandoned.

g. Vessel traffic. Quantitative information concerning present and projected vessel traffic at Maalaea Harbor is contained in Appendix A of the report. Paragraphs 6.1, 7.2 and Table A-2 specifically address this subject.

h. Ciguatera. It is possible that contamination of fish with ciguatera toxin may occur subsequent to dredging and breakwater construction. The State Department of Health has not recorded ciguatera outbreaks related to any man-made construction or natural alteration (storm) in the waters along the south coast of Maui. Mechanisms by which fish become contaminated are not well understood and effective preventative measures have not been developed.

i. Sewage discharge. Regulation of pollutant discharges including sewage within State harbors is the responsibility of the State Department of Transportation, Harbors Division, and the U.S. Coast Guard.

j. Humpback Whales. Refer to paragraph c of this letter.

k. Secondary Impacts. A discussion of existing land use and possible effects of the project on the surrounding community is provided in paragraphs 6 and 7 of Appendix E in the draft report. Recent Corps guidelines on report and EIS format dictate that information of this nature be contained in the Social and Cultural Resources Appendix unless significant social or cultural impacts are expected to result from project implementation.

Sincerely,

KISUK CHEUNG
Chief, Engineering Division

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

Office of the Director

June 23, 1980

RE:0310

Mr. Kisuk Cheung
Chief, Engineering Division
U.S. Army Engineer District, Honolulu
Building 230
Fort Shafter, Hawaii 96858

Draft General Design Memorandum and
Environmental Impact Statements
Maalaea Harbor for Light Draft Vessels
Maui, Hawaii

The Environmental Center has reviewed the above cited document with assistance from Charles Bretschneider, Ocean Engineering; Stephen Smith, Hawaii Institute for Marine Biology; Peter Rappa, Sea Grant Marine Advisory Program; John Sorensen and Barbara Vogt, Environmental Center.

In general we found that the document did a sound job in discussing the project and assessing the relevant environmental impacts. We have only several minor points to raise that warrant attention.

First, the significant endangered species of concern in the area is the humpback whale. Even though the waters off the harbor is only a minor portion of their territory, increased boat traffic in the area may create some problems. Cetacean experts might be asked to make a more definitive assessment of this problem.

Second, while there are important reef resources in nearby waters, it is unlikely that the harbor will have any major impacts on them. Any small boat harbor, however, will result in a deterioration of water quality, although in this case it will likely be a minor nature. What changes in the levels of various pollutants generated by the harbor can be anticipated?

Third, while the document adequately addresses the harbor itself, it ignores the description of and the potential impacts on surrounding land areas. It would be useful to add information on the nature of existing land use in the area, and on the land transportation network serving the harbor. Furthermore, any impacts on future land use, existing development, and traffic should be analyzed.

Thank you for the opportunity to comment on this document.

cc: OEQC
John Sorensen
Barbara Vogt

Yours very truly,

Doak C. Cox, Director

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED-PV

14 July 1980

Dr. Doak C. Cox, Director
University of Hawaii
Environmental Center
2550 Campus Road
Honolulu, HI 96822

Dear Dr. Cox:

This is in response to your letter of 23 June 1980 commenting on the US Army Corps of Engineers' Draft Design Memorandum No. 1 for Maalaea Harbor, Maui. We recognize that the relatively shallow waters between Maui, Lanai, Kahoolawe and Molokai including Maalaea Bay are preferred humpback whale wintering grounds. The National Marine Fisheries Service (NMFS) designated Maalaea Bay from Hekili Point to Puu Olai as an area of special significance. Specific guidelines for human activity have been published and are presently being enforced by NMFS agents. Cetacean biologists from NMFS and Maui Whale Research Institute have indicated that present levels of boating activity do not adversely effect humpback whales in Maalaea Bay. Boat ownership on Maui is expected to continue to increase with increasing population and affluence. According to Corps projections, a ratio of about 20 registered vessels per thousand population will be reached by 1990. Eventually, a level of boating activity in the Maalaea area may increase to the point at which the whales will be affected. Presently, insufficient data exists upon which to predict the maximum number of boats that may operate in the Maalaea Bay area without adversely affecting humpback whales. Continued monitoring and research of the potential problem is essential.

With increased use of the harbor resulting from the proposed expansion, increases in levels of certain pollutants may occur. Although vessels are prohibited from discharging wastes into harbor waters, violations of this are not uncommon. Major pollutants from vessels would be sewage, nutrients and petrochemicals. The State of Hawaii does not monitor water quality within the harbors. Therefore, it would be difficult to predict quantitative changes in pollutant levels.

Information concerning existing land use and potential impacts of the project on surrounding areas is provided in the Social and Cultural Resources Appendix of the Draft Design Memorandum. We anticipate that project impacts on existing development and future land use will be negligible.

Sincerely,

KISUK CHEUNG
Chief, Engineering Division

GREENPEACE

June 18, 1980

Mr. Kisuk Cheung, Chief
Engineering Division
Dept. of the Army
Corps of Engineers
U.S. Army Engineer District, Honolulu
Bldg. 230
Fort Shafter, HI 96858

Dear Mr. Cheung:

We have reviewed the Draft Design Memorandum, Maalaea Harbor for Light-Draft Vessels and offer the following comments:

The proposed project may adversely affect the endangered humpback whales which frequent the area. The document raises the question of possible impact to humpback whales but states that potential impact of harbor construction is being evaluated via consultation with the National Marine Fisheries Service. This potential impact is certainly the most important issue which the EIS process should address. When important information is not presented until the final EIS, public participation is substantially reduced. The draft statement should have contained the conclusions of the NMFS and the data on which the conclusions were based. This would have allowed an early determination of whether their conclusions were reasonable and based on sound data. Certainly, site specific data on the movements of humpbacks in the area of the project site is vital in order to formulate an opinion and to establish a baseline to monitor actual results if the project is enacted.

Noise

It is possible that general construction noise may adversely affect the humpbacks and probable that blasting would have significant negative impacts. It is questionable whether enough information exists on the effect of noise on humpbacks for the NMFS to render a defensible opinion on the project. This situation seems comparable to the lack of knowledge of the effects of man-made noise on the endangered bowhead whales.

> "Acoustical environmental impact upon the endangered bowhead whale was identified as an important environmental problem about which the federal government knew too little when U.S. District Court Judge Aubrey Robinson, Jr., District of Columbia, enjoined the Secretary of Interior from proceeding with the Beaufort Sea Oil and Gas Lease Sale."
>
> "Although Interior had announced its sale in 1974, information regarding the bowhead was so incomplete that in 1979 NMFS Director Terry Lietzel informed Bureau of Land Management (BLM) Director Frank Gregg that no biological opinion would be possible until the completion of further studies in 1982."
>
> (The Arctic Coastal Zone Management Newsletter, April 1980, p. 15)

If the NMFS feels it has enough data on humpbacks' reaction to noise to render a biological opinion on this project, the data used should be referenced to allow a review of the adequacy of that judgment. Certainly, baseline data should be included in the EIS which addressed present ambient underwater noise in the area. Data should be presented which shows what the expected characteristics of the construction noise will be, and how the humpbacks are expected to respond to it. While general construction noise may or may not be stressful to the humpbacks, it is highly probable that blasting would be immediately harmful. For this reason, it should be definitely stated in the EIS whether blasting will or will not be conducted during the months of December - June. If blasting is to be allowed during this period, there is a strong possibility of litigation to prevent such action.

Turbidity

It is stated on page F-5 that discharge from construction activities will not affect the humpback whales. On what is this conclusion based? If there is any evidence that turbidity does not affect humpbacks it should be cited in the EIS. The potential problem of turbidity is raised in the preliminary report of the USFWS on the project (appendix D, p.7), but is not mentioned in the main EIS section on environmental effects. The USFWS report states, "the whales have also exhibited a distinct avoidance of turbidity plumes resulting from high runoff and upland erosion during storm periods"(Naughton, personal communication). This potential problem should be dealt with in a meaningful way in the EIS. Certainly an attempt should be made to determine the expected areal extent of turbidity plumes.

Harassment

It is essential that meaningful data be presented in the EIS which address potential negative impacts to humpback whales from increased boating activity caused by additional berthing capacity at Maalaea Harbor.

We would question the statement on page 36 that, "Potential adverse impacts on whales resulting from increased boat traffic due to expanded harbor capacity can be minimized through continued rigorous enforcement of existing Federal regulations." Present enforcement can not be deemed "rigorous" and will not necessarily protect the humpbacks from detrimental stress at today's levels of boat-whale interaction, much less an increased level. Despite the best intentions of enforcement personnel, two agents cannot be expected to adequately monitor the large ocean areas which humpbacks frequent. We are not aware of any serious effort by the NMFS to quantify the success or lack of success of its enforcement program. Even if present regulations were adequately enforced, non-intentional boat-whale interactions may cause significant stress to the humpbacks. It should be noted that the National Park Service has recently enacted regulations to control boat-whale interactions in Glacier Bay National Park.

> "In their formal response to the consultation process, the National Marine Fisheries Service concluded '...that uncontrolled increase of vessel traffic, particularly of erratically traveling charter/pleasure craft, probably has altered the behavior of humpback whales in Glacier Bay...,' and '...that continued increase in the amount of vessel traffic...is likely to jeopardize the continued existence of the humpback whale population frequenting Southeast Alaska.'

GREENPEACE FOUNDATION • 913 HALEKAUWILA, HONOLULU, HAWAII 96814
A NON-PROFIT, TAX-EXEMPT ORGANIZATION • (808) 537-9505 • TLX 633175

"NMFS recommended '...that total vessel use of the Bay be restricted to 1976 levels, at the very least...,' and further, that '...regulations should address vessel routing and vessel maneuvering...,'"

(Federal Register, Thursday May 15, 1980)

The Alaskan situation may or may not be relevant to the problems of humpbacks in Hawaiian waters but it is probable that it is. The humpbacks are facing a variety of potentially stressful elements in their environment from a number of marine construction projects, military activities, increased boat harassment and pollution. If the combined effect of these activities are not adequately addressed now, we may soon be in the position of trying to bring the whales back to the Hawaiian waters that they have deserted.

Sincerely,

Kelley Dobbs

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96850

PODED-PV

11 July 1980

Mr. Kelley Dobbs
Greenpeace Foundation
913 Halekauwila
Honolulu, Hawaii 96814

Dear Mr. Dobbs:

We are replying to your letter of 18 June 1980 commenting on the Draft Design Memorandum, Haalaea Harbor for Light-Draft Vessels, Maui, Hawaii. We agree that the draft environmental impact statement, Section F of the report, should have contained conclusions of the National Marine Fisheries Service (NMFS) Biological Opinion, evaluating potential impacts of the project on endangered humpback whales. Informal consultation with the NMFS Western Pacific Program Office was initiated in March 1979. On 4 October 1979, we submitted to them a biological assessment on the probable effects of the proposed Haalaea Harbor project on the humpback whale (Incl 1). Not until three months had past were we informed that, based on review of our biological assessment, NMFS recommended formal Section 7 consultation. In a letter dated 11 January 1980 (Incl 2), we requested that formal consultation be initiated immediately to avoid possible delays in our project planning schedule. Unfortunately, NMFS did not complete their analysis until after our draft report submission date. Due to our rigorous report schedule, we had no option but to defer inclusion of NMFS Biological Opinion results until the final report submission. The NMFS Biological Opinion is provided for your information (Incl 3).

It is our understanding that the Corps' biological assessment provided the basis for the NMFS Biological Opinion. In their evaluation, no reference was made to data on responses of humpback whales to noise, nor were any baseline data on ambient noise levels in Haalaea waters provided or cited. However, since this species is accoustically oriented, it was assumed that individual whales within hearing range of underwater blasting could be adversely affected. The Biological Opinion recommends that subsurface blasting be limited to the period of May to December in order to avoid the possibility of adverse noise impacts. The final report and environmental impact statement will incorporate NMFS recommendations.

The effects of turbidity on humpback whales are not documented in available literature. However, the North Pacific population of this species,

PODEO-PV
Mr. Kelley Dobbs

11 July 1980

Including those frequenting Hawaii, spend approximately half the year in the turbid waters of the Arctic. It could be reasonably inferred from this that humpback whales are well adapted to turbid conditions and would not be threatened by temporary increases in turbidity in coastal waters of the Hawaiian Islands. Turbidity resulting from construction of proposed improvements at Maalaea Harbor would be confined to the project area. Project plans and specifications would require that the contractor maintain applicable State water quality standards in coastal waters adjacent to the project site during the construction period. For the reasons stated above, we do not feel that project-related turbidity will adversely affect Hawaiian humpback whales.

Although the proposed project will increase the berthing capacity of the harbor and consequently the number of boats operating in Maalaea waters, it should be pointed out that this increase would represent only a fraction of the anticipated increase in the number of registered boats on Maui. The State Department of Transportation, Harbors Division, maintains records of small craft registration by island. Comparing the number of registered craft with the population of Maui shows that the ratio of boats per thousand persons has been increasing steadily in recent years. The rate of increase is slowing down and Corps' projections indicate that a plateau of about 20 registered vessels per thousand population will be reached by 1990. According to the State Department of Transportation records for 1978, 653 registered craft on Maui (78.5 percent of the total) are stored on land. According to the Statewide Boat Launching Facilities Master Plan (Koebig & Koebig, 1972) in Maui, the principal method of launching dry-stored boats is from a trailer, using one of six boat ramps. Boat ramps at Maalaea Harbor, Kihei, and Lahaina account for 70 percent of the launches from ramps on Maui. The southwest shore between Maalaea and Lahaina and extending offshore to Kahoolawe, Lanai, and Molokai is the preferred boating area. This is attributable to more prevalent calmer waters and proximity to diving and fishing grounds. It is apparent that the number of boats operating in Maalaea Bay and adjacent preferred humpback whale wintering areas will continue to increase irrespective of the expansion of Maalaea Harbor berthing capacity.

We are not in a position to comment on the effectiveness of the NMFS enforcement efforts to regulate human activities within the designated area of special significance encompassing Maalaea Bay. Perhaps at some future date, it will become necessary for the NMFS to place restrictions on the maximum number of boats operating in this area as was the case in Glacier Bay National Park. Implementing and enforcing such restrictions at Maalaea would be, at the very least, as difficult a task as the present enforcement program, and may make this alternative untenable.

Sincerely,

3 Incl
As stated

KISUK CHEUNG
Chief, Engineering Division

MAUI WHALE RESEARCH INSTITUTE
(A Non-Profit Organization)
P. O. BOX 622
KIHEI, MAUI, HAWAII 96753

June 2, 1980

Mr. Kisuk Cheung,
Chief Engineering Division
Department of the Army,
Corps of Engineers
U.S. Army Engineer District, Honolulu
Bldg. 230
Fort Shafter, HI. 96858

Dear Mr. Cheung:

Thank you for your letter of 30 April, 1980, requesting comments by 23 June, 1980 on the attached "Draft General Design Memorandum Number 1 with Draft Environmental Statement for the Maalaea Harbor Navigation Improvement Study". My comments are submitted below:

First, the title of this study, as referred to in your cover letter, is misleading. The title of the Draft Design Memorandum No. 1", hereafter referred to as "the Memorandum", should reflect the fact that all of the proposed plans call for approximately a 33⅓% increase in number of berths in Maalaea Harbor. Perhaps "Draft General Design Memorandum Number 1 with Draft Environmental Statement for the Maalaea Harbor Expansion Study" would be a more appropriate title. Certainly the creation of a bend in the Maalaea Harbor entrance channel, as proposed by the Corps, will not improve navigation, although it may decrease surge (the Corps stated intent of this construction when the idea was first presented at the January 1979 hearing held at Maalaea Harbor).

Secondly, Section F, the Environmental Impact Statement, Maalaea Harbor, Maui, Hawaii, is inadequate and deficient with respect to humpback whales (Megaptera novaeangliae).

In Para. 1.4 (page 31 of the Memorandum) humpbacks are mentioned under the heading "Unresolved Issues". Humpback whale usage of Maalaea Bay and the needs of these whales must be thoroughly documented and well understood before any expansion of Maalaea Harbor takes place.

In the Federal Register, Vol. 45, No. 46, Thursday, March 6, 1980, Proposed Rules, page 14601, the National Park Service, Interior, comments that:

"Research into the behavioral responses of humpback whales to vessels has been conducted under contract in Glacier Bay since 1976. Preliminary results of this research indicate adverse impacts on humpback behavior from interaction with increasing numbers of vessels using the Bay. Although there is disagreement over the severity of impact caused by each vessel class and method of operation, it is clear that vessels create stress in whale behavior. Consideration is also being given to the hypothesis that conditioned behavior in the form of whale avoidance of the Bay may be developing.

Prior to the 1979 visitor season, vessel operating guidelines were publicized and discussed with boaters. Some of these were similar to the regulations proposed today. Basically, all motorized vessels were asked to remain ¼ mile from any humpback whale, and cruise ships were asked to proceed through designated waters at 10 knots or less. These requests were complied with in most respects, but the number of whales entering the Bay and remaining through their historic use period continued to decline.

When the 1979 procedures appeared to have no beneficial effect on the use of Glacier Bay by humpback whales, the National Park Service requested a formal consultation with the National Marine Fisheries Service in accordance with the provisions of the Endangered Species Act. In their formal response to the consultation process, the National Marine Fisheries Service (NMFS) concluded, "***that uncontrolled increase of vessel traffic, particularly of erratically traveling charter/pleasure craft, probably has altered the behavior of humpback whales in Glacier Bay***and,***that continued increase in the amount of vessel traffic***is likely to jeopardize the continued existence of the humpback whale population frequenting Southeast Alaska."

"NMFS recommended, "***that total vessel use of the Bay be restricted to 1976 levels at the very least***" and further, that "***regulations should address vessel routing and vessel maneuvering***" and, "***the system should be flexible enough to accommodate changes of areas of concentrated feeding activity."

Regulations to limit boat traffic in Glacier Bay to 1976 levels during the humpback whale season were proposed in this March 6, 1980 Federal Register notice.

On May 15, 1980, in the Federal Register, page 32228, the National Park Service issued Regulations limiting cruise

ship entries into Glacier Bay during the 1980 whale season to 107, with no more than two entries per day. In 1981, cruise ship entries will be limited to 89. Entries by other large vessels will be limited to three.

Also in the May 15, 1980 Federal Register, on page 32234, the National Park Service issued interim rules regarding small vessel entries into Glacier Bay and commercial fishing of organisms which humpbacks eat, to be in effect from May 15th until final regulations are issued.

The issuance of regulations restricting boating in Glacier Bay occurred because scientific evidence indicated that the humpbacks there could not tolerate the increased amount of boat traffic. Use of privately owned motorized vessels within Glacier Bay rose from 115 in 1969 to 699 during the 1978 season. Research supported by the National Park Service since 1976 indicates that whale/vessel interactions in Glacier Bay increased 29% in 1977 and 76% in 1978.

Given our knowledge of the Glacier Bay humpback situation and the regulations restricting boating and fishing which had to be put into effect there to protect the humpbacks from the increased numbers of boats, I deem it absolutely essential that no expansion of the Maalaea Harbor berthing capacity take place until science determines the maximum number of boats able to be tolerated by the humpbacks.

As you may be aware, in January, 1979, National Marine Fisheries recognized "all waters inshore from a line drawn from Hekili Point at Olowalu southeast to Puu Olai" to be a calving and breeding area for humpbacks (Federal Register Vol. 44, No. 3, Thursday, January 4, 1979). Presently, Maalaea's boats (exclusive of the hydrofoil and jet skis) and whales co-exist well together. Fishing boats especially seem to have no effect on the humpbacks using Maalaea Bay.

If, by increasing the number of berths at Maalaea Harbor, you increase boat traffic in Maalaea Bay beyond a presently unknown maximum, you may cause the humpbacks to leave the Bay, thereby requiring federal boating restrictions to protect the whales. Given this possibility, I strongly urge you to correct the surge problem in Maalaea by altering the harbor entrance as necessary, without enlarging the berthing capacity of the harbor. Your cost-effectiveness figures become meaningless if you cause the whales to be driven from the Bay, and boating restrictive measures have to be instituted.

Sincerely,

James Hudnall
Executive Director

cc: Environmental Quality Control
Honolulu, Hawaii

JH/am

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

POOED-PV

27 June 1980

Mr. James Mudnall
Executive Director
Maui Whale Research Institute
P. O. Box 822
Pilei, Maui, Hawaii 96753

Dear Mr. Mudnall:

This is in response to your letter of 2 June 1980, commenting on the Draft Design Memorandum No. 1 for Maalaea Harbor, Maui. We appreciate your concern for the welfare of the humpback whale; however, we disagree with your contention that the Draft Environmental Impact Statement, Section F of the report, is inadequate and deficient in addressing potential effects of the harbor improvement project on the whale. From the inception of the study, close coordination was maintained with the National Marine Fisheries Service regarding impacts of the proposed project on the endangered humpback whale. Based on a review of the U.S. Army Corps of Engineers biological assessment dated 4 October 1979 (Incl 1), NMFS recommended initiation of the formal consultation process under Section 7 of the Endangered Species Act in their letter of 19 February 1980 (Incl 2). The NMFS biological opinion (Incl 3) resulting from the consultation was issued in April 1978, subsequent to distribution of the Corps Draft Design Memorandum. The biological opinion provided the following conclusions and recommendations:

"The available data indicated that noise generated by harbor improvement construction activities when humpback whales are present may lead to temporary abandonment of a preferred habitat area by humpback whales in Maalaea Bay. We conclude that such a change in the distribution and behavior of the humpback whales inhabiting Maalaea Bay probably would jeopardize the continued existence of the humpback whale population that winters in Hawaiian waters."

"Until further research reveals the need for more specific action, we offer the following reasonable and prudent alternative to avoid jeopardizing the continued existence of the Hawaiian population of humpback whales. All subsurface construction activities involving blasting for the Maalaea Bay small boat harbor project be limited to the period of May through December."

POOED-PV

27 June 1980

Mr. James Mudnall

The potential impacts on whales, seasonally present in Maalaea Bay, resulting from increased boat traffic due to expanded harbor capacity were not addressed because of the present lack of scientific information on the subject and the proportionally small increase in total boat population resulting from the project. As you allow in your letter to us, presently, boats and whales co-exist in Maalaea Bay with no apparent adverse effects on the whales. Unfortunately, given the existing paucity of data it is not possible to accurately predict the maximum number of boats that may use the Maalaea Bay area without adversely affecting humpback whales.

Although the proposed project will increase the berthing capacity of the harbor and consequently the number of boats operating in Maalaea waters, it should be pointed out that this increase would represent only a fraction of the anticipated increase in the number of registered boats on Maui. The State Department of Transportation, Harbor Division, maintains records of small craft registration by island. Comparing the number of registered craft with the population of Maui shows that the ratio of boats per thousand persons has been increasing steadily in recent years. The rate of increase is slowing down and Corps' projections indicate that a plateau of about 20 registered vessels per thousand population will be reached by 1990. According to State Department of Transportation records for 1978, 653 registered craft on Maui (73.5% of the total) are stored on land. According to the Statewide Boat Launching Facilities Master Plan (Peebig & Peebig 1972) in Maui, the principal method of launching dry-stored boats is from a trailer, using one of six boat ramps. Boat ramps at Maalaea Harbor, Kihei and Lahaina account for 78% of the launches from ramps on Maui. The southwest shore between Maalaea and Lahaina and extending offshore to Kahoolawe, Lanai and Molokai is the prefered boating area. This is attributable to more prevalent calm waters and proximity to diving and fishing grounds. It is apparent that the number of boats operating in Maalaea Bay and adjacent, preferred humpback whale wintering areas will continue to increase irrespective of the expansion of Maalaea Harbor berthing capacity. Perhaps at some future date, it will become necessary for the NMFS to place restrictions on the maximum number of boats operating in this area as was the case in Glacier Bay National Park. However, as you are undoubtably aware, such restrictions would have to be based on factual information clearly demonstrating that increased boating activity would jeopardize the continued existence of the humpback whale.

Sincerely,

3 Incl
As stated

KISUK CHUNG
Chief, Engineering Division

THE AMERICAN CETACEAN SOCIETY
MAUI CHAPTER
P. O. Box 1518
Kihei, Maui, Hawaii 96753
879-6530

06-02-80

Office of Environmental Quality Control
550 Halekauwila St., RM 301
Honolulu, Hi. 96813

Re: Draft EIS for Maalaea Harbor

Dear Sirs;

Thank you for soliciting my comments on the draft EIS for the expansion of the Maalaea light boat harbor.

In your report you have attempted to establish a data base for the numbers of humpback whales which utilize the Kaalaea Bay habitat by citing E.W. Shallenberger's 1977 "Humpback Whales in Hawaii, Population and Distribution" report. In this report, Shallenberger estimates the Hawaiian whale population to be some 290 whales. However, you fail to cite another 1977 report by Rice and Wolman, "Humpback Whale Census In Hawaiian Waters", which estimates the Hawaiian humpback whale population to be "almost certainly within the range of 500±90.". Furthermore, the report reveals that the Maui-Molokai-Lanai-Kahoolawe area had the greatest density of whales per-square-mile, 0.35, of all the major Hawaiian islands.

During the months of January-April 1980 I conducted a shore-based research station in the Makena area, the southern-most portion of Maalaea Bay. Data of interest were: numbers of whales, migration and movement trends, pod composition, and interactions between whales and man, i.e., boats, jetskis, aircraft, etc.. Observational research revealed that 225 pods of whales were sighted in January, comprised of 389 individual whales; 266 pods sighted in February, comprised of 488 individual whales; and 215 individual whales were sighted in March. Careful analysis of the whale's movement patterns reveal that nearly 80% of the animals were traveling in a northerly direction. In otherwords, there is as-much-as a 80% relative chance that these observed whales could conceivably utilize the habitat area near the Maalaea Harbor region. The actual numbers sighted is a much higher number than the actual or real population, due to the fact that duplications of individual whale sightings may exist from day to day.

On February 09, 1980, my research team observed a birth of a humpback whale calf in the Maalaea Bay habitat. In 1977 two births were purportedly seen in the Maalaea Bay habitat as well, however, data collectors recording the incidents were questionable as to whether the newborn calf was not already with the cow prior to their observing the pair. We are very certain of the birth we observed, having observed the whales and their movement for nearly six and one-half hours prior to parturition. Humpback whales come to Hawaii to mate, calf, and nurse their young. Until February 09, 1980 scientists had not observed one of these functions in Hawaiian waters.

We as scientists do not know the environmental tolerence level which must exist for humpback whales to optimumly propagate. Currently it is estimated that only 850 humpback whales remain in existence in the North Pacific. This number is so relatively small for an animal of such size and range, that it is feared that the humpback whale may well be on its' way to being biologically extinct. We do not know if the population stock will or can recover. There is undoubtably a reason why we have not witnessed the mating, nursing, or the calving of humpback whales with greater frequency. Perhaps the whales are very atuned with their environment and will not perform these vital functions in the presence of environmental disruptions, i.e., boats, aircraft, ordnance, dredging, etc.. Perhaps this is not the case at all, but when dealing with an animal which is so dangerously close to extinction-is taking the risk of increased boats, underwater dredgings, military ordnance, worth the gamble of permanent extinction?

I agree that blasting during dredging operations would most probably impact the humpback whales; especially during the months of December-May. Underwater blasting anytime when humpback whales are present would seem to be a flagrant violation of Section 7 of the Endangered Species Act. To insure this violation does not occur, I would recommend the use of bottom mounted sonobouys to detect the whales presence before the months of December and after May. Should whales be detected, dredging would cease immediately. I would also recommend that blasting be curtailed until June 30. On June 09; 1979, I observed a cow and calf near the Maalaea boat harbor habitat.

The recommendation that formal consultation with the National Marine Fisheries Service on the impacts of harbor construction on the humpback whales be sought is questionable. Each year since 1979 NMFS sends two agents to patrol approximately 660 square miles of open ocean for possible violations of the harassment regulations provided for by the Endangered Species Act and the Marine Mammal Protection Act. This is, needless to say, a full time job. I am not aware of NMFS carrying out any population or impact research on the humpback whales in Maalaea Bay. Their agents are capable in their jobs as enforcement officers, but they are far from trained humpback whale research scientists. I doubt very much the ability of NMFS to assess the impacts of harbor constuction on the humpback whales.

I would recommend, therefore, that approval of the EIS for expansion of the Maalaea boat harbor be withheld until a thorough investigation of the uses and numbers of humpback whales in this area can accuarately be determined. I recommend that during the months of December through May 1980-81, a shore-based research station be employed to gather information on numbers of whales, pod size and composition, duration of stay in habitat area, interactions between pods and boats, behavioral and movement trends. This research would provide an adequate data base in which feasible recommendations can be drawn. Until such research is conducted, all recommendations made in regards to humpback whales in this area must be regarded as pure conjecture.

Draft EIS for Maalea Harbor
page 03.

Currently we do not know the effect of increased boat traffic in the whale's habitat. Our research did reveal, however, that nearly 30% of all whales observed encountered boats within the federal regulations distance guidlines, e.g., less than 300 yards, or 100 yards where applicable. The actual numbers of boats which knowingly harassed or violated the federal regulations was placed at less than 2%. The point being that whales encounter a good number of boats in their daily movements. By increasing the number of slip spaces available in Maalaea harbor, we must assume that we proportionally increase the possible whale-boat interactions. It is not the intentional whale-boat interactions which concern me, rather it is the high unintentional interactions which warrant concern. A typical unintentional interaction is: whale traveling due north, 1knots, surfaces to breath, dives, boat traveling due south, ½mile away from whale when whale surfaces, boat unaware of whale, travels at 10knots, passes over area in which whale dove minutes before, several minutes later whale re-surfaces in the last visible traces of the boats wake, boat and whale now ¼-½ miles apart traveling in different directions as before. The actual period of 'harassment' here is minimal, and most certainly unintentional, nevertheless, it occurs with a good deal of frequency. The calf we observed being born encountered six boats in less than 1½ hours of life, all passing unintentionally within 300 yards or less.

My concern lies with curbing the whale-boat interactions, and maintaining a constant level of 'low-level' harassment. If we allow the level of 'low-level' harasment to increase, the whales will most certainly be driven from their habitat areas. Currently this question is being investigated in Glacier Bay, Alaska, where the increase of vessel traffic has inversely mirrored the decrease of humpbacks in this area. It is my hope that in the year 2000 the level of 'low-level' harassment, i.e., all forms of unintentional harassment combined, will be equivalent to the 1980 level. If we can achieve this, we can maintain the whale's habitat. I do not feel that it is necessary to completely exclude whales and boats from the same area, some form of harmonious mixing can be derived, but let us not allow the mixing to get out of hand so there can never be a harmony, and the whales suffer the worst fate-extinction.

Thank you for your time and concern for cetaceans. Should you need my expertise or data in amending your draft EIS please feel free to contact me. I would also like to have a copy of the recommendations that NMFS makes to you in regards to humpbacks and the expansion of Maalaea harbor.

Sincerely,

Gregory Dean Kaufman
President and Research Director

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED-PV

24 June 1980

Mr. Gregory Dean Kaufman
American Cetacean Society
Maui Chapter
PO Box 1518
Kihei, Maui, HI 96753

Dear Mr. Kaufman:

This is response to your letter of 6 June 1980 commenting on the US Army Corps of Engineers Draft Design Memorandum No. 1 for Maalaea Harbor, Maui, Hawaii. As you are aware, recent estimates of the size of the Hawaiian humpback whale population vary considerably among researchers. A table summarizing recent counts and estimates from "Report to the Marine Mammal Commission and Committee of Scientific Advisors on Marine Mammals: The Hawaiian Humpback Whale Problem", 8 September 1980, is inclosed for your information (Incl 1). Shallenberger, 1977, combined available census data obtained during the 1976 and 1977 seasons from air, ship, and shore observations, including population data in Rice and Wolman, 1977.

Probable effects of underwater blasting on humpback whales were included in the environmental statement. The National Marine Fisheries Service Biological Opinion recommended that blasting be limited to the period of May through December. Recent subsurface boring investigations conducted in April 1980 have determined that underwater blasting will probably not be required.

The National Marine Fisheries Service, Northwest and Alaska Fisheries Center, Marine Mammal Division in Seattle, Washington, is actively engaged in research in marine mammal ecology. The NMFS Southwest Region also has marine mammal biologists on its staff. Endangered species consultation pursuant to Section 7 of the Endangered Species Act of 1973 involving endangered marine mammals is coordinated with the Regional Director, NMFS. Presumably, qualified biologists with the required expertise are involved in this consultation process. A copy of the NMFS biological opinion for the Maalaea Harbor project is inclosed per your request (Incl 2).

PODED-PV 24 June 1980
Mr. Gregory Dean Kaufman

We agree that much research remains to be done in the field of humpback whale ecology before any meaningful assessment of impacts resulting from harbor construction activities, boating activities, etc., can be made. Hopefully, in time, through the efforts of humpback whale researchers such as yourself, an adequate data base will be established.

Sincerely,

2 Incl
As stated

KISUK CHEUNG
Chief, Engineering Division

CF: w/o incl
Director
National Marine Fisheries Service, NOAA
US Department of Commerce
Southwest Region, Western Pacific Program Office
PO Box 3830
Honolulu, HI 96812

LIFE OF THE LAND
A GROUP FOR ENVIRONMENTAL RESEARCH AND ACTION

June 20, 1980

Mr. Kisuk Cheung, Chief
Engineering Division
Dept. of the Army
Corps of Engineers
U.S. Army Engineer District, Honolulu
Bldg. 230
Fort Shafter, Hawaii 96858

Dear Mr. Cheung,

We have reviewed the Draft Design Memorandum, Maalaea Harbor for Light-Draft Vessels and have three basic comments:

1. Since all three plans meet the primary objective of reducing surge and naviagational hazards and increasing berthing capacity in the harbor, and provide economic benefits that exceed the project costs we would like to support Plan 2 as it is the result of community participation and the "nearly unanimous", preferred plan among workshop participants.

2. We are concerned with the effects of the proposed harbor on the Humpback Whales, specifically:

-Noise
What is the effect of general construction noise on the Humpback? What is the effect of blasting on the Humpback? Will blasting occur between the months of Dec.-June?

-Turbidity
What arethe effects of turbidity on Humpbacks? What is the expected areal extent of turbidity plumes?

-Harassment
How will increased boating activity caused by additional berthing capacity effect the whales? Will enforcement personnel increase in relation to increased boating activity?

3. We are also concerned with the impacts of growth on Maalaea resulting from the enlarged harbor. It is noted that "Moderate growth of Maalaea can be anticipated, but this may place strains on utilities such as water supply, sewage disposal, and roadway use and parking." We would like a more

404 PIIKOI STREET HONOLULU HAWAII 96814 TELEPHONE 521-1300

comprehensive assessment of the expected growth. What further demands on utilities can be specifically anticipated and how will these demands be meet?

Thank-you for this opportunity to comment.

Sincerely,

Sandy Scafe
LOL Staff

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED-PV

14 July 1980

Ms. Sandy Scafe
Life of the Land
404 Piikoi Street
Honolulu, HI 96814

Dear Ms. Scafe:

This is in response to your letter of 20 June 1980 commenting on the Draft Design Memorandum, Maalaea Harbor for Light-Draft Vessels. We recognize your support of Plan 2 among the alternative plans considered in the draft report. Although Plan 2 is the result of community participation and preferred by a majority of workshop participants, Plan 1 has been selected as the recommended plan in the final design memorandum. The State of Hawaii, local sponsor for the harbor project, considers Plan 1 the most feasible for implementation because it provides an additional .75 acre revetted mole for automobile and boat trailer parking and would utilize approximately 22,000 cubic yards of dredged material generated by the project. This would reduce by about 70 percent the volume of dredged material to be stockpiled at a land disposal site. In other respects, the two plans are essentially the same. At the final public meeting held on 13 May 1980 in Maalaea, initial supporters of Plan 2 agreed that Plan 1 would also be acceptable to them, after hearing the State of Hawaii rationale for recommendation of Plan 1.

Impacts of the proposed project on the endangered humpback whale have been evaluated by the National Marine Fisheries Service (NMFS) during formal consultation under Section 7 of the Endangered Species Act. In their Biological Opinion issued 25 April 1980 (Incl 1), NMFS concluded that noise generated by underwater blasting could adversely affect whales in the proximity of Maalaea Harbor and thereby jeopardize the continued existence of the Hawaiian population of humpback whales. NMFS recommended that underwater blasting be limited to the period of May through December. We will comply with this recommendation.

POED-PV
Ms. Sandy Scafe

14 July 1980

NMFS did not address potential impacts on humpback whales resulting from construction-generated turbidity. The Hawaiian population of humpback whales spends several months each year feeding in the rich but turbid waters of the North Pacific subarctic region. Thus, it seems unlikely that localized turbidity in coastal areas around Hawaii would have any effect on the humpbacks. During construction of the harbor improvements, the contractor would be required to comply with state water quality standards, employing appropriate construction techniques to achieve compliance. Therefore, turbidity would be limited to the immediate project area.

Increased boating activity resulting from additional berthing capacity at Maalaea Harbor would represent only a fraction of the anticipated increase in the number of registered boats on Maui. Presently, boats and whales co-exist off Maalaea with no apparent adverse impacts on the whales. Eventually, with the continued increase in boating activity in this area, the situation could change. NMFS is responsible for monitoring human activities in the designated area of special significance at Maalaea between Hekili Point and Puu Olai. It is presumed that NMFS will assign additional enforcement personnel as required to fulfill this function.

It is our opinion that the proposed harbor improvements will have a negligible effect on growth at Maalaea. Some increase in fishing and boating related supply and service establishments in the area adjacent to the harbor zoned industrial could result from harbor expansion. Additional growth at Maalaea would be a function of local zoning and building ordinances and the demands of an increasing population.

Sincerely,

1 Incl
As stated

KISUK CHEUNG
Chief, Engineering Division

MONITOR
THE CONSERVATION, ENVIRONMENTAL AND ANIMAL WELFARE CONSORTIUM

1506 19th St., N.W.
Washington, D.C. 20036

U.S. Army Corps of Engineers
Pacific Ocean Division
Building 230
Fort Shafter, Hawaii 96858

16 June 1980

Dear Sir:

The following member organizations of the Monitor consortium endorse the contents of this letter:

The Humane Society of the United States
Society for Animal Protective Legislation
Greenpeace U.S.A.
Whale Protection Fund
The Fund for Animals
International Fund for Animal Welfare
International Primate Protection League
Friends of Wildlife
American Society for the Prevention of Cruelty to Animals
Washington Humane Society

We oppose the proposed expansion of Maalaea Harbor on the island of Maui in Hawaii. There is no compelling justification for undertaking this expansion, but there are some very compelling reasons for not doing so.

We believe this project would greatly disturb the endangered humpback whales which inhabit Maalaea Bay from December through June of each year. The dredging and blasting which would be necessary for this project, as well as the subsequent increase in vessel traffic, could seriously threaten these highly endangered marine mammals, especially if any of this were to occur during the months the whales are present (Dec. - June). Indeed, any such activity which were undertaken with whales nearby could constitute a violation of the Marine Mammal Protection Act and the Endangered Species Act.

16 June 1980

It is well known that vessel traffic has a deleterious effect on whales. Increased vessel traffic in Glacier Bay has frightened the humpbacks away from this important feeding ground: regulations are currently being promulgated to remedy this. It would be irresponsible to now take the risk of driving away the humpbacks from the important mating and calving area in Maalaea Harbor.

The proposed drastic expansion of Maalaea Harbor (increasing the berthing capacity from 93 to 310 boats - a 333% increase) is unnecessary and is certainly not worth the risk of furthering the decline of the magnificent humpback whales.

Sincerely,

Craig Van Note
Executive Vice President

DEPARTMENT OF THE ARMY
PACIFIC OCEAN DIVISION, CORPS OF ENGINEERS
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED-PV

11 July 1980

Mr. Craig Van Note
Executive Vice President
Monitor
1506 19th Street, S.W.
Washington, DC 20036

Dear Mr. Van Note:

We are responding to your letter of 16 June 1980 commenting on the Draft Design Memorandum No. 1 for Maalaea Harbor, Maui. We are considerably aware of the potential impacts of the Maalaea Harbor project on the endangered humpback whale. From the inception of the study, close coordination was maintained with the National Marine Fisheries Service (NMFS) regarding this problem. Based on a review of the US Army Corps of Engineers' biological assessment dated 4 October 1979 (Incl 1), NMFS recommended initiation of the formal consultation process under Section 7 of the Endangered Species Act in January 1980. The NMFS' biological opinion resulting from the consultation (Incl 2) was issued 25 April 1980, subsequent to distribution of the Corps' Draft Design Memorandum. The biological opinion recommended that subsurface blasting be limited to the period of May through December. Recent subsurface boring investigations conducted in April 1980 have determined that blasting may not be required. If it does become necessary to blast, this activity will be limited to the period recommended in the NMFS biological opinion. Therefore, the project is in compliance with the Endangered Species Act of 1973 and the Marine Mamnal Protection Act of 1972.

The proposed project will increase the berthing capacity of the harbor and consequently the number of boats operating in Maalaea waters; however, it should be pointed out that this increase would represent only a fraction of the anticipated increase in the number of registered boats on Maui. The State Department of Transportation, Harbors Division, maintains records of small craft registration by island. Comparing the number of registered craft with the population of Maui shows that the ratio of boats per thousand persons has been increasing steadily in recent years. The rate of increase is slowing down and Corps' projections indicate that a plateau of about 20 registered vessels per thousand population will be reached by 1990. According to the State Department of Transportation records for 1978, 653 registered craft on Maui (78.5 percent of the total) are stored on land. According to the Statewide Boat Launching

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Mr. Craig Van Note

Facilities Master Plan (Koebig and Koebig, 1972) in Maui, the principal method of launching dry-stored boats is from a trailer, using one of six boat ramps. Boat ramps at Maalaea Harbor, Kihei, and Lahaina account for 70 percent of the launches from ramps on Maui. The southwest shore between Maalaea and Lahaina and extending offshore to Kahoolawe, Lanai, and Molokai is the prefered boating area. This is attributable to more prevalent calmer waters and proximity to diving and fishing grounds. It is apparent that the number of boats operating in Maalaea Bay and in adjacent humpback whale wintering areas will continue to increase irrespective of the expansion of Maalaea Harbor berthing capacity.

Presently, boats and whales co-exist in Maalaea Bay with no apparent adverse effects on the whales. Unfortunately, given the existing paucity of data, it is not possible to accurately predict the maximum number of boats that may use the Maalaea Bay area without adversely affecting humpback whales. Perhaps, at some future date, it will become necessary for the NMFS to place restrictions on the maximum number of boats operating in this area as was the case in Glacier Bay National Park. Such restrictions would necessarily be based on sufficient information clearly demonstrating that increase boating activity would jeopardize the continued existence of the humpback whale.

The expansion of Maalaea Harbor in conjunction with other needed harbor improvements cannot be deemed unnecessary. A shortage of berthing space for light-draft vessels has existed in the State of Hawaii for many years. The shortage on the Island of Maui is no exception. In 1979, there were 280 boats on the waiting lists for the two State-owned light-draft harbors at Lahaina and Maalaea. No expansion of Lahaina Harbor is anticipated, nor is construction of an additional light-draft harbor on Maui.

Sincerely,

2 Incl
As stated

KISUK CHEUNG
Chief, Engineering Division