REVISED

ENVIRONMENTAL IMPACT STATEMENT

FOR THE

BARBERS POINT DEEP-DRAFT HARBOR

ON OAHU

PREPARED FOR:

Water Transportation Facilities Division
Department of Transportation
State of Hawaii

PREPARED BY:

M&E Pacific, Inc.
Environmental Engineers
190 South King Street
Honolulu, Hawaii 96813
June 1978
REvised

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For the
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DEPARTMENT OF TRANSPORTATION
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ENVIRONMENTAL IMPACT STATEMENT
ADMINISTRATIVE ACTION
for
BARBERS POINT DEEP-DRAFT HARBOR, OAHU

THIS STATEMENT FOR IMPROVEMENT WAS DEVELOPED IN ACCORDANCE WITH THE ENVIRONMENTAL IMPACT STATEMENT REGULATIONS, STATE OF HAWAI'I, AND IS SUBMITTED PURSUANT TO:

Chapter 343
Hawaii Revised Statutes

Date 6/26/78
DAVID K. HIGA
Chief, Water Transportation Facilities Division

REVIEWED FOR CONTENT AND ACCEPTED BY STATE DEPARTMENT OF TRANSPORTATION

Date 6/29/78
R. HIGASHIONNA, Ph.D.
Director
SUMMARY OF THE
ENVIRONMENTAL IMPACT STATEMENT
FOR THE
BARBERS POINT DEEP-DRAFT HARBOR

PROJECT DESCRIPTION

The State Department of Transportation proposes to construct shore-side and berthing facilities for the proposed Barbers Point Deep-Draft Harbor. The project area is located in the 1,300-acre Campbell Industrial Park on the leeward (west) coast of Oahu. The area is approximately 2 miles north-northwest of the Barbers Point lighthouse and 15 miles due west of Honolulu Harbor.

The state action is proposed in conjunction with the U.S. Army Corps of Engineers' project of dredging and excavating the entrance channel and harbor turning basin at Barbers Point. The proposed federal action has been previously addressed in the approved "Final Environmental Statement: Barbers Point Harbor," July 1976, as well as in the supplement to the final EIS issued in January 1977 by the Corps of Engineers.

Campbell Estate is granting to the State of Hawaii the land required for the first phase construction of the proposed harbor and shoreside facilities. In exchange for the land, about 90 percent of the sales proceeds from the projected 10.6 million cy of coralline material to be dredged from the channel and harbor will be awarded to the estate. The state of Hawaii will acquire approximately 246 acres in the first phase development of the harbor area, which will serve until 1990. The entire project has a 50-year planning period, and, based on preliminary plans, is anticipated to require a total of about 330 acres.

The objective of the Barbers Point Deep-Draft Harbor is to complement the existing and planned facilities at Honolulu Harbor. An evaluation of present and future Oahu waterborne commerce has indicated that the existing shoreside facilities at Honolulu Harbor are inadequate to handle projected containerized cargo needs beyond 1980 and even with state improvements, the harbor facilities will be unable to provide for the long-term commerce needs beyond 1990-1995.
The construction of a second commercial harbor at Barbers Point would not only provide for the long-term harbor needs for Oahu but also increase the efficient flow of goods and result in considerable savings in overland hauling to leeward Oahu.

Since the proposed Barbers Point Harbor is to complement Honolulu Harbor, the development of these harbors will be interphased. From fiscal year 1978 to fiscal year 1987, the construction of additional berthing spaces and shore facilities will be concentrated in Honolulu Harbor while the construction of shore facilities at Barbers Point will not be started until fiscal year 1983, when the dredging of the harbor by the Corps of Engineers is expected to be completed. The initial usage of Barbers Point, therefore, will not begin until the mid-1980s.

The construction of Barbers Point Harbor can be divided into two principal segments, the harbor development and the shore facilities development. These are described briefly as follows:

The harbor development would include the dredging of the entrance channel and the turning basin and the construction of wave absorbers and breakwater. The work will be done by the Corps of Engineers at an estimated cost of $43.2 million. The state will fund about 4.4 percent, or $1.9 million, of this cost, and the remaining $41.3 million will be funded by the federal government.

The shore facilities development is divided into the following main phases:

1. Phase 1 - Construction of an interisland barge berth and a neighbor island transhipment terminal, a petroleum berth and terminal, a lift-off lift-on (LO/LO) container berth and overseas container terminal, and a bulk and breakbulk berth and transit shed. The estimated cost of these facilities is $25 million.

2. Phase 2 - Construction of a slip for interisland barges, barge berths and a transhipment terminal, and another LO/LO container berth. The estimated cost of these facilities is $28 million.

The construction of the shoreside facilities in phases 1 and 2 would be totally funded by the state.
ENVIRONMENTAL SETTING

Presently existing at the proposed project site is a privately-owned, 9-acre barge harbor constructed in 1961. It was built to enable industries in the area to ship products directly by barge to the other islands. This harbor, however, has had limited use due to its small size and the existence of surge problems.

The climate of the area is characterized by sunshine, persistent tradewinds, and moderate temperature and humidity. The Ewa plain, an ancient emerged coral-algae calcareous reef, has a flat, hard, extremely porous surface. A brackish coral aquifer underlies the project area and overlies the Waianae Volcanic Series aquifer, a source of potable fresh water.

The coastal waters offshore from the project area currently meet the State Water Quality Standards most of the time. The tidal conditions of the Barbers Point area are similar to those at Honolulu Harbor. The ocean floor offshore from the project site is practically flat; the bottom and beach materials consist of hard coral rock or rubble and a low coral cover. The seepage of groundwater through the basin walls and floor of the existing barge harbor causes density stratification involving a lower salinity surface layer and a deeper, more saline bottom layer. Exchange of the existing harbor waters is very efficient; turbidity is typically low.

In order to estimate the cumulative effects of the proposed action, three related projects must be discussed: the Campbell Estate Regional Framework Plan for its Honouliuli lands, the expansion of James Campbell Industrial Park (JCIP), and the U.S. Naval Air Installation Compatibility Use Zone (AICUZ) study.

A 1974 master plan for the Campbell Estate Lands in the Honouliuli ahupua'a describes the five-stage development of a 12,000-acre urban area that will feature, in addition to the proposed harbor, a 200-acre city center, 13 residential villages, a college site, a resort complex, a marina development, and recreational space. The ultimate population is projected at 200,000 to 300,000. Altogether, the Honouliuli plan requires the conversion of 7,200 acres of agricultural land to urban use.
In the 1977 plan for expansion of JCIP, 75 industries and water transportation orientations were identified as prospects for the park. The land use pattern of the plan shows the heavy industry zone closest to the perimeter of the harbor, followed by the general industry zone. The light industry zone would interface with other Campbell projects in a land use transition zone.

In June 1976, the U.S. Navy released the AICUZ study, which evaluated the effect of air operations on the environs of NAS Barbers Point and recommended certain actions, such as zoning restrictions to insure compatible use of adjacent properties. The development of the harbor in this area will have some minimal effect on the air operations and the activities of NAS Barbers Point will have no significant effect on the harbor operations.

PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

During the first phase of construction, the entrance channel dredging will occur in open sea. About 1.3 million cy of coralline material will be dredged and piped ashore. Settling basins will be provided to remove the maximum amount of sediment before any excess surface water is permitted to flow back into the existing harbor or the ocean. Dredging of the approach channel will generate some turbidity and sediment in the immediate area.

The construction of the harbor basin would yield about 9.3 million cy of material. By phasing the inland dredging and maintaining a land barrier between the portions dredged and the ocean, most of the harbor development can be done under closely contained conditions with little or no interaction with the open ocean.

Practically all of the material to be dredged is coral limestone that is commercially valuable for construction and agricultural purposes. The material will be stockpiled to a height of 30 to 35 feet on an area of about 370 acres. Besides the temporary commitment of land, the visual impact of the stockpile is the main environmental effect.

Shoreside facility construction is anticipated to produce noise, dust, runoff during rainy weather, and traffic disturbance. The principal
post-construction impact will be visual. The facilities, which will be visible from most of the surrounding area, the H-1 freeway, and the ocean, will appear as an extension of the present Barbers Point Industrial Park.

The direct effect of the proposed harbor on the marine environment outside the mouth of the harbor will not be significant. The tide-related longshore current and the offshore wind-related surface current in the Barbers Point area are expected to transport and disperse the somewhat higher localized nutrient discharge and turbidity of the proposed harbor. It is expected, then, that the overall average nutrient discharge per length of coastline will be similar to present conditions since the overall groundwater discharge rate, after a new equilibrium is established, will be similar to the present rate.

The long-term effects of the harbor and entrance channel on the marine environment are likely to consist of a substrate change in the channel from generally hard bottom to a predominantly coral rubble bottom, and a somewhat higher concentration of phytoplankton and zooplankton.

In terms of impact on the groundwater, harbor construction will have no effect on the potable water supply of the Waianae Volcanic Series aquifer. Since the brackish caprock water of the coral aquifer may, in the future, be developed as a supplementary water supply the proposed harbor will reduce the area from which such water can be extracted but would not significantly reduce the amount of available brackish water.

Surveys have shown that two potentially endangered plant species, *Euphorbia skottsbergii* var. kalaaloana and *Achyranthes splendens* var. rotundata Hbd., are currently found in the project vicinity. A dense colony of *Euphorbia* has been located at the site of the proposed shoreside facilities and the configuration of the harbor would require its removal. According to the Division of Forestry, State Department of Land and Natural Resources, these plant species will be placed on the federal list of endangered species in the future. (They are presently found only in the vicinity of the proposed project area although there are unconfirmed reports that these plants were also found in the region between Ewa and Pearl Harbor and at Kaena Point.) The habitat requirements of *Achyranthes* are less certain. Both species will be propagated elsewhere.
The removal of kiawe trees that serve as the habitat of common bird and mammal populations would disturb the wildlife of the area. These wildlife species, however, are highly adaptive and are capable of relocating in adjacent areas. Potential impacts are expected to be minimal and short term. An indigenous species of heron was sighted in surveys. Shrimps were also seen in existing sinkholes containing water.

Archaeological studies have recovered deposits of "fossil" bird bones in the Barbers Point area that indicate the harbor site has paleontological and research value. The archaeological significance of the site has been acknowledged and a program of mitigative action will be implemented by the state prior to and during construction. Since a portion of the project area has been designated as eligible for inclusion in the National Register, mitigating measures will be taken to minimize the effect on the archaeological information available from this area. It should be noted that the nomination to the National Register is based on the value of the various sites in providing information on past habitation patterns and cultural practices and not on the preservation value of the sites. Consequently, the status of this area will be changed to a lower level once the information has been obtained through the planned studies. This approach is being coordinated with the State Historic Preservation Office and the U.S. Advisory Council on Historic Preservation.

The water supply requirement for the first phase of the proposed harbor facility is estimated to be only about 0.06 mgd, or about 0.5 percent of the present Ewa-Waianae water district demand of 13.1 mgd. Since this district is presently not self sufficient in water supply in that much of its supply comes from the Pearl Harbor district, the harbor water requirements as well as the anticipated CIP and Ewa plain development requirements will have to be coordinated with the Board of Water Supply using a water master plan. Prior to the implementation of such a plan, the Board of Water Supply has indicated that the modest harbor requirements can be met with the existing system by tapping into the 20-inch main along Kalaeloa Boulevard. The additional fire flow requirements for the harbor facilities will be met on an interim basis by providing salt water pumping equipment.
The sewage treatment and disposal requirements of the proposed harbor are as modest as the water supply needs. Since the proposed Honolulu wastewater treatment and disposal facility has no provisions for including flows from the Campbell Industrial Park area, a separate system will have to be planned and constructed for this area that would include the harbor contribution of about 0.06 mgd. If that facility (which would require its own EIS) is not available when the harbor begins operation, then an interim system will be required. Such an interim system, if required, would be planned during the design phase of the harbor to meet all applicable State Department of Health requirements. It is anticipated that the principal interim treatment alternatives would be oxidation ponds or a package treatment plant, followed by disposal of the treated effluent via injection wells or leaching fields. Because of the small flows involved and the proximity to the shoreline, no significant impact on the brackish groundwater area is likely.

A regional drainage system is being proposed by Campbell Estate for the general area that will intercept runoff along the eastern and southern perimeters of the harbor and direct it toward a drainage channel, which will discharge into the ocean. It is anticipated that this regional drainage system will require its own EIS. The surface drainage discharging directly into the harbor will be limited to the immediate area and is expected to have no significant impact because of the low rainfall in the area and the prompt clean-up policy by the Department of Transportation.

The land transportation facilities serving the Barbers Point area are being planned to accommodate the harbor requirements. This will include upgrading Kalaeloa Boulevard as well as the port access road. The proposed roadways and improvements will conform to all applicable governmental regulations.

The main source of air pollution would be vehicular traffic, ships berthed in the harbor, and fueling operations of ships. Anticipated concentrations due to traffic do not exceed state or federal standards. The major air quality impact from ships is the emission of sulfur oxides. The effects of these emissions are not critical but are of concern. If
governmental regulations are followed, no air pollution problems are expected. It should be noted that during normal tradewind conditions air emissions will be dispersed out to sea.

The harbor-related activities of the project will generate noise levels approximately equivalent to those presently emitted at Honolulu Harbor. Since the harbor will be an extension of the industrial park, no adverse impacts are expected.

The primary economic impact of the project is evaluated in three phases: current economic activity, economic activity during construction, and economic activity during operation of the harbor facility. During construction, employment benefits will be significant. In addition to the harbor itself, support and recreational facilities would be constructed. Secondary support jobs in construction-related industries will be generated also. Construction will result in the production of 10.6 million cy of coral limestone, with a present value in the range of about $11.6 to $14.5 million (not including $6.8 to $9.4 million storage expenses), depending upon the quality and marketability of the dredged material and the length of storage time. The economic impacts of actual harbor operations will be revenues from harbor use charges, creation of direct and indirect employment, and overland transportation cost savings. Generally, the harbor activity would stimulate related business enterprises, increase employment, and generate higher state tax revenues.

The secondary impact of the harbor relates to its effects on Campbell Industrial Park (CIP). Annual leasing activity is expected to increase due to the attraction of water-oriented industries. It is therefore anticipated that the employment levels of the light, medium, and heavy industrial users of the park will increase. Land value and real property taxes will be enhanced, and, in general, the competitiveness of CIP businesses will improve.

The tertiary economic impact involves the effects of the harbor development on the Ewa district. The impacts of the harbor on the Ewa District in terms of population growth, increased land values and future development of private and public services are expected to be minimal.
The induced physical and social impacts of the harbor may include increased demand for housing, loss of open space or agricultural land, modification of lifestyle from rural to urban. The attendant impacts of residential development and the urbanization of leeward Oahu can be anticipated. The rate of development is, in large part, determined by governmental land use policies and enactment of the proposed Honolulu Regional Framework Plan.

RELATIONSHIP OF THE PROPOSED ACTION TO LAND-USE PLANS, POLICIES, AND CONTROLS FOR THE AFFECTED AREA

The proposed first phase construction of a commercial port at the existing barge harbor site will involve lands within the "urban" (78 acres) and "agriculture" (168 acres) districts. The changes in land use for inclusion of a harbor must be approved by the Land Use Commission. The harbor shoreside facilities will lie within a special management area (SMA) and the project must undergo review by the City Council for an SMA permit, which controls projects that impact the shoreline.

Trends for Oahu development indicate that the leeward area is designated for industrial and urban growth. A gradual shift of population and economic activity toward the Ewa district is projected in the General Plan of the City and County of Honolulu.

PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The most significant adverse environmental effects include (1) destruction of existing marine community and generation of turbidity and sedimentation during dredging; (2) visual impact of stockpile; (3) visual impact of the 92-acre harbor basin development; (4) destruction of archaeological sites, removal of two acres of land from active sugar production, recovery and removal of possible endangered plants, elimination of habitat for common shorebirds and possibly the indigenous heron; and (5) noise, dust, siltation, runoff, traffic effects of shoreside facility construction and harbor operations.
ALTERNATIVES TO THE PROPOSED ACTION

Two alternate sites, Kaneohe Bay and West Loch, Pearl Harbor, were considered but were eventually eliminated. An expanded barge harbor concept was evaluated as an alternative to the deep-draft harbor. The 19-acre barge harbor would have reduced construction impacts and would not directly affect archaeological sites or lands presently in sugar production. It would not, however, meet the long-term needs for additional container handling and storage space. The economic impacts of the dredged material, shoreside facilities, overland transportation costs, and employment and business stimulation would also be reduced. The expanded barge harbor concept was therefore eliminated. Other deep-draft harbor alternatives evaluated were an offshore harbor and an extended inland harbor. Both, however, were found to be less attractive environmentally and economically. The alternative of no action would not fulfill the projected waterborne commerce needs of the state.

Several alternative shoreside facilities configurations have been considered. There are no significant differences among them with regard to environmental effects.

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

With rapid and intensive urbanization along the waterfront, the desire for multiple uses along the shoreline, increasing tonnages of incoming and outgoing cargo, and technological advances such as containerization, the physical limits of Honolulu Harbor are developed almost to maximum capacity. Even with state and federal improvements to the harbor, it will not be able to meet all waterborne commerce needs beyond the 1990 to 1995 period. The development of a second commercial port is significantly affected by the availability of industrial-zoned or planned lands, the direction of population growth, and the physical suitability of a site for harbor development. The Barbers Point location is the site of an existing barge harbor and provides all of these elements conducive to harbor use. A harbor constructed on any coastline would impact along the coastal environment, but the opportunity to implement an inland configuration at an existing harbor site minimizes the adverse effects. The
deep-draft harbor could immediately serve both short- and long-term needs. Together with Honolulu Harbor, a second deep-draft harbor at Barbers Point would meet needs for additional container space and handling, realize significant overland cost reduction benefits, and provide facilities to accommodate the 50-year waterborne commerce projections.

MITIGATION MEASURES PROPOSED TO MINIMIZE IMPACT

The most significant adverse impacts and mitigation measures to be implemented are summarized below.

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<td>1. Siltation during dredging and stockpiling</td>
<td>Dredging of the channel will be suspended during heavy seas when likelihood of turbidity is greatest. Use of silt barriers or containment facilities will be considered for the nearshore portion of the channel dredging. A closure will be made at the basin entrance while basin dredging is in progress to separate dredging activity from the open ocean. Sedimentation basins will be provided to settle out suspended material from dredge liquid when dredging is stockpiled.</td>
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<td>2. Visual impact of stockpile</td>
<td>The stockpile will be landscaped for visual mitigation as well as for dust control.</td>
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<td>3. Destruction of cultural sites</td>
<td>Excavation and salvage of archaeological sites and paleontological resource recovery will be performed prior to construction. Where preservation of sites is recommended, the stockpile configuration will be adjusted.</td>
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<td>4. Encroachment of lands where possible endangered plants have been found</td>
<td>The possible endangered plants will be propagated in locations suitable for their preservation.</td>
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<td>5. Noise and air pollution during construction</td>
<td>All applicable government regulations will be followed.</td>
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<td>6. Traffic disruption</td>
<td>Flagmen will be provided as necessary to coordinate traffic flow during construction hours.</td>
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ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

The commercial port development at Barbers Point would involve a wide range of irreversible commitments. The immediate area is presently committed to barge harbor operations but would be committed over the long term to deep-draft harbor use and industrial developments. The proposed harbor is in consonance with the adopted general plan for the City-and County of Honolulu. A second consideration is that urbanization of leeward Oahu may be accelerated. Urbanization would be subject to the policy direction and controls of both state and local government.

More specifically, the port development would directly remove two acres of land from active cane production and may hasten more widespread conversion of agricultural land to urban uses. The harbor construction and shoreside facility development would destroy cultural sites, but intensive study, if required, would be completed during detailed design and excavation prior to construction. The loss of existing open space, some possible endangered plants, and wildlife habitat represents an irreversible commitment of aesthetic and natural resources.

About 330 acres of land would be used for the ultimate harbor plan. The entrance channel construction would permanently commit a portion of the nearshore area to navigation use. Dredging the basin and channel would also involve a loss of 10.6 million cy of coralline limestone land that would then be converted into construction and agricultural material. In addition to the commitment of natural resources, a tremendous amount of capital, on the order of $72 million for the first phase construction, is involved. The commercial port development at Barbers Point would also involve an irreversible commitment of utilities, such as water and electrical service, and use of receiving waters for sewer and stormwater discharges.

AN INDICATION OF WHAT OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENTAL POLICIES ARE THOUGHT TO OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

The primary governmental policies that are encouraging the development of the deep-draft harbor at Barbers Point are the Oahu General Plan
and the recommendations of the State Multi-Modal Task Force, as found in the 1995 master plan for Honolulu Harbor. The construction of the harbor at Barbers Point is in harmony with the policies of the government to accommodate future economic growth and development of leeward Oahu.
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ENVIRONMENTAL IMPACT STATEMENT
FOR THE
BARBERS POINT DEEP-DRAFT HARBOR ON OAHU

I. PROJECT DESCRIPTION

PROJECT BACKGROUND, LOCATION, AND GEOGRAPHICAL SETTING

The State Department of Transportation proposes to construct shoreside and berthing facilities for the Barbers Point Deep-Draft Harbor. The project site is on the leeward (west) coast of Oahu about 2 miles north-northwest of the Barbers Point Lighthouse and 15 miles due west of Honolulu Harbor. The project site is also about 20 road miles from downtown Honolulu and within the 1,300-acre Campbell Industrial Park area (refer to Figure I-1 for location map).

The state action is proposed in conjunction with the proposed federal action (through the U.S. Army Corps of Engineers) of dredging an entrance channel and a harbor turning basin. The proposed federal action has been previously addressed in the approved "Final Environmental Statement: Barbers Point Harbor," July 1976 (with a supplement in January 1977), written by the U.S. Army Corps of Engineers following the requirements of the National Environmental Policy Act (NEPA) of 1969. The Corps' EIS serves as a basic reference document for this EIS.

Included in the proposed action is the dredging of approximately 10.6 million cy of coralline material from the proposed harbor and channel. This material will be temporarily placed on about 370 acres of Campbell Estate land bordering the harbor facilities. In exchange for about 90 percent of the sales proceeds derived from this material, Campbell Estate is granting to the state of Hawaii the 246 acres of land required for the construction of the first phase of the proposed harbor and shoreside facilities. If a need is demonstrated prior to 1995, an additional 31 acres will be added to the harbor. Also, until the year 2000 and subject to the termination of the Campbell Estate Trust, the State will have the right of first refusal to condemn an additional 53 acres of lands adjacent to the harbor.
The initial land acquisition by the State of Hawaii, 246 acres, should meet the needs of the harbor area until about 1990. The ultimate project has a 50-year planning period and may require a total of 330 acres.

STATEMENT OF OBJECTIVES

Studies of prevailing and projected Oahu waterborne commerce, land use, and economic conditions for both Honolulu Harbor and for Barbers Point are interrelated. The need for improvements at Honolulu Harbor is closely tied to the need for a second Oahu deep-draft port. An evaluation of the present and projected navigation conditions and trends has identified a number of problems and needs related to Oahu waterborne commerce. They are summarized as follows:

1. Honolulu Harbor's existing shoreside facilities will be unable to handle all the projected waterborne commerce to Oahu. Even with the state's planned shoreside improvements, the total facilities will be unable to provide for the long-term commerce needs beyond 1990 to 1995. There is a lack of available industrially-zoned warehousing space in the Honolulu Harbor area, and the existing warehousing space is gradually eroding and being redeveloped in nonindustrial uses.

2. The existing overland transport system of handling incoming and outgoing goods between Honolulu Harbor and destination areas can be improved. A large part of industrial activity on Oahu takes place on the leeward end of the island, a considerable distance from Honolulu Harbor. A survey of present shipping patterns by leeward Oahu firms, shown in Table I-1, indicates that they account for over 490,000 tons of existing general cargo activity at Honolulu Harbor. Of the approximately 5 million tons of non-petroleum cargo moved through Honolulu Harbor in 1974, about 2.4 million tons were transshipment cargo for neighbor island ports, and 2.6 million tons were Oahu-generated or -destined cargo. Therefore, the 490,000 tons of general cargo activity between Honolulu Harbor and leeward Oahu account for about 20 percent of the Oahu-generated or -destined cargo. If a harbor were available near the leeward industries, considerable
## TABLE I-1

### COMMERCE BETWEEN HONOLULU HARBOR AND LEEWARD OAHU INDUSTRIAL AREAS

<table>
<thead>
<tr>
<th>Item</th>
<th>Incoming Ton</th>
<th>Outgoing Ton</th>
<th>Total Ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Product</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef</td>
<td>8,800</td>
<td>0</td>
<td>8,800</td>
</tr>
<tr>
<td>Feed</td>
<td>94,011</td>
<td>1,200</td>
<td>95,211</td>
</tr>
<tr>
<td>Cement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gypsum</td>
<td>20,000</td>
<td>0</td>
<td>20,000</td>
</tr>
<tr>
<td>Silica Sand</td>
<td>50,000</td>
<td>0</td>
<td>50,000</td>
</tr>
<tr>
<td>Cement</td>
<td>0</td>
<td>125,000</td>
<td>125,000</td>
</tr>
<tr>
<td>Metal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scrap Iron</td>
<td>6,216</td>
<td>4,000</td>
<td>10,216</td>
</tr>
<tr>
<td>Raw Iron (for fabrication)</td>
<td>14,584</td>
<td>1,000</td>
<td>15,584</td>
</tr>
<tr>
<td>Wood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plywood</td>
<td>10,728</td>
<td>0</td>
<td>10,728</td>
</tr>
<tr>
<td>Lumber (exclude plywood)</td>
<td>33,454</td>
<td>0</td>
<td>33,454</td>
</tr>
<tr>
<td>Wood Products (Door, Molding, etc)</td>
<td>1,950</td>
<td>133</td>
<td>2,083</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food (wet and dry)</td>
<td>12,138</td>
<td>1,180</td>
<td>13,318</td>
</tr>
<tr>
<td>Concrete Pipe</td>
<td>0</td>
<td>11,800</td>
<td>11,800</td>
</tr>
<tr>
<td>Concrete Sewer Product</td>
<td>1,500</td>
<td>400</td>
<td>1,900</td>
</tr>
<tr>
<td>Silica Sand (Polished)</td>
<td>540</td>
<td>0</td>
<td>540</td>
</tr>
<tr>
<td>Equipment and Parts</td>
<td>11,080</td>
<td>1,514</td>
<td>12,594</td>
</tr>
<tr>
<td>Fencing</td>
<td>811</td>
<td>1</td>
<td>812</td>
</tr>
<tr>
<td>Metal Products (other)</td>
<td>3,125</td>
<td>105</td>
<td>3,230</td>
</tr>
<tr>
<td>Hardware</td>
<td>2,576</td>
<td>140</td>
<td>2,716</td>
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<tr>
<td>Paper Products</td>
<td>710</td>
<td>24</td>
<td>734</td>
</tr>
<tr>
<td>Chemical (solid and gas)</td>
<td>9,662</td>
<td>1,039</td>
<td>10,701</td>
</tr>
<tr>
<td>Electrical</td>
<td>150</td>
<td>0</td>
<td>150</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>450</td>
<td>600</td>
<td>1,050</td>
</tr>
<tr>
<td>Foam and Products</td>
<td>44</td>
<td>0</td>
<td>44</td>
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<tr>
<td>General Merchandise</td>
<td>16,060</td>
<td>4,419</td>
<td>20,479</td>
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<tr>
<td>Cars</td>
<td>7,505</td>
<td>5</td>
<td>7,510</td>
</tr>
<tr>
<td>Material and Clothing</td>
<td>1,681</td>
<td>30</td>
<td>1,711</td>
</tr>
<tr>
<td>Plastic and Cardboard</td>
<td>9,000</td>
<td>0</td>
<td>9,000</td>
</tr>
<tr>
<td>Tires</td>
<td>1,260</td>
<td>168</td>
<td>1,428</td>
</tr>
<tr>
<td>Plumbing</td>
<td>1,374</td>
<td>30</td>
<td>1,404</td>
</tr>
<tr>
<td>Roofing</td>
<td>5,316</td>
<td>385</td>
<td>6,201</td>
</tr>
<tr>
<td>Brick</td>
<td>0</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Tile and Clay Products</td>
<td>1,464</td>
<td>165</td>
<td>1,629</td>
</tr>
<tr>
<td>Aggregate (cinder)</td>
<td>2,100</td>
<td>0</td>
<td>2,100</td>
</tr>
<tr>
<td>Other</td>
<td>1,956</td>
<td>1,025</td>
<td>2,981</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>330,245</td>
<td>159,850</td>
<td>490,095</td>
</tr>
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</table>

overland haul savings would be realized. Based on these findings, the need for improvements to the existing Honolulu Harbor facilities and the need for a commercial port facility at Barbers Point have been reaffirmed.

3. Depths in Honolulu Harbor require increasing to permit economic use by vessels of deeper draft such as petroleum-carrying vessels and larger container vessels. Dredging is programmed by the U.S. Corps of Engineers.

4. Presently it is necessary to unload dangerous cargo and explosives in Honolulu Harbor close to downtown Honolulu. There is a need for alternate sites for handling hazardous cargo.

The need for improvements within Honolulu Harbor and the proposed 5-foot increases in project depths are addressed in a separate project report and EIS. The State of Hawaii, through the Governor's Multi-Modal Task Force on Honolulu Harbor, has recommended modifications to the shoreside facilities to accommodate some of Oahu's long-range waterborne commerce needs. However, the Task Force has recognized that even with federal and state modifications, Honolulu Harbor cannot physically accommodate containerized cargo facility and handling requirements beyond 1990 to 1995 and that a second Oahu commercial port would be needed. Evaluation of the containerized cargo capabilities shows that the total container facility acreage ultimately available at Honolulu Harbor would be 208 acres; 51 acres existing at the Fort Armstrong yard and a total of 157 acres to be developed incrementally at Sand Island. By the year 2030, the total Oahu needs for container acreage will probably be between 400 and 500 acres, or more than twice that which would be ultimately provided at Honolulu Harbor.

Cargo forecasts for both Honolulu Harbor and the proposed Barbers Point Harbor have been developed for the Statewide Harbor System Plan study. This expanded on earlier comprehensive cargo studies made by the Corps of Engineers and is tabulated in Table I-2.

A number of factors were considered in the determination of these projections, such as warehousing, cargo movement between Honolulu and
TABLE I-2
CARGO FORECASTS FOR HONOLULU HARBOR AND BARBERS POINT HARBOR

Honolulu Harbor (1,000 Short Tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Container In</th>
<th>Container Out</th>
<th>Overseas Bulk In</th>
<th>Overseas Bulk Out</th>
<th>Overseas Breakbulk In</th>
<th>Overseas Breakbulk Out</th>
<th>Interisland Container In</th>
<th>Interisland Container Out</th>
<th>Interisland Bulk In</th>
<th>Interisland Bulk Out</th>
<th>Interisland Breakbulk In</th>
<th>Interisland Breakbulk Out</th>
</tr>
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<tbody>
<tr>
<td>1976</td>
<td>1,589</td>
<td>987</td>
<td>326</td>
<td>575</td>
<td>897</td>
<td>170</td>
<td>122</td>
<td>327</td>
<td>576</td>
<td>77</td>
<td>82</td>
<td>537</td>
</tr>
<tr>
<td>1980</td>
<td>1,701</td>
<td>1,033</td>
<td>358</td>
<td>589</td>
<td>757</td>
<td>163</td>
<td>99</td>
<td>230</td>
<td>579</td>
<td>84</td>
<td>79</td>
<td>388</td>
</tr>
<tr>
<td>1985</td>
<td>1,782</td>
<td>1,023</td>
<td>282</td>
<td>554</td>
<td>738</td>
<td>154</td>
<td>92</td>
<td>214</td>
<td>543</td>
<td>9</td>
<td>83</td>
<td>343</td>
</tr>
<tr>
<td>1990</td>
<td>1,922</td>
<td>1,021</td>
<td>208</td>
<td>520</td>
<td>764</td>
<td>150</td>
<td>87</td>
<td>213</td>
<td>546</td>
<td>8</td>
<td>85</td>
<td>360</td>
</tr>
<tr>
<td>1995</td>
<td>1,871</td>
<td>941</td>
<td>192</td>
<td>513</td>
<td>772</td>
<td>144</td>
<td>92</td>
<td>224</td>
<td>547</td>
<td>9</td>
<td>90</td>
<td>389</td>
</tr>
<tr>
<td>2000</td>
<td>2,123</td>
<td>948</td>
<td>209</td>
<td>521</td>
<td>799</td>
<td>145</td>
<td>96</td>
<td>226</td>
<td>547</td>
<td>10</td>
<td>94</td>
<td>411</td>
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Barbers Point Harbor (1,000 Short Tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Container In</th>
<th>Container Out</th>
<th>Overseas Bulk In</th>
<th>Overseas Bulk Out</th>
<th>Overseas Breakbulk In</th>
<th>Overseas Breakbulk Out</th>
<th>Interisland Container In</th>
<th>Interisland Container Out</th>
<th>Interisland Bulk In</th>
<th>Interisland Bulk Out</th>
<th>Interisland Breakbulk In</th>
<th>Interisland Breakbulk Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1980</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1985</td>
<td>306</td>
<td>105</td>
<td>115</td>
<td>52</td>
<td>80</td>
<td>12</td>
<td>20</td>
<td>94</td>
<td>38</td>
<td>83</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>1990</td>
<td>594</td>
<td>201</td>
<td>231</td>
<td>105</td>
<td>110</td>
<td>18</td>
<td>39</td>
<td>183</td>
<td>42</td>
<td>94</td>
<td>12</td>
<td>135</td>
</tr>
<tr>
<td>1995</td>
<td>1,064</td>
<td>375</td>
<td>295</td>
<td>133</td>
<td>147</td>
<td>26</td>
<td>47</td>
<td>258</td>
<td>47</td>
<td>104</td>
<td>13</td>
<td>146</td>
</tr>
<tr>
<td>2000</td>
<td>1,298</td>
<td>457</td>
<td>320</td>
<td>144</td>
<td>153</td>
<td>26</td>
<td>54</td>
<td>326</td>
<td>50</td>
<td>112</td>
<td>14</td>
<td>154</td>
</tr>
</tbody>
</table>
Leeward Oahu, containerization, demand for cargo by neighbor islands, transshipment delays, and overall industrial growth of various portions of Oahu. The forecasts indicate requirements at Barbers Point Harbor starting from the mid-1980s.

In addition to the physical limitations of Honolulu Harbor, existing levels of overland traffic show that the availability of a deep-draft harbor near the leeward industries would result in net overland trucking savings of over $1 million annually. Therefore, the need for a deep-draft harbor at Barbers Point is two-fold:

1. A physical need for a second deep-draft harbor to provide for Oahu waterborne commerce over the 50-year project planning period, and
2. A more immediate economic need to provide for an efficient and uninterrupted flow of commerce by constructing a second Oahu commercial port in the vicinity of leeward Oahu industrial and warehousing operations.

GENERAL DESCRIPTION OF THE ACTION’S CHARACTERISTICS

Technical

Except for the shoreside facilities, which are described for the three phases, the following actions are required to construct the first phase of the harbor (refer to Figure I-2). Each action is designated as F, S, C, or P to identify it as a federal, state, Campbell Estate or private action, respectively.

1. Locating, studying, and where necessary salvaging archaeological and paleontological findings. (F, S, and C)
2. Where necessary, transplanting and propagating endangered species of vegetation found on the project site. (F, S, and C)
3. Relocating existing oil storage facilities and Malakole Road, which are presently within the project limits. The existing 8-inch oil pipeline will be abandoned in favor of a new line to be constructed outside of the harbor limits. (P)
NOTE: LAYOUT OF HARBOR FACILITIES
FURNISHED BY: PARSONS,
BRINCKERHOFF, QUADE &
DOUGLAS, INC.

FIGURE 1-2
PHASE I FACILITIES
TOTAL HARBOR AREA = 246 AC
4. Clearing and grubbing the site. (F and S)

5. Dredging an entrance channel 4,280 feet long, 450 feet wide, and 38 to 42 feet deep from offshore waters into the harbor basin. (F)

6. Excavating and dredging the 92-acre, land-locked harbor basin. Excavation of coralline material above water level would be done by land-based equipment, such as scrapers and bulldozers. Dredging work below sea level of both the basin and entrance channel would be accomplished by using a floating hydraulic cutterhead dredge(s), which would then discharge the dredged material through a pipeline to the stockpile area on shore. (F)

7. Excavating and dredging the berthing areas adjacent to the basin. (S)

8. Stockpiling about 10.6 million cy of dredged material into areas surrounded by berms to the height of 30 to 35 feet above the existing ground. The stockpile will occupy an area up to about 370 acres around the harbor facilities. Settling ponds will be utilized to remove suspended sediments from the dredge water prior to its return to sea. (F, S, and C)

9. Constructing wave absorbers on the channel and basin slopes totalling 4,700 lineal feet consisting of three layers of stones placed on a 1 vertical to 3 horizontal slope from -11 feet to +5 feet. The size of the stones will vary from 1/2 to 1 ton at the innermost section of the harbor to 3 to 4 tons at the seaward section. (F)

10. Constructing three major phases of shoreside facilities. The facilities to be constructed are listed below. (S)

   Phase I: 1980-1994 (Construction from 1980 to 1982) (Refer to Figure I-2)

   a. Container terminal. Construction of an overseas container terminal, which will include a wharf, 27 acres of marshaling and storage areas, 10 acres of ancillary area, a
container berth 1,000 feet long that will allow the berthing of one container ship, a container freight station, entry facilities with scales, a repair and maintenance shop, and an administration/operations building with a control center. A part of the container freight station would be used as a transfer shed for break bulk cargo, or alternatively another shed could be built.

b. Neighbor island transshipment terminal (NITT). The NITT will be an all-barge operation. It will contain area for three barge berths totalling 1,000 feet in length that can be used for interisland roll-on/roll-off container, bulk, and breakbulk barge operations. The bulk and break bulk yard will require 4 acres, and the container yard, 14 acres. Bulk cargo will consist of items such as cement for which onshore silos may be provided by others for storage. Break bulk cargo, on the other hand, consists of miscellaneous items, such as plywood and scrap iron, which can be palletized, bundled, or otherwise consolidated and requires only limited covered storage (transfer sheds).

c. Overseas bulk and break bulk terminal. This is a general receiving terminal for transferring and storing general cargo brought in by both barge and ship from overseas. The length of berthing space that will be provided (approximately 1,000 feet) can accommodate one barge and one ship.

d. Petroleum products terminal. The berth will be able to accommodate one tanker up to 700 feet. The terminal will be used for shipping out refined petroleum products. No provisions are made for oil storage and ballast treatment. These will be developed by private concerns outside of the harbor. A pipeline will be provided by either the state or private concerns from the terminal to the boundary of the harbor for connection to other lines.
Phase II: 1994 to Approximately 2010 (Refer to Figure I-3)

a. Overseas container terminal. The container berth will be expanded to 2,000 feet in length to accommodate two container ships. The container wharf is converted from what was previously the interisland barge wharf. The marshaling and storage areas will be expanded to 67 acres and the ancillary area to 23 acres. In addition, the repair and maintenance shop will be expanded.

b. Neighbor island transshipment terminal. The barge berth will be relocated in an inland slip. It will be approximately 850 feet long by 350 feet wide. About 800,000 cy of coralline material will be dredged to construct the slip. The dredged material will be placed on the same stockpile areas allocated in Phase I. The container yard will be expanded to 26 acres while the bulk and break bulk areas will remain the same size.

c. Overseas bulk and break bulk terminal. Two berths totaling 1,400 feet will be provided to accommodate two ships at a time, or one ship and two barges, or four barges. The area provided will be 16 acres for the bulk and break bulk terminals.

d. Petroleum terminal. No change.

Phase III: Approximately 2010 to 2030. (Refer to Figure I-4)

a. Container terminal. The container berthing space 2,900 feet long will be provided to accommodate three 720-foot container ships. Additionally, the container marshalling area, storage, and ancillary area will be expanded to approximately 111 acres. The ancillary facilities will also be enlarged.

b. Neighbor island transshipment terminal. An additional barge berth will be provided to accommodate the container
NOTE: LAYOUT OF HARBORS FACILITIES FURNISHED BY; PARSONS, BRINCKERHOFF, QUADE & DOUGLAS, INC.

GRAPHIC SCALE

1000 0 1000
SCALE IN FEET

FIGURE 1-3
BARBERS POINT HARBOR PHASE II
FIGURE I-4
ULTIMATE CONCEPT PLAN OF SHORESIDE FACILITIES
(Preliminary; including Total Area Requirements Through 2030)

Source: Parsons, Brinckerhoff, Quade, & Douglas
yard. The container yard will be increased to 25 acres and the bulk and break area to 10 acres.

c. Bulk and break bulk terminals. No change.

d. Petroleum products terminal. A new inland slip is dredged to relocate the old petroleum products terminal. The relocation is necessary to accommodate expansion of the MIT. An alternate site for the petroleum berth or space for an additional berth is located on the northeastern side of the harbor.

11. Construction of special piers and moorings for tugboats, pilot boats, and launches in the remainder of the existing barge harbor. Also oil spillage containment equipment and facilities will be located here. (S)

12. The design, construction, operation and maintenance of water, electrical, communications and sanitary sewer systems to service the harbor vessels and shoreside facilities will be handled by the state. Dockside utility connections will provide the essential services for ships during berthing. These utilities for the Barbers Point Harbor will be designed in relationship to the overall development of Campbell Industrial Park. (S)

In a preliminary report entitled Plan for Barber's Point Harbor Facilities and Expansion of James Campbell Industrial Park, prepared by Tippetts-Abbett-McCarthy-Stratton (TAMS) for the Estate of James Campbell, the future developmental needs of the industrial park were addressed. The plan also addressed the ultimate development of the Barbers Point Harbor but not its utilities. The future water system for the expanded Campbell Industrial Park will include a new water source, storage facility and distribution system. Such a system will require a water master plan that will be coordinated with the Board of Water Supply.

A proposed 20-inch main which will run along the perimeter of the Industrial Park, will create a loop system with the existing
20-inch main and will provide water for the entire industrial park. The expanded industrial park would be served by a closed network of 16-inch and 12-inch water lines that are tapped into the 20-inch mains. The Board of Water Supply has indicated that the initial harbor requirement of 0.06 mgd can be accommodated with the present supply for the area.

Drainage for a major portion of the industrial park will be accomplished by a major drainage channel that will traverse the site from east to west, and will discharge offshore just south of the existing Camp Malakole. A runoff collection system of open channels will collect the runoff from the land and will be directed toward the major channel. Intercepting open channels along the eastern and southern perimeters of the Barbers Point Harbor will isolate storm water runoff from the port facilities. The regional drainage system will require its own EIS.

A proposed sewer system, which includes a sewage treatment plant, will handle the wastewater of the Campbell Industrial Park. It might be noted that the wastewater from the harbor and the industrial park cannot be treated at the municipal sewage treatment plant at Honouliuli. Four options for treatment and disposal of wastewater were considered in the TANS report. These options are as follows:

a. Option One considers the development of an onsite, primary treatment plant, with the processed effluent pumped into the Makakilo Interceptor. This would involve, in addition to pumping requirements, the installation of some 18,000 feet of 48-inch diameter pipe, completing a "T" coupling with the interceptor and approximately doubling the size of the interceptor sewer (from 30- to 60-inch diameter). The magnitude of work involved with this option does not appear to make it feasible.

b. Option Two considers the development of an onsite, primary treatment plant. The processed effluent would be gravity discharged into the Pacific Ocean via an offshore outfall.
The land portion of the outfall would parallel the proposed major drainage channel between Malakole Road and the ocean.

c. Option Three involves the same system as Option Two, except that a nearshore outfall is considered with secondary treatment plus rapid sand filtration required at the treatment plant.

d. Option Four involves the construction of a secondary treatment plant and discharge of effluent into a multiple injection well field. Assuming a minimum well diameter of 4 inches, 110 wells would be required with an average area requirement of 2,500 square feet per well. A 25-foot buffer around the wells is also assumed; therefore, the well field would require about 13 acres.

These options for the sewage system and the other proposed utilities for the industrial park will be designed to comply with existing governmental regulations at the time they are implemented.

Master planning and design of the utilities for the harbor as well as the shoreside facilities are scheduled to begin in 1978. For purposes of general impact assessment, however, preliminary plans, alternatives, and estimates for utility demands were derived. During the interim period, several alternatives can be explored to provide adequate utility service for the daily operations of the harbor. The treatment of the harbor wastewater which primarily consists of domestic, shipboard and livestock washdown wastewater with a total estimated average flow of 0.06 mgd can be handled by (1) an oxidation pond system requiring a total area of approximately 3 acres, (2) an oxidation ditch, or (3) a small package plant followed by disposal of the treated effluent via an injection well system. The collection system will ultimately connect into the proposed regional system for the industrial park. The interim treatment facility will be taken out of service when the regional system is constructed.
The interim treatment facility for the harbors will comply with the appropriate governmental regulations. The regional system will require its own EIS.

Water service for the port facility during the interim will come from the Board of Water Supply's Ewa-Waianae water system that presently serves Campbell Industrial Park. An average daily consumption of 0.06 mgd is estimated for the Phase I development of the harbor (until 1990). The water service for the harbor will be from the existing 20-inch water main located in Kalaeloa Boulevard. Provisions for connection to the future 20-inch line will be provided. A storage tank or pumping system may be required to provide adequate fire protection during the initial phase of development until the new water system is built. The ultimate water system is planned for a fire flow of 4,000 gallons per minute (gpm) plus one half the domestic flow, or 2,000 gpm, for a total of 6,000 gpm. Additional fire protection services will be available when a new fire station is built in Campbell Industrial Park. This fire station is planned to be built in fiscal year 1980 by the Fire Department of the City and County of Honolulu.

The general concept of the drainage system for the proposed Barbers Point Harbor area is to collect all of the runoff generated by the port facilities through an underground system and to discharge it into the harbor. The drainage system will be constructed in phases as the harbor expands. Until the permanent drainage system is built, a temporary berm will be constructed around the harbor facility for protection from any offsite overland runoff.

**Economics**

A summary of the estimated costs of the proposed project for the first two phases is given below.
Construction Costs

A. Phase I

Entrance channel, basin, wave absorbers, aids to navigation
Shoreside facilities, not including sewage treatment and disposal facilities and other offsite utilities

Total

$47.7 million
$24.0 million

$71.7 million

B. Phase II Shoreside Facilities (total)

$25.4 million

Equivalent Annual Operation and Maintenance Costs

Phases I and II

Maintenance dredging, wave absorber, aids to navigation

$34,000

Costs for shoreside facilities have not been derived, yet.

Social

The main social characteristic of the project is that it will generate employment related to harbor operations. In addition to the development of Campbell Industrial Park, the increased industrial activity in this area may contribute to the accelerated and perhaps added urbanization of leeward Oahu. The shifting of population and economic activity towards the Ewa-Makakilo area as a secondary urban center is in accordance with the objectives and policies of the City and County General Plan.

Environmental

Briefly, the major environmental change associated with the proposed action will be the replacement of a terrestrial setting with a marine environment that is to be used for harbor activities. Some loss of marine life in the vicinity of the harbor channel is expected to occur during construction, but natural restoration of habitats is anticipated. The construction of the harbor basin and channel will also impact the archaeological sites and plant life habitats of the area. Archaeological sites will be studied and recovered, if necessary. The location of shoreside
facilities will also require that the possibly endangered plants, *Euphorbia skottsbergii* var. *kalaeloana* and *Achyranthes splendens* var. *rotundata*, be removed from their present habitats and cultivated elsewhere under controlled conditions.

**Use of Public Funds or Lands for Proposed Action**

Construction costs of the harbor and shoreside facilities will be paid by the federal and state governments, except for certain shipper-related facilities that will be provided by the users of the harbor. Costs for maintaining the entrance channel and basin depths, wave absorbers, and aids to navigation will be paid with federal funds. The operation and maintenance costs for the state shoreside facilities and the berth depths will be paid by the state.

As mentioned in the project description section, Campbell Estate will give to the state the 246 acres of land initially requested for the construction of the deep-draft harbor in return for the sales proceeds from about 90 percent of the dredged material.

**Historical Perspective, Phasing, and Timing of Action**

The concept of the proposed harbor at Barbers Point originated nearly 20 years ago when Congress, through the House Committee on Public Works, passed resolutions requesting the Board of Engineers for Rivers and Harbors to review reports on Honolulu Harbor with a view toward constructing a deep-water harbor at Barbers Point, Oahu, as well as increasing project depths at Honolulu Harbor. This review was sponsored by the Board of Harbor Commissioners.

In 1963, the Corps completed the review indicating that a deep-water harbor was feasible. The deep-draft harbor was authorized by Congress under Section 301 of the River and Harbor Act of 1965, and in 1968 the Corps conducted design and modal testing studies.

In 1969, the State Legislature appropriated $200,000 for the Barbers Point Deep-Draft Harbor project in Act 113/69. This was followed in 1971 by an additional $4,100,000 appropriation.
In evaluating the requirements for a second harbor, conditions at the existing Honolulu Harbor were taken into account. In 1973, the governor convened the Multi-Modal Task Force to extend the 1985 master plans of Honolulu Harbor to a new horizon of 1995. In its report, the Task Force recommended modifications to the Honolulu shoreside facilities to accommodate some of Oahu's long-range waterborne commerce needs. The Task Force, however, recognized that, even with federal and state modifications, Honolulu Harbor would not be physically able to accommodate containerized cargo facility and handling requirements beyond 1990 to 1995 and that a second Oahu commercial port would be needed.

In 1976, the Corps of Engineers completed Design Memorandum No. 1, plan formulation, and the EIS with supplement for the areas within the boundaries of the federal project. Design Memorandum No. 1, Phase II, Project Design was completed in 1977. Presently, the entire project including the state shoreside facilities are being addressed in this EIS.

The construction of shoreside facilities in Barbers Point Harbor and implementation of the planned improvements in Honolulu Harbor are inter-phased so that both harbors could accommodate the long-term cargo forecasts for Oahu. A tentative development plan in both harbors for the next ten years (FY 1978 to FY 1987) is shown in Table I-3. A tentative timetable for Barbers Point Harbor is given in Table I-4. This plan and timetable are not static. They are subject to continuous review, revision, and extension to future years to meet demands and changes that could occur in the ensuing years.
### TABLE I-3

**FY 1978-1987 DEVELOPMENT PLAN FOR HONOLULU HARBOR AND BARBERS POINT DEEP-DRAFT HARBOR**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>BUDGET BREAKDOWN</th>
<th>HARBOR: FY 1978-1987 HARBOR DEVELOPMENT PLAN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FY 78</td>
<td>$930,000</td>
</tr>
<tr>
<td></td>
<td>Design of P-52 &amp; P-51 and 14 Acre Container Yard.</td>
<td>$560,000</td>
</tr>
<tr>
<td></td>
<td>$130,000</td>
<td>- landfill of Battery Terminus.</td>
</tr>
<tr>
<td></td>
<td>$250,000</td>
<td>- Construction of Container Yard at H. Anchorage.</td>
</tr>
<tr>
<td></td>
<td>$50,000</td>
<td>- Miscellaneous Improvements.</td>
</tr>
<tr>
<td></td>
<td>FY 79</td>
<td>$8,290,000</td>
</tr>
<tr>
<td></td>
<td>Design of 2 1/2' draft.</td>
<td>$250,000</td>
</tr>
<tr>
<td></td>
<td>$1,520,000</td>
<td>- Construction of P-52 &amp; P-51 and 14 Acres.</td>
</tr>
<tr>
<td></td>
<td>$500,000</td>
<td>- Miscellaneous Improvements (26, $37,000 Federal).</td>
</tr>
<tr>
<td></td>
<td>$55,000</td>
<td>- Miscellaneous Improvements.</td>
</tr>
<tr>
<td></td>
<td>FY 80</td>
<td>$1,500,000</td>
</tr>
<tr>
<td></td>
<td>$7,292,000</td>
<td>- Sand Island - Completion of P-52 &amp; P-51, 14 Acres and OPA.</td>
</tr>
<tr>
<td></td>
<td>$140,000</td>
<td>- Sand Island - Design Ship Area and 1/2' Ext. P-52.</td>
</tr>
<tr>
<td></td>
<td>$150,000</td>
<td>- Inter Island Facility - Design of Facility Utilizations at 1/9-88.</td>
</tr>
<tr>
<td></td>
<td>FY 81</td>
<td>$1,190,000</td>
</tr>
<tr>
<td></td>
<td>$2,130,000</td>
<td>- Sand Island - Complete Plan (EF) and Back-up.</td>
</tr>
<tr>
<td></td>
<td>$180,000</td>
<td>- Ship Repair Facility - Design of Utilizations of P-24-26.</td>
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<td></td>
<td>$500,000</td>
<td>- Contin. of Utilizations of Ship Repair Facility.</td>
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<tr>
<td></td>
<td>$1,011,000</td>
<td>- Contin. of Utilizations of Inter-inter Island Facility.</td>
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<td>$5,000</td>
<td>- Miscellaneous Improvements.</td>
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<tr>
<td></td>
<td>FY 82</td>
<td>$1,140,000</td>
</tr>
<tr>
<td></td>
<td>$1,400,000</td>
<td>- Sand Island - Completion of P-52 Ext. (EF) and 14 Acres Back-up.</td>
</tr>
<tr>
<td></td>
<td>$200,000</td>
<td>- Miscellaneous Improvements.</td>
</tr>
<tr>
<td></td>
<td>FY 83</td>
<td>$2,520,000</td>
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<tr>
<td></td>
<td>$150,000</td>
<td>- Design Ext. to P-51 1/2' + 1/2' and Rebuilding Portion of Yard - Total 12 Acres.</td>
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<td></td>
<td>$75,000</td>
<td>- Miscellaneous Improvements.</td>
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<td></td>
<td>FY 84</td>
<td>$2,950,000</td>
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<tr>
<td></td>
<td>$150,000</td>
<td>- Sand Island - Completion of Design of P-51 Ext. and Container Yard.</td>
</tr>
<tr>
<td></td>
<td>$80,000</td>
<td>- Miscellaneous Improvements.</td>
</tr>
<tr>
<td></td>
<td>FY 85</td>
<td>$1,115,000</td>
</tr>
<tr>
<td></td>
<td>$1,000,000</td>
<td>- Sand Island - Start Costs of P-51 Ext. and Container Yard.</td>
</tr>
<tr>
<td></td>
<td>$105,000</td>
<td>- Miscellaneous Improvements.</td>
</tr>
<tr>
<td></td>
<td>FY 86</td>
<td>$1,140,000</td>
</tr>
<tr>
<td></td>
<td>$1,000,000</td>
<td>- Sand Island - Complete Construction of P-51 Ext.</td>
</tr>
<tr>
<td></td>
<td>$5,000</td>
<td>- Miscellaneous Improvements.</td>
</tr>
<tr>
<td></td>
<td>FY 87</td>
<td>$1,000,000</td>
</tr>
<tr>
<td></td>
<td>$50,000</td>
<td>- Sand Island - Design of Sand Island.</td>
</tr>
<tr>
<td></td>
<td>$50,000</td>
<td>- Miscellaneous Improvements.</td>
</tr>
<tr>
<td></td>
<td>$2,100,000</td>
<td>- Archaeology, Paleontology and Botanical Studies.</td>
</tr>
<tr>
<td></td>
<td>$110,000</td>
<td>- Project Envelope.</td>
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<tr>
<td></td>
<td>FY 88</td>
<td>$1,100,000</td>
</tr>
<tr>
<td></td>
<td>$3,900,000</td>
<td>- Bridging (State Cash Contribution) plus State Bonding. Federal Share = $8,800,000.</td>
</tr>
<tr>
<td></td>
<td>$200,000</td>
<td>- Archaeology, Paleontology and Botanical Studies.</td>
</tr>
<tr>
<td></td>
<td>FY 89</td>
<td>$1,100,000</td>
</tr>
<tr>
<td></td>
<td>$100,000</td>
<td>- Continued Bridging - Federal Share = $45,800,000.</td>
</tr>
<tr>
<td></td>
<td>FY 90</td>
<td>$100,000</td>
</tr>
<tr>
<td></td>
<td>Design of Horrington.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FY 91</td>
<td>$1,100,000</td>
</tr>
<tr>
<td></td>
<td>$2,000,000</td>
<td>- Construction Bridge.</td>
</tr>
<tr>
<td></td>
<td>$100,000</td>
<td>- Design Shoreline Facilities.</td>
</tr>
<tr>
<td></td>
<td>FY 92</td>
<td>$1,500,000</td>
</tr>
<tr>
<td></td>
<td>$1,500,000</td>
<td>- Construction Shoreline Facilities.</td>
</tr>
<tr>
<td></td>
<td>FY 93</td>
<td>$100,000</td>
</tr>
<tr>
<td></td>
<td>$100,000</td>
<td>- Design Shoreline Facilities.</td>
</tr>
<tr>
<td></td>
<td>FY 94</td>
<td>$1,000,000</td>
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<tr>
<td></td>
<td>$2,000,000</td>
<td>- Construction Bridge.</td>
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<td></td>
<td>$100,000</td>
<td>- Design Shoreline Facilities.</td>
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<tr>
<td></td>
<td>FY 95</td>
<td>$1,000,000</td>
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<tr>
<td></td>
<td>$1,000,000</td>
<td>- Construction Bridge.</td>
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<td>$100,000</td>
<td>- Design Shoreline Facilities.</td>
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<td></td>
<td>FY 96</td>
<td>$1,000,000</td>
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<tr>
<td></td>
<td>$1,000,000</td>
<td>- Construction Bridge.</td>
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<td></td>
<td>$100,000</td>
<td>- Design Shoreline Facilities.</td>
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<td></td>
<td>FY 97</td>
<td>$1,000,000</td>
</tr>
<tr>
<td></td>
<td>$1,000,000</td>
<td>- Construction Bridge.</td>
</tr>
<tr>
<td></td>
<td>$100,000</td>
<td>- Design Shoreline Facilities.</td>
</tr>
</tbody>
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### TABLE I-4

**TENTATIVE PHASE I CONSTRUCTION TIMETABLE**

<table>
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<tr>
<th></th>
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<tr>
<td>Dredging (federal)</td>
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<td></td>
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<tr>
<td>Dredging (state)</td>
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<tr>
<td>Engineering</td>
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<td></td>
</tr>
<tr>
<td>Harbor Construction</td>
<td></td>
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</tr>
</tbody>
</table>

Source: Parsons, Brinckerhoff, Quade, & Douglas, Inc.
II. DESCRIPTION OF THE ENVIRONMENTAL SETTING

The Barbers Point project site is located on the southwestern corner of Oahu. It is located 15 miles due west of Honolulu Harbor and approximately 20 road miles from downtown Honolulu. Presently, Honolulu Harbor is the only existing deep-draft harbor on the island and is the largest commercial port in the State of Hawaii.

The island of Oahu is the third largest island in the state and the center of social, cultural, economic, governmental, and military activities. Although the island comprises only 9.4 percent of the total land area in the state, about 80 percent of the state's mid-1975 population of 865,000 resides on this island.

The proposed Barbers Point Harbor is to be located north of the James Campbell Industrial Park, the first and only large-scale industrial complex outside of metropolitan Honolulu.

Existing, privately-owned navigation improvements within the project area consist of a 9-acre barge harbor with a 520-foot-wide, 700-foot-long, and 21-foot-deep basin and a 220-foot-wide, 700-foot-long, and 22-foot-deep entrance channel. The harbor was constructed in 1961 by the developers of the industrial park to enable industries in the area to ship some products directly by barge to other islands, thereby eliminating or reducing costs of trucking and transshipment to and from Honolulu Harbor. Use of the existing barge harbor has been limited by its size and surge problems. In 1974, the harbor handled a total of about 5,000 tons of cargo, primarily concrete products. This harbor is still in use.

CLIMATE

Barbers Point is located on the leeward coastal lowlands of Oahu. This area is characterized by abundant sunshine, persistent tradewinds, equable temperatures, and moderate humidities. The mean annual rainfall is less than 20 inches and the mean annual temperature is 73.5 degrees F. Northeasterly tradewinds predominate about 85 percent of the time and vary from 10 to 25 knots. Winds from the west and southwest occur primarily during the months of October to April. Occasional adverse "kona" or
southerly winds occur on the average of three times a year. Kona wind directions (from south-southeast to west directions) predominate about 30 days per year in this area.

GEOLGY AND TOPOGRAPHY

The Barbers Point Harbor project area is located on the Ewa plain, which is an emerged ancient coral-algae calcareous reef formed during the Pleistocene Period when the ocean level was at a higher elevation. The Ewa plain extends from sea level at the coastline to an elevation of about 100 feet, about 3 to 5 miles inland. The plain is basically flat with a few isolated bluffs eroded by Honouliuli Stream. It is composed of calcareous material which has been modified, consolidated, and cemented by dissolution, rain, air and other chemical factors to form a hard but extremely permeable surface. The shallow karst topography around the harbor site is marked by small sinks (holes) which have dissolved out of the limestone and are interspersed with abrupt ridges and irregular rock masses.

SOILS

The U.S. Soil Conservation Service classifies the soil in broad and fine classifications. In the broad classification, the soils in the project area belong to the "Lualualei-fill land ewa association". Its characteristics are described as "deep, nearly level to moderately sloping, well drained soils that have a fine textured or moderately textured subsoil or underlying material, and areas of fill land on coastal plains."

In terms of the finer soil classification by the U.S. Conservation Service, the project area is almost entirely designated "coral outcrop." There are small portions by the proposed location of the harbor entrance (northern side) that are classified as Mamala stony, silty, clay loam and as Jaucas sand. These areas, presently cultivated in acres of sugar cane, are considered to be of marginal value for agricultural use.

HYDROLOGY AND DRAINAGE

The hydrology of the harbor area is described by Dale (1968), with additional information given by Williams (1976). Groundwater in the
Barbers Point area occurs in two aquifers; the more important is the Waianae Volcanic Series basal aquifer, while the brackish coral aquifer immediately underlies the project area (Figure II-1). The coral aquifer is estimated to be at least 300 feet thick and is separated from the underlying basal aquifer by a zone of low permeability known as an aquiclade, which is formed by alluvium and marine sediments. This barrier retards the flow of fresh water from the basal aquifer to the coral aquifer.

The basal aquifer is a source of potable fresh water supply, and is recharged by infiltration from precipitation in the Waianae Range. The Ewa plain lies outside of this recharge area.

The coral aquifer is recharged by (1) the seaward movement of groundwater from the basal aquifer, (2) the direct infiltration of rainfall on the Ewa plain, (3) the infiltration from the stream runoff, and (4) the infiltration of water used for irrigation purposes. The movement of groundwater in the coral aquifer in the project area is seaward in a southwest direction. Due to tides and the underlying salt water, fresh groundwater mixes with salt water as it approaches the shoreline.

The surface drainage conditions in the Ewa Plain are rather unique. Runoff from the Waianae Mountains discharges onto the plain but is readily absorbed by the porous coral substrate so that most of the discharge never reaches the ocean by overland runoff. Near the mountains, erosion as well as agricultural activity has deposited rich layers of soil. There are no well-defined natural surface drainage patterns on the lower areas of the coral plain since its absorptive capacity accommodates most of the storm runoff.

The area above the H-1 freeway has an average slope of 12 percent, except for the slope of Puu Palailai and in the vicinity of gullies and ridge lines where it exceeds 20 percent. The area is generally dry but supports kiawe trees and small shrubs. Lava rock outcrops are also characteristic. In contrast, the makai area below the H-1 freeway has slopes of less than 0.5 percent with scattered mounds and depressions. A portion of the area mauka of the U.S. Navy railroad is used for sugarcane cultivation, while the remainder is leased for other uses. In areas not
WAIANAE VOLCANIC SERIES

EXISTING HARBOR

PROPOSED HARBOR

Coral Aquifer

Legend:
- Alluvium
- Coral Aquifer
- Waianae Volcanic Series

Scale in miles: 0 - 1/2

Figure II-1
Geologic Map

Drawn from USGS, Dale 1963
being utilized for sugarcane cultivation, heavy growth of kiawe, haole koa, grass, and brush undergrowth dominate.

The harbor project area presently receives drainage runoff from the Makaiwa Gulch and Palailai-Awanui areas. No flooding problems have been identified in the project area. During flash storms, however, the large catchment area mauka of Malakole Road contributes flood water to the low-lying areas. The percolating quality of the cane lands and the coral subgrade usually can handle the average storm, but when the storm duration is long and the soil becomes saturated, the low-lying areas are subject to flooding. The area mauka of the Standard Oil Refinery and Malakole Road and the ponding site at the intersection of Kalaekoa Boulevard and Malakole Road usually are underwater during severe storm conditions. Some localized flooding also occurs in the Barbers Point Naval Air Station area.

COASTAL WATER QUALITY

All coastal waters of the State of Hawaii have been divided into Water Quality Segments and Effluent Limitation Segments by the State Department of Health, as specified in Section 303(e) of Public Law 92-500, the Federal Pollution Control Act Amendments of 1972 (Figure II-2).

The Barbers Point coastline lies within the Ewa portion of the West Oahu Effluent Limitation, Segment II. This designation indicates that most of the time the coastal waters of this area satisfy existing State Water Quality Standards and will probably continue to do so. According to present State Water Standards, the existing barge harbor waters are designated Class B. Class B waters are to be protected for uses such as small boat harbors, commercial and industrial shipping, bait fishing, compatible recreation, the support and propagation of aquatic life, and aesthetic enjoyment. The coastal waters around the project site are designated Class A and are to be protected for recreation, aesthetic enjoyment, and the support and propagation of aquatic life.

MARINE ENVIRONMENTAL SETTING

Tidal conditions in the Barbers Point area are similar to those at Honolulu Harbor. The mean tidal range between mean lower low water (MLLW)
FIGURE 11-2
WATER QUALITY CLASSIFICATION MAP

Drawing not to Scale
and mean higher high water is 1.9 feet. Mean sea level is 0.8 feet above MLLW. The maximum extreme range is 4.0 feet. The current pattern along the coast of the project area is uniform and under strong tidal influence. During flood tides and tradewind conditions, the offshore current moves from northwest to southeast. During ebb tide and tradewind conditions, the current reverses and moves from southeast to northwest. Localized littoral currents vary in velocity and direction. Velocities range from 0 to 2 knots. Westerly and southwesterly storm waves, which are the most critical deep water waves, cause heavy surge in the existing barge harbor. Lighter surge also occurs during more usual wave conditions.

The coastal plain is almost flat at the project site, sloping 1 foot in 300 feet toward the ocean. The ocean floor slopes seaward at the following rates:

<table>
<thead>
<tr>
<th>Ocean depth (feet)</th>
<th>Distance from shore (feet)</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>800</td>
<td>1: 40</td>
</tr>
<tr>
<td>25</td>
<td>2,500</td>
<td>1:340</td>
</tr>
<tr>
<td>60</td>
<td>3,200</td>
<td>1: 20</td>
</tr>
<tr>
<td>600</td>
<td>6,000</td>
<td>1: 5</td>
</tr>
</tbody>
</table>

The uniformity of the slope and smooth coral reef surface is broken by scattered shallow pits filled with fine silty sand and large boulder-sized "coral head" masses of rock that have broken off the reef and have been deposited many yards inland from the seaward edge by combined storm wave and tidal action.

Coral limestone breccia is exposed in the 8-foot-high walls of the existing barge harbor at low tide. Washing and dissolution by wave surge in the harbor have made large caverns and cavities in the rock, often extending back from the wall face for 15 to 20 feet. On-land boring studies showed two coral reef structures separated by a 5- to 12-foot thick layer of calcareous sandstone (known as "beachrock"). The bottom of the lower reef was not penetrated. The two coral reef structures consist of skeletons of frameworks of coral limestone made by several thousands of different kinds of lime-secreting invertebrate animals and algae. The reefs are particularly well developed and structurally intact.
There are no significant sand beaches along the project area. Bottom and beach materials adjacent to the project area consist of hard coral rock or rubble. Shallow deposits of sand overlie the coral in small pockets, but the quantity of littoral drift in the area of the existing barge harbor appears negligible. Shoaling has not been observed in the channel of the barge harbor. No erosion or scour problems are evident in the project vicinity.

No serious point or nonpoint discharge problems have been identified within the area, and coastal water quality is not considered a problem at this time. The high quality of the waters at the project site is probably due to the absence of major point discharges, sedimentation from overland runoff, and stream drainages into the waters. The present relatively low level of development along the coastline also contributes to the high quality of the coastal waters.

A marine environmental study of the Barbers Point Harbor area was completed in November 1975 by Environmental Consultants, Inc. (ECI) for the Corps of Engineers. The report is based on data collected on seven days in the field during the months of October and November 1975. The physical parameters studied included circulation within the existing barge harbor, current profiles in the channel during rising and falling tides, temperature and salinity profiles, in situ light penetration measurements, and laboratory turbidity analyses of discrete water samples. Additional information was developed by ECI for the Corps in a January 1977 report.

Chemical analyses included in situ oxygen profiles and nutrient concentrations from discrete water samples. Biological investigations included benthic transects, fish counts, chlorophyll concentrations in the water column, and plankton tows. The station locations for water sampling and for fish and invertebrate censuses are shown on Figures II-3 and II-4.

The investigations characterized five basic bottom habitats in and adjacent to the Barbers Point Barge Harbor. The major characteristics and depths of these bottom habitats are summarized in Table II-1.
Source: Environmental Consultants, Inc. (ECI)

FIGURE II-3
STATION LOCATIONS FOR WATER SAMPLES

Not drawn to scale

II-9
Source: Environmental Consultants, Inc. (ECI)

FIGURE II-4
APPROXIMATE LOCATIONS OF STATIONS WHERE FISH AND INVERTEBRATES WERE CENSUSED

Not drawn to scale
TABLE II-1

MAJOR CHARACTERISTICS AND DEPTHS OF FIVE BOTTOM HABITATS
IN AND ADJACENT TO BARBERS POINT HARBOR

<table>
<thead>
<tr>
<th>Depth</th>
<th>Major Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 - 15 m</td>
<td>Sand rubble substratum, little relief</td>
</tr>
<tr>
<td>15 - 7 m</td>
<td>Hard limestone substratum, high relief</td>
</tr>
<tr>
<td>7 m - shore</td>
<td>Hard limestone substratum, low relief</td>
</tr>
<tr>
<td>7 m</td>
<td>Dredged channel, rubble bottom, little relief</td>
</tr>
<tr>
<td>8 - 0 m</td>
<td>Harbor, mud bottom, edges of limestone rock having</td>
</tr>
<tr>
<td></td>
<td>high relief</td>
</tr>
</tbody>
</table>

The following summary of the study conclusions has been extracted from the ECI report:

1. The seepage of groundwater through the basin walls and floor is responsible for density stratification and maintenance of a two-layer system in the harbor, a lower salinity surface layer, and a deeper, more saline bottom layer.

2. The general circulation is characterized by separate surface and bottom layers. The surface layer typically flows seaward during both ebbing and flooding tides. It is accentuated by typical tradewind conditions.

3. The surface layer exists even in the absence of temperature stratification.

4. The depth of the surface layer is approximately eight feet in the channel but may vary somewhat inside the harbor and in response to tidal phase shifts.

5. The water loss due to this continual surface outflow is compensated for by groundwater seepage into the harbor and sea water drawn into the subsurface layer.

6. Large traffic induces strong vertical mixing in the waters of the harbor and alters circulation patterns within the basin.
7. Flushing of the harbor basin is very efficient, characterized by a residence time on the order of half a day.

8. Light penetration through the water column increased from the most interior harbor station (station 1) seaward to the extreme outside control station (station 5). Typical extinction coefficients ranged from 0.58 at station 1 to 0.07 to station 5.

9. Turbidity of the harbor water was typically low, mean values ranging from 5.2 FTU at station 1 to 0.3 FTU at station 5. Entrance of a large barge significantly increased the turbidity for at least 5 hours afterwards.

10. Dissolved oxygen in the harbor waters was near saturation at all stations and depths sampled.

11. The mean concentration of chlorophyll-a varied from 0.47 mg chlorophyll-a per m$^3$ at station 1 to 0.04 mg chlorophyll-a per m$^3$ at station 5. There was a consistent increase with depth at stations inside the harbor.

12. All of the nutrients measured showed a decrease from station 1 to station 5. Unlike the chlorophyll results, however, nutrient concentrations were generally higher in the surface layer.

13. Dissolved nutrients in the harbor waters were generally present in concentrations nonlimiting to phytoplankton growth. Exceptionally high concentrations of nitrate-nitrogen were repeatedly encountered at 1 m depths at stations 1 and 2. Presumably, these high concentrations of nitrate are carried into the harbor with the brackish groundwater from the coral aquifer.

14. Zooplankton biomass was much less in the harbor than outside; however, the percentage (by dry weight) of large obligate carnivores present varied from 4.7 percent inside the harbor to 1.4 percent outside.

15. The highest percentage of coral cover and fish species diversity occurs at station C just seaward of the channel markers. The number of fish species and diversity indices decrease both in seaward and shoreward directions from station C.
16. The area of physical damage caused by the original dredging appeared to extend at least 100 meters seaward from the mouth of the harbor. This area was characterized by a rubble substratum and had a lower coral cover than control areas out of the channel.

17. The depth of sediment on the harbor floor was approximately 0.75 meters.

18. The harbor is inhabited mainly by juvenile fish of three species, *Pomacentrus jenkinsi* (mamo), *Thalassoma duperryi* (hinalea), and *Stethojulis balteata* ('omaka), and, at the time of sampling, was not a productive area for commercially important fish.

19. Coral colonies in the harbor were generally larger than those outside, indicating that the harbor walls may be a relatively more stable substratum with low mortality and low recruitment rates. The apparently lower suitability outside the harbor may be attributed to the higher wave energy and scour environments.

20. Litter is distributed mainly around the perimeter of the harbor where boulder rubble prevents the trash from sinking into the soft sediments of the harbor floor.

Light penetration and turbidity data, chlorophyll-a concentrations, nutrient data, and the list of fish species, and numbers observed are reproduced from the report and are included as Appendix A-1.

**TSUNAMIS**

The "Catalogue of Tsunamis in the Hawaiian Islands" by George Pararas-Carayannis estimates the shoreline elevation profile by the project area to be 12 feet. With a 25 percent projection factor, the estimated shoreline wave height for a 100-year tsunami is 15 feet (see Figure II-5). As the wave moves inland, the height attenuates at an estimated rate of 1 percent until it encounters the ground level. Better estimates of wave runup can be calculated by taking into account ground slope, surface friction, and wave period.
Source: (1) Pararas-Carayannis, G., Catalogue of Tsunamis in the Hawaiian Islands
(2) U.S. Army Corps of Engineers

FIGURE 11-5
TSUNAMI SHORELINE ELEVATION PROFILE
The Oahu Civil Defense Agency has prepared a map showing the probable inundation zone resulting from a 100-year recurrence interval tsunami. This zone is shown on Figure II-6.

Development within the tsunami inundation zone will have to conform to governmental regulations applicable at the time of design. For non-residential buildings, the Honolulu City and County building code requires that all structures below the 100-year tsunami envelope be waterproofed, preferably according to the standards described in the U.S. Army Corps of Engineers' Flood Proofing Regulations, EP-1165-314. Buildings in the tsunami inundation area are eligible for subsidized insurance provided by the emergency provisions of the National Flood Insurance Program. The Corps of Engineers will conduct a detailed computer study of the proposed harbor that will predict the expected degree of flooding from a 100-year tsunami. This information will be used in the design of the shoreside facilities.

**TERRESTRIAL BIOLOGY**

**Botanical Survey**

Potentially endangered species of plants are known to be present within or adjacent to the project area. The Barbers Point Harbor Final Environmental Statement and Supplement, prepared by the U.S. Army Corps of Engineers, lists five species known from the Barbers Point area that are included in the Department of the Interior's proposed endangered and threatened species list.\(^1\) This information is based largely on the studies conducted by Herbst (1976).

As part of the subject EIS, a comprehensive flora and fauna survey for 524 acres, which includes the harbor, shoreside facilities, and the proposed stockpile areas, was made. Field work was conducted over a two-week period from May 25 through June 9, 1977.

Vegetation in the Barbers Point Harbor project area is characteristic of that found in dry areas (see Figure II-7). The major vegetation along

Figure II-6

Estimated inundation limits for 100 year tsunami
the beach is strand vegetation that is strongly influenced by the sea. Strand vegetation is well adapted to high salinity, intense solar radiation, and the sandy substrate found in this zone. The range and abundance of many of the strand species have been greatly affected by direct disturbances and indirectly by the seaward encroachment of the introduced Prosopis pallida (kiawe).

Most of the project site, excluding areas that have been quarried, is occupied by the Prosopis forest. The Prosopis varies from a closed to an open tree canopy and may form a shrub 6 feet tall or a tree 33 feet or more tall.

During the course of the study, two species of plants listed in the Federal Register (1976) were found. Their relative abundance, distribution, and conditions of the species and their habitat were noted. Because of the large number of plants in the area, additional plants were undoubtedly missed during the survey.

A colony of Achyrantes splendens var. rotundata Hbd. was located in the Honouliuli military reservation area (Figure II-8). Approximately 115 of these plants were well-hidden behind a thicket of Prosopis and Pluchea. The plants were rather spindly since they were growing under shade, as compared to the more robust plants found growing in fully-exposed areas near the Coast Guard Lighthouse outside the study site. The plants were flowering and setting seed. Seedlings were also found in the area.

Three major colonies of Euphorbia skottsbergii var. kalaakoana Sherff were found in the study site (Figure II-8), with approximately 2,450 plants found during the survey. All four varieties of this species are considered very rare, with two varieties possibly extinct. This variety was considered extinct since its habitat has been greatly disturbed (Herbst, 1976) and is among those species being considered for inclusion in the U.S. Department of the Interior's official list of rare and endangered species.

The range of the species has been increasingly limited by direct disturbance. It is known only from the project area at present. The species seemed to prefer either bare coralline rock or the very shallow
soil that lies over this substrate in partial or full sun. This might be explained in part by the competition due to exotic species, such as Setaria, Asystasia, and Euphorbia genticulata, which prefer the deeper soil. The present major distribution of the species in the study area is along the edges of the Prosopis community near the fringes of the quarry and along previously bulldozed roads. A few plants can be found further in from the quarry area under the Prosopis, but these are usually where there is a relatively solid substrate and the Prosopis canopy is more open. Plants were not found south of Malakole Road behind the beach, on the coralline areas, or within the Prosopis-Batis community. This suggests that the plants may not be tolerant of high salinity, primarily from salt spray.

At the time of the survey, plants were blooming profusely. Individuals in the open areas set flower and fruit in greater abundance than in the shaded areas. The peak flowering period appears to extend from April through June. This observation, however, is based on only one survey and may vary with the coming of winter rains.

Seeds are dispersed by an explosive dispersal mechanism. As the capsules mature and dry out, uneven shrinkage causes the capsules to discharge. Because of this, the plant does not have a means for long-distance dispersal and there is a contiguous distribution of the same population.

The present population is stable and maintaining itself. The length of time needed to go from seedling to the first reproductive cycle is unknown. It appears that seeds require partial shade for germination.

A species checklist of the plants encountered in the project area is given in Appendix A-2.

Fauna Survey

In addition to the botanical survey, a fauna survey was conducted for this EIS. A walkthrough survey was conducted covering all wildlife habitats, and five general habitats were recognized in the study area (see Figure II-9). They are as follows:
1. Kiawe
2. Sugarcane fields
3. Quarry and disturbed area
4. Coastal
5. Ponding area about 500 feet from the coastline and 1,000 feet south of the existing barge harbor

Visual sightings were recorded in the field and special mammal traps, consisting of 24 traps of varying sizes located at five preselected sites throughout the study area, were set. The traps were set for a total of 120 trap-days (24-hour period). The migratory nature of many species prompted offsite observations, primarily in the highly developed Campbell Industrial Park area and on lands adjacent to the project area at a radius of approximately one mile.

The wildlife in the project area also reflects the low rainfall and attendant vegetation levels and the high level of disturbance to the natural setting by man's activities. Common mammals found in the area during the survey were feral dogs and cats, mongoose, house mice, and rats. Domestic animals are also located in the vicinity of the project site. A 72-acre cattle feedlot with a capacity of about 14,000 head of beef-type cattle is located about 1.5 miles south of the existing barge harbor. Chicken and hog farms are also located in the area.

The black-crowned night heron, which is the only indigenous resident species recorded in the project area, was seen during the survey. The two indigenous migratory species using the project area as wintering grounds are the American golden plover and the wandering tattler. These two species of birds were seen feeding at the ponding area (see Figure II-9), on the shoreline, and near the existing barge harbor.

Twelve exotic resident species were recorded during the May through June survey. The most abundant and ubiquitous bird observed in the project area was the barred dove. This dove is ranked as occasional to abundant in all major wildlife habitats, except the coastal area. Lace-necked doves were also prevalent in similar habitats. Coveys of doves were frequently flushed from herb and grass cover. Nesting doves were not
observed. Kentucky and Brazilian cardinals were most frequently found in the forest areas. A nesting Brazilian cardinal was sighted in a kiawe tree in the middle of the ponding area. House sparrows were also abundant in wooded areas and nesting sites were common in the tall kiawe trees. Occasional species of Japanese white eyes were more often heard than seen since they were well camouflaged within the vegetation and quickly moved from one tree to the next. Common mynahs, house finches, and ricebirds were recorded only adjacent to roadways or cultivated areas, such as that fronting the oil refinery. The Campbell Industrial Park area was also surveyed for birds, and, in addition to the exotic species previously mentioned, the mockingbird was occasionally seen here. It was seen only once in the project area, near the existing boat harbor. Cattle egrets were seen flying over the quarry area. This species is commonly found in sugarcane fields during harvesting operations. Fields south of the quarry had recently been harvested.

A cock pheasant was flushed near the quarry fringe. Aside from the doves, this was the only game bird recorded during the survey. The highly developed agricultural and industrial areas surrounding the project area preclude the presence of large populations of game birds.

A species checklist of fauna and a tabulation of the maximum number of mammals and birds recorded during a daily survey is found in Appendix A-3.

According to the U.S. Fish and Wildlife Service, no endangered bird species have been observed in the project area. The State Department of Land and Natural Resources pointed out that the Hawaiian owl is considered endangered on the island of Oahu; however, no known sightings of the Hawaiian owl have been recorded in the area.

**Aquatic Organisms**

Two species observed the field survey deserve special consideration.

The first unusual aquatic organism discovered was *Triops longicaudatus*. This organism was found in the waters of the low-lying ponding area south of the existing barge harbor. The discovery was made after heavy rains had inundated the area. Large populations were found in every water
puddle. This "population explosion" lasted approximately one week but subsided when the water began to evaporate and the level dropped rapidly. The *Triops* species suddenly disappeared, and dragonfly nymphs and water beetles began to appear. This observed phenomenon may be a natural function of their life cycle or may be due to predation by other species.

The second aquatic organism recorded was a species of shrimp identified to be *Halocaridina rubra*. The shrimp were found at four separate locations in the project area in sinkholes. Additional sinkholes containing shrimp species are probably located throughout the project area.

**HISTORIC AND CULTURAL SETTING**

The Barbers Point area is located within the ahupua'a of Honouliuli in the Ewa district. This area is part of the large emerged limestone reef, commonly known as the Ewa plain. The plain stretches along the coast from Pearl Harbor through Waianae. Agricultural, residential, and military developments have altered much of the characteristic topography of the region.

The Barbers Point area in the past has been the subject of very limited study, both archaeologically and historically. The previous lack of interest may be attributed, in part, to the austere natural setting of the flat, dry, coral plain and the apparent lack of importance attached to the area by early travelers. At present, the Barbers Point Harbor area has been declared eligible to be included in the National Register of Historic Sites (see Figure II-10). The importance of the area is in providing information on habitation pattern and cultural practices. It is expected that the status of this site will be lowered when the information has been obtained.

The first survey of sites in the Barbers Point area was conducted in 1970 by Ernest Lewis, a graduate student at the University of Hawaii. In 1975, a cultural reconnaissance was conducted by the Bishop Museum for the U.S. Army Corps of Engineers as part of the planning studies for a deep-draft harbor at Barbers Point. Other work by the Bishop Museum over the past 17 years has been limited to salvage work prior to the construction of the Standard Oil refinery and the present barge harbor.
Shaded areas are areas (A, B, C, D) surveyed.
Scale: 1:2400

FIGURE II-10
MAP OF ARCHAEOLOGICAL SURVEY BY BISHOP MUSEUM

Source: Bishop Museum
A brief summary of Bishop Museum's 1975 cultural reconnaissance is as follows.

A total of 92 sites exist in the area. Most of these sites fall into the following general categories:

1. Large to moderately large structural forms: enclosures, walls, and cairns
2. Smaller structural forms: C-shapes, enclosures, mounds, alignments, platforms, L-shapes, and cists
3. Modified natural features: walled sinks and sinks with modified interiors
4. Site clusters: heterogeneous and homogeneous aggregations

Table II-2 lists the 92 recorded sites by survey units A through D, and site locations are shown on Figure II-10. In addition to sites listed in Table II-2, 167 modified sinks and ahu were tallied but not numbered or otherwise recorded. These features were distributed as follows:

<table>
<thead>
<tr>
<th></th>
<th>Ahu</th>
<th>Modified Sinks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area A</td>
<td>41</td>
<td>21</td>
</tr>
<tr>
<td>Area B</td>
<td>14</td>
<td>37</td>
</tr>
<tr>
<td>Area C</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Area D</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>82</td>
<td>85</td>
</tr>
</tbody>
</table>

The Bishop Museum conducted an intensive cultural survey for the Corps of Engineers of the area covered by the reconnaissance survey in order to gather more information from this area. Cultural salvage work is continuing on the federal project lands.

Another study is presently being undertaken by Archaeological Research Center of Hawaii, Inc. (ARCH) for the Water Transportation Facilities Division, State of Hawaii, as part of the state's planning studies for the proposed Barbers Point Harbor. ARCH performed a relocation survey of the area within the proposed state shoreside facilities, parts of which were
SITES RECORDED IN THE BARRIERS POINT PROJECT AREA, SURVEY UNITS A-D.

<table>
<thead>
<tr>
<th>Area A</th>
<th>Area B</th>
<th>Area C</th>
<th>Area D</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-04-86-</td>
<td>50-04-86-</td>
<td>50-04-86-</td>
<td>50-04-86-</td>
</tr>
<tr>
<td>58* Enclosure</td>
<td>91 Two walled sinks</td>
<td>** Large sinkhole</td>
<td>Wall</td>
</tr>
<tr>
<td>59 Walled sink</td>
<td>92* C-shape</td>
<td>24 Enclosure</td>
<td>24 Enclosure</td>
</tr>
<tr>
<td>60 U-shape</td>
<td>93* Enclosure</td>
<td>25 Enclosure</td>
<td>25 Cluster</td>
</tr>
<tr>
<td>61 Cluster</td>
<td>94* Cluster</td>
<td>26 Cluster</td>
<td>26 Mound</td>
</tr>
<tr>
<td>62** Enclosure</td>
<td>95* Cairns and filled sinks</td>
<td>27 Cluster</td>
<td>27 Mound cluster</td>
</tr>
<tr>
<td>63** Enclosure</td>
<td>96* Two Cairns</td>
<td>28 Cluster</td>
<td>28 Mound cluster</td>
</tr>
<tr>
<td>64 Walls</td>
<td>97** Enclosure</td>
<td>29 Cluster</td>
<td>29 Platform</td>
</tr>
<tr>
<td>65 Walls</td>
<td>125** Enclosure</td>
<td>30 Cluster</td>
<td>30 Mound</td>
</tr>
<tr>
<td>66 Cluster</td>
<td>67 Two walls</td>
<td>31 Cluster</td>
<td>31 Mound</td>
</tr>
<tr>
<td>68 Cluster</td>
<td>69 C-shapes</td>
<td>32 Cluster</td>
<td>32 Mound</td>
</tr>
<tr>
<td>70* C-shapes</td>
<td>71* Enclosure</td>
<td>33 Cluster</td>
<td>33 Mound</td>
</tr>
<tr>
<td>72 Two C-shapes</td>
<td>73 Two C-shapes</td>
<td>34 Cluster</td>
<td>34 Mound</td>
</tr>
<tr>
<td>74 Sink with stepped ramp</td>
<td>75** Enclosure</td>
<td>76 Enclosure</td>
<td>76 Enclosure</td>
</tr>
<tr>
<td>77** Enclosure</td>
<td>78* Enclosure</td>
<td>79** Enclosure</td>
<td>79 Cairns</td>
</tr>
<tr>
<td>79 Sink with wall at bottom</td>
<td>80** Cairns</td>
<td>80** Cairns</td>
<td>80 Cairns</td>
</tr>
<tr>
<td>81 Walled sink</td>
<td>101 Mound</td>
<td>101 Mound</td>
<td>101 Mound</td>
</tr>
<tr>
<td>82 Two walled sinks</td>
<td>102 Mound</td>
<td>102 Mound</td>
<td>102 Mound</td>
</tr>
<tr>
<td>83 Walled sink</td>
<td>103* Enclosure</td>
<td>103 Enclosure</td>
<td>103 Enclosure</td>
</tr>
<tr>
<td>84 Enclosure and wall</td>
<td>104 Wall</td>
<td>104 Wall</td>
<td>104 Wall</td>
</tr>
<tr>
<td>85 C-shape</td>
<td>105* Circular enclosure</td>
<td>105 Circular enclosure</td>
<td>105 Circular enclosure</td>
</tr>
<tr>
<td>86 Walled sink</td>
<td>106* C-shape</td>
<td>106 C-shape</td>
<td>106 C-shape</td>
</tr>
<tr>
<td>87 Wall and walled sink</td>
<td>107 Trail</td>
<td>107 Trail</td>
<td>107 Trail</td>
</tr>
<tr>
<td>88 Railroad bed</td>
<td>108 Walled sink</td>
<td>108 Walled sink</td>
<td>108 Walled sink</td>
</tr>
<tr>
<td>89 Railroad bed</td>
<td>109 Walled sink</td>
<td>109 Walled sink</td>
<td>109 Walled sink</td>
</tr>
<tr>
<td>90 Walled sink</td>
<td>110 Walled sink</td>
<td>110 Walled sink</td>
<td>110 Walled sink</td>
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<tr>
<td>91 Walled sink</td>
<td>111 Walled sink</td>
<td>111 Walled sink</td>
<td>111 Walled sink</td>
</tr>
<tr>
<td>92 Walled sink</td>
<td>112 Cluster</td>
<td>112 Cluster</td>
<td>112 Cluster</td>
</tr>
<tr>
<td>93 Walled sink</td>
<td>113 Cluster</td>
<td>113 Cluster</td>
<td>113 Cluster</td>
</tr>
<tr>
<td>94 Walled sink</td>
<td>114 Walled enclosure</td>
<td>114 Walled enclosure</td>
<td>114 Walled enclosure</td>
</tr>
<tr>
<td>95 Walled sink</td>
<td>115 Walled sink</td>
<td>115 Walled sink</td>
<td>115 Walled sink</td>
</tr>
<tr>
<td>96 Walled sink</td>
<td>116 Walled sink</td>
<td>116 Walled sink</td>
<td>116 Walled sink</td>
</tr>
<tr>
<td>97 Walled sink</td>
<td>117 Walled sink</td>
<td>117 Walled sink</td>
<td>117 Walled sink</td>
</tr>
<tr>
<td>98 Large cairn</td>
<td>118 Walled sink</td>
<td>118 Walled sink</td>
<td>118 Walled sink</td>
</tr>
<tr>
<td>99* Sink</td>
<td>119 Large cairn with walls</td>
<td>119 Large cairn with walls</td>
<td>119 Large cairn with walls</td>
</tr>
<tr>
<td>100 Mound and wall</td>
<td>120 Enclosure</td>
<td>120 Enclosure</td>
<td>120 Enclosure</td>
</tr>
<tr>
<td>116 Platform</td>
<td>121 Enclosure</td>
<td>121 Enclosure</td>
<td>121 Enclosure</td>
</tr>
<tr>
<td>118 Alignment</td>
<td>122 Cluster</td>
<td>122 Cluster</td>
<td>122 Cluster</td>
</tr>
<tr>
<td>123 Wall and walled sink</td>
<td>124 Sink</td>
<td>124 Sink</td>
<td>124 Sink</td>
</tr>
<tr>
<td>126 Sink with ci plant</td>
<td>127 Sink with roof sinks</td>
<td>127 Sink with roof sinks</td>
<td>127 Sink with roof sinks</td>
</tr>
<tr>
<td>128 Cluster</td>
<td>129 Cluster</td>
<td>129 Cluster</td>
<td>129 Cluster</td>
</tr>
</tbody>
</table>

* Salvaged during 1976 fieldwork. ** Tested during 1976 fieldwork. † Contains fossil birdbone.

Source: Bishop Museum

TABLE II-2
RECORDED ARCHAEOLOGICAL SITES
BY BISHOP MUSEUM

II-27
previously surveyed by the Bishop Museum. A reconnaissance survey of parts of the proposed stockpile area was also done. The rest of the proposed stockpile area is currently under investigation to supplement the Bishop Museum's findings. The results of the ARCH preliminary report are summarized below.

1. Relocation survey of state increment, area "I" (Figure II-11). Most of the state's increment of the overall proposed project area has either been disturbed by construction of the existing barge basin or been extensively quarried prior to the present study. Relocation efforts within the remaining "undisturbed area" have identified and recorded 42 of the expected archaeological features. These include 9 ahu (rock mounds) and 33 structurally-modified sinkholes.

Some of the naturally formed sinkholes, which average 1 to 2 m. (3 to 7 feet) in diameter, have been modified either by filling in with large rock fragments and paving over with smaller-sized material or by partially encircling with low, stacked rock walls. In most cases, these walls are quite collapsed. The exact nature of these features is not known at this time; however, further study during the upcoming salvage operations should provide some insights. As for the ahu (rock mounds), it was preliminarily suggested by ARCH that they may have functioned as some sort of boundary markers. At present, however, the number of ahu in the state's increment is too small to test this proposition. Although all appear to be intentional constructions, only follow-up test excavations will help to resolve this question regarding their function.

The relocation survey also identified three "new" sites, all along the southern perimeter of the state's increment. Two are small, roughly rectangular enclosures measuring c. 3 by 4 m. (10 by 13 feet). Both are constructed of stacked stonewalls c. 1 m. (3 feet) high around three sides. The third site appears to be a house complex with associated sinkholes and a
deep sinkhole that may have served as a well. The house site is marked by a single course of stone forming a rectangular enclosure c. 4 by 5 m. (13 by 17 feet). There is a well-developed deposit in and around the enclosure that should provide material for analysis. Several quite large but shallow sinkholes lie immediately to the south of the enclosure. All contain well-developed humic deposits that would have been suitable for limited cultivation. Finally, a large and rather deep sinkhole is located just beyond the shallow sinks. The presence of water in this probably natural feature suggests that it could have served as a well that could have provided a relatively reliable source of water for planting in the nearby sinks.

2. Cultural reconnaissance of areas A, B₂, C, E, and F. These areas were designated "optional stockpile areas." Area A is presently under federal control as part of the Honouliuli military reservation, formerly known as Camp Malakole. This is located on the seaward (makai) side of Malakole Road. Areas B₂, C, E, and F are located within the Campbell Estate portion of the project area (see Figure II-11) on the inland (mauka) side of Malakole Road.

Cultural reconnaissance of these areas identified and provisionally recorded 39 new archaeological sites. By survey area, the results are as follows:

Area A: No remains of archaeological significance. The entire area has been bulldozed clear for military use.

Area B₂: Nine archaeological sites scattered throughout the area

Area C: Eleven archaeological sites clustered near Malakole Road

Area E: Eleven archaeological sites scattered throughout the area

Area F: Eight archaeological sites clustered toward the makai end along the HECO powerline

The results of these various studies show that major portions of the proposed harbor site have been disturbed by man for agriculture (sugarcane...
BARBER'S POINT DEEP-DRAFT HARBOR LOCATION MAP; ARCHAEOLOGICAL AREAS A-I by CAMPBELL ESTATE & STATE OF HAWAII

Source: Archaeological Research Center

FIGURE II-11
LOCATION MAP OF ARCHAEOLOGICAL AREAS IN THE SHORESIDE FACILITIES AND STOCKPILE AREAS
fields) and industrial development (quarrying and barge harbor). The data collected by the various studies, however, indicate that the area was occupied in prehistoric times and used as a fishing or marine-oriented center as well as some limited agriculture. It appears that the housing in the area was characterized by dispersed clusters of residences, surrounded by a relatively open and little-inhabited area. Temporary and some permanent housing were present.

According to the Bishop Museum, the archaeological sites are unique and significant to Hawaii because the surrounding area is a karstic area characterized by limestone substrata. Certain land adaptation techniques were required to make the land livable and suitable for certain types of agriculture.

A significant piece of data from these studies sponsored by the Corps of Engineers is the discovery of "fossil" bird bones by Bishop Museum. During excavation of the Barbers Point site and subsequent laboratory analysis of samples, large amounts of skeletal avifauna remains were noted and identified as the remains of extinct endemic birds. A partial list of tentatively identified, extinct birds represented by the Barbers Point samples is given below.

1. Procellariidae family (several species of shearwater and petrel)
2. Corvus spp. - Hawaiian crow
3. Branta sandwicensis - nene and two types of unnamed, flightless geese
4. Various Passeriformes, including at least two unnamed finch-bill species
5. Unnamed endemic eagle
6. Unnamed endemic owl

It should be noted that these paleontological resources, although important, are not cultural resources and are therefore not appropriate criteria for determining the historical value of the area. In any case, study at a later date of these fossil remains will be facilitated by the salvage operations being proposed.
Partly as a result of the studies conducted for this EIS, a portion of the project area has been declared "eligible" to be included in the National Register of Historic Places (see Figure II-10 for boundaries). In compliance with the laws governing this action, a memorandum of agreement is being prepared which will describe the mitigating measures that will be carried out relative to the archaeological sites in the project area. It is expected that after sufficient information is extracted the status of the site will be placed at a lower level that will allow construction of the harbor and shoreside facilities.

RECREATION

The sparse population surrounding the proposed harbor has prompted few recreational services there. The "Index of Oahu's Parks and Facilities" by the Department of Parks, City and County of Honolulu, lists six parks with a cumulative area of 101 acres lying within a radius of about six miles from the project area. The parks and their activities are listed below.

<table>
<thead>
<tr>
<th>Name</th>
<th>Area (acres)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nanakuli Beach Park</td>
<td>39.8</td>
<td>Basketball, volleyball, softball, camping, swimming, diving, and fishing</td>
</tr>
<tr>
<td>Kahe Point Beach Park</td>
<td>4.5</td>
<td>Picnicking, camping, swimming, surfing, fishing, diving</td>
</tr>
<tr>
<td>Makakilo Park</td>
<td>7.4</td>
<td>Basketball, volleyball, softball</td>
</tr>
<tr>
<td>Barbers Point Beach Park</td>
<td>7.4</td>
<td>Picnicking, swimming, diving, fishing</td>
</tr>
<tr>
<td>Oneula Beach Park</td>
<td>30.0</td>
<td>Swimming, picnicking, camping, fishing, diving, surfing</td>
</tr>
<tr>
<td>Kapolei Park</td>
<td>15.8</td>
<td>Some military equipment left from World War II will be used for recreational purposes</td>
</tr>
</tbody>
</table>

The location of these parks is shown on Figure II-12.

The project site lies within planning area 23 (Ewa-Mililani) of the State Comprehensive Outdoor Recreation Plan (SCORP). This planning area, like most others on Oahu, shows that the general recreational needs are
FIGURE II-12
PARK LOCATION MAP
high. According to SCORP, the recreational demand in this area is diverse, with no activity or group of activities distinctly dominant. The existing boat harbor has the only boat-launching facility in planning area 23. The description of the recreation patterns and needs of the project area is distorted by the more urbanized areas enumerated.

The adjacent planning area, planning area 24, is probably more representative of the present recreational demands and needs of the proposed project site and its surroundings. Planning area 24 starts near the boat harbor, takes in Nanakuli and Waianae, then terminates at Kaena Point. This area has many beaches and some of the finest surfing, swimming, and diving spots on the island of Oahu. The 1975 SCORP report showed that most of the residents recreate within the planning area, which also attracts many nonresidents. On an islandwide basis, ten percent of recreational participation occurs within the Waianae-Nanakuli area, while only five percent is generated from area 23. Only a few activities (camping, picnicking, boat launching, and active games) show high levels of need. More of the recreational demands of the area are currently being satisfied.

The 1971 SCORP report displayed a surfing site inventory and evaluation (see Figure II-13). Near the project area, three surfing sites were identified and evaluated. These three sites were given an overall rating of 21 points. On the island of Oahu, the range of evaluation varies from a low of 17 points for the site near Honolulu International Airport to a high of 26 points for the beach area between Chinaman's Hat and Punaluu and for Hanauma Bay. Besides the low rating given to the surf sites near the project area by the 1971 SCORP, the Hawaii Water Resources Plan (April 1977) lists the following surf sites on the west coast as being significant: Barbers Point, Tracks, Maili, Pokai Bay, Makaha, and Yokohama. None of these surf sites are near the project area.

SOCIO-ECONOMIC BACKGROUND

This section presents a brief overview of the economic and social trends occurring in the area surrounding the proposed deep-draft harbor at Barbers Point. Pertinent economic and social trends of the State of
**LEGEND**

- Surf Sites

**Source:** State Comprehensive Outdoor Recreation Plan

**FIGURE II-13**

SURF SITES
Hawaii, City and County of Honolulu, and the Ewa district of Oahu are discussed.

State of Hawaii

During the years since statehood in 1959, the State of Hawaii has exhibited dramatic economic growth, with the state gross product increasing at an average annual rate of 10.8 percent, reaching $75 billion in 1976, as shown in Table II-3. The economy of Hawaii during the past decade has become more diversified and dynamic, with the islands' economic emphasis on sugar and pineapple being replaced by the visitor, construction, and retailing industries.

The growth of the tourist industry has had the most pronounced effect on the Hawaiian economy. Visitor arrivals have grown 14 percent per annum over the last ten years and, in 1976, exceeded three million visitors. Similarly, visitor expenditures have grown at a dramatic rate and currently represent almost 20 percent of the gross state product. Outside of the visitor industry, retail activity, diversified manufacturing, and nondefense government sectors have been major economic growth sectors.

The state civilian labor force was estimated at 361,000 persons in 1976, with an unemployment rate of 9.8 percent. Individuals employed in wholesale and retail trade represent 24 percent of the state work force and is the largest occupational group. The federal, state, and local governments employ 23 percent of the state work force and is the second largest employer. Table II-4 illustrates the size and growth rate of the major employment sectors in Hawaii.

The Hawaii State Department of Planning and Economic Development (DPED) projects that retail and wholesale employment should continue to remain one of the fastest growing employment sectors in the Hawaiian economy. DPED also expects agricultural employment to continue to decline as Hawaii's sugar and pineapple companies continue to reduce their operations.

The Hawaii economy has exhibited a moderate rate of growth during the last three years. While tourism is setting new records in terms of numbers of visitors and visitor expenditures, the economy, in constant
**TABLE II-3**

**MAJOR ECONOMIC ACTIVITIES**

(\$ million)

<table>
<thead>
<tr>
<th></th>
<th>1966</th>
<th>1975</th>
<th>1976</th>
<th>Average annual change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gross State product</strong></td>
<td>$2,701</td>
<td>6,888</td>
<td>7,545</td>
<td>10.8%</td>
</tr>
<tr>
<td><strong>Gross State product (1960 $)</strong></td>
<td>2,365</td>
<td>3,786</td>
<td>3,944</td>
<td>5.2</td>
</tr>
<tr>
<td><strong>Retail sales</strong></td>
<td>1,297</td>
<td>3,551</td>
<td>4,000</td>
<td>11.9</td>
</tr>
<tr>
<td><strong>Visitor expenditures</strong></td>
<td>280</td>
<td>1,270</td>
<td>1,420</td>
<td>17.6</td>
</tr>
<tr>
<td><strong>Manufacturing:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar and pineapple</td>
<td>318</td>
<td>506</td>
<td>365</td>
<td>1.5</td>
</tr>
<tr>
<td>Diversified</td>
<td>294</td>
<td>811</td>
<td>835</td>
<td>11.0</td>
</tr>
<tr>
<td><strong>Federal Government:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defense</td>
<td>517</td>
<td>1,027</td>
<td>1,085</td>
<td>7.7</td>
</tr>
<tr>
<td>Nondefense</td>
<td>234</td>
<td>952</td>
<td>1,085</td>
<td>16.6</td>
</tr>
<tr>
<td>Construction completed</td>
<td>371</td>
<td>1,140</td>
<td>1,012</td>
<td>10.6</td>
</tr>
<tr>
<td>Diversified agriculture</td>
<td>37</td>
<td>58</td>
<td>60</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>Resident population (000)</strong></td>
<td>710</td>
<td>868</td>
<td>887</td>
<td>2.2</td>
</tr>
<tr>
<td><strong>Total visitor arrivals (000)</strong></td>
<td>835</td>
<td>2,829</td>
<td>3,195</td>
<td>14.4</td>
</tr>
</tbody>
</table>

Source: Bank of Hawaii.
<table>
<thead>
<tr>
<th>Industry Group</th>
<th>1965</th>
<th>1974</th>
<th>1975</th>
<th>Average annual change</th>
<th>1965-75</th>
<th>1974-75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail and wholesale trade</td>
<td>50,650</td>
<td>82,750</td>
<td>84,400</td>
<td></td>
<td>6.7%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Federal, State and local government</td>
<td>57,850</td>
<td>78,900</td>
<td>82,000</td>
<td></td>
<td>4.2%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Service industries</td>
<td>38,850</td>
<td>72,100</td>
<td>72,000</td>
<td></td>
<td>8.5%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>24,500</td>
<td>22,800</td>
<td>28,200</td>
<td></td>
<td>1.5%</td>
<td>23.7%</td>
</tr>
<tr>
<td>Transportation, communication and utilities</td>
<td>16,400</td>
<td>25,400</td>
<td>25,350</td>
<td></td>
<td>5.5%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Construction</td>
<td>17,900</td>
<td>28,050</td>
<td>23,900</td>
<td></td>
<td>3.4%</td>
<td>-14.8%</td>
</tr>
<tr>
<td>Finance, insurance and real estate</td>
<td>13,300</td>
<td>23,050</td>
<td>23,300</td>
<td></td>
<td>7.5%</td>
<td>1.1%</td>
</tr>
<tr>
<td>All other nonagricultural</td>
<td>23,400</td>
<td>26,150</td>
<td>21,800</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Agriculture</td>
<td>16,850</td>
<td>14,000</td>
<td>14,800</td>
<td></td>
<td>-1.2%</td>
<td>5.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>259,700</td>
<td>373,200</td>
<td>375,750</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Not comparable with previous years: data revised.

In 1976 the State of Hawaii revised their method of tabulating employment. Previous years figures are therefore presented for trends analysis.

Source: Chamber of Commerce of Hawaii.
dollars, only grew at a rate of 4.2 percent in 1976, compared to the ten-year average of 5.2 percent per annum. Government projections indicate that this moderate rate of growth should continue in the future.

City and County of Honolulu

The City and County of Honolulu is the center of economic activity in the state and the location of the state capital. Honolulu contains the principal air and sea port in the state, making the City and County of Honolulu the major trade and transportation center for the Pacific basin.

The county accounts for approximately 81 percent of the total resident population and 80 percent of the civilian employment in the state. In 1975 the population of the county was 704,455. Residents of the county have the highest per capita personal income in the state. In 1975 the per capita income was $6,886 in the county versus $6,658 for the state.

The county houses the majority of the state's economic activities. For instance, Waikiki is the most popular visitor destination in the state, with over half the state's hotel room inventory. The county also contains approximately 14 percent of the sugar acreage and 25 percent of the pineapple acreage in Hawaii. Almost all of Hawaii's military personnel and dependents live on major military bases and communities in the county. With more than 10,000 corporations, partnerships, and proprietorships, Honolulu is considered to be one of the top 100 industrial markets in the United States. In 1975 the county accounted for 88 percent of the state's volume of construction and 80 percent of the state's retail trade.

Economic growth is anticipated to continue in the county of Honolulu due, in part, to its role as the primary industrial and distribution center for the state. Future growth, however, may be at a slower pace than in the past since the state is placing a greater emphasis on the economic development of the neighbor islands.

Ewa District

The Ewa district, as defined by the Bureau of Census, is located on the leeward side of Oahu and includes the area bordered by central Honolulu
to the east, the Wahiawa district to the north, and the Waianae Ridge to
the west, as shown on Figure II-14. It is the largest of Oahu's seven
districts and encompasses 105,241 acres, or 27.5 percent of the total land
acreage on the island of Oahu.

During the past five years, the population of the Ewa district has
been expanding at a rate almost double that of Oahu. The Ewa population
has increased 23.1 percent between 1970 and 1975 and is currently at
162,821. In terms of housing units, the Ewa district accounts for approxi-
mately 17 percent of all housing units on Oahu, as shown in Table II-5.

Population growth within the district, however, has varied signifi-
cantly. Of the 17 census tracts in the Ewa district, three experienced
explosive growth rates of 70 to 110 percent during the past six years.
Residential developments at Mililani Town, Waimalu, and Pearl Harbor were
responsible for the large influx of new residents. Meanwhile, five census
tracts had negative growth rates, and the remaining nine grew at rates
from 4 to 25 percent.

The Ewa district's population density also varied significantly.
While the district's average population density of 1.5 people per acre
was less than Oahu's 1.8 people per acre, four census tracts had a popula-
tion density greater than the Honolulu average of 6 people per acre.
Three other census tracts had population densities twice that of Oahu, or
roughly two-thirds the density in Honolulu. These seven higher density
census tracts contain many multi-family dwellings, a major retail center,
and the new Aloha Stadium.

When an illustration highlighting the seven higher density census
tracts is superimposed over an illustration highlighting the three census
tracts that experienced explosive growth, a pattern of population movement
emerges. Historical population concentration and growth areas are in the
northern Ewa district and surrounding Pearl Harbor area. The census
tracts surrounding the proposed Barbers Point deep-draft harbor have
exhibited slower growth rates and lower population densities.

The residents in the communities surrounding the proposed harbor also
tend to have lower per capita income and higher rates of unemployment than
other Oahu residents, as shown in Table II-6.
JUDICIAL DISTRICTS

HYDROGRAPHIC AREAS

FIGURE II-14
ISLAND OF OAHU
<table>
<thead>
<tr>
<th>Census tract</th>
<th>Description</th>
<th>Housing Units</th>
<th>Population</th>
<th>Land area in acres</th>
<th>Density per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>April 1970</td>
<td>July 1975</td>
<td>change</td>
<td>April 1970</td>
<td>July 1975</td>
</tr>
<tr>
<td>73</td>
<td>Fort Kamehameha (Hickam)</td>
<td>1,557</td>
<td>2,152</td>
<td>38.2%</td>
<td>10,564</td>
</tr>
<tr>
<td>74</td>
<td>Pearl Harbor-Southeast Loch</td>
<td>756</td>
<td>752</td>
<td>-0.5</td>
<td>9,086</td>
</tr>
<tr>
<td>75</td>
<td>Foster Village-Malana Heights</td>
<td>2,506</td>
<td>2,486</td>
<td>-0.8</td>
<td>11,424</td>
</tr>
<tr>
<td>76</td>
<td>Aloha Stadium</td>
<td>727</td>
<td>811</td>
<td>11.6</td>
<td>2,934</td>
</tr>
<tr>
<td>77</td>
<td>Aiea</td>
<td>2,347</td>
<td>2,677</td>
<td>14.1</td>
<td>9,632</td>
</tr>
<tr>
<td>78</td>
<td>Waimalu</td>
<td>1,740</td>
<td>3,432</td>
<td>97.2</td>
<td>5,695</td>
</tr>
<tr>
<td>79</td>
<td>Waimano Home</td>
<td>614</td>
<td>732</td>
<td>19.2</td>
<td>3,535</td>
</tr>
<tr>
<td>80</td>
<td>Waiao-Leeward CC-Manana Naval</td>
<td>5,821</td>
<td>7,084</td>
<td>21.7</td>
<td>24,329</td>
</tr>
<tr>
<td>81</td>
<td>Pearl City Housing-Ford Island</td>
<td>614</td>
<td>732</td>
<td>19.2</td>
<td>3,535</td>
</tr>
<tr>
<td>82</td>
<td>Pearl Harbor</td>
<td>-</td>
<td>2</td>
<td>0.0</td>
<td>762</td>
</tr>
<tr>
<td>83</td>
<td>Pearl Harbor-Iroquois Point</td>
<td>1,200</td>
<td>2,343</td>
<td>95.2</td>
<td>4,759</td>
</tr>
<tr>
<td>84</td>
<td>Ewa Beach</td>
<td>1,932</td>
<td>1,999</td>
<td>3.5</td>
<td>7,801</td>
</tr>
<tr>
<td>85</td>
<td>Barbers Point Air Station</td>
<td>574</td>
<td>854</td>
<td>48.8</td>
<td>3,187</td>
</tr>
<tr>
<td>86</td>
<td>Koolia Camp-Ewa-Barbers Point</td>
<td>2,016</td>
<td>2,706</td>
<td>36.2</td>
<td>8,340</td>
</tr>
<tr>
<td>87</td>
<td>Waipahu</td>
<td>3,080</td>
<td>3,567</td>
<td>15.8</td>
<td>12,705</td>
</tr>
<tr>
<td>88</td>
<td>Waipahu-Sugar Hill</td>
<td>806</td>
<td>926</td>
<td>14.9</td>
<td>3,429</td>
</tr>
<tr>
<td>89</td>
<td>Waipahu-Mililani Town</td>
<td>3,788</td>
<td>8,196</td>
<td>116.9</td>
<td>14,117</td>
</tr>
</tbody>
</table>

Total: 29,456 40,719 38.3% 132,299 162,821 23.1% 105,241 1.5%

Ewa
Honolulu
Oahu

Source: Hawaii Census Statistical Area Committee, General Plan City and County of Honolulu.
TABLE II-6
SELECTED AVERAGE MEDIAN PER CAPITA INCOME AND UNEMPLOYMENT

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ewa, Ewa Beach</td>
<td>$2,550</td>
<td>6.8</td>
<td>10.4</td>
</tr>
<tr>
<td>Waipahu</td>
<td>2,750</td>
<td>6.4</td>
<td>9.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alea</td>
<td>3,400</td>
<td>4.7</td>
<td>7.3</td>
</tr>
<tr>
<td>Pearl City</td>
<td>3,170</td>
<td>3.7</td>
<td>5.8</td>
</tr>
<tr>
<td>Honolulu</td>
<td>3,480</td>
<td>4.7</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Source: State Department of Labor and Industrial Relations, U.S. 1970 Census

Residents in these Ewa communities are heavily dependent on an agriculture-oriented economy; therefore, incomes tend to be lower, and, with the decline of the sugar industry, employment has been on a steady downtrend for the past ten years. Although the Campbell Industrial Park has created 2,000 jobs since its inception, the Ewa-Ewa Beach residents' skills are not readily adaptable to industrial-related jobs and, as a result, only 8 percent of Campbell Industrial Park workers reside in the Ewa-Ewa Beach-Makakilo area.

New and expanded commercial, retail, and recreational facilities have located in the high and medium density areas. These include the Waimalu Shopping Center, additional phases of the Pearlridge Shopping Center, and the 50,000-seat Aloha Stadium. The economic development of the Ewa district appears to be centered in the high and medium density areas, enhancing employment opportunities within those areas as well as the overall attractiveness and desirability of the area. Campbell Industrial Park, the only other major employment center in the Ewa district, has been unable to date to stimulate secondary residential and commercial impact in its surrounding area. Local government policy is expected to continue to
encourage population movements and economic development of the Ewa dis-
trict; however, unless specifically altered, historical patterns of
population movement should persist.

CAMPBELL ESTATE REGIONAL FRAMEWORK PLAN FOR ITS HONOUILIULI LANDS

In 1974 a master plan for Campbell Estate lands in the entire Hono-
uliuli ahupua'a was made by Donald Wolbrink & Associates, Inc. (see
Figure II-15). Generally, the plan calls for the development of a metro-
politan area on 12,000 gross acres of Campbell Estate land, inclusive of
lands in the industrial park. The extent of the proposed city stretches
from the west shore of West Loch in Pearl Harbor to the shoreline of the
Harbor project site. The length of the urban area is approximately
10 miles and the width is a little over 4 miles at its widest point. The
main features of the plan include:

1. A vehicular circulation system, including suggested locale for a
possible fixed guideway transit system
2. Pedestrian circulation system existing as a "linear park"
connecting the villages and other components of the Honouiliuli
area
3. A city center of approximately 200 acres consisting of regional
governmental, shopping, office, medical, cultural, entertain-
ment, and recreational facilities
4. Thirteen village centers ranging in size from a resident popu-
lation of 10,000 to 25,000 persons or more. Each village
center would contain all the necessary facilities needed to
support itself.
5. College site (West Oahu College)
6. Deep water harbor, major industrial park, and employment center
7. Major marina at Ewa Beach
8. Resort complex with major activity center and marina at West
3 each
9. Extended mountain community at Makakilo
FIGURE II-15
PROPOSED HONOULULI REGIONAL FRAMEWORK PLAN
The entire plan emphasizes the city center and college at its core, the resort development at West Beach with a visitor activity center and marina, the marina and ocean frontage at Ewa Beach, the orientation to the mountain community with its recreational opportunities at Makakilo, and the open space for park and recreation purposes at West Loch.

More specifically, recent development plans for West Beach include nine hotels with approximately 7,200 guest rooms, a 2,000-unit residential community, and commercial and recreational areas. (Reclassification of 640 acres of Campbell land from agricultural to urban use for the West Beach development was approved in June 1977 by the Land Use Commission.) The Ewa Beach area is projected to accommodate 25,000 people in its coastal, residential community.

The master plan projected the ultimate population for the area to be between 200,000 and 300,000. A five-stage development of the total area is planned. The first stage of development provides for 2,100 acres of urban expansion that includes (1) an enlarged village around the existing Ewa Village (950 additional acres), (2) the initial development of the Ewa Marina Village (530 acres), (3) construction of most of the proposed resort-related activities at West Beach and part of the residential development, (4) continued expansion at Makakilo, (5) expansion of Campbell Industrial Park and the construction of Barbers Point Harbor, and (6) construction of West Oahu College. The industrial park with its proposed deep water harbor is a significant part of the plan in that it holds the prospect of a center for both employment and the distribution of goods for the total city.

Altogether, the long-term master plan requires the conversion of 7,200 acres of land from agricultural to urban, or 36 percent of the Oahu sugar cane acreage below the H-1 freeway (see Figure II-16). Part of this land is used for cane production, lying fallow, or used for related agricultural activities.

Following complete implementation of the plan, Oahu Sugar Company would retain 5,300 acres of Campbell Estate land within the master-planned area and 6,800 acres outside of Campbell Estate's boundaries. However,
2,400 acres of better quality land, located north of Waipahu and now lying fallow or used for other agricultural purposes, would be added to the lands leased to the sugar company by the Estate. The total area of land for sugar production will therefore be about 15,000 acres.

The master plan also calls for (1) confining the lands developed for urbanization to those lands that are below the basal water recharge area and (2) phasing the urban development so that the poorer agricultural lands are utilized in the initial phases while the better agricultural lands are converted in the later phases.

**EXPANSION OF JAMES CAMPBELL INDUSTRIAL PARK (JCIP)**

The firm of Tippetts-Abbett-McCarthy-Stratton (TAMS) has produced a plan for the expansion of the Campbell Industrial Park (draft, March 1977). Essentially, the plan is a market analysis and preliminary plan for the park. The conclusions in the report can be summarized as follows:

1. Given the size of the Hawaiian market and the great distances that would be involved in processing and fabricating imported raw materials for eventual shipment to export markets, deep-water frontage will not be important for any industries, except petroleum refining, ship repair and possibly, ship building.

2. Heavy industries with a water orientation that are scaled for sites ranging from, say, 2 to 20 acres as opposed to sites ranging from 50 to 750 acres can operate efficiently in proximity to a port.

3. Seventy-five industries with a water transportation orientation are deemed potential prospects for the industrial park expansion. The list is presented in Table II-7. It is the result of a screening process to eliminate noxious or dangerous industries.

4. The demand for land at the park, without a new harbor, is projected to be 30 acres per year.

5. The harbor, if built, will contribute an additional demand of 10 acres per year, bringing the total yearly demand to 40 acres. The Barbers Point Harbor will therefore add another advantage to
<table>
<thead>
<tr>
<th>Industry</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement</td>
<td>Inorganic chemicals</td>
</tr>
<tr>
<td>Alkalies and chlorine</td>
<td>Brick and structural tile</td>
</tr>
<tr>
<td>Structural clay products</td>
<td>Clay refractories</td>
</tr>
<tr>
<td>Ceramic wall and floor tile</td>
<td>Mineral wool</td>
</tr>
<tr>
<td>Nonferrous forgings</td>
<td>Malleable iron foundries</td>
</tr>
<tr>
<td>Paving mixtures and blocks</td>
<td>Nonclay refractories</td>
</tr>
<tr>
<td>Petroleum refining</td>
<td>Gypsum products</td>
</tr>
<tr>
<td>Organic chemicals</td>
<td>Flat glass</td>
</tr>
<tr>
<td>Animal oils</td>
<td>Pressed and blown glass</td>
</tr>
<tr>
<td>Cellulosic man-made fibers</td>
<td>Petroleum and coal products</td>
</tr>
<tr>
<td>Asphalt felts and coatings</td>
<td>Industrial gases</td>
</tr>
<tr>
<td>Grease and tallow</td>
<td>Steel foundries</td>
</tr>
<tr>
<td>Iron and steel forgings</td>
<td>Wood preserving</td>
</tr>
<tr>
<td>Gum and wood chemicals</td>
<td>Reclaimed rubber</td>
</tr>
<tr>
<td>Inorganic pigments</td>
<td>Raw cane sugar</td>
</tr>
<tr>
<td>Concrete block and brick</td>
<td>Cold finishing of steel shapes</td>
</tr>
<tr>
<td>Fertilizers</td>
<td>Plastics materials</td>
</tr>
<tr>
<td>Cane sugar refining</td>
<td>Vitreous plumbing fixtures</td>
</tr>
<tr>
<td>Earthenware food utensils</td>
<td>Ready-mixed concrete</td>
</tr>
<tr>
<td>Steel wire drawing</td>
<td>Glue and gelatin</td>
</tr>
<tr>
<td>Leather tanning and finishing</td>
<td>Pottery products</td>
</tr>
<tr>
<td>Shortening and cooking oils</td>
<td>Asbestos products</td>
</tr>
<tr>
<td>Malt</td>
<td>Finishing plants, synthetics</td>
</tr>
<tr>
<td>Flour and meal</td>
<td>Porcelain electrical supplies</td>
</tr>
<tr>
<td>Gaskets and insulations</td>
<td>Creamery butter</td>
</tr>
<tr>
<td>Vitreous china food utensils</td>
<td>Steel pipe and tubes</td>
</tr>
<tr>
<td>Carbon black</td>
<td>Cooperage</td>
</tr>
<tr>
<td>Finishing plants, cotton</td>
<td>Metal barrels, drums and pails</td>
</tr>
<tr>
<td>Hardwood dimension and flooring</td>
<td>Veneer and plywood plants</td>
</tr>
<tr>
<td>Steel springs</td>
<td>Plumbing fixtures</td>
</tr>
<tr>
<td>Concrete products</td>
<td>Wallpaper</td>
</tr>
<tr>
<td>Prepared animal feeds</td>
<td>Primary nonferrous metals</td>
</tr>
<tr>
<td>Scouring and combing plants</td>
<td>Condensed and evaporated milk</td>
</tr>
<tr>
<td>Metal coating, engraving, etc.</td>
<td>Tire cord and fabric</td>
</tr>
<tr>
<td>Weaving mills, cotton</td>
<td>Yarn mills, except wool</td>
</tr>
<tr>
<td>Brass, bronze, copper castings</td>
<td>Thread mills</td>
</tr>
<tr>
<td>Hard surface floor coverings</td>
<td>Throwing and winding mills</td>
</tr>
<tr>
<td>Plating and polishing</td>
<td></td>
</tr>
</tbody>
</table>

* Tippetts-Abbet-McCarthy-Stracton; Plan for Barbers Point Harbor Facilities and Expansion of James Campbell Industrial Park (draft), March 1977.
the park, and the land absorption rate is almost certain to be accelerated.

Figure II-17 shows the proposed land use pattern for the expanded industrial park, and Figure II-18 shows the phasing plan. The heavy industrial zone is closest to the perimeter of the harbor, the general industry zone is next, and the light industry zone is the farthest. The light industry zone interfaced with other projects on Campbell lands serve as a land use transition zone. The development is to occur in three phases and will include more than one type of industrial zone, starting from the area west and north of Increment Five, and proceeding in a counter-clockwise fashion around the proposed port. Increment Five is the next phase of the park's expansion and includes the Caneland Theme Park. Based on a land absorption rate of 40 acres per year, each increment is expected to be developed in periods of three to six years. The utility plan for the industrial park has been discussed in the project description of the harbor.

UTILITIES AND PUBLIC FACILITIES

Transportation and Access

The James Campbell Industrial Park area is presently served by Kalaeloa Boulevard, which interchanges with Farrington Highway and Hawaii Interstate Route H-1, approximately 2,000 feet mauka of the study area. Kalaeloa Boulevard is a divided roadway, with two lanes in each direction and has a right-of-way of 108 feet. At the present time, Kalaeloa Boulevard is classified as a "private" roadway and, in order to become a "dedicated" or public roadway, will require upgrading to the City and County of Honolulu Subdivision Rules and Regulations. Other roads in the industrial park area are improved and meet city and county roadway standards. The average daily traffic volume along Kalaeloa Boulevard between H-1 and Malakole Road was counted to be 6,215 vehicles per day on April 27, 1977 by the City and County of Honolulu, Department of Transportation Services. This volume is generated by some 995 developed acres within the existing industrial park.
Source: Tippetts-Abbett-McCarthy-Stratton (TAMS)
Utilities

The Barbers Point area is generally within the service area of most public utilities and facilities. Existing telephone and electrical lines are located along Malakole Road.

The area lies within the Board of Water Supply's "Ewa-Waianae Water District" Service Zone. At the present, the Board of Water Supply distributes an average of 13.1 million gallons a day in this water district. Included in this amount are 2.7 mgd used by the Standard Oil Company refinery at Campbell Industrial Park. The fresh water resources for this water district are insufficient to satisfy present demand. Most of the water is therefore transported from the Pearl Harbor water district to supplement the daily water demands.

Sewage in the Campbell Industrial Park area is presently disposed of in cesspools (Wolbrink, 1974). A new 51-mgd secondary municipal sewage treatment plant (Honouliuli STP) is being constructed adjacent to the east boundary of the Barbers Point Naval Air Station. The plant, which is being constructed in increments, will serve an area extending from Halawa Valley to Barbers Point. The treated effluent will be discharged through an outfall located off Oneula Beach. According to the Department of Public Works, City and County of Honolulu, no specific provisions were made to include wastewater flows from Campbell Industrial Park into the new system.

Compatibility with Barbers Point Naval Air Station Operations

The proposed deep-water harbor is located about 1-1/2 miles west of the U.S. Naval Air Station, Barbers Point, under the approach zone for Runway 11. The development of the harbor in this area will have a moderate effect on the air operations at NAS Barbers Point and, conversely, the air operations will have a moderate effect on harbor operations.

In June 1976, the U.S. Navy released the Air Installation Compatibility Use Zone (AICUZ) study. This comprehensive study evaluated air operations effect on the environs of NAS Barbers Point and recommended certain actions, such as zoning restrictions to insure compatible use of adjacent properties.
Potential sources of conflict between the airport and the proposed harbor are (1) high noise levels of military jet aircraft and (2) safety risks due to potential aircraft crashes. The impact that urban development and the air station have on each other will be discussed under the Probable Impact section of this EIS.

AIR QUALITY

The Barbers Point area is located within a broader area called the Greater Honolulu air basin, which extends from the coastline to the inland divide across the Schofield Saddle and from the Waianae Range to Diamond Head (Figure II-19). Most of the year, the northeast trades blow pollutants from the inland areas out to sea. The primary periods of concern for air pollution, therefore, are during the "kona" weather conditions. The existing air quality at both project areas is generally good due to the persistence of the tradewinds. Localized problems may occur under adverse "kona" conditions or in areas of intense industry or vehicular traffic.

Air sampling conducted for the Conoco-Dillingham Oil Refinery, about 1 mile south of the proposed harbor area, showed sulfur dioxide and nitrogen dioxide concentrations below state standards. Carbon monoxide and sulfur dioxide levels were below the levels of detection. Suspended particulates were moderately high, but not in excess of the standards. The Conoco studies concluded that the existing concentrations of airborne contaminants were lower than might be expected for an industrial area.

Sampling conducted by the State Department of Health in 1976 at the Barbers Point and Barbers Point Lighthouse station included nitrogen oxides, suspended particulates, and sulfur oxides. Table II-8 summarizes the results of the sampling, and Figure II-20 shows the sampling station locations. Like the Conoco-Dillingham program, the state's testing showed only the concentration of particulate matter to be moderately high.
FIGURE II-19

GREATER HONOLULU AIR BASIN

SOURCES: U.S. Dept. of Commerce, proposed expansion of Foreign Trade Subzone 9a (HIRI Oil Refinery, Draft EIS Feb. 1974)
TABLE II-8

SUMMARY OF 24-HOUR AIR QUALITY SAMPLING DATA (ug/m³) FROM
DEPARTMENT OF HEALTH SAMPLING STATIONS, 1976

<table>
<thead>
<tr>
<th>Statistical Parameters</th>
<th>Barbers Point</th>
<th></th>
<th>Barbers Point</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PARTICULATES</td>
<td>SO₂</td>
<td>NO₂</td>
<td>PARTICULATES</td>
</tr>
<tr>
<td>Number of samples</td>
<td>69</td>
<td>74</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>Range of values</td>
<td>12-101</td>
<td>5-7</td>
<td>5-29</td>
<td>-</td>
</tr>
<tr>
<td>Average of values</td>
<td>40</td>
<td>5</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td>No. of Times State Air Quality Standards Exceeded*</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

* State 24-Hr Standards: Particulates 100 ug/m³, SO₂ 80 ug/m³, NO₂ 150 ug/m³
FIGURE 11-20
DEPARTMENT OF HEALTH
AIR QUALITY SAMPLING STATIONS
III. THE PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

The discussion of environmental impacts primarily focuses on plans by the State of Hawaii and the Campbell Estate for the construction of shore­side facilities at Barbers Point and the disposition of dredged coral resulting from this construction. Federal plans relating to construction of the harbor basin, channel, and wave absorbers will be in large part a restatement of the U.S. Army Corps of Engineers' Final Environmental Impact Statement and Supplement.

CONSTRUCTION IMPACTS OF DREDGING AND DREDGING DISPOSAL

Construction of a commercial port at the site of the existing private barge harbor at Barbers Point results in numerous construction advantages. By locating the port at the site of an existing facility, construction will occur in an area which has already been altered and affected by previous dredging. In addition, studies of the existing barge harbor offer a baseline from which estimates of harbor expansion impacts can be determined. Except for the entrance channel, the harbor is situated completely inland, eliminating the need for offshore protective structures and thereby minimizing destruction of coastal areas.

Construction of the port facility involves three basic operations: Dredging of the entrance channel, excavation of the basin area down to water level, and dredging of the remainder of the basin down to project depth. The entrance channel construction will be done in open sea and will yield approximately 1.3 million cubic yards of coralline material. Dredging will be accomplished by a hydraulic cutterhead dredge with pipeline disposal to a land disposal site. This type of dredge was selected specifically to minimize turbidity and sediment generation and transport to adjacent areas. Between 60 and 80 percent of the piped material will be water, much of which is expected to be absorbed by the coral substrate at the disposal site. Settling basins will also be used to assure that the maximum amount of sediment is removed from the piped material before any surface water flows back into the ocean. One scheme for settling out the solid fraction of the slurry is to create coupled settling basins.
using, preferably, the spoils from land based operations. Each of the two coupled settling basins will be at least 5 acres in area, and the basins will be connected by a tube. The spoils from the hydraulic dredging operations will be pumped into the first settling basin and then flow into the second. Residence time will be about the same for each of the settling basins. The final effluent, which should meet government discharge requirements, will flow over the weir of the second settling basin and into the harbor. The point of entry of the slurry and the design of the coupled system were chosen to maximize the residence time of the material produced by the hydraulic dredging process. This system will be similar to the one used for the dredging of Kawaihae Harbor.¹ New coupled ponds will be created in the stockpile area as old ones are filled.

Judging from the Kawaihae Harbor study, the discharge from the settling ponds is not expected to have a significant effect on the harbor, except in the immediate area of the effluent discharge. During the study period, turbidity in Kawaihae Harbor ranged from 0 to 4 JTU, except for the immediate area of the discharge, where the turbidity measured as high as 45 JTU. Between 100 and 200 meters from the source of discharge, the turbidity was reduced to background levels.

Dredging in the open sea will generate some turbidity and sediment in the immediate area, but most of the material should be taken up by the suction equipment and piped to shore. Very little dispersion of fragmented coral rubble is expected, and most of the coarser sediment should also be taken up. The dredge operates from a floating plant which generally restricts its use to calm or moderate sea conditions; therefore, dredging operations would be suspended during heavy seas when the likelihood of turbidity would be greatest. Due to the agitation of ocean waters even in calm seas, the operation will result in dispersion of some of the finer sediments along the shoreline and offshore, and alternating currents along the coast may spread the impact to coral communities in the vicinity.

Some impact could persist for extended periods of time (even up to several months or years) as the sediments settle, become resuspended by wave action, and then become gradually redistributed in deeper water or at great distances from the harbor. Although the effective use of silt barriers or containment facilities does not appear feasible or necessary for the entire construction of the entrance channel, they will be considered for nearshore channel dredging.

Construction of the harbor basin would yield about 9.3 million cubic yards of material. Fortunately, the inland configuration of the basin allows for a number of alternative phasing sequences to minimize the impact of dredging on the coastal waters. Conceptually, the harbor basin excavation and dredging would be done in two phases. The first phase would involve a land operation in which land-based equipment, such as bulldozers, would be used to excavate the coral material down to water level. The land operation would be done entirely in the dry, and the material would be stockpiled at the nearby land disposal site (see Figure III-1.)

The second step would involve dredging the remainder of the basin down to project depths. This portion of the work would be done by a hydraulic cutterhead dredge with pipeline disposal to the shore, operating in the same manner as in the entrance channel dredging. In one alternative, the dredge would enter though the existing barge harbor and begin dredging the remainder of the basin after a closure is made behind it to completely separate the dredging activity from the open ocean. Another alternative would be to continue dredging the entrance channel inland, after making a closure near the coastline to confine the effects of the dredging. Final opening of the harbor to the sea would be made after the entire basin is dredged to project depth.

Details of the construction methods will be finalized during the detailed design stage, and every effort will be made to take advantage of the inland harbor configuration. By phasing the inland dredging and maintaining a land barrier between the portions dredged and the ocean, most of the harbor development could be done under closely contained conditions, and with little or no interaction with the open ocean.
FIGURE III-1
BARBERS POINT HARBOR
STOCKPILE PLAN

GRAPHIC SCALE
1500' 0' 8400'
SCALE IN FEET

APPROXIMATE
BOUNDARY OF
HARBOR
LANDS TO
BE ACQUIRED
BY STATE

STOCKPILE
AREAS
Additional measures such as the use of silt curtains may be required to minimize turbidity during the final opening to the sea; however, the major portion of the dredging work would not cause significant turbidity impacts. Overall, the most significant adverse impacts usually associated with harbor construction would be substantially minimized.

Practically all of the material to be dredged for this project is coral limestone material that is currently in demand for construction purposes, particularly as an aggregate material and for the manufacture of concrete. Much of the area inland from the proposed harbor site is already being quarried for construction materials. According to the State Department of Agriculture, coral supplies most of the Oahu crop production needs for calcium. The dredged material, therefore, would also represent a valuable resource for agriculture as well as for the construction industry. The State of Hawaii is responsible for designating a disposal site for the dredged material. In view of the commercial value of the dredged material, the material would be temporarily stockpiled on land adjacent to the harbor site. Stockpiling the coral limestone and distributing it for commercial use appear to be the most favorable method of disposal for the dredged material.

The stockpile will be a visible feature and will commit the area to disposal purposes until the material is fully utilized. Some odor from the stockpiled material may result, but the problem should be short-term and should not constitute a significant problem for neighboring residential areas. If the top soil in the project area is removed so that it could be used more productively elsewhere, it will be unlikely that the stockpile of dredged material will present any odor problem. The low rainfall and plentiful sunshine on the Ewa plains would also help to reduce odor problems.

The 10.6 million cy of material generated by the deep-draft harbor construction would cover a maximum area of about 370 acres, based upon a fill elevation of 30 to 35 feet. Studies of the demand for coralline material show that the entire quantity may be exhausted for commercial purposes in about 17.5 years. During that period, an extensive white "hill" will be visible from areas around the harbor. If the top surface
is levelled and planted, its adverse visual impact may be lessened. The plants being considered are beach morning glory (Ipomoea pes-caepre), beach weed (Arctotheca calendulata), batis (Batis maritima), and/or Australian salt bush (Atriplex semibaccata). These would require special watering only the first month or so to get established. Detailed grading plans will be developed during the detailed design stage of the project.

CONSTRUCTION IMPACT OF SHORESIDE FACILITIES

The construction of shoreside facilities described in the first section of this report will present essentially the same type of impact on the environment as any other construction effort near the shoreline. Prominent among the anticipated impacts will be the following:

1. Noise from construction equipment
2. Fugitive dust around the construction area on dry days
3. Runoff during rainy weather contributing to an increase in turbidity in the harbor
4. Interruption of vehicular traffic close to the construction area
5. Increased traffic movement caused by increased movement of people and material

After the shoreside facilities are erected, the principal impact will be visual. The warehouse terminal will be about 70 feet high (MLLW), and the top of the container cranes is expected to reach 190 feet high (MLLW). These structures will be visible from most of the surrounding area, from cars traveling along the H-1 freeway and from the ocean. Visually, however, the project area will appear to be a harmonious extension of the present Barbers Point Industrial Park.

MARINE-RELATED IMPACTS

The field investigation of the marine environment in the vicinity of the proposed harbor was conducted for the federal environmental statement by Environmental Consultants, Inc. (ECI) and reported in November 1975. A subsequent report by ECI dated January 1977 assessed the circulation and
ecological impact. The discussion of the marine-related impacts presented in this section expands on the work presented by ECI, with emphasis on wind-related transport and on phytoplankton growth dynamics.

The construction of the proposed deep-draft harbor will result in a new 92-acre marine environment with characteristics somewhat similar to those in the existing harbor. The similar characteristics are location, general shape, orientation, and the continuous inflow of significant amounts of groundwater. Four significant differences between the present and proposed harbors are volume, depth, proportional channel width, and amount of groundwater inflow per unit volume.

The proposed harbor will be deeper than the existing harbor (38 feet versus about 21 feet) and will result in proportionally less tidal exchange than presently exists. The water residence time directly related to tidal exchange will therefore increase from approximately 9 days for the present harbor to about 16 days for the proposed harbor, using an average 24-hour tidal fluctuation of 2.36 feet. These residence times should be considered outside maximum values since they do not take into account the two significant exchange mechanisms of wind-induced transport and fresh water-induced flux.

Measurements by Environmental Consultants, Inc. showed that, under maximum effect conditions, wind-induced transport and freshwater-induced flux result in enough exchange to reduce the average residence time in the present harbor to approximately a half day. The exchange for the proposed harbor from a wind-induced transport and freshwater-induced flux is expected to be less than that for the present harbor since the flux of groundwater will be proportionally smaller (Williams, 1976) and the width of the entrance channel will be proportionally less. The proportionally smaller input of fresh water will result in a lesser tendency to form the stratified two-layer system that prevails in the present harbor.

The exchange resulting from this two-layer system is dependent on the flux of fresh water and the mixing depth, the latter being in turn, dependent on wind energy input and other energy sources such as ship propellers. If more salt water can be mixed with the floating...
brackish water layer as it leaves the harbor, this will result in more total exchange and shorter residence time.

The surface layer of the water is propelled out of the harbor by two forces that also create a countercurrent at depth. These forces are the hydraulic gradient, which is imposed by the inflow of fresh water, and the wind stress. The hydraulic gradient is the predominant force when there is a large fresh water flow and/or when there is little mixing of salt water since these conditions increase the density of the surface layer and decrease the gradient. Conversely, the direct transport effect of the wind stress is greatest when there is little or no stratification since the primary energy transfer of the wind is limited to the depth of the upper layer if stratification exists, but can reach to the bottom of unstratified shallow water bodies.

In the proposed harbor it is likely that the wind-induced transport will be the predominant factor in the water exchange with the ocean, since the fresh water inflow will be relatively less than that of the present harbor and the entrance channel is reasonably well aligned with the predominant wind direction. An analysis of about 27 years of hourly wind observations at Barbers Point Naval Air Station shows that the overall average wind speed is about 12.2 knots, predominantly from the east or northeast. Calm conditions occur only about 1.5 percent of the time, mostly during the winter months, while kona wind conditions prevail about 30 days per year.

Using these average wind conditions, it is possible to estimate the wind-induced transport and the average residence time of the proposed harbor by using the method described by Banks (1975) for shallow water bodies.

\[ Q_1 = Q_2 = \frac{4 q_0 D}{27} \]

where:
- \( Q_1 \) = per unit width discharge of the upper layer
- \( Q_2 \) = per unit width counterflow in the lower layer
- \( D \) = depth (total depth if unstratified or depth to thermocline if stratified)
\[ q_0 = \alpha U = \text{water velocity at the surface} \]
\[ U = \text{wind velocity} \]
\[ \alpha = \text{proportionally constant (about 0.02 in this case)} \]

from a model developed by Wu (1973)

Assuming an effective channel transport width of 400 feet and a vertically mixed condition, then the average tradewind-induced exchange would be about \( 80 \times 10^6 \text{ft}^3/\text{day} \). This flux combined with the daily tidal exchange of about \( 10 \times 10^6 \text{ft}^3 \) would result in an overall average residence time for the proposed harbor of only about 1-3/4 days. A similar calculation for the existing harbor yields a minimum residence time of about 11 hours. This result is almost exactly what was calculated from direct field measurements by ECI for the present harbor. Such agreement would indicate that the predominant driving force for exchange in the present harbor is the tradewind and that the Banks (1975) approach gives a reasonable approximation of the exchange volume. This conclusion is supported by the field observation by ECI (1975) that, when the wind reversed to "light kona", the outward surface flow essentially ceased, thereby indicating that a light kona wind was enough to counteract the hydraulic gradient imposed by the groundwater flux.

The application of the Banks (1975) method was tested for both the conditions of flow out of a channel into an open water body and into a channel that dead ended more than 200 yards away. The channel, located in Hawaii Kai marina, was 200 feet wide and 10 feet deep. The water showed no density stratification. The wind-induced flux, as carefully measured by the simultaneous use of six drogues placed at various depths at one channel cross section, showed the development of a two-layer flow, the top third with the wind and the bottom two-thirds as counterflow. With the wind blowing toward the dead end of the channel, the Banks (1975) equation result was very close (within 10 percent) to the measured exchange. When the wind direction was down the channel toward the open water body, the Banks (1975) equation underestimated the measured flux by some 15 to 20 percent. These observations indicate that the application of this equation to the conditions at the proposed harbor is justified and may be conservative.
If the proposed harbor is strongly stratified, then the direct wind effect will be limited to the depth of the upper layer. Under these conditions (assuming an upper layer of 10 feet), the Banks (1975) equation wind flux combined with the tidal exchange yields an average overall residence time of about 5 days. It must be remembered, however, that the upper layer will have a significantly shorter residence time than the lower layer in such a stratified system. This is supported by the observation by ECI (1975) for the present harbor, where the lower layer of chlorophyll-a concentration was consistently higher than that of the upper layer, in spite of generally lower nutrient concentrations in the lower layer. This indicated that the phytoplankton population had a longer time to grow in the lower layer than in the upper layer.

In summary, the average residence time of the proposed harbor is dependent on the tide, groundwater, and wind-induced exchanges with the ocean. If only tide is considered, then an outside maximum residence time of about 16 days is indicated. With a vertically mixed condition and the average tradewind-induced flux, the average residence time is estimated to be less than 2 days. If the proposed harbor is strongly stratified, then the tide and average tradewind flux results in an average residence time of about 5 days. It is expected that the worst case condition will exist during times of kona winds, which would tend to counteract the surface hydraulic gradient from the groundwater flux and thereby restrict exchange. Kona conditions, however, do not predominate, and the return of the tradewinds is expected to efficiently flush the harbor of the higher nutrient and plankton concentrations that build up during the kona conditions.

Much of the effects of the residence time on the water quality characteristics of the proposed harbor are dependent on the rate of inflow of nutrients with the groundwater and with any surface water and, subsequently, on the net phytoplankton growth rate.

In order to estimate the nutrient concentrations of the groundwater that would be flowing into the proposed harbor, seven groundwater samples were taken from the four observation wells along the shoreward edge of the proposed harbor (see Figure III-2). The results of the laboratory analyses on these samples are given in Table III-1.
Existing Harbor: 9.1 Acres, 21' Deep

Proposed Channel: 38' to 42' Deep

FIGURE III-2
WELL LOCATION: BARBERS POINT HARBOR
TABLE III-1
GROUNDWATER QUALITY CHARACTERISTICS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Arithmetic Mean*</th>
<th>Standard Deviation*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorides</td>
<td>mg/l Cl</td>
<td>1230</td>
<td>650</td>
</tr>
<tr>
<td>TKN</td>
<td>ug/l N</td>
<td>71</td>
<td>21</td>
</tr>
<tr>
<td>NO₃+NO₂</td>
<td>ug/l N</td>
<td>710</td>
<td>201</td>
</tr>
<tr>
<td>TP</td>
<td>ug/l P</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>DO</td>
<td>mg/l O</td>
<td>5.2</td>
<td>0.8</td>
</tr>
</tbody>
</table>

* Of seven separate samples

The nutrient concentrations shown in this table are lower than those given by ECI in 1975 and 1977 from samples taken from "a natural subsurface pool located in a construction site about a half mile directly inland from the harbor." The relatively high NO₃+NO₂ nitrogen values, however, confirm the supposition that the high nitrate concentrations noted by ECI in the existing harbor are due to the inflow of groundwater.

Because of the inflow of nutrients (especially nitrogen) to the proposed harbor from the groundwater and from adjacent surface drainage, it is expected that the phytoplankton growth rate during the residence time in the harbor will not be nutrient limited. Under such conditions the phytoplankton concentration in the photic zone is limited by time, predation pressure, and removal by settling according to the following first order differential equation that describes net exponential growth during the time that the phytoplankton are exposed to the higher nutrient concentrations in the proposed harbor.

\[
\frac{dC}{dt} = (K_G - K_P - K_R) C
\]

where:
- \( C \) = phytoplankton concentration (as indicated by the chlorophyll-a concentration)
- \( t \) = time
- \( K_G \) = gross growth rate constant
- \( K_P \) = predation rate constant
- \( K_R \) = removal rate constant
The net growth rate constant $K = K_G - K_P - K_R$ is the slope of the line when the log of $C$ is plotted versus time. Estimations for Hawaii Kai marina show a net phytoplankton growth rate of about 0.25 per day while those for the more complex ecosystem of Kaneohe Bay show estimated values of 0.12 per day for the present high nutrient condition and 0.09 per day for the conditions in 1958 to 1959.

Using the conservative net phytoplankton growth rate of 0.25 per day, a starting chlorophyll-a concentration of 0.20 mg/m$^3$, and an overall average residence time of 5 days (calculated earlier in this section) results in a predicted average chlorophyll-a concentration of about 0.70 mg/m$^3$ in the proposed harbor. This is approximately equal to the average concentration of phytoplankton presently observed in the north section of Kaneohe Bay during the dry season. Such an average concentration does not constitute an excessively eutrophic condition and no significant oxygen depletion problems are expected in the proposed harbor.

Higher phytoplankton concentrations can be expected to occur during extended kona wind conditions as well as in the bottom layer and in wind-sheltered areas of the proposed harbor as a result of longer residence times. No greatly excessive phytoplankton blooms, however, are expected under such conditions and in these areas because of the limited supply of phosphorus entering the system.

The direct effect of the proposed harbor on the marine environment outside of the mouth of the harbor is not expected to be significant. The tide-related longshore current and the predominantly offshore wind-related surface current in the Barbers Point area are expected to transport and disperse the somewhat higher nutrient discharge and higher turbidity from the proposed harbor. It is expected, however, that the overall average nutrient discharge per length of coastline in the Barbers Point area will be similar to the present condition since the overall groundwater discharge rate, after a new equilibrium is established, will be very similar to the present rate. This is because the overall groundwater flux is primarily dependent on the recharge rate, which would not be significantly affected by the proposed harbor.
In summary, the long-term effect of the proposed harbor on the marine environment is expected to be localized to the harbor and entrance channel. The major effects will be a substrate change in the channel from a generally hard bottom to a coral rubble bottom and the development of a new marine environment in the proposed harbor, similar to that of the existing harbor, but with somewhat higher concentrations of phytoplankton and zooplankton.

**GROUNDWATER IMPACT**

With respect to groundwater resources, evaluation of the proposed Barbers Point harbor development was made by the U.S. Geological Survey in their December 1968 Administrative Report. The report states that harbor construction would essentially move the shoreline inland at the harbor site. Since the coral aquifer and the Waianae Volcanic Series aquifer are essentially independent of each other due to the aquiclude that separates them, the impact of harbor construction would be limited to the coral aquifer, with no effect expected on the potable water supply of the Waianae Volcanic Series aquifer. The Board of Water Supply, City and County of Honolulu, concurs that there will be no effect on the potable water supply, but adds that there may be some effect on potential development of brackish caprock water as a supplementary water source. It should be noted, however, that although the harbor would reduce the volume of brackish water presently stored in the coral aquifer, it would not significantly affect the net flux of this water to the ocean. The net effect is that as much water would be available, but the wells would have to be located further inland.

The USGS report states that harbor construction should not have any measurable effect on the chloride content of the water pumped by any of the existing wells in the area. The only well that might possibly be affected is an irrigation deep well operated by Ewa Sugar Plantation and located about 1 mile northeast of the proposed harbor site. The USGS evaluation concludes that the possibility of effect is rather remote, and increased chloride content in the well is more likely to be caused by an upward movement of saltier water during well pumping rather than by a lateral movement from the coral aquifer to the well.
To develop an idea of the impact of a tsunami on the proposed shoreline facilities, a 15-foot wave was considered. This wave, which is the projected 100-year recurrence interval wave height, would break at a depth of about 20 feet, 600 to 1,000 feet from shore. In the 42-foot deep by 450-foot wide channel, however, this wave would remain a single, long period swell going into the harbor basin. Within the inshore channel, where the depth decreases to 38 feet, the wave height would increase slightly. This wave may overtop the revetment to an extent dependent on the tidal level and the revetment elevation. The barge harbor, which is 21 feet deep, would serve to attenuate the wave height a minor amount before the wave enters the main harbor basin. The resulting water level in the basin would be dependent on the wave length, wave shape, friction effects, and possible flooding effects. The channel area of the harbor would be especially subject to high velocity currents as the water enters and subsequently exits the harbor basin.

In addition to the effect of a single wave, the effect of resonance must be considered. In March 1977, the Army Corps of Engineers conducted a preliminary study, the "Numerical Analysis of Harbor Oscillations for Barbers Point Deep-Draft Harbor". One of the findings of the study was that the proposed harbor exhibited a large, broad resonant peak centered at a period of approximately 13.3 minutes. The largest tsunami elevation recorded in recent years on the open coast near the proposed harbor was probably the 12-foot elevation (MLLW) attained during the 1946 Aleutian tsunami. This tsunami had a period that was in the range of 10 to 15 minutes and, thus, could have excited the proposed harbor, causing elevations within the harbor in excess of a single wave condition. There also is evidence that the 1868 and 1877 tsunamis from Chile had periods near the resonant period of the proposed harbor. Furthermore, seismic experts have predicted a large earthquake may occur in the near future at the site of the 1868 and 1877 earthquakes.

The study of oscillations of the proposed harbor used a numerical model that did not consider dissipative effects or land flooding. Such effects would restrict the development of a resonant amplification of
tsunamis. A reliable estimate of the degree of overland flooding in cases where the harbor response may exceed confines of the immediate docks cannot be accurately performed without detailed calculations accounting for all the important processes involved. In addition, an estimate of the recurrence interval of significant tsunami flooding should be made in order to provide a basis for evaluation of the problems.

Because of the concern expressed regarding the possible tsunami effects on the proposed harbor and in light of the apparent long period resonant characteristics, the U.S. Army Corps of Engineers has requested funding to conduct a comprehensive evaluation of probable tsunami effects. The results of this study will be applied to the design of the shoreside facilities to alleviate possible flooding effects. The study will be conducted by the Waterways Experiment Station (WES) using a recently developed computer approach.

SURGE

The March 1977 WES study of harbor resonance showed several narrow period peaks in the period range of 20 to 150 seconds. WES, however, concluded that no significant surge problem would exist in the proposed harbor because of the character of the moored ship response and the possibility of using various mooring configurations.

Harbor oscillations with periods below about 100 seconds are not expected to create shipping operations problems because, according to WES, the period of moored surge response of the design size of Enterprise class of ships lies between 100 and 300 seconds.

The harbor resonant peaks above 100 seconds do have a potential for exciting some ship surging response. The small magnitudes and narrow widths of these peaks along with the results of other WES investigations lead WES to conclude that ship surge responses would be relatively small. Such responses can be dealt with by appropriate changes in the ship mooring configuration to mismatch the resonant periods of the mooring system with the narrow period peaks of the harbor oscillations.
TERRESTRIAL BIOLOGY

Plants

The major concentrations of *Euphorbia* are shown on Figure II-8. The location of the shoreside facilities at the proposed harbor will require removal of the most abundant and dense colony of *Euphorbia* at the southside of the facility. Scattered populations in that general area will also be affected. Another major *Euphorbia* colony is found at the northern extremity of the stockpile area. It is probable that the *Euphorbia* extend beyond the outer limits of the stockpile area. As such, stockpiling and other construction activities may adversely affect plants on the fringes by subjecting them to water spillage from the hydraulic dredging. As will be discussed later, however, mitigating measures will be taken to control the influence of the salt water on these plants. Salt water spillage is not expected to be of a magnitude to raise the ground-water level significantly.

The colony of another potentially endangered species, *Achyranthes splendens* var. rotundata Hbd., just makai of Malakole Road is found near the proposed stockpile and shoreside facilities.

According to the Division of Forestry, State Department of Land and Natural Resources, *Euphorbia skottsbergii* var. kalaaloana Sherff and *Achyranthes splendens* var. rotundata Hbd. will be placed on the federal list of endangered species in the future. These species are presently known to inhabit only the proposed project area and are believed to be habitat specific. Efforts to propagate both these species elsewhere are ongoing and are meeting with some success.

Wildlife

The proposed construction of the Barbers Point Harbor and the use of adjacent lands for stockpiling the dredged coral will have an adverse impact on all wildlife in the project area because of the necessary removal of keawe trees that serve as their habitat. The bird and mammal populations, however, have the capability to relocate to adjacent areas, and it is anticipated that they will do so when construction begins. Potential impacts to the birds and mammals are expected to be minimal and
short term. The species recorded during the survey are not endangered or threatened and are highly adaptive.

The large ponding area at Camp Malakole was recognized as an important wildlife habitat primarily because of the large numbers of water and aquatic organisms available to the bird and mammal populations. The aquatic organisms are evidently adapted to the seasonality of the ponding areas since the area is dry during most of the year. With an annual average rainfall of 20 inches, the ponding area would be inundated only after heavy and sustained rainfalls, probably during the winter months. It must be recognized, however, that the ponding area is essential to the survival of the aquatic organisms. The stockpiling of dredged coral will, if it occurs here, destroy the existing shrimp and other aquatic populations recorded during the survey.

HISTORIC AND CULTURAL SETTING

Studies by Bishop Museum and Archaeological Research Center Hawaii, Inc. found that the construction of the harbor basin, shoreside facilities, and stockpiles will either destroy or significantly alter the cultural sites in the Barbers Point area. The archaeological significance of the area lies in the opportunity to extract data from cultural sites in a marginal area, about which little is known.

The studies recommend that an intensive survey and salvage mitigation of cultural sites be conducted in areas that will be directly affected by the construction of the harbor. Bishop Museum further recommends the salvage of all paleontological deposits in areas that will be affected by construction. The Barbers Point area is unique in its historical and research value because of the recovery of "fossil" birdbones. The amount and distribution of fossil bones recovered indicate a high probability that other such deposits will be found. It is recommended by Bishop Museum that all sink holes in the project area be tested to assure that all such deposits have been located.

A program of mitigative action for the state's increment (Area I) as recommended by ARCH will be implemented by the state prior to construction. Proposed mitigation measures for the sites located in Areas B2, C,
E, and F (Area A has already been indicated as clear of archaeological remains) are as follows (see Figure II-11):

1. A detailed archaeological feature map and an accurate locational map will be prepared for the above areas as soon as possible so that the identified sites may be analyzed for their spatial arrangements and orientations.

2. The above areas have been proposed as optional stockpile areas (along with Camp Malakole, Area A). As such, there is no immediate need to take archaeological work in these areas beyond the detailed mapping stage. Having the mapping portion of the study completed at the earliest possible date, however, will allow for greater flexibility in selecting optimum stockpile areas to meet contingencies which may arise once dredging of the proposed harbor has begun.

3. Should the presently "optional stockpile areas" be deemed necessary for construction to proceed without delay, then salvage excavations of the sites in these areas will be conducted immediately.

4. If, on the other hand, these areas should remain of secondary importance to the phasing of development, excavation of the newly identified sites may be postponed until such time that the "optional stockpile areas" are scheduled for use.

These intensive studies are presently underway and will be completed during the detailed design stages of the harbor planning.

Partly as a result of the ongoing studies, the area shown on Figure II-10 has been declared eligible to be included in the National Register of Historic Places. It is expected that the ongoing studies along with the proposed studies being funded by the state will comply with the National Historical Register regulations. When sufficient information has been developed, the site will be given a lower status and construction can then proceed.
RELOCATIONS

The proposed harbor site has been subjected to extensive alteration and modification by man. Most of the area has been cleared and is vacant or is under haole koa-kiawe shrub vegetation. The Standard Oil Company will be responsible for the relocation of an 8-inch fuel line along Malakole Road. The line provides fuel from the Standard Oil Refinery to the Hawaiian Electric's Kahe Power Plant. The deep-draft harbor would require both temporary and permanent relocation of Malakole Road around the perimeter of the new port by the State as part of its shoreside facility planning. There are no immediate impacts from the relocation of Malakole Road since it is a private road owned by Campbell Estate.

Several oil storage tanks located along the perimeter of the existing barge harbor will have to be relocated to another area within the Campbell Industrial Park. These tanks are owned by the Powerine Oil Company and Times Oil Company.

RECREATION AND AESTHETICS

The harbor development would have temporary adverse effects on existing recreation. Recreation opportunities, however, would increase after harbor construction is completed. During the construction period, recreational fishing within the existing barge harbor and use of the launching ramp may be restricted or temporarily halted, depending upon the final construction procedures. Use of the barge basin would be restored after construction, with the new harbor providing additional areas for recreational fishing. Currently, use of the private barge harbor and ramp is restricted to permit holders. Implementation of a public launching ramp would expand access and use of the coastal resources to the general public. The detailed plan for such a facility will be worked out during the design phase of the proposed harbor.

Since the only navigation feature offshore would be the entrance channel, it appears that there will be no measurable effect on the littoral drift regime. An evaluation of the littoral currents, the rocky character of the nearshore zone, and hydrographic surveys of the barge harbor entrance channel indicates that shoaling from littoral drift is
negligible. Neither the adjacent shoreline areas nor the more distant Kahe and Barbers Point beach parks should be adversely affected.

Existing reports on the existence of surfing sites in the vicinity of the harbor were reviewed. These reports are:

1. 1968 - Survey on the Ewa Quadrangle 3 by the Hawaii Surfing Association (HSA) (John Kelly)
2. 1971 - *Statewide Surfing Site Survey* by Surfing Education Association (SEA)
4. 1977 - *Hawaii Water Resources Plan* by the Hawaii Water Resources Regional Study (HWRRS)
5. 1975 - *State Comprehensive Outdoor Recreation Plan* (SCORP)

The reports by HSA, SCORP, and HWRRS do not identify sites immediately adjacent to the existing barge harbor. The nearest surfing sites to the harbor, as indicated by the Hawaii Surfing Association report, were about 1,600 to 2,000 feet north and about 2,500 to 3,000 feet south of the harbor. The proposed harbor channel is not expected to affect these sites. The Surfing Education Association (SEA) report, however, did show two other sites just north and south of the existing harbor. These surf sites, on either side of the existing entrance channel, will be displaced by the new channel. Since the nearshore bathymetry is generally regular and uniform, and since no other structures will be built offshore, it is likely that waves suitable for surfing will continue to form on the sides of the wider entrance channel. Access and private ownership of the adjacent lands have limited the current use of these sites. Public access to the area would be improved with harbor development by the state.

It should be noted that the SEA survey indicated that the locations shown on their map are general and that a detailed site survey would be required for engineering purposes. Because three of the aforementioned

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reports did not list the existence of the nearby surf sites indicated by the SEA report, there is a question as to their significance.

It might be further noted that the Barbers Point Deep-Draft Harbor was listed on page 162 of the Surf Parameters Final Report as one of the projects authorized for construction, and it was not discussed in Appendix B as a proposed project that may endanger surfing sites and usage.

DEMAND FOR UTILITIES

At its ultimate development, the Barbers Point Harbor facilities are projected to cover a total of 330 acres. The lands would be incrementally developed to provide facilities for container cargo, a general barge facility, and a container/general cargo/bulk cargo area.

As these shoreside developments are built, traffic volume, noise, water, electrical, telephone, and sewage treatment requirements for the harbor will gradually increase.

1. Traffic. It is estimated in the TAMS preliminary report for Campbell Estate that the traffic generated by the Barbers Point Harbor port facilities at ultimate development, will average 14,000 equivalent cars per weekday. During this same period, it is anticipated that Campbell Industrial Park will expand, adding 1,046 developed acres. The expected traffic demand of Campbell Industrial Park and Barbers Point Harbor, at full development, will average 27,000 equivalent vehicles per weekday. The harbor facilities will therefore account for 52 percent of the total traffic. This means that Kalaeloa Boulevard will require upgrading from its present classification as a "private" four-lane roadway (two in each direction) to a six-lane roadway in order to meet the future traffic demand. The traffic carrying capacity of Kalaeloa Boulevard, expanded to three lanes in each direction, would range from 26,000 to 30,000 equivalent vehicles per day. Kalaeloa Boulevard, widened to a total of six lanes, would be capable of accommodating an average daily traffic demand at an acceptable level of service. The port access road will also have to be four lanes wide to accommodate the increased
traffic. Other proposed roadways, according to Campbell Estate, will conform to the subdivision regulations. It is estimated that a majority of the 27,000 equivalent vehicles will travel towards Honolulu on the H-1 and the remainder will travel in the Waianae direction. The increased traffic from Honolulu into Kalaeloa Boulevard might create a bottleneck on the Palailai Interchange. The Palailai Interchange is four lanes wide, one incoming from Honolulu and one going to Waianae on the H-1 and combining with incoming and outgoing lanes from Farrington Highway. The Palailai Interchange will change from four lanes into Kalaeloa Boulevard, which is planned for the six lanes expansion. The existing roadway facilities will have sufficient capacities until about 1990, if the predicted development of Campbell Industrial Park materializes. If not, the improvements could be deferred longer. It will be necessary to widen to four lanes about one mile of the existing Malakole Road from Kalaeloa Boulevard to the harbor site. The road construction should be included in the early phases of the harbor development. The estimated cost of widening the road segment is about $400,000.

2. **Drainage.** Within the harbor, water quality controls will be subject to regulations of the State Water Transportation Facilities Division. Water input into the harbor will be by tidal and wind exchange, groundwater flow, and local drainage of the harbor facilities. No stream or drainage canals will enter the harbor area. The discharge of local storm runoff from the harbor facility is not expected to have a significant impact to the harbor basin. With the enforcement of harbor regulations, the port should not suffer any significant pollution levels. The water quality should be better than Honolulu Harbor which is greatly affected by discharge from Nuuanu and Kapalama streams. As noted previously, a regional drainage system proposed by Campbell Estate will intercept runoff along the eastern and southern perimeters of the harbor and direct it toward a major drainage channel for discharge into the ocean.

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3. **Water Supply.** The estimated 0.06 mgd per day that the port facilities will need for the initial phase of development will put some additional burden on the existing water sources serving the Campbell Industrial Park. Water for the park presently comes from the Board of Water Supply's Ewa-Waianae district. The Ewa-Waianae water district includes all of the land west of the crest of the Waianae range to the sea coast, south of Kaena Point, and encompassing Nanakuli, Ewa, and part of Honolulu. The fresh water resources within this water district that could be developed by the Board of Water Supply are insufficient to satisfy the projected demand. Four new wells have been proposed to meet the increased consumption. The Ewa-Waianae water district will have to depend heavily on other water districts, such as the Pearl Harbor water district (which presently supplements the Ewa-Waianae water district) and the Wahiawa water district, to meet the estimated average daily requirement of 88 million gallons per day and the maximum daily consumption of 132 million gallons per day predicted for 2020.

The Board of Water Supply has indicated that the initial phase 0.06 mgd harbor requirement can be accommodated by tapping into the existing system. Fire flow requirements would be initially satisfied by using a salt water pumping system. The improvements needed to satisfy the growing requirements for the entire Barbers Point area will be the subject of an area water master plan that will be coordinated with the Board of Water Supply. It is expected that such a program will require the preparation of its own EIS.

4. **Wastewater.** An estimated wastewater flow of 0.06 mgd is expected for the port facility at ultimate development. The waste flow will generally consist of domestic, shipboard, and possibly livestock waste. The shipboard waste, livestock dock waste and wash water, and shoreside domestic waste will be conveyed to a proposed regional treatment plant by Campbell Estate. The harbor wastewater will be treated with other sewage generated by
the Campbell Industrial Park. The proposed treatment plant by Campbell Estate will be designed to handle the ultimate sewage flows of the industrial park since no specific provisions were made to include industrial wastewater flows into the new Hono­uliuli Sewage Treatment Plant. It is expected that such a regional facility will require the preparation of an EIS.

Until the proposed treatment plant is built, however, other alternatives must be used to treat the harbor sewage. Alternatives such as an oxidation pond or a package treatment plant followed by disposal of the treated effluent via injection wells or a leaching field appear to be the most feasible methods of treatment and disposal. A total of approximately three acres would be needed for the temporary facilities. This site would be located on either state or Campbell Estate land. The impact of the treatment process to the surrounding areas and disposal into the brackish groundwater will be assessed during the planning and design phases of the harbor facilities. It is expected, however, that the impact will be minimal because of the low flow and the opportunity for disposal into the brackish groundwater near the shoreline.

**AIR QUALITY IMPACT**

The main sources of air pollution that would be associated with this project are the increased vehicular traffic due to vehicles going in and out of the harbor, ships that are berthing in the harbor, and the fueling operations of ships.

The intent of the air quality analyses presented in this EIS is to give the reviewing agencies a sound basis for comparison and judgement.

The Environmental Protection Agency (EPA) has published the results of its extensive analyses of air quality effects for microscale environments. These analyses are the basis for the EPA's air quality planning guidelines used in this study, along with some basic assumptions and engineering rationale, to estimate the effects of the proposed harbor complex on the air quality.
Air pollution sources are regulated by federal standards and Chapters 42 and 43 of the Public Health Regulations as administered by the State Department of Health. The federal standards and Chapters 42 and 43 are applicable to the street traffic effects insofar as they affect the general public. The federal standards as well as the standards from Chapter 42 are summarized in Table III-3 along with air pollution projections.

1. Street traffic. The bases for air quality projections in this study are the publications by the EPA titled, "Guidelines for Air Quality Maintenance Planning and Analysis, Volume 9: Evaluating Indirect Sources," January 1975; "Compilation of Air Pollutant Emission Factors (AP-42)," April 1973; and its Supplement No. 5, December 1975. In addition, the revised compliance timetable noted in the August 1977 amendments to the Clean Air Act was taken into account.

In making the street air quality effects analyses, carbon monoxide (CO) was chosen as the measure of air pollution because of its potential hazard to health and its conservative nature compared to other pollutants. Although it is true that the levels of other pollutants (most likely hydrocarbons) may exceed state or federal standards more readily than does CO, the estimations of the likely levels of these pollutants are much more tenuous than the estimate of CO concentrations.

The major arterial road in the James Campbell Industrial Park (JCIP) is Kalaeloa Boulevard which runs in a northeast-southwest orientation between Malakole Road and the H-1 interstate freeway. The weekday average daily traffic (ADT) taken on Wednesday, April 27, 1977, on the four-lane road (two in each direction) was 6,215 vehicles, with a peak hour flow of 784 cars from 3 to 4 pm. Another peak of 743 cars occurred in the morning from 7 to 8 am. Almost all of the traffic is generated by the industrial park. With the planned future expansion of JCIP, an estimated 13,500 vehicles per day is projected. This figure includes 1,300 vehicles per day from the Theme Park. In
addition, an estimated 7,000 trucks per day are expected to be generated by the harbor and industrial park.

During the course of the JCIP expansion, Kalaeloa Boulevard will be expanded to three lanes in each direction. If the present time distribution of traffic is assumed, then an ultimate peak hour flow of 2,585 vehicles can be expected. The traffic distribution is shown on Figures III-3 and III-4 for the year 1977 (present) and the design year (anticipated full expansion of the industrial complex) respectively. The 1977 distribution represents actual peak hour traffic counts taken during that year. The design year traffic flow incorporates the traffic increase attributable to the proposed, expanded, industrial park and the harbor.

The following assumptions were made in estimating the CO concentrations:

The "worst case" meteorological conditions are assumed to be the following:
- calm wind, 1 m/sec
- overcast (D stability)

The receptor location shown on Figures III-3 and III-4 is one meter from the street curb. This receptor site was selected to specifically reflect the effect of the composite traffic flow from the JCIP and the harbor.

The federal timetable for reduction of vehicular carbon monoxide emissions was assumed to apply in the calculations to the regular traffic. No reduction in diesel truck emissions was assumed.

Peak eight-hour average estimates were calculated using an assumed 0.6 meteorological persistence factor, as suggested by the EPA.

Using the assumed traffic volumes, the EPA method requires the use of standard graphs for free-flowing traffic and summing the
RIGHT OF WAY

GRASSED SHOULDER

TO MALAKOLE ROAD

100

100

MEDIAL STRIP

292

292

TO H-1

RECEPTROR

GRASSED SHOULDER

RIGHT OF WAY

FIGURE III-3

PEAK HOUR TRAFFIC ALONG KALAELOA BLVD BETWEEN MALAKOLE ROAD AND H-1 INTERSTATE HWY

SOURCE: TRAFFIC COUNT FROM C&C OF HONOLULU DEPT OF TRANSPORTATION SERVICES

3-4 PM., 4-27-77, WEDNESDAY
RIGHT OF WAY
GRASSED SHOULDER

147 Regular Traffic (RT)
76 Heavy Duty Diesel (HDD)
TO MALAKOLE ROAD
147 (RT)
76 (HDD)
147 (RT)
76 (HDD)

MEDIAL STRIP

420 (RT)
218 (HDD)
420 (RT) TO H-1
420 (RT)
218 (HDD)
420 (RT)
218 (HDD)

GRASSED SHOULDER

FIGURE III-4
PROJECTED PEAK HOUR TRAFFIC ALONG KALAELOA BLVD BETWEEN MALAKOLE ROAD AND H-1 INTERSTATE HIGHWAY FOLLOWING FULL EXPANSION OF CAMPBELL INDUSTRIAL PARK
carbon monoxide contributions from all lanes on the receptor. The results are given in Table III-2.

In both the peak hour and peak eight-hour average periods, carbon monoxide concentrations do not exceed the federal or state standards either now or at the time of full expansion of the industrial park and the harbor. It might be noted that the harbor complex accounts for slightly over one-half of the peak hour concentration and about one-third of the peak eight-hour average concentrations. Even if the concentrations did exceed the governmental standards, it is expected that there would be minimal impact in that there would be only minimal pedestrian traffic, as is now the case, passing through Kalaeloa Boulevard.

2. Ship emissions. Ship emissions and air quality effects were evaluated for a ship when in dock. In this situation, the ship continues to burn fuel to generate auxiliary power, although at a lower but less efficient fuel rate. This power must be generated for the ship's light, heat, pumps, refrigeration, ventilation, etc. As the fuel is burned and discharged from the smoke stack, emissions are dispersed in the air as a plume.

In determining the concentrations of various pollutants, the plume was assumed to spread following a Gaussian distribution in both the horizontal and vertical planes, in accordance with the following relationship:

\[
\chi (x, y, z; H) = \frac{Q}{2 \pi \sigma_y \sigma_z} \exp \left\{ -\frac{1}{2} \left( \frac{y}{\sigma_y} \right)^2 \right\} \cdot \exp \left\{ -\frac{1}{2} \left( \frac{z - H}{\sigma_z} \right)^2 \right\} + \exp \left\{ -\frac{1}{2} \left( \frac{z + H}{\sigma_z} \right)^2 \right\}
\]

where: 
- \(Q\) = uniform emission rate of pollutants, gm/sec
- \(\sigma_y, \sigma_z\) = standard deviations of plume concentration distribution in the horizontal and vertical directions, m (these are a function of weather conditions and the distance downwind from the source)
TABLE III-2
ESTIMATES OF CARBON MONOXIDE (CO) CONCENTRATIONS ON KALAELOA BLVD. BETWEEN MALAKOLE ROAD AND H-1 INTERSTATE HIGHWAY

<table>
<thead>
<tr>
<th>Year</th>
<th>Peak Hour</th>
<th></th>
<th></th>
<th>Peak 8-hour Average</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concentration</td>
<td>Standards, mg/m³</td>
<td>Concentration</td>
<td>Standards, mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>mg/m³</td>
<td>State</td>
<td>Federal</td>
<td>mg/m³</td>
<td>State</td>
<td>Federal</td>
</tr>
<tr>
<td>1977</td>
<td>5</td>
<td>10</td>
<td>40</td>
<td>3</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>1990-95</td>
<td>9</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>(Assumed time of completed JCIP expansion)</td>
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<td></td>
</tr>
</tbody>
</table>

(1) Assumed ambient CO concentration = 1 mg/m³

(2) Assumed EPA meteorological persistence factor = 0.6

(3) Assume revised federal timetable for automobile emission controls will apply.

A Total concentration from Campbell Industrial Park & Harbor

B Concentration attributable to harbor
The ship emission, Q, and the height, H, were estimated using EPA's *Compilation of Air Pollutant Emission Factors* (April 1973) and by assuming that ships with the same characteristics as Matson container steamships will be docking at the proposed container terminal. The present steamships use bunker C fuel oil with an average 1.5 percent sulfur content.

Based on the average fuel consumption rate of the Matson ships, corresponding emission rates of pollutants developed by the EPA were obtained. No emission controls were assumed to be in effect to mitigate the effects of the pollutants.

The concentrations of carbon monoxide, nitrous oxide, sulfur oxide, hydrocarbon, and particulates were estimated for receptor sites six feet tall and at various radial distances from the center of the stack. "Worst case" meteorological conditions (wind speed of 1 m/sec = 1.9 knots, D stability) were assumed.

The results and the federal and state standards are presented in Table III-3.

As seen in the table, the concentrations increase with distance and reach a maximum downwind at about 425 m to 500 m and decrease thereafter. The maximum concentrations correspond to areas near the outside boundary of the shoreside facilities and the shoreline. Under worst meteorological conditions, the 24-hour nitrous oxide state standard is exceeded beginning from radial distances of between 200 and 300 m. The nitrous oxide concentration reaches a maximum of 260 ug/m³ at 425 m. Under worst meteorological conditions, the federal and state 24-hour sulfur oxide standards as well as the state 3-hour standard are exceeded, with the state 24-hour standard being exceeded beginning at a
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Concentration @ the Indicated Horizontal Distance from Ship's Stack ug/m^3</th>
<th>State Standard ug/m^3</th>
<th>Federal Standard ug/m^3</th>
<th>Percent Probability of Exceeding State 24-hr Standard 425m away</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24m</td>
<td>100m</td>
<td>200m</td>
<td>300m</td>
</tr>
<tr>
<td>Carbon Monoxide (mg/m^3)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hydrocarbon</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Nitrous Oxides</td>
<td>14</td>
<td>14</td>
<td>64</td>
<td>193</td>
</tr>
<tr>
<td>Particulates</td>
<td>40</td>
<td>40</td>
<td>44</td>
<td>53</td>
</tr>
<tr>
<td>Sulfur Oxides</td>
<td>5</td>
<td>5</td>
<td>119</td>
<td>409</td>
</tr>
</tbody>
</table>

* 8 Hour Standards

** Federal Secondary Standard

† Alert Levels

Projected concentration includes the following assumed ambient air concentrations and reflect an assumed meteorological persistence factor of 0.6.

- Carbon Monoxide = 1 ug/m^3
- Hydrocarbon = unknown
- Particulates = 40 ug/m^3
- Sulfur Oxides = 5 ug/m^3
- Nitrous Oxides = 14 ug/m^3
200 m distance, while the federal standard is exceeded beginning at about 300 m.

Based on wind observation (1942 to 1970) from Barbers Point Naval Air Station, calm wind conditions (0 to 3 knots) occur 1.5 percent of the time, which means that the frequency of occurrence of the worst case conditions is very low.

An estimate for phase I was also made of the probability for exceeding the stringent state 24-hour standards under all-wind conditions. It was found that the nitrogen oxide standard will be exceeded 3 percent of the time, while the sulfur oxide standard, 18 percent of the time. These probabilities take into account that 80 berthings are projected to occur in one year, with an average turnaround time per berthing of 1.4 days. (The assumed turnaround time reflects present Matson average turnaround times.)

In conclusion, it appears that the major effect of the ship emissions is the emission of sulfur oxide. Calculations show that, under worst case meteorological conditions, the concentration is the highest at radial distances of about 425 m (1,400 feet) from the stack and that, under all meteorological conditions, the state 24-hour standard would be exceeded 18 percent of the time. While an 18 percent frequency of occurrence is of concern, it should be mentioned that these maximum concentrations are derived for receptor sites along the centerline of the plume.

Many simplifying assumptions were made in the calculations and, owing to the many environmental factors that would influence the actual concentrations, the concentrations and probabilities projected are not meant to be precise numbers but should give an indication of the degree of air pollution effects. With due consideration to the above data, therefore, the impact of the ship's sulfur oxide emission is not critical but is of marginal concern.
The air quality effects due to ship emissions are controlled by state and federal regulations. If these regulations are complied with then no significant air pollution problems are expected to occur.

**IMPACT OF THE BARBERS POINT NAVAL AIR STATION ON THE HARBOR AND VICE VERSA**

**Noise**

Aircraft noise exposure already has a degree of adverse behavioral and subjective effects on people working in this area. Harbor development will increase the number of people subjected to this noise. It is anticipated that the noise generated by normal work operations at the proposed harbor will be equal to or greater than the aircraft flying overhead.

A noise study was made in the preparation of the Air Installation Compatibility Use Zone (AICUZ) report that purports that the total harbor area is in Noise Exposure Zone 1 (see Figure III-5). NEZ 1 is the least severe exposure of three noise zone classifications and is roughly equivalent to a Composite Noise Ration 1 (CNR 1) and a Noise Exposure Forecast (NEF) below 30. For a harbor area, NEZ 1 is considered satisfactory, with little noise impact and having no special noise insulation requirements for new construction.

Table III-4 indicates that there is no noise conflict between harbor (industrial) and aircraft operations.

**Hazards to Aircraft Operations.** Chapter 262 of the Hawaii Revised Statutes is written to prevent construction of hazards to aircraft operations. An obstruction protruding excessively into the airspace would be in violation of this code. Runway 11 at NAS Barbers Point requires a glide slope of 50:1. Figure III-6 shows that a height of a structure can be about 225 feet before it becomes an obstruction to flight in the harbor area. A height of 225 feet will allow normal design of buildings and normal crane operations for a port facility. The top of the warehouse terminal is expected to be at an elevation of 70 feet, while the top of the container cranes is expected to be at elevation 190 feet. Both elevations are referenced to mean lower low water.
**TABLE III-4**

<table>
<thead>
<tr>
<th>LAND USE</th>
<th>1 LOW NOISE IMPACT</th>
<th>2 MODERATE NOISE IMPACT</th>
<th>3 HIGH NOISE IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIDENTIAL, LOW DENSITY</td>
<td></td>
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<tr>
<td>RESIDENTIAL MEDIUM DENSITY</td>
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<tr>
<td>RESIDENTIAL, HIGH DENSITY</td>
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<tr>
<td>SCHOOLS, HOSPITALS</td>
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<td>OFFICE</td>
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<td>COMMERCIAL</td>
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<tr>
<td>INDUSTRIAL</td>
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<tr>
<td>AGRICULTURE</td>
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</tr>
<tr>
<td>CNN</td>
<td>100-</td>
<td>100-115+</td>
<td>115+</td>
</tr>
<tr>
<td>NEF</td>
<td>30-</td>
<td>30-40</td>
<td>40+</td>
</tr>
<tr>
<td>Lmin</td>
<td>65-</td>
<td>65-75</td>
<td>75+</td>
</tr>
</tbody>
</table>

**LEGEND**

- NO LOW CONFLICT
- LOW CONFLICT
- MODERATE CONFLICT
- SERIOUS CONFLICT

**NOTE:**

NOISE COMPATIBILITY REFLECTS OPEN VENTILATION COMMONLY USED IN BUILDINGS IN HAWAII.
Accident Potential. A potential of aircraft accidents is always a consideration when planning a development in the vicinity of the airport. The occurrence of aircraft accidents in the approach zone of Barbers Point Naval Air Station is always a possibility.

In 1975 the U.S. Navy made a survey and an analysis of accidents in the vicinity of NAS Barbers Point and established criteria for rating the risks of aircraft accidents. Accident potential zones were developed that represent greater or lesser degrees of risk but no specific probability of crashes were assigned to each zone. Accident potential zone A (APZ A), shown on Figure III-5, is the zone considered to have the highest degree of risk and extends 3,000 feet from the end of the runway. APZ B extends from the outer limit of APZ A to a distance of 10,000 feet along the flight path from the end of runway 11. APZ C is the area beyond the APZs A and B where aircraft fly below 500 feet above ground level.

The risk of death and injury is directly related to the density and activity of people occupying the area being studied. Table III-5 equates land use to activity and density. Knowing the APZ and the land use, the degree of conflict can be determined in Table III-6.

As shown on Figure III-5, a portion of the proposed deep water harbor site is in APZs B and C. Table III-6 shows a low accident potential conflict for that portion of the project that falls in APZ C, moderate conflict for areas in APZ B, and no conflict for the remainder of the site. It should be noted, however, that the AICUZ study shows that, from November 1960 to January 1975, there have been no recorded accidents on runway 11's approach zone.

Summary. A meeting was held with representatives from the Planning Department, U.S. Naval Facilities Engineering Command, Pacific Division, to discuss compatibility of the proposed deepwater harbor with operations of the naval air station. The normal operations and normal density of personnel for a typical harbor operation were considered. Navy representatives considered that the classification of activities found in a harbor operation would be similar to the classification for industry-fabrication and manufacturing. For an industry-fabrication and manufacturing in APZ C, (see Table III-6), compatible use is restricted to 25 persons per
**TABLE III-5**

<table>
<thead>
<tr>
<th>LAND USE</th>
<th>A</th>
<th>B3</th>
<th>B2</th>
<th>B1</th>
<th>C3</th>
<th>C2</th>
<th>C1</th>
<th>3</th>
<th>2</th>
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<tbody>
<tr>
<td>RESIDENTIAL - RURAL, 0 TO 3 DU'S/ACRE</td>
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<tr>
<td>RESIDENTIAL - SINGLE FAMILY &amp; DUPLEX, 3 TO 7 DU'S/ACRE</td>
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<tr>
<td>RESIDENTIAL - MULTI-FAMILY, 7 DU'S/ACRE OR MORE</td>
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<tr>
<td>COMMERCIAL - RESORT/HOTEL</td>
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<td>INDUSTRY - FABRICATING AND MANUFACTURING</td>
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<td>INDUSTRY - PETROLEUM/EXPLOSIVE</td>
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<tr>
<td>AGRICULTURE (EXCEPT LIVESTOCK)</td>
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<td>RECREATION - GOLF</td>
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<tr>
<td>FOREST, WILDLIFE HABITATS, PRESERVATION</td>
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</tbody>
</table>

**LEGEND**

- : Restricted - No New Development
- : Restricted to Limited Development
- : No Restrictions

- 10: Restricted to Ten Persons Per Acre
- 25: Restricted to Twenty-Five Persons Per Acre

**NOTE:**

Noise compatibility reflects open ventilation commonly used in buildings in Hawaii.
<table>
<thead>
<tr>
<th>LAND USE</th>
<th>LIMITED HAZARD</th>
<th>CONSIDERABLE HAZARD</th>
<th>EXTREME HAZARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIDENTIAL, LOW DENSITY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESIDENTIAL MEDIUM DENSITY</td>
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<tr>
<td>RESIDENTIAL, HIGH DENSITY</td>
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<td>SCHOOLS, HOSPITALS</td>
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<td>OFFICE</td>
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<td>COMMERCIAL</td>
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<td>INDUSTRIAL</td>
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<tr>
<td>AGRICULTURE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAXIMUM ASSEMBLY (NO.)</td>
<td>100</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>MAXIMUM OCCUPANCY/ACRE</td>
<td>25</td>
<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>

**Legend:**

- **NO CONTACT**
- **LOW** CONFLICT
- **MODERATE** CONFLICT
- **SERIOUS** CONFLICT
acre. Similarly, 10 persons per acre are allowed in zone B. Based on the population projection for the harbor, the gross density, excluding the harbor basin, of personnel working in this area will be 3 persons per acre for phase I development and 6 persons per acre at ultimate development. The proposed deepwater harbor located as shown on Figure III-5 is therefore considered to be compatible with air operations at NAS Barbers Point.

**NOISE**

The noise generated in the harbor will be emitted by ships, unloading equipment, trucks, and other harbor-related activities. The noise level in the future harbor will be approximately equivalent to that presently emitted at pier 2 in Honolulu Harbor.

The intensity of the noise generated by the harbor activities will not affect the existing industrial park and surrounding area. There are no planned schools, churches, or residential areas near enough to the noise-producing areas of the harbor. The proposed West Beach development will be located north of the harbor boundary, which will have no shoreside activities.

Much of the noise that will be generated in the harbor will come from heavy trucks that emit about 90 decibels at a distance of 50 feet. By January 1, 1978, the noise emitted by new trucks will be reduced to 83 decibels and further reduced in 1982 to 80 decibels. The present noise level of 90 decibels that may be emitted by trucks operating in the harbor will be reduced to 60 decibels at a distance of about 1,500 feet from the berthing spaces in the harbor. When the truck noises are reduced to 83 and 80 decibels, the corresponding distances for the 60-decibel level will decrease to 900 and 500 feet respectively. No adverse impacts from the noise levels generated in the harbor are therefore anticipated.

**ECONOMIC IMPACTS**

**Primary Impacts**

The primary economic impact of the harbor has been evaluated in terms of current economic activity, economic activity during construction, and
economic activity during the operation of the harbor facility.

The site for the proposed deep-draft harbor currently is used as a barge harbor, and the surrounding lands are primarily unused lands. The development of a deep-draft harbor will result in expanded harbor activity and the conversion of much unused land to productive land.

The existing Barbers Point Harbor is limited in terms of the size and type of ships it can accommodate. The harbor is classified as a barge facility primarily servicing interisland commerce.

The harbor was constructed by Campbell Estate to enable industries located in Campbell Industrial Park to ship products directly to other islands, thereby reducing transshipment costs to and from Honolulu Harbor. Due to the limited size of the facility, however, the harbor is infrequently used for cargo shipments. Average annual tonnage at the harbor is reported to be less than 4,000 tons.

Offshore pipelines also exist in the Barbers Point area. These pipelines handle approximately 60 percent of all petroleum cargo on Oahu, estimated at 7.5 million tons in 1974. The pipelines operate primarily as a receiving facility for crude oil, which is processed locally by the two refineries located at Campbell Industrial Park. Outshipments and inshipments of refined petroleum products have been affected by the availability of Honolulu Harbor, the inability of oil tankers to dock at the existing Barbers Point Harbor, and the weather-induced delays experienced in using the offshore pipelines.

If continued primary dependence is placed on fossil fuel for energy generation, then future fuel shipments to Oahu are expected to increase to five times the present level in the next 50 years. The offshore pipelines are anticipated to receive all incoming crude oil; however, according to the U.S. Army Corps of Engineers, a number of oil companies have indicated they would also use the harbor for incoming and outgoing shipment of refined petroleum products if a deep-draft harbor were available at Barbers Point. Using the proposed Barbers Point Harbor for shipping and receiving refined petroleum products would save oil companies approximately $48,000 per year now lost through weather-induced delays at the offshore moorings and would eliminate the need for approximately $9,000,000 of
investments in offshore moorings and handling facilities at the pipeline sites. If a portion of the future energy requirements of Oahu are filled by the use of coal, the proposed harbor would be a prime location for receiving such shipments because of available area and proximity to potential users.

The harbor site is presently used for agriculture, recreation, and as a military area. Most of the land at the harbor site, however, is an unused, flat, dry, coral plain. Expected changes in the current utilization of the land and its potential impacts are discussed below.

**Loss of Sugar Land.** The proposed location of the harbor would require removing only about two acres of sugar land currently under production. Although this land is judged to yield good to marginal returns, officials at Oahu Sugar Company have indicated that the rocky terrain and its distance to the sugar mill make it of marginal economic value.

**Loss of Real Property Tax Revenue.** The proposed harbor would occupy approximately 330 acres of undeveloped land currently owned by Campbell Estate. It is estimated that approximately $50,000 of real property tax revenues would be lost annually due to state ownership. Additional acreage for the proposed harbor is owned by the U.S. government, and a change in ownership to the state would have no impact on real property taxes.

**Construction Activity**

The construction of the proposed Barbers Point Harbor is planned for completion in three phases over a 50-year period beginning in 1979. The construction of the harbor and shoreside facilities is expected to increase construction activity and employment, benefit construction-related industries, and generate economic benefits from the dredged material.

Over the last four years, the construction industry in Hawaii has been plagued by cost increases and a decline in real construction volume. Consequently, although construction expenditures in 1976 registered $1.012 billion, the third largest year ever recorded, construction volume in real terms was below the 1970 volume. Increased governmental construction in recent years has somewhat offset declining private construction; however, in 1976 governmental construction declined 25 percent, to $378
million. The Bank of Hawaii forecasts a bleak future for the construction industry in 1977, expecting an 11 percent decline in construction expenditures to $900 million.

Construction costs of the proposed Barbers Point Harbor are estimated at $93 million during the first two phases of construction.

In addition to harbor construction expenditures, added construction expenditures for support and recreational facilities would be incurred throughout the 50-year period. Examples of such facilities are offsite roadways, utility systems, communication systems, and sanitary sewer systems to serve harbor vessels and onshore facilities. No estimates of these costs are currently available.

Construction of the proposed harbor is projected to create an average of 290 construction jobs during the first five-year construction period. These projections were based on the proposed expenditure, percentage labor cost related, and average annual wage by trade.

### TABLE III-7

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Due to Federal Portion</th>
<th>Due to State Portion</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>360</td>
<td>10</td>
<td>370</td>
</tr>
<tr>
<td>1979</td>
<td>360</td>
<td>20</td>
<td>380</td>
</tr>
<tr>
<td>1980</td>
<td>180</td>
<td>70</td>
<td>250</td>
</tr>
<tr>
<td>1981</td>
<td>-</td>
<td>210</td>
<td>210</td>
</tr>
<tr>
<td>1982</td>
<td>-</td>
<td>260</td>
<td>260</td>
</tr>
</tbody>
</table>

Source: Peat, Marwick, Mitchell & Co.
An additional 290 jobs in the construction industry due to harbor construction would have reduced 1976 unemployment from 19.4 to 18.5 percent. Although the percentage decrease is not large, the resulting savings of unemployment insurance would have been $1.2 million to the state, assuming 39 weeks of benefits at $125 per week. Revenues from state income taxes would also have increased approximately $180,000, based on prevailing state tax rates in 1976. In addition, social and psychological trauma associated with unemployment would have been avoided.

Aside from the direct employment described above, suppliers to the construction industry would also benefit, and secondary support jobs could be created. It can be expected that harbor development would benefit construction-related industries, such as cement producers, electrical suppliers, wood and steel processors, and the like.

During phase II, sometime in the 1990s, the addition to the harbor facilities is estimated to create 20 jobs in fiscal year 1990, 240 jobs in fiscal year 1991, and 350 jobs in fiscal year 1992. These estimates were based on the proposed spendings in each of those years.

### Dredged Material

The value of the coral is dependent upon how much the construction industry can absorb each year and whether it is processed for use as aggregate or merely hauled off as fill material. Several studies have been made regarding the value of the coral and the stockpile depletion period. While earlier studies by the U.S. Army Corps of Engineers estimated a 6- to 10-year depletion period, later studies by Urban Projects, Inc. estimated a 17½-year depletion period. This was based on processing plant limitations of one million tons per year and on the marketability of the products.

The primary uses for dredged coral are for road base and structural fills for road embankments and as processed aggregates for cement mortar and concrete. Unless there is an extensive road-building program, the demand for road-building material will not be very large. It would therefore be reasonable to assume that much of the coral will be processed and sold as aggregates.
At a density of 125 lbs per cubic foot, the 10.6 million cubic yards of coral would equal 17.5 million tons. When processed, this quantity could have present values ranging from $11.6 million to $14.5 million at 8 percent discount rate for 17.5 years.

The coral would be stored on private lands during the depletion period. Based on current rental costs of $4,000 to $6,000 per acre, the present value of the land rental, at 8 percent discount rate for 18 years, could range from $6.5 to $9.7 million. Thus, the net present value of the coral would range from $4.8 to $5.1 million. About 11 percent of the net present value would accrue to the state.

Harbor Operating Period Activity

The proposed Barbers Point Harbor operations would be supervised and run by the Water Transportation Facilities Division, State Department of Transportation, in the same manner as Honolulu Harbor. The primary economic impacts of the harbor's operations are expected to be revenues generated from harbor use charges, creation of direct and indirect employment, and overland transportation cost savings as described below.

Initial employment, primarily state workers, directly related to the operations of the harbor is estimated at 12 employees. This estimate is based on discussions with the State Superintendent of Harbors. Additional employees projected below would be added as harbor usage increases.

<table>
<thead>
<tr>
<th>Year</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>12</td>
</tr>
<tr>
<td>2000</td>
<td>19</td>
</tr>
</tbody>
</table>

The operation of a harbor also requires various support businesses to aid in supplying ships and cargo movement. These businesses provide
employment in trades such as tugboat operators, stevedores and longshoremen, truckers, and the like.

Currently, approximately 1,000 people are employed in these trades at Honolulu Harbor. Since most of these trades derive their employment from nonpetroleum cargo, the growth of support employment can be expected to mirror the growth in nonpetroleum products.

### Table III-9

**SUMMARY OF DIRECT AND SUPPORT EMPLOYMENT**

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct</th>
<th>Support</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>60</td>
<td>360</td>
<td>420</td>
</tr>
<tr>
<td>2000</td>
<td>90</td>
<td>530</td>
<td>620</td>
</tr>
<tr>
<td>2030</td>
<td>150</td>
<td>1,240</td>
<td>1,390</td>
</tr>
</tbody>
</table>

Source: Peat, Marwick, Mitchell & Co.

The creation of a harbor and its work force should result in the formation of indirect business enterprises to service the harbor employees, crews of the ships, and visitors to the harbor. Various examples of these enterprises might be restaurants, lunch wagons, snack bars, drug and novelty stores, medical services, research, etc. The degree to which these enterprises are established and flourish depends on the growth of the harbor work force and visitors.

**Other Economic Impacts**

The operations of the harbor should stimulate harbor-related and indirect business enterprises, increase employment, and aid current leeward businesses. This increased business activity should result in higher state tax revenues in the form of excise taxes and individual and corporate income taxes.

Another impact is that a harbor at Barbers Point would reduce the need to ship goods to Honolulu Harbor and have it trucked to leeward users. The Corps estimated that approximately 490,000 tons of goods are
currently being handled in that fashion, and future traffic could grow to 3,400,000 tons by the year 2030. The Corps estimates that a harbor at Barbers Point would save $1.1 million of overland transportation costs if all 490,000 tons were shipped through Barbers Point, and, in future years, an equivalent average annual savings of $3.2 million could be realized.

Initially, all goods currently shipped through Honolulu Harbor and trucked to the leeward area would not switch to direct waterborne shipment. Containerized ships carry approximately 1,200 containers, and, to justify docking at the proposed Barbers Point Harbor, special coordination among the leeward users would be required. The extent to which this special coordination emerges will directly affect the realization of overland transportation cost savings.

Two of the industries that could benefit from switching to waterborne shipment are the cement and sand industries. Cement and sand products represented 51,000 tons of the incoming and 136,000 tons of the outgoing cargo transshipped from Honolulu Harbor to leeward businesses. Since most of the cement industries are located within eight miles of the proposed harbor, they could realize an immediate savings.

A decrease in hauled tonnage between Honolulu Harbor and Leeward Oahu could have an adverse short-term impact on the trucking industry. Reduced transshipment, however, would occur gradually over time, and the expected long-term growth in tonnage for both harbors would assure the industry of continued growth. In addition, a reduction of trucking mileage between Honolulu Harbor and leeward Oahu would reduce traffic on public roads and rechannel potential fuel savings into other economic activities.

Secondary Impact

This section evaluates the economic impact of the proposed deep-draft harbor on the secondary impact area, Campbell Industrial Park.

As experienced at Honolulu Harbor, the impacts of the proposed harbor development at Barbers Point will affect industrial and light manufacturing activities in the surrounding areas of the harbor development. Campbell Industrial Park, which is located adjacent to the harbor development, is the only area containing industrial activity in the vicinity of
the harbor and is defined to be the secondary impact area of the harbor development.

Campbell Industrial Park (CIP) is the largest industrial park facility in the islands. Opened in 1958, the park has approximately 1,700 acres of land zoned for industrial use. Currently, approximately 1,200 acres have been leased or sold.

The park contains 92 companies that employ over 2,100 workers and can accommodate heavy, medium, and light industrial users. Since its inception, $150 million of capital commitments have been expended by private enterprises at CIP. In addition, the completion of the H-1 freeway has greatly improved access to the park.

**Industrial Land Demand.** A number of studies have been conducted by Campbell Estate, who owns and operates CIP, to determine the potential impact of harbor development on the industrial park in terms of increasing industrial land demand. These studies have generally concluded that leasing activity at the park could significantly increase as a result of the harbor development.

The industrial park leases approximately 50 acres per year, according to Campbell Estate representatives. During the initial years of the park's operation, leasing activity was much higher than the average as the initial facilities located at the park were generally large land users (i.e., oil refineries). In recent years, leasing activity has declined as the park has attracted smaller land users (i.e., light industrial companies).

The demand for industrial land at CIP is related to state and county economic activity, supply of industrial land, lease rent levels, and changes in distribution patterns. Based on past levels of leasing activity, Campbell Estate expects that leasing activity at the park, without the development of the deep-draft harbor, would be approximately 30 acres annually. These estimates appear reasonable in that the City and County of Honolulu, Department of General Planning, estimates that the annual demand for industrial land on Oahu is currently approximately 40 to 45 acres annually and should increase to 50 to 55 acres annually by the 1980s. Further, most of the existing industrial parks on Oahu are fully leased, and planned industrial areas, except for CIP, would add only 200 acres of industrial land in the coming years.
With the development of a deep-draft harbor at Barbers Point, the industrial park could be expected to attract additional users who would not normally locate at the park. These would most likely be industries that are water-oriented in terms of receiving or shipping bulk raw materials to and from the islands. According to a comprehensive market study conducted by Tippetts-Abbett-McCarthy-Stratton, consultants for Campbell Estate, there are approximately 75 industrial groups who would be prospects for the industrial park if the deep-draft harbor were developed (see Table II-7). Based on this analysis, the Tibbetts' study concludes that leasing activity would increase by approximately 10 acres per year if the harbor were developed.

The development of the deep-draft harbor could be expected to have a direct impact on CIP in terms of increased leasing activity. Assuming the harbor is developed, leasing activity at the industrial park could be expected to increase from 30 to 40 acres per year. Over the 40-year period, from 1980 to 2020, the incremental demand would result in approximately 400 additional acres of leased industrial land at CIP. Campbell Estate intends to develop approximately 1,000 additional acres of industrial land to meet the incremental demand.

**Industrial-Related Employment.** With an increase in industrial land utilization, it is reasonable to expect that industrial employment at the park would also increase. The principal factor determining the level of employment at an industrial park is the mix of industries located at the park.

CIP serves light, medium, and heavy industrial users. In the past, medium and heavy industrial users have comprised the majority of business concerns at the park. These firms have tended to be land and plant intensive industries rather than labor intensive industries. As shown on Table III-10, construction-related firms and manufacturing firms represent the majority of users at the park.
According to recent studies conducted by Campbell Estate regarding the impact of the proposed harbor on the industrial park, employment density at the park could be expected to increase from less than 4 employees per acre to approximately 6.6 employees per acre over the next 40-year period. These estimates assume that light industrial and distribution users would represent a larger proportion of concerns at the park and are based on employment densities of similar type parks located at major transportation facilities.

Assuming that industrial land leasing activity increases from 30 acres a year to 40 acres a year and that employment density at the park increases to 6.6 employees per acre by the year 2020, the following figures (Table III-11) present the additional employment at CIP over the period 1976 to 2020.
TABLE III-11
PROJECTED EMPLOYMENT AT CIP

<table>
<thead>
<tr>
<th>Year</th>
<th>Without Harbor</th>
<th>With Harbor</th>
<th>Margin Due to Harbor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>2,119</td>
<td>2,119</td>
<td>-</td>
</tr>
<tr>
<td>1985</td>
<td>3,000</td>
<td>3,350</td>
<td>350</td>
</tr>
<tr>
<td>1995</td>
<td>4,300</td>
<td>5,100</td>
<td>800</td>
</tr>
<tr>
<td>2005</td>
<td>6,350</td>
<td>7,800</td>
<td>1,450</td>
</tr>
<tr>
<td>2015</td>
<td>9,100</td>
<td>11,450</td>
<td>2,350</td>
</tr>
<tr>
<td>2020</td>
<td>10,850</td>
<td>13,750</td>
<td>2,900</td>
</tr>
</tbody>
</table>

Source: Peat, Marwick, Mitchell & Co. and Urban Projects, Inc.

The proposed harbor would result in an additional 2,900 workers at CIP by the year 2030.

**Enhancement of Land Values.** The anticipated increase in leasing activity at CIP, as a result of harbor development, would enhance the land values for both CIP land and land at the harbor. This section evaluates the potential increase of land values as related to the incremental leasing activity of 10 acres per year, or 400 acres over a 40-year period.

Campbell Estate has commissioned various studies concerning the current land values at the industrial park. Their studies have indicated that the current value of unimproved industrial land at the park ranges from $41,400 to $58,000 per acre.

Urban Projects, Inc. conducted a study for Campbell Estate to determine the enhanced valuation of industrial land at the park as a result of the development of the harbor facility. Based on a current lease rental rate of $7,000 per acre per annum, it was estimated that the value of improved industrial land at the park would be approximately $100,000 per acre. Of this amount, $42,000 was attributed to the cost of land improvements, buildings, facilities, etc.; therefore, the resulting cost of the land is $58,000 per acre at the park.
Urban Projects, Inc. also reviewed seven previous studies conducted for Campbell Estate to determine the enhanced value and demand for industrial land due to the addition to the proposed harbor. After weighting those studies, it was concluded that port-related land would increase in value by 30 percent and the remaining land by 15 percent.

Assuming 30 percent enhancement on the 400 acres of port-related industrial land that would be leased over the next 40 years, 15 percent enhancement on currently leased land, and 15 percent enhancement on other lands that could be leased in increments of 30 acres per year, the present value of the enhancement would be $8.2 million at 8 percent discount rate for 40 years and at a unit cost of $58,000 per acre.

Urban Projects, Inc., however, suggested that only 20 acres could be leased per year instead of 30 acres, as assumed in the above paragraph. Under this condition, the present value of the enhancement would be $6.8 million.

The U.S. Corps of Engineers estimated the value of the land at $47,000 per acre. By using this unit price, the present value of enhancement would be $5.9 million if 20 acres could be leased each year and $6.7 million if 30 acres could be leased annually.

Since it is difficult to forecast the exact value of any land 40 years from now and determine the area that can be leased annually, the figures derived above must be considered as estimates.

Value of Lands to Be Given to the State

An appraisal made in early 1977 by Mr. Edward Burns for Urban Projects, Inc. valued the 246 acres of unimproved land to be given to the state for the harbor at $10,130,000.

In addition to giving 246 acres, Campbell Estate is preparing to grant the State of Hawaii an additional 31 acres prior to 1995 should the state demonstrate a need for the additional acreage.

It should be noted that additional enhancement of Campbell Estate land could also result if zoning changes were allowed for residential and commercial development in the surrounding Ewa area.
With the expected increase in land values, it is reasonable to anticipate that real property taxes would also increase. According to Campbell Estate, real property taxes at CIP amounted to $804,000 in 1975.

Based on the anticipated increase in land values due to the harbor and using current real property tax assessment rates, it is calculated that an additional $200,000 of real property taxes could accrue to the state. Tax revenues, however, would grow slowly over time as the additional lands are absorbed and current land valuations increased to reflect the enhanced values. Additionally, the estimated market values used in the computation do not necessarily reflect tax valuations. Increased property tax revenues, therefore, will depend on current and future tax valuations.

**Other Impacts**

The additional absorption of 400 acres of land at CIP and greater utilization of the harbor by CIP business should boost construction expenditures, increase state tax revenues, and enhance the competitiveness of CIP businesses.

The transformation of undeveloped industrial land into a usable condition necessitates the construction of water, sewage, and electrical systems as well as buildings, facilities, and roadways. Consultants for Campbell Estate estimate that this transformation will cost approximately $42,000 per acre. Assuming that 400 acres of undeveloped land would be transformed into a usable condition over the next 40 years as a result of the harbor, $16.8 million of construction expenditures could result. Again, businesses and industries generated as a result of the harbor would be taxed and would be another source of state revenue.

Another impact is that the construction of the harbor would indirectly enhance competitiveness of CIP businesses. The distance of CIP to downtown Honolulu and the lack of direct water-borne transportation facilities nearby has, to a certain degree, impaired CIP businesses. As discussed earlier, the lack of direct water-borne shipments results in higher transportation costs than would be necessary if direct shipment were available. The lack of a usable barge facility has also somewhat
retarded an expansion of business activity with the neighbor islands. The proposed harbor would remove many of these barriers by lowering operating costs and would enhance the competitiveness of businesses located at CIP.

The existence of a harbor at Barbers Point could encourage relocation of many of the businesses presently located at Kakaako. In a study conducted by the Pacific Urban Studies and Planning Program of the University of Hawaii, it was found that almost half of the business firms located in Kakaako are dependent on Honolulu Harbor for their supplies, yet 84 percent of these businesses serve islandwide customers. A harbor facility at Barbers Point would ideally suit those firms that do a larger share of their business in leeward Oahu.

**Tertiary Economic Impact**

This section evaluates the economic impact of the proposed deep-draft harbor on the tertiary impact area, the Ewa district. The impacts of the harbor on the Ewa District in terms of population growth, increased land values and future development of public and private services are expected to be minimal. Normal growth trends will have a much greater impact in the Ewa District than the harbor.

**Population.** As pointed out in the General Plan of the City and County of Honolulu, the population of the Ewa plain (the census tract of Ewa Beach-Barbers Point Air Station and Kunia Camp-Ewa) is expected to quadruple to 104,000 by the year 2000, and the population of the Ewa district is expected to double to 321,000. This exodus to Ewa reflects the results of governmental encouragement, favorable land use changes, and the lack of residential space within Honolulu city. Table III-12 shows these projections by areas.

Because of this general movement to Ewa, care should be taken to distinguish between normal versus harbor-related population growth. Based on the DPED projections, a sizeable increase in population can be expected, even without a harbor. When evaluating population increases attributable to the harbor, therefore, a basis for identifying harbor-induced relocation is required. Assuming that an individual's employment location
has a major bearing on where he lives, harbor-induced relocation was based on the following individual's decision to reside in the Ewa plain and Ewa district:

1. Harbor workers who decide to reside in Ewa
2. Additional CIP workers due to the harbor who decide to reside in Ewa
3. Private and public workers to support the above people who decide to reside in Ewa

The key variables that determine the marginal increase in population due to the harbor are additional jobs, number of people per household, and the percent of workers who decide to reside in Ewa. For the projections presented in Table III-13, it is assumed that for each job created by the harbor the employee holding that job is the head of a household and that private and public employees (20 percent of total workers) would be required to support the additional harbor and CIP workers.

Based on these projections, harbor-related population would increase the projected Ewa plain population from 104,000 to 105,600, or by 1.5 percent, and the Ewa district's population from 321,000 to 325,300, or by 1.3 percent. Due to this small additional increase in population, it appears that normal growth trends will have a significantly greater impact than the harbor on Ewa's future population. For example, normal growth of the CIP work force without the harbor would increase the Ewa plain population by 10,700 and the Ewa district population by 23,800 by the year 2000.
## TABLE III-12

**DISTRIBUTION OF THE RESIDENTIAL POPULATION**

1975 and 2000

<table>
<thead>
<tr>
<th>Location</th>
<th>1975 Population</th>
<th>2000 Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oahu total</td>
<td>704,403</td>
<td>1,039,000</td>
</tr>
<tr>
<td>Primary urban center</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honolulu (Waialae/Kahala-Halawa)</td>
<td>398,354</td>
<td>530,000</td>
</tr>
<tr>
<td>Aiea-Pearl City*</td>
<td>304,546</td>
<td>400,000</td>
</tr>
<tr>
<td>Aina Kea-Hawaii Kai</td>
<td>93,806</td>
<td>130,000</td>
</tr>
<tr>
<td>Secondary urban center</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ewa-Makakilo*</td>
<td>221,800</td>
<td>104,000</td>
</tr>
<tr>
<td>Urban fringe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aina Koa-Hawaii Kai</td>
<td>223,892</td>
<td>322,000</td>
</tr>
<tr>
<td>Kailua</td>
<td>39,374</td>
<td>65,000</td>
</tr>
<tr>
<td>Kaneohe-Ahuimanu</td>
<td>40,374</td>
<td>49,000</td>
</tr>
<tr>
<td>Waipahu-Crestview*</td>
<td>51,394</td>
<td>69,000</td>
</tr>
<tr>
<td>Mililani-Waipio*</td>
<td>26,913</td>
<td>48,000</td>
</tr>
<tr>
<td>Wahiawa</td>
<td>20,302</td>
<td>39,000</td>
</tr>
<tr>
<td>Rural</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waimanalo</td>
<td>45,185</td>
<td>52,000</td>
</tr>
<tr>
<td>Kahaluu-Kahuku</td>
<td>39,374</td>
<td>65,000</td>
</tr>
<tr>
<td>North Shore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waianae Coast</td>
<td>51,394</td>
<td>69,000</td>
</tr>
<tr>
<td>Ewa</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*These centers are included in the Ewa District.

Note:

The population figures used in the foregoing discussions and shown in Table III-12 were based on a total resident Oahu population of 1,039,000 by the year 2000 as projected by the State Department of Planning and Economic Development. This projection is designated as Series E-2 and was published in May 5, 1976.

However, in March 1, 1976 that department published a new projection designated as Series II-F that forecasts a total resident Oahu population of 917,400. This latter forecast which shows a decrease of 11.7% is intended to replace the Series E-2 forecast. The geographic distribution of the population according to Series II-F has not yet been determined. It is most likely that the population distribution figures shown in Table III would decrease by 11.7% or more depending upon the economic opportunities, availability of land, and/or public and private services. Should this anticipated population in the Ewa District decrease by 11.7% or more percent by the year 2000, the socio-economic impact of the harbor would still be minimal as compared with the impacts that may be induced by the normal population growth trend particularly in the Ewa-Makakilo area.
### TABLE III-13

**PROJECTED INCREMENTAL HARBOR-RELATED POPULATION**

**Ewa District**

<table>
<thead>
<tr>
<th>Source of Employment</th>
<th>Additional jobs</th>
<th>Average household size</th>
<th>% residing in District</th>
<th>Additional population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harbor related</td>
<td>620</td>
<td>3.075</td>
<td>66.5%</td>
<td>1,280</td>
</tr>
<tr>
<td>CIP</td>
<td>1,120</td>
<td>3.075</td>
<td>66.5</td>
<td>2,300</td>
</tr>
<tr>
<td>Public and private workers$^1$</td>
<td>360</td>
<td>3.075</td>
<td>66.5</td>
<td>720</td>
</tr>
</tbody>
</table>

**Total** 2,100 4,300

**Ewa-Makakilo-Barbers Point Area**

<table>
<thead>
<tr>
<th>Source of Employment</th>
<th>Additional jobs</th>
<th>Average household size</th>
<th>% residing in Ewa Plain</th>
<th>Additional population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harbor related</td>
<td>620</td>
<td>3.075</td>
<td>25%</td>
<td>480</td>
</tr>
<tr>
<td>CIP</td>
<td>1,120</td>
<td>3.075</td>
<td>25</td>
<td>850</td>
</tr>
<tr>
<td>Public and private workers$^1$</td>
<td>360</td>
<td>3.075</td>
<td>25</td>
<td>270</td>
</tr>
</tbody>
</table>

**Total** 2,100 1,600

$^1$Estimated at 20% of harbor and CIP employment.
$^2$Based on the average household size on Oahu.
$^3$Based on Campbell Estate employment residential patterns.
Land Value. A change in land utilization from agricultural to residential and/or commercial has a significant impact on the land value. This change of utilization usually results from governmental policy and demand from the general populace. In Planning for Oahu, produced by the City and County Department of General Planning, four alternatives for growth are described. Under each alternative, the rapid growth in population of the Ewa district appears inevitable. In fact, the city and county's statement of objectives calls for creation of a secondary urban center in the Ewa plain.

Past trends described earlier also reflect the rapid demand for housing in this area. With the Pearl City-Aiea area already intensely developed, further expansion must move north into Mililani Town, the Waipahu fringes, Ewa, and Makakilo. As the buying power of the war baby generation increases, a greater demand for single-family dwellings is expected.

In summary, it appears that both governmental policy and demand for housing are pointing toward a change in land utilization in the Ewa district. The addition of the harbor, besides being in conformance with the policies of the general plan, would fuel this trend. Because of the small projected increase in population resulting from the harbor, however, its direct effect on land values is expected to be minimal.

Public Services and Commercial Development. Development of various public and private services, such as libraries, schools, shopping centers, etc., are directly related to population growth. Many of the public and private services for a fringe area such as the Ewa plain are met by a larger city's facilities. As the fringe area grows in size, it taxes the capabilities of its mother city and therefore requires its own facilities. Expenditures for further development of the Ewa plain's public and private service needs can be expected to result merely from its projected normal growth in population.

Multiplier Effect. Economic theory suggests that tertiary stimulation should also result due to the multiplier effect. Governmental expenditures and refunds normally create private expenditures of approximately two to three times the original amount as the money circulates through the
economy. Under this theory, the phase I expenditure of $71.7 million would add $144 to $216 million of revenues and expenditures to the state economy. The impact on state employment of this tertiary result cannot be determined; however, we would expect an overall positive impact for all business in Hawaii.

SECONDARY PHYSICAL AND SOCIAL IMPACTS

While the harbor is projected to stimulate employment, industrialization, and residential urbanization, it will also contribute proportionately to the impact associated with this development.

As indicated in the "economic impact" section, the harbor is projected to account for, directly and indirectly, 2,100 jobs with a corresponding increase of 4,300 people, or 1.3 percent, of the Ewa district population projected by the Oahu General Plan for the year 2000. In putting the following discussion of impacts in the proper perspective, it is also appropriate to point out that the creation of the harbor and the encouragement of gradual development of the Ewa district in terms of population and economic activity conform to the objectives and policies of the Oahu General Plan.

One impact of the harbor project will be pressure for housing in areas close to the place of employment. This, in turn, means pressure for conversion of agricultural lands to urban use and the visual impact of replacing agricultural open space with planned residential developments. The residential developments will decrease the permeability of the ground because rooftops and pavement will replace the vegetation, the underlying soil, and the relatively permeable coral substrate. Also, ground slopes may be altered. These actions will result in increased storm runoff and possible adverse effects to the area of discharge, which will probably be the shoreline. In addition, sewage flows will increase and would require adequate treatment prior to disposal. Added demand on the water system, increased traffic, and air pollution are other impacts associated with residential development.

Insofar as the stimulation of growth in the Campbell Industrial Park is concerned, adverse impacts to air and water quality (industrial
wastewater) may occur, depending on the types of industries that will move into the park. The list of 75 prospective industries in Table II-7 includes a few industries that would involve emissions of air pollutants.

Although desirable, quantified estimates of water and air pollution for both the residential and industrial developments would be difficult to make until detailed development plans are available. The amount that is attributable to the harbor, however, would be in proportion to the industrial land demand it induces and the new housing demand generated by persons who would be working in the Barbers Point area as a result of the harbor. In order to mitigate air and water degradation, governmental controls exist for regulating sewage treatment and disposal, the installation of new sources of air pollution, and storm runoff and erosion. The following regulations apply:

1. Sewage treatment and disposal
   1a. State Public Health Regulations
       Chapter 37 - Water Pollution Control
       Chapter 37A - Water Quality Standards
       Chapter 38 - Sewage Treatment and Disposal Systems
   1b. U.S. Public Law 92-500 - Sewage Treatment
   1c. City and County of Honolulu - Sewer Systems and Industrial Wastewater Discharge Certificates

2. Air pollution
   2. State Public Health Regulations
       Chapter 42 - Ambient Air Quality Standards
       Chapter 43 - Air Pollution Control and Permit System to Construct Air Pollution Sources

3. Storm runoff and erosion control during and after construction
   3. City and County of Honolulu - Ordinance Nos. 3968, 4294, and 4538

Associated with commitment of agricultural lands for urban expansion is the reduction in agricultural employment. The plantation communities such as Ewa town may slowly undergo a change from rural to urban. Furthermore, with higher demands for residential development come increased prices of housing, increased land values, and higher property taxes for
those residents already living near prospective new developments. Increased land values may also exert pressure to urbanize other agricultural lands.

Although the neighboring Waianae district will not be directly involved in this urban development, it too will feel the subtle pressures of encroaching urbanization.

In summary, the harbor will be contributing to the urbanization of leeward Oahu. The direct influence of the harbor, however, as indicated by the economic projections, will be minimal. Moreover, the creation of a deep-draft harbor is specifically called for in the general plan, which also calls for distributing a good portion of Oahu's population and economic growth toward the Ewa district. If urban growth takes place as prescribed by Campbell Estate's Honouliuli Regional Framework Plan, it can be expected that urbanization will be phased for gradual development. Of course, governmental land use policies and decisions will certainly influence the rate and trends of development. A key item in the state of Hawaii's land use policies is the preservation of agricultural lands. The direct effect of the proposed harbor on productive agricultural land is almost nonexistent. The governmental control of increased development of the Ewa district, however, will have to take into account both the general plan policies of directing growth in Ewa and preserving productive agricultural lands.

It must be remembered that construction and operation of the harbor are not contingent upon, nor do they automatically lead to, the creation of large housing developments. Approval of the harbor plans does not obligate the state and county to urbanize the surrounding area. Any proposed residential development in the Ewa area would be subject to the same permits and approvals, whether the harbor is built or not.
IV. RELATIONSHIP OF THE PROPOSED ACTION TO LAND-USE PLANS AND CONTROLS FOR THE AFFECTED AREA

The shoreline areas up to the high-water mark are within the State Land Use Conservation District. Coastal lands around the existing barge harbor, extending from the shoreline to Malakole Road are within the "urban district". Lands designated "agriculture" lie inland of Malakole Road and along the coastline to the north of the existing barge harbor. The proposed construction of a commercial port at the existing barge basin site will involve lands within the "conservation", "urban", and "agriculture" districts (see Figure IV-1). The change in land use to include a harbor must be approved by the Land Use Commission.

On January 18, 1977, the City and County of Honolulu adopted a General Plan that superseded the General Plan adopted in 1964. The 1964 General Plan consisted of two parts; a map designating land use for the city and county and a narrative statement in the back of the map. The new general plan is a statement of broad policies and objectives. On February 1, 1977, the map of the 1964 general plan was renamed the "Interim Zoning Control Ordinance." This map will continue to determine allowable land use until the City and County of Honolulu generates the development plans for the 13 developmental areas. Development plans are essentially detailed schemes to implement the directive of the new general plan. A development plan will include a map of the area of the city and county to which it is applicable and will contain statements of standards and principles related to land use within that area. It shall also state the preferred sequence for development.

The City and County of Honolulu's Interim Zoning Control map designates most of the lands surrounding the barge harbor "industrial". Two exceptions are the military's Honolulu Military Reservation, formerly called Camp Malakole, and a small park area, about 1/2-mile north of the barge basin near the mouth of Maka'iwa Stream. The existing use of the proposed harbor area can best be seen on Figure IV-2, an aerial photograph of the area. With the exception of the narrow strip of cane fields north of the barge basin, most of the area immediately inland of Malakole Road
FIGURE IV-1
STATE LAND USE MAP

A - Agricultural
U - Urban
**LEGEND**

1. AGRICULTURE
2. RESIDENTIAL
3. QUARRY
4. OPEN
5. MILITARY
6. (CIP) EXPANSION

R.M. Tovill Photo, 1974

**FIGURE IV-2**
CURRENT LAND USE (1974)
is currently vacant or used for quarry purposes. The Standard Oil Company refinery and Campbell Industrial Park lie to the south and southeast of the harbor site. Barbers Point Naval Air Station, the only active naval air station in Hawaii, is located to the east of Campbell Industrial Park. Honokai Hale subdivision, about one mile northeast of the harbor, is presently the closest residential area. Makakilo City overlooks the harbor area from the Waianae Range.

Various portions of land affected by the project are presently zoned I-2, R-6, and Ag-1 by the City and County of Honolulu (see Figure IV-3). Areas affected by the project must be zoned I-3. The legislative intent of the I-3 zoning is "to set apart and protect areas considered vital to the performance of port functions and to their efficient operation, continuation, and expansion. Accordingly, it is intended to permit in such districts the full range of facilities necessary for successful and efficient performance of port functions. In order to reserve such areas for port-related activities only, it is intended to exclude users who are not only inappropriate in this district but also who could be located elsewhere" (amended Ordinance 3234, City Council of Honolulu).

Part of the project area is in the special management area (SMA) (see Figure IV-4). The project must comply with the requirements of Ordinance No. 4529, which regulates the use of the shoreline. The purpose of the ordinance is "to preserve, protect, and where possible to restore the natural resources of the coastal zone of Hawaii. Until a general coastal zone management program can be developed and implemented, special interim controls on development within an area along the shoreline are necessary to avoid permanent loss of valuable resources and foreclosure of management options, and to insure that adequate public access is provided to public owned or used beaches, recreational areas, and natural reserves, by dedication or other means. The objectives of the special management area shall be the maintenance, restoration, and enhancement of the overall quality of the coastal zone environment, including but not limited to its amenities and aesthetic values." Work within 40 feet of the certified shoreline is subject to the "Shoreline Setback Rules and Regulations" of the City and County of Honolulu (HRS, Chapter 205-32).
FIGURE IV-4
SPECIAL MANAGEMENT AREA
The proposed use of the project, however, is consistent with the present use of the general area where a harbor is already in existence. The difference is that the project will result in a bigger harbor. The harbor shoreside facilities, however, will impact the special management area with harbor warehouses and other buildings that would infringe on the relatively undeveloped shoreline under existing conditions. There will also be dredging activities to enlarge the present channel.

The entrance channel makai of the shoreline will occupy about 34 acres. Such submerged lands, which fall into the category of "conservation district," are administered by the Department of Land and Natural Resources. A permit will be required from this agency to dredge or construct in this zone.

Most of the lands which would be required for a commercial port development lie within the holdings of Campbell Estate. The estate owns about 36,000 acres in the Ewa-Honouliuli area, extending from the coastline through the Waianae Range to Schofield Barracks. Other land holdings include the Army's Honouliuli Military Reservation (Camp Malakole) and Standard Oil Company's refinery site.

An important aspect of Oahu waterborne commerce and commercial port development is the availability of urban industrial lands. Major industrial lands now servicing Honolulu Harbor include Kakaako, Kalihi, Honolulu International Airport area, and Mapunapuna. At the present time, these industrial neighborhoods do not appear suitable nor adequate for future industrial expansion. Kakaako, a major light industrial area, is being considered for future mixed use, possibly as a "special design" district. Kalihi is not likely to expand to its full industrial use potential because of the nature of land ownership and existing nonconforming uses in that area, primarily numerous small fee-simple lots in residential use. Both Mapunapuna and the Honolulu International Airport industrial areas are already developed to their maximum potential.

The only major land areas available for large scale industrial expansion at this time are in leeward Oahu. The following table and summary paragraphs are extracted from Study of Land-Use Pattern Impacts
on Oahu Harbors, Environment Capital Managers, 1975. Table IV-1 summarizes the industrial land uses on Oahu. Oahu is divided into the following areas, by census tract:

Honolulu: Makapuu Beach Park to Tripler. Census Tracts 1.01 - 72.
Leeward Oahu: Tripler to Kaena Point to Waimea Bay. Census Tracts 73 - 100.

<table>
<thead>
<tr>
<th>Location</th>
<th>Interim Zoning Control 1/</th>
<th>Interim Zoning Control 2/</th>
<th>Existing Use 3/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honolulu</td>
<td>2,279.80</td>
<td>3,030.00</td>
<td>1,019.22</td>
</tr>
<tr>
<td>Leeward Oahu</td>
<td>4,191.28</td>
<td>2,710.87</td>
<td>2,511.70</td>
</tr>
<tr>
<td>Windward Oahu</td>
<td>271.26</td>
<td>382.80</td>
<td>356.58</td>
</tr>
<tr>
<td>TOTAL OAHU</td>
<td>6,742.34</td>
<td>6,123.67</td>
<td>3,887.50</td>
</tr>
</tbody>
</table>

1/ Planned by Interim Zoning Control Map. Includes all land classified industrial under the Interim Zoning Control Map.
2/ Zoned. Includes all land classified industrial under the existing comprehensive zoning code (CZC).
3/ Existing Use. Includes all land classified industrial actually in use.

Honolulu has more acres zoned industrial (3,030) than designated in the control map (2,280). Only 1,019 acres of land, however, are in existing industrial use. There are approximately 2,000 acres of industrial zoned lands not presently in industrial use, most of that land is already developed in a nonconforming use.

Leeward Oahu is using most of its industrial-zoned property. There are, however, 1,680 acres in leeward Oahu designated by the interim
control map not in existing industrial use. The majority of this land has not been urbanized. Leeward Oahu is now developing and has more acres in existing industrial use (2,512) than Honolulu (1,019). More important, it contains the majority of land planned for industrial use (4,191 acres) by the city and county government. Windward Oahu has not played, nor do plans indicate that it will play, an important role in providing industrial land use.

In addition to existing and planned industrial land use and the availability of reasonably priced, under-developed property, the city growth policies and the Campbell Estate plans for the Barbers Point area indicate a trend for future development to occur in the leeward area.

The new general plan designates the Ewa-Makakilo area as a "Secondary Urban Center" and projects that 10 percent of the city and county's total population, estimated to be 1,039,000, will be located to that area by the year 2000. This will represent a 6.9 percent rate of increase over the 1975 population and the greatest margin of increase for any of the 13 areas designated in the new "General Plan". Policy 2, Objective C, of the section on "Population" of the "General Plan" is to "encourage the gradual development of Ewa to relieve developmental pressures in the urban-fringe and rural areas." All of Objective C in the "Physical Development and Urban Design" section of the "General Plan" is dedicated to the development of Ewa as a secondary urban center. Policy 5 of the section is to "cooperate with the state and federal governments in the construction of a deep-water harbor in Ewa." The directives of the new "General Plan" point to Ewa-Makakilo area as the fastest growing development plan area in the City and County of Honolulu.

The Estate of James Campbell, through its land-use plans over the years, has similarly supported the concept of expanded urban growth in the Ewa-Honouliuli area. The estate's most recent proposals (Wolbrink, 1974) call for the development of a total interrelated city on their lands. The plans include a complex of clustered urban developments on both sides of the H-1 freeway to house from 200,000 to 300,000 people. Development would be phased over a period of 25 years or more. Other aspects of the plan include employment opportunities at Campbell Industrial Park (with
the Congressionally-authorized deep-draft harbor), recreational facilities, and educational facilities.

In terms of State of Hawaii growth policies, the Department of Planning and Economic Development examined four alternative growth policies in its publication, *State of Hawaii Growth Policies Plan: 1974-1984*. Of the four plans that included (1) continuation of existing policies, (2) no growth, (3) slowed growth, and (4) accelerated growth, the policy of slowed growth was recommended for adoption. The policy recommends slower population growth, higher densities in existing urban areas, and no urban sprawl into prime agricultural lands. It also places particular emphasis on neighbor island development. The State Legislature has not approved the recommendation nor any of the alternative growth policies.

The Department of the Navy, Pacific Division, Naval Facilities Engineering Command, has prepared a report on Air Installations Compatible Use Zones (AICUZ) for Naval Air Station, Barbers Point, Oahu, Hawaii. The US Navy has adopted the AICUZ program, and the principles of the program are: (1) to define areas of impact from air facility operations and attempt to lessen those impacts by reducing the area affected, and (2) to develop long-range strategies that will prevent or deter encroachment into impacted areas. The report recognizes the harbor development proposal and notes that the harbor development needs to be studied and planned with the AICUZ in mind. Both the federal construction of general navigation facilities and the state's development of shoreside facilities will continue to be coordinated with the Navy.

Proposed projects such as the Kahe Theme Park, Caneland, and the Fort Barrette Theme Park would have no impact on the operations of the proposed harbor, nor would the harbor affect the operations of these parks since they are located relatively far from the proposed harbor. Kahe Theme Park is about 2.5 miles from the harbor; Caneland, 1.5 miles; and Fort Barrette, 3.5 miles.

The master plan for the West Beach project shows the construction of a marina on the north side of the proposed harbor. The marina will be compatible with the harbor and would, in effect, serve as a buffer zone.
between the harbor and the West Beach development. There are, however, some concerns about the probable effects of the proposed entrance to the marina. These concerns are as follows:

1. The entrance of the marina at the mauka end of the deep-draft harbor entrance channel would create an undesirable traffic mix in the channel involving large and small vessels that are traveling at an angle to each other.

2. The marina would have an effect on the resonance characteristics of the harbor configuration. The type and magnitude of this effect are presently unknown and would require further study since the marina was not taken into account during the design of the deep-draft harbor.

3. The presence of the marina may have a detrimental effect on the water quality of the deep-draft harbor. It is expected that there will be significant inflow of nutrient-rich groundwater to the marina, similar to the inflow to the deep-draft harbor. The marina is likely to have somewhat longer residence time characteristics than might be expected since the marina entrance channel is aligned roughly perpendicular to the prevailing wind direction. In addition, the two-layer flow induced by the inflow of groundwater is not expected to be as effective an exchange mechanism as in the deep-draft harbor because the marina discharge would be to the already formed surface layer of the harbor rather than directly to the nearshore waters. These limitations in exchange would probably mean that the primary exchange mechanism for the proposed marina is tidal exchange. Tidal exchange by itself would result in an average marina residence time of about five days relative to the harbor. This longer residence time, combined with the anticipated relatively high nutrient concentrations, would probably result in a fairly high phytoplankton concentration (estimated to be as high as 2.5 µg/l chlorophyll-a based on a net growth rate of 0.25 per day and an initial concentration of 0.7 µg/l chlorophyll-a for the deep-draft harbor). This would be comparable to the levels
in South Kaneohe Bay. The overall result of the marina would therefore be an increase in the turbidity in the deep-draft harbor, with the increased possibility of periodic algae blooms and oxygen problems during calm wind conditions.

The marina entrance channel should be relocated out of the deep-draft harbor and independent access to the ocean provided for the marina. This would eliminate the difficulties addressed above.
V. PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Inasmuch as adverse environmental impacts have been previously discussed in Chapter III, they will only be summarized here.

1. Dredging the channel will destroy the marine community attached to or living in the substratum in the area to be dredged. Since much of the channel dredging will be done in open seas, the likelihood of turbidity and sedimentation affecting nearshore coral communities cannot be completely avoided. There may also be some blasting required in the dredging operation that will have some localized impact on the biological community.

2. There will be a visual impact from the 92-acre harbor basin where there is now vacant land and vegetation.

3. There will also be visual impact of a maximum 370-acre stockpile standing at a height of 30 to 35 feet and the massive harbor shoreside facilities.

4. Construction of the deep draft harbor would destroy some cultural sites, remove about two acres of land from sugar production, and require the recovery and relocation of endangered plants in the project area. Some risk of loss of the plants is involved in the relocation and cultivation process.

5. The project will eliminate a portion of the habitat for common migratory shorebirds and possibly the indigenous heron.

6. While mitigation measures will be employed, there will be some noise and air pollution from dust and machines, traffic disruption, and siltation effects due to stockpiling and construction of the shoreside facilities.

7. Due to the large size of the proposed harbor and its specific location at the existing barge harbor, the project will be impacted in terms of noise and accident potential by the Barbers Point Naval Air Station, as described by the AICUZ.

8. The harbor may require an interim sewage treatment facility until a regional system is constructed. Such an interim
facility would have some negative, though controllable, aesthetic effects. If effluent disposal via injection wells is used for the estimated 0.06 mgd flow, the effluent will add additional nutrients into the groundwater table. The impact on the brackish groundwater, however, is expected to not be significant because of the low flow and the close proximity to the shoreline and because of the short-term nature of the discharge.

9. The discharge of drainage runoff from the harbor facility will be a possible source of pollution to the harbor. The effects of storm discharge, however, will be minimal since it will be limited only to storm runoff collected by the onsite collection system.

10. The harbor will generate additional traffic and some air pollution, as previously mentioned.

11. Industrial and residential developments (and their associated impacts) within the Campbell Industrial Park and the Ewa plain respectively may occur as a result of the harbor in that it can stimulate employment in leeward Oahu. Depending on the controls exercised by the state and local land use planning agencies, the harbor and related development may hasten urbanization and industrialization in leeward Oahu. Such a transition could result in adverse visual, social, and aesthetic impacts upon the region.

12. The water that the port facilities will need will put an additional burden on existing water sources serving Campbell Industrial Park. Water from the park comes from the Board of Water Supply's Ewa-Waianae district, which may not have enough water to accommodate future demands. The district will have to depend on other water districts to meet future needs. As a separate project, a water master plan for the Barbers Point area will have to be prepared and coordinated with the Board of Water Supply. In the interim, the Board of Water Supply has indicated that the 0.06 mgd required by the proposed harbor would be available from the present system.
VI. ALTERNATIVES TO THE PROPOSED ACTION

SITE ALTERNATIVES

The development and analysis of alternative plans for a second major commercial port on Oahu were based on the concept that Honolulu Harbor would continue to function as the primary port for Oahu. As mentioned earlier, the proposed improvements to Honolulu Harbor are addressed in a separate report and environmental statement. Although the River and Harbor Act of 1965 authorized the construction of a second Oahu deep-draft port at Barbers Point, an attempt was made to evaluate other harbor sites with potential for commercial port development to determine which would best complement and support Honolulu Harbor.

Pearl Harbor

The West Lock area of Pearl Harbor was considered as a potential site for use by commercial vessels. The commander of the naval facility state by letter to the State of Hawaii in 1973, and again in testimony before the City Council (City and County of Honolulu) in 1976, that use of Pearl Harbor would not be in accord with the Navy’s needs. This was reaffirmed by the Office of the Secretary of the Navy (letter dated November 14, 1977) in a response to Mayor Frank Pasi’s inquiry to President Carter. The Navy’s reasons are as follows:

1. Security. Sensitive operations, testing, training, and communications are conducted at Pearl Harbor, and an increase in exposure would be ill-advised. There is apprehension that deliberate or inadvertent hindrance to Navy ships in emergency situations could occur.

2. Safety-blast hazard. Navy-owned or -controlled lands are within West Loch ammunition handling facilities and by naval residential and waterfront communities.

Additional investigations show that wetland habitat areas and Hawaiian fishponds are found in the upper reaches of West Loch. Presently water
quality there has been designated by the state to be Class AA. It might be noted that West Loch has the potential of supporting productive shellfish beds when suitable environmental conditions are restored. The significant dredging associated with constructing a commercial harbor facility could adversely impact the groundwater system in Pearl Harbor, and the maintenance of the harbor area to project depths would be difficult and expensive because of the silt-bearing streams that enter the harbor. Economic returns attributable to a commercial harbor in the West Loch area are expected to be comparable to those of a facility at Barbers Point. After weighing all the factors, Pearl Harbor was eliminated as a potential harbor site and not considered for further evaluation.

**Kaneohe Bay**

Kaneohe Bay was also considered in the site evaluation process for development as a commercial harbor. It is located on the windward coast of Oahu, approximately 15 miles from Honolulu Harbor. The bay is valued for its natural beauty, marine resources, and recreational opportunities. An area of significant social and environmental concern, Kaneohe Bay is the subject of an urban water resources study now being conducted by the Corps of Engineers under the authority of Section 106 of the River and Harbor Act of 1970 (PL 91-611).

Physically suitable areas for a harbor are available within the bay and in the Kahaluu area. A survey study for a deep-water harbor at Kahaluu was authorized by congressional action in the River and Harbor Act of 1960. At any of the Kaneohe Bay sites, however, available land areas are limited; therefore, a harbor development would probably require filling of reef areas to create lands for harbor-related activities. The total reef area required to be filled for a complete complex, consisting of harbor and support facilities, would be approximately 250 acres.

Land in the Kaneohe Bay area is presently for residential, agricultural, and conservation uses, with small pockets of industrial-zoned land. A commercial harbor sited in such an area would require significant overland hauling of goods and materials to Honolulu and the leeward Oahu industrial area. "Negative" benefits would result from this long distance hauling. It is also likely that the residents of windward Oahu would be
strongly opposed to the development of a major harbor in Kaneohe Bay because it would create land use conflicts and traffic congestion.

Because of these reasons it was concluded that Kaneohe Bay would neither meet Oahu's future harbor needs nor be economically feasible. These alternative sites were also determined to be unacceptable from a social and environmental standpoint. No further consideration appears warranted for a harbor in the Kaneohe area.

Barbers Point

The authorized Barbers Point area was reevaluated as a site for a second commercial harbor on Oahu. The area considered most feasible from navigational, environmental, and land availability aspects is at the existing privately owned barge harbor. Use of the existing barge harbor at Barbers Point is limited by the size and surge problems experienced there at the present time. No action or improvement to this situation would eliminate all of the costs and impacts of commercial port construction on both the marine environment and the surrounding shoreside areas. The existing facility could continue to operate at its restricted level, but the long-term physical needs for a second Oahu port would remain unfulfilled, and the overland haul costs between leeward Oahu and Honolulu Harbor would continue to increase in the future. The problem due to lack of physical space would become most acute about 1990 to 1995. For these reasons, the alternative of no action in this area was considered not to be responsive or viable to Hawaii's future.

ALTERNATIVE HARBOR CONCEPT FOR A COMMERCIAL HARBOR AT BARBERS POINT

Evaluation of a comparative range of development alternatives for a second commercial harbor at Barbers Point focused upon design of a deep-draft harbor, and an expanded barge harbor. Depths, area and shoreside facility requirements, make the economic and environmental aspects of each distinct and separate.
A barge harbor (Figure VI-1A) designed to accommodate medium-sized, towed carriers can be readily sited at Barbers Point by enlarging the existing privately-owned facility. This would accommodate the transocean barges that operate between Hawaii and the west coast, as well as barges between the Far East and Hawaii. Analyses of existing barges presently used to transport cargo between the west coast and Hawaii show a major part of the cargo barges fit the following description:

1. Design length, 400 feet
2. Design beam, 75 feet
3. Design loaded draft, 20 feet

To accommodate barges with these base dimensions, an entrance channel 2,800 feet long, 300 feet wide, and 25 feet deep would be required. A basin width of 950 feet and depth of 23 feet would accommodate a design barge under normal conditions. The basin area would be approximately 19 acres, with a total of 1,700 feet of rubble wave absorbers along the north and southwest sides of the channel and basin. Construction of this harbor (shown on Figure VI-1A) would require dredging and excavation of approximately one million cubic yards of coralline material. The U.S. Coast Guard would be required to provide the necessary aids to navigation.

Berthing areas along the east and south sides of the basin, shoreside facilities, including docks, paved storage areas, storage buildings, utilities, roads, and necessary lands, are to be provided by the State of Hawaii.

The estimated project first cost for the general navigation facilities is $10.2 million. The average annual cost associated with the facility is estimated at $431,000, including $16,000 for annual maintenance. Benefits attributable to a barge facility would be the direct result of overland transportation savings on bulk-type cargo, including cement and cement products, grains and feed products, lumber, and miscellaneous goods and
supplies adaptable to transport by barges. Additional benefits would accrue to the sale of the one million cubic yards of coral material dredged from the harbor construction. The total estimated average annual benefits attributable to an expanded barge harbor at Barbers Point is $1,473,000, with a resulting net benefit of $1,042,000.

When compared to the deep-draft harbor, the expanded barge harbor's impacts, both beneficial and adverse, are of a generally smaller scope. Construction period impacts are reduced by the more limited size of the facility. The entrance channel dredging and harbor basin would yield only 100,000 cy and 1,000,000 cy of material respectively, as compared to 1,300,000 cy and 9,300,000 cy for the deep-draft channel and basin.

The land disposal area for the dredged material would occupy about 36 acres, compared to the 370 acres for material from the deep-draft harbor, and the material would be exhausted in a shorter period of time. The resulting new marine environment created by the expanded barge basin would be about 19 acres with depths of 23 to 25 feet. General water circulation patterns in the enlarged barge basin are likely to remain unchanged from conditions in the existing barge harbor.

The 19-acre expanded barge basin would not directly affect any cultural sites or lands presently in sugar production. Relocation of existing public or private facilities would not be required.

Finally, the secondary impacts of the shoreside facilities would not be as significant as those of the deep-draft harbor. The expanded barge harbor would result in an average annual savings in overland haul of goods between Honolulu and Leeward Oahu of $1,339,000, and its construction would not preclude its expansion to a deep-water port facility in the future. The expanded barge harbor in conjunction with Honolulu Harbor, however, would not meet the long-term, 50-year physical needs for additional container handling and storage space. Consideration would have to be given to deep-draft harbor development in the future.

Although an expanded barge harbor meets some of the economic need for a second Oahu port, its inability to provide for the long-term physical requirements of a second port reaffirmed the need for a deep-draft harbor.
A deep-draft harbor can be readily developed at Barbers Point at the site of the existing barge harbor. The deep-draft harbor would have to accommodate transocean vessels carrying containerized and bulk cargo between various ports from the Far East, the Pacific Basin, and the west and east coasts of the United States. Although giant container and bulk carriers are already plying world trade routes, it is anticipated that the largest carriers calling at Barbers Point would be of the "Enterprise" class vessel (Matson Navigation Company). This vessel was therefore selected as a typical "design vessel." Pertinent features of the "design ship" are as follows:

1. Design length, 720 feet
2. Design beam width, 95 feet
3. Design draft (loaded), 34 feet

To accommodate the design vessel, a 450-foot wide, 42-foot deep entrance channel and a basin with a depth of 38 feet and turning diameter of 1,800 feet are required. Petroleum tankers were not expected to use this harbor; however, according to recent information from oil firms operating in Hawaii, petroleum tankers of the 28,000 to 32,000 deadweight ton class would use the harbor if it were available at Barbers Point. Honolulu Harbor is expected to continue as the primary petroleum products port on Oahu. The huge bulk petroleum vessels presently providing service to the two refineries at Barbers Point via offshore buoy facilities will continue crude oil shipping operation in the future. With a harbor at Barbers Point, however, it is expected that refined products would be shipped through the new harbor.

In view of the present and projected vessel types, it was found that the authorized plan, as modified by the hydraulic model tests, would not be adequate in basin size. The following deep draft harbor concepts are therefore based upon the current vessel needs, as described above. For any of these deep draft concepts, the U.S. Coast Guard would be responsible for installing necessary aids to navigation, including lighted buoys, breakwater lights, and a range light system. Similarly, the State of Hawaii would be responsible for providing all necessary shoreside facilities and lands to develop a complete facility. Finally, all of the
dredged material created by construction of any of the conceptual plans would become the property of the State of Hawaii, which would be responsible for designating the method and site of disposal.

An offshore alternative concept (Figure VI-1C) combines the use of a 2,450-foot-long south breakwater and a 1,150-foot-long revetted mole to the north. Fill areas on the landside sector of both structures would be constructed to support harbor activities. The entrance channel would be dredged in a north-northeastern direction, transitioning into a 22-acre turning area varying from 450 to 1,200 feet in width and 38 feet in depth and then into an 87-acre, 38-foot-deep harbor basin. Wave absorbers would be placed along a 1,200-foot-long sector on the inboard side of the revetted mole. Excavation and dredging of about 5 million cubic yards of coralline material would be required. Land area to construct and maintain the general navigation facilities is estimated at 58 acres.

Analysis of this concept indicates that wave energy entering the harbor would have a significant impact on the berthing areas. It is estimated that berths would be closed up to about five percent of the time due to wave conditions. Entry into the harbor under moderate to heavy sea conditions can be made with relative ease due to the comparatively shorter entrance channel and wider turning area. Flushing of the harbor would be good with the wider opening into the basin and proximity to open ocean. Impact on the nearshore marine habitat would be severe, with approximately 100 acres of shore area committed to the harbor development. About 35 acres would be occupied by the breakwater and revetted mole structures. By placing the harbor partially offshore, however, the land resources are impacted to a lesser degree and are available for other uses.

Two completely onshore or landlocked harbor concepts were evaluated. The proposed concept and its impacts have been addressed previously.

Navigation conditions within the proposed basin are expected to be excellent, according to hydraulic model tests conducted in 1968. Wave heights along the berth areas would not exceed two feet, even under the most severe storm conditions. Channel navigation under very severe wind conditions may be difficult, but the 450-foot-wide channel would provide adequate clearance for the Enterprise class vessels.
Since the harbor is excavated as a landlocked facility, impact to the nearshore marine habitat would not be severe. In actuality, the harbor creates an additional 92 acres of new marine habitat area. The wave absorber sections would provide pockets for small fish to find shelter. Also, it is expected that corals and other invertebrates will colonize the hard surfaces of the harbor walls, wave absorbers, and other structures and thereby provide the basis for the development of a more diverse benthic community.

A second landlocked concept, which is favored by Campbell Estate, is shown on Figure VI-1D as an extended inland concept. Their preference is based on the plan's versatility for berth and dock development. The extended inland plan would provide an initial pierhead length of 4,900 feet, which could be used without further modifications, as compared to the 4,400 lineal feet of developable dock sectors in the proposed plan. The concept was model tested in 1968, and data indicated that the wave heights along the berths would be less than 4.5 feet about 99 percent of the time. The 4.5-foot wave height was considered the maximum allowable wave height in the deep-draft harbor.

The impacts of this extended inland concept are comparable to that of the proposed concept except for the breakwater. The breakwater would cover and destroy about three acres of nearshore area but may eventually enhance fish life in the nearshore waters by providing large holes in which marine life would find shelter. Flushing action could be a problem for this configuration due to the relatively long inland configuration. Additional study would be required on circulation and flushing patterns if this configuration were selected.

Table VI-1 summarizes the pertinent information on the three deep-draft harbor concepts for Barbers Point. The proposed deep-draft concept (Figure VI-1B) was selected primarily for its navigation suitability, as indicated by previous model tests, but also for the reasons summarized in Table VI-1.

ALTERNATIVES TO THE PROPOSED SHORESIDE FACILITIES

The planning for the entire shoreside facility considered the available land, the efficient use of berthing space and backup land, the
**TABLE VI-1**  
SUMMARY OF DEEP-DRAFT HARBOR CONCEPTS

<table>
<thead>
<tr>
<th></th>
<th>Offshore (Figure 1-C)</th>
<th>Extended Inland (Figure 1-D)</th>
<th>Proposed Inland (Figure 1-B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Project First Cost ($1,000)</td>
<td>$43,100</td>
<td>$50,500</td>
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<tr>
<td>Average Annual Cost ($1,000)</td>
<td>1,843</td>
<td>2,117</td>
<td>1,977</td>
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<tr>
<td>Average Annual Benefits ($1,000)</td>
<td>3,884</td>
<td>4,319</td>
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<tr>
<td>Net Benefits ($1,000)</td>
<td>2,041</td>
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<td>Benefit-Cost</td>
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</tbody>
</table>

**Channel Navigation**  
Above average

**Basin Navigation**  
Unfavorable; wave hts. greater than 4.5 feet about 5% of time

**Shore Impact**  
Greatest impact; partially offshore

Adequate; wave hts. less than 4.5 feet 99% of time

Entrance channel impact only

Excellent; wave hts. less than 2 feet 99% of time

Entrance channel impact only
efficient relationship among the terminals and adjacent land uses, and the ease of future expansion of facilities (Figures I-2 to I-4 for the three phases of harbor development). For discussion purposes, assume that the side of the harbor closest and parallel to the shoreline is the west side. Container terminals were generally located on the south side because adequate harbor frontage and backup land is available there. The principal variable was the location of the petroleum terminal because it is small and independent from other port activities and should be separated from other marine terminals by a ship's length for safety reasons. The petroleum terminal was located on the east side to provide sufficient separation from other marine terminals without sacrificing needed berthing space. This location also provides additional berthing space as needed, and the ability to develop slips to the north and south of the petroleum berth during subsequent phases. The petroleum terminal would eventually be relocated to the north slip. The tankers would also be able to withstand better the relatively severe wave activity characteristic of this side of the harbor than would the other vessels.

The bulk and break-bulk facilities are located on the west side of the harbor where there is adequate berthing and backup space. It might be noted that these facilities are not planned to be expanded in the ultimate phase. The interisland facilities are located adjacent to the container terminal, where they can be expanded in future phases into the south slip.

An alternative location considered for the petroleum berth is on the west side of the harbor and relatively close to the refineries. This location, however, was rejected because a large length of potential berthing space would be sacrificed in order to maintain separation from the other terminals. An alternate location for the petroleum terminal was also considered on the northern side of the harbor. This will locate the berth outside the naval air station accident potential zone and thus lessen somewhat the aircraft hazard potential associated with the petroleum terminal. Should the need arise, this 9-acre location can be used as a second berth. The reason why this alternate location was rejected is because bad surge conditions may be encountered here that would affect the utility of the berth for docking.
No Construction Alternative

Under the no construction alternative, the concerns and problems of the facilities for waterborne commerce will remain unresolved with the following impacts:

1. The present net overland haul cost between Honolulu Harbor and leeward Oahu will not be reduced. As tonnages increase in the future, the total net overland cost will increase.

2. Shoreside areas in Honolulu Harbor will not adequately handle all future projected cargo beyond the 1990 to 1995 period. This would result in longer waiting time for ships to dock and unload.
VII. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Honolulu Harbor has served as the major port of the Hawaiian Islands and the only deep-water port on Oahu for over a hundred years. The city of Honolulu developed around the harbor and has become the center of population, government, and civic activities for the state. Commerce through the harbor has been generally increasing with the increasing demand for both petroleum products and general commodities to satisfy Hawaii's growing population and expanding economy.

Honolulu Harbor is expected to continue to be the major center of waterborne commerce within the state. With the rapid and intensive urbanization along the waterfront, the desire for multiple uses along the shoreline, the increasing tonnages of incoming and outgoing cargo, and technological advances such as containerization, however, the physical limits of the harbor are developed almost to its maximum capacity. Even with state and federal improvements to Honolulu Harbor, the port will not be able to meet all waterborne commerce needs beyond the 1990 to 1995 period.

The development of a second commercial port is significantly affected by the availability of industrial-zoned or planned lands, the direction of population growth, and the physical suitability of a site for harbor development. The Barbers Point location is the site of an existing barge harbor and provides all of these elements conducive to harbor use. A harbor constructed on any coastline would have impacts along the coastal environment, but the opportunity to implement an inland configuration at an existing harbor site minimizes the adverse effects.

An expanded barge harbor would meet a limited range of short- and long-term needs for waterborne commerce as well as produce savings in overland haul of goods between Honolulu and leeward Oahu. Combined with Honolulu Harbor, an expanded barge harbor at Barbers Point would not be able to meet the total 50-year projected commerce needs but would represent an intermediate or transition stage of commercial port development. As future needs exceed the capacity of the Honolulu-Barbers Point barge
basin system, consideration would have to be given to further expansion of the barge harbor or other port development alternatives.

The deep-draft harbor could immediately serve both short- and long-term needs, depending on the incremental development of the shoreside facilities. Phasing of the development of the port facilities could control the balance of cargo handling between the two ports, and flexibility in planning for and responding to commerce needs is maximized with the construction of a deep-draft harbor. Together with Honolulu Harbor, a second deep-draft harbor at Barbers Point would meet short- and long-term needs for additional container space and handling, realize significant overland haul reduction benefits, and provide facilities for accommodating the 50-year waterborne commerce projections.
VIII. MITIGATION MEASURES PROPOSED TO MINIMIZE IMPACT

Several mitigation measures will be implemented for the adverse impacts. They are identified below.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Destruction of cultural sites</td>
<td>Excavation and salvage of archaeological sites and possibly paleontological resource recovery will be performed prior to construction in accordance with the requirements imposed by the designation of eligibility for the National Register of Historic Places. Where preservation of sites is necessary, the stockpile configuration will be adjusted. An alternative is to temporarily stockpile dredged material on lands required for shoreside facilities.</td>
</tr>
<tr>
<td>Tsunami hazard</td>
<td>Except for minor structures, the shoreside facilities design will take into account the probable effects of the 100-year tsunami as defined by the results of the Corps of Engineers' tsunami effects study.</td>
</tr>
<tr>
<td>Siltation during dredging &amp; stockpiling</td>
<td>Dredging of the channel will be suspended during heavy seas when likelihood of turbidity is greatest. Use of silt barriers or containment facilities will be considered for nearshore portions of the channel dredging. A closure will be made at the basin entrance while basin dredging is in progress to separate dredging activity from the open ocean. Sedimentation basins will be provided to settle out suspended material from dredge water when dredging material is stockpiled.</td>
</tr>
<tr>
<td>Traffic disruption</td>
<td>The contractor will be required to provide, install, and maintain all necessary signs and other protective facilities, which shall conform with the &quot;Rules and Regulations Governing the Use of Traffic Control Devices at Work Sites on or Adjacent to Public Streets and Highways&quot; adopted by the Highway Safety Coordinator, and the Federal Highway Administration's &quot;Manual on Uniform Traffic Control Devices for Streets and Highways,&quot; Part VI, &quot;Traffic Control for Highway Construction and Maintenance Operations.&quot;</td>
</tr>
<tr>
<td>Impact</td>
<td>Mitigation Measure</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>5. Noise and air pollution during construction</td>
<td>All applicable government regulations will be followed.</td>
</tr>
<tr>
<td>6. Height of shoreside facilities</td>
<td>Height of structures will be coordinated with Barbers Point Naval Air Station at the time of design.</td>
</tr>
<tr>
<td>7. Visual impact of stockpile</td>
<td>The stockpile will be landscaped for visual mitigation as well as for dust control.</td>
</tr>
<tr>
<td>8. Sewage disposal problem</td>
<td>Interim treatment and disposal measures will comply with state and federal requirements. The long-term sewage disposal requirements will be accommodated by the regional system.</td>
</tr>
<tr>
<td>9. Oil spills</td>
<td>Floating oil booms, skimmers, and launches will be available in the harbor to take immediate measures to contain and remove pollutants.</td>
</tr>
</tbody>
</table>
| 10. Encroachment of lands where endangered plants have been found | Campbell Estate is currently making efforts to locate other sites outside the project area where these endangered species can be transplanted. The estate is also presently working with several horticulturists to find the best means of propagating the two plant species that have been proposed for inclusion on the endangered species list.  

The endangered plants in the areas proposed for construction will be propagated in three locations (provided by Campbell Estate) suitable for their preservation. No construction will take place in the area of the dense colony of Euphorbia at the proposed harbor's south side for at least one year, which should provide sufficient time for successful propagation elsewhere.  

The dense colony on the north side of the proposed harbor is outside of the proposed harbor site. This colony is in the area to be used by the proposed West Beach development.
IX. ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH
WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

The commercial port development at Barbers Point would involve a wide range of irreversible commitments. The immediate area is presently committed to barge harbor operations; this commitment would be changed over the long term to deep-draft harbor use and industrial developments. This proposed change is in consonance with the adopted general plan for the City and County of Honolulu.

The port development would directly remove two acres of land from active cane production and may hasten more widespread conversion of agricultural land to urban uses. Urbanization would be subject to the policy direction and controls of both state and local government. The harbor construction and shoreside facility development would destroy cultural sites, but intensive study during the detailed design phase, and excavation, if required would be completed prior to construction. The loss of existing open space, some proposed endangered plants, and wildlife habitat represents an irreversible commitment of aesthetic and natural resources.

About 330 acres of land would be used for the ultimate harbor plan. The entrance channel construction would permanently commit a portion of the nearshore area to navigation use. Dredging the basin and channel would also involve a loss of 10.6 million cy of coralline limestone material that would then be converted into construction and agricultural material. In addition to the commitment of natural resources, a large amount of capital, on the order of $72 million for the first phase construction, is involved. The commercial port development at Barbers Point would also involve an irreversible commitment of utilities, such as water and electrical service, and use of receiving waters for sewer and storm-water discharges.
X. AN INDICATION OF WHAT OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENTAL POLICIES ARE THOUGHT TO OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

The primary governmental policies that are encouraging the development of the deep-draft harbor at Barbers Point are the Oahu General Plan and the recommendations of the State Multi-Modal Task Force as found in the 1995 Master Plan for Honolulu Harbor. The master plan recommends the "development of supplementary port facilities at Barbers Point in accordance with needs of the leeward area and to accommodate the total Oahu and statewide waterborne commerce requirements." Moreover, the construction of the harbor was authorized by Congress in 1959. In addition, the Oahu General Plan specifically calls for the city to "cooperate with the state and federal governments in the construction of a deep-water harbor in Ewa," and to "facilitate the development of a second deepwater harbor to relieve congestion in Honolulu Harbor." In effect, the creation of the harbor at Barbers Point is in harmony with the policies of the government to accommodate future economic growth in the state and to specifically direct much of the growth to leeward Oahu.

There are other alternative harbor plans that are considered and discussed in the alternatives section. Two other alternatives for the Barbers Point Harbor configuration were discussed which would achieve similar benefits to the proposed harbor configuration. The calculated benefit-cost ratios for the three alternatives showed that the proposed inland harbor concept had the most favorable benefit-cost ratio (see Table VI-1.) The offshore configuration would involve a severe environmental impact on the nearshore marine habitat with the utilization of harbor breakwater and revetted mole structures.

The extended inland concept is similar in impact to the proposed harbor concept but would require a breakwater which would cover and destroy about 3 acres of nearshore area and would have less favorable wave heights along the berths. The proposed harbor concept would impact the land resources to a greater degree than the offshore concept. An expanded
barge harbor concept was also examined but it was determined that it did not meet the long-term, 50-year physical needs for additional container handling and storage space, as would be provided by the other alternatives. Consideration would eventually have to be given to the deep-draft harbor development in the future.
XI. ORGANIZATIONS AND PERSONS CONSULTED

FEDERAL
1. U.S. Army Corps of Engineers
2. U.S. Fish and Wildlife Service
3. Fourteenth Naval District

STATE
1. Department of Health
2. Department of Land and Natural Resources
3. Department of Agriculture
4. Department of Social Services and Housing
5. Department of Planning and Economic Development
6. Office of Environmental Quality Control
7. State Historic Preservation Officer

CITY AND COUNTY OF HONOLULU
1. Board of Water Supply
2. Department of Transportation Services
3. Department of Land Utilization
4. Department of Housing and Community Development
5. Fire Department
6. Police Department
7. Department of Public Works
8. Department of General Planning
9. Department of Parks and Recreation

UNIVERSITY OF HAWAII
1. Environmental Center
2. Division of Math and Sciences, Leeward Community College
3. Water Resources Research Center
4. Community Information and Resource Center, Leeward Community College
OTHER ORGANIZATIONS

1. Hawaiian Electric Company
2. Hawaiian Independent Refinery
3. Pacific Resources, Inc.
4. Shoreline Protection Alliance
5. Outdoor Circle
6. Sierra Club
7. Life of the Land
8. Waianae Neighborhood Board #24
9. Waianae Businessmen's Association
10. Community Relations Specialist, Waianae Satellite City Hall
11. Waianae Neighborhood Community Center
12. State Comprehensive Employment and Training Program, Waianae State Manpower Center
13. Waianae Community Service Center
14. Chamber of Commerce of Hawaii
15. Environmental Health, American Lung Association
16. Hawaii Visitors Bureau
17. Ewa Beach Community Association
18. Honokai Hale Community Association
19. Alii's Athletic Club
20. Makakilo Community Association #1
21. Makakilo Community Association #2
22. Waipahu Community Association
23. Ewa Beach Satellite City Hall
24. Ewa Beach Business Association
25. Ewa Beach Merchants Association
XII. SUMMARY OF UNRESOLVED ISSUES

All of the significant issues related to the environmental impact of the proposed harbor have been resolved. Specific courses of action are currently being taken to study and mitigate the impact of the proposed action. These include: (1) the identification, location, study, and possible salvage of the historical/cultural sites located in the area and alteration of the configuration of the stockpile, if necessary, (2) the transplanting program for the proposed endangered plants, and (3) the study by the U.S. Army Corps of Engineers of the potential tsunami flooding problem to be used in the detailed design by the state of the shore-side facilities.
XIII. LIST OF NECESSARY APPROVALS

The following are major approvals required from government agencies to implement the proposed action. Procurement of all the required permits is presently being initiated.

<table>
<thead>
<tr>
<th>Agency</th>
<th>Permit or Action Required</th>
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<tbody>
<tr>
<td><strong>State</strong></td>
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<tr>
<td>1. Land Use Commission</td>
<td>1. Land use boundary changes from agriculture to urban</td>
</tr>
<tr>
<td>2. Department of Land and Natural Resources</td>
<td>2. Conservation district use permit for dredging of the entrance channel</td>
</tr>
<tr>
<td>3. Department of Health</td>
<td>3. Sewage treatment and disposal facilities construction permits</td>
</tr>
<tr>
<td><strong>City and County</strong></td>
<td></td>
</tr>
<tr>
<td>1. Department of Land Utilization</td>
<td>1a. Special management area permit to construct in Special Management Zone</td>
</tr>
<tr>
<td></td>
<td>1b. Zoning changes from R-6, I-2 and Ag-1 to I-3</td>
</tr>
<tr>
<td>2. Department of Public Works</td>
<td>2a. Grading permit</td>
</tr>
<tr>
<td></td>
<td>2b. Stockpiling permit</td>
</tr>
</tbody>
</table>
REFERENCES


2. U.S. Army Corps of Engineers, Design Memorandum No. 1 Phase II - Project Design, March 1977


4. Pacific Division Naval Facilities Engineering Command, Air Installation Compatible Use Zone, April 1976

5. Donald Wolbrink & Associates, Honouliuli A Self-Contained City at Ewa, April 1974


11. Board of Water Supply, City and County of Honolulu, Oahu Water Plan, July 1975

12. Surfing Education Association, 1971 Statewide Surfing Site Surfing

13. Hawaii Water Resources Regional Study, Hawaii Water Resources Plan (draft), April 1977


15. Hawaii Department of Planning Economic Development, State Comprehensive Outdoor Recreation Plan, 1975


19. Daniels, A., Jones, R., and Bach, W., *Determination of Patterns of Average and Maximum Air Pollutant Levels in Urban Areas*, Contribution No. 72-12 of the Department of Meteorology, University of Hawaii, 1972


APPENDIX

A-1: Water Quality and Marine Biology Data
A-2: Species Checklist of Plants
A-3: Species Checklist of Fauna and Record of Maximum Number of Birds and Mammals
A-4: Consultation Letters and Responses Prior to Draft EIS
A-5: Review Letters for Draft EIS and Responses
APPENDIX A-1

Water Quality and Marine Biology Data
### Table A-1

**WATER QUALITY AND MARINE BIOLOGY DATA**

#### Appendix I: Light Penetration and Turbidity Data for October 14, 1975.

<table>
<thead>
<tr>
<th>Station</th>
<th>Depth (m)</th>
<th>Sampling Time</th>
<th>Turbidity Units</th>
<th>Surface Light Intensity</th>
<th>Extinction Coefficient K (depth to depth + 1 m)</th>
<th>Mean E/Sta. (0-5 m)</th>
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#### Appendix I (cont.): October 14, 1975.

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<th>Extinction Coefficient K (depth to depth + 1 m)</th>
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*Combined effects of angle of incident radiation and boat movement produced self-shading of deck cell.*
### Table A-1, Cont.

<table>
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<tr>
<th>Station</th>
<th>Depth (m)</th>
<th>Sampling Time</th>
<th>Turbidity Units</th>
<th>% Surface Light Intensity</th>
<th>Extinction Coefficient K (depth to depth + 1 m)</th>
<th>Mean K/Sta. (0-5 m)</th>
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Angle of incidence too great to avoid self-shading of deck cell at initiation of sampling. Light penetration only measured during afternoon sampling.

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<th>Turbidity Units</th>
<th>% Surface Light Intensity</th>
<th>Extinction Coefficient K (depth to depth + 1 m)</th>
<th>Mean K/Sta. (0-5 m)</th>
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Combined effects of angle of incident radiation and boat movement produced self-shading of deck cell.
### Table A-1, Cont.

#### Appendix 2: Chlorophyll \( \alpha \) Concentrations for October 9, 1975.

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<th>Time</th>
<th>Chlorophyll ( \alpha ) (( \mu g/m^3 ))</th>
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#### Appendix 2 (cont.): October 14, 1975.

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<th>Time</th>
<th>Chlorophyll ( \alpha ) (( \mu g/m^3 ))</th>
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<td>0.70 ± 0.06</td>
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<td>0.17 ± 0.00</td>
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### Table A-1, Cont.

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<th>NO$_2$-N</th>
<th>NO$_3$-N</th>
<th>PO$_4$-P</th>
<th>Time</th>
<th>NH$_3$-N</th>
<th>NO$_2$-N</th>
<th>NO$_3$-N</th>
<th>PO$_4$-P</th>
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<td>3.11 ± 0.05</td>
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<td>1620</td>
<td>0.39</td>
<td>0.00</td>
<td>0.04</td>
<td>1.07 ± 0.08</td>
<td>0.22 ± 0.00</td>
</tr>
<tr>
<td>1 2</td>
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<td>1550</td>
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<td>0.22 ± 0.00</td>
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<tr>
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*Sample bottles contaminated. Values were not used in further calculations.*

---

**Appendix 1: Nutrient Data for October 9, 1975.**

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<th>Sta.</th>
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<th>NO$_2$-N</th>
<th>NO$_3$-N</th>
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<td>0.07 ± 0.01</td>
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<td>0.31 ± 0.01</td>
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<td>0.26 ± 0.01</td>
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<td>NO₂⁻-N (µg-at N/l)</td>
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Table A-1, Cont.
Appendix 4: List of Fish Species and the Numbers of Each Seen in Transsects 1 - 16. (Common names are given in parentheses.)

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| Number of Species  | 30  | 30  | 41  | 49  | 36  | 31  | 17  | 12  | 11  | 21  | 13  | 43  | 41  | 29  | 41  | 24  |
| Total Number of Individuals Counted | 124 | 210 | 427 | 365 | 313 | 231 | 107 | 58  | 75  | 136 | 264 | 324 | 422 | 239 | 244 | 209 |

**Shannon-Weaver Diversity Index** \((-\sum P_i \ln P_i)\)

- 2.69 2.83 3.10 3.16 2.82 2.59 2.15 1.80 1.62 2.60 2.22 3.40 2.94 2.74 2.99 2.44

A-7
### Table A-1, Cont.

#### Appendix 4 (cont.)

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<td>C. bimaculatus</td>
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<td>H. macrophthalmus</td>
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<td>T. mesoleucus (Hawaii)</td>
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<td>Pseudoliotides caeruleus</td>
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<td>Stegastes bicaratus</td>
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<td>H. lineolatus</td>
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<td>H. pavo</td>
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<td>Macropristus zanclus</td>
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<td>A. cuneiformis</td>
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<td>L. chrysopterus</td>
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<td>L. chrysopterus</td>
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<td>L. signifer</td>
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<td>L. lanceolatus</td>
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<td>H. sexifrons</td>
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<td>J. ibi (pe'o' tealia)</td>
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<td>P. rastrum (kala)</td>
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<thead>
<tr>
<th>SCORPAENIDAE (rockfishes)</th>
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<td>S. brachyura</td>
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<td>S. scutulata   (nulu)</td>
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<td>S. ocellata (kala)</td>
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<table>
<thead>
<tr>
<th>SALIDAE (triggerfishes)</th>
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<tbody>
<tr>
<td>D. spinatus (kala)</td>
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<td>D. leptospinus</td>
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<td>R. elongatus</td>
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<td>R. elongatus</td>
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<td>R. elongatus</td>
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| B. huygens (huis)       |                  |
| B. huygens (kala)       |                  |
| B. huygens (kala)       |                  |

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<td>B. huygens (kala)</td>
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</table>

| A-8 |
APPENDIX A-2

SPECIES CHECKLIST OF PLANTS


For each species the following information is provided:

1. Scientific name.
2. Vernacular name, when commonly used, or Hawaiian name when known.
3. Status of the species. The following symbols are employed:
   E endemic to the Hawaiian Islands, i.e. occurring naturally nowhere else in the world.
   I indigenous, i.e., native to the Hawaiian Islands but also occurring naturally (without the aid of man) elsewhere.
   X exotic, i.e., plants of accidental or deliberate introduction after the Western discovery of the islands.
   P Polynesian introduction; it includes those plants brought by the Polynesian immigrants previous to Captain Cook's discovery of the island.
   E endangered (a taxon which is in danger of extinction throughout all or a significant portion of its range - def. from Pub. Law 93205).
   * plant taxon for which information on living specimens is especially desired (by U.S. Fish and Wildlife Service Office of Endangered Species).
5. F. R. Fosberg and Derral Herbst (FH) - Listing of rare and endangered species of Hawaiian vascular plants.

A list of symbols and their explanations are given below:
6. Relative abundance of the species within the project area. The rank is based entirely upon a comparison of the frequency with which a species occurs, as compared to all others within the project area. It does not denote, necessarily, the abundance of that particular species in the Hawaiian Islands.

The following symbols and explanations are employed:

- A: ABUNDANT, generally the major or dominant species in a given area
- C: COMMON, generally distributed throughout a given area in large numbers
- O: OCCASIONAL, generally distributed through a major portion of a given area, but in small numbers
U UNCOMMON, observed uncommonly but more than 10 times in a given area
R RARE, observed 2 to 10 times in a given area
S SINGLE, only 1 specimen observed
L LOCAL, restricted to a confined area, although within that area it may occur in large numbers

7. Vegetation Zones: The symbols correspond to those used in the checklist and explained in the text.

S Strand
C Sugarcane fields
PH Prosopis with herbaceous groundcover
PB Prosopis-Batis
oP Open Prosopis forest
oPM Open Prosopis forest - previously urbanized
PL Prosopis scrubland, Prosopis savannah
SL Pluchea open scrubland
LS Leucaena open scrubland
WF Wasteland fringe
WR Roadside
WQ Quarry
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<tr>
<th>SCIENTIFIC NAME</th>
<th>COMMON NAME</th>
<th>STATUS FB</th>
<th>FH</th>
<th>PL</th>
<th>TL</th>
<th>WT</th>
<th>HR</th>
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<td>Polygala zeylanica</td>
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<td>POLYCOMACEAE</td>
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<td>W</td>
<td>D</td>
<td>L</td>
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**CHECK LIST OF PLANTS**

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**CHECK LIST OF PLANTS**

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<td>False malane</td>
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<td>J. carica (L.) Sweet</td>
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<td>J. oblonga (L.) Per-Cav</td>
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<td>J. triloba L.</td>
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<td>Jacobinia sandwicensis Gray</td>
<td>Kalu-um-hili-'aka</td>
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<td>Pailau aampil, ku kua</td>
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<td>Scyos microcarpus Mann</td>
<td>Kupala</td>
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<td>Atelesites adsciana (L.) Willd.</td>
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APPENDIX A-3

Species Checklist of Fauna and Record of Maximum Number of Birds and Mammals
APPENDIX A-3

SPECIES CHECKLIST OF FAUNA AND RECORD OF MAXIMUM NUMBER OF BIRDS AND MAMMALS

Families are listed alphabetically under birds and mammals. Genera and species are arranged alphabetically. Taxonomy and nomenclature of birds follows that of the Hawaii Audubon Society (1975) and Berger (1972). Mammals were classified according to Kramer (1971) and Tomich (1969).

For each species, the following information is provided:

1. Scientific name.
2. Vernacular name.
3. Status of the species. The following symbols are employed:
   - **E** endemic to the Hawaiian Islands, i.e., occurring naturally nowhere else in the world.
   - **I** indigenous, i.e., native to the Hawaiian Islands, but also occurring naturally (without the aid of man) elsewhere.
   - **X** exotic, i.e., species of accidental or deliberate introduction after the western discovery of the islands.
   - **P** Polynesian introduction; it includes those species brought by the Polynesian immigrants previous to Captain Cook's discovery of the islands.

4. Endangered Status
   - **ES** Listed as endangered by the State of Hawaii on the Island of Oahu.
   - **EF** Listed as endangered by the Department of the Interior, Fish and Wildlife Services.

Species listed under those categories are denoted with an asterisk (*).

5. Relative Abundance:
   - **Abundant** - plentiful; seen with great frequency either within a single habitat or throughout the entire study area.
   - **Common** - general; seen frequently over a wide area but not in exceedingly large numbers.
   - **Occasional** - limited; seen infrequently in the study area or restricted to one habitat or a few habitats.
Rare - unusual; seldom seen, usually in very low numbers or merely passing through the study area.

6. Locality symbols used above each column represent general wildlife habitats in the project area.

C Coastal habitat
S Sugarcane fields
Q Quarry and disturbed areas
K Kiawe habitat
P Ponding area
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<td>Feral dog, ilio</td>
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<tr>
<td>Felidae</td>
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<td>R. norvegicus</td>
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<td>COMMON NAME</td>
<td>STATUS US</td>
<td>EP</td>
<td>WILDLIFE HABITAT RELATIVE ABUNDANCE</td>
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<td>-------------</td>
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<td>----</td>
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<tr>
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<td>Javanese white-rumped munia</td>
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**TABLE A-2**

**MAXIMUM NUMBER OF MAMMALS AND BIRDS RECORDED DURING A DAILY SURVEY**

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<tr>
<th>Species - (Birds)</th>
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<tr>
<td>Subulcus ibis</td>
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<tr>
<td>Nycticorax nycticorax hoactili</td>
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<tr>
<td>Pluvialis dominica fulva</td>
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<td>Geopelia striata</td>
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<td>Streptopelia chinensis</td>
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<td>Paroaria coronata</td>
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<td>Passer domesticus</td>
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<td>Heteroscelus incanus</td>
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<tr>
<td>Arcidocheza tristis cristis</td>
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<tr>
<td>Zosterops japonica</td>
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<table>
<thead>
<tr>
<th>Species - (Mammals)</th>
<th>Maximum No. Recorded</th>
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<tr>
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<td>R. norvegicus</td>
<td>1</td>
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<tr>
<td>R. rattus</td>
<td>2</td>
</tr>
<tr>
<td>Harphestes auropecten</td>
<td>3</td>
</tr>
</tbody>
</table>

A-22
APPENDIX A-4

Reproduction of Comments and Responses
Made During the Consultation Process for Draft EIS
Mr. David K. Higa  
Acting Chief  
Water Transportation  
Facilities Division  
Department of Transportation  
State of Hawaii  
79 South Nimitz Highway  
Honolulu, Hawaii 96813

Dear Mr. Higa:

Proposal for  
Environmental Impact Statement  
for the Proposed Barbers Point Harbor  
Job H. C. 1315B

In response to your letter of May 10, 1977, announcing preparation of an Environmental Impact Statement (EIS) for the construction of a deep draft harbor at Barbers Point, Oahu, and seeking significant concerns in advance, the U. S. Navy believes the following items should be addressed in the EIS:

a. Dangers involved in providing a petroleum terminal berth which will be directly under the flight path approach to Runway 11 and just at the end of Accident Potential Zone (APZ) "C" as shown in the April 1975 Air Installations Compatible Use Zone (AICUZ) Study for Naval Air Station, Barbers Point.

b. Density of people in and around harbor area and impacts on them due to noise and potential for aircraft accidents.

c. Any emissions from ship's stacks in the port, potentially blocking sight for passing aircraft.

d. Lights from night operations at harbor which might interfere with passing aircraft.

e. Accelerated growth as a result of harbor implementation.
The above listing is not all-inclusive, and additional concerns may be raised at the time the EIS is submitted for Navy review. It would be appreciated if two copies of the EIS would be provided so as to allow for simultaneous review by Naval Air Station, Barbers Point at that time.

Sincerely,

R. P. NYSTEDT
CAPTAIN, CEC, USN
DISTRICT CIVIL ENGINEER
BY DIRECTION OF THE COMMANDANT

Copy to:
Sunn, Low, Tom & Hara:
Attn: Mr. L. C. Fruto
190 S. King Street
Suite 600
Honolulu, Hawaii 96813
July 12, 1977

Captain R. P. Nystedt, CEC, USN
District Civil Engineer
Headquarters
Fourteenth Naval District
P. O. Box 110
FPO San Francisco, California 96610

Dear Captain Nystedt:

Subject: Barbers Point Harbor EIS

This is in response to the concerns expressed in your letter of May 31, 1977, regarding the EIS for the proposed Barbers Point Harbor. These concerns will be addressed fully in the EIS which will be available for public review upon completion. The responses to your questions are as follows:

Q: What are the dangers involved in providing a petroleum terminal berth which will be directly under the flight path approach to Barbers Point Naval Air Station's Runway 11?

R: Based on the AICUZ study of April, 1976, the petroleum berth will be located at the end of Accident Potential Zone (APZ) "C". Aircraft accidents do occur, but the degree of risk is slight as evidenced by the absence of accidents in the approach zone of Runway 11.

Q: What are the impacts on the people in and around the harbor area due to the noise and potential for aircraft accidents?

R: Based on the AICUZ, the harbor will be located in APZ's B and C and NEF Zone 1. Here, the aircraft noise levels are estimated to be less than 30 in the NEF scale. The noise generated in the harbor will be about 85 decibels or greater than 40 in the NEF scale. Thus, it is not expected that there will be complaints due to the aircraft noise.
The probability of aircraft accidents is difficult to predict. However, the accident historical data contained in the AICUZ report does not indicate the occurrence of any accident in the harbor area. The occurrence of an aircraft accident is a remote possibility.

Q: Will the emissions from any ship's stacks in the port potentially block the sight for passing aircraft?

R: The emission from the ships docked in harbors is regulated by the State Department of Health. The Water Transportation Facilities Division of the State Department of Transportation assists in the enforcement of the regulations.

The northeasterly trade winds predominate about 75 to 85 percent of the time and vary from 10 to 20 knots. The trade winds should dissipate the emissions before they cross the line of sight of the aircraft.

Q: What is the expected accelerated growth as a result of the harbor?

R: The harbor-related population by the year 2000 would increase the projected Ewa plain population from 104,000 to 105,610 or 1.5% and the Ewa district's population from 321,000 to 325,280 or 1.3%. Due to the negligible increase in population, it appears that normal growth trends will have a more significant impact than the harbor. The demand of land in the Campbell Industrial Park may increase from 30 to 40 acres per year.

Very truly yours,

E. ALVEY WRIGHT
Director
May 23, 1977

Mr. L. C. Fruto
Sunn, Low, Tom & Hara
190 South King Street, Suite 600
Honolulu, Hawaii 96813

Re: Proposed Deep Draft Harbor
Barbers Point, Oahu, Hawaii

Dear Sir:

This responds to your environmental impact statement preparation notice dated May 10, 1977 regarding the proposed Barbers Point deep draft harbor, Oahu, Hawaii.

The subject project was previously examined in our review of the environmental impact statement prepared by the U. S. Army Corps of Engineers. The preliminary design of shoreside facilities at that time, however, precluded full analysis of the State plan. Although the navigational project features would probably create greater direct impacts, shoreside facilities have the potential of creating chronic water quality problems. The subject EIS should, therefore, provide a detailed discussion regarding the anticipated effectiveness of the proposed sanitary sewage system. Would ship-to-shore hookups be compatible with equipment on existing vessels? Where would these facilities be located and what types of procedures would be developed to insure its use? Another source of water pollution may be generated by surface runoff. The draft EIS should identify discharge outlets, diagram drainage patterns of adjacent areas and in general provide assurances against all potential sources of pollution.

Sincerely yours,

Maurice H. Taylor
Field Supervisor

cc: HA
DOT (Higa)

Save Energy and You Serve America!
Mr. Maurice H. Taylor  
Field Supervisor  
U. S. Fish and Wildlife Service  
P. O. Box 50167  
Honolulu, Hawaii 96850

Dear Mr. Taylor:

Subject: Barbers Point Harbor EIS

This is in response to the concerns expressed in your letter of May 23, 1977 regarding the EIS for the proposed Barbers Point Harbor.

These concerns will be addressed fully in the EIS, which will be available for public review upon completion. The responses to your questions are as follows:

Q: Would ship-to-shore hookups be compatible with equipment on existing vessels? Where would these facilities be located, and what types of procedures would be developed to insure its use?

R: The treatment of the harbor wastewater, which will primarily consist of domestic, shipboard, and livestock washdown, will be collected and treated on an interim basis by either an oxidation pond system, oxidation ditch, or a small package plant. The collection system may ultimately connect to a proposed regional system for the industrial park. The method of collection and treatment of the harbor waste will be finalized during the design phase.

The ship-to-shore hookups will be designed to accommodate hookups with existing vessels. State Department of Health regulations prohibit the discharge of sewage into Hawaii waters, which violates State water quality standards.
Mr. Maurice H. Taylor  
Page 2  
July 13, 1977

Q: How will the drainage of the area be handled?

R: Water pollution in the harbor will be limited only to the discharge of storm runoff from the paved areas in the terminal. The storm runoff will be collected by an underground system that will be finalized during the design phase of the shoreside facilities for the harbor.

Thank you for your interest in this project.

Very truly yours,

E. ALVEY WRIGHT  
Director
May 20, 1977

Sunn, Low, Tom and Hara
190 S. King St., Suite 600
Honolulu, Hawaii 96813

Attention: Mr. L. C. Fruto

Gentlemen:

We are writing to you in response to Mr. David Higa’s letter requesting comments on the proposed Barbers Point Deep Draft Harbor (May 10, 1977). We realize that your firm is preparing an Environmental Impact Statement on the State’s portion of the proposed harbor facility and you are soliciting our preliminary comments to assist in your research in preparing the EIS.

We are very pleased to provide you with the following comments for your consideration in preparing the EIS. Please be aware of the fact that these comments are preliminary, and further coordination between this Department and the Department of Transportation is needed before the environmental impacts of the proposed harbor can be fully assessed. We reserve the right to impose pollution control measures as they are needed.

1. The statement should address the types and capacity of sanitary facilities of both land and ocean going activities.

2. Industrial waste treatment disposal systems (if applicable) should be included in the EIS.

3. There needs to be a discussion on the types of run-off control measures adjacent to the proposed stockpile area.

4. Pollutants from general industrial facilities which are appurtenant to the harbor such as petroleum refineries should be discussed in the EIS.

5. Construction activities related to the proposed boat harbor should be discussed, specifically in regards to the air, water, and solid waste pollution.

6. The effects of the present and future air emissions from Campbell Industrial Park should be discussed in the statement.
7. Air pollution control related to stockpiles will be a problem. How will dust be controlled?

Since it is impossible to discuss all of the concerns of this Department in this letter, I suggest that you or your representative meet with the staff at the Pollution Technical Review Branch to discuss the types of information which should be included in the EIS. The Pollution Technical Review Branch can be contacted at 548-6410.

Sincerely,

JAMES S. KUMAGAI, Ph.D.
Deputy Director for Environmental Health

cc: Mr. David Higa, Chief
   Water Transportation Facilities Div.
   Office of Environmental Quality Control
July 12, 1977

Dr. James S. Kumagai
Deputy Director of Health
Department of Health
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Kumagai:

Subject: Barbers Point Harbor EIS

This is in response to the concerns expressed in your letter of May 20, 1977, regarding the EIS for the proposed Barbers Point Harbor. These concerns will be addressed in the EIS, which will be available for public review upon completion. The responses to your questions are as follows:

Q: What are the types and capacity of sanitary facilities for both land and ocean-going activities?

R: Preliminary alternatives for the sanitary facilities are as follows. The harbor wastewater, which will primarily consist of domestic, shipboard and livestock washdown, will be collected and treated on an interim basis by either an oxidation pond system, oxidation ditch or a small package plant. Initially, the treated effluent will probably be disposed of by an injection well system. Ultimately, the collection system will be connected to a proposed regional treatment and disposal system for Campbell Industrial Park.

Q: How will the industrial waste be disposed?

R: As mentioned, the nature of the harbor wastewater will consist only of domestic, shipboard and livestock washdown. There will be no industrial waste generated by the harbor facilities.
Q: What types of runoff control measures will be employed adjacent to the proposed stockpile area?

R: The runoff control measures adjacent to the stockpile areas will conform to the City and County of Honolulu, Soil Erosion Standards and Guidelines, November 1975. Between 60 to 80 percent of the dredged material will be water, much of which is expected to be absorbed by the coral substrate at the disposal site. A system of settling basins will be used during construction to settle out as much of the solid fraction of the slurry as possible. During post-construction phases, the settling basins will remain in operation to minimize surface runoff into the harbor.

Q: What are the pollutants from the general industrial facilities which are appurtenant to the harbor such as petroleum refineries?

R: The harbor itself will not contain any industries. However, it is expected that the construction of the harbor will enhance industrialization in Campbell Industrial Park.

There is no doubt that the construction of the harbor will accelerate the development of the Industrial Park. However, it is difficult and perhaps premature at this point to address the quantities and type of pollution that will occur as a result of the harbor because there is no information on what industries will occupy the park. A detailed catalogue of pollutants cannot be established until actual industrial facilities are proposed.

Industrial facilities that may locate in the harbor area will be required to apply for a permit from the Department of Health to operate air and wastewater discharge sources and will undergo review at that time. Furthermore, once in operation, the industries will be required to conform to existing air, water and noise control regulations as promulgated by the State Public Health Regulations, Chapters 37, 37A, 38, 42, and 43.

Q: Construction activities related to the proposed harbor should be discussed specifically in regards to the air, water, and solid waste pollution.
R: The construction of the port facility is divided into several basic operations: Dredging of the entrance channel, excavation of basin area down to the water level, dredging of the remainder of the basin down to the project depth, and construction of shoreside facilities.

Two 5-acre coupled settling basins will be constructed to assure that the maximum amount of sediment is removed from the dredged material before any excess surface water flows back into the ocean. The system used will be similar to the one used for the dredging of Kawaihae Harbor.

Dredging in open seas will generate some turbidity and sediment in the immediate area although most of the material should be taken up by the suction equipment and piped to shore. The dredge operates from a floating plant which generally restricts its use to calm or moderate sea conditions; therefore, dredging operations would be suspended during heavy seas when the likelihood of turbidity would be greatest. The details of the construction methods will be finalized using the detailed design stage, and every effort will be made to take advantage of the inland harbor configuration. By phasing the inland dredging and maintaining a land barrier between the inland harbor and the ocean waters, most of the harbor development could be done under closely contained conditions, and with little or no interaction with the open ocean.

The major impact of construction of the shoreside facilities will be noise from construction equipment and dust.

Q: What are the effects of the present and future air emissions from Campbell Industrial Park?

R: In an air sampling study conducted by the Conoco-Dillingham Oil Refinery, which is 1 mile south of the proposed harbor area, measurements showed sulfur dioxide and nitrogen dioxide concentrations below State standards. Carbon monoxide and sulfur dioxide levels were below the levels of detection. Suspended particulates were moderately high, but not in excess of the standards. The study concluded that the
existing concentrations of airborne contaminants were lower than expected for an industrial area. A 1976 sampling conducted by the Department of Health at the Barbers Point lighthouse showed similar results.

The future air emissions at Campbell Industrial Park insofar as it is related to enhanced land demand due to the harbor has been discussed previously.

Q: How will the dust from the stockpile be controlled?

R: The dust control for the stockpile will conform to the State Air Pollution Regulations, Chapter 43, Section 10. Landscape measures will be taken to mitigate dust problems.

Thank you for your comments. We shall again appreciate your review and comments when this document is up for public review.

Very truly yours,

E. ALVEY WRIGHT
Director
May 24, 1977

Mr. David K. Higa, Acting Chief
Water Transportation Facilities Division
Department of Transportation
79 So. Nimitz Highway
Honolulu, HI 96813

Dear Mr. Higa:

This responds to your letter of May 10, 1977 regarding your proposal to prepare an environmental impact statement for the proposed dredging of the basin and entrance channel at Barbers' Point Harbor, Job H.C. 1315B.

Comments on the portion of the proposed project (i.e., the dredging of the basin and entrance channel) have been received from the Army Corps of Engineers and you may refer to these for additional comments or suggestions.

With respect to impacts on the terrestrial biota, the Army Corps of Engineers' statement adequately addresses the species involved (lists of impacts on them). The project will eliminate habitat for the indigenous heron and owl, but the combined impact to be low. The Hawaiian owl (if it indeed is endangered on the Island of Oahu by this Department's activities) is not represented in your EIS. The remainder of the wildlife species present at the site and mammals and thus loss of habitat for these animals is adequately addressed.

As the wildlife habitat type of the channel and surrounding lands upon which accessory structures will be constructed is not discussed in the Federal EIS, the discussion can generally be used to prepare your EIS.

I trust that the foregoing discussion is adequate and that we will have an opportunity to review your EIS. I look forward to your comments on our comments.

Yours truly,

Attachment
Honorable Andrew I. T. Chang, Director
Department of Social Services and Housing
State of Hawaii
P. O. Box 339
Honolulu, Hawaii 96809

Dear Mr. Chang:

Subject: Barbers Point Harbor EIS

This is in response to your letter of May 26, 1977 regarding the EIS for the proposed Barbers Point Harbor.

Thank you for your interest and prompt reply. The EIS will be available for public review upon completion.

Very truly yours,

E. ALVEY WRIGHT
Director
3. Secondary impacts: The economic and social impacts are discussed in detail for the immediate harbor area, the Campbell Industrial Park, and the greater Ewa district, on pages III-39 to III-60 of the EIS.

4. Recreational resources: Additional fishing areas will be provided as a result of enlarging the marine basin. Public access to coastal areas will be significantly increased with the opening of the harbor.

Upon completion, the EIS will be filed with the Environmental Quality Commission for the 30-day public review period. At that time, we will again appreciate your review and comments in regard to this document.

Very truly yours,

E. ALVEY-WRIGHT
Director
Sunn, Low, Tom & Hara  
190 South King Street  
Suite 600  
Honolulu, Hawaii 96813  

Attn: Mr. L. C. Fruto  

Gentlemen:  

Subject: EIS for the Proposed Barbers  
Point Harbor, Job No. H. C. 13158  

Thank you for informing us about the EIS planned for the Barbers  
Point Harbor.  

We would appreciate being kept apprised of the project. As may  
be expected our major concerns would relate to the impacts, both  
positive and negative, that the project may have upon agricul­
ture.  

Sincerely,  

JOHN FARIAS, JR.  
Chairman, Board of Agriculture
Honorable John Farias, Jr., Chairman
Department of Agriculture
State of Hawaii
1428 South King Street
Honolulu, Hawaii 96814

Dear Mr. Farias:

Subject: Barbers Point Harbor EIS

This is in response to your letter which we received on June 1, 1977 regarding the EIS for the proposed Barbers Point Harbor.

Thank you for your interest and prompt reply. There will be both short- and long-term impact on agricultural lands associated with the construction of the harbor. During construction, 8½ acres of marginally profitable sugarcane land will be taken out of production. The harbor basin will also require the conversion of about 170 acres of land now zoned Ag-1 to I-3. Ultimately, it is projected that the Ewa area will experience increased population growth and urbanization. The demand for housing, public services and commercial development is expected to result in the conversion of more agricultural lands to residential and industrial uses. These points are further developed in the EIS which will be available for public review upon completion.

Very truly yours,

E. Alvey Wright
Director
Ms. Carolyn Corn  
Division of Forestry  
Department of Land and Natural Resources  
1151 Punchbowl Street  
Honolulu, Hawaii 96813

Dear Ms. Corn:

Subject: Barbers Point Harbor EIS

This is in response to the concerns expressed in your letter of June 6, 1977, regarding the EIS for the proposed Barbers Point Harbor.

Thank you for your comments and suggestions. The responses to your questions follow:

Q: Where and how large are the colonies of E. Skottsb ergri var, Kalaeloana that will be affected by harbor activities? When will each area be affected?

R: The locations of the colonies are given in the Terrestrial Biology section on pages II-15 to II-20 of the EIS. Campbell Estate is currently making efforts to locate other colonies of these endangered species outside of the project area. No construction will take place in the area of the dense colony of Euphorbia at the south side of the proposed harbor for about one year, unless the specie has been sufficiently propagated sooner during test plantings. The dense colony on the north side of the proposed harbor in the designated stockpile area will be preserved indefinitely until sufficient numbers of plants have been found or have been successfully transplanted outside the project area.
Q: Will the hydraulic dredging cause surface spillage and/or water table changes that will be detrimental to plans outside the stockpile area?

R: The impact of the dredging will be significantly minimized due to a system of 5-acre coupled settling basins that will be constructed. The water table is not expected to rise significantly as a result of surface spillage. During a field trip, the depth of the water table was measured to be about 10 feet below the ground surface. The root systems of the endangered plants, however, have been measured at 1 1/2 to 4 1/2 feet. Since a rise in the water table on the order of 6 to 10 feet is highly improbable, it is unlikely that the plants outside the stockpile area will be threatened.

Upon completion, the EIS will be filed with the Environmental Quality Commission for the 30-day public review period. At that time, we will again appreciate your review and comments in regard to this document.

Very truly yours,

E. ALVEY WRIGHT
Director
MEMORANDUM

TO: MR. DAN TANAKA, Water Transportation Facilities Division, Department of Transportation

THRU: MR. WILLIAM H. SAGER, State Forester

FROM: CAROLYN CORN, Botanist

SUBJECT: Environmental Impact Study for Barber’s Point Harbor

A deadline of May 9, 1977 has been given in the Environmental Quality Commission Bulletin to respond to Environmental Impact Survey preparation of Barber’s Point Harbor. As I understand from verbal communication with Dan Tanaka and Joe Amaki, several agencies within the State have questions that were not covered in the Federal EIS statement and that the State is formulating answers to these questions.

The State Division of Forestry is concerned with the impact that the harbor will have upon the endangered plant species in the area. Several species are in the immediate vicinity of the construction of the harbor. One species, E. skottsbergii var. kalaeloana, will be placed on the Federal official list of endangered species within the immediate future and will be, as close as we can ascertain, on State land in the immediate area of development. We need to know (1) the exact location of these plants; (2) how large an area will be affected by various harbor activities, such as area of coral stockpiles, area to be developed, and areas affected by salt water spillage due to hydraulic dredging; and (3) when each area will be affected.
Of particular concern to us is if the hydraulic dredging will cause surface spillage and/or water table changes that will be detrimental to plants outside the stockpile area. If so, how large an area? The results of your findings will determine if other endangered species may be affected.

CAROLYN CORN

CC: fkf
Office of the Director

Sunn, Low, Tom & Hara
Attn: Mr. L. C. Fruto
190 S. King Street, Suite 600
Honolulu, Hawaii 96813

Dear Mr. Fruto

Subject: EIS for the Proposed Barbers Point Harbor,
Job H.C. 1315B

We have reviewed the information provided in the DOT letter,
5/10/77, regarding the above subject and have no comments to offer
at this time.

Sincerely,

Reginald H. F. Young
Asst. Director, WRRC

RHFY: jm
Mr. Reginal H. F. Young  
Assistant Director  
Water Resources Research Center  
University of Hawaii  
2450 Dole Street  
Honolulu, Hawaii 96822

Dear Mr. Young:

Subject: Barbers Point Harbor EIS

This is in response to your letter of June 1, 1977 regarding the EIS for the proposed Barbers Point Harbor.

Thank you for your interest and prompt reply. The EIS will be available for public review upon completion.

Very truly yours,

E. Alvey Wright
Director
Dear Mr. Higa:

RE: Environmental Impact Statement for the Proposed Barbers Point Harbor
Job H.C. 1315B

In response to your letter of May 10, 1977 (UT-EP 4713) requesting our comments on the proposed Barbers Point Harbor EIS we would like to offer the attached material for your information. You will note that the Environmental Center has been coordinating reviews of the Federal EIS for this project since June 1976. Most of the concerns expressed during these reviews were directed toward the lack of information as to the secondary impacts and shoreside facilities and operations which will result from the proposed harbor construction.

Your letter suggests that the State EIS under preparation will primarily address items 5-9. We note, however, that item 9 is not identified. Furthermore, we would strongly suggest that the environmental impacts associated with item 4, "Disposition of approximately 9.73 million c.y. of dredge material... bordering the harbor" needs to be fully evaluated and described in the State EIS.

If you have any questions as to our previous comments in the Federal EIS please call. We appreciate the opportunity to express our concerns relative to this EIS.

Yours truly,

Doak C. Cox
Director

cc: Charles Bretschneider
Harold Loomis
William Kimmerer
Martin Vitousek
John T. O'Brien
Jacquelin Miller
Corp of Engineers
Dr. Doak Cox, Director  
University of Hawaii Environmental Center  
Crawford 317  
2550 Campus Road  
Honolulu, Hawaii 96822  

Dear Dr. Cox:

Subject: Barbers Point Harbor EIS

This is in response to the concerns expressed in your letter of May 26, 1977, regarding the EIS for the proposed Barbers Point Harbor.

Your concerns are addressed in the following manner:

1. Secondary Impacts - The economic and social impacts are discussed in detail for the immediate harbor area, the Campbell Industrial Park, and the greater Ewa district, on pages III-39 to III-60 of the EIS.

2. Impact of Stockpiled Material - No significant impact is anticipated from stockpiling near the harbor. Between 60 to 80 percent of the dredged material will be water, much of which is expected to be absorbed by the coral substrate at the disposal site. A system of settling basins will be used during construction to settle out as much of the solid fraction of the slurry as possible. During post-construction phases, the settling basins will remain in operation to minimize runoff into the harbor. The main impact of the stockpile will be visual. To mitigate the visual and dust pollution impacts, the stockpile will be landscaped.

3. Thank you for bringing to our attention that Item #9 is not included in our letter to you. Item "#9" should be changed to read "#8".
Upon completion, the EIS will be filed with the Environmental Quality Commission for the 30-day public review period. At that time we will again appreciate your review and comments in regard to this document.

Very truly yours,

E. ALVEY WIGHT
Director
June 1977

Sunn, Low, Tom, & Hara
190 S King Street
Suite 600
Honolulu, HI 96813

Attention: Mr L C Fruto

Subject: EIS for the Proposed Barbers Point Harbor, Job H C 1315 B

Dear Mr Fruto:

Having assessed the Federal EIS for the proposed harbor, which we feel is not wholly adequate, the following concerns should be fully addressed in your EIS:

Project Description. 1. Potential users of the harbor facilities. Who are they? Have they expressed a willingness to use it. What demand for harbor facilities exists? What economical advantages will be gained based on their current methods of transporting goods?

2. A best estimate of the value of dredged coral and a discussion of the basis for such an assessment.

3. A description of the activities at the petroleum terminal. Will shoreside facilities be used for off-loading?

4. Consideration given to the potential impact of non-fossil energy sources (e.g. solar) on expected increases in petroleum cargo inshipments and activities.

Environmental Setting. 1. Inclusion of BOD and total coliform water quality parameters since these are useful indicators of human activities. In the future, they may be helpful in detecting discharges and determining the effectiveness of pollution control measures.

2. A discussion of known discharges into the existing barge harbor. e.g. through cattle loading operations.

3. A more broadly based flora survey of the Industrial Park and surrounding areas to locate other endangered species previously known to exist.
Barbers Point Harbor
Page 2
6 June 1977

Environmental Impact. 1. Anticipated long term changes in the population and composition of marine organisms—fish, coral, algae and crustaceans—and for the water quality of the project site. Will the water quality be degraded to that approaching Honolulu Harbor?

2. Protection of Euphorbia skottsbergii var kalaeolana. Will the State of Hawaii ensure its survival within the development area whether or not it becomes officially listed as an endangered species?

3. The possibility of designating an area of critical habitat for E. skottsbergii var kalaeolana.

Secondary Impacts. 1. Threats to the existence of other endangered species, Capparis sandwichiana var sandwichiana and Achyranthes splendens var rotundata, as a consequence of the harbor's completion.

2. Long term economic and social impacts on the Barbers Point region in relationship to other proposed and future developments, e.g. West Beach, Caneland. Will one project stimulate another?

3. The extent to which Campbell Estate owned lands will increase in value and a basis for such a determination.

4. Will harbor development cause a direct increase in petroleum and cargo shipments into Oahu?

5. What percentage of users of Honolulu Harbor will find it economical to relocate their activities at Barbers Point? How many new users can be expected?

Alternatives. 1. Discussion involving the adequacy of an expanded barge harbor design as proposed by the Sierra Club.

2. The possibility of commercial uses of Pearl Harbor.

Mitigation Measures. 1. To prevent oil spillage and seepage within the harbor and of nearshore waters should any possibility exist.

2. Measures to minimize adverse aesthetic effects of stockpiled materials.

Commitment of Resources. 1. The amount of energy resources required to construct and maintain a deep draft harbor.

2. The extent to which current recreational opportunities such as fishing, diving, and ogo collecting, will be curtailed or enhanced.

3. An estimated value of destroying live coral which would offset the economic resale value of the dredged material.
We believe that all comments presented by Representative Carl Takamura (Honolulu Star-Bulletin, April 11, 1977, page A-15) are worthy of comment and should be addressed in the EIS.

Mahalo,

Bert Y. Kimura
Division of Math and Sciences

George T. Shiroma
Division of Math and Sciences
Messrs. Bert Y. Kimura and
George T. Shiroma
Division of Math and Sciences
Leeward Community College
96-045 Ala Ike Street
Pearl City, Hawaii 96782

Gentlemen:

Subject: Barbers Point Harbor EIS

This is in response to the concerns expressed in your letter of June 6, 1977, regarding the EIS for the proposed Barbers Point Harbor.

Thank you for your comments and suggestions. The questions you have raised are discussed in the following manner:

Q: Who are the potential users of the harbor facilities?

R: A number of studies have been conducted by Campbell Estate to determine the industries that may locate in the park due to the harbor. One such comprehensive market study identified 75 industries that are water-oriented in terms of receiving and/or shipping bulk raw materials to and from the islands. See attached list.

The existence of a harbor could also encourage relocation of many of the businesses presently located at Kakaako. In a study conducted by Pacific Urban Studies and Planning Program of the University of Hawaii, almost half of the business firms located in Kakaako are dependent on Honolulu Harbor for their supplies, yet 84 percent of these businesses serve island-wide customers. A harbor facility at Barbers Point would be ideally suited to those firms doing a larger share of their business in Leeward Oahu.
Q: What is the estimated value of the dredged coral?
R: At a density of 125 lbs. per cubic foot, the 10.6 million cubic yards of coral would equal 17.5 million tons. When processed, this quantity could have present values ranging from $11.6 million to $14.5 million at 8 percent discount rate for 17½ years.

The coral would be stored on private lands during the depletion period. Based on current rental costs of $4,000 to $6,000 per acre, the present value of the land rental, at 8 percent discount rate for 18 years, could range from $6.5 million to $9.7 million. Thus, the net present value of the coral could range from $4.8 million to $5.1 million.

Q: Describe the activities at the petroleum terminal.
R: Outshipment of refined petroleum products will be the main activity in the terminal.

Q: What is the potential impact of non-fossil energy sources on expected increases in petroleum cargo activities?
R: It is recognized that non-fossil energy sources will play a significant role in Hawaii's future. Development of many of these sources, however, is still in the experimental stage and their economic viability on a large scale basis remains to be demonstrated. It is expected that petroleum will still provide the bulk of the energy in the foreseeable future; therefore, planning of the harbor was done on this basis. However, should there be a significant change in the type of energy sources to be used in Hawaii then the ship-to-shore handling facilities may be changed at that time.

Q: Inclusion of BOD and total coliform water quality parameters since these are useful indicators of human activities. In the future they may be useful in detecting discharges and determining the effectiveness of pollution control measures.
R: We would like to refer you to the response made by the Corps of Engineers in their Final Environmental Statement for the same project. Their response addresses a similar comment you made at that time. Their response is reproduced in the following page:
"The measurement of BOD has been seriously questioned by many marine scientists because of the very low values and poor resolution of BOD data collected from marine environments. BOD is also very expensive and time consuming to analyze. Other parameters such as zooplankton, chlorophyll, and oxygen concentrations were determined to be more relevant indicators of organic material and dynamics at the project site. Finally no stream water or sewage water will be discharged into the harbor basin thus eliminating the possibility of BOD from such sources.

Coliform bacteria is more an indicator of public health hazard than an indicator of adverse environmental impact. There are no planned or existing water contact recreational activities in the harbor and the corresponding potential health hazard from coliforms should remain very low. In addition, there are no important sources of coliform bacteria in the existing harbor environment except an unlikely potential source from occasional garbage or trash. Finally the measurement of coliform is very expensive and would not be cost effective relative to other information requirements."

Q: What are the wastewater discharges into the existing harbor?

R: There are no known wastewater discharges into the existing harbor.

Q: Will the water quality be degraded to that approaching Honolulu Harbor?

R: Within the harbor, water quality controls will be subject to State Water Transportation Facilities Division and State Public Health regulations. Water input to the harbor will be limited to tidal and wind exchange, groundwater flow, and local drainage of the harbor facilities since, unlike Honolulu Harbor, no stream or drainage canals enter the harbor area. The discharge of storm runoff from the proposed harbor facility is not expected to contribute a significant impact to the harbor basin. A regional drainage system proposed by Campbell Estate, will intercept offsite runoff along the eastern and southern perimeters of the harbor and will direct it toward a major drainage channel for discharge into the ocean.
No sewage discharges from ships will be allowed in the harbor. Preliminary plans are to have the shipboard waste, livestock dock waste and washwater, and shore-side domestic waste conveyed to an interim treatment facility with the effluent disposed through a system of injection wells. Ultimately, the wastewater effluent may be collected and conveyed to a treatment and disposal facility that may be constructed in the Industrial Park. Therefore, no sewage will be emptied into the harbor.

With the enforcement of harbor and Public Health regulations, the port should not suffer significant pollution levels.

Q: What are the results of the flora survey of the park and surrounding areas? Will the protection of Euphorbia skottsbergii be assured? Will other endangered species be threatened?

R: The Terrestrial Biology section of the EIS (pp. II-15 to II-24) addresses the botanical and fauna surveys of the region. In order to mitigate the encroachment on lands where possible endangered species have been located, the Campbell Estate is making efforts to propagate Euphorbia in other areas outside the project location. Since the status of Achyranthes splendens is less critical, it could be transplanted with less difficulty.

Q: What are the long-term effects for marine organisms and water quality at the project site?

R: The direct effect of the proposed harbor on the marine environment outside of the mouth of the harbor is not expected to be significant. It is expected that the overall average nutrient discharge per length of coastline in the area will be similar to present conditions. The long-term effect is expected to be localized to the harbor and entrance channel. It is likely to consist of the substrate change in the channel from generally hard bottom to soft bottom, and the development of a new marine environment in the proposed harbor similar to that of the existing harbor, but with somewhat higher concentrations of phytoplankton and zooplankton. The details of the marine-related impacts are given on pages III-6 to III-12.
Q: What are the long-term economic and social impacts on the Barbers Point region in relationship to other proposed developments?

R: The economic and social impacts for the immediate harbor area, the Campbell Industrial Park and the Ewa District are discussed in detail on pages III-39 to III-60 of the EIS.

Q: To what extent will the Campbell Estate lands increase in value and what is the basis for this determination?

R: Studies indicated that there may be 30 percent enhancement on 400 acres of port-related industrial land that could be leased over the next 40 years, 15 percent enhancement on currently leased land and also 15 percent enhancement on other lands that could be leased in increments of 30 acres per year. At $58,000 per acre and 8 percent discount rate for 40 years, the present value of the enhancement could be $8.2 million.

Urban Projects, Inc., suggested that only 20 acres could be leased per year instead of 30 acres, the present value of the enhancement could be $6.8 million.

Also, if the land were $47,000 as estimated by the Corps of Engineers, the present value of the enhancement could be $5.9 million if 20 acres could be leased each year and $6.7 million if 30 acres could be leased annually.

Since it is difficult to forecast the exact value of any land 40 years from now and the area that can be leased annually, the figures derived above reveal a range of values that can only be considered as estimates.

Q: Discuss the expanded barge harbor design and the commercial use of Pearl Harbor as alternatives to the proposed harbor.

R: These two alternatives are examined in the alternatives section pages VI-1 to VI-11 of the EIS to be submitted.

Q: What oil spill control measures will be available.

R: Floating oil booms, skimmers, and launches will be available in the harbor to take immediate measures to contain and remove pollutants.
Q: What measures will be taken to minimize adverse aesthetic effects of stockpiled materials?

R: The stockpile will be landscaped for mitigation of visual impact and dust control.

Q: Describe the commitment of resources required to construct and maintain a deep-draft harbor.

R: The irreversible and irretrievable commitments of resources which would be involved in the proposed action are presented on page IX-1. The energy sources required during construction would be associated with the operation of the hydraulic cutterhead dredge (about 1,500 horsepower) and other construction machinery such as trucks, bulldozers, and cranes which run on fuel oil. The operation and maintenance of the harbor will require primarily electrical energy sources. Specific amount of energy required for the above purposes are not known at this time (conceptual planning stage).

Q: To what extent will recreational opportunities be curtailed or enhanced?

R: Because public access to the coastal region will be greatly increased with the opening of the harbor, recreational opportunities such as fishing will be enhanced.

Q: What is the estimated value of destroying live coral which would offset the economic resale value of the dredged material?

R: It is difficult to assess the value of live coral because it provides intangible benefits as well as tangible benefits. These intangible benefits include visual and recreational enjoyments when diving and fishing.

As pointed out previously, the direct long-term effect of the proposed harbor on the marine environment outside of the mouth of the harbor is not expected to be significant. There will be destruction of the marine substrate in the channel. Also, dredging in
the open seas will generate some turbidity and sediment in the immediate area of the dredge although most of the material should be taken up by the suction equipment of the hydraulic cutterhead dredge and piped to shore. Along with the use of this dredge and other actions described in Section III of the EIS, the impact on any coral adjacent to the dredged portion of the channel will be minimized.

Upon completion, the EIS will be filed with the Environmental Quality Commission for the 30-day public review period. At that time, we will again appreciate your review and comments in regard to this document.

Very truly yours,

E. ALVEY WRIGHT
Director

Attachment
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* Tippetts-Abbett-McCarthy-Stratton; Plan for Barbers Point Harbor Facilities and Expansion of James Campbell Industrial Park (draft), March 1977.
May 13, 1977

Mr. L. C. Fruto
Sunn, Low, Tom and Hara, Inc.
190 S. King Street, Suite 600
Honolulu, Hawaii 96813

Dear Mr. Fruto:

Subject: Environmental Impact Statement for the Proposed Barbers Point Harbor Job H. C. 1315B
(Referenced DOT Letter WT-EP 4713 Dated May 10, 1977)

The EIS for the proposed project should discuss the needs of infrastructure facilities and services which are under our jurisdiction. Those include the collection and treatment of wastewater, flood control, drainage, and collection and disposal of solid wastes.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer
Mr. Wallace Miyahira  
Director and Chief Engineer  
Department of Public Works  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Subject: Barbers Point Harbor EIS

This is in response to the concerns expressed in your letter of May 13, 1977, regarding the EIS for the proposed Barbers Point Harbor.

These concerns will be addressed fully in the EIS, which will be available for public review upon completion. The responses to your questions are as follows:

Q: How will the wastewater be collected and treated?

A: Harbor wastewater, which will primarily consist of domestic, shipboard, and livestock washdown, will be collected and treated on an interim basis either by an oxidation pond system or an oxidation ditch or a small package plant. The treated effluent will be disposed in an injection well system. The collection system will ultimately connect to the proposed regional system for the industrial park.

Q: How will the solid waste be collected and disposed?

A: All solid waste generated by either the State or the users of the harbor facilities will be collected by the State or commercial haulers and disposed of in the City-operated incinerators or dumps.
Q: How will drainage and flood control be handled?

A: An underground drainage system in the harbor will be installed and drained into the harbor basin.

Thank you for your interest in this project.

Very truly yours,

E. Alvey Wright
Director
May 13, 1977

Sunn Low, Tom & Hara
190 S. King Street, Suite 600
Honolulu, Hawaii 96813

Attention Mr. L. C. Fruto

Gentlemen:

Subject: Environmental Impact Statement for the Proposed Barbers Point Harbor, Job H.C. 1315B

Reference is made to State of Hawaii, Department of Transportation, Harbors Division’s letter WT-EP 4713, dated May 10, 1977, regarding the subject EIS.

We have no comment at the present time.

Sincerely,

TYRONE T. KUSAO
Acting Director

cc: Department of Transportation
    Harbors Division
Mr. Tyrone T. Kusao  
Acting Director  
Department of Housing &  
Community Development  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii  96813

Dear Mr. Kusao:

Subject: Barbers Point Harbor EIS

This is in response to your letter of May 13, 1977 regarding the EIS for the proposed Barbers Point Harbor.

Thank you for your interest and prompt reply. The EIS will be available for public review upon completion.

Very truly yours,

E. ALVEY WRIGHT  
Director
May 17, 1977

Mr. David K. Higa, Acting Chief
Water Transportation
Facilities Division
79 So. Nimitz Highway
Honolulu, Hawaii 96813

Dear Mr. Higa:

Environmental Impact Statement for
the Proposed Barbers Point Harbor
Job H. C. 1315B

We have reviewed the proposed construction of a deep harbor at Barbers Point Harbor, especially those areas that will concern the State of Hawaii.

Although there will be an increase in traffic and other calls for service, we do not anticipate any immediate need for additional police officers for the near future.

Very truly yours,

FRANCIS KEALA
Chief of Police
Mr. Francis Keala  
Chief of Police  
Honolulu Police Department  
City and County of Honolulu  
1455 South Beretania Street  
Honolulu, Hawaii 96814

Dear Mr. Keala:

Subject: Barbers Point Harbor EIS

This is in response to your letter of May 17, 1977 regarding the EIS for the proposed Barbers Point Harbor.

Thank you for your interest and prompt reply. The EIS will be available for public review upon completion.

Very truly yours,

E. Alvey Wright  
Director
May 19, 1977

Sunn, Low, Tom & Hara
190 South King Street, Suite 600
Honolulu, Hawaii 96813

ATTENTION: Mr. L.C. Fruto

Gentlemen:

Environmental Impact Statement for the Proposed Barbers Point Harbor

This is in response to a letter from the Department of Transportation, Harbors Division, informing us that an Environmental Impact Statement is being prepared under Chapter 343 for the subject project.

We are, of course, interested in the project. The harbor is a major facility and certainly it will affect the zoning and land use pattern within the area. We are also charged with the enforcement of the Interim Shoreline Protection Ordinance and the project will require a Shoreline Management Permit prior to construction.

We have no specific concerns for the project at this time. However, we appreciate being considered a consulted party on the Environmental Impact Statement and look forward to reviewing the document.

Should you have any questions, please contact Mr. Carl Smith of our staff at 523-4077.

Very truly yours,

GEORGE S. MORIGUCHI
Director of Land Utilization

GSM:ey
Mr. George S. Moriguchi, Director  
Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813  

Dear Mr. Moriguchi:  

Subject: Barbers Point Harbor EIS  

This is in response to your letter of May 19, 1977 regarding the EIS for the proposed Barbers Point Harbor.  

Thank you for your interest and prompt reply. We have addressed zoning, land use and Special Management Area regulations in Section IV of the EIS: "Relationship of the Proposed Action to Land-use Plans, Policies and Controls for the Affected Area", pp. IV-1 to IV-11. The EIS will be available for public review upon completion.  

Very truly yours,  

E. ALVEY WRIGHT  
Director
May 23, 1977

Mr. David K. Higa, Acting Chief
Water Transportation
Facilities Division
Harbors Division
Department of Transportation
State of Hawaii
79 So. Nimitz Highway
Honolulu, Hawaii 96813

Dear Mr. Higa:

Subject: Your Letter WT-EP 4713 of May 10, 1977
Relating to Environmental Impact Statement
for the Proposed Barbers Point Harbor
Job R. C. 1315B

We recommend that the following items be addressed in the subject environmental impact statement:

1. The ultimate master plan for the harbor,
2. The harbor's estimated water demand,
3. The project's estimated water demand, and
4. The harbor's source of water supply.

In addition, we request that a water master plan, including the harbor's projected water demands, and any construction plans be submitted to us for review and approval.

Our department contact is Lawrence Whang at 548-5221.

Very truly yours,

[Signature]
Edward Y. Hirata
Manager and Chief Engineer

cc: Mr. L. C. Fruto
Sunn, Low, Tom & Hara, Inc.
Mr. Edward Y. Hirata  
Manager and Chief Engineer  
Board of Water Supply  
City and County of Honolulu  
P. O. Box 3410  
Honolulu, Hawaii 96843  

Dear Mr. Hirata:

Subject: Barbers Point Harbor EIS  

This is in response to the concerns expressed in your letter of May 23, 1977, regarding the EIS for the proposed Barbers Point Harbor. These concerns will be addressed fully in the EIS which will be available for public review upon completion. The responses to your questions are as follows:

Q: What is the ultimate master plan for the harbor?  
R: The ultimate water master plan for domestic consumption and fire protection will be developed during the design phase.

Q: What will be the harbor’s estimated water demand and source of water supply?  
R: An estimated average daily consumption of 60,000 gallons will be needed for Phase I development (until 1990). The initial water service for the harbor will be from the existing 20-inch water main located on Kalaeloa Boulevard.

In our meeting of June 13, 1977, you indicated that there will be no problem in supplying the daily requirement of 60,000 gallons per day since this quantity is relatively small. However, there will be some difficulty in supplying the amount of water needed for fire protection since there are no adequate
storage facilities in the Ewa Plain. In this regard, various schemes of using salt water for fire protection will be investigated during the design stages of the project.

Thank you for your interest in this project.

Very truly yours,

E. ALVEY WRIGHT
Director
June 1, 1977

Mr. L. C. Fruto  
Sunn, Low, Tom & Hara  
190 S. King Street  
Suite 600  
Honolulu, Hawaii 96813

Dear Mr. Fruto:

Subject: Environmental Impact Statement for the Proposed Barbers Point Harbor Job H. C. 1315B

We received a letter from the Department of Transportation, Harbors Division, regarding the above subject matter wherein they requested that we submit our comments directly to you.

Our concern regarding this project is fire protection within the harbor complex. Presently, we do have a fireboat which is stationed at Pier 15 in Honolulu and will be available to respond when the need arises. However, we feel that some arrangements should be made with the Navy to serve the port facilities from Pearl Harbor.

Our capital improvement program calls for a new fire station in the Campbell Industrial Park. Presently, it is being projected for Fiscal Year 1980 at a total cost of approximately $1,045,000. When completed, it will house an engine company and an aerial ladder company with 33 firefighting personnel at an annual operating cost of approximately $600,000.

Should you require further information, please contact Assistant Chief Stanley W. C. Tom at 955-8304.

Very truly yours,

ANTHONY J. LOPEZ  
Acting Fire Chief

cc: Harbors Division, DOT
July 12, 1977

Mr. Anthony S. Lopez
Acting Fire Chief
Honolulu Fire Department
City and County of Honolulu
1455 South Beretania Street
Honolulu, Hawaii 96814

Dear Mr. Lopez:

Subject: Barbers Point Harbor EIS

This is in response to your letter of June 1, 1977, regarding the EIS for the proposed Barbers Point Harbor.

Thank you for your interest and prompt reply. Your response in regard to the construction of a new fire station in the Campbell Industrial Park in fiscal year 1980 will be mentioned in the EIS for subject project. The EIS will be available for public review when it is completed.

Very truly yours,

E. ALVEY WRIGHT
Director
June 2, 1977

Mr. David K. Higa, Acting Chief
Water Transportation Facilities Division
Department of Transportation
79 So. Nimitz Highway
Honolulu, Hawaii 96813

Dear Mr. Higa:

Subject: Environmental Impact Statement for the Proposed Barbers Point Harbor Job H.C. 1315B
(Ref: WT-EP 4713)

We are concerned about the adequacy of the proposed accesses to and from the proposed Barbers Point Harbor development. Please keep us apprised of your development plans for the street system that will service the harbor.

Very truly yours,

Kazu Hayashida
Director
Mr. Kazu Hayashida, Director  
Department of Transportation  
Services  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813  

Dear Mr. Hayashida:  

Subject: Barbers Point Harbor EIS  

This is in response to the concerns expressed in your letter of June 2, 1977, regarding the EIS for the proposed Barbers Point Harbor.  

These concerns will be addressed fully in the EIS, which will be available for public review upon completion. The response to your questions is as follows:  

Q: How will access be provided for the harbor?  
R: Consideration is being made by the Department of Transportation to include the permanent access road to the harbor in either the State or Federal aid highway system. In the meantime, a tentative access road to the harbor will be via Kalaeloa Boulevard and Malakole Road.  

Thank you for your interest in this project.  

Very truly yours,  

E. ALVEY WRIGHT  
Director
May 2, 1977

Mr. Dan Tanaka  
Water Transportation Facilities Division  
Department of Transportation  
869 Punchbowl Street  
Honolulu, Hawaii 96813

Dear Mr. Tanaka:

Pursuant to the EIS Regulations promulgated by the State Environmental Quality Commission, the American Lung Association of Hawaii hereby requests "consulted party" status in the preparation of the environmental impact statement for the proposed Barbers Point Harbor, Barbers Point, Oahu. Our principal interest is the potential impact, both direct and indirect, on air quality in the project area. In addition to the EIS Preparation Notice required by the regulations, we would appreciate receiving any other details regarding the proposed harbor facility.

Sincerely yours,

James W. Morrow, Director  
Environmental Health

cc: Dr. Richard E. Marland

Christmas Seals Fight TB, Asthma, Emphysema, Air Pollution
July 12, 1977

Mr. James W. Morrow, Director
Environmental Health
American Lung Association
245 North Kukui Street
Honolulu, Hawaii 96817

Dear Mr. Morrow:

Subject: Barbers Point Harbor EIS

This is in response to the concerns expressed in your letter of May 2, 1977, regarding the EIS for the proposed Barbers Point Harbor.

Thank you for your comments and suggestions. The direct impacts which include pollution due to ship emissions and street traffic from the harbor and the Industrial Park are discussed on pages III-22 to III-31 of the EIS. In addition to the planned facilities, other industries and residential developments that may locate in the vicinity may also have potential air quality impacts. However, estimates for air pollution for these projected developments are difficult to quantify until detailed plans are available. The secondary physical and social impacts are presented on pages III-58 to III-60.

Upon completion, the EIS will be filed with the Environmental Quality Commission for the 30-day public review period. At that time, we will again appreciate your review and comments in regard to this document.

Very truly yours,

E. ALVEY WRIGHT
Director
May 5, 1977

Mr. Dan Tanaka
Water Transportation Facilities Division
State Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Tanaka:

The Shoreline Protection Alliance would like to be a consulted party on the Barbers Point Harbor EIS.

As you might be aware, the existing Barbers Point barge harbor entrance channel is aligned and cut in such a way as to form surfing sites. This was entirely accidental. However, as a result of the Surf Parameters Program conducted by the Look Laboratory and the UH Ocean Engineering Department, it now is possible to intentionally create surfing sites.

The Shoreline Protection Alliance would like the Barbers Point Harbor entrance channel intentionally designed so as to create new surfing sites to replace the existing surfing sites which will be destroyed by construction of the deep draft harbor. If it is not feasible to do so, then we want new artificial surfing sites built at some other location on the West Shore of Oahu.

Hawaii's new Coastal Zone Management (CZH) law, HB 122 HD1 SD2, which soon will be signed by the Governor, requires "...replacement of coastal resources having significant recreational value, including but not limited to surfing sites and sandy beaches, when such resources will be unavoidably damaged by development...." We believe that the existing surfing sites at the Barbers Point entrance channel have significant recreational value. Unlike the North Shore, it is very feasible to construct an artificial surfing site on Oahu's West Shore.

We strongly recommend that the DOT Barbers Point Harbor EIS specifically address whether the Barbers Point Harbor entrance channel will be designed to create new surfing sites or whether the DOT will instead develop new artificial surfing sites at some other location. If your EIS indicates the former alternative, then we recommend a detailed discussion of how the design of the deep draft harbor entrance channel will compare to the requirements for surfing site bathymetry developed by the Surf Parameters Program.

Respectfully,

Douglas Heller
Secretary

cc: Jack Schweigert
Mr. Douglas Meller  
Shoreline Protection Alliance  
P. O. Box 4247  
Honolulu, Hawaii 96813  

Dear Mr. Meller:  

Subject: Barbers Point Harbor EIS  

This is in response to the concerns expressed in your letter of May 5, 1977, regarding the EIS for the proposed Barbers Point Harbor.  

Thank you for your comments and suggestions. All of the points you discussed have been or are being considered in the preparation of the EIS.  

Upon completion, the EIS will be filed with the Environmental Quality Commission for the 30-day public review period. At that time, we will again appreciate your review and comments in regard to this document.  

Very truly yours,  

E. ALVEY WRIGHT  
Director
June 2, 1977

Sunn, Low, Tom & Hara, Inc.
190 South King Street, Suite 600
Honolulu, Hawaii 96813

Attention: Mr. L. C. Fruto

Dear Mr. Fruto:

Subject: Environmental Impact Statement for
the Proposed Barbers Point Harbor
Job H. C. 1315B

Gasco, Inc., one of our subsidiaries, uses the present small-boat harbor for lifting liquid petroleum gas (LPG) from Standard Oil's refinery. We request that LPG barge loading operations be allowed to be continued during all construction phases of the harbor. This access is necessary to permit the movement of propane to the outer islands where only minimal storage is maintained. We also request that easements and berths be provided for barge receipts of LPG from the refineries in the Industrial Park. We would prefer the continued use of the small-boat harbor for receiving LPG.

We would also like to have the operation of a petroleum berth with pipeline easements to both refineries in the Industrial Park discussed in the environmental impact statement. We would especially like to have discussed the difficulties of containment of a minor oil spill from a tanker in the petroleum berth.

Sincerely,

Charles D. Hartman
Director of Government Affairs

CDH:FTT:si
July 12, 1977

Mr. Charles D. Hartman
Director of Government Affairs
Pacific Resources, Inc.
P. O. Box 3379
Honolulu, Hawaii 96842

Dear Mr. Hartman:

Subject: Barbers Point Harbor EIS

This is in response to the concerns expressed in your letter of June 2, 1977, regarding the EIS for the proposed Barbers Point Harbor. A copy of your letter expressing your concern of maintaining LPG barge loading during all construction phases of the harbor has been forwarded to the Corps of Engineers for their consideration during the design and construction phases of the project.

The operation of a petroleum berth with pipeline easements to the refineries and containment of minor oil spills will be discussed with you more fully during the design phases of the harbor facilities.

Very truly yours,

E. ALVEY WRIGHT
Director
Sunn, Low, Tom & Hara  
190 S. King St., Suite 600  
Honolulu, Hawaii 96813

Attention: Mr. L. C. Fruto  

Dear Mr. Fruto:  

Subject: EIS for Barbers Point Harbor

In response to the Department of Transportation's request of May 10, 1977, the following are the comments of the Hawaiian Electric Company with reference to subject project.

Under current planning HECO will continue to add generation at its Kahe Generating Station and major transmission lines out of Kahe well past the turn of the century as Kahe is the only generating site currently available to HECO on which additional steam generation can be developed. The point here is that the Kahe Power Plant is an ongoing industrial operation and will remain so for many years to come.

The proposed Harbor Development is interposed directly between Kahe and its source of fuel at the Standard Oil Refinery. With the uncertain fuel situation facing us, it is not known what type of fuel will be available for use at Kahe so it is imperative that provision be made for an energy corridor between the Kahe Power Plant and the Harbor and Refinery Development in the Industrial Park. The minimum requirement would be to accommodate the existing pipeline and perhaps one or two more. However, since the type of fuel we may be required to use in the future is unknown, provision should also be made now for the worst case which would probably be the surface transport of coal -- more than likely by conveyor or rail. We would suggest a minimum of 40 feet right of way be provided which, with suitable setbacks to install landscaping for screening, would allow the construction of an energy transport system through the area with minimum impact. The planning for such
an energy corridor should begin now with the Campbell Estate, HECO and other interested City and State planners participating.

Should coal become the type of fuel we will be burning in the future at Kahe, the State's harbor facilities should also provide for the off-loading of coal and movement to an appropriate storage site, either within the confines of the harbor area or at a locale in the Campbell Estate Industrial Park. We currently estimate that an area approaching about 83 acres of land would be required for this purpose to insure an adequate operating and safety level of fuel on the island.

There is also the question of providing electrical transmission and distribution facilities to serve electrical load growth in the area. Existing and planned facilities are only adequate for limited growth. Changing land use designations such as is proposed will change the load and load growth patterns for the area and undoubtedly will require additional transmission and distribution facilities. Provisions and allowances for these should also be incorporated into the development plans. Possibly, with proper planning, some of these requirements could be combined in the energy corridor outlined above. When more definitive State plans become available, we will be better able to scope the HECO facilities (additional Substations and Transmission-Lines) that will be required to serve the harbor facilities and adjacent areas.

Sincerely yours,

[Signature]

REB: cm
Mr. Richard Bell, Manager  
Environmental Department  
Hawaiian Electric Company  
P. O. Box 2750  
Honolulu, Hawaii 96803.

Dear Mr. Bell:

Subject: Barbers Point Harbor EIS

This is in response to the concerns expressed in your letter of June 6, 1977, regarding the EIS for the proposed Barbers Point Harbor.

We are referring your request for the continuation of the use of the existing barge harbor to the Corps of Engineers for their consideration during the construction stages of the harbor.

Your other requests regarding the berthing spaces, oil line easements, etc., will be considered during the final planning and design of the harbor facilities.

Very truly yours,

E. ALVEY WRIGHT  
Director
June 14, 1977

Mr. L. C. Fruto
Sunn, Low, Tom & Hara
190 South King Street, Suite 600
Honolulu, HI 96813

Dear Mr. Fruto:

This replies to the Harbors Division Letter of 10 May 1977, which requests comments on the deep-draft harbor at Barbers Point, Oahu. An environmental impact statement (EIS) is currently under preparation by your firm, and it is to this document that these comments are being addressed, specifically, to the construction phase dealing with petroleum terminal berths.

Hawaiian Independent Refinery, Inc., (HIRI) operates a refinery in the Campbell Industrial Park, soon to be operating at about 67,500 barrels per day. In addition, the company operates a crude oil and product marine terminal, a 25-mile pipeline to Honolulu, and a tanker barge (Barge 255), which also discharges and receives products in the Campbell Industrial Park Barge Harbor. Barge 255 moves HIRI and other petroleum distribution companies' products to Honolulu Harbor and to the neighbor islands.

The Barge Harbor provides an additional means of transferring petroleum products to and from the petroleum industry complex in Campbell Industrial Park, which in addition to the HIRI refinery and marine terminal, comprises of the following:

- Chevron USA refinery, offshore terminal and the Barge Harbor
- Texaco, Inc., fuel storage and pipelines to the Barge Harbor
- Time Oil fuel storage and transfer facilities at the Barge Harbor
- Gasco, Inc., liquid gas loading facilities at the Barge Harbor
- Enerco SNG plant in the Foreign Trade Zone
- Powerine, Inc., fuel storage facility

In that the Barge Harbor will be eliminated by the construction of the deepwater port, it is properly expected that the petroleum handling facilities currently under full utilization at this harbor will be included in the planning and design of the deepwater port petroleum terminal berths. Moreover, attention
should be given in the EIS to the environmental and economic benefits derived from expanding these petroleum terminal berths to include facilities for product tankers and bunkering currently provided at the offshore terminals of HIRI and Chevron USA.

Therefore, the following should be given appropriate consideration as to their economic and environmental benefits in the preparation of the state of Hawaii EIS:

(a) The HIRI and Chevron marine terminals are operational less than 75% in a given year, due primarily to Kona storms and unfavorable seastate conditions. This situation leads to tanker demurrage charges which increase operating costs and, subsequently, petroleum prices in Hawaii.

(b) Despite strictly enforced preventive measures and practices, the risk of oil spills at the marine terminals are higher than at harbor facilities where firm docking and transfer equipment is available. The deepwater harbor would greatly reduce these risks by reducing the number of product tankers in the offshore moorings.

(c) The present estimated 110,000 barrels per day of petroleum consumed in Hawaii is forecasted to increase to 513,000 barrels per day by 2030* with proportionately larger increases in the neighbor islands. Therefore, it can be anticipated that there will be required expansion in all marine terminaling and petroleum storage facilities in the Campbell Industrial Park complex to accommodate this growth. The proposed petroleum terminal berths of the deepwater harbor will reduce this required expansion of the terminals and storage by providing product tanker and barge facilities.

(d) The expanded petroleum terminal berths can also provide needed jobs to Waianae coast residents. Oahu has a projected rate of growth of 2% annually with an estimated 6,000 new jobs annually to meet the needs of its growing labor force.

(e) Throughput charges incurred by State pipeline tolls and wharfage fees will accrue to the benefit of the State, as these added petroleum movements develop increased revenue.

Thank you for this opportunity to submit comments for possible inclusion in the State EIS for the deepwater harbor.

Sincerely,

William F. Murdy
Vice President

*U.S. Corps of Engineers Petroleum Demand Parameters Study.

cc: Mr. David K. Higa, Acting Chief
Water Transportation Facilities Division
Department of Transportation
Mr. William F. Murdy  
Vice President  
Hawaiian Independent Refinery, Inc.  
1060 Bishop Street  
Honolulu, Hawaii 96813

Dear Mr. Murdy:

Subject: Barbers Point Harbor EIS

This is in response to your letter of June 14, 1977, regarding the EIS for the proposed Barbers Point Harbor.

Thank you for your interest and background information which expressed your needs for a petroleum berth. The petroleum berth is now being considered in the preparation of the master plan for subject harbor.

Very truly yours,

E. ALVEY WRIGHT  
Director
Office of Environmental Quality Control
550 Kakaako Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

Staff review of the Environmental Impact Statement for the Barbers Point Deep-Draft Harbor on Oahu has been completed and the Coast Guard has no objections to any portions of the project as described therein.

Facilities which make up various parts of the new harbor complex will be subject to Coast Guard pollution prevention regulations and other requirements for handling dangerous cargos: 33 CFR 154-156 and 126. Compliance is mandatory if the facilities are to receive general permits under these regulations. The Coast Guard Captain of the Port, Honolulu will enforce these regulations for the safety of the port and is available for any assistance both during and after construction of these facilities.

The opportunity to review and comment on the Draft EIS is appreciated.

Sincerely,

Copy to:
COTP Honolulu
DCT, State of Hawaii
Lieutenant Michael W. Masterbrook  
Coast Guard Marine Safety Division  
U.S. Department of Transportation  
Room 9141  
Honolulu, Hawaii  96813  

Dear Sir:  

Subject: Response to Draft EIS  
Barbers Point Harbor  
Job H. C. 1315  

We wish to thank you very much for your review of subject EIS.  

We will consult with you during the design stage of the shore facilities in order to comply with your rules and regulations concerning pollution prevention and other requirements for handling dangerous cargo.  

Very truly yours,  

R. HIGASHIONNA, Ph.D.  
Acting Director
MEMORANDUM

TO: E. Alvey Wright, Director Department of Transportation

FROM: Richard E. Marland, Director Office of Environmental Quality Control

SUBJECT: Environmental Impact Statement for Barbers Point, Barbers Point, Oahu

The Environmental Quality Commission has transmitted a comment from the U.S. Fish and Wildlife Service dated November 28, 1977 on the above subject. We are forwarding a copy of this comment for your appropriate attention.

Your cooperation in this matter is greatly appreciated.

attachment
United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
300 Ala Moana Blvd., Rm. 5302
P. O. Box 50167
Honolulu, Hawaii 96850

Reference: ES

November 28, 1977

Environmental Quality Commission
550 Halekauwila Street, Rm. 301
Honolulu, Hawaii 96813

Re: Draft Environmental Impact Statement
Barbers Point Deep
Draft Harbor, Ewa Plain, Oahu, Hawaii
State of Hawaii,
Department of Transportation

Dear Sir:

We have reviewed the referenced document, dated 4 October 1977 concerning construction of the Barbers Point Deep Draft Harbor and Harbor Facilities. We have commented on the Environmental Impact Statement prepared by the U.S. Army Corps of Engineers for harbor construction. Therefore, although this project was recapped in the referenced statement, the following comments primarily address construction, operation and maintenance of the proposed harbor-side facilities.

Two proposed endangered plants, Achyranthes splendens var. rotundata Hbd. and Euphorbia skottsbergii var. kalaeloana Sherff, will be affected by construction of the shoreside facilities. Provisions for their transplanting and propagation have been included in this document. Efforts to do so should begin prior to disturbance of their habitat to insure adequate lead time for the development of successful methods. This is especially critical in the case of Euphorbia skottsbergii var. kalaeloana Sherff since this plant appears to be very restricted in distribution, i.e.

Save Energy and You Serve America!
the only known population is found within the proposed project area. Achyranthes is found at Kaena Point also.

On page II-23, two organisms are given special attention, but with no explanation as to why they deserve this consideration. *Triops longicaudatus*, a primitive (branchipod) crustacean, is found in temporary ponds. Large populations suddenly appear and, often just as suddenly, disappear.

The presence of *Halocaridina rubra*, a species of shrimp, is indicative of a habitat type nationally unique to Hawaii i.e. anchialine pools. These waterbodies are connected subterraneanly with the sea and are characteristically brackish. Such pool systems are generally associated with islands of recent volcanic origin. Other organisms, usually more cryptic than *Halocaridina*, and similarly unique, are found in the anchialine pool ecosystem. Since they are secretive, an inclusive population survey is virtually impossible.

Anchialine pool systems have been found in the southwestern corner of Maui and in the Kapoho and Kona coastal areas of the Big Island. State purchase and establishment of the Ahihi-Kinau Natural Reserve Area on Maui will help preserve this anchialine pool ecosystems. Present alteration of the Kapoho pools and anticipated resort development along the Kona coast could mean the eventual destruction of a significant amount of the anchialine pool habitat in these areas. Since they are often linked by underground connections, the alteration of a single pool by filling, pollution or introduction of predatory species often portends adverse impacts on the biota of several others.

On page VIII-1 - Mitigative measures to be used during harbor and shoreside facility construction are very broadly outlined. Measures to be instituted during and after shoreside facility development are not adequately addressed in the Environmental Impact Statement. Although the leeward coast is not subject to frequent heavy rainfall, provisions should be made to reduce the potential for sedimentation of the harbor and offshore marine environment during construction of these facilities. Sediment traps, revegetation, as appropriate, and other sediment reduction measures should be utilized.

In addition, there is a potential for accidental spillage of
pollutants on land, which could have an adverse effect on water quality and marine biota both within and outside of the proposed harbor. Provisions have been suggested to take care of such problems within the harbor area. However, they do not appear to have been considered for on-land accidents. If, for example, an oil spill occurs at or near the storage facility would it enter the harbor or offshore area via the storm drain system or could it somehow be contained and eliminated on land? This impact should be addressed in the final environmental impact statement and provisions to take care of accidental pollutant spillage incorporated in the project design.

Thank you for the opportunity to comment on the proposed project.

Sincerely yours,

Maurice H. Taylor
Field Supervisor

cc: HA
    NMFS
    HDF&G
Mr. Maurice H. Taylor  
Field Supervisor  
Division of Ecological Services  
Fish and Wildlife Service  
300 Ala Moana Boulevard, Room 5302  
Honolulu, Hawaii 96850

Dear Mr. Taylor:

Subject: Response to Draft EIS  
Barbers Point Harbor  
Job H. C. 1315

This is in response to your letter of November 28, 1977, regarding the draft EIS for the proposed Barbers Point Harbor.

The endangered Euphorbia skottsbergii var. kalaeloana Sheriff is now being successfully propagated at the Kawahara Nursery in Kaneohe and Campbell Estate is now in the process of developing a program of transplanting the cuttings at selected locations in the Barbers Point area.

No attempts have yet been made to propagate the Achyranthes splendens var. rotunda Hdb. but this will also be done.  
Ms. Carolyn Corn, Botanist of the State Department of Natural Resources, reported that she found that three percent of the seeds she had planted germinated. This is very encouraging.

We wish to thank you for the information concerning the Triops longicaudatus and the Holocaridina rubra. They were mentioned in the EIS as part of the biological survey.

The construction of the harbor will involve two distinct and separate actions that may pollute the surrounding waters. The first part of the construction will be the dredging operations and stockpiling of the dredge materials. The mitigation measures which are briefly described will be supplemented by detailed engineering analyses so that the sedimentation basins would function properly before the dredging effluent is discharged into the sea. Also, dredging operations would be suspended during rough weather.
The second part of the construction would consist of the driving of precast concrete piles, form work for the pile caps and placement of precast concrete T-beams for the berthing spaces and wharves. The areas outside of the wharves will have a drainage system and paved with asphaltic concrete. The construction specifications will state that extreme care will be observed during the construction and disallows any dumping of debris or material into the water.

The Water Transportation Facilities Division of the Department of Transportation will operate and maintain the shore facilities. The rules and regulations of the Division requires that "good housekeeping procedures" such as removal of spillages, refuse, and sweeping be performed by the ships’ operators. The Division is also equipped with mechanical sweepers and trucks for the removal of debris and refuse incident to the loading and unloading of ships.

The United States Coast Guard has specific responsibilities regarding water pollution. It has specific rules and regulations concerning small discharge containment, discharge removal and discharge containment equipment as described in Volume 37, Number 246, Part II of the Federal Register. The operation of the harbor is subject to Coast Guard inspection and its statement in this regard follows:

"Staff review of the Environmental Impact Statement for the Barbers Point Deep-Draft Harbor on Oahu has been completed and the Coast Guard has no objections to any portions of the project as described herein.

Facilities which make up various parts of the new harbor complex will be subject to Coast Guard pollution prevention regulations and other requirements for handling dangerous cargos: 33 CFR 154-156 and 126. Compliance is mandatory if the facilities are to receive general permits under these regulations. The Coast Guard Captain of the Port, Honolulu will enforce these regulations for the safety of the port and is available for any assistance both during and after construction of these facilities."
Mr. Maurice H. Taylor  
Page 3  
January 24, 1978

We are complying to these regulations in our other harbors, and we intend to comply with all of the Coast Guard Rules and will seek its assistance both during and after the construction of the harbor and the shore facilities.

Very truly yours,

R. Higashionna
R. HIGASHIONNA, Ph.D.
Acting Director
Dear Dr. Marland:

Draft Environmental Impact Statement (DEIS)
Barbers Point Deep-Draft Harbor on Oahu

The subject DEIS, which was forwarded by your transmittal (undated), was received on 12 October 1977 and has been reviewed.

The questions raised in the COMFOURTEEN letter serial 1064 of 31 May 1977 appear to have been answered satisfactorily by the State Department of Transportation letter of July 12, 1977, both of which appear in the Appendix of the DEIS.

The concern expressed for compatibility of this project with the Air Installations Compatible Use Zone (AICUZ) for Barbers Point Naval Air Station is reaffirmed. It is important that any industrial developments in the vicinity of this Station take the existing AICUZ into account.

Thank you for the opportunity to review this document.

Sincerely,

FRED W. DEW
LT, CEC, USA
Deputy District Civil Engineer
By direction of the Commandant

Copy to:
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813
Lt. Fred W. Dew, CEC, USN  
Deputy District Civil Engineer  
Headquarters, Fourteenth Naval District  
Box 110  
Pearl Harbor, Hawaii 96860

Dear Sir:

Subject: Response to Draft EIS, Barbers Point Harbor

We wish to thank you very much for your letter of November 18, 1977, and your favorable review of the subject Draft EIS.

Very truly yours,

R. HIGASHIONNA, Ph.D.  
Acting Director
Department of Transportation  
869 Punchbowl Street  
Honolulu, Hawaii 96813

Gentlemen:

Barbers Point Deep-Draft Harbor on Oahu

Thank you for sending us a copy of the "Barbers Point Deep-Draft Harbor on Oahu" Environmental Impact Statement. We have received the publication and have no comments to offer.

Yours truly,

WAYNE R. TOMOYASU  
Captain, CE, HARNG  
Contr & Engr Officer
March 1, 1978

Captain Wayne R. Tomoyasu, CE
HARNG
Department of Defense
Fort Ruger
Honolulu, Hawaii 96816

Dear Sir:

Subject: Response to Draft EIS, Barbers Point Harbor

I wish to thank you for your letter of October 13, 1977, and your response of "no comment" to subject EIS.

Very truly yours,

R. HIGASHIONNA, Ph.D.
Acting Director
DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY SUPPORT COMMAND, HAWAII
FORT SHAFTER, HAWAII 96858

Office of the Governor
State of Hawaii
Environmental Quality Commission
550 Naalehu Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

Thank you for the opportunity to review the inclosed Environmental Impact
Statement for Barbers Point Deep-Draft Harbor on Oahu. A review has been
conducted and there are no comments. The document is returned as requested.

Sincerely,

CARL P. RODOLPH
Colonel, C2
Director of Facilities Engineering

Copy furnished:
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813
March 1, 1978

Colonel Carl P. Rodolph, CE  
Director of Facilities Engineering  
Department of the Army  
Headquarters United States Army  
Support Command, Hawaii  
Fort Shafter, Hawaii 96858

Dear Sir:

Subject: Response to Draft EIS, Barbers Point Harbor

I wish to thank you for your letter of October 19, 1977, and your response of "no comment" to subject EIS.

Very truly yours,

R. HIGASHIONNA, Ph.D.  
Acting Director
DEVELOPMENT OF THE AIR FORCE
HEADQUARTERS 15TH AIR/SPACE WING (PACAF)
HICKAM AIR FORCE BASE, HAWAII 96853

DEEV (Mr. Nakashima, 4491831) 22 NOV 1977

SUBJECT: Draft Environmental Impact Statement (EIS) for Barbers Point Deep-Draft Harbor, Oahu, Hawaii

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

1. This headquarters has reviewed the subject Draft EIS and has no comment to render relative to the proposed project.

2. We greatly appreciate your cooperative efforts in keeping the Air Force apprised of your project and thank you for the opportunity to review the EIS.

ROBERT O. K. CHING
Chief, Engineering, Construction EIS
and Environmental Planning Div
Directorate of Civil Engineering

Cy to: Dept of Transportation wo atch
869 Punchbowl St.
Honolulu, Hawaii 96813
March 1, 1978

Mr. Robert Q. K. Ching
Chief, Engineering, Construction
and Environmental Planning Div.
Headquarters 15th Air Base Wing
(PACAF)
Department of the Air Force
Hickam Air Force Base
Honolulu, Hawaii 96853

Dear Sir:

Subject: Response to Draft EIS, Barbers Point Harbor

I wish to thank you for your letter of November 22, 1977, and your response of "no comment" to subject EIS.

Very truly yours,

[Signature]

R. HIGASHIONNA, Ph.D.
Acting Director
May 5, 1973

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

Dear Colonel Schlapak:

Subject: Response to Your Comments on the State DOT EIS for the Proposed Barbers Point Deep-Draft Harbor

Thank you for your extensive review, dated November 23, 1977, of the subject EIS as well as your explanatory comments regarding the basis of the historical register nomination and the proposed tsunami affects study.

The format of this response letter consists of summary versions of your comments followed by our response.

Comment (1): The "Corps of Engineers Design Memorandum No. 1 - Phase II - Project Design, March 1977" should be used to revise and update the information regarding the Federal project presented in the EIS.

Response: The information in the EIS has been updated using the Phase II design memorandum.

Comment (2): Descriptions, quantities, numbers, etc., are not consistent, and in many instances do not cross-check from one page to the next or from report section to report section.

Response: Care has been taken so that the revised EIS is more self-consistent.

Comment (3): It should be noted that a supplement to the final EIS was issued by the Corps of Engineers in January 1977.
The received CDR includes this information:

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Response:
The two plant species in question continue to be on the proposed list. According to Dr. Harbst it may be more than a year or so before the proposed list is accepted for official endangered status. The EIS has been changed to indicate that the habitat requirements of Achyranthes are less certain than those of Euphorbia but that both species will be propagated elsewhere.

Comment (9):
The basis for the historical register nomination should be clarified.

Response:
As you suggested, the revised EIS includes a clarifying statement to the effect that the importance of the area is in providing information on the habitation pattern and cultural practices and not on the preservation value. It was also noted that the State Historic Preservation Office concur with the change of status of the area to a lower level once the archaeological information has been obtained.

Comment (10):
Suggest greater elaboration on traffic, drainage, water supply and wastewater impacts in the summary portion of the EIS.

Response:
The discussion of the supporting utility requirements of the proposed harbor has been greatly expanded in the summary portion of the EIS.

Comment (11):
Note that during normal trade wind conditions, air emissions would be dispersed out to sea.

Response:
This comment has been included in the revised EIS.

Comment (12):
Suggest including information on the number of acres of land for each land use district category.

Response:
The State Land Use Map for the area shows that 168 acres of the Phase I land requirement of 246 acres is classified as agricultural with the remainder as urban. However, only about two acres of the agricultural area was actually used for sugar cane with the rest being used for quarry purposes or unused because it is poor agricultural land.
Comment (13): Why is stimulation for industrial and residential development necessarily adverse?

Response: This impact was taken out of the "Adverse Environmental Effects" category in the revised EIS.

Comment (14): What about alternative shoreside facilities planning? Alternative harbor plans were completely covered in the Federal EIS.

Response: Some alternative shoreside facilities arrangements are discussed, however, they do not differ significantly in environmental effects, consequently emphasis was placed on alternative harbor plans and locations.

Comment (15): What specifically is being considered regarding landscaping of the coral stockpiles?

Response: The plants that are being considered are the beach morning glory (Ipomoea pes-caprae), beach weed (Arctotheca calendulata), batis (Batis maritima) and/or Australian salt bush (Atriplex semibaccata). These will require watering the first month to get established but should then survive on natural precipitation only.

Comment (16): Note the total number of days per year that the area is characterized by "Kona" winds.

Response: According to the wind rose from the Barbers Point Naval Air Station Kona winds (from SSE to W directions) predominate about 30 days per year.

Comment (17): Note that Williams (1976) provides information additional to Dale (1968) on the hydrology of the harbor area.

Response: Williams' excellent contribution is noted in the revised EIS.
Comment (13): The information on Water Quality Segments and Effluent Limitation Segments is not necessary and can be potentially confused with the water quality standards and conditions of the area. Since no serious water quality problems now exist at the project site, it does not follow that a discussion of segments is warranted.

Response: We believe this discussion is necessary background information since it establishes that in the view of the State Department of Health the coastal waters by the project area presently meet the existing State Water Quality Standards most of the time.

Comment (19): The discussion of the BCI 1975 study should include evaluation of and reference to additional water quality and circulation studies performed by BCI in 1976 for the Corps.

Response: The BCI 1977 study was referenced where appropriate in the revised EIS.

Comment (20): Over what distance will tsunami wave height attenuate "at an estimated rate of 1 percent?"

Response: Until it encounters the ground level.

Comment (21): Reference the vegetational surveys at the site performed by Dr. Herbst (1976).

Response: The survey work by Dr. Herbst (1976) is referenced in the revised EIS.

Comment (22): Show the location of the wintering bird habitat.

Response: The text discussion is referenced to the figure showing the areas where the birds in question were observed.

Comment (23): The Intensive Cultural Survey Report of the Barbers Point area completed by the Bishop Museum for the Corps should be referenced and evaluated. Also, the ongoing Federally-sponsored cultural salvage work on Federal project lands should be mentioned.
Response: The revised EIS includes further discussion of the Bishop Museum work and the Federal participation.

Comment (24): The figure and table of the archaeological sites and survey areas should be referenced.

Response: These items are referenced to the work done by Bishop Museum.

Comment (25): Clarify that sinkholes are natural features and are not of archaeological significance unless utilized in the past. The "cursory" treatment given to these has satisfied Federal requirements and responsibilities regarding cultural resources. Clarify what is meant by "the original proposal".

Response: The sinkholes have been identified as natural formations. The unfortunate wording regarding the previous evaluation of the collapsed walls associated with the sinkholes has been deleted. "The original proposal" has been ascribed to the Archaeological Research Center (ARCh).

Comment (26): It should be explained that the "well" constituting a "rather deep sinkhole" is probably a natural feature which may have been used by the early residents of the area.

Response: The EIS has been revised to reflect this comment.

Comment (27): Reference the source of the information on the archaeological field surveys.

Response: The information noted in the text is from both the Bishop Museum survey and the ARCh survey.

Comment (28): Reference the source and sponsor of the paleontological studies. It should be indicated that salvage operations will enable the fossils to be stored and more easily examined at a later date. Clarify that paleontological resources are natural resources and not cultural resources; therefore, the value of the fossils is not an appropriate criterion for determining eligibility of the area for nomination to historical registers unless past living patterns are associated with the fossils.
Response: The paleontological studies were conducted by Bishop Museum and sponsored by the Corps of Engineers. The EIS has been expanded to reflect this comment.

Comment (29): If possible, cite the cause for the "moderately high" levels of "suspended particulates" in the air quality studies.

Response: Neither the Department of Health study or the Conoco-Dillingham study identified the source of the suspended particulates.

Comment (30): Clarify that "hydraulic cutterhead" dredging was selected because the method minimizes turbidity and sediment generation compared to other dredging techniques.

Response: This comment has been incorporated in the revised EIS.

Comment (31): The Corps' contractor Environmental Consultants, Inc. (ECI) (1976) developed cautious estimates of the residence time, circulation, and phytoplankton dynamics for the proposed harbor. These studies need to be carefully evaluated and referenced, particularly in view of the fact that the State EIS utilized an entirely different approach and came to different conclusions on these characteristics.

Response: The State EIS expanded on the November 1975 and January 1977 ECI reports because the significant factor of wind-induced transport was not fully taken into account in the ECI 1977 calculations although it was definitely observed in the reported field measurements of 1975. Since the predominant wind direction in the project area is aligned with the entrance channel and since wind-induced transport in water bodies (especially shallow areas such as channels) has been observed and well-documented by numerous investigators, an estimate of wind-induced transport was included in the State EIS.
Under the supposition that the maintenance of density stratification is necessary to induce significant exchange between the proposed harbor basin and the ocean, PCI (1977) recommended the installation of a collapsible curtain across the lower portion of the entrance channel as well as the construction of free standing underwater walls along the perimeter of the harbor basin. Besides significant problems with design, construction and interference with harbor operations it is apparent, when the wind transport is taken into account, that such structures are not necessary to achieve good exchange but rather would constitute obstructions to flow. During those times when the trade wind is sufficiently strong to overcome the stratifying density gradient a two-layer wind-induced flow will result which would be at least as effective in providing good exchange as is the density-induced (and trade wind aided) two-layer system. Because the proposed harbor will have proportionally less groundwater flux than the existing harbor it is more likely to be weakly stratified than the existing harbor and the direct wind-induced exchange would constitute the dominant exchange mechanism. The entrance curtain recommended by PCI (1977) would restrict the inflow of new sea water to the harbor and would result in an increase in the residence time of the lower layer. Since neither the construction of an entrance curtain or of underwater walls was considered by either the Corps of Engineers or the State Department of Transportation as a desirable addition to the proposed harbor plan, these structures were not discussed in the State EIS.

The PCI (1977) report made no estimate of phytoplankton dynamics since no time-related factors were considered. Estimates were developed by PCI of maximum chlorophyll-a concentrations based on complete assimilation of all of the
phosphorous in the proposed harbor. The time required for the phytoplankton population to increase in the higher nutrient concentration conditions of the harbor was not considered. Neither were the time-related factors of predation rate and settling rate considered in making the estimates. The interpretation by ECI of their prediction of high chlorophyll-a concentrations drew analogies to South Kaneohe Bay for the best case and to East Loch of Pearl Harbor for the worst case.

In contrast, the State EIS included an estimate of the characteristic chlorophyll-a concentrations in the proposed harbor based on exponential growth with an empirically derived net growth rate constant. The relationship used in making the estimate for the proposed harbor has been observed to apply to Hawaii Kai Marina and Kaneohe Bay. Based on the State EIS estimate, it is expected that the chlorophyll-a concentrations in the proposed harbor will be similar to those of North Kaneohe Bay.

Comment (32): Aside from the fact that the State's evaluation of circulation and productivity was approached differently, the Corps believes the evaluations suffer a number of shortcomings including the following:

Comment (32): a. The discussion of residence time neglects to mention that a dominant driving mechanism is sea-level fluctuations outside the harbor.

Response: The tidal exchange was mentioned and included in every calculation for flux. It was found, however, that the tide is not the principal exchange force. The trade wind-induced exchange was found to dominate for the conditions at the
Response: proposed harbor location.

Comment (12): b. The residence time estimate of 1-3/4 days is substantially underestimated and deserves explanation and comparison to other estimates.

Response: This estimate for the proposed harbor is based on a condition of little or no vertical stratification, an average trade wind and an average tidal exchange. The same assumptions, when applied to the existing harbor, yield a residence time of 11 hours—almost exactly what was measured by BCI. In any case, the more conservative assumption of strong stratification and the same wind flux equation yields an estimated residence time of 3 days which was subsequently used in estimating phytoplankton growth.

Comment (12): c. Stratification within the existing and proposed harbor will probably improve circulation, not restrict it.

Response: Stratification without fortuitously aligned wind stress or a significant hydraulic gradient (such as a river flow or very large ground water flow) does not significantly increase circulation. If it did then Pearl Harbor and Hilo Harbor would both be models of exchange efficiency since they receive ground water discharges that are an order of magnitude greater per unit volume than the proposed harbor. These bodies of water are in fact noted for poor exchange; Pearl Harbor because of its relatively small mouth and cross-wind alignment and Hilo Harbor because of the generally shoreward wind stress which opposes the outward flow of the surface layer in Hilo Bay.

Comment (12): d. The estimates of wind-induced transport appear inappropriate because they were based on a model developed for closed basins with steady circulation.
Response: The model used was developed by Banks (1975) for calculating the average wind-induced upper layer transport and equal counter current in the lower layer of shallow (but not small) lakes. The equations are applicable to the middle of the lake (not the upwind or downwind ends) and to the depth of wind effect penetration (i.e., above any significant density gradient). The equation used in making the calculations for the Barbers Point Harbor was tested (in addition to the ECI data for the existing harbor) against data gathered for a channel in Hawaii Kai Marina. This unstratified channel has a dead and at one extremity and opens to a large body of water at the other. The equation results were found to agree closely with measured values when the wind direction was toward the dead end. When the wind was toward the open end the equation predicted some 15 to 20 percent less exchange than actually occurred. This indicates that the model used in the State EIS is appropriate, or possibly conservative, in estimating the wind-induced exchange through the proposed harbor entrance channel.

Comment (32): a. The model used to estimate biological productivity is overly simple and apparently misinterpreted; many important ecological factors were omitted from consideration.

Response: The model used in the State EIS in estimating a representative chlorophyll-a concentration is one of the net exponential growth for the time the phytoplankton are exposed to the higher nutrient concentration in the harbor. Exponential growth when nutrients are in excess is a widely accepted assumption. The net growth rate constant used was a conservative one measured at Hawaii Kai Marina which has virtually no settling out of planktonic organisms. Although several unknown ecological influences, such as attached filter feeding pressures and differentiation between the upper and lower layers, were not included.
Response:
(cont'd)

the model used can be considered to be a significant expansion on the predictions made by ECI (1977). The ECI (1977) chlorophyll-a levels are simply direct proportions to the estimated phosphorus concentrations; no time-related factors were considered. Applying the ECI (1977) approach to other areas where data is available, such as Kaneohe Bay, shows that this approach grossly overestimates the chlorophyll-a concentrations. It might be noted that although ECI discussed predation pressure and residence time in their report, these factors were not used in their calculations of phytoplankton concentration.

Comment (32): f. The boundary conditions for the circulation model are poorly defined and inaccurate. The net effect of these discrepancies has been to underestimate residence time and circulation and overestimate productivity effects. Although these discrepancies will not significantly change the evaluation of the overall environmental impacts of the project, the Corps nevertheless believes that a thorough and accurate appraisal of these conditions is warranted. We recommend that the evaluations performed by the Corps be given preferential consideration. As a minimum, the existing approach in the State EIS should thoroughly be evaluated with respect to the limiting assumptions and the reliability of the estimates.

Response:

The Marine related impact section of the revised EIS has been expanded to better define and justify the approach taken in estimating the expected exchange rate and characteristic chlorophyll-a concentrations in the proposed harbor. The residence time and chlorophyll-a estimations are believed to be reasonable, and probably conservative, for the reasons already discussed. The field measurements performed by ECI for the Corps were extensively used in the State EIS. However, it was felt to be necessary to expand on the data evaluation performed by ECI in order to adequately include the effect of the wind on the water exchange and the effect of time on the phytoplankton concentration.
**Comment (33):** The ability of the existing barge harbor to act as a "resonator," or tuned cavity, is questionable; particularly in light of the broad bandwidth of possible incident tsunami wave energy and the relatively narrow resonant bandwidth of a fixed size and shape cavity. Numerical analysis of harbor oscillations conducted by the Corps of Engineers indicates that the existing barge harbor will not experience significant resonance effects due to tsunami excitation because its fundamental period of oscillation is far below typical tsunami periods.

**Response:** The SIS has been changed to reflect this comment. Previous calculations were in error because of a faulty assumption regarding the wave period.

**Comment (34):** The numerical analysis of harbor oscillation for the proposed Barbers Point Harbor conducted by the Corps of Engineers indicates a potential for flooding as a result of the response of the harbor to incident tsunami energy. A broad resonant peak of about 13.3 minutes may create a situation wherein the harbor can respond to incident tsunami energy to such an extent that water elevations will rise above the docks and flood adjacent low-lying areas. This problem exists for other bays and harbors in the State. There is no such thing as a "tsunami proof" harbor. There is very little record of historical tsunami periods, hence it is difficult (if not impossible) to predict the frequency of occurrence of tsunami with 10-15 minute periods. However, the probability of occurrence may not be significant since only three incidents of tsunamis have been recorded in the vicinity of Honolulu with periods in the order of 13 minutes and wave heights greater than 1 foot since about 1820.

We suggest that management plans and/or operational procedures be formulated assuming some potential for tsunami flooding. Grading and placement of harbor shoreside facilities should also be done assuming some flood hazard.
The U.S. Corps of Engineers also indicates that the flood damage assessment studies conducted as part of the Corps' flood damage mitigation plans would be more effective if the design changes are incorporated in the revised regulations. It is our understanding that the Corps will conduct a similar study to evaluate the flood damage mitigation plans which can be used by the States in the design and construction of flood protection systems.

Comment (24): The Corps has been expanded on this point as noted in the response to Comment (34).

Response: The Corps has been expanded on this point as noted in the response to Comment (34).

Comment (34): The Corps has been expanded on this point as noted on Comment (24).

Response: The Corps has been expanded on this point as noted on Comment (24).

Comment (37): The State's existing policies on the installation of concrete or other materials on riprap or on the installation of riprap or other materials to stabilize the embankment will also have an impact on the development of the proposed harbor. The State's existing policy is to allow only about two acres of present riprap policies and to require that the riprap be replaced with similar materials. The State has not yet developed policies for the installation of concrete or other materials on riprap or for the installation of riprap or other materials to stabilize the embankment.
Comment (33): The Kaneohe-Kalaelau area is strongly opposed to any deep-draft commercial harbor development in Kaneohe Bay because of possible conflicts with existing land use and cultural life-styles.

Response: This comment has been included in the revised ISS.

Comment (39): Can the ponding area be restored after the stockpile materials are depleted? If so, would this still constitute an unavoidable impact?

Response: A portion of the area presently used by the birds in question will be used for the harbor area, consequently this remains an unavoidable impact.

Comment (40): Suggest mentioning that Pearl Harbor has the potential to support shellfish beds once suitable environmental conditions are restored.

Response: This comment has been included in the revised ISS.

Comment (41): Suggest adding that corals and other invertebrates will settle and colonize hard surfaces of the proposed harbor basin, walls, channel, wave absorbers, and other harbor structures.

Response: This comment has been included in the revised ISS.

Thank you for your comments and we hope that the information provided answers your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

[Signature]

LCF: alc

bc: M&T Pacific, Inc.
DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96856

23 November 1977

Director
Office of Environmental Quality Control
550 Haileakalaua Street, Room 301
Honolulu, Hawaii 96813

Dear Sir:

This is in response to your request for review comments on the Environmental Impact Statement (EIS) for the proposed Barbers Point Deep-Draft Harbor prepared by the State of Hawaii, Department of Transportation.

The Barbers Point Harbor is a joint Federal-State project. Pursuant to Federal regulations, a Final Environmental Statement for the project prepared by the Corps of Engineers was filed with the Council on Environmental Quality on 7 December 1976 and printed in the Federal Register on 27 December 1976.

We have reviewed the EIS prepared by the Department of Transportation and find that, in general, it very adequately addresses the impacts associated with the proposed harbor, particularly the impacts of construction of harbor and shoreside facilities and the secondary impacts associated with the development of a new harbor.

Inclosed are our review comments. We will be happy to meet with the Department of Transportation to discuss these comments at their convenience.

Sincerely,

F. M. PENDER
Colonel, Corps of Engineers
District Engineer

[Incl F. M. PENDER]

As stated

Copy furnished:
Director, Department of
Transportation, State of Hawaii
CORPS OF ENGINEERS
REVIEW COMMENTS

DRAFT ENVIRONMENTAL IMPACT STATEMENT
BARBERS POINT DEEP-DRAFT HARBOR
PREPARED BY STATE OF HAWAII, DOT/TFD

General Comments

1. The Corps of Engineers Design Memorandum No. 1 - Plan Formulation, July 1976, was apparently used as the reference when describing the Federal project. Changes which occurred during the detailed design phase of the planning for the harbor, such as a reduction in the basin size from 94 to 92 acres, are presented in the Corps of Engineers Design Memorandum No. 1 - Phase II - Project Design, March 1977. It is suggested that this report be used to revise and update the information regarding the Federal project presented in the State EIS.

2. Descriptions, quantities, numbers, etc., are not consistent, and in many instances do not cross-check from one page to the next or from report section to report section.

Specific Comments

3. Page 1, Para 2. It should be noted that a supplement to the Final ES was issued by the Corps of Engineers in January 1977 (also pg II-1, para 2).

4. Pg 2, Para 3. The Federal project also includes construction of 4,700 lineal feet of wave absorbers and necessary aids to navigation.

5. Pg 3, Para 1. At the project site the coral aquifer lies peripheral to, and not over, the Waianae Volcanic Series aquifer.

6. Pg 3, Para 2. This paragraph should be rewritten to clearly distinguish between the existing barge harbor conditions and the proposed harbor and open ocean.

7. Pg 5, Para 2. The existing harbor basin has a soft bottom, but the channel area is hard or composed of rubble. The proposed harbor would be expected to have similar bottom characteristics (also pg II-13 and pg II-12).

8. Pg 5, Para 5. Suggest checking with the U.S. Fish & Wildlife Service on the status of the two plant species proposed for the Federal endangered species list. Clarify what is meant by "The status of Achyranthes is less certain. . . ."
9. Pg 6, Para 1; Pg II-24, Para 2; Pg III-16, Para 2; Pg VIII-1, Item 1. It should be clarified throughout the statement that the basis of the Historical Register nomination was the value of the cultural resources to provide information on past habitation of the area and not upon the preservation value of the sites. As a consequence, the status of the resources will change to a lower level once the information has been retrieved through salvage studies. The State Historic Preservation Office and the U.S. Advisory Council on Historic Preservation both concur with the evaluation and the salvage approach to retrieve the information.

10. Pg 6, Para 2. Suggest greater elaboration on traffic, drainage, water supply and wastewater impacts in this section of EIS.

11. Pg 6, Para 3; Pg III-32, Para 2. Note that during normal tradewind conditions, air emissions would be dispersed out to sea.

12. Pg 7, Para 5; Pg IV-1, Para 1. Suggest including information on the number of acres of land for each land use district category.

13. Pg 8, Para 1. Why is stimulation for industrial and residential development necessarily adverse?

14. Pg 8, Para 2. What about alternative shoreside facilities planning? Alternative harbor plans were completely covered in the Federal ES (also Section VI).

15. Pg 9, Para 2. What specifically is being considered regarding landscaping of the coral stockpiles (also pg III-5, 6)?

16. Pg II-2, Para 2. Add the total number of days per year that the area is characterized by "Kona" winds.

17. Pg II-2, Para 5. Williams (1976) provides additional information on the hydrology of the harbor area.

18. Pg II-5, Paras 2 - 3. The information on Water Quality Segments and Effluent Limitation Segments is not necessary and can be potentially confused with the water quality standards and conditions of the area. Since no serious water quality problems now exist at the project site (see EIS page II-8, para 2), it does not follow that a discussion of segments is warranted.

19. Pg II-8, Para 3. The statement should include evaluation of and reference to additional water quality and circulation studies performed by Environmental Consultants, Inc. in 1976 for the Corps.

20. Pg II-13. Over what distance will tsunami wave height attenuate "at an estimated rate of 1 percent"?

21. Pg II-15, Para 2. Reference the vegetational surveys at the site performed by Harbst (1976).
22. Pg II-22, Para 3. Show the location of the wintering bird habitat.

23. Pg II-24, Para 4. The Intensive Cultural Survey Report of the Barbers Point area completed by the Bishop Museum for the Corps should be referenced and evaluated. Also, the ongoing federally sponsored cultural salvage work on Federal project lands should be mentioned.

24. Pp II-26 - 27. Reference the source of the figures or information therein.

25. Pg II-29, Para 1. Clarify that sinkholes are natural features and are not of archaeological significance unless utilized in the past. The "cursory" treatment given to them has satisfied Federal requirements and responsibilities regarding cultural resources. Clarify what is meant by "the original proposal."

26. Pg II-29, Para 2. It should be explained that the "well" constituting a "rather deep sinkhole" is probably a natural feature which may have been used by the early residents of the area.

27. Pg II-30, Para 1. Reference the source of the information on the archaeological field surveys.

28. Pg II-31, Para 2; Pg III-16, Para 2. Reference the source and sponsor of the paleontological studies. It should be indicated that salvage operations will enable the fossils to be stored and more easily examined at a later date. Clarify that paleontological resources are natural resources and not cultural resources; therefore, the value of the fossils is not an appropriate criterion for determining eligibility of the area for nomination to historical registers unless past living patterns are associated with the fossils.

29. Pg II-53, Para 5. If possible, cite the cause for the "moderately high" levels of "suspended particulates."

30. Pg III-1, Para 3. Clarify that "hydraulic cutterhead" dredging was selected because the method minimizes turbidity and sediment generation compared to other dredging techniques.

31. Pg III-7, Para 1; Pg III-8, Paras 3 - 4; Pg III-9, Paras 1 and 3; Pg III-11, Para 2. The Corps contractor Environmental Consultants, Inc. (1976) developed cautious estimates of the residence time, circulation, and phytoplankton dynamics for the proposed harbor. These studies need to be carefully evaluated and referenced, particularly in view of the fact that the State EIS utilized an entirely different approach and came to different conclusions on these characteristics.
32. Pg III-8, Paras 1 - 2. Aside from the fact that the State’s evaluation of circulation and productivity was approached differently, the Corps believes the evaluations suffer a number of shortcomings including the following:

a. The discussion of residence time neglects to mention that a dominant driving mechanism is sea level fluctuations outside the harbor.

b. The residence time estimate of 1 3/4 days is substantially underestimated and deserves explanation and comparison to other estimates.

c. Stratification within the existing and proposed harbor will probably improve circulation, not restrict it.

d. The estimates of wind-induced transport appear inappropriate because they were based on a model developed for closed basins with steady circulation.

e. The model used to estimate biological productivity is overly simple and apparently misinterpreted; many important ecological factors were omitted from consideration.

f. The boundary conditions for the circulation model are poorly defined and inaccurate. The net effect of these discrepancies has been to underestimate residence time and circulation and overestimate productivity effects. Although these discrepancies will not significantly change the evaluation of the overall environmental impacts of the project, the Corps nevertheless believes that a thorough and accurate appraisal of these conditions is warranted. We recommend that the evaluations performed by the Corps be given preferential consideration. As a minimum, the existing approach in the State EIS should thoroughly be evaluated with respect to the limiting assumptions and the reliability of the estimates.

33. Pg III-13, Para 4. The ability of the existing barge harbor to act as a "resonator," or tuned cavity, is questionable; particularly in light of the broad bandwidth of possible incident tsunami wave energy and the relatively narrow resonant bandwidth of a fixed size and shape cavity. Numerical analysis of harbor oscillations conducted by the Corps of Engineers indicates that the existing barge harbor will not experience significant resonance effects due to tsunami excitation because its fundamental period of oscillation is far below typical tsunami periods.

34. Pg III-14, Paras 2 - 3; Pg XIII-1. The numerical analysis of harbor oscillation for the proposed Barbers Point Harbor conducted by the Corps of Engineers indicates a potential for flooding as a result of the response of the harbor to incident tsunami energy. A broad resonant peak of about 13.3 minutes may create a situation wherein the harbor can respond to
incident tsunami energy to such an extent that water elevations will rise above the docks and flood adjacent low-lying areas. This problem exists for other bays and harbors in the State. There is no such thing as a "tsunami proof" harbor. There is very little record of historical tsunami periods, hence it is difficult (if not impossible) to predict the frequency of occurrence of tsunami with 10-15 minute periods. However, the probability of occurrence may not be significant since only three incidents of tsunami have been recorded in the vicinity of Honolulu with periods in the order of 13 minutes and wave heights greater than 1-foot since about 1820.

We suggest that management plans and/or operational procedures be formulated assuming some potential for tsunami flooding. Grading and placement of harbor shoreside facilities should also be done assuming some flood hazard.

The harbor oscillation analyses accomplished by the Corps also indicate that ship movements, due to short period harbor surges resulting from surf beat and/or short period wave groups of narrow energy band widths, probably do not pose a serious problem for day to day harbor operations. For infrequent occurrences of ship surging, changes in cooring procedures and techniques would be more effective and less costly than attempting to structurally change the harbor geometry.

35. Pg III-17, Para 3. Elaborate on the measures which will be used to comply with National Historical Register regulations.
36. Pg III-32, Para 5, Fig III-5. Explain or define "AICUZ".
37. Pg III-60, Para 5. The State's existing policy to preserve agricultural lands needs to be addressed.
38. Pg. IV-9, Para 1; Pg VI-2, Para 3. The Kaneohe-Kahaluu area is strongly opposed to any deep draft commercial harbor development in Kaneohe Bay because of possible conflicts with existing land use and cultural lifestyles.
39. Pg V-1, Item 5. Can the ponding area be restored after the stockpile materials are depleted? If so, would this still constitute an unavoidable impact?
40. Pg VI-1, Para 3. Suggest mentioning that Pearl Harbor has the potential to support shellfish beds once suitable environmental conditions are restored.
41. Pg VI-9. Suggest adding that corals and other invertebrates will settle and colonize hard surfaces of the proposed harbor basin, walls, channel, wave absorbers, and other harbor structures.
Dr. Richard Marland, Director
Office of Environmental Quality
Control
550 Halekauwila Street
Room 301
Honolulu, Hawaii 96813

Dear Dr. Marland:

Subject: Draft Environmental Impact Statement, Barbers Point
Deep-Draft Harbor, Oahu

We have reviewed the subject draft EIS and wish to offer the following comments for your consideration.

1) The EIS should address, in more specific terms, the question of whether public recreational boat launching facilities can be developed within the design framework of the proposed harbor project. According to the Department of Transportation's Statewide Boat Launching Facilities Master Plan (November, 1972) the existing private mooring facility should be relocated or expanded upon within or adjacent to the proposed commercial harbor if it is determined to be appropriate in the context of future harbor use.

2) Perhaps additional study may be advisable to evaluate the impact of the proposed deep-draft harbor and channel dredging project on existing surfing sites since the 1971 Statewide Comprehensive Outdoor Recreation Plan (SCORP) and Surfing Education Association (SEA) surfing site evaluation of the Barbers Point area was somewhat general in scope and detail. It is noted that the current SCORP, prepared in 1975, does not contain an evaluation of surfing sites.

We have no further comments to offer at this time but appreciate the opportunity to review and comment upon this project.

Sincerely,

[Signature]

cc: Hon. E. Alvey Wright

Ref. No. 5024
Reference is made to your letter of November 21, 1977, regarding the boat launching ramp and effect of the proposed Barbers Point Harbor on the existing surfing sites.

Boat Launching Ramp. There is a boat launching ramp in the existing barge basin. The continuous use of this facility or its relocation and improvement in the barge basin will be considered in the final design of the berthing spaces for the tugboats and other marine equipment that would be co-located in that basin. The use of the launching ramp may, however, be restricted or temporarily halted, depending upon the construction procedures.

Existing Surf Sites. The surfing sites nearest to the harbor, as indicated by the Hawaii Surfing Association's report, were about 1,600 to 2,000 feet north and about 2,500 to 3,000 feet south of the harbor. However, the report by the Surfing Education Association did show two other sites just north and south of the existing harbor. These surf sites on either side of the existing entrance channel may be displaced by the new channel. Since the near shore bathymetry is generally
regular and uniform and since no other structures will be built offshore, it is likely that waves suitable for surfing will continue to form on the sides of the wider entrance channel. It appears that at most, these sites will be displaced rather than completely eliminated.

Very truly yours,

R. HIGASHIONNA, Ph.D.
Acting Director
MEMORANDUM

To: Office of Environmental Quality Control

Subject: EIS for Barbers Point Deep-draft Harbor on Oahu

The Department of Agriculture has reviewed the subject EIS and has no substantial comments to offer. The report adequately addresses the negative impacts upon agriculture if the deep-draft harbor is constructed.

We appreciate the opportunity to comment.

JOHN FARIAS, JR.
Chairman, Board of Agriculture

cc: Department of Transportation
Honorable John Farias, Jr.
Chairman, Board of Agriculture
Department of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

Dear Sir:

Subject: Response to Draft EIS, Barbers Point Harbor

We wish to thank you very much for your memorandum of October 18, 1977, and your favorable review of the negative impacts of the subject harbor on agriculture.

Very truly yours,

R. Higashionna, Ph.D.
Acting Director
MEMORANDUM

TO: Environmental Quality Commission  
550 Halekauwila St., Room 301  
Honolulu, Hawaii 96813

FROM: Andrew I. T. Chang, Director  
Department of Social Services and Housing

SUBJECT: Environmental Impact Statement,  
Barbers Point Deep - Draft Harbor on Oahu

Subject EIS has been reviewed for its impact on departmental programs.

We feel that some localized program needs in the future may be indirectly affected by this project as it nears completion but in ways beneficial to the persons we serve.

We are returning the EIS for your usage.

Thank you for the opportunity to review and comment.

[Signature]

DIRECTOR

Attachment  
cc: Office of Environmental Quality Control  
Dept. of Transportation
March 1, 1978

Honorable Andrew I. T. Chang, Director
Department of Social Services and Housing
P. O. Box 339
Honolulu, Hawaii 96809

Dear Sir:

Subject: Response to Draft EIS, Barbers Point Harbor

We wish to thank you for your letter of October 18, 1977, and your statement that some of your program needs in the future may be indirectly affected by this project as it nears completion but in ways beneficial to the persons you serve.

Very truly yours,

R. HIGASHIONNA, Ph.D.
Acting Director
Dr. Richard Marland  
Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Dear Dr. Marland:

Subject: EIS for Barber's Point Deep-Draft Harbor on Oahu

Thank you for this opportunity to review the subject statement.

The subject project will not have adverse environmental impact on any existing or planned facilities serviced by our department.

Very truly yours,

Hideo Murakami  
State Comptroller
March 1, 1978

Honorable Hideo Murakami
State Comptroller
Department of Accounting
and General Services
P. O. Box 119
Honolulu, Hawaii 96810

Dear Sir:

Subject: Response to Draft EIS, Barbers Point Harbor

I wish to thank you for your letter of October 18, 1977, and your response that the subject harbor would have no adverse effect on the facilities serviced by your department.

Very truly yours,

R. Higashionna, Ph.D.
Acting Director
Gentlemen:

Subject: Environmental Impact Statement for the Barbers Point Deep-Draft Harbor on Oahu, Barbers Point, Ewa Plain, Oahu

We have reviewed the draft EIS and have no comments to offer. Since we have no future use for this EIS it is returned.

Thank you for the opportunity to review this document.

Sincerely,

Jack P. Kanai
State Conservationist

Enclosure

cc:
Department of Transportation
369 Punchbowl Street
Honolulu, Hawaii 96813
March 1, 1978

Mr. Jack P. Kanalz
State Conservationist
P. O. Box 50004
Honolulu, Hawaii 96850

Dear Sir:

Subject: Response to Draft EIS, Barbers Point Harbor

I wish to thank you for your letter of October 25, 1977, and your response of "no comment" to subject EIS.

Very truly yours,

R. HIGASHIONNA, Ph.D.
Acting Director
Mr. David K. Higa  
Department of Transportation  
869 Punchbowl Street  
Honolulu, Hawaii 96813  

Dear Mr. Higa:

We have reviewed the EIS for the Barbers Point Deep-Draft Harbor and have no critical comment. We appreciate the opportunity to participate in this review.

Sincerely,

Reginald H. F. Young  
Asst. Director, WRRC

cc: OEQC  
Env. Ctr.
Mr. Reginald H. F. Young  
Assistant Director, WRRC  
University of Hawaii  
2540 Dole Street  
Honolulu, Hawaii 96822

Dear Sir:

Subject: Response to Draft EIS, Barbers Point Harbor

I wish to thank you for your letter of November 22, 1977, and your response of "no comment" to subject EIS.

Very truly yours,

R. HIGASHIONNA, Ph.D.  
Acting Director
MEMORANDUM

To: E. Alvey Wright, Director
   Department of Transportation

From: Richard E. Marland, Director
      OEQC

Subject: ENVIRONMENTAL IMPACT STATEMENT FOR BARBERS POINT
        DEEP -DRAFT HARBOR, BARBERS POINT, OAHU, HAWAII

As of this date, this Office has received comments from fifteen agencies
and/or organizations. Respondents are listed on an attached sheet.

It is evident that great effort has been expended in the preparation
of the subject EIS. However, we would like to offer a number of comments and re-
commendations for its improvement.

One general comment is that the EIS does not adequately address possible
secondary impacts of the proposed harbor: for example, the influence and impact
of harbor activities on future urban development in the Ewa plain. For justi-
fication of the project the EIS includes mainly two policy statements from the
City and County of Honolulu General Plan: one indicating the need for a second
deep draft harbor on Oahu; and the other, proposing development of the Ewa
district as a secondary urban center for the island.

Addressing of secondary impacts is especially important since there
appears to be some conflict between the EIS interpretation of the cited General
Plan policy statements and other policy statements of both the City and the
State. One of the policies of the State Environmental Policy Act (Chapter 344),
for example, is to:

Protect endangered species of indigenous plants and animal... es-
tablish, preserve and maintain scenic historic, cultural park and recreation
areas... protect the shorelines of the State from encroachment of man-made improvements, structures, and activities... promote and foster the agricultural industry of the State; and preserve and conserve agricultural lands.

The County General Plan has a similar policy statement:

Encourage the more intensive use of productive agricultural land...
Preserve sufficient agricultural land in Ewa... to ensure the continuation of sugar and pineapple as viable industries.

The Governor, in his 1977 State of the State Address to the Legislature also spoke to this issue: "We must direct and encourage compact urban patterns to preserve existing open space, conservation areas and agricultural land for the future."

Both the State and County policies reflect an attempt to preserve the agricultural productivity of the Ewa plain.

In addition to these overall comments, we have the following specific comments to offer.

Funding (p. 2)

The estimated total cost of construction is $47.7 million. However, the revised EIS states that the total cost of the deep draft harbor will be more than $93 million. These costs should be discussed further, including a breakdown between federal and state funds.

Sewage Treatment (pp. I-14,15)

The EIS states that:

These options for the sewage system and the other proposed utilities for the industrial park will be designed to comply with existing governmental regulations at the time they are implemented.

However, section 1:12 of the EIS Regulations states:

A group of proposed actions shall be treated as a single action when: (1) the component actions are phases of increments of a total undertaking; (2) an individual project is a necessary precedent for a larger project; (3) an individual project represents a commitment to a larger project; or (4) the actions in question are essentially the same and a single Statement will adequately address the impacts of any single action. (emphasis added).

Therefore, we recommend that the impacts of the sewerage system and other proposed utility systems be considered within the subject EIS.

Campbell Estate Master Plan (p.II-6)

In attempts at justifying the project, the EIS includes statements which
appear to be in conflict. The EIS includes an excerpt from the Campbell Estate Master Plan:

... expansion of Campbell Industrial Park and construction of Barbers Point Harbor... is a significant part of the plan in that it holds the prospect of a center of both employment and distribution of goods for the total city.

The EIS also includes a statement from a report by Tippett-A广播电视-McCarthy

Stratton:

Given the size of the Hawaiian Market and the great distances that would be involved in processing and fabricating imported raw materials for eventual shipment to export markets, deep-water frontage will not be important for any industries, except petroleum refining, ship repair and possibly, ship building.

We recommend further discussion of justification for the project.

Historic and Cultural Setting

Significant impacts are anticipated for archaeological and historic sites. The federal portion of the historic and archaeological study has been completed with recommendations; however, the ARCH study for the state is to be only included as an appendix to the revised EIS. The act of appending the study to the revised EIS does not in itself satisfy the intent of EIS Regulations, Section 112 of the EIS Regulations, states:

...Special emphasis shall be placed on environmental resources that are rare or unique to the region and the project site (including man-made resources of historical, archaeological... significance...).

Identification of resources alone is not adequate; instead, a complete analysis and discussion of environmental implications is necessary. To assure a sound basis for decision making, a full range of responsible opinions on environmental impact should be provided, including opposing viewpoints.

Discussion on means of protecting precious historic resources, archaeological sites and endangered species is especially important.

Recreation (pp. III-13,19)

The EIS should include discussion of possible interactions between the proposed harbor expansion and the proposed West Beach development. The West Beach development includes a proposal for a private marina adjoining the Barbers Point Harbor.
Since oil tankers will be berthing and unloading cargo, the EIS should address the potential for oil spills.

The EIS states: "The discharge of storm runoff from the harbor facility is not expected to have a significant impact to the harbor development." The statement should be substantiated, since the harbor development would include impermeable surfaces, and since significant amounts of bacteria from surface runoff may adversely affect quality of receiving waters.

Direct Influence of the Harbor (pp. II-48, III-60)

There need to be further discussion of the direct influence of the proposed harbor. The Tippett-Abbett-McCarthy-Stratton report, for example, proposes the possibility of significant influence:

The harbor, if built, will contribute an additional demand of 10 acres per year bringing the total to 40 acres. Barbers Point Harbor will therefore add another advantage to the park, and the land absorption rate is almost certain to be accelerated.

Probable Environmental Impact (pp. V-1,2)

There should be a discussion of the impact of blasting for the harbor.

Offshore Moorings

Since supertankers will not be accommodated by the proposed harbor expansion, offshore moorings will still be required. Impacts of oil spillage on land or in the harbor need to be discussed.

Alternatives (VI-1,12)

The alternative of "no expansion of the harbor" should be discussed.

Further Recommendations

For brevity and fairness, this Office did not attempt to summarize comments of other reviewers. Instead, we strongly recommend that each comment be given careful consideration. In responding to comments during the review process, we also recommend that your responses be sent directly to the commenter with a copy to our Office. If reference is made to the revised EIS, the response should be accompanied by the revised EIS or excerpts of the document to assure that an adequate response has been given.

Further-the-EIS-Regulations-state-that-the-accepting-authority-must-not.
consider responses after the fourteen days response period. We will consider responses beyond the fourteen days response period.

We trust that our comments have been helpful to you in preparing the revised EIS. We thank you for the opportunity to comment on the EIS. We look forward to the revised EIS.

attachment
LIST OF RESPONDING AGENCIES AND ORGANIZATIONS

FEDERAL

* Soil Conservation Service
  Department of the Army
  National Oceanic & Atmospheric Administration
  Fourteenth Naval District

STATE

Department of Defense
Department of Agriculture
Department of Accounting & General Services
Department of Social Services & Housing
Department of Health Transportation
Department of Transportation

CITY AND COUNTY OF HONOLULU

* Department of Housing & Community Development
* Department of Public Works
* Department of General Planning
Department of Parks and Recreation
Department of Land Utilization

PRIVATE

Hawaii Boating Association
Ewa Beach Aliis Athletic Club

*Comment forwarded by reviewer
Dr. Richard O'Connell, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Dr. O'Connell:

Subject: Response to Draft EIS
Barbers Point Harbor

Reference is made to the letter from Dr. Marland of November 22, 1977, regarding the draft EIS for the proposed Barbers Point Harbor. The following responses are divided according to the comments contained in that letter:

Influence and Impact of Harbor Activities on the Future Urban Development in the Ewa Plain

The economic impacts of the proposed harbor related to the construction activity, employment during construction and operation of the harbor, increase in the demand for industrial land in Campbell Industrial Park and resulting employment, enhancement of land values, and estimated related employment are discussed in the EIS. The discussions and accompanying figures indicate that the harbor activities would indeed influence the future urban development of the Ewa plain to some degree. The contributions of the harbor are discussed as follows:

- The total land area for the harbor is 246 acres. Of this, 73 acres are in the urban district and 163 acres in the agricultural district. Thus, the construction of the harbor would create an urban activity that would gradually increase from the mid-1930's to the year 2000.

- Leasing activities in the industrial park would increase by 10 acres per year above the current trend of 30 acres per year, according to trend studies.
Population Growth - The proposed harbor is estimated to directly and indirectly employ approximately 630 workers over the next 25 years. In addition, the harbor development is estimated to be responsible for the employment of approximately 1,120 workers in Campbell Industrial Park and to generate approximately 360 more jobs among private and private-support industries. Thus, the total employment related to the development of the harbor is estimated to amount to 2,100 workers. Assuming that each worker would be the head of a household and that the average size of a household would be 3.075 people (average on Oahu), the total population related to the harbor development is estimated to be approximately 6,300 people over the next 25-year period.

In estimating the number of workers who would live in the area as a result of the harbor development, residential location patterns of workers at Campbell Industrial Park provide some perspective. According to Campbell Estate statistics, 61.3 percent of the CTW workers reside in the leeward district and 3 percent live in the Ewa-Hakakilo-Barbers Point area. Based on these residential patterns, Campbell Estate estimates that by the year 2000, approximately 66 percent of industrial park employees will live in the leeward district and 25 percent of the employees will live in the Ewa-Hakakilo-Barbers Point area. Utilizing these residential patterns, the incremental employment as a result of the harbor development is estimated to result in an increase in population to the district of 4,300 people by the year 2000 and an increase in the Ewa-Hakakilo area population of 1,600 people. Of the projected population of 104,000 by the year 2000 in Ewa-Hakakilo, the harbor-related population would only be about 1.3 percent. It is now predicted by the State Department of Planning and Economic Development that the resident population of Oahu would be 917,000 by the year 2000. Using the 10 percent distribution factor in the statement of objectives in the County's General Plan, the population in the Ewa-Hakakilo area could be 91,700 instead of 104,000.

Policy Statements

We are aware of the policy statements of the State Environmental Policy Act (Chapter 344) and the State and County policies and recognize that there may be some adverse impacts
on the environment due to the construction of the harbor, but we will endeavor to mitigate the adverse effects in accordance with the best available measures.

For example, a reconnaissance survey of the historical and cultural resources of the proposed harbor site is now underway, and additional work on the "determination of effect" and decisions on the salvaging and preservation of some of the monuments will be determined by consulting archaeologists, subject to the review of the State Historic Preservation Officer.

The endangered plant species Zuphorbia skottsbergii var. kalaaloana Sheriff is now being propagated, and plans are being formulated for transplanting. The Achyranthes splendens var. rotundata Ebd. can be propagated from seeds, and plans are also underway for its propagation.

As for the preservation of agricultural land, it should be noted that the 168 acres in the agricultural district are not in active, agricultural production. There were 2 acres planted in cane, but, with approval of the West Beach development, this area is now included in the urban district. Of the remaining 166 acres, 103 acres are being quarried, 37 acres are overgrown with kiawe, and 5 acres are in roads. According to the Land Study Bureau (LSB Bulletin 11, December 1972), the soil is described as rocky, shallow, nonexpanding, well-drained, and not suitable for machine fillability. It has the lowest productivity rating of "E". Although the land is now in the agricultural district, it is not likely to be used for farming because of its marginal quality.

Sewage Treatment

A discussion of sewage treatment and disposal requirements is included in the EIS. Briefly, we have outlined the need for a regional system to be planned and constructed in the area. An interim system will be required should a regional system not be available when the harbor begins operation.

Campbell Estate Master Plan

The excerpts from the Campbell Estate master plan and the statement from the Tippets-Abbott-McCarthy-Stratton report were included in the EIS to establish the relation of the
Harbor with the proposed development of the Campbell lands and not as a justification for the harbor. The main justifications for the harbor are that a supplementary harbor in Oahu is needed to accommodate the increased shipping requirements that will not be able to be handled at Honolulu Harbor and to serve the specific requirements of Leeward Oahu.

**Historic and Cultural Setting**

As mentioned earlier, the "determination of effect" on the historic and cultural monuments will be made in cooperation with the State Historic Preservation Officer.

**Recreation**

The proposed marina in West Beach will adjoin the proposed harbor. We consider that the marina would be a compatible land use adjacent to the harbor. The planned connection of the marina channel to the harbor channel, however, would adversely impact the water quality in the harbor basin. Another channel to the marina should be provided by the West Beach developers.

The continuous use of the existing boat ramp, its relocation and/or improvement will be considered in the final design of the berthing spaces for the tugboats and other marine equipment that would be located in the existing boat basin. Provisions for the ancillary facilities (parking, loading docks, washdown areas, utilities, etc.) would also be considered according to need during the design stages of the project.

**Water Quality**

The berthing and unloading of tankers are subject to the State and U. S. Coast Guard rules and regulations that would minimize the incidence of oil spills in the harbor. The U. S. Coast Guard rules and regulations have specific requirements for discharge containment, discharge removal, discharge containment equipment, and procedures to be followed for loading and unloading oil products offshore or inshore. These are described in Volume 17, Number 43, Part II, of the Federal Register.
Within the harbor, water quality controls will be subject to regulations of the State Water Transportation Facilities Division. No stream or drainage canals will enter the harbor area. The discharge of local storm runoff from the harbor facility is not expected to have a significant impact to the harbor basin. With the enforcement of harbor regulations, the port should not suffer any significant pollution levels. The water quality should be better than Honolulu Harbor, which is greatly affected by discharges from Nuuanu and Kapalama streams. A regional drainage system proposed by Campbell Estate will intercept runoff along the eastern and southern perimeters of the harbor and direct it toward a major drainage channel for discharge into the ocean.

**Impact of Blasting for the Harbor**

Blasting the hard coralline material in the channel and basin may be required as a pre-dredge operation. Should some blasting be necessary, the local marine life may be adversely affected. No long-term effects, however, are expected.

**Offshore Moorings**

The crude oil tankers would continue to unload on the offshore moorings under the same existing regulations of the U. S. Coast Guard that were cited in previous paragraphs of this letter. Despite all the regulations, however, oil spills from the offshore moorings are always a possibility.

**Alternatives - No Expansion of the Harbor**

If the proposed harbor were not constructed, Honolulu Harbor would become congested by mid-1980 and it might be too late by that time to begin planning for a second harbor. Moreover, an undeveloped site large enough to accommodate an inland turning basin and shoreside facilities may no longer be available. It is possible to construct a harbor along the shoreline, but this would create greater impact on the marine biota and shoreline.

The primary and secondary benefits described in this study would not be realized.
Thank you for your comments and we hope that the information provided answers your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

LCF:di

R. Higashionnna

bcc: M&E Pacific, Inc.
Governor, State of Hawaii
550 Kamehameha Avenue
Honolulu, HI 96813

Dear Sir:

We have reviewed the draft EIS for Barber's Point Harbor and have comments to offer.

As the draft indicates, there is insufficient water to meet demands for the area. For this reason we suggest that the applicant keep water resources agencies apprised of developments.

The EIS adequately addresses concerns regarding harbor flushing. We request a copy of the construction plans when they are completed.

Regarding endangered plant species in the area, recent federal interpretations of the Endangered Species Act of 1973 have been strict. According to some of those interpretations, there can be no mitigation for endangered species. Since federal funding is being utilized in this project, the critical habitat of the plant could not be altered once either species becomes a part of the official federal listing. Undoubtedly, this interpretation will be tested further.

If this ruling is upheld, it would be in the best interest of the Barber's Point Project to place priority emphasis on getting the Euphorbia and Achyranthes established successfully in their new localities before these plants are officially placed on the federal endangered listing. Since casual efforts to propagate the species by Foster Botanic Gardens have met with poor results and it will take a minimum of several years to get the plants established and reproducing successfully in their new habitats once the proper propagation methods are developed, timing of this project will be very important to meet harbor development deadlines.
On two pages, 10 and VIII-2, under mitigation for endangered plants it is stated that "...Campbell Estate is currently making efforts to locate other colonies of these endangered species outside the project area." This statement needs to be modified since no studies have or are being conducted (personal communication Willard Stlu:k, Campbell Estate). The only projects to locate endangered plants were an initial survey by Darrel Herbst and later by the NIS Corporation. The statement should read "Campbell Estate is currently making efforts to locate other sites where these endangered species can be transplanted outside the project area." Campbell Estate is presently working with several horticulturists in finding the best means to propagate Euphorbia skottsbergii var. kalaaloana.

On page 5 in the last part of the paragraph that starts with "Surveys have shown", the last sentence should read "...the status of Achyranthes is less certain. Both species will be propagated elsewhere." This will clarify the question that may arise in the reader's mind if one or both species will be propagated.

The last time our botanist visited the site she collected some Achyranthes seed to see if it is readily viable. She found that 3% of the seeds germinated. Although the percentage of the seed germination is low, the seeds are numerous enough that efforts to grow this plant should meet with success. If we can get Euphorbia to do the same thing, a big hurdle will have been crossed.

Very truly yours,

[Signature]

Chairman of the Board

c/o Department of Transportation
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY
P.O. BOX 3435
HONOLULU, HAWAII 96814

October 21, 1977

TO:     MR. GORDON SOX, Program Planning Coordinator
FROM:   CAROLYN CORN, Botanist
SUBJECT: SIS/CL.1, Proposed Barbers' Point Deep-
          Draft Harbor on Oahu

The draft EIS has been received by our office. I have several
comments I wish to submit on the endangered species of plants growing in the
area proposed for Barbers Point Harbor.

Recent rulings at the federal level have been interpreting
the endangered Species Act of 1973 in a strict manner that affects
the Barbers Point Project. By their interpretations, there can
be no mitigation for endangered species. Since federal funding
is being utilized in this project, the critical habitat of the
plant cannot be altered once either species becomes a part of
the official federal listing. Undoubtedly, this interpretation
will extend further in other cases on the mainland.

If this ruling is upheld, it would be in the best interest
of the Barbers Point Project to place a priority emphasis on
getting the Euchonias and Admyranchas established successfully in
their new locations before these plants are officially placed on
the federal endangered listing. Since casual efforts to propagate
the species by Foster Botanic Gardens has met with poor results
and it will take a minimum of several years to get the plants
established and reproducing successfully in their new habitats
once the proper propagation methods are developed, timing of this
project will be very important to meet harbor development deadlines.

On page 10 and VIII-2 under mitigation for endangered
plants it is stated that... "Campbell Estate is currently making
efforts to locate other colonies of these endangered species out-
side the project area." This statement needs to be modified since
no studies have as yet been conducted (personal communication, Willard Stiuk, Campbell Estate). The only projects to locate endangered plants were an initial survey by Darrel Herbst and then by EISC Corporation. Possibly the statement should read "Campbell Estate is currently making efforts to locate other sites where these endangered species can be transplanted outside the project area." You may want to mention that Campbell Estate is presently working with several horticulturists in finding the best means to propagate Euphorbia skottsbergii var. kalaalona.

On page 5 in the last part of the paragraph that starts with "Surveys have shown", could I suggest that the last sentence read ..."The status of Achyranthes is less certain. Both species will be propagated elsewhere." This will clarify the question that may arise in the reader's mind if one or both species will be propagated.

The last time I visited the site, I collected some Achyranthes seed to see if it is readily viable. I found that 3% of the seeds germinated. Although the percentage of the seed germination is low, the seeds are numerous enough that efforts to grow this plant should meet with success. If we can only get the Euphorbia to do the same thing, a big hurdle will be past.

If I can be of any further assistance, don't hesitate to contact me.

CAROLYN CORN

C.C.: SNA

cc: Mr. Joe Amaki, Harbors Div.
May 9, 1973

Honorable William Y. Thompson
Chairman and Member
Board of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96819

Dear Mr. Thompson:

Subject: Response to Draft EIS
Barbers Point Harbor

Reference is made to your letter of November 8, 1977, regarding the draft EIS for subject project. We would like to reply to the following concerns you raised:

**Insufficient Water Supply to the Area**

The water supply requirement for the first phase of the proposed harbor facility is estimated to be only about 0.06 mgd, or about 0.5 percent of the present Ewa-Waianae water district demand of 13.1 mgd. Since this district is presently not self-sufficient in water supply in that much of its supply comes from the Pearl Harbor district, the harbor water requirements as well as the anticipated Campbell Industrial Park (CIP) and Ewa Plain development requirements will have to be coordinated with the Board of Water Supply. Prior to the implementation, the Board of Water Supply has indicated that the modest harbor requirements can be met with the existing system by tapping into the 20-inch main along Kalaeloa Boulevard. The additional fire flow requirements for the harbor facilities will be met on an interim basis by providing saltwater pumping equipment.

**Request for Construction Plans**

As you requested, a set of construction plans will be forwarded to you as soon as they are ready.
Endangered Plant Species

Since the draft EIS was prepared, Campbell Estate has been successful in propagating the Euphorbia skottsbergii var. kahaloana. Sheriff at the Kawahara Nursery in Kaneohe and transplanting outside the project area is scheduled during the rainy season. Campbell Estate is presently working with several horticulturists in finding the best means to propagate the Euphorbia.

We wish to thank you for the efforts of your botanist in propagating the Achyranthes and determining its survival rate. This information has been brought to the attention of Campbell Estate.

Thank you for your comments and we hope that the information provided answers your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

[Signature]

LCF:di

bcc: M&Z Pacific, Inc. 

A. Higashionna
MEMORANDUM

To: Mr. David K. Higa, Chief, Water Transportation Facilities Division, Department of Transportation

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement (EIS) for Barbers Point Deep-Draft Harbor, Oahu

Thank you for allowing us to review and comment on the subject EIS. We submit the following comments for your consideration:

Air

We agree with the methodology and conclusions of the air quality analysis of the proposed project. In addition, we believe that, under variable Kona wind conditions, the cumulative effect of airborne pollutants from existing and future sources may result in ambient air quality levels reaching the upper limits of State Ambient Air Quality Standards.

Water

In addition to the treatment and disposal of wastewaters, it is recommended that dockside pump-out facilities be provided for all ships and other ocean-going vessels.

The proposed harbor should have a spill prevention plan for oils and chemicals. Any emergency or temporary storage of bulk chemicals should be controlled and prevented from being discharged into the harbor waters by surface runoff or washdowns into stormdrains.

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.

cc: Environmental Quality Commission
    Office of Environmental Quality Control

JAMES S. KUMAGAI, Ph.D.
Dr. James S. Kumagai  
State of Hawaii  
Department of Health  
P.O. Box 3379  
Honolulu, Hawaii 96831

Dear Dr. Kumagai:

Subject: Response to Comments on the EIS for the Proposed Barbers Point Deep-Draft Harbor, Oahu

Thank you for your review dated November 7, 1977 of the subject EIS and your comments regarding the air quality and wastewater disposal effects. Following are restatements of your comments with our responses:

Comment

We agree with the methodology and conclusions of the air quality analysis of the proposed project. In addition, we believe that, under variable Kona wind conditions, the cumulative effect of airborne pollutants from existing and future sources may result in ambient air quality levels reaching the upper limits of State Ambient Air Quality standards.

Response

The air quality effects analysis has been changed slightly in the revised EIS in response to some comments by the American Lung Association. However, the numerical results did not change. Estimation of the cumulative air quality effects from existing and future sources would require more detailed knowledge than is presently available. Continuing surveillance by the Department of Health should serve as a basis for control for future sources.
Comment

In addition to the treatment and disposal of wastewaters, it is recommended that docksides pump-out facilities be provided for all ships and other ocean-going vessels.

Response

Docksides pump-out facilities will be considered during the detailed design phase of the harbor facilities, especially if governmental regulations applicable at that time call for them.

Comment

The proposed harbor should have a spill prevention plan for oils and chemicals. Any emergency or temporary storage of bulk chemicals should be controlled and prevented from being discharged into the harbor waters by surface runoff or washdowns into storm drains.

Response

The U.S. Coast Guard regulations and the Department of Transportation Harbor operation requirements of oil and chemical handling during loading/unloading as well as storage facilities will be enforced.

We trust that these responses satisfactorily answer your concerns. The revised EIS for this project will shortly be available through the BQC.

Thank you for your comments and we hope that the information provided answers your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

R. Higashiroma

LCP: akn

bcc: M&E Pacific, Inc.
Mr. David K. Higa  
Dept. of Transportation  
Harbors Division  
79 South Nimitz Highway  
Honolulu, HI 96813  

Dear Mr. Higa:  

Pet: State EIS for Barbers Point Deep Draft Harbor,  
September 1977  

I will comment only on the anticipated tsunami and surge problems connected with the Barbers Point Deep Draft Harbor.  

On pages III - 13, 14, the tsunami problem is addressed. The finding of a broad resonant peak at 13.3 min. does suggest that some tsunamis will be subject to unusual amplification in the harbor. It is proposed in the EIS that this problem be studied further. Although tsunami hazard is mentioned again on page VIII - 1, with a statement that it will be taken into account, there are no specific descriptions of how the design of the harbor or the shore facilities will take into account the tsunami hazard. I feel that the problem is being glossed over and that a more detailed examination is needed of what the tsunami hazard really is and what can be done about it.  

Similarly, the surge problem is being glossed over. The present barge harbor at Barbers Point has serious surging which suggests that there is a strong external excitation for surge at that place. The repeated claim that model tests at Look Laboratory showed there was no surge problem does not square with either the published report from Look Lab, or the statement of the people who did the model testing. My own view would be that the question as to whether the proposed harbor will have serious surging problems is not yet settled and should be studied further.  

Sincerely,  

[Signature]  

Harold G. Loomis  
Tsunami Specialist  

cc: J. Miller  
D. Cox  
M. Vitousek  
Office of Env. Qual. Control
May 5, 1978

Dr. Harold G. Loomis
Tsunami Specialist
Joint Tsunami Research Effort
University of Hawaii
2525 Correa Road
Honolulu, Hawaii 96822

Dear Dr. Loomis:

Subject: Response to Draft EIS
Barbers Point Harbor

Reference is made to your letter of October 31, 1977, concerning the tsunami and surge problems in the subject harbor.

Because of the concern expressed regarding the possible tsunami effects on the subject harbor, the U.S. Army Corps of Engineers has requested funding to conduct a comprehensive evaluation of probable tsunami effects. The study will be conducted by the Waterways Experiment Station (WES), and the results will be applied to the design of the shoreside facilities.

The harbor configuration is based on hydraulic model studies conducted for the Corps of Engineers by the University of Hawaii, Department of Ocean Engineering in 1968. The harbor basin has been enlarged from the model test size of 77 acres to 94 acres to be compatible with the newer Enterprise Class of container ships.

The Corps of Engineers' WES recently completed a numerical analysis of harbor oscillations for the proposed Barbers Point Harbor. A "State of the art" computer modeling technique was used to determine whether resonant response of the harbor would result in wave energy amplification and possible harbor surge or oscillations that might affect the usability of the harbor. The model computed wave-height amplification factors and maximum current velocities associated with the harbor's response to a broad range of incident waves from 15 seconds to 27 minutes.
Of the possible significant resonant peaks between 20 to 150 seconds, WES has concluded that there is no serious threat to day-to-day operations of the proposed harbor because of its narrow band widths and/or small wave height amplification factors. However, if adverse ship surging occurs, appropriate changes in ship mooring configuration and/or characteristics should greatly reduce ship response. Based on this study, the Corps of Engineers feels that additional studies on short period surges are not required. The Corps of Engineers' studies were primarily on the responses of larger ships and they have indicated that additional funds for further studies on surging and ship responses are not available.

The WES study also determined that the proposed harbor exhibited a large, broad resonant amplification peak centered at a period of approximately 13.3 minutes. This period corresponds with historical tsunami periods, and resonant amplification of tsunami waves which could result in flooding of the adjacent shoreside area. The Corps of Engineers will conduct a more detailed numerical model study which will provide a reliable estimate of the degree of flooding that can be expected during tsunami occurrences at Barbers Point. The final product of the study will be plots of tsunami flooding with associated frequencies of occurrences. This information will aid the State in its planning, design and operations of the shoreside facilities to minimize hazards to personnel and property losses.

The Corps of Engineers anticipates no harbor design changes or delay in the construction of the harbor. The Corps of Engineers feels that the tsunami study can be undertaken concurrently with the harbor construction.

Thank you for your comments and we hope that the information provided answers to your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

[Signature]

LCT:ao

bcc: N&Z Pacific, Inc.
TO: Chairman
Environmental Quality Commission

FROM: Doak C. Cox, Director

SUBJECT: Review of Barbers Point Deep-Draft Harbor State Environmental Impact Statement

The following members of the University community have contributed to the preparation of this review: John T. O'Brien, Frans Gerritsen, and Charles Breitschneider, Ocean Engineering; Martin Vitousek, Geophysics; William J. Kimmerer, Oceanography; Harold Loomis, Joint Tsunami Research Effort (NOAA); Hiroshi Yamauchi, Agricultural and Resource Economics; and Jacquelin N. Miller and Doak C. Cox, Environmental Center.

The Federal EIS for the Barbers Point Harbor dealt primarily with the environmental impacts associated with the harbor construction per se and specifically deferred to the State EIS the evaluation of the environmental impacts associated with the land based operations and required shoreside facilities and utilities. The Center's reviewers have expressed serious concern at this policy of two separate and essentially non-coordinated EIS documents for a single project. The resulting two documents suffer from redundancy and thus extra cost in some sections and serious omissions in others. The following comments are offering for your consideration:

Page I-3. The Statement of Objectives contains erroneous and misleading statements. Item 1, for example, states that depths in Honolulu Harbor are inadequate to handle ships presently using the area, particularly petroleum carrying vessels. However, Honolulu Harbor is currently planned for dredging (40 to 45 feet) (Federal EIS, 17 January 1977) to eliminate the depth limitations and in fact will be deeper than the 33 feet Barbers Point Harbor. Item 2 cites steering difficulties in Kapiolani Channel. This too is addressed and will be eliminated with the planned dredging. Item 3, the adequacy of Honolulu Harbor's existing shoreside facilities beyond the year 1980 is questioned yet in the next sentence this 1980 figure is modified to 1990-95 assuming the States planned shoreside improvements. The Federal EIS on Honolulu Harbor (January 17, 1977) states specifically that Honolulu Harbor will "physically accommodate all Oahu waterborne commerce needs through the 1990-1995 period."
Item 3 states that there is a lack of available industrially-zoned warehousing space in the Honolulu Harbor area and that existing warehousing space is gradually eroding and being redeveloped to non-industrial uses. If this is the case, one must ask why such non-industrial uses are being pursued or allowed in an industrially-zoned area?

Page I-14. We seriously question the rationale for exclusion of the sewage treatment and disposal facilities and other off-site utilities from the construction costs used in deriving the cost-benefit ratios.

Page I-14, II-52, III-22. According to the EIS (pages II-52 and III-22), no specific plans have been made to include wastewater flows from Campbell Industrial Park in the Honouliuli sewage treatment plant and disposal facility and an additional treatment plant and disposal facility will be needed. To the extent that the new plant and facility will be made necessary by the proposed port development, their cost should be added to the other costs of the port development. If an additional ocean outfall will be required, the additional cost will be substantial. In the case of injection wells for wastewater disposal, the impacts of high levels of nutrients on the coastal waters from the livestock shipments must be considered.

Page I-16. We also question the derivation of the Equivalent Annual Operation and Maintenance cost for, "maintenance dredging wave absorber, and aids to navigation" of $34,000. This number seems unreasonably low.

Page II-49. Table II-7 reflects some 75 industries with a water transportation orientation deemed suitable for the park. There appears to be considerable overlap of potential industrial operations. What was the basis used in selecting these particular industries?

Pages II-52 and III-22. The Board of Water Supply has stated that the fresh water resources are inadequate to satisfy present demand. The costs and sources of fresh water supply should be included in the EIS.

Page II-53. What are the noise levels and frequency of exposure that will be experienced at Barbers Point Harbor area due to naval air stations operations?

Page III-4. There is no mention in the text of the need expressed by Hawaiian Independent Refinery, Inc. to assure continued use of the barge harbor during construction so as to accommodate neighbor island propane transport.

**Impacts on coral reefs**

Page III-6. It seems implied in the EIS that the coral reef in the vicinity of the present barge harbor and proposed deepwater harbor is not well developed. This is true in the immediate vicinity, but a few hundred yards to the north, coral heads up to 30 feet in diameter and height are common. It
seems implied that deleterious effects of the harbor construction on the coral will end after the construction is complete. It is difficult to believe that the operation of the harbor will not have significant effects, and the potential for such effects should be examined.

**Tsunamis**

Page III-13. The discussion of the effects of tsunamis on the harbor is quite inadequate. On page III-13, the behavior of "a single 15-foot wave" is described. Since the height of a tsunami is depth dependent, it is meaningless to describe a tsunami wave in the ocean by a single height without indicating at what depth this height pertains. It appears that what is meant is a 15-foot wave at the 42-foot depth of the outer channel. It is indicated that the wave height will increase to 17 feet in the inner channel (38 feet deep) and that it will result in large resonant oscillations in the barge harbor, but that the wave height will drop to 4 feet in the channel inland of the barge harbor, and presumably still more by diffraction in the main basin. This discussion is meaningless, because the effects of resonance in the barge harbor depend upon wave period.

The effects of resonance are considered on page III-14 where it is recognized that the main basin will have a resonant peak centered at a period of about 13 minutes, close to the period of the 1946 Aleutian tsunami. The Waterways Experiment Station study which brought this resonance period to light suggested a very large associated amplification factor, 8.5. As pointed out in the EIS, this study did not take into account the dissipative effects, such as those associated with land flooding. It also did not take into account the fact that the initial apparent period of a tsunami persists for only a few waves. It should be recognized, however, that if the 8.5 amplification factor actually applied to a 4-foot wave entering the harbor, the resulting 34-foot oscillation would be catastrophic.

The EIS indicates the need for further studies to evaluate the tsunami effects, but does not indicate definitely that such a study will be made. Considering the very great importance of the effects that might occur, so far as present information indicates, it must be judged that the address to the tsunami problem in the present EIS is quite unsatisfactory. Certainly no harbor in Hawaii should be constructed on the basis of such inadequate information as to the tsunami hazard.

**Surges**

Page III-14. The problem with surges is dismissed with the statement on page III-14 that "As part of the tsunami evaluation study, the potential for surge problems in the proposed harbor should be addressed." The same Waterways Experiment Station study that brought to light the 8.5 amplification factor for 13 minute waves called attention to much larger amplification factors associated with periods within the range of long swells and seiches generated by such swells.
In harbors protected permeable or perforated breakwaters, the surge problem may be slight, but in a land-enclosed harbor with relatively simple geometry such as is proposed at Barbers Point, the seiche problem may be a very severe one. It should be recognized that the recurrence frequency of significant long-period swells is much higher than that of significant tsunamis, and that a recurrent surge problem may seriously reduce the utility of a harbor. The horizontal water motions can be quite strong and can result in breaking mooring lines and damage to ships, fender supports, or both.

The Look Laboratory has performed model tests on the proposed harbor, but these were intended to indicate means to reduce ordinary wave effects within the proposed harbor and did not address surges. The EIS on the harbor cannot be considered adequate until it reflects the results of studies of the potential surge problem.

Page III. Storm effects. The effects of storms on the proposed harbor are not addressed except with respect to wind effects on water transport (currents) within the harbor. The potential exposure of the harbor to hurricanes and storms of near-hurricane strength should be discussed.

III-5. What percent of the coral stockpiled will be required by the Department of Agriculture for Oahu crop production needs for Calcium?

III-7. Why is the harbor being dredged only to a depth of 33 feet? If Honolulu Harbor requires deepening to 40-45 feet, why won't Barbers Point Harbor require a similar depth?

Page III-40. Much of the rationale for immediate construction of the Barbers Point Harbor seems to rest on the present cost of land transportation of freight between Honolulu and Leeward Oahu. However, the extent to which the construction of this new harbor would result in decreased costs must depend critically on the extent to which the cargo of certain ships may be intended exclusively for delivery to Leeward Oahu. The cost per unit distance of water transport of freight is low, but the costs of partial unloading of freight from a ship at each of two ports may well exceed the cost of a single unloading and land transport. The increase in cost for the shipping firms unloading a ship at both ports probably accounts for the statements by shipping firms that they do not intend to use the proposed Barbers Point Harbor.

Page III-41. Many of the projections on which the proposal for the Barbers Point Harbor is based are questionable. In particular, it is questionable that shipments of petroleum to Oahu will increase five times in the next 50 years. In the light of the world petroleum supply situation, the availability of a supply to sustain this increase is doubtful; the increased cost per unit volume will undoubtedly curb per capita demand; and the State policy of controlled growth will also control future petroleum demands. Elimination of a need for a $9 million investment in offshore moorings for tankers is indicated as a rationale for the Barbers Point Harbor, but it is not clear whether this is a future investment need or an investment in present facilities.
Effects on agriculture

Page III-41. The EIS recognizes that 24 acres of land will be removed from sugar cultivation by the harbor construction but that Oahu Sugar Company officials indicate that this land is of marginal economic value because of terrain and distance. The EIS also recognizes that the Campbell Estate master plan calls for conversion of 7,200 acres of land from agricultural use to urban use, 35 percent of the Oahu Sugar Company cane acreage (page II-45). The EIS claims that the establishment of a deepwater port at Barbers Point will add very little to the increase in the population of the Ewa district beyond what is anticipated without the port. An important question not addressed is whether the increment of increased urbanization in the Ewa District attributable to the deepwater port might result in the decrease of total acreage available for sugar cultivation below the economic minimum, and hence be responsible for bringing an end to the operation of Oahu Sugar Company.

Impact on construction industry

Page III-42. Much of the rationale for the construction of the proposed Barbers Point Harbor appears to rest on an offset to the decrease in the construction industry of Hawaii in the recent years. The facts of the decrease and of related unemployment are unquestionable. However, continued maintenance of a high volume of construction is neither expectable nor desirable. A continuing high volume of construction would require the maintenance of a rapid growth in the State's economy. Economic indicators suggest, however, that continuance of rapid growth in the future is not expectable; and the social and physical environmental detriments of the rapid growth of the past have led the State to adopt a controlled growth policy. With controlled growth, so large a construction industry will not be needed in the future. A stimulated construction industry is a stimulus to growth and hence represents an undermining of the policy of control of growth.

Page IV-1. The no-construction alternative has not been discussed. What are the options in terms of rezoning and upgrading the facilities at Honolulu Harbor to accommodate post 1995 needs? The State of Hawaii Growth Policies Plan 1974-1994 has recommended slowed growth, non-sprawl into prime agricultural lands, and emphasizes neighbor island development. Is the proposed Barbers Point Harbor consistent with these recommendations?

Since the Honolulu Harbor facility will be adequate until approximately 1995 and the need for two deep draft harbors within 16 miles of each other to serve such a modest population and area appears to be subject to some question, the alternatives of a total long-term shift of commercial harbor facilities from Honolulu to Barbers Point might be appropriate.

The chapter of the EIS on alternatives (Chapter VI) assumes that there must be a second deep draft commercial port on Oahu on the basis of an authorization in the Rivers and Harbors Act of 1963 and on inadequacies of Honolulu Harbor. A recent EIS on Honolulu Harbor deals with planned improvements with Honolulu Harbor that will make it adequate until 1980 or 1995. There is
no proof in either that EIS or this one that the possible improvements at Honolulu are limited to those planned and no discussion to indicate that further improvements of Honolulu Harbor would be less desirable than the establishment of a new deep-draft port.

Alternatives: Partly offshore harbor

The alternative of a partly offshore harbor (figure IV-1C) is examined but discarded on the grounds that the entering wave energy to the harbor would be too great. Reorientation of the entrance jetties could easily eliminate the problem. however, without additional cost.

Offshore harbor

In the discussion of alternatives there is only minimal discussion of the alternative of an offshore harbor. Earlier correspondence with the Corps of Engineers indicate that this alternative has not been studied because: "While innovative offshore berthing structures may be feasible in other countries, any offshore structure at the proposed harbor site would probably require protective structures. Construction of breakwaters or other offshore structures would destroy or damage considerably more reef area than the proposed inland harbor."

There is no indication why innovative offshore berthing facilities are not feasible in the United States, and specifically in Hawaii; and it is not clear that the construction of protective structures for an offshore harbor at Barbers Point would destroy or damage more reef area than the construction of the proposed harbor.

Deferred construction

The EIS claims that Honolulu Harbor, even with planned improvements, will be inadequate to meet commercial needs beyond the period 1990-1995 (page I-3). It projects a five-year construction period for the proposed Barbers Point Harbor. Thus the proposed harbor will be provided 7 to 12 years before it is needed.

Even it is assumed that the harbor is economically justified, there is no showing that the economic justification for initiating construction of the harbor in the immediate future will be greater than or even as great as the economic justification for initiating its construction 7 to 12 years from now, and no discussion of the opportunity costs of construction now. It is doubtful that construction in the immediate future can be justified, particularly in the light of the statements by major shipping firms that the use of the Barbers Point Harbor will not be advantageous to them.

cc: Contributors
OEQC
Department of Transportation
Darro Thuet
May 3, 1973

Dr. Doak C. Cox, Director
Environmental Center
University of Hawaii at Manoa
Crawford 317
2550 Campus Road
Honolulu, Hawaii 96822

Dear Dr. Cox:

Subject: Response to Draft DIS

Barbers Point Harbor

The following are our responses to your comments of November 22, 1977, concerning the subject DIS:

Page I-3 Statement of Objectives
(Comparisons to Honolulu Harbor)

We regret that there is some misunderstanding on the Statement of Objectives. Essentially, what we are trying to say is that the existing Honolulu Harbor as it was in 1976 would be inadequate to handle the anticipated containerized cargo beyond 1980 and if navigational improvements (dredging in items 1 and 2) and improvements to the shore facilities were made, the total facilities will be insufficient to provide for the long-term needs beyond the period 1990-1993. The Corps of Engineers' DIS on Honolulu Harbor (H-3(c) page I-3) contains the following statement: "The State has been incrementally developing the Sand Island container facility, and when ultimately developed, the combined 203 acres will accommodate containerized traffic to about 1990-1995 period." Although the language in the underlined phrases are different, it is our opinion that they complement each other and convey the same meaning.

The lands around Honolulu Harbor are zoned light industrial (I-1), heavy industrial (I-2), waterfront industrial district (I-3) and community business district (B-2). According to the
Comprehensive Zoning Code (CZC) of the City and County of Honolulu, warehousing is only one of the permitted uses in these zoned areas. Other uses are for industry-related activities. The exclusive use of certain lands in these zones for warehousing and distribution would indeed provide some relief to Honolulu Harbor but this could not be done under the present zoning regulations. Some private lands could be acquired by the State for these purposes but such an action would displace many existing businesses that are also harbor related.

Page I-14 Cost-Benefit Ratios

The cost-benefit ratios were derived by the Corps of Engineers for the construction of the marine facilities such as the entrance channel, turning basin, wave absorbers, etc. The construction of the shore facilities including water and sewer are fundable from the revenues derived from dockage and wharfage fees collected by the State from the users of the harbor.

Pages I-14, II-32, II-22 Wastewater Disposal

The sewage treatment and disposal requirements of the proposed harbor are as modest as the water supply needs. Since the proposed Honolulu wastewater treatment and disposal facility has no provisions for including flows from the Campbell Industrial Park area, a separate system will have to be planned and constructed for this area that would include the harbor contribution of about 0.06 mgd. If that facility (which would require its own TIS) is not available when the harbor begins operation, then an interim system will be required. Such an interim system, if required, would be planned during the design phase of the harbor to meet all applicable State Department of Health requirements. It is anticipated that the principal interim treatment alternatives would be oxidation ponds, or a package treatment plant, followed by disposal of the treated effluent via injection wells or leaching fields. Because of the small flows involved and the proximity to the shoreline, no significant impact on the brackish groundwater area is likely.
Page I-15 Equivalent Annual Operation and Maintenance Cost

The breakdown of the total maintenance cost was derived as follows by the Corps of Engineers (page 56 of Design Memo 1):

- Dredging of about 100,000 cy once in 10-yr. intervals - average annual cost $ 0,000

- For maintenance of wave absorbers, a one percent cost factor is assumed, resulting in an average annual cost of 20,000

- Annual maintenance cost of the U.S. Coast Guard’s aids to navigation is estimated for the 30-yr project life 5,000

Total 534,000

Page II-40 Table II-7, Industries with Water Transportation Orientation

The list of 75 industries was selected by Zippetta-Abbat-McCarthy-Stratton (ZAMS) after a review of 133 firms in Hawaii and relating their activities into 113 industrial categories. The number of categories was then screened and reduced to 75 because the others were considered as less than prime prospects for the industrial park. Industries rejected were:

- Industries oriented to sources of material not abundant in the State or which cannot be delivered at competitive prices.

- Industries oriented to other industries not present in the State (unless integration feasible).

- Industries which must be closer to major consuming centers due to present competitive supply conditions and importance of shipping costs.

- Industries in or due for long-run decline because of advancing technology, changing tastes, rising competitive products, etc.
Industries with abundant capacity in the area or adequate space for expansion; no additional facilities needed in the foreseeable future.

Industries which locate on a "clustering" basis and which, on this account, are not likely to come to the State.

Industries that do not meet the development standards of the James Campbell Industrial Park.

Pages II-52 and II-22 Costs and Sources of Water Supply

The water supply requirement for the first phase of the proposed harbor facility is estimated to be only about 0.06 mgd, or about 0.5 percent of the present Wai-Oiaianae water district demand of 13.1 mgd. Since this district is presently not self-sufficient in water supply in that much of its supply comes from the Pearl Harbor district, the harbor water requirements as well as the anticipated CIP and Wai-Plain development requirements will have to be coordinated with the Board of Water Supply using a water master plan. Prior to the implementation of such a plan, the Board of Water Supply has indicated that the modest harbor requirements can be met with the existing system by tapping into the 20-inch main along Kahalaele Boulevard. The additional fire flow requirements for the harbor facilities will be met on an interim basis by providing salt water pumping equipment.

Page II-53 Noise Levels at Barbers Point due to Naval Air Station Operations

The noise levels, degree of exposure and accident potential from aircraft activities at the harbor site due to aircraft operations are described on pages II-32 to III-39 of the draft EIS.

Page III-4 Continued Use of the Existing Barge Harbor

This matter was referred to in our letter of June 30, 1977, to the Corps of Engineers, the agency responsible for the dredging of the harbor. We are certain that access to the existing barge harbor will be provided during the dredging operations.
Page III-6 Impacts on Coral Reefs

The impacts on coral heads a few hundred yards away from the dredged channel are expected to be insignificant. Surveys conducted near the edge of the Pearl Harbor entrance channel, for example, showed no discernible effects on the coral community much less than a hundred yards away (Dr. Ralph Bowers, personal communications). The long-term effect of the harbor is expected to be a localized moderate increase in the phytoplankton and zooplankton population resulting from the transport of surface water leaving the harbor.

Page III-13 Tsunamis

Because of the concern expressed regarding the possible tsunami effects on the subject harbor, the Corps of Engineers has requested funding to conduct a comprehensive evaluation of probable tsunami effects. The study will be conducted by the Waterways Experiment Station (WES), and the results will be applied to the design of the shoreside facilities. The discussion of tsunamis has been expanded from the draft HIE. (Status Report of April 4, 1973, attached.)

Page III-14 Surge

Surge problems are directly addressed in the revised HIE. The section on surge reads as follows:

"Surge. The March 1977 HIE study of harbor resonance showed several narrow period peaks in the period range of 20 to 150 seconds. WES, however, concluded that no significant surge problem would exist in the proposed harbor because of the character of the moored ship response and the possibility of using various mooring configurations.

Harbor oscillations with periods below about 100 seconds are not expected to create shipping operations problems because, according to WES, the period of moored surge response of the design size of Enterprise class of ships lies between 100 and 300 seconds.

The harbor resonant peaks above 100 seconds do have a potential for exciting some ship surge response. The small magnitudes and narrow widths of these peaks along with the results of other WES investigations lead WES to conclude that ship surge responses would be relatively small."
Such responses can be dealt with by appropriate changes in the ship mooring configuration to mismatch the resonant periods of the mooring system with the narrow period peaks of the harbor oscillations. (Status Report of April 4, 1973, attached.)

Page III  Storm Effects

Hurricane waves typical for Oahu were determined by Bretschneider in the Sand Island Tsunami Study (Look Laboratory bulletin, July 1973) to have a period of just under 12 seconds. As such, these waves were included in the spectrum of wave periods analyzed by the PES for resonance in the proposed harbor. It was concluded by PES that such relatively short-period waves pose no significant problem for the harbor basin although mooring procedures might be altered under extreme circumstances.

The hurricane effect on the harbor area would therefore be primarily a function of direct wind effects. The building codes applicable in Hawaii include lateral loading requirements for wind and earthquake conditions. Earthquake loadings usually govern the design with typical lateral loadings for heights less than 30 feet of 15 psi, which is equivalent to wind speed of around 75 mph. This is higher than the maximum wind speed recorded at Barbers Point Naval Air Station. Hurricane effects exceeding building code specifications are of course possible but would then have a devastating effect on the entire island and not only on the proposed shoreside facilities at the proposed Barbers Point Harbor. It might also be noted that the direct wind effect from a hurricane might temporarily make the harbor channel un navigable. This, however, would be expected for almost any harbor under hurricane conditions.

Page III-5  Percent of the Coral Required by the Department of Agriculture

The State Department of Agriculture is not directly involved in the distribution of raw coral. However, raw coral could be available to anyone from the stockpiles at prices to be determined later.

Page III-7  Dredging Depth of 38 Feet at Barbers Point and 42-43 Feet in Honolulu

The dredging depths at Barbers Point Harbor are 42 feet for the seaward portion of the entrance channel and 38 feet for
the inland portion of the channel and the turning basin. These depths were determined from the requirements of the Enterprise Class vessels which have a loaded draft of 34 feet.

The planned dredging depths for Honolulu Harbor are 45 feet at the Fort Armstrong Channel and 40 feet at the Kapalama Channel and Basin. These depths were determined from the characteristics of tankers of 39,000 deadweight tons and draft of 36 feet and other large vessels.

Essentially, the main difference in the effective depths between the two harbors is only two feet (40-38) because of the larger tankers that would use Honolulu Harbor.

Page III-40 Split Shipments

We concur that split operations may result in additional costs and for this reason shipping firms are not making commitments now. However, it is anticipated that the demand for shipping service through Barbers Point Harbor will be great enough to attract shipping companies at competitive prices.

Page III-41 Petroleum Projections and Offshore Investment

The major portion of petroleum activity in Hawaii will primarily occur at the offshore mooring facilities at Barbers Point. The proposed Barbers Point Harbor is anticipated to handle some of the residual product outflows at a petroleum berth; however, the benefits derived from this traffic are not a significant factor in the justification of the harbor.

The studies which projected the petroleum requirements for Hawaii were sponsored by the Corps of Engineers, Pacific Ocean Division. The studies were done concurrently and are titled, Study of Waterborne Commerce of Hawaii, "Petroleum Parameters", by James J. Lynch, November 1973; and "Petroleum Demand and Facilities", by Tudor Engineering Company, January 1973.

The historical base of the projections illustrated the rapid growth of Hawaii's energy consumption, 3% per year, as compared to its population increase, 2% per year, and the almost total dependence of the state on imported domestic and
foreign petroleum for its energy source. It was concluded that energy demand would be primarily influenced by population growth and price levels.

The factors which were used for predicting the future requirements were: (a) the probable increase of energy consumption due to population growth envisioned at a much lower rate; (b) the continued requirement for liquid fuel for transportation since historically almost 67% of our existing energy consumption has been used for this and the projected future need will consume about 58%; (c) the continued availability of fossil fuel, if not in the form of petroleum, then in other forms of liquified hydrocarbons such as coal, tar sand, and shale oil; and (d) the lack of significant technological breakthroughs for alternate sources of non-fossil energy for use in transportation.

In the projections of future energy requirements, energy consumption was expressed as 'equivalent petroleum consumption' measured in barrels per day. The use of petroleum as the measurement of energy in the study was qualified on the assumption that it will probably be available at a higher price during most of the study period to the year 2030.

However, if this assumption is found to be invalid, the projections would still be usable since the unit of measurement is a measure of energy consumption and could be readily converted to other possible fuel sources such as coal slurry or synthetic crude or a combination of these with natural petroleum.

These other forms of energy could be handled through most of the existing petroleum-handling facilities. Coal would most likely be transported in a more convenient form such as slurry, liquid, or gas.

Based on the above, the energy consumption in Hawaii during 1974 was 111,000 barrels/day or a total of 5.1 million tons of petroleum, and the projected consumption in 2030 is 313,000 barrels/day or a total of 27 million tons, almost a five-time increase.

The $3 million is a future investment for offshore mooring and handling facilities to be constructed in six increments, $1.5 million each, between 1985 and 2025.
Page III-42 Effects on Agriculture

The total area of the land needed for the harbor is 240 acres. Of this area, 168 acres is in the agricultural district but the land is barren and unproductive. About two acres were in cane land but this area is now included in the urban district when the West Beach improvement was approved. Studies on the effect of the harbor upon the Campbell Industrial Park indicate that their annual land leasing activity would increase from the present rate of 30 acres to 40 acres, or by 400 acres more over the next forty years. Thus, the long-term total would be 560 acres.

Cahu Sugar Company now operates on 17,300 acres of which 10,300 acres are leased from Campbell Estate and 6,200 acres are owned by the sugar company and others. The Campbell Estate's long-range development plan assumes that 4,700 acres (including harbor land) south of Farrington Highway could be developed to urban uses but 2,700 acres more of other agricultural lands could be added to Waipahu Sugar Company. Thus, the net acreage would be about 15,200 acres. This acreage could sustain the operations of the sugar company since the remainder of the land plus the additional lands are considered more productive than the lands that would be withdrawn from present production.

Page III-43 Impact on Construction Industry

The construction of the harbor would help the construction industry by providing jobs. Since the construction of the harbor will be done incrementally over a period of about 50 years, the project is viewed as consistent with controlled growth by helping stabilize the construction industry and provide long-term employment. (See Status Report by DOE on April 4, 1979, before the House Committee on Energy and Transportation.)

Page IV-1 No-Construction Alternative and Improvements in Honolulu Harbor

Under the no-construction alternative, the concerns and problems regarding the facilities for waterborne commerce will remain unresolved with the following impacts:

(a) The present net overhand haul cost between Honolulu Harbor and leeward Cahu would not be reduced. As
tonnages increase in the future, the total net overland cost will increase.

(b) Shoreside areas in Honolulu Harbor will not adequately handle all future projected cargo beyond the 1990-1995 period. This may result in a longer waiting time for ships to dock and unload.

Various strategies and plans for increasing the capacity of Honolulu Harbor are being implemented and the need for Barbers Point Harbor is not only indicated by the Corps of Engineers' studies, but has also been recognized by another notable study, the 1995 Honolulu Harbor Master Plan, which recommends the construction of the Barbers Point Harbor. That study was approved by Governor George R. Ariyoshi on April 23, 1976.

The optimum development of Honolulu Harbor has always been the objective of the harbor system plan for the State. Its Capital Improvement Program has a higher priority than Barbers Point. The strategies and plans for the development of Honolulu Harbor and Barbers Point Harbor are described in the attached Testimony of the Department of Transportation before the House of Representatives Interim Subcommittee on the 1995 Honolulu Harbor Plan (November 25, 1977, attached).

Alternatives: Partly Offshore or Offshore Harbor

We concur with the conclusions of the Corps of Engineers in not pursuing the alternatives of partly offshore or a completely offshore harbor in order to avoid destroying or damaging more reef lands.

Other arguments in favor of the proposed harbor are as follows:

- Lesser infringement in the conservation district (offshore lands).
- Lesser infringement in the special management area.
- Minimal infringement in the agricultural district because the land except for two acres is barren and not used for planting of crops.
We concur that innovative designs could be tried such as an offshore loading platform with either a causeway to shore or a cableway upon which containers could be suspended and carried ashore in the same manner as cable cars; an offshore island with approach channels and a connecting causeway to shore which in effect would be similar to the reef runway; a marginal wharf that could be constructed completely or partially inshore with protective marine structures; and a finger pier with inshore marshalling yard. Each of these schemes would require independent studies but it is obvious that any of these schemes would create greater spatial impact on the offshore reef land than the selected scheme of an inland harbor and may prove to be economically and operationally unfeasible. We consider that the site selection as well as the inland harbor concept is innovative in the sense of incorporating the existing channel and basin with the new harbor and lesser impact on the reef land.

Deferred Construction

The harbor consists of two essential parts, i.e., the marine facilities and the shore facilities. The marine facilities consisting of the channel, turning basin, wave absorbers, etc., will be constructed in a period of about 3 years. The shore facilities will be constructed in increments because of the enormous magnitude of the project. Ample time to construct as well as finance the development must be provided to maintain its feasibility. Initially, a barge-type facility will be adequate to handle cargo demands in the mid-1980's, then the facilities will be expanded to meet the expected cargo growth.

Thank you for your comments and we hope that the information provided answers to your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

LCF:ao

Attachments

bcc: M&E Pacific, Inc.
Mr. E. Alvey Wright
Department of Transportation
869 Punchbowl St.
Honolulu, HI 96813

Dear Mr. Wright,

The following comments on the "Barbers Point Deep-Draft Harbor on Oahu" Environmental Impact Statement were contributed by Bert Kimura (instructor, Chemistry), George Shirona (instructor, Science/Budget), Jack Zimmermann (Lecturer, Social Sciences), Don Klin (instructor, Oceanography), and Tony Russo (instructor, Oceanography) from Leeward Community College.

1. Oceanography
   The oceanographic data presented in this report is in general agreement with data which LCC students obtained on water characteristics and behavior for this area. Observations by our students suggest that more organisms reside in this area than the report claims.

2. Marine Related Impacts
   What are "maximum values" for residence times as referred to in paragraph 1, III-7?
   Does "not... an excessively eutrophic condition" mean that 0.70 mg / m³ is just slightly eutrophic? If so, can the extent of oxygen depletion be estimated from available data? (III-11)

   Will a change occur in populations of pelagic and benthic organisms due to construction and over the long term? (III-12)

3. Groundwater Impact
   It is not clear how harbor construction will affect the potential development of brackish caprock water. How much brackish water in the coral aquifer will be lost as a consequence of moving the shoreline inland? (III-5, 13)

4. Dredging
   There is no discussion on the need for periodic dredging of the harbor once it has been completed. How frequently would dredging be required? Will dredging be required by the lateral flow of sand as it moves up the Waianae Coast? The harbor entrance may not only retard this flow, but might cause sand bars to build up at the harbor mouth. Subsequent increased wave action due to the sandbar may be hazardous to ships.
5. Oil Spill

There is insufficient discussion on the potential effect of oil spills (except in response to comments made by DPED). The EIS should include possible impacts of spills on the surrounding area taking into consideration the distributing effect from wind currents due to topographic features, tidal currents, etc. Oahu's most productive deep water banks are just off the harbor area. In addition some of the island's most beautiful and thriving coral are found between the harbor and Kahe Point. The impact of spills on these resources should be addressed.

6. Plants

Mitigating measures for relocating Euphorbia skottsbergii are vague. What will be the extent and area of possible relocation efforts? How successful has other transplanting projects been?

What alternatives, other than relocation, have been considered for perpetuating E. skottsbergii var. kalaeloana? The Secretary of the Smithsonian Institution has recommended (House Document No. 94-51) that

Preservation of endangered and threatened species of plants in their native habitat should be adopted as the best method of ensuring their survival. Cultivation or artificial propagation of these species is an unsatisfactory alternative to in situ perpetuation and should be used only as a last resort, when extinction appears certain, with the purpose of re-establishing the species in its natural habitat.

Federal Register, June 10, 1976
p. 24524

What percent of the surveyed population will be destroyed or displaced by harbor development? What percent does this constitute of all endemic E. skottsbergii species? How far will the stockpiling occur from the second major Euphorbia colony? Although mentioned on III-15, there is no significant discussion in Section VIII about mitigating measures to control the influence of salt water on these plants. (III-14)

One year may be too short to determine whether E. skottsbergii can be relocated successfully by artificial propagation methods. Hawaiian plants, generally, are extremely slow growing. What happens, if, after the one year period, attempts at relocation fail? Will harbor development proceed as planned or be deferred until some definite progress has been made in propagation? An immediate study of E. skottsbergii's growth rate and life cycle would be beneficial. (VIII-2)

7. Demand for Utilities

Are the four proposed wells designed to meet harbor needs as well as future urban expansion of the area? With ground-water levels already critical in the Pearl Harbor Water District, will the supply be adequate to sustain all secondary developments in the Honolulu ahupua'a? (III-22, 53)

The use of injection wells for wastewater disposal is incompatible with the proposed development (page 5) of brackish caprock water in the area because of potential subsurface contamination by sewage effluents. (III-22)
8. Industrial Wastewater
Is there any possibility for domestic and/or industrial wastewater to be treated and safely re-used in the area?

9. Recreation
What specific actions will be taken to expand the access to and use of the new harbor for the general public? Will parking facilities, walkways, boat ramps, etc. be provided?

10. Impact on Surrounding Areas
Since the proposed West Beach project will be immediately north of the harbor, there should be more discussion on the impact of the harbor on this development.

11. Economic Impacts
Does the five fold increase of future petroleum shipments reflect the potential impact of alternate energy sources, particularly solar and geothermal? (III-41)

The economic advantages gained from the reduction of trucking mileage will be offset by increased overhead costs such as the maintenance of additional equipment and separate facilities and personnel at each harbor. (III-47)

How many firms in Kaka'ako would benefit economically from a harbor facility at Barbers Point? (III-53)

How much land presently used by Honolulu Harbor facilities would become available for other uses should this deep draft harbor be constructed?

How realistic is it to assume that all tonnage intended for Leeward users would be shipped through Barbers Point? (III-46)

Based on present population growth patterns, it is incorrect to assume that an individual's employment location determines his/her place of residence. Areas such as Mililani, Crestview, Kane'ohe, Waipio, Pearl City and Makakilo simply do not generate employment opportunities for the majority of residents in each respective district. (III-54)

12. Alternatives
The expanded barge harbor alternative should be recognized as being environmentally attractive, particularly in terms of the conservation of existing marine and terrestrial resources. To what extent are economic considerations of higher priority than social and environmental concerns?

13. Consulted Parties
Comments submitted by Bert Y Kimura and George T Shirma of the Division of Mathematics and Natural Sciences during the consultation period were not included in Section XII. Is there a reason for this omission?

14. Statement of Objectives
A recent news article (Honolulu Star Bulletin, Nov. 18, 1977, A-10 enclosed) indicated that container handling and storage companies would prefer maintaining operations at an improved Honolulu Harbor. Without container operations, how great is the need for a new harbor and the ancillary requirement for land area? Other than those dependent on petroleum products, what intentions have been expressed by other potential users of the deep-draft harbor? (I-4)
With severe fuel shortage predicted in the not-too-distant future, can we safely predict the need for expanded shipping facilities simply by extrapolating from the current trend?

15. Expansion of JCIP
What criteria were utilized for determining that 75 industries are potential prospects for JCIP expansion? Can all of them meet a local demand and operate profitably on O'ahu? We would appreciate receiving a copy of the TANS expansion plans in order to better understand the basis for statements presented. (II-48)

[Signature]
John E. Moriyama
Community Information and Resource Center
May 9, 1978

Mr. John E. Moriyama
Community Information and
Resource Center
Leeward Community College
96-045 Ala Ike Street
Pearl City, Hawaii 96782

Dear Mr. Moriyama:

Subject: Response to Draft EIS
Barbers Point Harbor

The following is our response to your letter of November 22, 1977, concerning the subject EIS:

Oceanography

Comment:

The oceanographic data presented in this report is in general agreement with data which LCC students obtained on water characteristics and behavior for this area. Observations by our students suggest that more organisms reside in this area than the report claims.

Response:

The marine environmental survey for the project was completed in November 1975 and the report was based on data censused at ten stations. The data were collected for seven days in the field during the months of October and November 1975.

It could very well be that there are more organisms than were reported since there may be cyclical and seasonal changes.

Marine-Related Impacts

Comment:

What are "maximum values" for residence times as referred to in paragraph 1, III-7?
Does 'not...an excessively eutrophic condition' mean that 0.70 mg/m^3 is just slightly eutrophic? If so, can the extent of oxygen depletion be estimated from available data? (III-11)

Will a change occur in populations of pelagic and benthic organisms due to construction and over the long term? (III-12)

Response:

The residence time "maximum values" referred to in the draft EIS (III-7) are 3 days for the present harbor, and 16 days for the proposed harbor. It must be remembered that these are "outside maximum values" because they do not take into account the two significant exchange mechanisms of wind transport and fresh water flux, and will only occur in the proposed harbor should the wind and groundwater movements cease for an extended period.

An average phytoplankton concentration of 0.70 mg/m^3 can be considered slightly eutrophic. The extent of oxygen depletion in the proposed harbor cannot be accurately calculated from available data because not enough is known about the present trophic structure. However, the conditions of the proposed harbor can be compared to those of North Kaneohe Bay, where no significant oxygen depletion problems exist.

As expected, the populations of pelagic and benthic organisms in the harbor will be affected by harbor construction, but those populations beyond the dredged area outside the harbor will not be significantly impacted.

Groundwater Impact

Comment:

It is not clear how harbor construction will affect the potential development of brackish caprock water. How much brackish water in the coral aquifer will be lost as a consequence of moving the shoreline inland? (III-5, 13)

Response:

Development of the harbor would reduce the volume of brackish water presently stored in the coral aquifer, but would
not significantly affect the net flux of this water to the ocean. Therefore, although the area from which such water can be extracted will be reduced, the same amount of water will be available, but the wells would have to be located further inland, as harbor construction would essentially move the shoreline inland at the harbor site.

Dredging

Comment:

There is no discussion on the need for periodic dredging of the harbor once it has been completed. How frequently would dredging be required? Will dredging be required by the lateral flow of sand as it moves up the Waianas Coast? The harbor entrance may not only retard this flow, but might cause sand bars to build up at the harbor mouth. Subsequent increased wave action due to the sand bar may be hazardous to ships.

Response:

The Corps of Engineers estimates that requirements for maintenance dredging are not expected to be a significant item. There are no streams entering the harbor and the near shore littoral pattern does not indicate that significant amounts of sand would be deposited in the channel. Therefore, an estimated dredging of every 10 years with removal of 100,000 cubic yards was used for evaluation purposes, resulting in an average annual cost of $8,000.

Oil Spill

Comment:

There is insufficient discussion on the potential effect of oil spills (except in response to comments made by DPED). The EIS should include possible impacts of spills on the surrounding area taking into consideration the distributing effect from wind currents due to topographic features, tidal currents, etc. Oahu's most productive deep-water banks are just off the harbor area. In addition, some of the island's most beautiful and thriving coral are found between the harbor and Kane Point. The impact of spills on these resources should be addressed.
Response:

The offshore and inshore transfer facilities are subject to the regulation and inspection of the U. S. Coast Guard of the Federal Department of Transportation. The U. S. Coast Guard also maintains records of oil spills in all the harbors and offshore transfer facilities. Between January 12, 1973, and November 5, 1977, there were 26 incidents of oil spills at the existing offshore moorings and barge harbor. Oil spills of 2,280 gallons of diesel oil and 2,100 gallons of crude oil were recorded on February 7, 1973, and February 18, 1974, respectively. The other spills vary in amounts of 2 to 420 gallons. During the same period, the spills amount to 2,514 gallons of crude oil and 3,342 gallons of refined products. These figures indicate that the risk of spills in handling refined petroleum products is more than in handling crude oil. However, an unusual accident in unloading crude oil may reverse these figures.

Although the U. S. Coast Guard strictly enforces preventive measures and practices, the risk of oil spills at the offshore moorings are higher than at harbor facilities where firm docking and transfer equipment are available. The proposed Barbers Point Harbor would provide berthing spaces for oil tankers and barges for the loading and unloading of refined petroleum products, in accordance with U. S. Coast Guard rules and regulations on petroleum transfers.

Large oil spills in the proposed harbor would be easier to contain because of its almost land-locked configuration than spills in the offshore moorings.

Plants

Comment:

Mitigating measures for relocating Euphorbia skottsbergii are vague. What will be the extent and area of possible relocation efforts? How successful has other transplanting projects been?

What alternatives, other than relocation, have been considered for perpetuating E. scottsbergii var. kalaeloana?
The Secretary of the Smithsonian Institution has recommended (House Document No. 94-31) that:

"Preservation of endangered and threatened species of plants in their native habitat should be adopted as the best method of ensuring their survival. Cultivation or artificial propagation of these species is an unsatisfactory alternative to in situ perpetuation and should be used only as a last resort, when extinction appears certain, with the purpose of re-establishing the species in its natural habitat." (Federal Register, June 10, 1976, p. 24524)

What percent of the surveyed population will be destroyed or displaced by harbor development? What percent does this constitute of all endemic E. skottsbergii species? How far will the stockpiling occur from the second major Euphorbia colony? Although mentioned on III-15, there is no significant discussion in Section VIII about mitigating measures to control the influence of salt water on these plants. (III-14)

One year may be too short to determine whether E. skottsbergii can be relocated successfully by artificial propagation methods. Hawaiian plants, generally, are extremely slow-growing. What happens, if, after the one-year period, attempts at relocation fail? Will harbor development proceed as planned or be deferred until some definite progress has been made in propagation? An immediate study of E. skottsbergii's growth rate and life cycle would be beneficial. (VIII-2)

Response:

The endangered Euphorbia skottsbergii is now being successfully propagated at the Awanara Nursery in Kaneohe and Campbell Estate is now in the process of developing a program of transplanting the cuttings at selected locations in the Barbers Point area. We have no information on the success of other transplanting projects. We understand that this will be the first attempt. We have not considered any other alternatives for propagating the Euphorbia other than saving some colonies and propagation in other areas in Barbers Point. We hope that the transplanting program which is equivalent to in situ perpetuation will be successful. We still have a lot of time to observe the life cycle of this plant. The first phase of
the harbor construction will be the dredging of the channel and the turning basin. There are no Euphorbia in these areas. The dredging will be followed by the construction of the shoreside facilities which is programmed in 1983.

The total number of plants was not counted. Judging by the area covered in the survey about half of the population is in the shore facilities area and the other half is in the stockpile areas. We could not relate the percent of the Euphorbia in the shore facilities to the total population of the endemic E. skottsbergii. We understand that there are a number of specimens of this plant preserved in the Bishop Museum Herbarium collected as early as 1916 from Barbers Point to Pearl Harbor and the Ewa plain. Just how much more is growing in these other areas would be difficult to determine. Every effort will be made to propagate this plant.

Demand for Utilities

Comment:

Are the four proposed wells designed to meet harbor needs as well as future urban expansion of the area? With groundwater levels already critical in the Pearl Harbor Water District, will the supply be adequate to sustain all secondary developments in the Honouliuli ahupua'a? (III-22, 53)

The use of injection wells for wastewater disposal is incompatible with the proposed development (page 5) of brackish caprock water in the area because of potential subsurface contamination of sewage effluents. (III-22)

Response:

The four wells proposed to supplement the Ewa-Waianaee district may be part of the improvement plans of the Barbers Point area master plan which will be coordinated with the Board of Water Supply. This water master plan will endeavor to find ways to supply water to the Honouliuli ahupua'a.

Any injection wells to be installed for wastewater disposal will be located close to the shoreline, down gradient from any wells that might tap the water stored in the coral aquifer. Therefore, there is no significant threat of subsurface contamination to the brackish water, should it be developed in the future.
Industrial Wastewater

Comment:

Is there any possibility for domestic and/or industrial wastewater to be treated and safely reused in the area?

Response:

Recycling of domestic and/or industrial wastewater is a possibility but this has to be done on a regional basis to make it worthwhile. The estimated effluent from the harbor is only about 0.06 mgd. It may not be feasible to treat only this amount of effluent. On a regional basis involving large quantities, the treated effluent could possibly be impounded in reservoirs and reused for the irrigation of the adjacent agricultural lands.

Recreation

Comment:

What specific actions will be taken to expand the access to and use of the new harbor for the general public? Will parking facilities, walkways, boat ramps, etc., be provided?

Response:

There is a boat launching ramp in the existing barge basin. The continuous use of this facility or its relocation and improvement in the barge basin will be considered in the final design of the berthing spaces for the tugboats and other marine equipment that would be co-located in that basin. The need for parking spaces and other improvements will be evaluated according to the necessity and needs during the design of the shore facilities. The use of the launching ramp may, however, be temporarily halted during the construction period for safety reasons.

Impact on Surrounding Areas

Comment:

Since the proposed West Beach project will be immediately north of the harbor, there should be more discussion on the impact of the harbor on this development.
Mr. John E. Moriyama
Page 8
May 9, 1978

Response:

The master plan for the West Beach project shows the construction of a marina on the north side of the proposed harbor. The marina will be compatible with the harbor and the marina would in effect serve as a buffer zone between the harbor and the West Beach Development. However, we are concerned with the probable effects of the proposed entrance to the marina. Our concerns are as follows:

1. The entrance of the marina at the mauka end of the deep-draft harbor entrance channel would create an undesirable traffic mix in the channel involving large and small vessels.

2. The marina would have an effect on the resonance characteristics of the harbor configuration. The type and magnitude of this effect are presently unknown and would require further study since the marina was not taken into account during the design of the deep-draft harbor.

3. The presence of the marina may have a detrimental effect on the water quality of the deep-draft harbor. It is expected that there will be significant inflow of nutrient rich groundwater to the marina, similar to the inflow to the deep-draft harbor. The marina is likely to have somewhat longer residence time characteristics than might be expected since the marina entrance channel is aligned roughly perpendicular to the prevailing wind direction. In addition, the two-layer flow induced by the inflow of groundwater is not expected to be as effective an exchange mechanism as in the deep-draft harbor because the marina discharge would be into the already formed surface layer of the harbor rather than into the nearshore waters. These limitations in exchange would probably mean that the primary exchange mechanism for the proposed marina is tidal exchange. Tidal exchange by itself would result in an average marina residence time of about five days relative to the harbor. This longer residence time, combined with the anticipated relatively high nutrient concentrations, would probably result in a fairly high
phytoplankton concentration (estimated to be as high as 2.5 ug/l chlorophyll-a based on a net growth rate of 0.25 per day and an initial concentration of 0.7 ug/l chlorophyll-a for the deep-draft harbor). This would be comparable to the levels in South Kaneohe Bay. The overall result of the marina would therefore be an increase in the turbidity in the deep-draft harbor, with the increased possibility of periodic algae blooms and oxygen problems during calm wind conditions.

The marina entrance channel should be relocated out of the deep-draft harbor and independent access to the ocean should be provided for the marina. This would eliminate the difficulties discussed above.

Economic Impacts

Comment:

Does the five-fold increase of future petroleum shipments reflect the potential impact of alternate energy sources, particularly solar and geothermal? (III-41)

Response:

Yes. However, transportation in Hawaii takes up a large percentage of our energy requirements. This fact is not anticipated to change in the future due to the State's geographical location. Even with technological breakthroughs in solar or similar alternate sources, the demand for liquified energy will still be substantial due to transportation requirements. Coal is a viable alternate source of energy primarily for the generation of electricity.

Comment:

The economic advantages gained from the reduction of trucking mileage will be offset by increased overhead costs such as the maintenance of additional equipment and separate facilities and personnel at each harbor. (III-47)
Response:

Dockage and wharfage fees are uniform at all the piers operated by the State. Thus, ships destined for Barbers Point will not pay any more than the fees charged at Honolulu Harbor. On a systems basis for the State's ports, revenues from fees are used to pay for the construction, maintenance and operations of the shore facilities in the State.

It is anticipated that the amount of cargo movement through Barbers Point Harbor be adequate enough to attract shipping firms which will provide services at a competitive price.

The Corps of Engineers, in calculating the benefit-cost ratio for the marine facilities, had taken into consideration the average annual cost versus the overland transportation savings as well as other benefits.

Comment:

How many firms in Kaka'ako would benefit economically from a harbor facility at Barbers Point? (III-53)

Response:

We could not determine how many firms in Kaka'ako would be benefited by the harbor. However, the following data might be useful to you:

The Corps of Engineers' survey in November 1975 estimated that the commerce between Honolulu Harbor and leeward Oahu industrial areas amounted to 490,095 tons. This data is reported in the Corps of Engineers' Design Memorandum No. 1 which also contains the following statement concerning Kaka'ako:

"Erosion of the existing warehousing in the Honolulu Harbor vicinity would mean additional containers would be traveling overland to reach warehousing if there were no harbor near the future warehousing (industrial) growth center. Environmental Capital Managers study on land-use impacts observed that just the shifts expected in the Kaka'ako warehousing area would result in over 25% of the existing Honolulu warehousing to other areas, probably leeward."
Comment:

How much land presently used by Honolulu Harbor facilities would become available for other uses should this deep-draft harbor be constructed?

Response:

No land in Honolulu Harbor will be available for other uses should the deep-draft harbor be constructed. It is anticipated that all available lands will be developed for harbor operations and will be under maximum use when Phase I of Barbers Point Harbor is completed.

Comment:

How realistic is it to assume that all tonnage intended for leeward users would be shipped through Barbers Point? (III-46)

Response:

The cargo projection for Barbers Point Harbor was based on extensive research such as economic, land-use, and population growth studies. In accordance to all the available information and data, the projections for Barbers Point are considered realistic.

Comment:

Based on present population growth patterns, it is incorrect to assume that an individual's employment location determines his/her place of residence. Areas such as Mililani, Crestview, Kaneohe, Waipio, Pearl City and Makakilo simply do not generate employment opportunities for the majority of residents in each respective district. (III-54)

Response:

An indication of an individual's employment location and place of residence could be derived from the statistics compiled by Campbell Estate. Their figures indicate that 61.5 percent of the workers in Campbell Industrial Park reside in the leeward district, 8 percent reside in the Ewa-Makakilo-Barbers Point areas, and the remainder in other parts of the island.
on these residential patterns, Campbell Estate estimates that by the year 2000, approximately 66 percent may live in the leeward district and 25 percent in the Swa-Makakilo-Barbers Point area.

We agree that there are many factors that influence an individual's place of residence. Among these are income, proximity to place of work, social and family ties, public amenities, etc. It is rather difficult to assess which of these factors are the most important but income and proximity to work play important roles.

The other communities you mentioned were developed as residential areas with a small commercial center as the core. They are not expected to provide employment to the people living there.

Alternatives

Comment:

The expanded barge harbor alternative should be recognized as being environmentally attractive, particularly in terms of the conservation of existing marine and terrestrial resources. To what extent are economic considerations of higher priority than social and environmental concerns?

Response:

Economic consideration is a very important factor in the construction of the harbor and for that matter, any public works facility. The objective is to construct the harbor as economically as possible with the minimum environmental impacts.

Consulted Parties

Comment:

Comments submitted by Mr. Bert Y. Kimura and Mr. George T. Shiroma of the Division of Mathematics and Natural Sciences during the consultation period were not included in Section XII. Is there a reason for this omission?
Response:

We regret the fact that the comments submitted by Mr. Bert K. Kimura and Mr. George T. Shiroma were not typed in time to be added to the draft EIS. By this time, they would have received our reply. Their letter, as well as our response, will be included in the final EIS.

Statement of Objectives

Comment:

A recent news article (Honolulu Star-Bulletin, November 13, 1977, A-16, enclosed) indicated that container-handling storage companies would prefer maintaining operations at an improved Honolulu Harbor. Without container operations, how great is the need for a new harbor and the ancillary requirement for land area? Other than those dependent on petroleum products, what intentions have been expressed by other potential users of the deep-draft harbor? (I-4)

Response:

Fully loaded container ships may not immediately use the harbor but even if the container operations were deferred, the harbor would be needed for the shipment of petroleum products and for non-containerized commodities such as cement and sand products, scrap iron, raw iron, lumber, tile and clay products, aggregates (cinder), etc.

Other potential users such as the Cyprus Hawaiian Cement Corporation, Amaron KHD and Kemult Incorporated have testified in a hearing held on April 4, 1978, by the House Committee on Energy and Transportation of the Ninth State Legislature that they would use the Barbers Point Harbor. Attached are copies of their testimonies.

Comment:

With severe fuel shortage predicted in the not-too-distant future, can we safely predict the need for expanded shipping facilities simply by extrapolating from the current trend?
Response:

It is not likely that past trends may continue and the shipping forecasts were not made by simply extrapolating from present trend. They were developed on demand models developed for the conditions in Hawaii. It is unlikely that alternate transportation modes will provide economical movement of goods as the waterborne mode.

Expansion of JCIP

Comment:

What criteria were utilized for determining that 75 industries are potential prospects for JCIP expansion? Can all of them meet a local demand and operate profitably on Oahu? We would appreciate receiving a copy of the TAMS expansion plans in order to better understand the basis for statements presented. (II-48)

Response:

The list of 75 industries was determined by TAMS after a review of 158 firms in Hawaii and relating their activities into 115 industrial categories. The industrial categories were then screened and reduced to 75 because the others were considered as less than prime prospects for the industrial park. The following were rejected:

- Industries oriented to sources of material not abundant in the State or which cannot be delivered at competitive prices.
- Industries oriented to other industries not present in the State (unless integration feasible).
- Industries which must be closer to major consuming centers due to present competitive supply conditions and importance of shipping costs.
- Industries in or due for long-run decline because of advancing technology, changing tastes, rise of competitive products, etc.
Mr. John E. Moriyama
Page 15
May 9, 1973

- Industries with abundant capacity in the area or adequate space for expansion; no additional facilities needed in the foreseeable future.

- Industries which locate on a "clustering" basis and which, on this account, are not likely to come to the State.

- Industries that do not meet the development standards of the James Campbell Industrial Park.

As far as we know, a separate market study was not made on each of the industries listed.

We have only one copy of TAMS report and cannot furnish you another copy. You may, however, examine our file copy.

Thank you for your comments and we hope that the information provided answers your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

LCF:di

Attachments

bcc: M&E Pacific, Inc.
By Matson; U.S. Lines

Barbers Pt. Harbor Opposed

By Gregg Tokayama
Star-Bulletin Writer

The deep-water harbor at Barbers Point sought by the State Department of Transportation would not be used by the two largest shipping companies serving Hawaii, state legislators were told yesterday.

Officials of Matson Navigation Co. and United States Lines Inc. urged that state funds instead be used to improve existing facilities at the downtown Honolulu Harbor.

"The construction of a Barbers Point harbor would mean splitting operations between downtown and Barbers Point, burdening shippers with added expenses for more equipment," said James L. Reid, senior vice president for Matson.

"It already costs Matson between $500,000 and $750,000 a year extra to split its container operations between Honolulu Harbor's Fort Armstrong Terminal and Sand Island," he said. "A second major harbor would add even more expenses," Reid said.

"THE ONLY CONDITION under which it would be feasible to use a second Oahu harbor would be if all facilities were fully utilized and could not be expanded at Honolulu (Harbor)," said a spokesman for Davies Marine Agencies, representing U.S. Lines.

The shippers spoke at a state House subcommittee hearing on the Honolulu Harbor master plan. The House study was called for by a resolution which caused bitter debate between critics and backers of the proposed harbor at the last legislative session.

Under a proposal supported by the State Department of Transportation, the state would receive 250 acres of Campbell Estate land (valued at $10.4 million) for the harbor, in return for the rights to sell the coral dredgings.

The state is seeking $50 million from Congress for dredging and construction of the harbor.

OPPONENTS OF THE deal argue that the 17 million tons of dredged coral, widely used in local construction, could be worth much more than the Barbers Point land.

State Transportation Director E. Alvey Wright told legislators that the future growth of the Leeward Oahu area, plus the cramped quarters at Honolulu Harbor, justify the Barbers Point harbor.

"When you get a $50 million harbor for less than 5 percent state funding, it's a bargain. We should build it even if we don't use it," Wright said.

He added that state studies show that the second harbor would be used.

Representatives from shipping companies, however, said the present Honolulu Harbor, plus new facilities at Sand Island, would meet shipping needs for at least the next decade.

THE LONG-RANGE Honolulu Harbor plan calls for locating all container operations on Sand Island.

Robert Keen of Dillingham Corp., which runs interisland shipping, said, "present-day and near-term foreseeable problems are in Honolulu Harbor and it is here where the greatest improvement can be achieved."

Reid of Matson criticized the transportation department for dragging its feet in expanding its Fort Armstrong facilities.

A third container ship will begin Mainland runs next year and the improvements are needed to make room for the added cargo, he said.

Ariyoshi Not Freeing Funds for Kohala Yet

Gov. George Ariyoshi yesterday said...
Mr. Chairman, members of the House Committee on Transportation.

My name is Nat Potter. I'm vice president of Cyprus Hawaiian Cement Corporation. Our cement manufacturing plant is located at Campbell Industrial Park. Our company enthusiastically supports the development of a deep water harbor, both for selfish reasons and because we are citizens of this community and wish to see maritime services improved for this island state, so dependent on waterborne commerce.

We annually import 3 or 4 shiploads of silica sand and gypsum needed in the manufacture of portland cement. Each ship presently requires approximately 600 truck trips from Honolulu Harbor to Campbell Industrial Park.

We annually haul from Barbers Point to Honolulu Harbor for transshipment to the Neighbor Islands, approximately 28,000 tons of finished portland cement, which requires another 1,100 truck trips.

This adds up to 5,000 one-way trips annually - for only one company! The construction of a deep water harbor at Campbell Industrial Park should result in the complete elimination of this movement (and comparable truck trips by our competitor - which has a 20-mile longer haul, round trip) and:

1. Lower costs of some raw materials
2. Lower costs of shipping cement to the Neighbor Islands
3. Significant reduction of traffic congestion
4. Meaningful conservation of fuel energy, and
5. Combining the above, help to slow the inflationary trend in construction costs.

To repeat, we strongly urge the construction of this deep water harbor.

Thank you for the opportunity to offer this testimony.
Michael B. Wood, Executive Vice President
KENAULT INCORPORATED - Broker/Distributor
Tenant C.I.P. - Planning 2,500,000 cu.ft. distribution center in Park serving all islands - distributing: Food and Household products to all Hawaii.
Planned Completion - Spring 1979.

Testimony on behalf of creating a deep draft harbor at Barbers Point.

1. Current island 3 phase expansion (resident, retail and wholesale) supports location of deep draft harbor at Barbers Point...all growth in this direction.
   a. Theory is that first expansion is residential, followed shortly thereafter by major retail expansion and finally by wholesale/distribution and support industries.
      1) The Leeward side of the island is well into the second phase (retail) and is now entering into the wholesale/distribution phase.
      2) One outside factor that has an unusually strong influence in Hawaii is the rapid increase in the cost of land in Zones 1 and 2 and the limited amount of land available for major development in the Honolulu, airport area for the distribution industry.
      3) It is KENAULT's feeling that by 1988 - 10 years from now - that we will be nearly as close to our major customers distribution point as we are currently in our present Honolulu location. Because of the limited growth potential in the Koko Head direction, the only logical direction of continued growth will be in the Ewa direction. Thus the Barbers Point harbor looms very important to the whole distribution industry, not just KENAULT.
Other points in favor of the deep draft harbor are:

1. Removes congestion from downtown area.
   a. This includes removing many motor vehicles (containers, etc.) currently supporting Honolulu harbor.
      
      Note: That after approx. 10 year period the cost of fuel, etc. will probably be no greater to those vehicles supporting the Barbers Point harbor customers, then they would for the Honolulu harbor customers.
      
      b. Thus you have effectively reduced the demand on the present harbor system by diverting traffic to Barbers Point without adding real long term economic costs to those customers presently using the system.

2. Economics of land cost and use force realistic expansion to Leeward side.
   a. Cost of condemnation and land acquisition in Honolulu area far from acceptable.
   b. Public and private enterprise will be building and expanding in Leeward area.

3. With Leeward, Oahu being new center of industrial and distribution support, Barbers Point harbor would bring savings on both in-haul and out-haul to main Oahu customers, (many industrial customers already closer to Barbers Point).

4. If Young Bros. would locate facility at Barbers Point, KENAVULT and many other customers would find shipping to neighbor island customers right at our back door.

      Note: Neighbor island customers represent 20% of our current 30 million in sales.

5. Greater flexibility to our direct shipment customers (import-full container shipments). Depending on location of customers warehouse or retail location we can pick harbor closest to their facility to reduce in-haul cost.
KENAULT usage of current and planned distribution center

<table>
<thead>
<tr>
<th></th>
<th>1978</th>
<th>1988</th>
</tr>
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<tbody>
<tr>
<td>a. $ volume out of distribution center</td>
<td>$22,000,000</td>
<td>$70,000,000</td>
</tr>
<tr>
<td>b. Pounds shipped out of distr. center</td>
<td>28,000,000</td>
<td>60,000,000</td>
</tr>
<tr>
<td>c. Out island business $</td>
<td>$5,000,000</td>
<td>$15,000,000</td>
</tr>
<tr>
<td>c. Incoming containers</td>
<td>1,000/yr</td>
<td>2,200/yr</td>
</tr>
</tbody>
</table>

Mike Wood
November 22, 1977

Dr. Richard E. Marland
Director
Office of Environmental Quality Control
Office of the Governor
State of Hawaii
550 Halekauwila Street
Room 301
Honolulu, Hawaii 96813

Dear Dr. Marland:

Draft Environmental Impact Statement for the Barbers Point Deep-Draft Harbor on Oahu

The proposed Deep-Draft Harbor will have no adverse environmental impact on our basal groundwater sources because only the caprock will be excavated.

A water master plan will be required for the initial and ultimate water requirements of the project before we can assess our ability to provide for the total water needs of the harbor.

If there are any further questions on this matter, please call Lawrence Whang at 548-5221.

Very truly yours,

Edward Y. Hirata
Manager and Chief Engineer

cc: Mr. E. Alvey Wright, Director
Department of Transportation
State of Hawaii
Mr. Edward Y. Hirata  
Manager and Chief Engineer  
Board of Water Supply  
630 South Beretania Street  
Honolulu, Hawaii 96813  

Dear Mr. Hirata:

Subject: Response to Draft EIS  
Barbers Point Harbor  
Job H. C. 1315

Reference is made to your letter of November 22, 1977, concerning the EIS for the subject project.

We are pleased to find that you concur with our findings that the proposed harbor will not impact the basal groundwater sources.

We have estimated that the water requirements directly attributable to the harbor will be about 60,000 gallons per day. The ultimate water requirements will be furnished to you during the design stages of the project.

As you suggested in your letter, it is anticipated that the water requirements for the harbor will be coordinated with the other users in the area and a water master plan will be prepared. This work will, of course, require the participation of the Board of Water Supply.

Very truly yours,

R. Higashionna
R. HIGASHIONNA, Ph.D.
Acting Director
November 17, 1977

Dr. Richard E. Marland, Director
Office of Environmental Quality Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

Environmental Impact Statement-Barber’s Point-Deep Draft Harbor

We have reviewed the Environmental Impact Statement (EIS on the above project. Generally, we find the document to be comprehensive and thorough. We recommend, however, that it be noted in "Section IV. Relationship of the Proposed Actions to...Controls for the Affected Area", that work proposed within 40 feet of the certified shoreline is subject to the "Shoreline Setback Rules and Regulations of the City and County of Honolulu (HRS, Chapter 205-32)."

Although government construction of harbor and waterfront facilities are exempt from these rules and regulations, the governmental body charged with the construction must hold two public hearings as follows:

1. When the project is first conceived, and
2. When the project is substantially designed and planned, but prior to the letting of the construction contract.

We have no comments on some of the more technical aspects of the project at this time, but this does not imply our concurrence with the analysis or conclusions drawn therefrom.

Please contact Mrs. Lorrie Chee at 523-4077 if you should have any questions or wish additional information.

Very truly yours,

GEORGE S. MORICUCHI
Director of Land Utilization
January 24, 1978

Mr. George S. Moriguchi, Director
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Moriguchi:

Subject: Response to Draft EIS
Barbers Point Harbor
Job H. C. 1315

Reference is made to your letter of November 17, 1977, regarding the EIS for subject project.

We will note your requirement that construction within 40 feet of the certified shoreline is subject to the "Shoreline Setback Rules and Regulations of the City and County of Honolulu (HRS, Chapter 205-32)". We intend to submit our request for a permit as soon as the EIS is approved by the Governor.

We also intend to comply with the public hearing requirements as specified in your letter.

Very truly yours,

R. Higashionna
R. HIGASHIONNA, Ph.D.
Acting Director
Environmental Quality Commission  
550 Halekauwila St., Rm. 301  
Honolulu, Hawaii 96813

Gentlemen:

EIS for Barbers Point Deep-Draft Harbor

We recommend that the following paragraph be included in the Mitigation Measures Proposed to Minimize Impact section of the report:

The Contractor shall provide, install, and maintain all necessary signs and other protective facilities, which shall conform with the "Rules and Regulations Governing the Use of Traffic Control Devices at Work Sites on or Adjacent to Public Streets and Highways" adopted by the Highway Safety Coordinator, and the Federal Highway Administration's "Manual on Uniform Traffic Control Devices for Streets and Highways", Part VI "Traffic Control for Highway Construction and Maintenance Operations".

Very truly yours,

[Signature]

cc: Office of Env. Quality Control  
DOT
Mr. Kazu Hayashida, Director  
Department of Transportation Services  
City and County of Honolulu  
Honolulu Municipal Building  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

Subject: Response to EIS  
Barbers Point Harbor  
Job H. C. 1315

The regulation of traffic recommended in your letter of November 22, 1977, will be included as part of mitigation measures in the EIS.

We wish to thank you for your recommendation.

Very truly yours,

R. HIGASHIONNA, Ph.D.  
Acting Director
Environmental Quality Commission
State of Hawaii
550 Halekauwila Street, Rm. 301
Honolulu, Hawaii 96813

Gentlemen:

Subject: Barbers Point Deep-Draft Harbor on Oahu
Environmental Impact Statement

Thank you for the opportunity of reviewing the subject environmental impact statement.

We have no objections to the project.

Per your request we are returning the copy of the EIS forwarded to us.

Sincerely,

TYRONE T. KUSAO

Director

Enc.

cc: Office of Environmental Quality Control
Department of Transportation
State of Hawaii
Mr. Tyrone T. Kusao, Director
Department of Housing and
Community
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Sir:

Subject: Response to Draft EIS, Barbers Point Harbor

In response to your letter of October 18, 1977, we are very pleased to know that you have no objections to the subject project.

We wish to thank you very much for reviewing the environmental impact statement.

Very truly yours,

R. HIGASHIONNA, Ph.D.
Acting Director
October 19, 1977

Office of Environmental Quality Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

Subject: Environmental Impact Statement
for the Proposed Barbers Point
Deep-Draft Harbor on Oahu

We have reviewed the subject EIS and have the following comments.

a. So few specifics are given on the proposed sewer system serving the harbor that we are wondering whether a supplementary EIS will be prepared at a later date.

b. No mention is made on who will be responsible for the operation and maintenance of the proposed interim and regional wastewater treatment plants. Will it be the State and/or the Campbell Estate?

c. It might be difficult to implement the proposed interim and permanent sewer systems unless those systems are designated and made a part of the "208" Areawide Waste Treatment Management Plan for Oahu. Also, new water quality standards (Chapter 37A) which are being proposed for adoption in January 1978 as part of the 208 planning process may have an effect on the proposed effluent disposal schemes.

d. Only the general concept of the drainage system is described and discussed, therefore, few comments can be made. Is it proposed that the system be dedicated to the City and County for maintenance?

e. The proposed drainage system will convey silt, trash and other pollutants into the harbor and the ocean. Other
pollutants will probably include some petro-chemical wastes generated by harbor and shore facilities.

f. Solid wastes generated by harbor and shore facilities should be collected and hauled by the State and private collectors to the Palailai sanitary landfill at Makakilo.

g. A permit for grading, excavation and fill will be required pursuant to Ordinance No. 4538, approved December 31, 1975, Chapter 23, Revised Ordinances of Honolulu, 1969, as amended. State activities are now required to comply with the provisions of the revised ordinances.

Very truly yours,

WALLACE MIYAHIRA
Director and Chief Engineer

cc: State Dept. of Transportation
Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Subject: Response to Comments on the EIS for the Proposed Barbers Point Deep-Draft Harbor

Thank you for your review of the subject EIS. Following are restatements of your comments along with our responses:

Comment: So few specifics are given on the proposed sewer system serving the harbor that we are wondering whether a supplementary EIS will be prepared at a later date.

Response: The Regional Sewer System for the Barbers Point area, which will include the flows from the proposed harbor, has not yet been planned in detail. It is expected that the regional system will require its own EIS. If such a system is not available when the harbor begins operation, an interim system for the first phase harbor sewage flows of 0.06 mgd will have to be provided using one of the alternatives discussed in the EIS.

Comment: No mention is made on who will be responsible for the operation and maintenance of the proposed interim and regional wastewater treatment plants. Will it be the state and/or the Campbell Estates?
Response: If an interim wastewater system is required for the harbor, the State will be responsible for its operation and maintenance. The planning of the regional system will be coordinated by Campbell Estate; no definite decision has been made regarding operation and maintenance.

Comment: It might be difficult to implement the proposed interim and permanent sewer systems unless those systems are designated and made a part of the "208" Areawide Waste Treatment Management Plan for Oahu. Also, new water quality standards (Chapter 37-A) which are being proposed for adoption in January 1978 as part of the 208 planning process may have an effect on the proposed effluent disposal schemes.

Response: The proposed wastewater systems will have to conform to all applicable Department of Health and EPA regulations.

Comment: Only the general concept of the drainage system is described and discussed; therefore, few comments can be made. Is it proposed that the system be dedicated to the City and County for maintenance?

Response: The planning of the Regional Drainage System for the Barbers Point area is being coordinated by Campbell Estate. It is expected that this regional system will require its own IIS. The local harbor drainage system will be the responsibility of the State Department of Transportation.

Comment: The proposed drainage system will convey silt, trash and other pollutants into the harbor and the ocean. Other pollutants will probably include some petro-chemical wastes generated by harbor and shore facilities.

Response: The local harbor drainage system is not expected to result in significant discharges of silt, trash and other pollutants into the harbor.
because Department of Transportation maintenance practices and regulations as well as U.S. Coast Guard regulations will be strictly enforced. In addition, it should be noted that the low average rainfall in the area minimizes the amount of local runoff. No off-site drainage or streams will enter the harbor, thereby resulting in significantly better prospects for good water quality.

The effects of the Regional Drainage System will have to be addressed in a separate EIS.

**Comment:** Solid wastes generated by harbor and shore facilities should be collected and hauled by the State and private collectors to the Palailai sanitary landfill at Makakilo.

**Response:** This comment will be considered in the detailed design phase of the harbor facilities.

**Comment:** A permit for grading, excavation and fill will be required pursuant to Ordinance No. 4538, approved December 31, 1975, Chapter 23, Revised Ordinances of Honolulu, 1969, as amended. State activities are now required to comply with the provisions of the revised ordinances.

**Response:** This permit will be obtained before harbor construction begins.

Thank you for your comments and we hope that the information provided answers to your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

R. Higashionna

LCP:ao

bcc: Me Pacific, Inc.
Office of Environmental Quality Control
869 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

SUBJECT: BARBERS POINT DEEP-DRAFT HARBOR ON OAHU

In response to your letter requesting our comments on the Environmental Impact Statement of the proposed Barbers Point Deep-Draft Harbor, the Department of Parks and Recreation believes the following comments should be addressed:

a) Public access - Section III-18. "Implementation of the public harbor development would expand the access and use of the coastal resources to the general public."

Comments: The EIS does not describe in sufficient detail, how public access will be increased and what additional, if any, recreational opportunities will be provided.

b) The existing recreational launching ramp - Section III-18. "During the construction period, recreational fishing within the existing barge harbor and use of the launching ramp may be restricted or temporarily halted, depending upon the final construction procedures. Use of the barge basin would be restored after construction, and the new harbor would provide additional areas for recreational fishing use."

Comments: These statements imply that once construction of the proposed project is completed, the State will operate the existing launching ramp.
The ultimate concept plan of shoreline facilities (Fig. I-4) and accompanying text (Phase III, Sec. I-11), however, do not indicate the existence of a recreational launching facility or where it is to be located. This should be clarified.

If indeed, recreational use of the launching ramp is to be restored after completion of the proposed project, do the design plans provide for ancillary facilities (parking, loading docks, washdown area, utilities, etc.)?

c) Recreational design considerations within the harbor development.

Comments: The EIS should address the possibility of providing low intensity, leisure opportunities for the public to observe, harbor activities and enjoy the adjacent shoreline area.

Sincerely,

ROBERT T. FUKUDA
ACTING DIRECTOR
May 1, 1973

Mr. Robert T. Fukuda, Director
Department of Parks and Recreation
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Fukuda:

Subject: Response to Draft DIS
Barbers Point Harbor

Reference is made to your letter of November 11, 1977, regarding the boat launching ramp and other recreational facilities in the proposed Barbers Point Harbor.

Public Access

At the present time the land as well as the road to the harbor site are privately owned and secured by a gate. Also, a permit is needed to use the existing boat launching ramp.

During the project implementation stage, the access to the harbor site would become a public road. This road may also provide access to the beach for offshore fishing.

Operation of the Launching Ramp

Yes, the launching ramp will be operated by the State.

The continuous use of this facility or its relocation and improvement in the barge basin will be considered in the final design of the parking spaces for the tugboats and other marine equipment. Provisions for the ancillary facilities (parking, loading docks, wash-down area, utilities, etc.) would also be considered according to need during the design stages of the project.
Recreation Design Considerations
within the Harbor Development

No thoughts have been given to the recreational design considerations within the harbor development but we will consider this aspect within the restraints of public safety and security during the design stages of the project.

Thank you for your comments and we hope that the information provided answers to your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

LCP: 10

R. Higashionna

bcc: M&L Pacific, Inc.
November 9, 1977

Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Gentlemen:

Draft Environmental Impact Statement for Barbers Point
Deep-Draft Harbor on Oahu, September 1977
Comments Requested October 12, 1977

We offer the following comments.

Conformance with General Plan. The draft EIS indicates that the proposed project is in conformance with the City and County General Plan. It should be noted that the policy makes no specific geographic reference and that the West Loch alternative is likewise consistent with the same policy to

"Facilitate the development of a second deep-water harbor to relieve congestion in Honolulu Harbor" (Chapter 5, Objective A, Policy 13).

Projected Harbor Requirements. The draft EIS shows 1975 cargo activity at Honolulu Harbor by leeward firms. No projections of cargo activity are provided for the future.

The draft EIS states that "the Task Force has recognized that even with federal and state modifications, Honolulu Harbor cannot physically accommodate containerized cargo facility and handling requirements beyond the 1990-1995 period and that a second Oahu commercial port would be needed" (Draft EIS, p. I-4).

The draft EIS should show projections, if any, of cargo activity for leeward firms so that a reviewer need not look for a copy of the Multi-Modal Task Force report.
The draft EIS does not indicate how many of the 157 acres for containerized cargo handling at Sand Island are presently developed.

Endangered Plant Species. The draft EIS indicates that the two most abundant and dense colonies of the endangered Euphorbia will be affected by the project. There is no indication of the acreages of these two colonies. It is indicated that the Campbell Estate is trying to locate other colonies of these species outside of the project area and that the "endangered plants in the areas proposed for construction will be propagated in three locations (provided by Campbell Estate) suitable for their preservation" (p. VIII-2). The EIS does not indicate who will pay for the propagation or whether an equivalent area will be provided for the propagation.

Groundwater Leakage. Seepage of groundwater into the deep-water harbor is mentioned but not quantified (p. II-11). The Corps of Engineers Supplement to the Final EIS, dated January 1977, indicates that groundwater leakage is 780,000 gallons per day in the present harbor and is projected to be 4,000,000 gallons per day for the proposed deep-water harbor. The estimated leakage is significant. This could adversely affect potential development of brackish caprock water as a supplemental water source.

Transportation Facilities. It is indicated that the project will increase traffic from the proposed harbor to Interstate Highway H-1. The EIS should include a schematic showing how access to the harbor from H-1 will be provided. The cost of the proposed improvements should be estimated.

The Pearl Harbor Alternative. The draft EIS discusses the alternative of Pearl Harbor, especially the West Loch area, as a potential site for use by commercial vessels, but this is not adequately addressed (pp. VI-1 to VI-2). The EIS cites the Navy's objections because of security and the blast hazard. The EIS lists other objections: the impact on wetland habitat areas and Hawaiian fishponds, the designation of West Loch waters as Class AA waters, the impact on the groundwater system in Pearl Harbor, the dredging problem because of siltation.

Security. Security is a matter of degree. Pearl Harbor is surrounded by civilian land. The City operates a golf course on Waipio peninsula on land declared surplus to Navy needs and acquired by the City. From here and the hills surrounding Pearl Harbor, it is possible to view operations in Pearl Harbor.
The Navy has compromised its position regarding security in allowing tour boats access to Pearl Harbor to the U.S.S. Arizona Memorial, taking tourists right into Pearl Harbor, past the Pearl Harbor shipyard and the submarine base in East Loch where Navy operations are centered.

Opening West Loch would not decrease security significantly because West Loch is on the periphery, not near the center of naval operations.

Blast Hazard. In a report on Federal Requirements Evaluation, State of Hawaii, around 1972 (also known as the FRESH report), the Department of Defense indicated the need for additional land adjacent to the Navy's present lands at West Loch for expansion of the blast hazard zone. So far as we know, little has been done in the intervening five years to acquire such lands. The unwillingness to budget funds is a good indication that the blast hazard has been overrated.

We do not know of any major port throughout the world which excludes civilian ships because of the need to handle naval ammunition. This is not to say there is no risk involved; but when the need to handle explosives arises, proper safety measures can be implemented.

Water Quality. The draft EIS cites the State classification of West Loch waters as Class AA as a reason for not developing a deep-water harbor there. The classification is arbitrary. It is difficult to see how West Loch waters fit the classification as defined by the State:

"Class AA waters.

The uses to be protected in this class of waters are oceanographic research, propagation of shellfish and marine life, conservation of coral reefs and wilderness areas and aesthetic enjoyment.

It is the objective of this class of waters that they remain in as nearly their natural, pristine state as possible with an absolute minimum of pollution from any source. To the extent possible, the wilderness character of such areas shall be protected. No zones of mixing will be permitted in these waters.

The classification of any water area as Class AA shall not preclude other uses of such waters compatible with these objectives and in conformance with the standards applicable to them." (Hawaii Revised Statutes, Chapter 37-A.)
Moreover, the State Department of Health, in its "208" Water Quality Management Program, has indicated that the classification system itself is not appropriate for Hawaii. A new set of standards is being proposed for adoption.

Part of the basis for the Class AA classification may have been the commercial potential of the oyster beds in West Loch. Recent breakthroughs in aquaculture make oyster production on a commercial basis possible elsewhere. And if commercial oyster beds were allowed, what about the "security" argument being presently used?

Relatively little has been done to clean up Pearl Harbor waters. Harbor development would provide an economic incentive to do so.

Damage to Groundwater Aquifer. Another objection is the "possibility that the groundwater aquifer in the Pearl Harbor area would be adversely affected by dredging in West Loch."

While the possibility exists, its probability is remote. Our high quality, productive artesian springs border East Loch, not West Loch.

As to dredging, aircraft carriers and other capital ships use the main channel of Pearl Harbor. They require a greater depth than the commercial ships that might be using the second deep-draft harbor at West Loch. There is no indication that the aquifer has been damaged because of dredging and use of East Loch. The likelihood of aquifer damage to West Loch is remote.

Finally, the Board of Water Supply has indicated that dredging would not affect the caprock in West Loch. It estimates that any disturbance to the caprock would be minimal since the caprock is over 200 feet thick at West Loch!

Siltation in West Loch. The draft EIS indicates that, with major silt bearing streams entering West Loch, maintaining the required project depths in a large harbor area would be difficult and expensive, but fails to provide quantification of this.

Loss of Wetland Habitat and Fish Ponds. The draft EIS indicates that there is wetland habitat in the upper reaches of West Loch and several fish ponds.

This loss of wetland habitat should be balanced against the loss of sites of archaeological significance as well as habitat for a rare shrub at the Barbers Point area. The Barbers Point proposal is more damaging.
The proposed solutions to these are simplistic: the archaeological sites will be salvaged; the rare shrubs will be moved.

There are on Oahu a number of alternative wetlands for the Hawaiian Coot and Stilt.

So far as we know, there are no alternative sites for the endangered plant species at Barbers Point. The draft EIS indicates that one of the species is habitat specific; there may be problems in trying to propagate it elsewhere.

Energy Considerations. A deep-water harbor at West Loch would be some 3.3 miles closer to downtown Honolulu, the primary urban center, than the proposed Barbers Point harbor. There would be considerable energy savings in transshipment if the West Loch site were selected.

Thank you for allowing us to comment on this matter.

Sincerely,

[Signature]

RAMON DURAN
Acting Chief Planning Officer

RD: fmt.

cc: OEQC
May 9, 1978

Mr. Ramon Duran
Chief Planning Officer
Department of General Planning
City and County of Honolulu
550 South King Street
Honolulu, Hawaii 96813

Dear Mr. Duran:

Subject: Response to Draft EIS
Barbers Point Harbor

Reference is made to your letter of November 9, 1977, regarding the draft EIS for the subject project.

Most of your comments refer to West Loch as the preferable site for the second deep-draft harbor on Oahu. In this regard, we will not attempt to answer your comments on West Loch because the J. S. Navy, in reply to Mayor Frank F. Fasi's letter of March 17, 1977, reiterated its previous position that West Loch should be used exclusively by Navy ships for the same reasons stated in the EIS.

Our replies to your other comments are as follows:

Cargo Projections

The cargo projections will be included in the EIS as you suggested. The cargo projections for Honolulu Harbor and Barbers Point are shown in Table I-2 of the EIS (attached for your information).

Land Area on Sand Island for Container Cargo

About 50 acres of the 157 acres on Sand Island are now developed for containerized cargo. Another 50 acres will be developed by 1980, and the remaining 57 acres will be incrementally developed to 1990.
Land Area Covered By Endangered Species

There is an area of about 13 acres that is considered a major colony and another 20 acres with scattered individuals of Euphorbia scottsbargii var. kalaeloana Sherff within the project area. There is also a small patch of Achyranthes splendens var. rotundata Kod. in the project area. Euphorbia cuttings are now being propagated in a nursery in Kaneohe. These will be transplanted during the rainy season in selected areas of Barbers Point. There is no established rule as to whether the damaged plants should be replaced by either an equal number or area of coverage. The vitality of the plants and their capability of self-propagation have to be observed after they are transplanted.

Groundwater Leakage

Harbor construction will have no effect on the potable water supply of the Waianae Volcanic Series aquifer. The Board of Water Supply, City and County of Honolulu, concurs with this fact but adds that there may be some effect on the potential development of brackish caprock water from the coral aquifer as a supplementary water source. The harbor would reduce the volume of brackish water presently stored in the coral aquifer but would not significantly affect the net flux of this water to the ocean since this is primarily dependent on the recharge rate. The net effect is that as much water would be available for development, but the wells would have to be located further inland, as harbor construction would essentially move the shoreline inland at the harbor site.

Transportation Facilities

The main access road between the proposed Barbers Point Harbor and the H-1 freeway will be Kalaeloa Boulevard, which also serves Campbell Industrial Park. Kalaeloa Boulevard is a four-lane highway and, as noted in the EIS, it would be necessary to widen this road to six lanes in order to accommodate the traffic from Campbell Industrial Park, Barbers Point Harbor, and the proposed Theme Park. The details of the widening and adjustments of the H-1 on- and off-ramps, if necessary, would be considered as the volume of traffic increases. It would be too premature now to prepare schematic sketches of the proposed improvements since the existing roadways would have sufficient
capacities up to about 1990. Also, other programs, such as car pools, van pools, and improvements in public transportation, may have significant effects in decreasing the predicted traffic volume. The State Department of Transportation is expected to designate Kalaeloa Boulevard a federal aid primary (FAP) route because it would serve as the major access to the harbor and the industrial park.

From Kalaeloa Boulevard to the harbor site, it would be necessary to improve about one mile of the existing Malakole Road at an estimated cost of about $400,000. This road construction should be included in the early phases of harbor development.

Thank you for your comments and we hope that the information provided answers your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

LCFP:di

Attachment

bcc: M&E Pacific, Inc.
### Table I-2

**Cargo Forecasts for Honolulu Harbor and Barbers Point Harbor**

#### Honolulu Harbor (1,000 Short Tons)

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<th>Container Out</th>
<th>Overseas Bulk In</th>
<th>Overseas Bulk Out</th>
<th>Overseas Breakbulk In</th>
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<th>Interisland Bulk In</th>
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#### Barbers Point Harbor (1,000 Short Tons)

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Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

November 17, 1977

Dear Sir:

Several members of the Hawaii Boating Association have indicated that you currently have an Environmental Impact Statement concerning the Barbers Point Harbor use out for comment. We would like to state this Association's concern for the recreational use currently available at this site.

Specifically, our concern is that your future plans continue the access available to the boating public now provided by the existing small boat launching ramp. We would like to emphasize that this is the only ramp available for a considerable distance on the Ewa shoreline of Oahu.

Your kind consideration of this matter and specific planning for this facility, or its equivalent, would be greatly appreciated.

Very truly yours,

[Signature]

Frank M. Searl
President
Mr. Frank M. Searl, President  
Hawaii Boating Association, Inc.  
P. O. Box 8207  
Honolulu, Hawaii  96815

Dear Mr. Searl:

Subject: Response to Draft EIS  
Barbers Point Harbor  
Job H. C. 1315

Reference is made to your letter of November 17, 1977, regarding the use of the boat launching ramp in the existing barge basin.

The existing barge harbor will be used primarily as a tugboat and launch basin and to accommodate other uses such as the storage of pollution equipment and possibly limited industrial activities, including the current LPG loading operation as well as for a small boat launching ramp. In view of these other planned activities in the barge basin, the improvement or relocation of the existing boat ramp will be considered in the final design of the shore facilities in the project.

Very truly yours,

R. Higashionna, Ph.D.
Acting Director
Sunn, Low, Tom & Hera
190 South King Street
Suite 600

Attn: Mr. L. C. Fruto

Gentlemen;

Subject; EIS for the Proposed Barbers Point Harbor, Job No. H. C. 13153

Thank you for informing us about the EIS planned for the Barbers Point Harbor.

We would appreciate being kept apprised of the project. As maybe expected our major concerns would relate to the impacts, both positive and negative, that the project may have upon water shortages, agriculture, Historical, social impact, and mineral rights.

Sincerely,

John S. Silva Jr.
Aliis Athletic Club
Board of Director
May 2, 1973

Mr. John S. Silva, Jr.
Board of Directors
Aliis Athletic Club
91-471 Fort Weaver Road
Ewa Beach, Hawaii 96706

Dear Mr. Silva:

Subject: Response to EIS - Barbers Point Harbor

Reference is made to your letter that we received on
November 22, 1977, on the subject project. The following
responses are to the topics in your letter:

Water Shortages

The water supply requirement for the first phase of the
proposed harbor facility is estimated to be only about 0.06 mgd,
or about 0.5 percent of the present Ewa-Vaiana water district
demand of 13.1 mgd. Since this district is presently not self-
sufficient in water supply in that much of its supply comes
from the Pearl Harbor district, the harbor water requirements
as well as the anticipated Campbell Industrial Park (CIP) and
Ewa plain development requirements will have to be coordinated
with the Board of Water Supply using a water master plan.
Prior to the implementation of such a plan, the Board of Water
Supply has indicated that the modest harbor requirements can be
met with the existing system by tapping into the 20-inch main
along Kalaeloa Boulevard. The additional fire flow requirements
for the harbor facilities will be met on an interim basis by
providing salt water pumping equipment.

Impacts on Agriculture

The total area of the land needed for the harbor is 2.46
acres. Of this area, 1.63 acres is in the agricultural district
but the land is barren and unproductive. About 2 acres were in cane land, but this area is now included in the urban district since the West Beach Improvement was approved. Thus, we do not see that the harbor development would contribute a significant adverse impact upon Hawaii's agriculture.

There may be pressures toward the conversion of the agricultural lands in the vicinity of the harbor to urban uses but this is subject to the approval of other public agencies.

**Historical Impacts**

Based on the information collected by Bishop Museum and Archaeological Research Center Hawaii, Inc., the construction of the harbor basin, shoreside facilities and stockpiles will either destroy or significantly alter the cultural sites of the area.

The studies recommend that an intensive survey and salvage mitigation of cultural sites be conducted in areas that will be directly affected by the construction of the harbor. Bishop Museum further recommends the salvage of all paleontological deposits in areas that will be affected by construction. The Barbers Point area is unique in terms of its historical and research value because of the recovery of "fossil" bird bone. The amount and distribution of fossil bone recovered indicates a high probability that other such deposits will be found. It is recommended by Bishop Museum that all sink holes in the project area be tested to assure that all such deposits have been located.

A program of mitigative action has already been recommended by Archaeological Research Center Hawaii, Inc., and will be implemented by the State prior to construction.

A detailed archaeological survey and an accurate locational map are being prepared so that the identified sites may be analyzed for their spatial arrangements and orientations.

The survey is being coordinated with the State Historical Officer.
Pending the completion of the study, we wish to refer you to pages II-24 through II-31 of the JIS. Copies of these pages are attached to this letter.

Social Impact

Population. The proposed harbor development is estimated to directly and indirectly employ approximately 630 workers over the next 25 years. In addition, it is estimated to be responsible for the employment of approximately 1,123 workers in Campbell Industrial Park and to generate approximately 260 more jobs among private and private-support industries. Thus, the total employment over the 25-year period is estimated to be about 2,100 workers. Assuming 3.075 people per household, the total population related to the harbor is approximately 6,300 people. This projected growth would have a negligible impact in the Ewa district since the population there is projected to increase from 162,321 in 1975 to 321,000 in the year 2,000. Even with the recently revised population projections by DPED, this conclusion is still valid.

The development of the Ewa-takakilo area as a secondary urban center, coupled with the projected growth in population of the Ewa district, should result in increased demand for housing, retail and commercial facilities and related population support facilities. The demand for housing and commercial area should result in a change in land utilization and possible increased land values.

The harbor development, being a self-contained facility, is not expected to have a significant impact on surrounding land values in the tertiary impact area. Any increase in surrounding land values is expected to be derived principally from the overall growth in the population of the area.

Public Services and Commercial Development. Development of various public and private services such as libraries, schools, shopping centers, etc., is directly related to population growth. Many of the public and private services for a fringe area such as the Ewa-takakilo area are met by a larger city's facilities. As the fringe area grows in size, it takes the capabilities of its mother city, and therefore requires its
own facilities. Expenditures for further development of the Ewa-Makakilo areas' public and private service needs can be expected to result primarily from its projected normal growth in population.

**Multiplier Effect**

Economic theory suggests that tertiary stimulation could also result due to the multiplier effect. Governmental expenditures and refunds normally create private expenditures of approximately two to three times the original amount as the money circulates through the economy. Although no detailed studies have been conducted to determine the impact of the multiplier effect in Hawaii, some impact could be expected. Assuming a multiplier of two to three times, the Phase I expenditure of $71.4 million could add $143 to $214 million of revenues and expenditures to the State economy. The impact on State employment of this tertiary result cannot be determined, however, and we would expect an overall positive impact for the businesses and residents of Hawaii.

**Demographic**

The harbor development is not expected to have a significant impact on the profile of residents of the Ewa district for two reasons. First, the increase in population and employment in the district is expected to be negligible. Secondly, the average worker at the harbor could be expected to closely resemble the resident profile of the area. These workers could be expected to be primarily middle income, blue collar workers with an average annual income of approximately $15,000. Although average annual income information for the district is not currently available, it is believed the average income closely parallels the average family income in the district. Based on census information, the average family income for the district was approximately $9,750 in 1960. Assuming an inflation factor of 5% per annum, the average family income in 1977 dollars for the district is estimated to amount to $13,700. Thus, the additional population growth related to the harbor development is expected to have a marginal impact on current economic and social characteristics of the district. Changes in current demographic characteristics, however, are expected to primarily be a result of the significant growth in the population of the area that is projected to occur without the development of the proposed harbor.
Lifestyle Patterns

The leeward district is considered to be a "bedroom" community of Honolulu, in which residents of the area commute to work in central Honolulu or Pearl Harbor. Given that the harbor development would result in an economic multiplier effect (discussed previously) on the growth of the population of the area and that the harbor operations would be located within an existing industrial area, the development of the harbor is expected to have a minimal, if any, impact on the current lifestyles of the area. Changes in lifestyles in the area are primarily expected to result from the increased urbanization of the area, rather than from the increased industrial activity at Barbers Point.

Land Value

A change in utilization of land from agricultural to residential and/or commercial has a significant impact on land value. This change of utilization usually results from governmental policy and demand from the general populace. The City and County Department of General Planning has implemented four alternatives for growth, and under each alternative, the rapid growth in population of the Ewa District appears inevitable. In fact, the City and County's Statement of Objectives call for creation of a secondary urban center in the Ewa-Makakilo area.

Mineral Rights

On the question of whether coral is a mineral, the Office of the Attorney General has rendered an opinion that coral is not a mineral. Their opinion is as follows:

"The Hawaii Revised Statutes Subsection 131-1 and 132-1, define 'minerals' to exclude sand, rock and gravel. The dictionary definition indicates that minerals are the result of inorganic processes of nature.

Since 'coral' is the skeletal deposit produced by polyps which are animal (organic) and since 'coral' is primarily limestone which is a 'rock' and thereby outside the definition of 'mineral' in Subsection 131-1, it is clear that coral is not a mineral."
May 2, 1973

Thank you for your comments and we hope that the information provided answers to your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

[Signature]

LCF:di

Attachments

bcc: M&E Pacific, Inc.
puddle. This "population explosion" lasted approximately one week but subsided when the water began to evaporate and the level dropped rapidly. The *Triops* species suddenly disappeared, and dragonfly nymphs and water beetles began to appear. This observed phenomenon may be a natural function of their life cycle or may be due to predation by other species.

The second aquatic organism recorded was a species of shrimp identified as *Halocaridina rubra*. The shrimp were found at four separate locations in the project area in sinkholes. Additional sinkholes containing shrimp species are probably located throughout the project area.

**HISTORIC AND CULTURAL SETTING**

The Barbers Point area is located within the ahupua'a of Honouliuli in the Ewa district. This area is part of the large emerged limestone reef, commonly known as the Ewa plain. The plain stretches along the coast from Pearl Harbor through Waianae. Agricultural, residential, and military developments have altered much of the characteristic topography of the region.

The Barbers Point area in the past has been the subject of very limited study, both archaeologically and historically. The previous lack of interest may be attributed, in part, to the austere natural setting of the flat, dry, coral plain and the apparent lack of importance attached to the area by early travelers. At present, the Barbers Point Harbor area has been declared eligible to be included in the National Register of Historic Sites (see Figure II-10). The importance of the area is in providing information on habitation patterns and cultural practices. It is expected that the status of this site will be lowered when the information has been obtained.

The first survey of sites in the Barbers Point area was conducted in 1970 by Ernest Lewis, a graduate student at the University of Hawaii. In 1975, a cultural reconnaissance was conducted by the Bishop Museum for the U.S. Army Corps of Engineers as part of the planning studies for a deep-draft harbor at Barbers Point. Other work by the Bishop Museum over the past 17 years has been limited to salvage work prior to the construction of the Standard Oil refinery and the present barge harbor.
Shaded areas are areas (A, B, C, D) surveyed.
Scale: 1:2400

FIGURE II-10
MAP OF
ARCHAEOLOGICAL SURVEY
BY BISHOP MUSEUM

Source: Bishop Museum
A brief summary of Bishop Museum's 1975 cultural reconnaissance is as follows.

A total of 92 sites exist in the area. Most of these sites fall into the following general categories:

1. Large to moderately large structural forms: enclosures, walls, and cairns
2. Smaller structural forms: C-shapes, enclosures, mounds, alignments, platforms, L-shapes, and cists
3. Modified natural features: walled sinks and sinks with modified interiors
4. Site clusters: heterogeneous and homogeneous aggregations

Table II-2 lists the 92 recorded sites by survey units A through D, and site locations are shown on Figure II-10. In addition to sites listed in Table II-2, 167 modified sinks and ahu were tallied but not numbered or otherwise recorded. These features were distributed as follows:

<table>
<thead>
<tr>
<th></th>
<th>Ahu</th>
<th>Modified Sinks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area A</td>
<td>41</td>
<td>21</td>
</tr>
<tr>
<td>Area B</td>
<td>14</td>
<td>37</td>
</tr>
<tr>
<td>Area C</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>Area D</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>82</td>
<td>85</td>
</tr>
</tbody>
</table>

The Bishop Museum conducted an intensive cultural survey for the Corps of Engineers of the area covered by the reconnaissance survey in order to gather more information from this area. Cultural salvage work is continuing on the federal project lands.

Another study is presently being undertaken by Archaeological Research Center of Hawaii, Inc. (ARCH) for the Water Transportation Facilities Division, State of Hawaii, as part of the state's planning studies for the proposed Barbers Point Harbor. ARCH performed a relocation survey of the area within the proposed state shoreside facilities, parts of which were
### Sites Recorded in the Dangars Point Project Area

#### Survey Units A-D

<table>
<thead>
<tr>
<th>Area A</th>
<th>Area B</th>
<th>Area C</th>
<th>Area D</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-0A-66-</td>
<td>50-0A-65-</td>
<td>50-0A-66-</td>
<td>50-0A-65-</td>
</tr>
<tr>
<td>58*</td>
<td>Enclosure</td>
<td>91</td>
<td>Two walled sinks</td>
</tr>
<tr>
<td>59</td>
<td>Walled sink</td>
<td>92*</td>
<td>C-shape</td>
</tr>
<tr>
<td>60</td>
<td>U-shape</td>
<td>93**</td>
<td>Enclosure</td>
</tr>
<tr>
<td>61</td>
<td>Cluster</td>
<td>94**</td>
<td>Cluster</td>
</tr>
<tr>
<td>62**</td>
<td>Enclosure</td>
<td>95*</td>
<td>Cairns and filled sinks</td>
</tr>
<tr>
<td>63**</td>
<td>Enclosure</td>
<td>96*</td>
<td>Two cairns</td>
</tr>
<tr>
<td>64</td>
<td>Walls</td>
<td>97*</td>
<td>Enclosure</td>
</tr>
<tr>
<td>65</td>
<td>Walls</td>
<td>125**</td>
<td>Enclosure</td>
</tr>
<tr>
<td>66</td>
<td>Cluster</td>
<td>67</td>
<td>Two walls</td>
</tr>
<tr>
<td>68</td>
<td>Cluster</td>
<td>69**</td>
<td>C-shape</td>
</tr>
<tr>
<td>70**</td>
<td>C-shape</td>
<td>71**</td>
<td>Enclosure</td>
</tr>
<tr>
<td>72</td>
<td>Two shu</td>
<td>100</td>
<td>Mound</td>
</tr>
<tr>
<td>73</td>
<td>Sink with stepped ramp</td>
<td>101</td>
<td>Mound</td>
</tr>
<tr>
<td>74</td>
<td>Two C-shapes</td>
<td>102**</td>
<td>Enclosure</td>
</tr>
<tr>
<td>75**</td>
<td>Walled sink</td>
<td>103*</td>
<td>Wall</td>
</tr>
<tr>
<td>76</td>
<td>Wall</td>
<td>104**</td>
<td>Circular enclosure</td>
</tr>
<tr>
<td>77**</td>
<td>Enclosure</td>
<td>105**</td>
<td>Enclosure</td>
</tr>
<tr>
<td>78**</td>
<td>Sink with wall at bottom</td>
<td>106**</td>
<td>C-shape</td>
</tr>
<tr>
<td>81</td>
<td>Walled sink</td>
<td>107</td>
<td>Trail</td>
</tr>
<tr>
<td>82</td>
<td>Two walled sinks</td>
<td>108</td>
<td>Walled sink</td>
</tr>
<tr>
<td>83</td>
<td>Walled sink</td>
<td>109</td>
<td>Walled sink</td>
</tr>
<tr>
<td>84</td>
<td>Enclosure and wall</td>
<td>110</td>
<td>Walled sink</td>
</tr>
<tr>
<td>85</td>
<td>C-shape</td>
<td>111**</td>
<td>Enclosure</td>
</tr>
<tr>
<td>86</td>
<td>Walled sink</td>
<td>112</td>
<td>Cluster</td>
</tr>
<tr>
<td>87</td>
<td>Wall and walled sink</td>
<td>113</td>
<td>Walled enclosure</td>
</tr>
<tr>
<td>88</td>
<td>Railroad bed</td>
<td>114</td>
<td>Walled sink</td>
</tr>
<tr>
<td>89</td>
<td>Two C-shapes</td>
<td>115</td>
<td>Walled sink</td>
</tr>
<tr>
<td>90</td>
<td>Walled sink</td>
<td>116</td>
<td>Walled sink</td>
</tr>
<tr>
<td>98*</td>
<td>Large cairn</td>
<td>117</td>
<td>Contained in Birdhouse.</td>
</tr>
<tr>
<td>99**</td>
<td>Sink</td>
<td>118</td>
<td>Large seam with walls</td>
</tr>
<tr>
<td>100</td>
<td>Mound and wall</td>
<td>119</td>
<td>Enclosure</td>
</tr>
<tr>
<td>114</td>
<td>Platform</td>
<td>120</td>
<td>Alignment</td>
</tr>
<tr>
<td>122</td>
<td>Cluster</td>
<td>123</td>
<td>Walled sink and shu</td>
</tr>
<tr>
<td>121</td>
<td>Shu</td>
<td>126</td>
<td>Sink with ti plant</td>
</tr>
<tr>
<td>127</td>
<td>Sink with roof sinks</td>
<td>130</td>
<td>Cluster</td>
</tr>
<tr>
<td>135</td>
<td>Mound cluster</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Salvaged during 1976 fieldwork.  
** Tested during 1976 fieldwork.  
† Contains fossil Birdhouse.

### Table II-2

#### Recorded Archaeological Sites

*By Bishop Museum*

**Source:** Bishop Museum
previously surveyed by the Bishop Museum. A reconnaissance survey of parts of the proposed stockpile area was also done. The rest of the proposed stockpile area is currently under investigation to supplement the Bishop Museum’s findings. The results of the ARCH preliminary report are summarized below.

1. Relocation survey of state increment, area "I" (Figure II-11). Most of the state’s increment of the overall proposed project area has either been disturbed by construction of the existing barge basin or been extensively quarried prior to the present study. Relocation efforts within the remaining "undisturbed area" have identified and recorded 42 of the expected archaeological features. These include 9 ahu (rock mounds) and 33 structurally-modified sinkholes.

Some of the naturally formed sinkholes, which average 1 to 2 m. (3 to 7 feet) in diameter, have been modified either by filling in with large rock fragments and paving over with smaller-sized material or by partially encircling with low, stacked rock walls. In most cases, these walls are quite collapsed. The exact nature of these features is not known at this time; however, further study during the upcoming salvage operations should provide some insights. As for the ahu (rock mounds), it was preliminarily suggested by ARCH that they may have functioned as some sort of boundary markers. At present, however, the number of ahu in the state’s increment is too small to test this proposition. Although all appear to be intentional constructions, only follow-up test excavations will help to resolve this question regarding their function.

The relocation survey also identified three "new" sites, all along the southern perimeter of the state’s increment. Two are small, roughly rectangular enclosures measuring c. 3 by 4 m. (10 by 13 feet). Both are constructed of stacked stonewalls c. 1 m. (3 feet) high around three sides. The third site appears to be a house complex with associated sinkholes and a
deep sinkhole that may have served as a well. The house site is marked by a single course of stone forming a rectangular enclosure c. 4 by 5 m. (13 by 17 feet). There is a well-developed deposit in and around the enclosure that should provide material for analysis. Several quite large but shallow sinkholes lie immediately to the south of the enclosure. All contain well-developed humic deposits that would have been suitable for limited cultivation. Finally, a large and rather deep sinkhole is located just beyond the shallow sinks. The presence of water in this probably natural feature suggests that it could have served as a well that could have provided a relatively reliable source of water for planting in the nearby sinks.

2. Cultural reconnaissance of areas A, B₂, C, E, and F. These areas were designated "optional stockpile areas." Area A is presently under federal control as part of the Honolulu military reservation, formerly known as Camp Malakole. This is located on the seaward (makai) side of Malakole Road. Areas B₂, C, E, and F are located within the Campbell Estate portion of the project area (see Figure II-11) on the inland ( mauka) side of Malakole Road.

Cultural reconnaissance of these areas identified and provisionally recorded 39 new archaeological sites. By survey area, the results are as follows:

Area A: No remains of archaeological significance. The entire area has been bulldozed clear for military use.

Area B₂: Nine archaeological sites scattered throughout the area

Area C: Eleven archaeological sites clustered near Malakole Road

Area E: Eleven archaeological sites scattered throughout the area

Area F: Eight archaeological sites clustered toward the makai end along the HECO powerline

The results of these various studies show that major portions of the proposed harbor site have been disturbed by man for agriculture (sugarcane
Source: Archaeological Research Center

FIGURE II-11
LOCATION MAP OF ARCHAEOLOGICAL AREAS IN THE SHORESIDE FACILITIES AND STOCKPILE AREAS
fields) and industrial development (quarrying and barge harbor). The data collected by the various studies, however, indicate that the area was occupied in prehistoric times and used as a fishing or marine-oriented center as well as some limited agriculture. It appears that the housing in the area was characterized by dispersed clusters of residences, surrounded by a relatively open and little-inhabited area. Temporary and some permanent housing were present.

According to the Bishop Museum, the archaeological sites are unique and significant to Hawaii because the surrounding area is a karstic area characterized by limestone substrata. Certain land adaptation techniques were required to make the land livable and suitable for certain types of agriculture.

A significant piece of data from these studies sponsored by the Corps of Engineers is the discovery of "fossil" bird bones by Bishop Museum. During excavation of the Barbers Point site and subsequent laboratory analysis of samples, large amounts of skeletal avifauna remains were noted and identified as the remains of extinct endemic birds. A partial list of tentatively identified, extinct birds represented by the Barbers Point samples is given below.

1. Procellariidae family (several species of shearwater and petrel)
2. *Corvus* spp. - Hawaiian crow
3. *Branta sandvicensis* - nene and two types of unnamed, flightless geese
4. Various Passeriformes, including at least two unnamed finch-bill species
5. Unnamed endemic eagle
6. Unnamed endemic owl

It should be noted that these paleontological resources, although important, are not cultural resources and are therefore not appropriate criteria for determining the historical value of the area. In any case, study at a later date of these fossil remains will be facilitated by the salvage operations being proposed.

II-31
November 21, 1977

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Re: Comments on Barber's Point Environmental Impact Statement

Dear Sirs:

Please find hereinbelow Life of the Land's "Comments" to the Draft EIS for Barber's Point. For your convenience, our comments have been roughly categorized into general topics.

Introduction

Several general comments about the Draft EIS should be made. First, no compelling need for the proposed harbor is demonstrated in the EIS. (The lack of a real need for the harbor is strongly implied in Director Wright's comments cited in the November 18, 1977 "Honolulu Star-Bulletin." See Attached Exhibit A.)

Secondly, the Draft EIS seems to reflect an all too intimate, and unhealthy, relationship between the James Campbell Estate and the state government. Contrary to the general impression created in the Draft, the State does not have to conform its policies to the policies (II 43-45) of the Campbell Estate. The unanswered question, therefore, is, "Why does the State seek to fulfill the Campbell Estate's Master Plan?"

Finally, the Draft fails in a substantial manner to address the economic impact of the proposed harbor upon the Port of Honolulu. Likewise, the Draft does not even touch upon the impact of the proposed harbor upon Hawaii's existing shipping companies. These omissions are highly critical.
A. The Draft Does Not Adequately Discuss the Availability of Water.

One of the most notable defects in the Draft is the "glossing over" of the water problem in the Ewa area. (I-13, 15, II-52, III-12, 13, 22, V-2). The Draft does not specifically state from where the 60,000 gallons will be obtained. The 1968 study by USGS must be considered outdated in light of the 1973 and 1977 water crises. The Draft fails to address the costs and benefits caused by the depletion of 60,000 gallons from the Ewa-Waianae system, i.e., will the proposed withdrawal of 60,000 gallons make the remaining water more expensive?


The Draft at several points discusses growth and development projected for the Ewa area, along with related factors. (Pp. 7, 11, I-16, II-42, 43, III-48, 49, 54, 58). The Draft fails, however, to take into account various State efforts to control growth, i.e., residency requirements, etc. Thus, the Draft assumes growth, and growth towards Ewa.

Several points alluded to in the Draft should be underscored and emphasized. It is highly unlikely that the proposed harbor will significantly reduce unemployment in the Ewa-Waianae area, which has a history of chronic unemployment. (II-43). The new jobs would probably go to new in-residents. (III-54). In any event, relatively few persons would be employed at the site. (III-49). Consequently, LOL must ask how the residents of Ewa-Waianae stand to benefit from the harbor?

C. The Proposed Harbor Development Contributes To A Significant Adverse Impact Upon Hawaii's Agriculture.

As we have noted above, the proposed harbor appears to be a commitment on the part of the State to "push" the planned expansion and development of the Ewa area. (II-45, 46, 48). At the same time, however, those plans call for the eventual conversion of 7200 acres of Agriculture lands to urban use. (II-46). Such conversions directly contradict the General Plan of the City and County of Honolulu, which is designed to protect Agriculture lands.

Two other matters should be considered. That is, whose lands are to be rented out to store the coralline material? (LOL suspects that Campbell Estate will be the lessor.) And, what would be the secondary impact upon the residents (especially the poor) in the area if their tax assessments would increase dramatically? LOL believes that if this issue were more closely analyzed, many present residents of Ewa, Oahu would be forced
to sell their homes.

D. The Draft Justifies the Proposed Harbor Almost Solely On the Basis of Spurring the Construction Industry

The Draft is particularly interesting in that facts and figures related to the construction industry's interest in the project have been calculated quite clearly. (III-42, 43, 47.) Life of the Land would submit that the underlying motivation for the harbor is to spur the dwindling construction industry in Hawaii. (See, again, Attached Exhibit A). Again, the State's rationale seems to be that of "make work."


Several points in the Draft address the petroleum industry. (I-9, 11, III-41). The projections appear to be wildly optimistic, however, especially where a five-fold expansion is projected. (III-41). Even Richard Bell of Hawaiian Electric alludes to this projection in his letter of June 6, 1977; where he points out that conversion to coal is a real possibility in the future.

The question arises, therefore, as to whether the terminal for petroleum products planned for phase I (I-8) is necessary. LOL would submit that it is not necessary; and, in the alternative, more flexibility should be built into the project.

F. Sewage Treatment and Costs Should Be Specifically Addressed.

Life of the Land is greatly disturbed by the fact that sewage treatment and costs are left "up in the air." (I-14, 16). Who will pay for these facilities, the public? If not, have private interests come forward? This omission ought to be remedied.

G. Alternatives Should Be More Comprehensively Discussed.

The Draft discusses at several points various alternatives to the Barber's Point project. (P.8, I-5, 4). These alternatives, even the alternative of no construction, ought to be more fully addressed. This seems to be particularly important in light of the fact that the original impetus for the project occurred in 1965 or before. (I-17, 18).

What was feasible (possible and desirable) in the early 1960's may not be so today.
H. The Draft Is Overly Optimistic With Regards to Environmental Impacts.

The Draft concedes that lack of development along the Waianae-Ewa coast has left the shoreline undisturbed. (II-8). After that, however, the Draft fails to adequately recognize the adverse impacts of the proposed development.

For example, the Draft does not clarify whether or not the endangered plants will survive. (II-15). The Draft does not clarify whether various fish species will survive. (III-16). The Draft downplays the expected sulfur emissions. (III-30). And, finally, the Draft fails to recognize that more cars mean more pollution. (III-24). This overabundance of cars and car usage on the island has caused the State to threaten various remedies. (See Attached Exhibit B). It would seem anomalous for the State to encourage auto usage for Barber's Point while Oahu experiences excess air pollution.

Summary

The proposed Barber's Point Harbor may have been, 20 years ago, an attractive concept. Over time, however, the attractiveness of the Harbor concept has been lost, to the point where such a development would be unnecessary and uneconomical today or in the future. Life of the Land does not agree with Director Wright's assessment that "the harbor should be built even if we don't use it."

Very respectfully yours,

Fred P. Benco
Life of the Land
Staff
Barbers Pt. Harbor Opposed

By Gregg Takayama
Star-Bulletin Writer

The deep-water harbor at Barbers Point sought by the State Department of Transportation would not be used by the two largest shipping companies serving Hawaii, state legislators were told yesterday.

Officials of Matson Navigation Co. and United States Lines Inc. urged that state funds instead be used to improve existing facilities at the downtown Honolulu Harbor.

The construction of a Barbers Point harbor would mean splitting operations between downtown and Barbers Point, burdening shippers with added expenses for more equipment, said James L. Reid, senior vice president for Matson.

It already costs Matson between $500,000 and $750,000 a year extra to split its container operations between Honolulu Harbor's Fort Armstrong terminal and Sand Island, he said. A second major harbor would add even more expenses, Reid said.

THE ONLY CONDITION under which it would be feasible to use a second Oahu harbor would be if all facilities were fully utilized and could not be expanded at Honolulu Harbor," said a spokesman for Davies Marine Agencies, representing U.S. Lines.

.. The shippers spoke at a House subcommittee hearing on the Honolulu Harbor master plan. The House study was called for by a resolution which caused bitter debate between critics and backers of the proposed harbor at the last legislative session.

Under a proposal supported by the State Department of Transportation, the state would receive 250 acres of Campbell Estate land (valued at $10.4 million) for the harbor, in return for the rights to sell the coral dredgings.

The state is seeking $50 million from Congress for dredging and construction of the harbor.

OPPONENTS OF THE dem argue that the 17 million tons of dredged coral, widely used in local construction, could be worth much more than the Barbers Point land.

State Transportation Director E. Alvey Wright told legislators that the future growth of the Leeward Oahu area, plus the cramped quarters at Honolulu Harbor, justify the Barbers Point harbor.

"When you get a $50 million harbor for less than 5 percent state funding, it's a bargain. We should build it even if we don't use it," Wright said.

He added that state studies show that the second harbor would be used.

Representatives from shipping companies, however, said the present Honolulu Harbor, plus new facilities at Sand Island, would meet shipping needs for at least the next decade.

THE LONG-RANGE Honolulu Harbor plan calls for locating all container operations on Sand Island.

Robert Keen of Dillingham Corp., which runs interisland shipping, said, "present-day and near-term foreseeable problems are in Honolulu Harbor and it is here where the greatest improvement can be achieved."

Reid of Matson criticized the transportation department for dragging its feet in expanding its Fort Armstrong facilities.

A third container ship will begin Mainland runs next year and the improvements are needed to make room for the added cargo, he said.
May 2, 1978

Mr. Fred P. Benco
Life of the Land
404 Piikoi Street
Honolulu, Hawaii 96814

Dear Mr. Benco:

Subject: Response to Draft EIS
Barbers Point Harbor

Reference is made to your letter of November 21, 1977, concerning the subject EIS. The following responses are arranged according to the topics discussed in your letter:

Comment

No compelling need for the harbor is demonstrated in the EIS.

Response

Director Wright's comments quoted in the November 13, 1977 issue of the Star-Bulletin indeed stated that, "When you get a $50 million harbor for less than 5 percent State funding, it's a bargain. We should build it even if we don't use it." However, this quotation is followed by a sentence that reads: "He added that State studies show that the second harbor would be used."

After a review of the operations in Honolulu Harbor, the Multi-Modal Task Force recognized the need and recommended the development of a supplementary harbor facility at Barbers Point in accordance with the needs of the leeward area and to accommodate the total Oahu and Statewide waterborne commerce requirements. The report of the Multi-Modal Task Force was approved by Governor George A. Ariyoshi on April 23, 1976.

The anticipated cargo projections if Barbers Point Harbor were completed in 1985 are shown in Table I-2 of the EIS (attached for your information).
Comment

The draft EIS seems to reflect an all too intimate and unhealthy relationship between the James Campbell Estate and the State Government.

Response

The Campbell Estate master plan is discussed in the EIS in order to determine the impacts of the proposed harbor on the development plans of Campbell Estate lands. This has to be done whether the land is owned by Campbell Estate or anyone else. The harbor site was selected in order to minimize the impacts along the shorelines by integrating the existing barge harbor channel with the proposed channel of the new harbor and due to the fact that there is sufficient land available for the shore facilities area. That the proposed harbor conforms with the Campbell Estate master plan does not necessarily mean "...an intimate, and unhealthy, relationship...and fulfill the Campbell Estate's master plan".

Comment

Economic impact of the proposed harbor upon the Port of Honolulu.

Response

As previously stated, the main purpose of the Barbers Point Harbor is to supplement Honolulu Harbor. Additional improvements are planned in Honolulu Harbor to increase its capacity and to maintain its position as the main port on Oahu. The Harbor Development Plan, prepared by the State Department of Transportation, shows a budget requirement of $21.3 million for Honolulu Harbor from FY 72 to FY 76, while the budget requirement for Barbers Point for the same period amounts to only $4.7 million, exclusive of Federal funds. The construction of the shore facilities at Barbers Point is not scheduled to start until FY 73.

The development program as well as the cargo projections shown in Table I-1 of the EIS will not lessen the economic vitality of Honolulu Harbor because of Barbers Point Harbor.
Comment

Impact of the harbor upon Hawaii's existing shipping companies.

Response

It is not anticipated that fully loaded container ships will immediately use the proposed harbor. In time, however, fully or partially loaded container ships are expected to call at Barbers Point Harbor. The immediate uses of the harbor would be for barge operations which include shipments of petroleum products to the other islands, and bulk products such as cement and sand products, lumber, scrap iron, raw iron, tile and clay products, and aggregates (cinder).

Comment

A. The draft does not adequately discuss the availability of water.

Response

The Board of Water Supply has indicated that the initial phase 0.06 mgd harbor requirement, which is only 0.5 percent of the present Ewa-Maunae district demand, can be accommodated by tapping into the existing system. As this is a very modest amount, the harbor water requirement is not likely to result in an increase in the price of water.

Fire flow requirements would initially be satisfied by using a salt water pumping system. The improvements needed to meet the increasing water requirements for the entire Barbers Point area will be the subject of an area-wide water master plan that will be coordinated with the Board of Water Supply. Such a regional system will require its own GIS.

Comment

3. The draft discussion of population trends assumes a pattern of growth toward Ewa.

Response

The draft assumes population growth consistent with the statement of objectives and policies of the General Plan of the
City and County of Honolulu. According to the population distribution shown in the General Plan, by the year 2030, ten percent of Oahu's population of 1,039,000, or 104,300, could be residing in the Ewa-Nakakilo area. This shows a growth of about four times the 1975 population figure of 21,300.

However, the projected population in the County's General Plan may not be fully realized because of recent growth control policies. It is now predicted by the State Department of Planning and Economic Development that the resident population of Oahu would be 917,000 by the year 2000. In spite of this lower figure, there will still be growth and if the ten percent distribution factor used in the statement of objectives in the County's General Plan prevails, the population in the Ewa-Nakakilo area would be 91,700 instead of 104,300. It appears that growth is inevitable.

The harbor as well as the growth of harbor-related industries could create employment opportunities. Some of the jobs could be captured by the Ewa residents who could be benefited by the short distance between their residences and places of work.

Comment

C. The proposed harbor development contributes to a significant adverse impact upon Hawaii's agriculture.

Response

The total area of the land needed for the harbor is 248 acres. Of this area, 158 acres are in the agricultural district, but the land is barren and unproductive. About 2 acres were in cane, but this area is now included in the urban district when the West Beach development was approved. Thus, we do not see that the harbor development would contribute a significant adverse impact upon Hawaii's agriculture.

As stated in the ISS, the long-term plan for Honouliuli calls for the conversion of 7,200 acres from agricultural to urban use of the land below the H-1 freeway. Part of this land is used for cane production, lying fallow, or used for related cane production.

The Honouliuli plan also provides for the utilization of 1,400 acres of better quality land that is lying fallow in the area north of Waipahu.
These are the tentative plans of Campbell Estate according to a study prepared by Donald "Olbrink & Associates. Their eventual adoption depends upon the policies of the Department of State Regulatory Agencies that has jurisdiction over such matters.

Comment

Lands to be rented out to store coralline material, increase in real estate taxes, etc.

Response

The coral will be stockpiled on the Campbell Estate land as you suspected. It can be argued that the use of the land for stockpile purposes is not the "highest and best use" of that land, and it is doubtful whether such use would raise the real estate taxes since the land would be provided by Campbell Estate at no cost to the State.

Comment

D. The draft justifies the proposed harbor almost solely on the basis of spurring the construction industry.

Response

Motives for the proposed development of Barbers Point Harbor are independent of the legging construction industry. The need for a second harbor to supplement Honolulu Harbor is clearly outlined in the HHS. Briefly restated, the shoreside facilities at Honolulu Harbor will be inadequate to handle projected cargo needs. Even with the State's planned shoreside improvements, the total facilities will be unable to provide for the long-term commerce needs beyond the 1980 to 1985 period. The construction of a second Oahu commercial port near the industrial and warehouse operations of leeward Oahu would increase the efficient flow of commerce and result in considerable savings in overland hauling costs.

The development of Barbers Point Harbor will help the construction industry, however, this would be a secondary type of benefit.

Comment

D. The draft assumes, probably unrealistically, a greatly expanded petroleum industry.
Response

The major portion of petroleum activity in Hawaii will primarily occur at the offshore mooring facilities at Barbers Point. The proposed Barbers Point Harbor is anticipated to handle some of the residual product outflows at a petroleum berth; however, the benefits derived from this traffic are not a significant factor in the justification of the harbor.

The studies which projected the petroleum requirements for Hawaii were sponsored by the U.S. Corps of Engineers, Pacific Ocean Division. The studies were done concurrently and are titled, Study of Waterborne Commerce of Hawaii, "Petroleum Parameters", by James G. Lynch, November 1975; and "Petroleum Demand and Facilities", by Tudor Engineering Company, January 1976.

The historical base of the projections illustrated the rapid growth of Hawaii's energy consumption, 9% per year, as compared to its population increase, 2% per year, and the almost total dependence of the State on imported domestic and foreign petroleum for its energy source. It was concluded that energy demand would be primarily influenced by population growth and price levels.

The factors which were used for predicting the future requirements were: (a) the probable increase of energy consumption due to population growth envisioned at a much lower rate; (b) the continued requirement for liquid fuel for transportation since historically almost 67% of our existing energy consumption has been used for this and the projected future need will consume about 53%; (c) the continued availability of fossil fuel, if not in the form of petroleum, then in other forms of liquified hydrocarbons such as coal, tar sand, and shale oil; and (d) the lack of significant technological breakthroughs for alternate sources of non-fossil energy for use in transportation.

In the projections of future energy requirements, energy consumption was expressed as "equivalent petroleum consumption" measured in barrels per day. The use of petroleum as the measurement of energy in the study was qualified on the assumption that it will probably be available at a higher price during most of the study period to the year 2030.
However, if this assumption is found to be invalid, the projections would still be usable since the unit of measurement is a measure of energy consumption and could be readily converted to other possible fuel sources such as coal slurry or synthetic crude or a combination of these with natural petroleum.

These other forms of energy could be handled through most of the existing petroleum-handling facilities. Coal would most likely be transported in a more convenient form such as slurry, liquid, or gas.

Based on the above, the energy consumption in Hawaii during 1974 was 110,300 barrels/day or a total of 3.7 million tons of petroleum, and the projected consumption in 2039 is 113,000 barrels/day or a total of 27 million tons, almost a five-time increase.

Comment

F. Sewage treatment and costs should be specifically addressed.

Response

The sewage treatment and disposal requirements of the proposed harbor are as modest as the water supply needs. Since the proposed Honolulu wastewater treatment and disposal facility has no provisions for including flows from the Campbell Industrial Park area, a separate system will have to be planned and constructed for this area that would include the harbor contribution of about 1.06 mgd. If that facility (which would require its own EIS) is not available when the harbor begins operation, then an interim system will be required. Such an interim system, if required, would be planned during the design phase of the harbor to meet all applicable State Department of Health requirements. It is anticipated that the principal interim treatment alternatives would be oxidation ponds, or a package treatment plant, followed by disposal of the treated effluent via injection wells or leaching fields.

Comment

G. Alternatives should be more comprehensively discussed.
Response

We believe that the alternatives are appropriately discussed in Section VI of the draft EIS. We will, however, add the no-action alternative to this section.

We wish to reiterate that the harbor is needed much more now than in the early 1960's because of Hawaii's growth and its continuing dependence on waterborne commerce.

Comment

1. The draft is overly optimistic with regard to environmental impacts.

Response

We believe that we have adequately assessed all impacts, whether beneficial or adverse, of constructing a deep-draft harbor at Barbers Point.

In answer to your specific questions, it is expected that the endangered plants as well as the various fish species will survive harbor development. Also, the sulfur emissions were not played down in the EIS. The emissions were calculated for the plume centerline and therefore are at maximum concentrations affecting a very small area. In answer to your last specific concern, automobile pollution is not expected to cause any major problems. Studies into this matter were conducted according to EPA guidelines, and the results showed that in both the peak hour and peak eight-hour average periods, carbon monoxide levels would not exceed Federal or state standards at the time of full expansion of the industrial park and the harbor.

Thank you for your comments and we hope that the information provided answers to your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

[Signature]

LCT:10

Attachment

bcfr: N&E Pacific, Inc.
TABLE I-2
CARGO FORECASTS FOR HONOLULU HARBOR AND BARBERS POINT HARBOR

Honolulu Harbor (1,000 Short Tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Container In</th>
<th>Container Out</th>
<th>Overseas Bulk In</th>
<th>Overseas Bulk Out</th>
<th>Overseas Breakbulk In</th>
<th>Overseas Breakbulk Out</th>
<th>Interisland Bulk In</th>
<th>Interisland Bulk Out</th>
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Barbers Point Harbor (1,000 Short Tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Container In</th>
<th>Container Out</th>
<th>Overseas Bulk In</th>
<th>Overseas Bulk Out</th>
<th>Overseas Breakbulk In</th>
<th>Overseas Breakbulk Out</th>
<th>Interisland Bulk In</th>
<th>Interisland Bulk Out</th>
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Interisland

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<th>Overseas Bulk Out</th>
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<td>326</td>
<td>50</td>
<td>112</td>
</tr>
</tbody>
</table>
Dr. Richard E. Marland, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Dr. Marland:

Subject: Barbers Point Deep Draft Harbor EIS

We have reviewed those sections of the subject EIS which pertain to air quality impact, and our detailed comments are attached.

Of most significance, was the finding that the traffic input to the EPA model employed was not "localized" to reflect the vehicle type distribution, speed, and emission factors where they differed from the model's built-in assumptions about those parameters. The net result was an underestimation of impact, the exact magnitude of which we did not determine. In light of the significant truck traffic generated by the industrial park and proposed harbor, appropriate factors should be used in lieu of built-in assumptions to insure the most accurate possible estimates.

Sincerely yours,

James W. Morrow, Director
Environmental Health

JWM:ct
Att.

cc: DOT
DOH

Christmas Seals Fight TB, Asthma, Emphysema, Air Pollution
1. Page III-24:
   a. The 1 truck = 2 cars equivalency factor is acceptable for traffic analyses according to the Highway Capacity Manual (1965), but it is not suitable for emissions and air quality impact analyses. For example, in terms of emission factors (g/mi), one gasoline-powered truck in 1990 would be the equivalent of 25 cars.
   
   b. The EPA method employed assumes 88% cars and 12% light duty pick-up and panel trucks in deriving its emission factors. Since the project in question is an industrial project and associated with an industrial park, the vehicle type distribution is probably quite different, particularly in that there will be a significant percentage of heavy duty trucks which aren't reflected at all in the EPA emission factors.
   
   c. The analysis year adjustment factors from page 42 of the EPA Volume are no longer accurate. They must be modified to reflect the changes in emissions standards passed by Congress in August, 1977.

2. Page III-23: Since all the factors noted above would result in higher emission factors, it is probable that the ambient estimates presented in Table III-2 are on the low side. This suggests that CO concentrations along Kalaeloa Boulevard may exceed the State's 1-hour standard of 10 mg/m³.

3. Because of the facts noted in the above comments, new emission factors reflecting local traffic conditions and current laws should have been calculated in order to adjust the EPA model output and yield more accurate results.

4. Page III-29: The conversion factor for m/sec to knots is incorrect (m/sec = 1.94 kt).

5. Pages III-24-32: There is no indication that background pollutant levels were added to the pollutant concentration estimates resulting from motor vehicle or ship activities. This results in an underestimation of ambient concentrations.
Mr. James W. Morrow  
Director of Environmental Health  
American Lung Association of Hawaii  
245 North Kukui Street  
Honolulu, Hawaii 96817

Dear Mr. Morrow:

Subject: Response to Review of the EIS for the Proposed Barbers Point Deep-Draft Harbor

Thank you for your review of the air quality aspects of the subject EIS. Summary versions of the substantive comments in your letter dated November 22, 1977, are presented below followed by our responses:

Comment

The one truck = two cars equivalency factor applies only to traffic analyses and should not be used for air quality effect analyses. The large proportion of heavy-duty trucks anticipated is not taken into account in the standard EPA method that was used in the EIS. Also, the August 1977 amendments to the Clean Air Act should be used in making calculations.

Response

The air quality effects have been recalculated, specifically taking into account the heavy-duty trucks (assumed to be diesel powered) as well as the August 1977 amendments. The net effect on the anticipated carbon monoxide concentrations under calm wind conditions has been one of no change. This is because the greater contribution from the heavy-duty trucks is balanced by the reduction in the assumed amount of regular traffic as well as by the lower emission rate applicable to the 1990 regular traffic. This lower emission rate is specified in Supplement No. 5 to the air pollution emission factors published by EPA and is applicable under the August 1977 amendments to the Clean Air Act. No reduction was assumed for the heavy-duty diesel emissions.
Comment

The conversion factor for m/sec to knots is incorrect.

Response

The factor has been revised.

Comment

There is no indication that the background pollutant levels have been taken into account.

Response

An assumed background level of 1 mg/m³ CO was included in the calculations as indicated in the footnote in the results table. Also, the results of the Department of Health and the Conoco-Billingham Oil Refinery air sampling were discussed in the EIS.

Thank you for your comments and we hope that the information provided answers to your questions and concerns about the project. Please feel free to call on us should you need more information.

Very truly yours,

[Signature]

LCT:ao

R. Higashionna

bcc: M&F Pacific, Inc.
November 22, 1977

E. Alvey Wright, Director
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Subject: Comments on the Environmental Impact Statement for
Barbers Point Harbor, Barbers Point, Ewa, Oahu

Dear Mr. Wright,

The subject EIS have been reviewed by myself and other residents of Ewa. In general, we find the EIS to be lacking in detail. We ask that the EIS be expanded to provide an adequate document which will disclose all of the impact, primary as well as secondary, associated with the project. We offer the following comments:

Campbell Estate will grant to the State of Hawaii 246 acres of land in exchange for the corralline material to be dredged from the channel and harbor. An in-depth analysis of the economic trade-off should be included in the EIS. We seriously question whether the people of Hawaii are getting a fair return on this land-exchange deal.

The EIS mentions three related projects in estimating the cumulative effects of the project - The Campbell Estate Regional Framework Plan for its Honouliuli lands, the expansion of James Campbell Industrial Park, and the U.S. Naval Air Installation Compatibility Use Zone study. This document should expand its discussion to include the proposed "Caneland" by E.K. Fernandez, "Kahe Theme Park," and the proposed Fort Barrette Theme Park at Makakilo by the City and County of Honolulu. We also question what the proposed harbor will provide
for the West Beach Development. We ask that a discussion is made on the relationship of the proposed project with the proposed West Beach development.

How long does it take to construct a harbor such as the proposed harbor? Why is the project being phased for a 50 year period? Why is the proposed project planned for construction as early as 1978 when the existing Honolulu Harbor will still be adequate for about twenty or more years? Since the project is scheduled to start as early as next year and will continue until about 2030, please discuss all the primary as well as secondary impacts relating to this project during that the time period of implementation of the project. We are very concerned of the impact on our neighborhood. As a rural area become urbanized, many changes take place. Please include a detailed discussion on the effects of urbanization in the Ewa District -- changes in lifestyles, cost of living, crime rates, traffic, utilities, natural resources, and most important of all, the effects of the project on sugar production in the Ewa District.

As stated in the EIS, the governmental policies that encourage the development of the project are the Oahu General Plan and the recommendations of the State Multi-Model Task Force. The Oahu General Plan is only a policy statement. What governmental policies discourage projects that promotes urbanization and causes the loss of agricultural lands? The justification of the proposed harbor is weak. Will the harbor reinforce the directed growth toward Leeward Oahu?
We are especially concerned about the loss of agricultural lands and jobs. This project will remove precious lands for sugar production and stimulate other growth in industry, services and developments that will eventually lead to the destruction of sugar production for our area. We question the adequacy of the water needed for the development. Will the water supply be met without diverting the water from other serviced areas? Will this project affect the water needed for the agricultural industry in the Ewa District?

Do container shippers have opposition to the proposed project? How many companies actually support the construction of a deep draft harbor? How many will use it? How many companies will prefer alternative sites? What impacts will this project have on the trucking industry and employees?

In what ways will water quality (underground) be affected? On what do you base your conclusion of "no effect"?

How exactly do you plan to dredge the area? How will this method affect the marine environment?

On what do you base your conclusion that "the overall average nutrient discharge per length of coastline will be similar to the present rate?" (pg. 5)

How will the brackish caprock water supply of the coral aquifer be affected in terms of the reduced area from which such water can be extracted? How much less water can be expected?

What kind of alternative or solution do you have to address
the two potentially endangered plant species, *Euphorbia skottsbergii* var. *kalaeloana* and *Achyranthes splendens* var. *rotundata*?

In concluding our comments, we would like to express strong opposition to the Barbers Point Deep Draft Harbor Project. This project is not in the best interest of the Ewa residents. We would like to see our district to be preserved as it is.

Thank you for the opportunity to comment on this project.

Sincerely,

April Gushi

Address:
91-1727 Paonia Street
Ewa, Hawaii 96706

cc: OEQC, Office of the Governor
May 11, 1978

Ms. April Gushi
91-1727 Paionia Street
Ewa, Hawaii 96706

Dear Ms. Gushi:

Subject: Response to Draft EIS
Barbers Point Harbor

Reference is made to your letter of November 22, 1977 concerning the EIS for the subject project. For convenience, we have arranged our replies according to the following topics:

Dredged Coral and Land Exchange

The present arrangement calls for Campbell Estate to provide the State with at least 246 acres of land for the harbor in exchange for the proceeds of the coral spoils. The coral will be stockpiled primarily on Campbell Estate lands, at no cost to the State. It will be processed and marketed by an independent firm under a separate contract. As the material is sold over a period estimated at up to 17.5 years, the processor will pay all revenues in excess of his operating costs and a reasonable profit to the State. The State will reimburse Campbell Estate about 89 percent of this money, retaining 11 percent. Campbell Estate also stands to benefit from any enhancement to its surrounding lands.

It is estimated that a total of 17.5 million tons will eventually be dredged. Eighty-nine percent of this coral will be extracted from lands belonging to Campbell Estate, while eleven percent will be extracted from State land where the channel to the harbor crosses the beach and extends offshore. When processed, the coral could have present worth values ranging from $11.6 to $14.5 million. Since the coral must be stored on Campbell Estate land, the foregone present value of the rental could range from $6.5 to $9.7 million. Thus, the net present value of the coral would range from $4.3 to $5.1 million. Of this amount, 11 percent would accrue to the State.
An alternative arrangement considered was for the State to condemn and acquire the lands and sell the coral. In this situation, the State must change the wording of the appropriations for the Barbers Point Harbor project and also appropriate the $10+ million estimated value of the land. Coral must be stockpiled primarily on Campbell Estate lands and rentals paid to the Estate for such use. The risk that the coral can be sold at sufficient cost and in sufficient quantities to compensate for the initial appropriation cost lies with the State. The Estate still stands to benefit from any enhancement to its surrounding lands.

This latter arrangement would be preferable to the Estate, but the arrangement in which the State would receive the land in exchange for the coral proceeds would be much more advantageous to the State since no acquisition funds would be required and the risks would be with the Estate.

**Proposed Parks and West Beach Development**

The proposed amusement parks, "Caneland", Kaneohe Beach Park, and the Fort Barratette Theme Park, will have no adverse impact on the operations of the harbor, nor would the parks be affected by the harbor because they are located at far distances from the proposed harbor.

The master plan for the West Beach project shows the construction of a marina on the north side of the proposed harbor. The marina will be compatible with the harbor and would, in effect, serve as a buffer zone between the harbor and the West Beach development. We are concerned, however, with the probable effects of the proposed entrance to the marina. Our concerns are as follows:

1. The entrance of the marina at the mauka end of the deep-draft harbor entrance channel would create an undesirable traffic mix in the channel involving large and small vessels.

2. The marina would have an effect on the resonance characteristics of the harbor configuration. The type and magnitude of this effect are presently unknown and would require further study since the marina was not taken into account during the design of the deep-draft harbor.
3. The presence of the marina may have a detrimental effect on the water quality of the deep-draft harbor. It is expected that there will be significant inflow of nutrient-rich groundwater to the marina, similar to the inflow to the deep-draft harbor. The marina is likely to have somewhat longer residence time characteristics than might be expected since the marina entrance channel is aligned roughly perpendicular to the prevailing wind direction. In addition, the two-layer flow induced by the inflow of groundwater is not expected to be as effective an exchange mechanism as in the deep-draft harbor because the marina discharge would be to the already formed surface layer of the harbor rather than to the near shore waters. These limitations in exchange would probably mean that the primary exchange mechanism for the proposed marina is tidal exchange. Tidal exchange by itself would result in an average marina residence time of about five days relative to the harbor. This longer residence time, combined with the anticipated relatively high nutrient concentrations, would probably result in a fairly high phytoplankton concentration (estimated to be as high as 2.5 ug/l chlorophyll-a based on a net growth rate of 0.25 per day and an initial concentration of 0.7 ug/l chlorophyll-a for the deep-draft harbor). This would be comparable to the levels in South Kaneohe Bay. The overall result of the marina would therefore be an increase in the turbidity in the deep-draft harbor, with the increased possibility of periodic algae blooms and oxygen problems during calm wind conditions.

The marina entrance channel should be relocated out of the deep-draft harbor and independent access to the ocean provided for the marina. This would eliminate the difficulties discussed above.

**Construction Period of the Harbor**

Adequate lead time is necessary to develop the required facilities of the harbor. Dredging is expected to take 30 months or longer, and the planning and construction of the minimum shore-side facilities would require an additional 36 months. Thus, if construction could begin in 1978, the
May 11, 1979

The cargo projections, income, maintenance, etc., were projected from the base year 1980 to 2030 because the assumed life of the facilities is 50 years. It does not mean that it would take that length of time to construct the harbor. The impacts during the construction period and their mitigation measures were discussed in Section VIII of the EIS.

Urbanization in the Ewa District

Population:

The proposed harbor development is estimated to directly and indirectly employ approximately 680 workers over the next 25 years. In addition, it is estimated to be responsible for the employment of approximately 1,120 workers in Campbell Industrial Park and to generate approximately 360 more jobs among private and public-support industries. Thus, the total employment over the 25-year period is estimated to be about 2,100 workers. Assuming 3.075 people per household, the total population related to the harbor is approximately 6,500 people.

In estimating the number of workers who would live in the area as a result of the harbor development, residential location patterns of workers at Campbell Industrial Park provide some perspective. According to Campbell Estate statistics, 61.5 percent of the CIP workers reside in the leeward district and 3 percent live in the Ewa-Makakilo-Barbers Point area. Based on these residential patterns, Campbell Estates estimates that by the year 2000, approximately 66 percent of industrial park employees will live in the leeward district and 25 percent of the employees will live in the Ewa-Makakilo-Barbers Point area. Utilizing these residential patterns, the incremental employment as a result of the harbor development is estimated to result in an increase in population to the district of 4,500 people by the year 2000 and an increase in the Ewa-Makakilo area population of 1,300 people.
Demographic:

The harbor development is not expected to have a significant impact on the profile of residents of the Ewa district for two reasons. First, the increase in population and employment in the district is expected to be negligible. Second, the average worker at the harbor could be expected to closely resemble the resident profile of the area. These workers could be expected to be primarily middle income, blue collar workers with an average annual income of approximately $15,000. Although average annual income information for the district is not currently available, it is believed the average income closely parallels the average family income in the district. Based on census information, the average family income for the district was approximately $9,650 in 1969. Assuming an inflation factor of 6 percent per annum, the average family income in 1977 dollars for the district is estimated to amount to $15,700. Thus, the additional population growth related to the harbor development is expected to have a marginal impact on current economic and social characteristics of the district. Changes in current demographic characteristics, however, are expected to primarily be a result of the significant growth in the population of the area that is projected to occur without the development period of the proposed harbor.

Lifestyle Patterns:

The leeward district is considered to be a "bedroom" community of Honolulu, in which residents of the area commute to work in central Honolulu or Pearl Harbor. Given that the harbor development would result in an economic multiplier effect on the growth of the population of the area and that the harbor operations would be located within an existing industrial area, the development of the harbor is expected to have a minimal, if any, impact on the current lifestyles of the area. Changes in lifestyles in the area are primarily expected to result from the increased urbanization of the area rather than from the increased industrial activity at Barbers Point.

Land Value:

A change in utilization of land from agricultural to residential and/or commercial has a significant impact on land value. This change of utilization usually results from governmental policy and demand from the general populace. The
City and County Department of General Planning has implemented four alternatives for growth and, under each alternative, the rapid growth in population of the Ewa district appears inevitable. In fact, the City and County's statement of objectives calls for creation of a secondary urban center in the Ewa-Makakilo area.

The development of the Ewa-Makakilo area as a secondary urban center, coupled with the projected growth in population of the Ewa district, should result in increased demand for housing, retail and commercial facilities, and related population support facilities. The demand for housing and commercial area could result in a change in land utilization and possible increased land values.

The harbor development, being a self-contained facility, is not expected to have a significant impact on surrounding land values in the tertiary impact area. Any increase in surrounding land values is expected to be derived principally from the overall growth in the population of the area.

Public Services and Commercial Development:

Development of various public and private services such as libraries, schools, shopping centers, etc., is directly related to population growth. Many of the public and private services for a fringe area such as the Ewa-Makakilo area are not by a larger city's facilities. As the fringe area grows in size, it taxes the capabilities of its mother city and therefore requires its own facilities. Expenditures for further development of the Ewa-Makakilo area's public and private service needs can be expected to result primarily from its projected normal growth in population.

Impact on Agriculture:

The total area of land needed for the harbor is 246 acres. Of this area, 158 acres are in the agricultural district, but the land is barren and unproductive. About 2 acres were in cane land, but this area is now included in the urban district when the West Oahu Development was approved. Thus, we do not see that the harbor development would contribute a significant adverse impact upon Hawaii's agriculture.

As stated in the EIS, the long-term plan for Honolulu calls for the conversion of 7,200 acres from agricultural to
urban use of the land below the H-1 freeway. Part of this land is used for cane production, is lying fallow, or is used for related cane production activities.

The Homouliuli plan also provides for the utilization of 2,400 acres of better quality land that is lying fallow in the area north of Waipahu.

These are the tentative plans according to a study prepared by Donald Wolbrink & Associates for Campbell Estates. Their eventual adoption depends upon the policies of the State Regulatory Agencies that have jurisdiction over such matters. It should be noted that the land use change of the large areas of land is not related to the harbor.

Water Supply

The harbor and its port facilities will need an estimated 0.36 mgd for the initial phase of its development. Water presently supplied to the Campbell Industrial Park comes from the Board of Water Supply's Ewa-Waianae district. The fresh water resources within this water district that could be developed by the BWS are insufficient to meet the future demand. Four new wells have been proposed to meet the increased consumption, or the Ewa-Waianae water district will have to depend heavily on other water districts, such as the Pearl Harbor water district (which presently supplements the Ewa-Waianae water district) and the Wahiawa water district.

The BWS, however, has indicated that the initial harbor water requirements can be accommodated by tapping into the existing system. Fire flow requirements would initially be satisfied by using a salt water pumping system. The improvements needed to satisfy the growing requirements for the entire Barbers Point area will be the subject of an area water master plan that will be coordinated with the BWS.

Users of the Harbor

Fully loaded container ships may not immediately use the proposed harbor. In time, it is anticipated that fully or partially loaded container ships will call at Barbers Point Harbor.

The immediate uses of the harbor would be for large shipment of petroleum products, cement and sand products, lumber, scrap metal, raw iron, tile and clay products, and aggregates.
Other potential users such as the Cyprus Hawaiian Cement Corporation, Ameron HDI and Renault Incorporated have testified in a hearing held on April 4, 1973 by the House Committee on Energy and Transportation of the Ninth State Legislature that they would use the Barbers Point Harbor. Attached are copies of their testimonies.

Effects on the Trucking Industries and Employees

It is anticipated that the proposed harbor would have no adverse effect on the trucking industries and its employees. Some of the long hauls between Honolulu Harbor and the Leeward area may decrease, but the cargo projections for Honolulu Harbor and Barbers Point will increase to offset the decrease in the long hauls.

Water Quality (Underground)

The U.S. Geological Survey, in its December 1968 administrative report, evaluated the proposed Barbers Point Harbor development and found that, with respect to groundwater resources, there will be no effect to the potable water supply of the Wai'anae Volcanic Series aquifer resulting from harbor construction. It further states that harbor construction should not have any measurable effect on the chloride content of the water pumped by any of the existing wells in the area. The only well that might possibly be affected is an irrigation deep well operated by Wa Sugar Plantation located about 1 mile northeast of the proposed harbor site. The USGS evaluation concludes, however, that the possibility of adverse effect is rather remote.

Method of Dredging and Impacts

The Corps of Engineers will be the responsible agency for the dredging and construction of the protective structure of the harbor. The dredging operations are described as follows:

Construction Impacts:

Construction of a commercial port at the site of the existing private large harbor offers a number of unique construction opportunities. By locating the port at the site of the existing facility, the construction will
occur in an area that has already been altered and affected by previous dredging. In addition, studies of the existing large harbor offer a baseline from which estimates of harbor expansion impacts can be made. Except for the entrance channel, the harbor is situated completely inland from the shoreline, eliminating the need for offshore protective structures and thereby minimizing destruction of coastal areas.

The construction of the port facility can be divided into three basic operations: dredging of the entrance channel, dredging of the basin area down to water level, and dredging of the remainder of the basin down to project depth. The entrance channel construction will be done in open sea and will yield about 1 million cubic yards of coralline material. Dredging will be accomplished by a hydraulic cutterhead dredge with pipeline disposal to a land disposal site. Between 60 and 80 percent of the piped material will be water, much of which is expected to be absorbed by the coral substrate at the disposal site. Settling basin will also be used to assure that the maximum amount of sediment is removed from the piped material before any excess surface water flows back into the ocean.

The dredging in open seas will generate some turbidity and sediment in the immediate area of the dredge, although most of the material should be consumed by the suction equipment and piped to shore. Very little dispersion of fragmented coral rubble is expected, and most of the coarser sediment should also be taken up. The dredge operates from a floating plant that generally restricts its use to calm or moderate sea conditions; therefore, dredging operations would be suspended during heavy seas when the likelihood of turbidity would be greatest. Being exposed to the agitation of ocean waters, even in calm seas, the operation will result in dispersion of some of the finer sediments along the shoreline and offshore, and alternating currents along the coast may spread the impact to coral communities in the vicinity. Some impact could persist for extended periods of time (even up to several months or years) as the sediment settles, becomes resuspended by wave action, and then becomes gradually redistributed in deeper water or at great distances from the harbor.
Although the use of silt barriers or containment facilities does not appear feasible for the entire entrance channel, their use will be considered for the nearshore portion of the channel dredging if it is necessary.

While the impacts of dredging the entrance channel may be significant, construction of the basin portion is proportionately a much larger undertaking. Construction of the harbor basin would yield about 3.5 million cubic yards of material. Fortunately, the inland configuration of the basin allows for a number of alternative methods of phasing the dredging to minimize its impact on the coastal waters. Conceptually, the harbor basin excavation and dredging would be done in two phases. The first phase would involve a land plant operation in which land-based equipment such as bulldozers would be used to excavate the coral material down to water level. The land operation would be done entirely in the dry, and the material would be stockpiled at the nearby land disposal site. The second step would involve dredging the remainder of the basin down to project depths. This portion of the work would be accomplished by a hydraulic cutterhead dredge with pipeline disposal to the shore, operating in the same manner as in the entrance channel dredging. The dredge may be able to enter through the existing barge harbor and begin dredging the remainder of the basin after a closure is made behind it to completely separate the dredging activity from the open ocean. Another method would be to continue dredging the entrance channel inland, after making a closure near the coastline to confine the effects of the dredging. Final opening of the harbor to the sea would be made after the entire basin is dredged to project depth and the connection between basin and channel is all that remains.

The details of the construction methods will be finalized during the detailed design stage, and every effort will be made to take advantage of the inland harbor configuration. By peeling the inland dredging and maintaining a land barrier between the portions dredged and the ocean waters, most of the harbor development could be done under closely
contained conditions and with little or no interaction with sea waters. Additional measures such as the use of silt curtains will be required to minimize turbidity during the final opening to the sea; however, the major portion of the dredging work would not cause significant turbidity impacts. Overall, the most significant adverse impacts associated with harbor construction would be substantially minimized.

Water Quality, Average Nutrient Discharge, and Caprock

After the harbor development, the overall average nutrient discharge per length of coastline in the Barbers Point area will be similar to the present condition since the overall groundwater discharge rate, after a new equilibrium is established, will be very similar to the present rate. This is because the overall groundwater flux is primarily dependent on the recharge rate, which would not be significantly affected by the proposed harbor.

The harbor would reduce the volume of brackish water presently stored in the coral aquifer but would not significantly affect the net flux of this water to the ocean. The net effect is that as much water would be available for development, but the wells would have to be located further inland, as the harbor construction would essentially move the shoreline inland at the harbor site.

Endangered Plant Species

The endangered Pachypodium skottbergii var. kalaaloana Sheriff is now being successfully propagated at the Kawahara Nursery in Kaneohe, and Campbell Estate is now in the process of developing a program of transplanting the cuttings during the next rainy season at selected locations in the Barbers Point area.

No attempts have yet been made to propagate the Achyranthes splendens var. rotundata Whit., but this will also be done. Ms. Carolyn Torn, botanist with the State Department of Natural Resources, reported that she found 3 percent of the seeds she planted had germinated. So far, the results of propagating both these plants are encouraging.
Ms. April Gushi
Page 12
May 11, 1978

Thank you for your comments and we hope that the information provided answers your questions and concerns about the project. Although we were not successful in our previous efforts to meet with you and your group to discuss the details of the project, please feel free to call on us should you need more information.

Very truly yours,

LCF:akn
Attachments

bcc: M&E Pacific, Inc.
April 4, 1978

Mr. A. Rodger
General Sales Manager

with a major harbor facility at Campbell Industrial Park, delivery costs of products to neighbor Island ports could be reduced. You may be assured that we would definitely use such a facility.
Mr. Chairman, members of the House Committee on Transportation. My name is Nat Potter. I'm vice president of Cyprus Hawaiian Cement Corporation. Our cement manufacturing plant is located at Campbell Industrial Park. Our company enthusiastically supports the development of a deep water harbor, both for selfish reasons and because we are citizens of this community and wish to see maritime services improved for this island state, so dependent on waterborne commerce.

We annually import 3 or 4 shiploads of silica sand and gypsum needed in the manufacture of portland cement. Each ship presently requires approximately 600 truck trips from Honolulu Harbor to Campbell Industrial Park.

We annually haul from Barbers Point to Honolulu Harbor for transshipment to the Neighbor Islands, approximately 28,000 tons of finished portland cement, which requires another 1,100 truck trips.

This adds up to 5,000 one-way trips annually - for only one company! The construction of a deep water harbor at Campbell Industrial Park should result in the complete elimination of this movement (and comparable truck trips by our competitor - which has a 20-mile longer haul, round trip) and:

1. Lower costs of some raw materials
2. Lower costs of shipping cement to the Neighbor Islands
3. Significant reduction of traffic congestion
4. Meaningful conservation of fuel energy, and
5. Combining the above, help to slow the inflationary trend in construction costs.

To repeat, we strongly urge the construction of this deep water harbor.

Thank you for the opportunity to offer this testimony.
Michael B. Wood, Executive Vice President
KENAULT INCORPORATED - Broker/Distributor
Tenant C.I.P. - Planning 2,500,000 cu.ft. distribution center
in Park serving all islands - distributing:
Food and Household products to all Hawaii.
Planned Completion - Spring 1979.

Testimony on behalf of creating a deep draft harbor at Barbers Point.

1. Current island 3 phase expansion (resident, retail and wholesale) supports location of deep draft harbor at Barbers Point...all growth in this direction.
   a. Theory is that first expansion is residential, followed shortly thereafter by major retail expansion and finally by wholesale/ distribution and support industries.

   1) The Leeward side of the island is well into the second phase (retail) and is now entering into the wholesale/distribution phase.

   2) One outside factor that has an unusually strong influence in Hawaii is the rapid increase in the cost of land in Zones 1 and 2 and the limited amount of land available for major development in the Honolulu, airport area for the distribution industry.

   3) It is KENALULT's feeling that by 1988 - 10 years from now - that we will be nearly as close to our major customers distribution point as we are currently in our present Honolulu location. Because of the limited growth potential in the Koko Head direction, the only logical direction of continued growth will be in the Ewa direction. Thus the Barbers Point harbor looms very important to the whole distribution industry, not just KENALULT.
Other points in favor of the deep draft harbor are:

1. Removes congestion from downtown area.
   a. This includes removing many motor vehicles (containers, etc.) currently supporting Honolulu harbor.
      
      Note: That after approx. 10 year period the cost of fuel, etc. will probably be no greater to those vehicles supporting the Barbers Point harbor customers, then they would for the Honolulu harbor customers.
   b. Thus you have effectively reduced the demand on the present harbor system by diverting traffic to Barbers Point without adding real long term economic costs to those customers presently using the system.

2. Economics of land cost and use force realistic expansion to Leeward side.
   a. Cost of condemnation and land acquisition in Honolulu area far from acceptable.
   b. Public and private enterprise will be building and expanding in Leeward area.

3. With Leeward, Oahu being new center of industrial and distribution support, Barbers Point harbor would bring savings on both in-haul and out-haul to main Oahu customers, (many industrial customers already closer to Barbers Point).

4. If Young Bros. would locate facility at Barbers Point, KENAUTZ and many other customers would find shipping to neighbor island customers right at our back door.
   
   Note: Neighbor island customers represent 20% of our current 30 million in sales.

5. Greater flexibility to our direct shipment customers (import-full container shipments). Depending on location of customers warehouse or retail location we can pick harbor closest to their facility to reduce in-haul cost.
KENAULT usage of current and planned distribution center

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<tr>
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<td>a.  $ volume out of distribution center</td>
<td>$22,000,000</td>
<td>$70,000,000</td>
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<tr>
<td>b. Pounds shipped out of distr. center</td>
<td>28,000,000</td>
<td>60,000,000</td>
</tr>
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<td>c. Out island business $</td>
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<td>$15,000,000</td>
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<tr>
<td>c. Incoming containers</td>
<td>1,000/yr</td>
<td>2,200/yr</td>
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Mike Wood