FINAL ENVIRONMENTAL IMPACT STATEMENT

for the

HAWAII COMMERCIAL HARBORS 2020 MASTER PLAN

Island of Hawaii, Hawaii

Proposing Agency:

State of Hawaii
Department of Transportation
Harbors Division

Accepting Authority:

Office of the Governor, State of Hawaii

Prepared by:

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RMTC Job No. 18844-OE

July 2001

EXECUTIVE CHAMBERS

HONOLULU

BENJAMIN J. CAYETANO
GOVERNOR

August 20, 2001

TO: The Honorable Brian K. Minaai, Director
Department of Transportation
State of Hawaii

SUBJECT: Acceptance of the Final Environmental Impact Statement
Hawaii Commercial Harbors 2020 Master Plan

With this memorandum, I accept the Final Environmental Impact Statement for Hawaii Commercial Harbors 2020 Master Plan, the island of Oahu, as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes. The economic, social and environmental impacts, which will likely occur should this project be implemented, are adequately described in the statement. The analysis, together with the comments made by reviewers, provides useful information to policymakers and the public.

My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws but does not constitute an endorsement of the proposed action.

I find that the mitigation measures proposed in the environmental impact statement will minimize the negative impacts of the project. Therefore, if this project is implemented, the Department of Transportation and/or its agents should perform these or alternative and at least equally effective mitigation measures at the discretion of the permitting agencies. The mitigation measures identified in the environmental impact statement are listed in the attached document.

Benjamin J. Cayetano

BENJAMIN J. CAYETANO

Attachment

c: Honorable Bruce S. Anderson, Ph.D., M.P.H.
Office of Environmental Quality Control

In the event that archeological resources or human remains are found, all work in the area will cease and the State Historic Preservation Division of DLNR will be notified at once to determine significance and treatment of the findings.

Water quality

a. Temporary increases in turbidity due to pile driving and dredging are expected at both harbors. These will be mitigated by the use of siltation curtains.

b. To reduce impacts to nearshore waters at Hilo Harbor, dredging spoils will be deposited in an ocean dump site approved by the U.S. Environmental Protection Agency. Spoils comprised of basalt may be reused as crushed material for the base course for pavement. Dredging spoils at Kawaihae will be used as fill material in future harbor projects.

c. Pollution control measures will adhere to the requirements of the National Pollutant Discharge Elimination System (NPDES) permit, including the submission of a Best Management Practices Plan regarding runoff, erosion, and sediment control methods.

Fauna

Injury to or inadvertent taking of the threatened green sea turtle (*Chelonia midas*) will be minimized by the use of siltation curtains. At Kawaihae Harbor, the undredged coral reef area along the harbor side of the breakwater will be protected from construction-related turbidity by a siltation curtain. A second siltation curtain may be erected as an extra safeguard. In addition, pier construction will be planned for periods in which coral in the area is not reproducing. DOT will continue to work with the US Fish & Wildlife Service regarding reduction of impacts to coral.

Operational impacts

Introduction of alien marine species

Department of Transportation Harbors Division will strictly abide by the regulation standards of agencies responsible for control of alien species introductions.

Water quality

a. To prevent contamination of groundwater from any leakage from new above-ground storage tanks, their design and construction will be in accordance with applicable State and Federal regulations. Measures will include underground liners and construction of berms to contain leakage.

b. Increased pollutant runoff, as a result of an increase of hard surface in newly paved terminal areas, will be mitigated by a drainage plan to ensure that future storm drainage systems are properly sized.

c. The discharge of oil from vehicle exhaust will be mitigated by the use of subsurface catchment systems and a permanent floating oil boom.

d. The existing liquid bulk pipelines will be periodically monitored to ensure that petroleum leakage does not contaminate ground or ocean water.

Traffic impacts

Impacts from increased land side traffic will be mitigated by construction of additional access roads into both harbor areas and implementation of planned regional highway improvements by the Highways Division of the Department of Transportation.

Solid waste

Harbors Division will actively encourage recycling efforts by interisland cruise ships and the use of on-board incinerators. Incinerator ash will be disposed of at a State Department of Health (DOH)-permitted municipal solid waste ash monofils or other permitted disposal facilities.

Public Health and Safety

To lessen damage from earthquakes and hurricanes new facilities will be constructed according to proper design criteria for these hazards. On an ongoing basis, personnel will coordinate with Hawaii Civil Defense and implement established procedures in the event of a disaster.

Recreation

Pier construction at Hilo Harbor will be designed to minimize the disruption of tidal currents and circulation of water that can affect fishing activities.

Attachment to Acceptance Memorandum from Governor Benjamin Cayetano to Brian K. Minaai regarding Hawaii Commercial Harbors 2020 Master Plan Environmental Impact Statement Mitigation Measures

The following list of mitigation measures identified in the final environmental impact statement will minimize the negative impacts of the project. If the project is implemented, the Department of Transportation and/or its agents should perform these or alternative and at least equally effective mitigation measures at the discretion of the permitting agencies.

Construction impacts

Noise & vibration

Noise impacts will be reduced by adherence to State Department of Health regulations controlling noise limits and curfew times. Other measures may include properly muffled construction equipment, and the location of engines and generators at least 400 – 500 feet from residences. The use of pre-drilling techniques, vibratory pile driving equipment, and bored and cast-in-situ piles will reduce noise and vibration impacts from pile driving operations. In the event blasting is required during construction, a blasting consultant will be retained to provide a blasting plan that will include supervision of an initial test blast to establish effects and baseline conditions, and a plan for monitoring vibration-sensitive locations.

Air Quality

Impacts to air quality will include the reduction (or elimination) of fugitive dust by employment of dust screens, frequent watering and rapid paving or landscaping of exposed soils; and, if required, the limiting of construction motor vehicle activity to off-peak hours to reduce exhaust emissions.

Construction Waste

Harbors Division will develop and implement a construction and demolition recycling plan.

Hazardous materials

All hazardous materials and substances will be managed in accordance with measures agreed upon by the State Department of Health (DOH), which may include removal, on-site stabilization, and, if feasible, recycling of hazardous materials to avoid the potential for release into the environment.

Archeological and Historical Remains

If vibration impacts from blasting and pile driving to sensitive resources at Kawaihae are prohibitive, alternative technologies to blasting during dredging will include the use of cutterheads, drag line operations or roadcutters. Other alternatives to blasting, such as using pre-drilling and expansion gels to split rock, will also be considered.

HARBORS DIVISION
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE HAWAII COMMERCIAL HARBORS 2020 MASTER PLAN ISLAND OF HAWAII, HAWAII

TMK:
Hilo Harbor: 2-1-07; 2-1-09
Kawaihae Harbor: 6-1-03

This Environmental Document is Submitted Pursuant to Chapter 343, Hawaii Revised Statutes

PROPOSING AGENCY:

Department of Transportation
State of Hawaii

ACCEPTING AUTHORITY:

Governor, State of Hawaii

"This statement and all ancillary documents were prepared under my direction and, to the best of my knowledge, address the content requirements as set forth in HAR 11-200-17 and 11-200-18, as appropriate."

Signed:

JUL 2 4 2001

Brian Minaai, Director
State of Hawaii
Department of Transportation

Date

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INTRODUCTION AND PROJECT SUMMARY

1.1 INTRODUCTION

1.1.1 Introduction to Commercial Harbors

Hawaii's commercial harbors develop, manage and promote the flow of waterborne commerce throughout the State. Over 98% of all imported goods enter through these gateways. Commercial harbors also are important catalysts for economic growth.

The State of Hawaii, Department of Transportation, Harbors Division (hereafter Harbors Division) is responsible for the control, management, use and regulation of deep-draft commercial harbors and their improvements (Hawaii Revised Statutes, Chapter 266). Harbors Division's jurisdiction is to provide: 1) essential infrastructure for the movement of cargo, passenger and fishing vessels entering, leaving, or traveling within the State of Hawaii, and 2) the facilities and supporting services for loading, offloading and handling of these vessels, their cargo and passengers.

Commercial harbors handle a variety of cargo:

- *Bulk* (loose) cargo, including *liquid bulk* cargo like petroleum and *dry bulk* cargo such as cement mix;
- *Breakbulk* cargo in packages such as bundles, crates, barrels, and pallets; and
- *General cargo* like automobiles or materials packed in steel boxes called containers. (American Association of Port Authorities (AAPA), 2000b).

Commercial harbor users in Hawaii range from major cargo carriers such as Matson and Young Brothers to commercial fishermen and charter boat operators with a single vessel. Other operations such as cement distribution also take place on harbor lands.

For definitions of harbor-related terms used in this EIS see CHAPTER 11, GLOSSARY. For definitions of acronyms, see CHAPTER 12, ACRONYM LIST.

1.1.2 Hawaii Commercial Harbors 2020 Master Plan

The State of Hawaii [must] develop**s** long-range plans for commercial harbor facilities to meet increasing demand for cargo and cruise ships. The Hawaii Commercial Harbors 2020 Master Plan (hereafter 2020 Master Plan) is a conceptual land use plan proposing facility development over the next 20 years at the two deep-draft harbors on the Island of Hawaii, Hilo Harbor and Kawaihae Harbor.

The 2020 Master Plan was developed collaboratively by the Harbors Division and two User Groups – one for each harbor – who provided input based on their experience with harbor operations and knowledge of anticipated harbor trends. The User Groups included maritime industry representatives, petroleum firms, interisland and overseas cargo carriers, a cement firm, timber harvesting operations, stevedores, cruise ship agents, commercial fishing operations and electric power generation firms. CHAPTER 7 contains a list of participating organizations and individuals as well as a description of the groups' involvement in developing the 2020 Master Plan.

The following objectives for the 2020 Master Plan were developed and agreed to by the User Groups.

- Facilitate maritime shipments of essential commodities.
- Optimize use of harbor lands and water resources.
- Plan facility development that serves Hawaii's port system in an efficient, safe and secure manner.
- Minimize the impacts of the 2020 Master Plan on environmental quality and recreational and cultural activities bordering Hilo Harbor and Kawaihae Harbor.

The 2020 Master Plan is designed to be flexible and adapt to changing conditions. It will be updated approximately every five years.

1.2 SCOPE AND AUTHORITY

This Environmental Impact Statement (EIS) has been prepared pursuant to Hawaii Revised Statutes, Chapter 343, and Title 11, Chapter 200 (Department of Health), of the Hawaii Administrative Rules. The requirement for this EIS is triggered by three of the eight conditions which stipulate the preparation of an Environmental Impact Statement: 1) use of State or County lands or funds; 2) use within Conservation District Lands; and 3) use within the shoreline setback area.

The purpose of this EIS is to address the potential for environmental impacts associated with the planned improvements through the year 2020 at Hilo Harbor and Kawaihae Harbor, as expressed in the 2020 Master Plan. ***The Environmental Impact Statement Preparation Notice for the 2020 Master Plan was published in The Environmental Notice of the State Office of Environmental Quality Control on November 8, 2000. The Draft Environmental Impact Statement (DEIS) was published on March 2001. The Public Comment Period for the DEIS extended from March 8, 2001 to April 23, 2001.***

Statements in this Final Environmental Impact Statement that have been added since the Draft Environmental Impact Statement are indicated in bold italics. Statements that have

been deleted are enclosed in brackets [ ].

1.3 PROJECT SUMMARY

TABLE 1 provides a summary of the project including proposed harbor improvements.

TABLE 1
Project Summary

PROJECT	Hawaii Commercial Harbors 2020 Master Plan Improvements
PROPOSED ACTION	The State of Hawaii, Department of Transportation - Harbors Division (Harbors Division) proposes to implement harbor improvements at Hilo Harbor and Kawaihae Harbor when state funding becomes available, beginning in 2002. The proposed action is presented in Harbors Division's Hawaii Commercial Harbors 2020 Master Plan, 1998.
PROPOSING AGENCY	State of Hawaii Department of Transportation Harbors Division 79 South Nimitz Highway Honolulu, Hawaii 96813 Contact Person: Thomas Fujikawa, Harbors Administrator
ACCEPTING AUTHORITY	Governor, State of Hawaii
EIS PREPARER	R. M. Towill Corporation 420 Waiakamilo Road, Suite 411 Honolulu, Hawaii 96817-4941 Contact Person: Chester T. Koga, AICP
LOCATION	Hilo Harbor, Waiakea, South Hilo, Island of Hawaii Kawaihae Harbor, Kawaihae, South Kohala, Island of Hawaii
LAND OWNERSHIP	State of Hawaii

Tax Map Keys:	Hilo Harbor: 2-1-07; 2-1-09 Kawaihae Harbor: 6-1-03
EXISTING LAND USES	**Hilo Harbor:** Commercial harbor uses include berthing and loading/unloading of ships, barges and small boats; berthing of passenger cruise ships; and dry and liquid bulk cargo operations. Other uses of the commercial harbor include recreational fishing. **Kawaihae Harbor**: Commercial harbor uses include berthing and loading/unloading of ships and barges; mooring of small boats; and dry and liquid bulk storage. Other uses of the commercial harbor include recreational fishing; swimming; outrigger canoe paddling; and outdoor education.
PROPOSED USES	**Hilo Harbor:** Dolphins at Piers 2 and 3; interim passenger terminal (renovation of existing shed) at Pier 4; dry bulk cargo staging area; interisland cargo terminal at proposed Pier 4; overseas container terminal at Pier 1; passenger terminal at proposed Pier 5; ocean research facility at proposed Pier 6; cargo, passenger and research vessel berths for Pier 3 and proposed Piers 4, 5 and 6; berths for commercial fishing, Coast Guard, visiting and research boats; access roadways. **Kawaihae Harbor:** Liquid bulk cargo terminal; dry bulk terminals at Pier 1; interisland cargo terminal at proposed Piers 3-4; overseas container terminal at Pier 2A; passenger terminal and ocean research facility; cargo and military berths for Piers 1, 2A, 2B and proposed Piers 3, 4 and 5; military cargo terminal, proposed Pier 5; access roadways.
LAND AREA	Hilo Harbor: 43 acres of fast land Kawaihae Harbor: 113 acres of fast land
STATE LAND USE CLASSIFICATION	Hilo Harbor: Urban Kawaihae Harbor: Urban and Conservation
DEVELOPMENT PLAN LAND USE	Not applicable

COUNTY ZONING	Hilo Harbor: MG-1A and Open Kawaihae Harbor: MG-1A; Open/RM-1.5 and Open
SPECIAL DISTRICTS	Not applicable
COUNTY OF HAWAII LAND USE DESIGNATIONS (General Plan)	***Hilo Harbor: Industrial*** ***Kawaihae Harbor: Industrial / Open***

1.4 SIGNIFICANT BENEFICIAL AND ADVERSE IMPACTS AND PROPOSED MITIGATION MEASURES

Significant beneficial impacts of proposed harbor development include the provision of critical commercial harbor infrastructure to accommodate projected increases in shipping, cargo volume and cruise ship arrivals. Overseas and interisland cargo terminals will have adequate capacity to load and offload goods to serve the island's growing businesses and population. Cruise ships will have adequate berthing and passenger accommodations at the island's two commercial harbors. Liquid bulk materials, e.g. petroleum products, will be offloaded and stored at Kawaihae Harbor to serve West Hawaii instead of being trucked across the island from Hilo.

Adverse impacts of greatest concern are short-term impacts associated with construction of proposed harbor improvements. Short term impacts include temporary increases in turbidity due to pile driving and dredging at both subject harbors. These will be mitigated by the use of siltation curtains, which will also protect the threatened green sea turtle (Chelonia midas) from injury. At Kawaihae Harbor, the coral reef area along the harbor side of the breakwater remaining after previous dredgings will be protected from construction-related turbidity by the siltation curtain method. In addition, pier construction will be planned for periods in which coral in the reef area is not reproducing.

Water quality impacts will be mitigated by the development and implementation of erosion, sedimentation and turbidity control measures. Unavoidable but temporary noise and vibration impacts may occur during the construction of the proposed harbor improvement projects. Underwater blasting may be necessary to achieve the required dredging depths. Harbors Division will explore the feasibility of using other technologies as an alternative to blasting, such as the use of cutterheads, drag line operations or roadcutters, to dredge

designated areas. Other alternatives to blasting, such as technology using pre-drilling and expansion gels to split rock, will also be considered. Construction methodology will attempt to minimize the possibility of inadvertent taking of any green sea turtles.

Alien marine species introductions are a concern at both harbors. Harbors Division will cooperate with regulatory agencies responsible for regulation of alien species introductions. Longer-term impacts include increased risk of liquid bulk spills at Kawaihae Harbor and which will be mitigated by strict adherence to containment design and regulations. Increased traffic at Hilo Harbor and Kawaihae Harbor is anticipated due to cargo and cruise ship operations. Traffic impacts at both subject harbors will be mitigated by construction of additional access roads into the harbors and implementation of planned regional highway improvements by the Department of Transportation - Highways Division. Finally, recreational opportunities at Kawaihae Harbor will be diminished due to the construction of a pier along part of the coral stockpile coastline.

1.5 ALTERNATIVES CONSIDERED

The no action alternative would mean the existing operations at Hilo Harbor and Kawaihae Harbor would remain unchanged. Harbor operations will become inefficient and unsafe because of spatial constraints. Traffic congestion in the harbors would not be alleviated. Existing vacant areas would remain undeveloped and unutilized for commercial harbor operations. With this alternative, there would be not additional piers, dolphins, terminals or passenger facilities to accommodate the anticipated growth of the State's commercial shipping and cruise ship industries. Current recreational uses of the harbors would be unhampered by new development.

The no action alternative has been rejected from further consideration because 1) the goals of the 2020 Master Plan would not be met; 2) State and County development policies would not be implemented; and 3) there would be anticipated negative economic consequences in the form of lost revenue opportunity 4) importation costs would rise, causing higher cost of goods for consumers. The delayed action alternative was also rejected because the existing harbor facilities, already strained at the present, will not be adequate to handle projected increases in cargo and passenger vessel demand.

The 2020 Master Plan was developed collaboratively by Harbors Division and User Groups of maritime industry representatives, cargo carriers, commercial harbor users, recreational harbor users, government agencies, community groups and individuals. Alternatives considered but rejected for Hilo Harbor included: installation of crane rails, shifting interisland operations to Pier 1, lengthening of Pier 1, transferring jurisdiction for roadways,

constructing a new road parallel to Kanoelehua, fish processing plant and filling in of Radio Bay. Alternatives considered but rejected for Kawaihae Harbor included installation of crane rails, cold storage facilities for agricultural products, bunkering, bulk fiber storage, space for a wood chip mill, veneer plant, wood processing and storage facility, intra/interisland ferry terminal, additional military land, U.S. Coast Guard pier and expansion of the turning basin.

1.6 UNRESOLVED ISSUES

The year-long master planning process with harbor User Groups and EIS consultation process yielded input from harbor users, government agencies, businesses, private interest groups and individuals. Comments were received on the EISPN and the DEIS (see Appendices A-1 and A-2) which provided input on issues and concerns relative to the proposed action.

The issues raised during the consultation program have been resolved in this FEIS, with the exception of the transfer of the Baker's Beach lease lots from the Department of Land and Resources to enable construction of the passenger terminal at proposed Piers 5 and 6.

The Department of Transportation, Harbors Division is aware that additional concerns regarding the proposed development may arise in the future. Therefore, Harbors Division will continue to work with harbor users, government agencies, private interest groups and the public so that project plans meet project objectives and take into consideration the concerns of agencies and the public.

1.7 COMPATIBILITY WITH LAND USE PLANS AND POLICIES

The proposed harbor improvements support existing plans, policies and objectives set forth by the State of Hawaii and the County of Hawaii. The proposed improvements will be compatible with existing land uses in the project areas. Public and private land use plans include harbor development as an infrastructure requirement. Harbor facility improvements will support expected future growth.

1.8 LISTING OF NECESSARY PERMITS AND APPROVALS

Applicable permits and approvals that may be required for the proposed action include the following, in order of application:

1. *Coastal Zone Management Federal Consistency Certification, issued by the Office of Planning, State Department of Business Economic Development and Tourism*

2. *Section 401 Water Quality Certification, issued by the State Department of Health*
3. *Department of the Army Permit, issued by the U.S. Army Corps of Engineers*
4. *Conservation District Use Permit, issued by the State Department of Land and Natural Resources*
5. *Shore and Shorewaters Permit, issued by the State Department of Land and Natural Resources*
6. *Shoreline Certification, determined by State Department of Accounting and General Services and State Department of Land and Natural Resources*
7. *Historic Preservation and Federal Section 106 Review, by State Department of Land and Natural Resources*
8. *Federal Section 106 Review, Protection of Historic Properties, by the State Department of Land and Natural Resources*
9. *National Pollutant Discharge Elimination System Permit, issued by State Department of Health*
10. *Permit to Construct a Wastewater System, issued by State Department of Health*
11. *Hazardous Waste Permit, issued by State Department of Health*
12. *Non-Covered Source Air Permit, issued by State Department of Health*
13. *Asbestos Regulations, State Department of Health*
14. *State Highways Permit, issued by State Department of Transportation*
15. *Section 103 Marine Protection, Research and Sanctuaries Act, issued by the U.S. Army Corps of Engineers*
16. *Public Lands Dispositions, by State Department of Land and Natural Resources*

CHAPTER 2
PROJECT DESCRIPTION

2.1 PROJECT LOCATION AND HISTORICAL OVERVIEW

The Island of Hawaii is currently served by two deep-draft commercial harbors. **Hilo Harbor** is located at the eastern end of Kuhio Bay on the windward, or eastern coast of the Island of Hawaii. As the island's primary commercial port, Hilo Harbor provides a wide range of maritime activities and services. This harbor also serves as a major distribution center for the island. Both overseas and inter-island ships and barges make regular calls at Hilo Harbor, as well as scheduled passenger cruise ships (SDOT 1993). **Kawaihae Harbor**, the Island of Hawaii's second commercial harbor, lies about 17 miles south of Upolu Point, the northwestern tip of the Island of Hawaii, and 28 miles north of Kona International Airport.

See FIGURE 1 for the location of the two harbors and FIGURES 2 and 3 for neighborhood location maps.

Hilo Harbor. Hilo Bay is a broad indentation in the northeastern coastline of the Island of Hawaii. The beginnings of the present configuration of Hilo Harbor date to construction of the Hilo breakwater in 1908. Originally built of stone quarried from Waiakea and Puna (and later from Waipio Valley), the breakwater was constructed on the inner part of the reef fronting Hilo Bay and was completed in 1929 to its present length of 10,170 ft (3,100 m) (Kelly et al., 1981).

The pier that was originally called Kuhio Wharf was constructed in 1912-16 at the present Pier 1 site. The harbor bottom near the pier was dredged at that time to a depth of 35 feet (approximately 10 meters). Completion of this pier removed most ship loading and unloading activity from the former Railroad Pier and the Government Wharf that had existed near the mouth of Wailoa River at Waiakea. Pier 2 was constructed in 1921-23 and Pier 3 in 1926-27. Large areas of the harbor basin were dredged during this period to accommodate approaches to these piers (Kelly et al., 1981).

Kawaihae Harbor. In response to the increasing population of west Hawaii, the Federal government authorized the Kawaihae Harbor Project as part of the Rivers and Harbors Act of 1899.

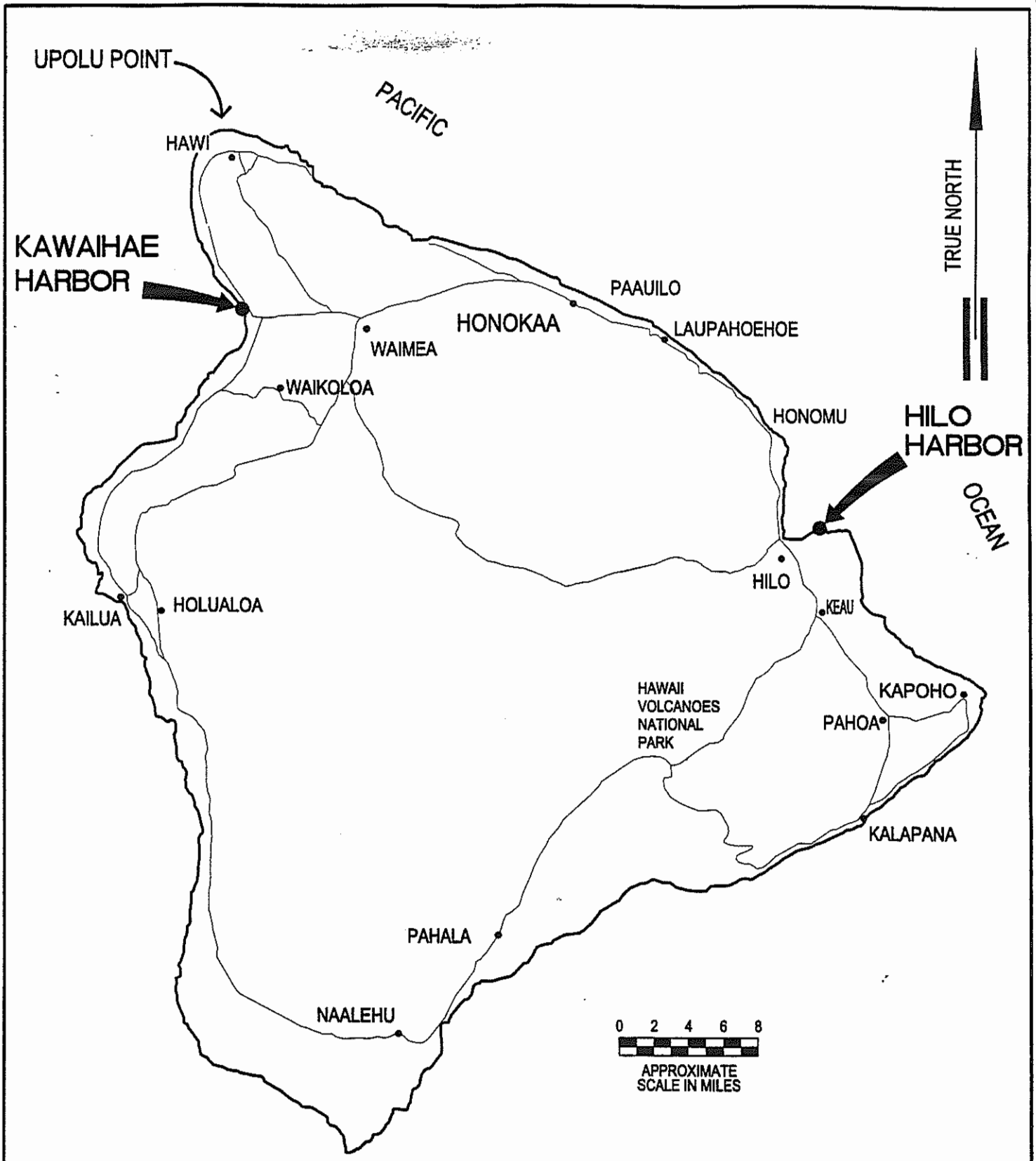

Figure 1
Location Map
ISLAND OF HAWAII

Approx. Scale : 1" = 8 Miles

HAWAII COMMERCIAL HARBORS
2020 MASTER PLAN
FEIS

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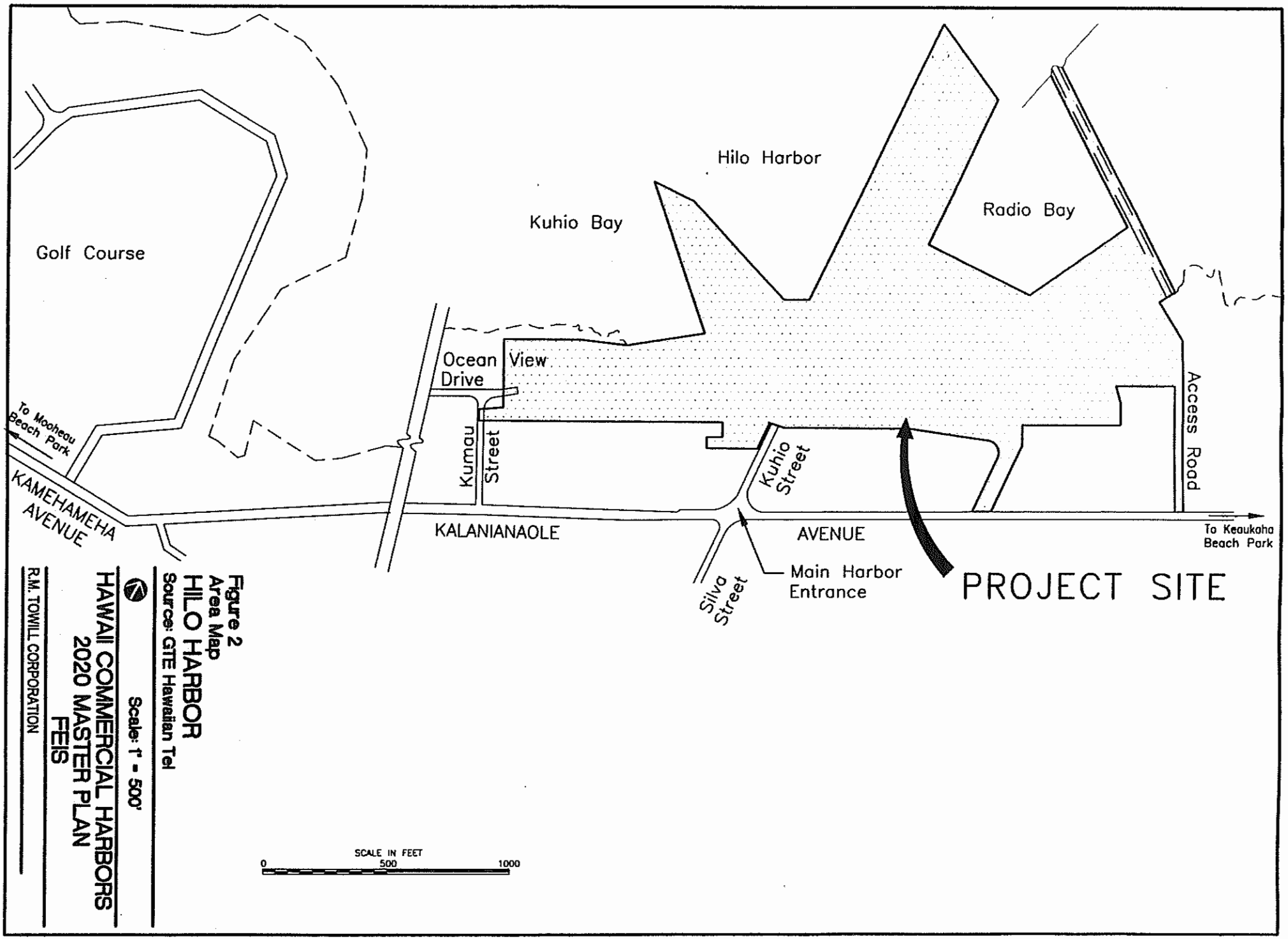

Figure 2
Area Map
HILO HARBOR
Source: GTE Hawaiian Tel

Scale: 1" = 500'

HAWAII COMMERCIAL HARBORS
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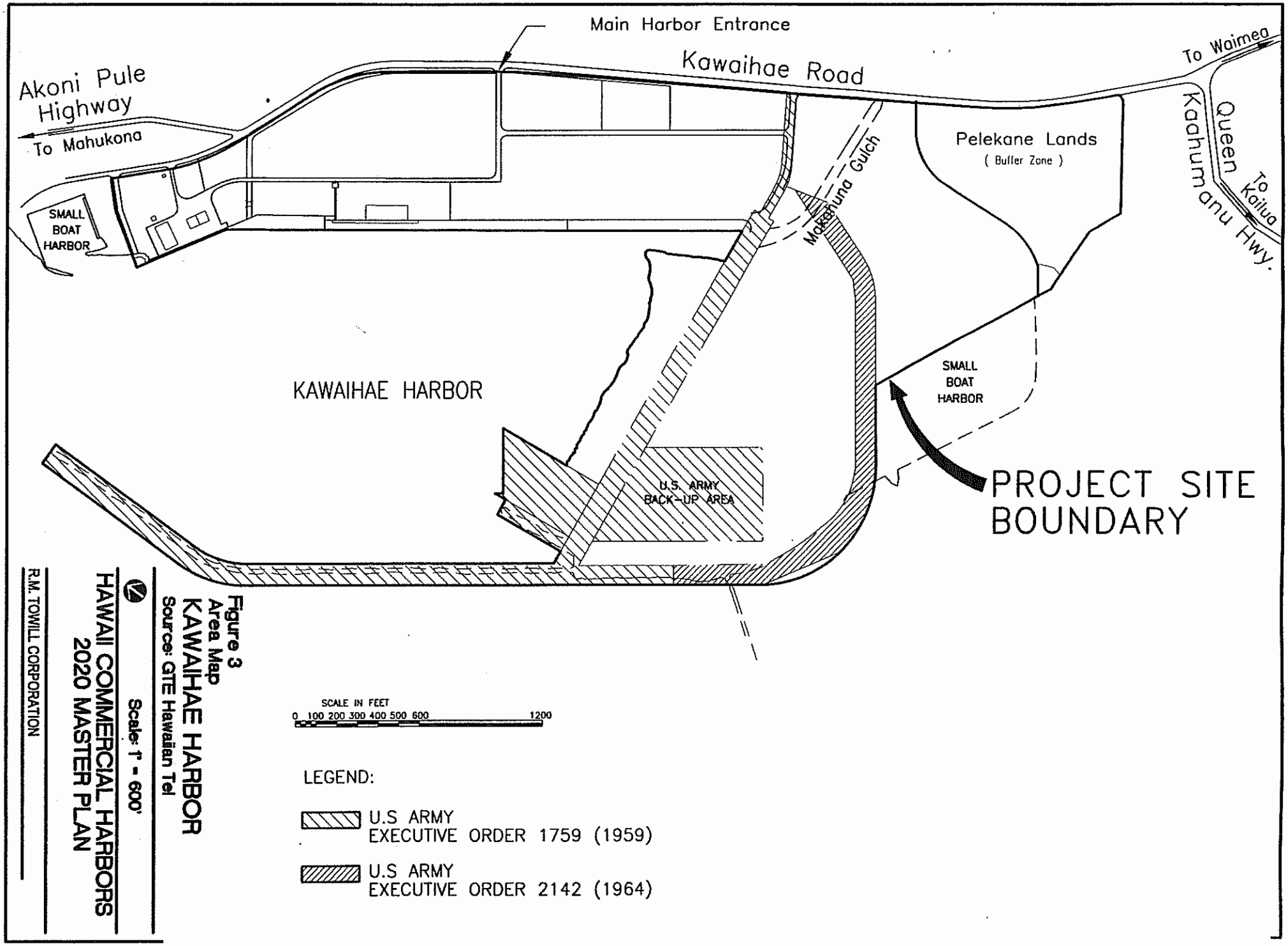

Figure 3
Area Map
KAWAIHAE HARBOR
Source: GTE Hawaiian Tel

Scale: 1" = 600'

HAWAII COMMERCIAL HARBORS
2020 MASTER PLAN

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The harbor was constructed in 1959 by blasting and dredging out a portion of the coral reef offshore and constructing a breakwater of basalt boulders on the harbor's seaward side (ORCA/Cheney, 1981). Prior to this, a small boat harbor and wharf existed on the site. In 1969-70, a small boat harbor was added on the south side of the harbor jetty seaward of the revetment. This small craft harbor was modified in 1995. At that time an attempt was made to moderate the environmental impact of revetment construction by transplanting corals that would have been eliminated by the project (Jokiel et al., 1999). The commercial harbor's basin was expanded through additional dredging in 1972 (AECOS, Inc., 2000).

2.2 EXISTING CONDITIONS AND SURROUNDING LAND USE

Hilo Harbor. Hilo Harbor is bordered by Hilo Bay on the north and Kalanianaole Avenue on the south. Current activities and facilities within the harbor boundaries are shown in FIGURE 4. Land uses include, from west to east; Piers 1 and 2 and their accompanying sheds; bulk sugar storage tanks; Hawaiian Cement bulk storage facilities; Harbors Division office facilities; container yards; and a water tower. Harbor land to the east of Radio Bay was recently occupied with illegal tents and crude plywood structures. This area has since been cleared by the Department of Land and Natural Resources.

Container and general cargo, petroleum products, lumber, cement, livestock and liquefied petroleum gas are handled at Hilo Harbor's three piers. The combined cargo handling and storage area totals over 595,000 square feet. Pier 1, the largest of the existing piers at 1,250 feet of berthing space, is used by interisland container barges, cargo ships and large passenger cruise ships. At 725 feet, Pier 2 is primarily used for interisland barge activity. Pier 3, measuring 652 feet in length, is used mostly for fuel barges but also accommodates overflow berthing of cruise ships and ships carrying bulk cargo. Alongside depth of each pier is 35 feet, the same depth as the harbor's channel (SDOT, 1993).

The Radio Bay area is frequently occupied by a Coast Guard cutter, Harbor Pilot boat, University of Hawaii at Hilo research vessel, Clean Island Council container with equipment for containing oil spills, and itinerant private vessels, mostly sailboats.

The project area is bounded on three sides by industrial uses and fuel suppliers, Gas Company storage yard and office to the east, C. Brewer fertilizer warehouse facility to the south and the

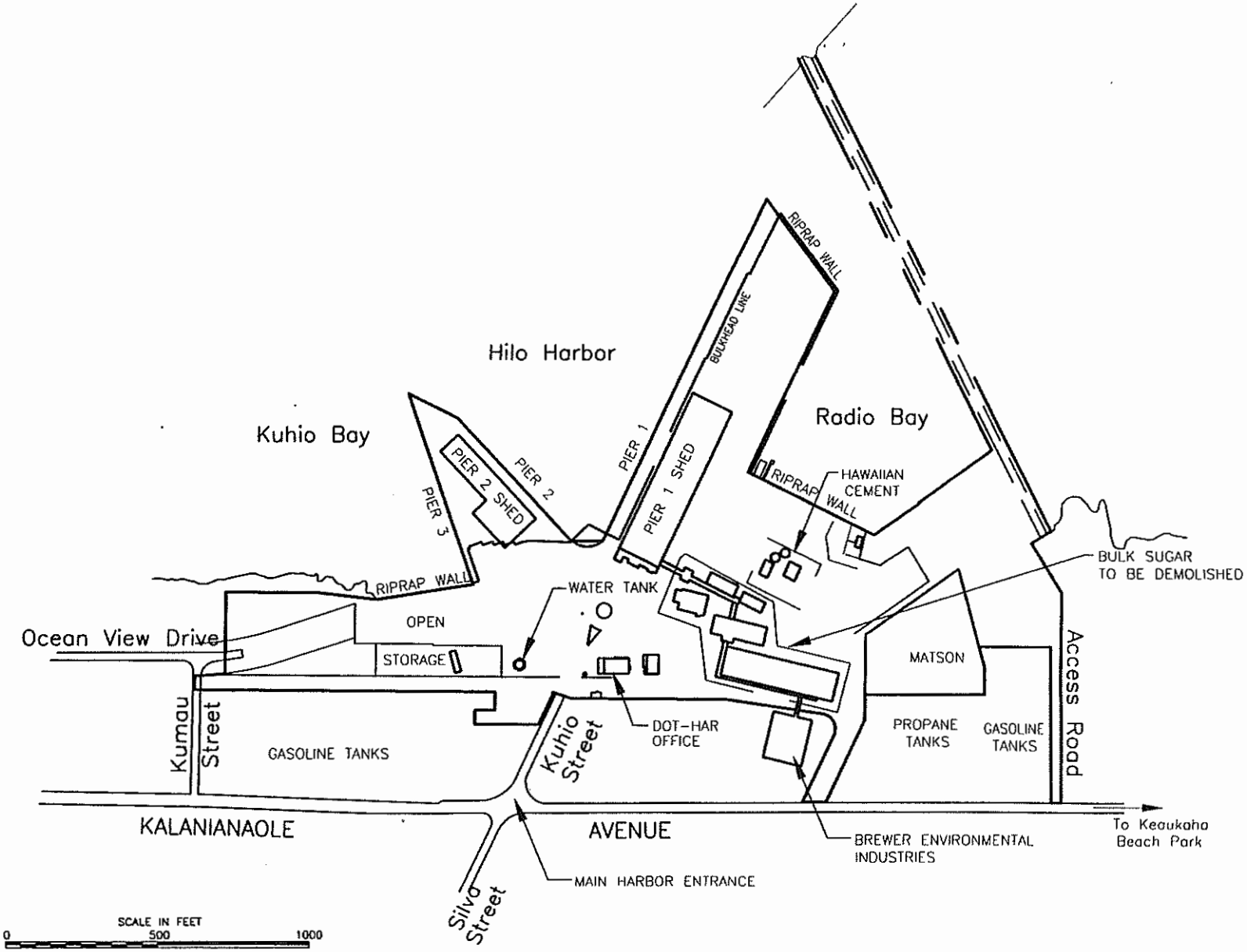

Figure 4
Existing Uses
HILO HARBOR

Scale: 1" = 500'

HAWAII COMMERCIAL HARBORS
2020 MASTER PLAN
DEIS

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harbor container yard to the north. Neighboring land uses on both sides of Kalanianaole Avenue include warehouses, University of Hawaii at Hilo's Pacific Aquaculture Research Center, petroleum tank yards and the Department of Hawaiian Home Lands community of Keaukaha.

Kawaihae Harbor. Kawaihae Harbor offers facilities for handling both overseas and inter-island cargo with room for future expansion. The harbor is strategically located to play a major role in the rapidly developing area of west Hawaii.

Kawaihae Harbor is bounded by Kawaihae Road, Puukohola ***Heiau*** National Historic Site, Hawaiian Home Lands, and the Pacific Ocean (FIGURE 3). The harbor is generally unimproved, with the exception of the inter-island barge and overseas terminals (FIGURE 5). Portions of the back-up areas are on long-term leases for petroleum product storage and bulk cement storage. To the north of the barge terminal are a livestock corral, a loading platform and a small boat harbor. The small boat harbor provides limited mooring for small vessels and a boat launching ramp. Another small boat harbor area is located at the south end of the harbor where a breakwater has been built by the U.S. Army Corps of Engineers.

The primary forms of cargo handled at Kawaihae Harbor are container and general cargo, bulk cement, lumber, steel, produce, petroleum products, bulk fertilizer, livestock, lava cinders and grain. Improved cargo handling and storage areas measure about 14 acres. The two piers at Kawaihae offer combined berthing space of over 1,562 feet. Pier 1 is 412 feet and used for barges. Pier 2 is 1,150 feet in length and has an alongside water depth of 35 feet. Pier 2a is used primarily for loading and offloading barges and has an alongside depth of 20 to 24 feet. The harbor turning basin measures some 1,450 feet by 1,500 feet with a depth of 35 feet. The entrance channel is 3,270 feet long, 500 feet wide and 40 feet deep. A 2,650-foot breakwater protects the harbor (SDOT, 1993).

Coexisting with the commercial port operations are recreational water related activities, including swimming, fishing, mooring of fishing and sailing boats along the east side of the harbor, a public boat launching ramp adjacent to the harbor entrance, and canoe racing practices conducted within the calm water of the harbor (AECOS, Inc., 2000).

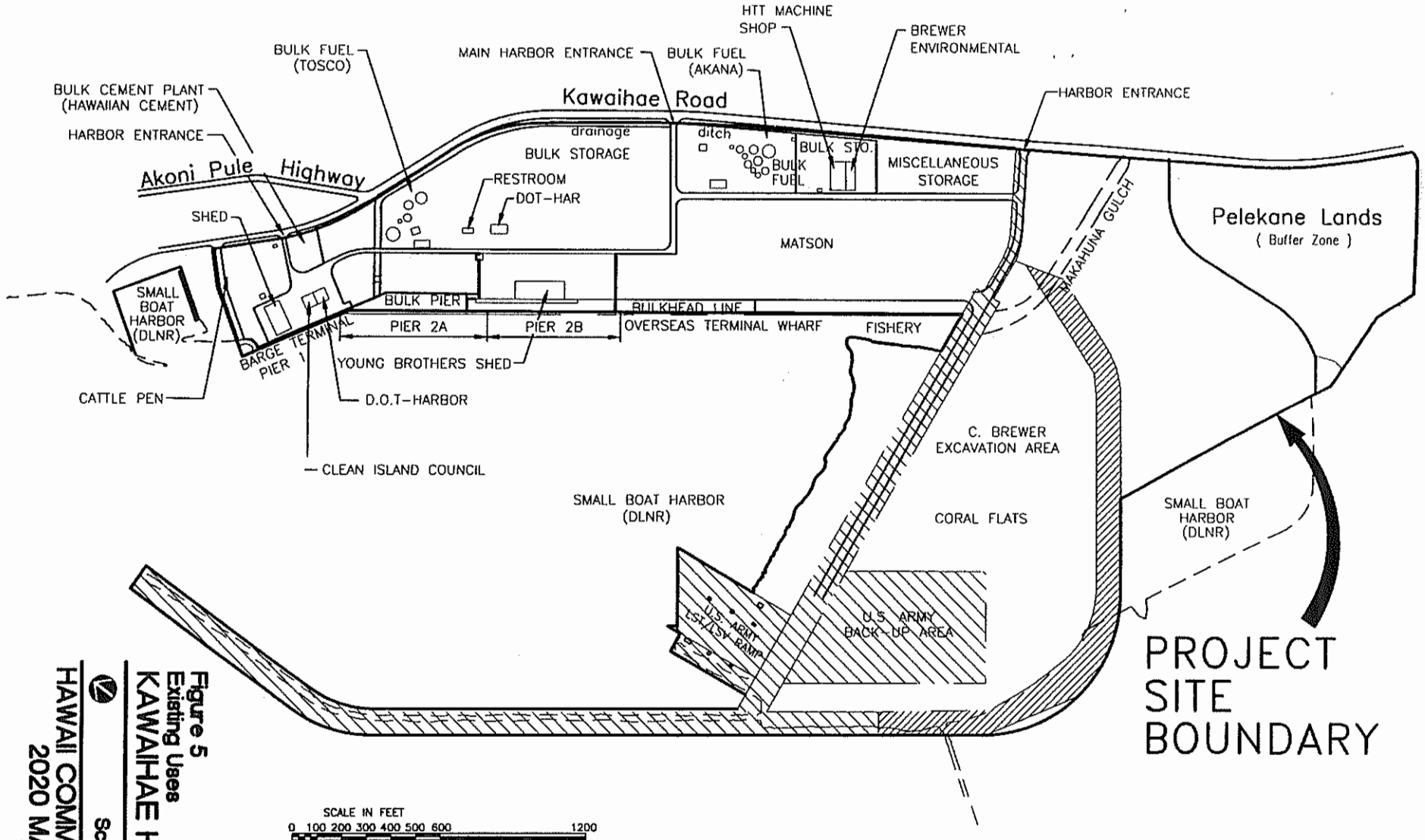

Figure 5
Existing Uses
KAWAIHAE HARBOR

Scale: 1" = 600'

HAWAII COMMERCIAL HARBORS
2020 MASTER PLAN
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The eastern side of the harbor is a wide beach shoreline formed by the tailings from the dredging of the harbor from the original coral reef. Natural beaches occur outside the harbor on the seaward side of the small boat harbor, inside Pelekane Bay and at Spencer Beach Park. Kawaihae Harbor contains large basalt boulders that form the jetty and concrete or metal sheet piling bulkheads that form the docks.

The U.S. Army owns and operates a landing ramp in the southwest corner of the basin under Executive Order No. 1759 (1959) and access to the ramp area under Executive Order 2142 (1964).

The southeastern corner of the inner basin is also used as a temporary mooring site for recreational and commercial small boats with a wooden loading dock and dinghy rack located in the vicinity (SDOT, 1993).

2.3 PURPOSE AND NEED FOR THE PROJECT

2.3.1 Economic Impact of Hawaii's Harbors

Hawaii is a geographically isolated state. As such, its economic viability and growth potential are closely tied to its essential commercial harbor infrastructure. In 1992:

- The major harbor industries of Hawaii produced $1.934 billion in direct sales.
- Hawaii's Gross State Product amounted to $33 billion. Fully a third, or $10.3 billion, of that amount in the form of goods and services passed through the State's commercial harbors.
- Harbor industries employed 8,298 people in Hawaii.
  (McDonald and Deese, 1994; Lee and Olive, 1994, adjusted by SMS Research & Consulting for major commercial harbor industries)

2.3.2 Demand Factors for Harbor Facilities: Cargo and Cruise Ship Arrivals

Planned commercial harbor improvements will be driven by two factors. The first major element of demand for harbor infrastructure will be projected increases in shipping and cargo volume. This translates into the need for additional piers and terminal improvements. The second demand factor concerns harbor facilities needed to serve the rapidly expanding Hawaii cruise ship industry. This demand will translate into the urgent need for cruise ship berthing and passenger accommodations, particularly at Hilo Harbor.

Harbor Facility Demand Factor #1: Projected Demand for Shipping and Cargo Handling

The key driver of shipping is economic activity. Therefore, a consistently strong correlation exists between cargo growth and Hawaii's Gross State Product. The State of Hawaii has been experiencing economic turnaround since 2000, reversing a recessionary trend during the 1990s. According to First Hawaiian Bank's Economic Forecast, "much of the [State's] growth continues to be concentrated in the Neighbor Islands. As far as sustained growth is concerned, the Big Island has fared better in recent years than even Maui or Kauai" (First Hawaiian Bank, 2000). This growth will translate into the demand for space and facilities to handle increases in cargo volumes at the Island of Hawaii's two commercial harbors (FIGURE 6).

The concentration of recent tourism growth in Hawaii's Neighbor Islands is supported by analysis of tourism trends performed by the State Department of Business, Economic Development and Tourism:

> "Oahu was the primary beneficiary of the surge in eastbound visitors during the first half of the 1990s ... As a result of the shift in growth from eastbound to westbound visitors since 1997, the visitor count on Oahu has fallen, while Neighbor Islands have experienced stronger growth on average. This trend has restored confidence in the tourism sectors of the Neighbor Islands and has provided a needed economic boost" (DBEDT, 1999a).

Hilo Harbor. Cargo movement through Hilo has remained stable over time, reinforcing Hilo Harbor as the key commercial harbor serving the Island of Hawaii. In addition to serving the needs of an increasing resident population, Hilo Harbor will be required to meet the demands of a growing diversified agriculture industry. Facilities must be modified continually to remain compatible with technological changes in the cargo handling industry, such as the accommodation of longer and heavier containers.

Kawaihae Harbor. Evidence of sustained economic growth on the Island of Hawaii is seen in the tightening of the island's job market, especially in west Hawaii where Kawaihae Harbor is located.

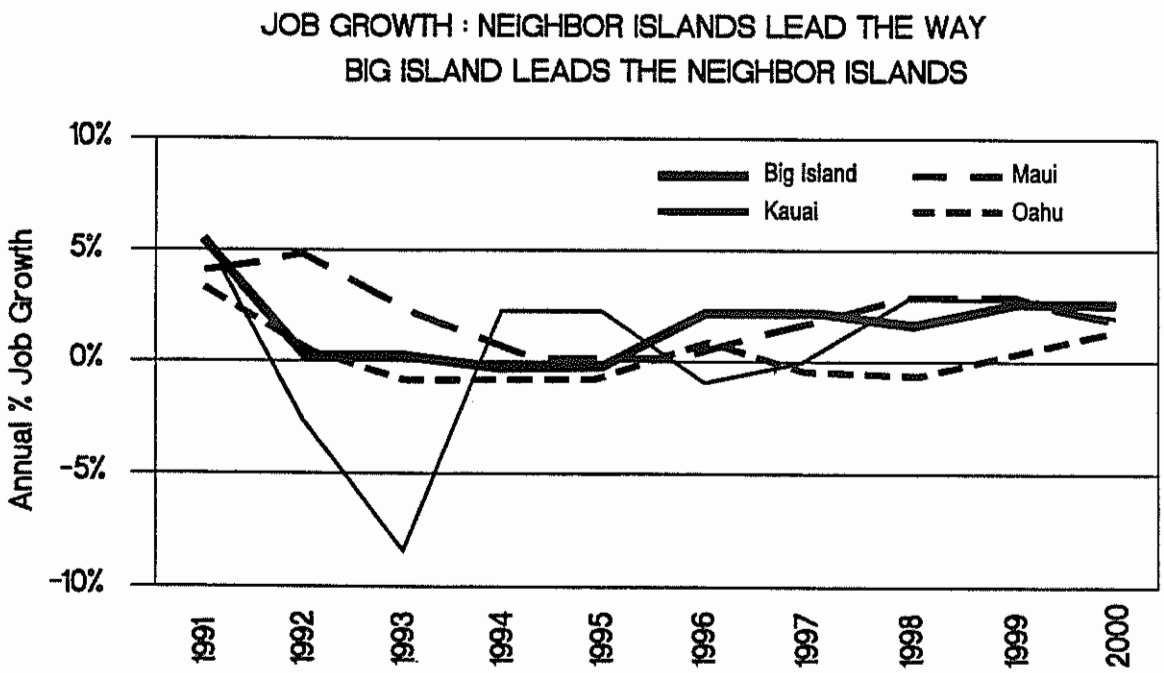

Figure 6
Job Growth - Neighbor Islands
Source: First Hawaiian Bank, 2000

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The island's economic growth is broad-based, with impressive tourism figures that are expected to continue. ***Economic indicators point to continued economic growth for the island. For example,*** [C]considerable construction activity is expected, both for residences catering to offshore demand and for substantial public works projects. Although Island of Hawaii building permits are up (FIGURE 7), offshore demand for second homes in west Hawaii is not fueling a speculative real estate market as it did in the past (First Hawaiian Bank, 2000). ***Building permit value is an indicator of the level of construction. The higher the value of building permits, the greater amount of construction is occurring. Consultation with rental agents in the South Hilo and South Kohala areas indicated a tight rental market for commercial and residential properties, but a lack of severe price inflation as was experienced in the late 1980s. Although rental prices have steadily risen in the past five years, prices have not reached the levels known during past inflationary periods.***

Analysis of Cargo Facilities Demand. Preparation of the Hawaii Commercial Harbors 2020 Master Plan included an extensive economic analysis that was translated into specific needs for physical improvements at each of the harbors. Economic analysis included research of economic trends and developing projections of future cargo volume. Growth projections in the Gross State Product and historical cargo demand patterns were used to forecast demand for additional cargo terminals and cargo handling at the two harbors. Projections of land requirements for cargo handling were developed by Harbors Division using standard port planning formulae which considered existing storage capacity, the amount of time cargo remains within the harbor, and monthly fluctuations in cargo activity. These factors are used to calculate demand for additional cargo handling space, expressed in acres. Finally, estimates of future space requirements at the two harbors were then reviewed for reasonableness by the project's harbor User Groups who were involved with each stage of the master planning process.

The analysis of future facility needs also considered the knowledge and experience of harbor users, government agencies, community groups and other stakeholders. Anticipation of future trends was aided by interviews with cargo carriers and cruise ship agents. The estimated 2020 demand for additional cargo handling space at the two harbors is shown in TABLE 2.

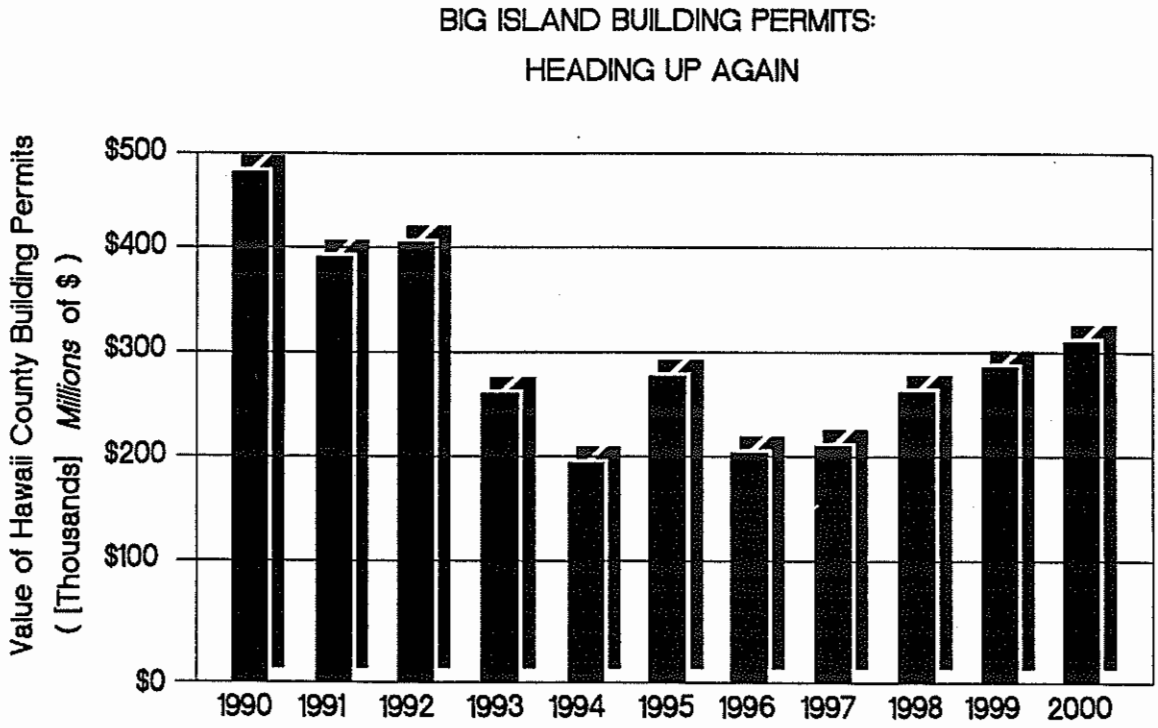

Figure 7
Big Island Building Permits
Source: First Hawaiian Bank, 2000

TABLE 2
Projected Acreage Required for Harbor Operations to 2020

	Hilo Harbor Area to be Developed	Kawaihae Harbor Area to be Developed
Interisland Cargo Terminal	21 acres	21 acres
Overseas Cargo Terminal	20 acres	21 acres
Liquid Bulk Storage	N/A	22 acres
Dry Bulk Storage ***(Timber Products, Cement and Scrap Metal)***	1	9 acres
Total Area to be Developed	**42 acres**	**73 acres**

Harbor Facility Demand Factor #2: Growth in the Hawaii Cruise Ship Market

Hawaii's cruise ship market is poised for record expansion in the coming years. Estimates indicate employment related to Hawaii's cruise ship industry could quadruple to more than 10,000 jobs by 2005 (DBEDT, 1999a, based on Leo A. Daley, 1999).

Traditionally foreign cruise ships have visited Hawaii between their Caribbean winter season and Alaska summer season. [Increasingly ships are coming from the Mainland U.S. with Hawaii as their primary destination.] Hawaii is becoming a more popular cruise ship destination because the newly-constructed ships are much faster and can cross the Pacific in sufficient time to allow visiting multiple islands.

Hawaii is considered the "last great year-round destination that has been overlooked because of its distance from other ports and because of the federal restrictions that have made it difficult for foreign-flagged ships to enter the market" (Honolulu Advertiser, December 3, 2000). The federal Passenger Services Act prohibits foreign-flagged ships (those registered in foreign countries) from conducting cruises exclusively within U.S. waters. Only American-registered ships, such as the SS Independence, may do so. To operate within this constraint, foreign-flagged ships are beginning or ending cruise packages in other countries while including Hawaii in the U.S. portion of the cruise.

The Hawaii market is comprised of two primary segments: interisland cruise ships and foreign cruise ships.

- **Interisland cruise ships.** Restrictions under the Passenger Services Act have limited the market because of a lack of American-flagged ships until the past several years. American Hawaii Cruises has long served Hawaii with interisland cruise ships, including the 1,000 passenger SS Independence and formerly the SS Constitution. Beginning interisland service

in December 2000, the newly purchased ship, MS Patriot, is expected to be the first of four large ships to arrive in Hawaii through 2004 to serve the interisland cruise ship market. American Hawaii Cruises registered about 46,000 passengers with one ship in 1998 and expects traffic to level off at about 190,000 per year with two ships. Each of the interisland cruise packages involves docking in Hilo Harbor and off the coast of Kona (DBEDT, 1999a).

- **Foreign cruise ships.** Passengers on foreign cruise ships nearly doubled from approximately 25,000 in 1997 to 49,000 in 1998. The firm of Leo A. Daley, consultants for Harbors Division, anticipates that passengers on foreign cruise ships will reach 100,000 by 2004; 200,000 by 2013; and nearly 340,000 by 2020 (DBEDT 1999a).
- **Total impact.** Over 500,000 total interisland and foreign cruise ship passengers are expected by 2020. As a result, retrofitting and renovations at Neighbor Island harbors are recommended by economic consultants for the period between 2004 and 2020 (DBEDT, 1999a).

Growth in the Island of Hawaii Cruise Ship Industry. Hilo Harbor is experiencing ever-increasing demand for berthing of luxury cruise ships. According to records of the Hawaii Island Harbormaster:

- Harbor bookings for 2001 are expected to total 153 cruise ships (48 foreign) compared to 92 in 1999. This represents an increase of approximately 75,000 passengers in Hilo.
- Passengers disembarking in Hilo are expected to nearly triple from a level of 64,356 in 1996 to a projected 172,000 in 2001.
- In 2001, all but three of the 153 cruise ships due at Hilo Harbor are over 600 feet in total length. In addition, 17 are over 900 feet and 33 total over 800 feet.
- At least two ships, holding approximately 4,000 passengers, may have to be turned away because they require berthing at Pier 1 and their schedule conflicts with weekly docking of American Hawaii Cruises vessels.

Cruise ship operators have conducted trial runs of berthing ships at Kawaihae Harbor and busing visitors to the Kona area. For the time being, cruise operators prefer to anchor off Kona rather than use berthing facilities at Kawaihae Harbor because of the distance to Kona (approximately 35 miles).

Projected Need for Harbor Facilities to Accommodate Cruise Ships. The need for cruise passenger harbor facilities is driven by two major factors: 1) lack of harbor infrastructure to accommodate multiple cruise ships and 2) lack of passenger amenities.

- **Lack of harbor infrastructure to accommodate multiple cruise ships simultaneously.** Both Hilo Harbor and Kawaihae Harbor were developed to accommodate strictly commercial shipping activities. However, the growing demand for the berthing of large passenger vessels and the lack of cruise ship berths could result in turning away of cruise ships from Hilo Harbor in the short term and from Kawaihae Harbor in the future. As an industry expert from Royal

Caribbean International & Celebrity Cruises was recently quoted, "It's not so much a passenger infrastructural support issue . . . it's to be able to maintain the presence of two ships on the same day, without hampering other harbor operations" (Honolulu Advertiser, December 3, 2000).

- **Lack of passenger amenities.** The passenger support issue also is important. At Hilo Harbor, passengers currently disembark onto the pier and may seek shelter in the industrial shed at Pier 1. They walk along the dock and are loaded into tour buses bound for Volcanoes National Park, the Mauna Kea observatories and local attractions in Hilo. Only the most rudimentary rest room facilities are available within the industrial shed at Pier 1. Tourist-oriented concessions display their wares in the shed.

2.4 FUTURE DEVELOPMENT ACTIONS UNDER THE 2020 MASTER PLAN

Hilo Harbor Improvements. The conceptual Master Plan for 2020 for Hilo Harbor includes the following elements and their approximate time frame, beginning with the Year 2002. The location of the improvements are summarized in TABLE 3 and illustrated in FIGURE 8.

TABLE 3
Summary of Planned Improvements to 2020
Hilo Harbor

Project	Timing	Area [(K= 1,000)]	New Pier	Dredging Alongside Piers*	Clearing, Grading & Paving	Utilities	Shed	Access Road
Piers 2/3 Dolphins	2002	***0.18 acres***	X					
Pier 1 Interim Passenger Terminal (Renovate existing shed)	2002	1.7 Acres					X	
Dry Bulk Cargo Staging Area	2003	1 Acre			X			
Pier 4 Interisland Cargo Terminal	2005	21 Acres	X	X	***X***	***X***	***X***	X
Pier 1 Overseas Cargo Terminal	2010	20 Acres			X	X		
Pier 5 Passenger Terminal	2015	0.8-0.9 Acres	X	X	X	X	X	X
Ocean Research Facility	2015		X	X	X	X	X	X

* Harbors Division is responsible for dredging from the pier face to the Federal Project Line, where the jurisdiction of the Army Corps of Engineers (ACOE) begins. The ACOE is responsible for dredging of the harbor channel and turning basin area within the harbor.

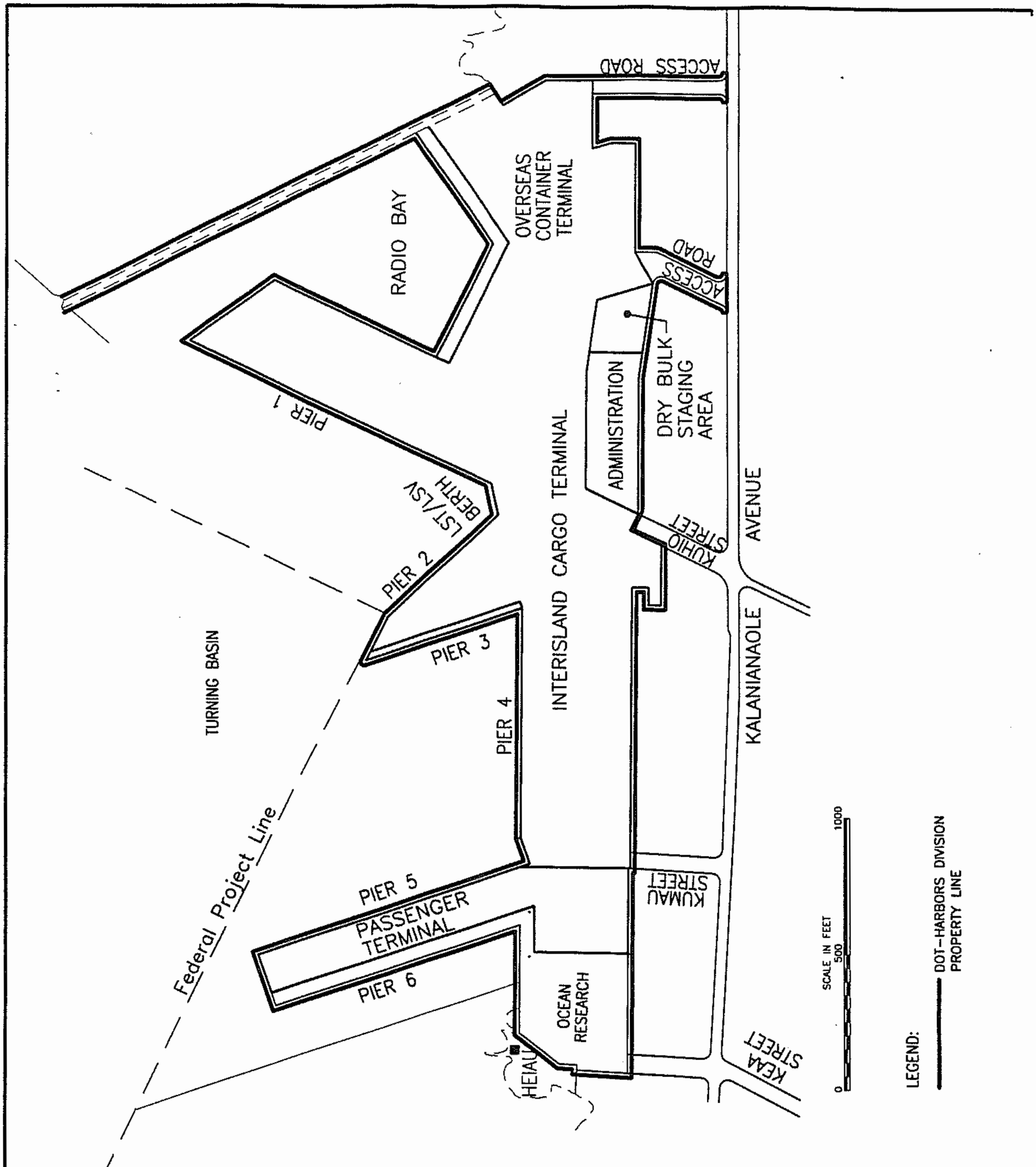

Figure 8
2020 Master Plan Improvements
HILO HARBOR

Scale: 1" = 500'

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Kawaihae Harbor Improvements. The conceptual Master Plan for 2020 for Kawaihae Harbor includes the following elements and their approximate time frame, beginning with the year 2002. The location of the improvements are summarized in TABLE 4 and illustrated in FIGURE 9.

TABLE 4
Summary of Planned Improvements to 2020
Kawaihae Harbor

Project	Timing	Area	New Pier	Dredging Alongside Piers*	Clearing, Grading & Paving	Utilities	Shed	Access Road
Liquid Bulk Cargo Terminal	2002	22 Acres	X	X	X	X		X
Pier 1 Dry Bulk Terminals	2003	9 Acres	X	X	X	X	X	
Pier 2a Overseas Container Terminal	2008	21 Acres	X	X	X	X	X	X
Piers 3-4 Terminal Interisland Cargo	2010	21 Acres	X	X	X	X	X	X
Passenger Terminal; Ocean Research Facility	2015		X	X	X	X	X	X
Pier 5 Military Cargo Terminal	2020		X		X	X		X

* Harbors Division is responsible for dredging from the pier face to the Federal Project Line, where the jurisdiction of the Army Corps of Engineers (ACOE) begins. The ACOE is responsible for dredging of the harbor channel and turning basin area within the harbor.

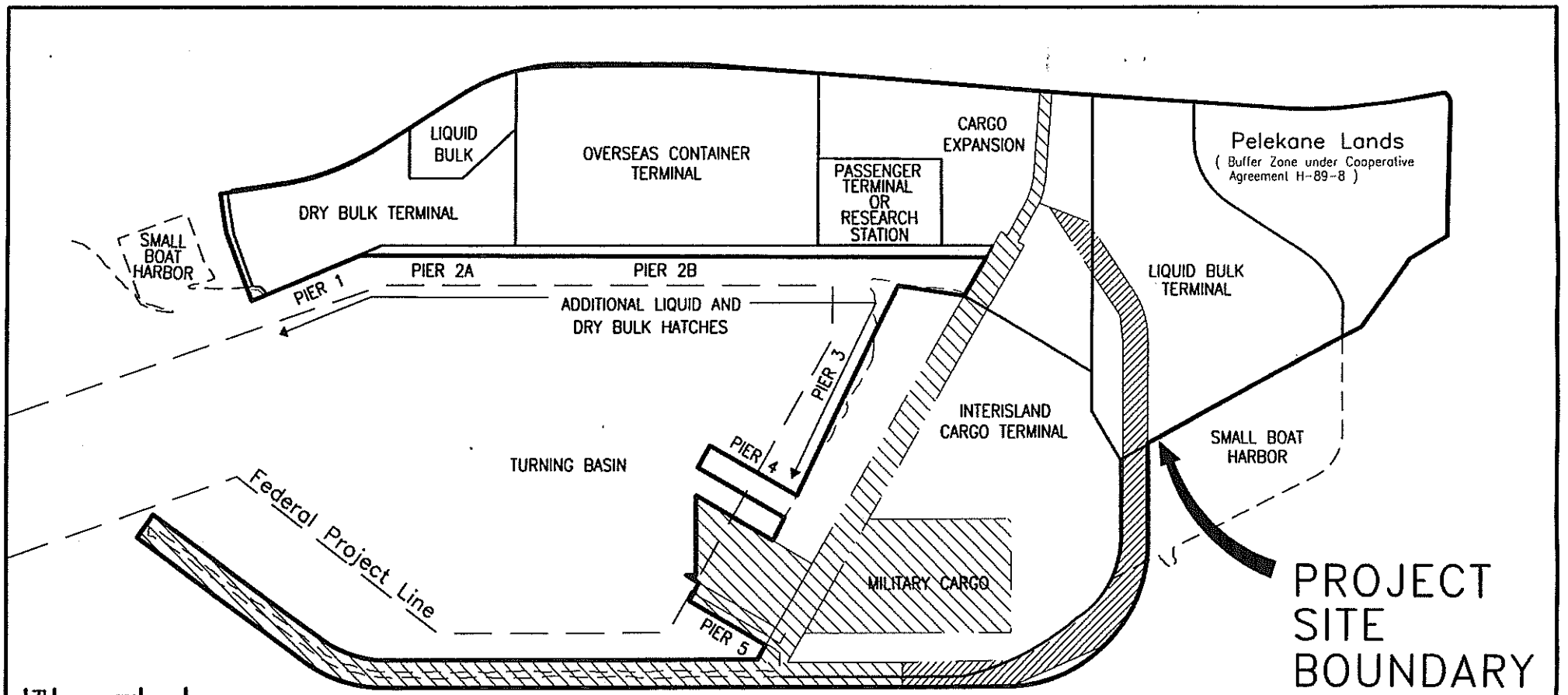

Figure 9
2020 Master Plan Improvements
KAWAIHAE HARBOR

Scale: 1" = 600'

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2.5 OVERVIEW OF HARBOR DEVELOPMENT

Note: For definitions of harbor-related terms and acronyms, also see CHAPTER 11, GLOSSARY and CHAPTER 12, ACRONYM LIST.

The Hawaii Commercial Harbors 2020 Master Plan is a conceptual land use plan outlining future harbor development. The types of improvements proposed at the two harbors to accommodate growth in both cargo handling and cruise ships are discussed in general terms in this section. The sources of this information are a study by C.E. Maguire and R.M. Towill Corporation and personal communication with the Chief Engineer of R.M. Towill Corporation.

Types of development proposed for the harbors are described in the following sections:

2.5.1 Interisland Terminal Facilities

The basic function of a marine terminal is to provide the transfer area when cargo is exchanged between land and water transportation carriers.

General cargo consists of miscellaneous cargo of varying quantities and sizes which are organized at the terminal for subsequent shipment to a common port or regional destination. Basic terminal facilities to transship general marine cargo consist of 1) a pier, 2) an adjacent apron for transfer of cargo to and from the vessel, 3) a marshalling (organizing) area and a covered transit shed or open area as required where cargo is accumulated or stored for subsequent shipment to its destination, and 4) adequate roadway access.

A typical general cargo facility such as an interisland terminal has berths capable of accommodating vessels up to 800 feet in length and maximum draft of 35 feet, although interisland operations at the two subject harbors are served by barges that currently measure only approximately 350 feet. ***Although individual barges are generally 350 feet in length, they are often brought into the harbor in pairs with accompanying tugboats, thus requiring a longer pier. In addition, larger vessels such as liquid bulk tankers will need to be berthed at proposed Pier 3 to gain access to liquid bulk terminal facilities.***

Apron widths must be sufficient to allow crane access to the vessel and/or yard equipment to remove the cargo from the pier. A width of 50-200 feet is considered optimal for handling interisland cargoes. The current trend is toward transit sheds to be back as far as possible from the pier face to maximize flexibility in using the apron area. The typical area of a shed at smaller harbors is approximately 50-75,000 square feet (gross). Larger port transit sheds could be as large as 120,000 square feet per berth.

2.5.2 Overseas Container Terminal Facilities

Containerization is the use of specialized containers for transport of cargo. The basic container is a closed metal or reinforced box with fixtures for stacking, lifting and handling, and attachment to truck beds. Variations include: refrigerated units (reefers) and special types for the transportation of bulk cargo, automotive equipment, livestock, liquids, etc. Cargo carried by containers can include practically everything but the following: dry or liquid bulk products which are shipped in large quantities, such as coal, ore or petroleum; or commodities that cannot generally be containerized economically because of their nature, size and weight.

The advent of containerized cargo is one of the most significant advances in modern shipping. Containerization has revolutionized harbor operations by greatly increasing terminal efficiency and decreasing vessel turnaround (loading and offloading) time. Container terminal requirements differ from those of other cargo terminals in their onshore and equipment needs. However, berths and water depth requirements for container terminals are the same as for other cargo terminals. The minimum water depth should be 35 feet and berths should be planned in minimum lengths of 800 feet. It is essential that a container port be located close to highway access.

The backup area needed to serve a container terminal is generally larger than that required for other cargo operations. Terminal space requirements vary according to the size of ships calling, cargo handling equipment and method of storing. A terminal space of 15-30 acres per berth is not excessive. Most of the space requirements are for container storage or parking and marshalling of cargo. Some container terminals may also involve consolidation and stuffing operations which add to the space requirements. Parking area requirements can be reduced by vertically stacking containers or by the use of multi-level container parking structures.

Container terminal equipment generally includes a pier-mounted gantry crane of 30 to 50 ton capacity to handle the standard size containers. Additional gantry cranes or other specialized handling equipment are needed to transport the containers from dockside to the back-up area for marshalling, consolidation, and/or stacking and retrieval. Warehouses, transit shed and consolidation sheds may be required, depending on the type of operation, i.e., if container packing is to be done at the terminal.

Roll on/roll off or RO/RO ships are vessels specialized in the transport of wheeled equipment, or vehicles, and can carry wheeled containers. Cargo is rolled on and off the vessel through bow or stern ramps or side cargo doors. Combination container ships are being used with features that permit the carriage of wheeled vehicles of all sizes concurrently with unwheeled containers.

The basic concept of the RO/RO vessel is increased efficiency of the materials handling phase of cargo offloading, since costly crane equipment is not used. An inherent disadvantage in the system is the reduced cargo density by virtue of the internal ramps and elevators required and by the loss in volume taken up by chassis equipment. The RO/RO system is ideally suited for shorter sea routes where fast turnaround time is more important than the reduced cargo density.

2.5.3 Dry Bulk and Liquid Bulk Terminals

Dry bulk terminals include areas for storage, loading and unloading dry bulk. The facilities generally include a paved loading area and covered storage (usually an industrial shed). Liquid bulk facilities generally include above-ground storage tanks, a system of pumps and pipelines. Pipelines can be placed either under the pavement or above ground and lead to the piers where liquid bulk is transferred from vessels.

2.5.4 Construction of Terminals

New terminal areas will require the following construction elements:

Clearing, Paving and Grading of Terminal Areas. The design of each paved area will be consistent with the proposed use. For example, areas slated for overseas terminal development should be designed consistent with requirements for heavy industrial pavement areas utilized for container storage and handling.

Utilities. New utility lines, such as drain lines, water lines, and electrical duct trenches for utilities will be excavated in the surface fill materials encountered at each harbor site. In addition, below-ground transmission lines for liquid bulk (e.g. petroleum) will be installed within new paved areas.

Sheds. Sheds in harbors are for industrial uses and are generally of steel and concrete construction. The 2020 Master Plan foresees construction of industrial sheds for overseas and interisland terminals. Special-purpose sheds are also planned to serve as cruise ship terminal buildings to provide amenities and shopping opportunities for passengers.

Access Roads. Additional access roads are planned at each harbor to serve the newly developed terminal areas. These roads would generally be 40 feet in width. Access roads will be subjected to heavy vehicles. Based on heavy truck traffic, flexible pavement sections consisting of asphalt concrete over asphalt treated base may be used for design of the access roads. For other areas that will be light duty (for passenger cars, light trucks and occasional heavy trucks) as opposed to heavy duty, pavement can be constructed with a thinner layer of asphalt concrete over an aggregate base. To prevent drainage problems, new pavement will be slightly sloped to carry

surface water off the pavement into appropriate drainage structures. At Hilo Harbor, a new access road will be required to serve the proposed research vessel area in Radio Bay. Furthermore, improvements will be required to existing Kumau Street for improved access to proposed Piers 4, 5 and 6. At Kawaihae Harbor, access roads will be provided as needed to support the planned new terminal facilities.

2.5.5 Construction of Piers and Dolphins

A new pier area should contain minimum protuberances in order to provide an open area for cargo offloading. Water, fire protection, and sewage outlets are generally inset into the deck and electrical and communications outlets placed adjacent to the pier curbing. Bollards are placed at 100 foot centers along the pier intermittently with cleats at the same spacing. Two additional bollards are placed on the seawall at the breakwater head to accommodate stern lines. Structural design of piers should take into account such a potential future installation. Similar consideration should be given to a future stern load platform for RO/RO type cargoes in locating utilities, bollards and pump stations. Pier areas include container staging areas.

Pier design must satisfy oceanographic design criteria and serve the functional cargo movement requirements. Numerous solid structures need to be evaluated in selection of a pier construction type. Types of pier construction include the following.

- ***Bulkhead with* Sheet Piles and Backfilling *(FIGURE 10).*** Sheet piles are interconnected steel circular cells filled with dredge material. This method of pier construction requires driving sheet piles and backfilling it with coral or other suitable material such as crushed rock. Pier 1 at Kawaihae Harbor is constructed in this manner.
- **Concrete Piles and Concrete Deck *(FIGURE 11).*** This type of pier construction requires the driving of concrete piles to support a concrete deck used for terminal space. Piers 1, 2 and 3 at Hilo Harbor are of this type of construction.
- **Combination Design.** Using this method of pier construction entails driving sheet piles and backfilling behind them. The seaward side is a concrete deck supported by piles. Pier 2a at Kawaihae Harbor is constructed in this manner.
- ***Mooring* Dolphins.** Dolphins are structures that jut out of the water and [can be] are used for tying down ships, thereby effectively extending the berthing space without having to construct a new pier. Dolphins consist of reinforced concrete caissons where basalt is encountered as the foundation material or concrete piles where coral is the substratum. ***Often mooring dolphins are constructed in a row and are joined by a catwalk deck to accommodate forklifts or other equipment.***

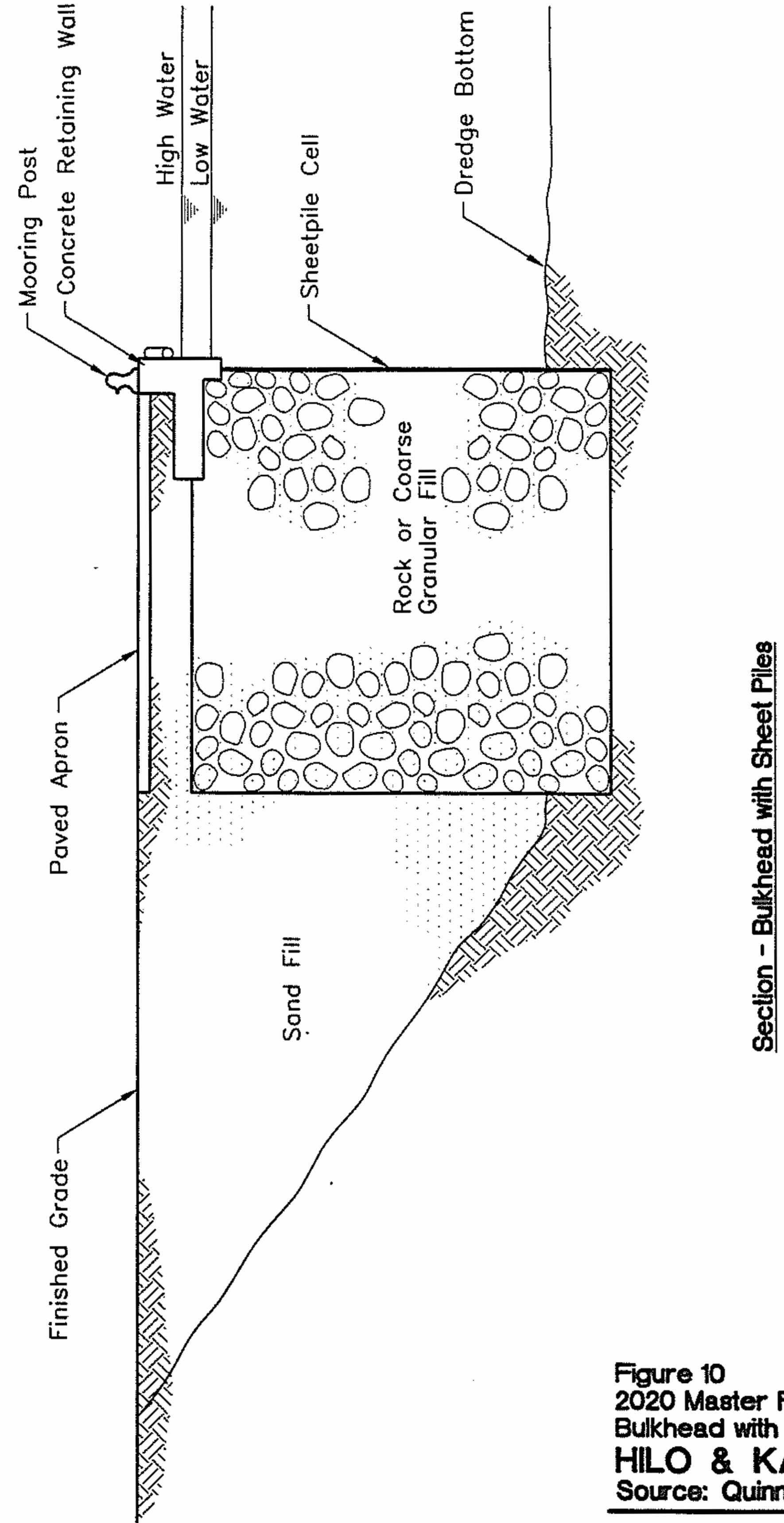

Figure 10
2020 Master Plan Improvements
Bulkhead with Sheet Piles

HILO & KAWAIHAE HARBORS

Source: Quinn

Not to Scale

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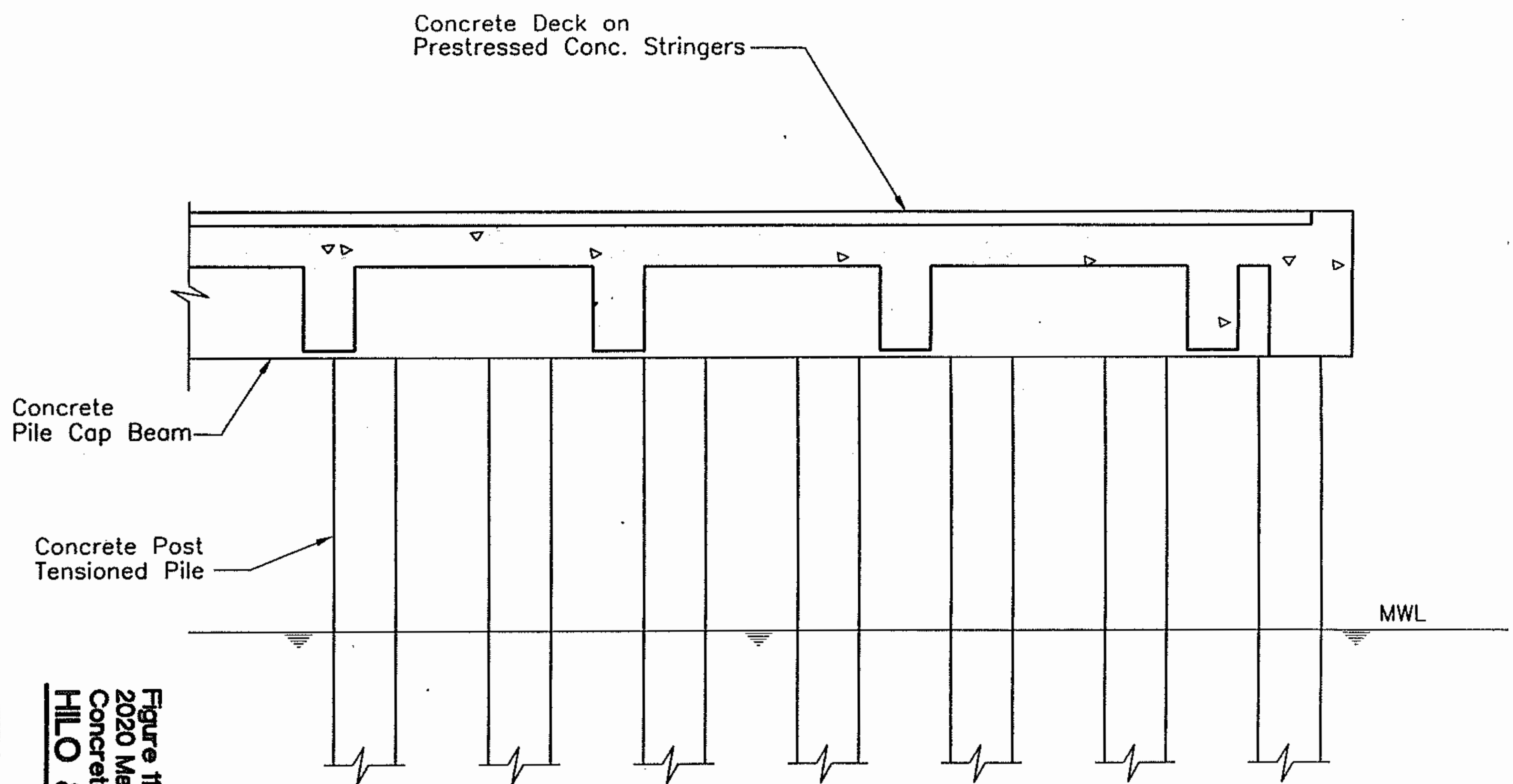

Section - Concrete Deck on Concrete Piles

Figure 11
2020 Master Plan Improvements
Concrete Deck on Concrete Piles

HILO & KAWAIHAE HARBORS

Not to Scale

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Hilo Harbor Projects. The 2020 Master Plan calls for construction of dolphins at the ends of Piers 2 and 3 and proposed Piers 4, 5 and 6. Construction of Piers 4, 5 and 6 will likely be of the concrete piles and concrete deck type of construction similar to the existing harbor. The actual design will depend on analysis of substratum conditions and engineering analysis.

Kawaihae Harbor Projects. The 2020 Master Plan pier projects at Kawaihae include the addition of three new piers.

2.5.6 Dredging of Berths

Dredging will be required to construct pier berths with the required alongside depth of 35 feet ***at Hilo Harbor and 40 feet at Kawaihae Harbor.***

Dredging Methods. The conventional method of dredging uses a cutterhead (similar to a chisel pile driver) or explosives. Although the cutterhead is the most likely method to be used at the subject harbors, the proper dredging method will have to be determined by analysis of harbor conditions during the design phase of each project.

Disposal of Dredging Spoils. Once materials have been dredged, the "spoils" (dredged material) will require disposal. Spoils comprised of coral and basalt can be used in pier construction and pavement construction, respectively. The ability to reuse spoils on-site will depend on the nature of the substratum in the dredging area and the amount of room ***available*** to store the spoils on-site. For Hilo Harbor dredging spoils, Harbors Division plans to utilize an Environmental Protection Agency (EPA)-approved ocean dumping site. This will require testing of dredged material and proper permitting by the U.S. Department of the Army. For dredging spoils from Kawaihae Harbor, Harbors Division intends to continue stockpiling on the harbor site. If there is insufficient room for on-site disposal, dredge spoils from Kawaihae Harbor will be transported to the EPA site as well.

Hilo Harbor. Wash borings conducted in 1980 in the general vicinity of Baker's Beach indicate a substratum of hard or crunchy corals that can be readily dredged by conventional cutterhead methods. ***Carefully controlled blasting may be required to remove underlying basaltic surfaces, if they are encountered, to achieve the dredge depth of 35 feet for the proposed new piers.***

Kawaihae Harbor. At Kawaihae Harbor, conventional cutterhead dredges may not be useful in this material because of its hardness, the high mobilization costs and the vulnerability of floating dredges and disposal pipelines to high wind conditions. Carefully controlled blasting may be required to remove underlying coral surfaces to the dredge depth of 40 feet for the proposed new piers.

Diurnal Variation in Wind Direction and Speed on Hawai'i Island

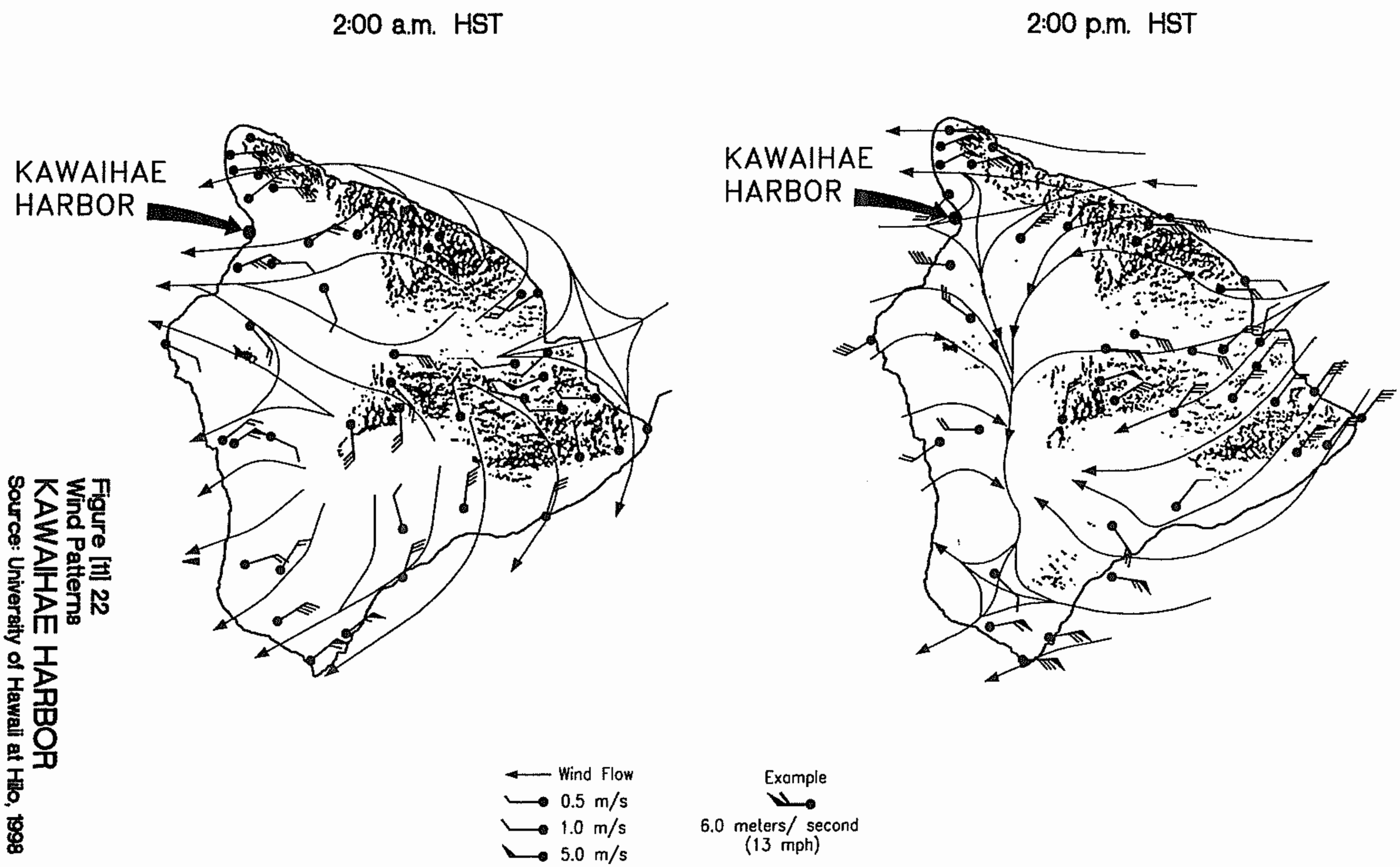

Figure [11] 22
Wind Patterns
KAWAIHAE HARBOR
Source: University of Hawaii at Hilo, 1998

Not to Scale

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3.1.2 Potential Impacts

Improvements under the 2020 Master Plan improvements will not affect climate in either location. However, proposed projects will be affected by climatic conditions such as rainfall in Hilo and wind in Kawaihae. Impacts and mitigation measures for these climatic factors are discussed in Section 3.6 NATURAL HAZARDS).

3.1.3 Potential Mitigation Measures

Since there are no expected impacts, no mitigation measures are proposed.

3.2 REGIONAL GEOLOGY, TOPOGRAPHY AND SOILS

Regional Geology. Hawaii, the largest island of the Hawaiian Archipelago, covers an area of approximately 4,000 square miles. The island was formed by the activity of five shield volcanoes (FIGURE [12] ***23***):

- Kohala (5,505 feet), which is long extinct.
- Mauna Kea (13,784 feet), which has had activity during recent geologic time.
- Hualalai (8,251 feet), which last erupted in 1801.
- Mauna Loa (13,679 feet) and Kilauea (4,040 feet), which are both still active.

Hilo is located on the eastern flank of the Mauna Loa Volcano. Kawaihae Harbor is located on the southwestern flank of the Kohala Mountains (Geolabs, 1999a and 1999b).

3.2.1 Existing Conditions

Hilo Harbor. Hilo Harbor is a relatively flat area (U.S.G.S. Topographical Map). The commercial harbor is situated on land reclaimed from the bay by the placement of coralline fill materials over coralline lagoonal (silt) deposits overlying basalt formations. Based on borings taken from a Board of Harbor Commissioners Drawing dated January 1924, the fill materials of the landside harbor area are underlain by soft mud deposits and loose finger and tree corals extending to depths of about 35 to 60 feet below the existing ground surface (Geolabs, 1999b).

Kawaihae Harbor. Kawaihae Harbor is located at sea level and is a relatively flat area (U.S.G.S. Topographical Map). The site slopes down gently toward Kawaihae Harbor on the southwest and toward a drainage ditch on the northeast. The existing ground elevations at the project site range from approximately +9 to +15 feet Mean Sea Level (Geolabs, 1999a).

Most of the project area is comprised of coral fill from the original dredging of the harbor in the 1960s. Borings taken in 1999 indicate surface fills extending to depths from about 8 to 13 feet below the existing ground surface. The fills encountered generally consist of dense sandy coral

2.6 PROPOSED DEVELOPMENT AT HILO HARBOR AND KAWAIHAE HARBOR

As shown in Tables 3 and 4, the following projects proposed at the subject harbors are described and illustrated in this section:

Hilo Harbor

2.6.1 Mooring Dolphins at Piers 2 and 3 (2002)
2.6.2 Renovation of Pier 1 Shed (2002)
2.6.3 Dry Bulk Staging Area (2003)
2.6.4 Overseas Cargo Terminal (2010)
2.6.5 Interisland Cargo Terminal (2005)
2.6.6 Passenger Terminal (2015)

Kawaihae Harbor

2.6.7 Liquid Bulk Terminal (2002)
2.6.8 Dry Bulk Terminals (2003)
2.6.9 Overseas Container Terminal (2008)
2.6.10 Interisland Cargo Terminal (2010)

2.6.1 Hilo Harbor: Pier 2 and 3 Mooring Dolphins (2002) (FIGURE 12)

The purpose of constructing mooring dolphins at Hilo Harbor is to extend the berthing area at Pier 3 to accommodate larger vessels such as cruise ships. The proposed mooring dolphins are located in line with existing Pier 3, at 50-foot intervals (from the center of one dolphin to the center of the next) forming a 315-foot extension of the mooring area. Each mooring dolphin's surface is approximately 25 by 30 feet. The mooring dolphins consist of concrete platforms supported by piles. The platforms are approximately ten feet above the harbor water.

The proposed dolphins are connected by a concrete walkway ("catwalk") supported by concrete piles. The 10-foot wide catwalk connects the mooring dolphin platforms to accommodate stevedores operating forklift equipment. The catwalk includes safety handrails and bullrails (similar to curbs) along the edges to inhibit machinery from leaving the catwalk. The catwalk will comply with requirements of the Americans with Disabilities Act. The catwalk and platforms approximate the height of existing Pier 3 to allow equipment to pass from the pier surface to the catwalk and mooring dolphins. Mooring bollards or cleats will be installed on the horizontal surface of the dolphins to tie up vessels.

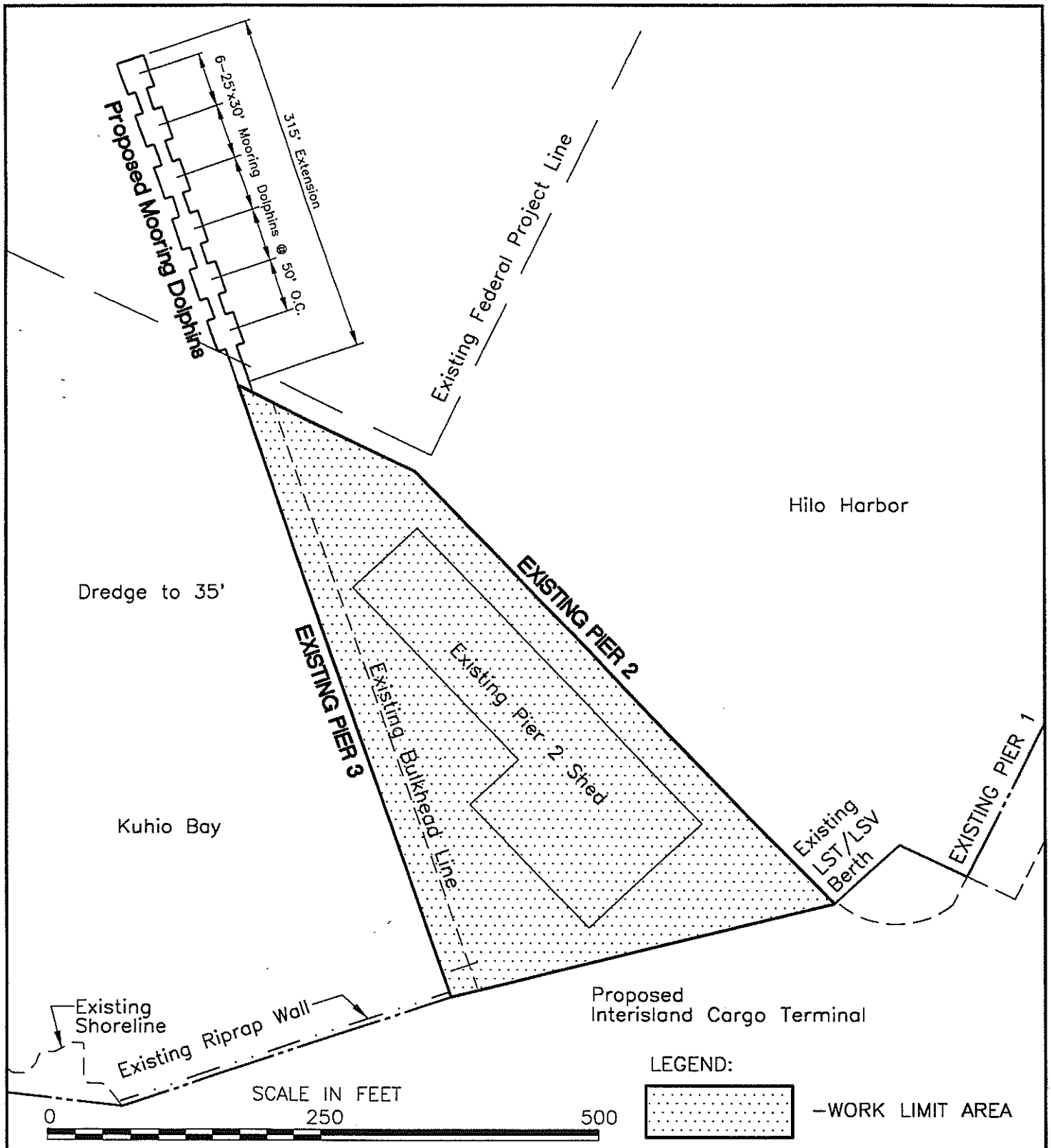

Figure 12
2020 Master Plan Improvements
Mooring Dolphins at Piers 2 and 3 (2002)

HILO HARBOR

Scale : 1" = 125'

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2.6.2 Hilo Harbor: Renovation of Pier 1 Shed (2002) (FIGURE 13)

The purpose of the renovation of the Pier 1 shed is to optimize vehicular circulation, passenger accommodations and overall efficiency of Pier 1 usage, particularly by cruise ship passengers. Because it is considered internal renovation, this project is exempt from Chapter 343, Hawaii Revised Statutes. Renovation of Pier 1 is an interim solution to the problem of accommodating cruise ship arrivals. The long-term solution is a new, single-use passenger terminal at proposed Pier 5 in 2015.

The Pier 1 renovation reduces the size of the existing shed by half (from approximately 72,000 ft^2 to approximately 36,000 ft^2). Reduction of the shed size could be lengthwise or widthwise, depending on the final renovation plan. Internal renovations are focused on providing temporary passenger terminal amenities for cruise ship passengers disembarking at Pier 1. These modifications include office space, ground transportation, restrooms, a waiting room and a holding area. A dedicated passenger walkway on the interior of the renovated Pier 1 shed leads to the existing parking area.

2.6.3 Hilo Harbor: Dry Bulk Staging Area (2003; 1 acre) (FIGURE 14)

The purpose of the dry bulk staging area at Hilo Harbor is to store bulk cargo such as forest industry products. The proposed dry bulk staging area consists of a 1-acre cargo yard paved for heavy lift equipment. To protect the surrounding area from leaching, runoff or accidental spills of toxic materials, the dry bulk staging area is surrounded by a trench which empties into a sump structure. The trench will likely be trapezoid-shaped and could be approximately four feet wide at the bottom and ten feet wide at the top, subject to design specifications. An approximately 5-foot by 7-foot collection sump connected to the drainage trenches provides further protection from potential spillage. A 12-inch berm surrounds the drainage trenches. The dry bulk staging area requires electrical utilities, overhead lighting and a partial perimeter security fence.

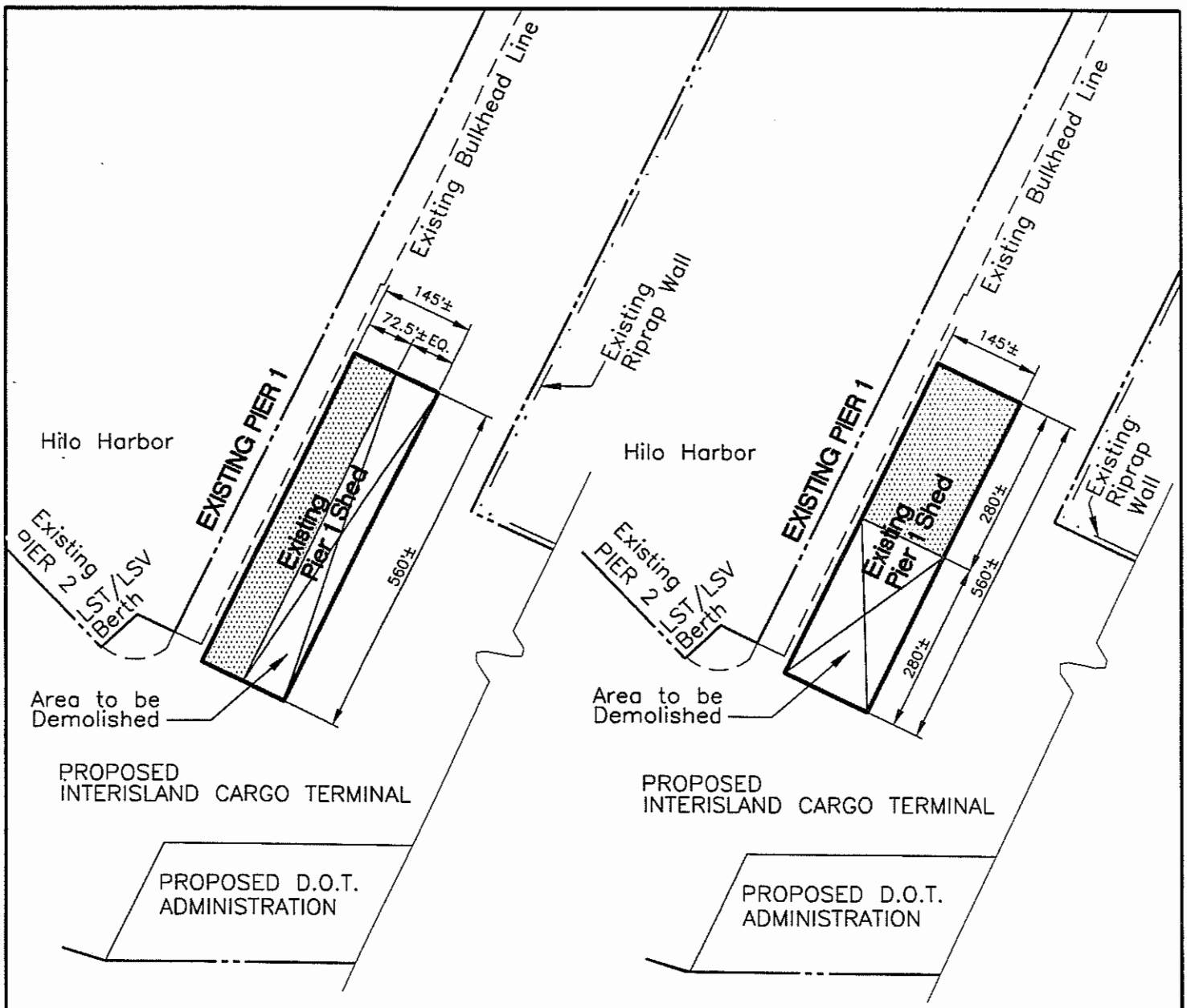

Figure 13
2020 Master Plan Improvements
PIER 1 SHED RENOVATION (2002)
HILO HARBOR

Scale: 1" = 250'

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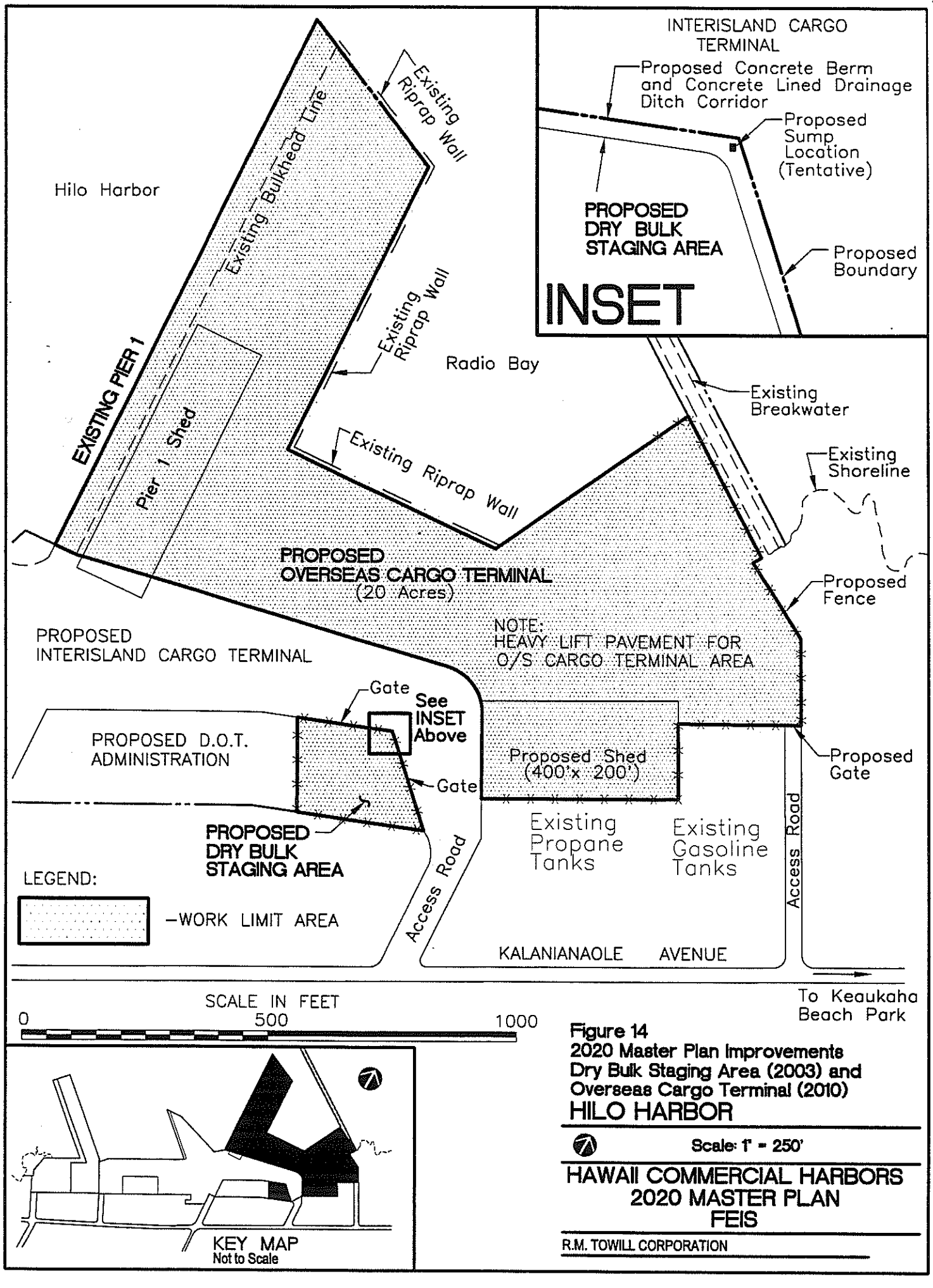

Figure 14
2020 Master Plan Improvements
Dry Bulk Staging Area (2003) and Overseas Cargo Terminal (2010)
HILO HARBOR

Scale: 1" = 250'

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2.6.4 Hilo Harbor: Overseas Container Terminal (2010; 20 acres) (FIGURE 14 above)

The purpose of the Overseas Cargo Terminal at Hilo Harbor is to accommodate projected future increases in overseas cargo volume. The proposed 20-acre overseas container terminal consists of paved area and a single-story industrial shed. The area to be paved is a hardened surface suitable for use by heavy lift equipment. The proposed shed is approximately 80,000 ft^2 (200 feet by 400 feet). The proposed shed is one story and of steel and concrete construction. The overseas container terminal requires overhead lighting and perimeter security fencing. Utilities of electricity, sewer, water and telephone service are required to support terminal activities. The pavement will be designed to accommodate heavy lift equipment. The exact composition of the pavement will be determined in the design phase based on geotechnical information regarding the substrata. Internal circulation also will be determined during the design phase and will be accomplished via striping of terminal area pavement.

2.6.5 Hilo Harbor: Interisland Cargo Terminal (2005; 21 acres) (FIGURE 15)

The purpose of the Interisland Cargo Terminal at Hilo Harbor is to accommodate projected future increases in interisland cargo volume. Proposed Pier 4 provides berthing space. The 1,000-foot pier design is probably a concrete platform supported by piles, bulkheads with sheet-piling or a combination of the two types. The construction method will be determined in the design phase. Dredging is required next to the pier to a depth of 35 feet. The proposed interisland cargo terminal includes a shed of approximately 80,000 square feet (200 by 400 feet). The terminal requires overhead lighting, perimeter security fencing, and utilities of electricity and water. Approximately 21 acres will be paved with a hardened surface suitable for use by heavy lift equipment. Access to the interisland cargo terminal is provided via existing Kumau Street. The proposed Pier 4 berths, interisland cargo terminal, will be dredged to a depth of 35 feet. Because this is an existing shoreline, the pier design could be either bulkhead (sheet piles with backfill), concrete piles and concrete deck, or a combination of both. The final choice of pier support will be made during the design phase.

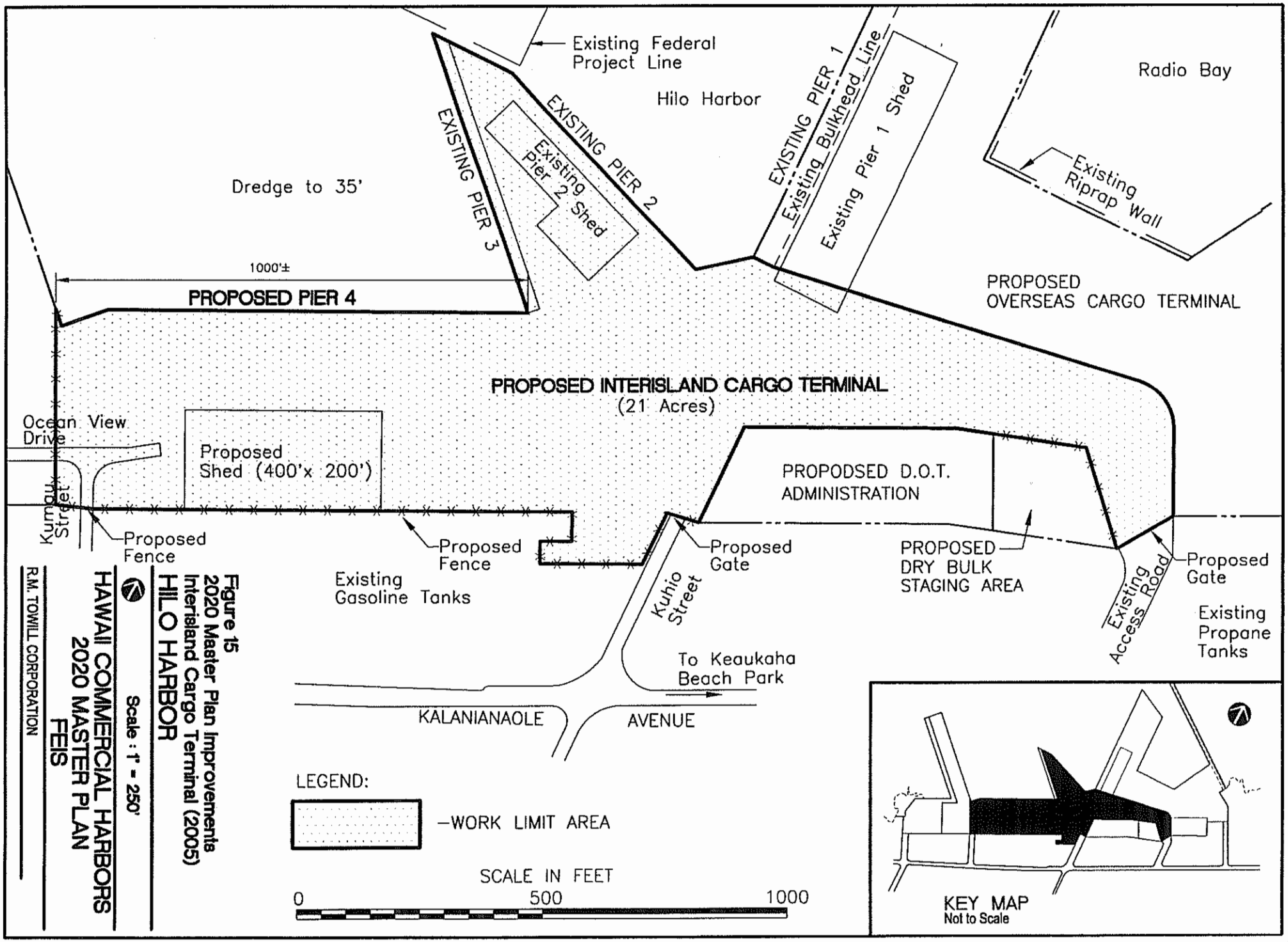

Figure 15
2020 Master Plan Improvements
Interisland Cargo Terminal (2005)

HILO HARBOR

Scale : 1" = 250'

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2.6.6 Hilo Harbor: Passenger Terminal (2015; 35-40K Ft² area) (FIGURE 16)

The purpose of the Passenger Terminal is to optimize accommodations by segregating cruise ship activity from other maritime operations in Hilo Harbor. The proposed passenger terminal consists of a terminal building and a bus staging area on the pier. The approximately 7,000 ft², twenty-foot high, single-story passenger terminal building includes such facilities as a passenger waiting lounge, rest rooms, information booth, telephone booths, entertainment area, refreshment and lei stands, storage and circulation space. The bus staging area features an approximately 7,000 ft² bus loading passenger shelter and additional space for bus circulation. A preliminary site plan was prepared by Leo A. Daly, Inc., for Harbors Division in 1998.

The proposed cruise terminal facility would serve as Hilo Harbor's primary cruise ship berthing facility at proposed Pier 5. Piers 1, 3, and proposed Pier 6 would function as overflow berths for cruise ships when additional berthing area is required. Berths at Piers 5 and 6 require dredging to a depth of 35 feet to the existing Federal Project Line. Piers 5 and 6 will most likely follow the concrete deck on pilings construction type of existing Piers 1, 2 and 3.

The proposed cruise terminal facility has an internal roadway system and parking areas that provide sufficient space for queuing, stacking, drop-off, and turnaround functions of buses, taxis and limousines. The vehicular circulation system connects through Ocean View Drive to Keaa Street. The proposed vehicular access from Keaa Street provides circulation of passenger related traffic, which includes tour buses, taxicabs, rental car shuttles, limousines, and public, private and staff vehicles. Cargo/container traffic, store vehicles, baggage trucks, and other operationally related vehicles utilizes the Kuhio Street harbor entrance for access to pier side activity.

2.6.7 Kawaihae Harbor: Liquid Bulk Terminal (2002; 22 acres) (FIGURE 17)

The purpose of the liquid bulk terminal at Kawaihae Harbor is to accommodate the offloading and storage of liquid bulk materials, primarily petroleum. Having a liquid bulk terminal at Kawaihae Harbor removes the current requirement to offload all of the island's liquid bulk products at Hilo Harbor and ship them by truck to West Hawaii, including all jet fuel for Kona International Airport. The 22-acre proposed liquid bulk terminal includes a combination of six 150-million barrel (MBBL) storage tanks, truck parking, truck maintenance area, warehouse shed, employee and guest parking and commercial cardlock

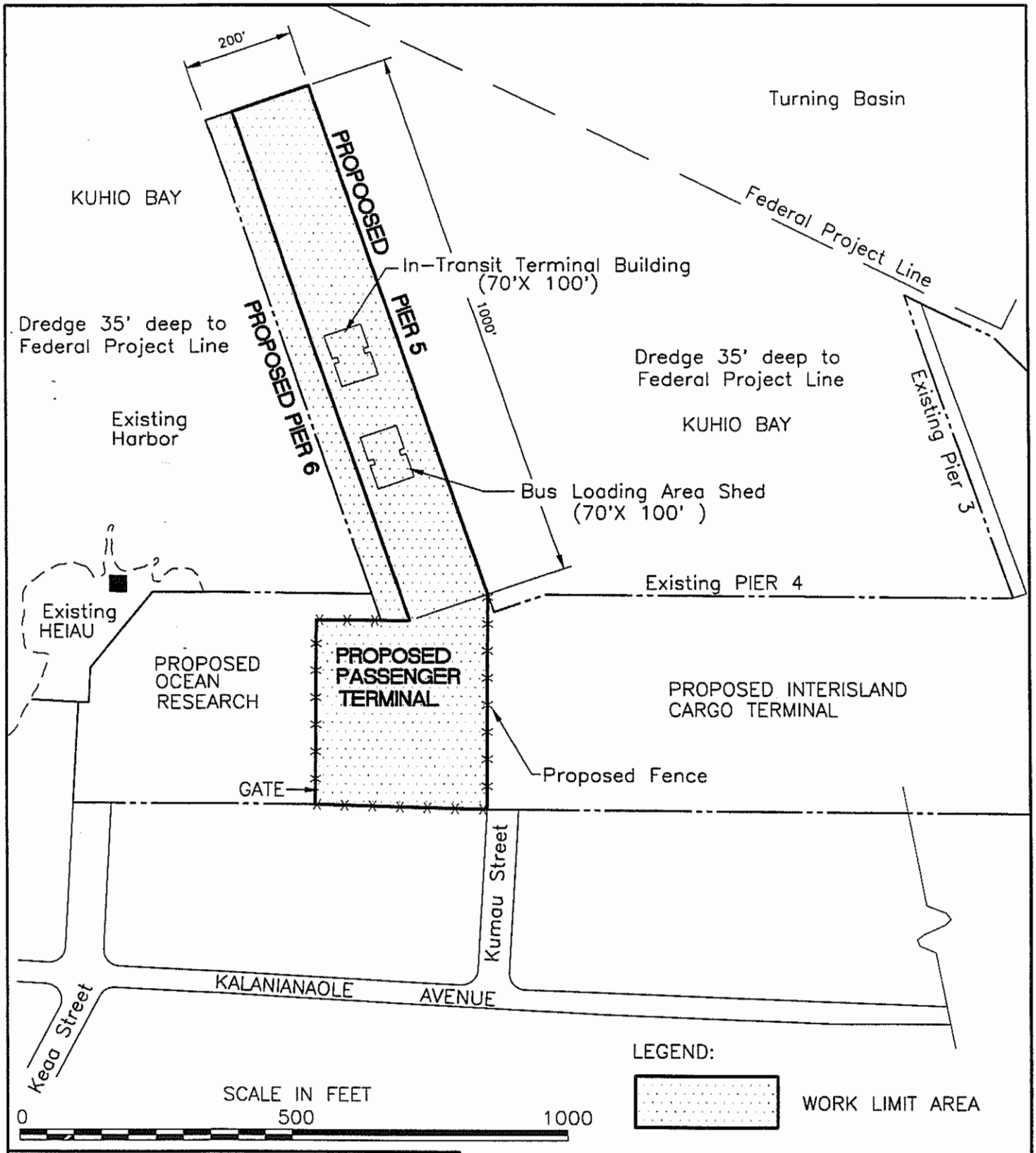

Figure 16
2020 Master Plan Improvements
Passenger Terminal (2015)
HILO HARBOR

Scale: 1" = 250'

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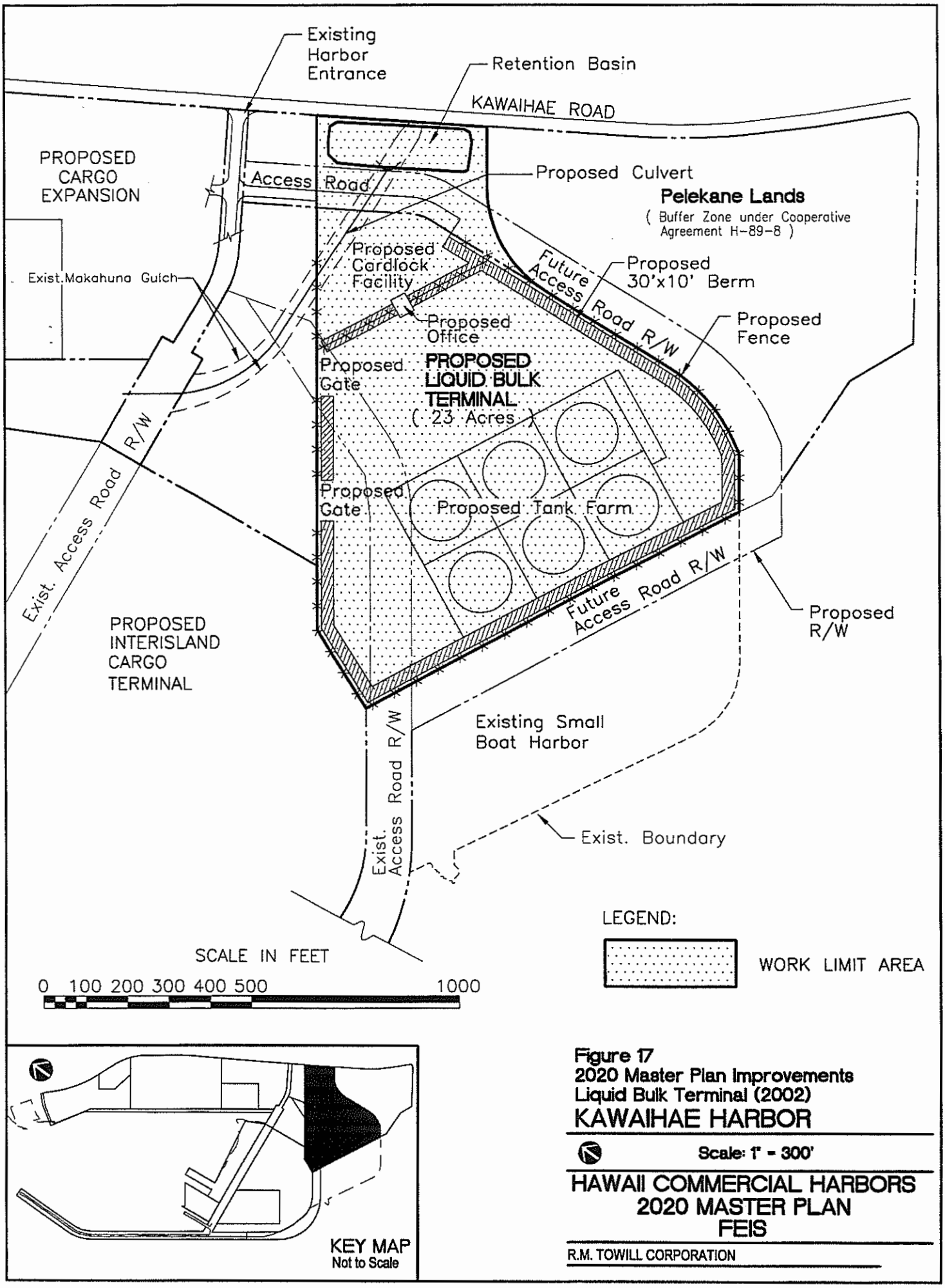

Figure 17
2020 Master Plan Improvements
Liquid Bulk Terminal (2002)
KAWAIHAE HARBOR

Scale: 1" = 300'

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facility. Safety and emergency facilities are also provided. Construction of the liquid bulk terminal will comply with all applicable environmental requirements for containment of spills.

2.6.8 Kawaihae Harbor: Dry Bulk Terminals (2003, 9 Acres) (FIGURE 18)

The purpose of the dry bulk terminals at Kawaihae Harbor is storage of dry materials such as scrap metal, cement and timber products. Two pile-supported piers serve the proposed dry bulk terminals: existing Pier 1 at 550 feet and existing Pier 2a at 535 feet. At each berth at Piers 1 and 2a, dredging is proposed to a depth of 40 feet. To protect the surrounding area from leaching, runoff or accidental spills of toxic materials, the proposed dry bulk terminals are surrounded by drainage facilities in which liquid can be pumped from a collection sump. The trench will most likely be trapezoid-shaped and will be approximately four feet wide at the bottom and ten feet wide at the top, subject to design specifications. A 12-inch berm surrounds the drainage trenches. The dry bulk cargo terminal requires electrical utilities, overhead lighting and a partial perimeter security fence.

2.6.9 Kawaihae Harbor: Overseas Container Terminal (2008, 21 Acres) (FIGURE 19)

The purpose of the Overseas Container Terminal is to accommodate projected future increases in overseas cargo volume. Berthing for this 21-acre facility is provided by the existing Pier 2a. The dredge depth at the berthing area of Pier 2a is proposed to be increased from 35 feet to 40 feet. A 400- by 200-foot shed is included in the design. The shed is proposed as a one-story structure of steel and concrete construction. The terminal requires overhead lighting and utilities of electricity, water, wastewater collection and telephone. When completed, the combined pier face of Piers 2a and 2b is proposed to provide 2500 feet of continuous berthing.

2.6.10 Kawaihae Harbor: Interisland Cargo Terminal (2010, 21 Acres) (FIGURE 20)

The purpose of the Interisland Cargo Terminal is to accommodate projected future increases in interisland cargo volume at Kawaihae Harbor. This proposed 21-acre facility consists of hardened pavement to accommodate heavy lift equipment. The berth area is proposed to be dredged to 40 feet in depth. Proposed Pier 3, 1000 feet in length, will be either of concrete platform on piles, bulkhead with sheet piling, or a combination of both. Pier 4, also serving the interisland cargo terminal, is approximately 500 by 100 feet and supported by piles. A 400- by 200-foot shed is included in the design. The shed is proposed as a one-story structure of steel and concrete construction.

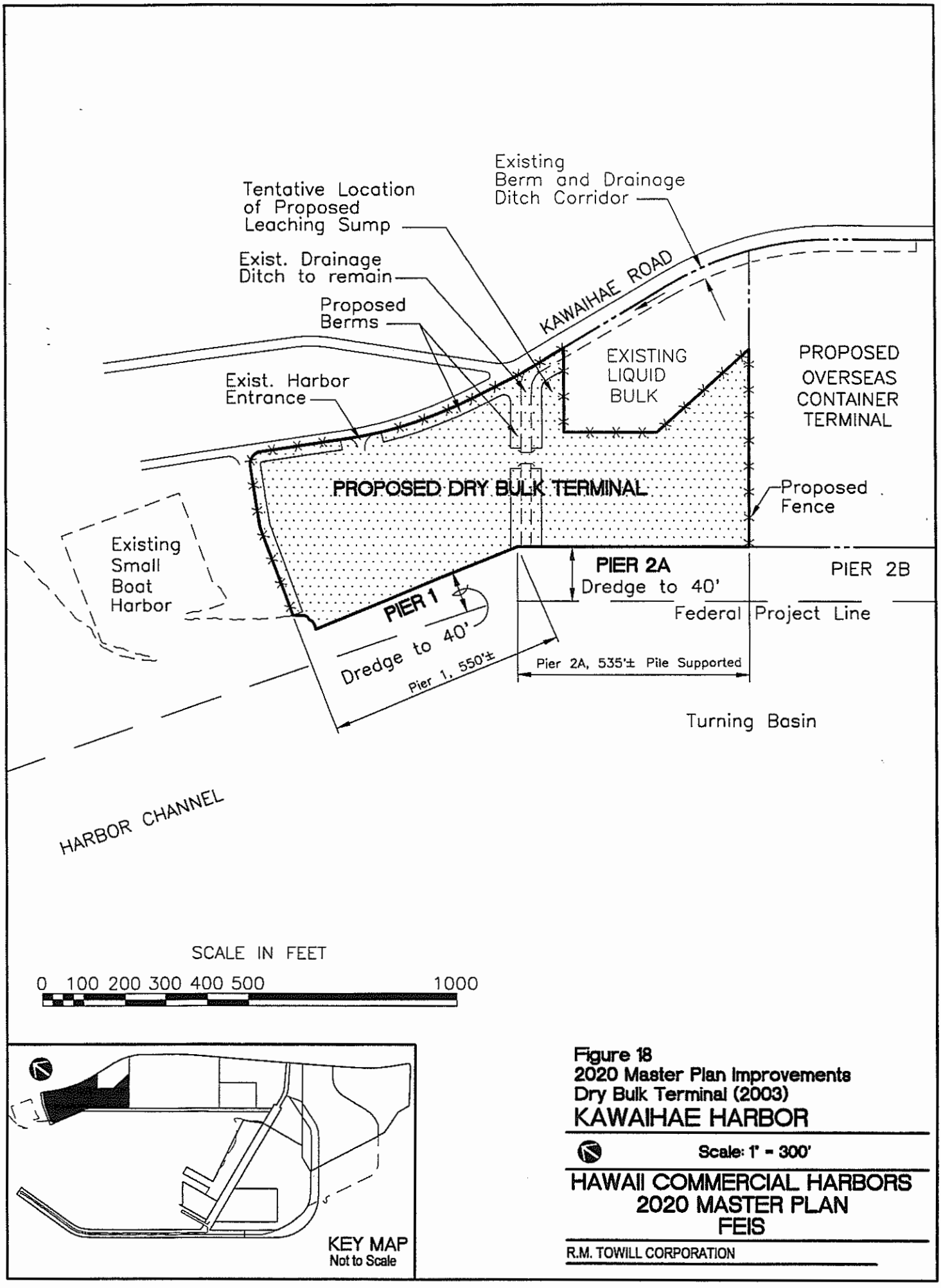

Figure 18
2020 Master Plan Improvements
Dry Bulk Terminal (2003)
KAWAIHAE HARBOR

Scale: 1" = 300'

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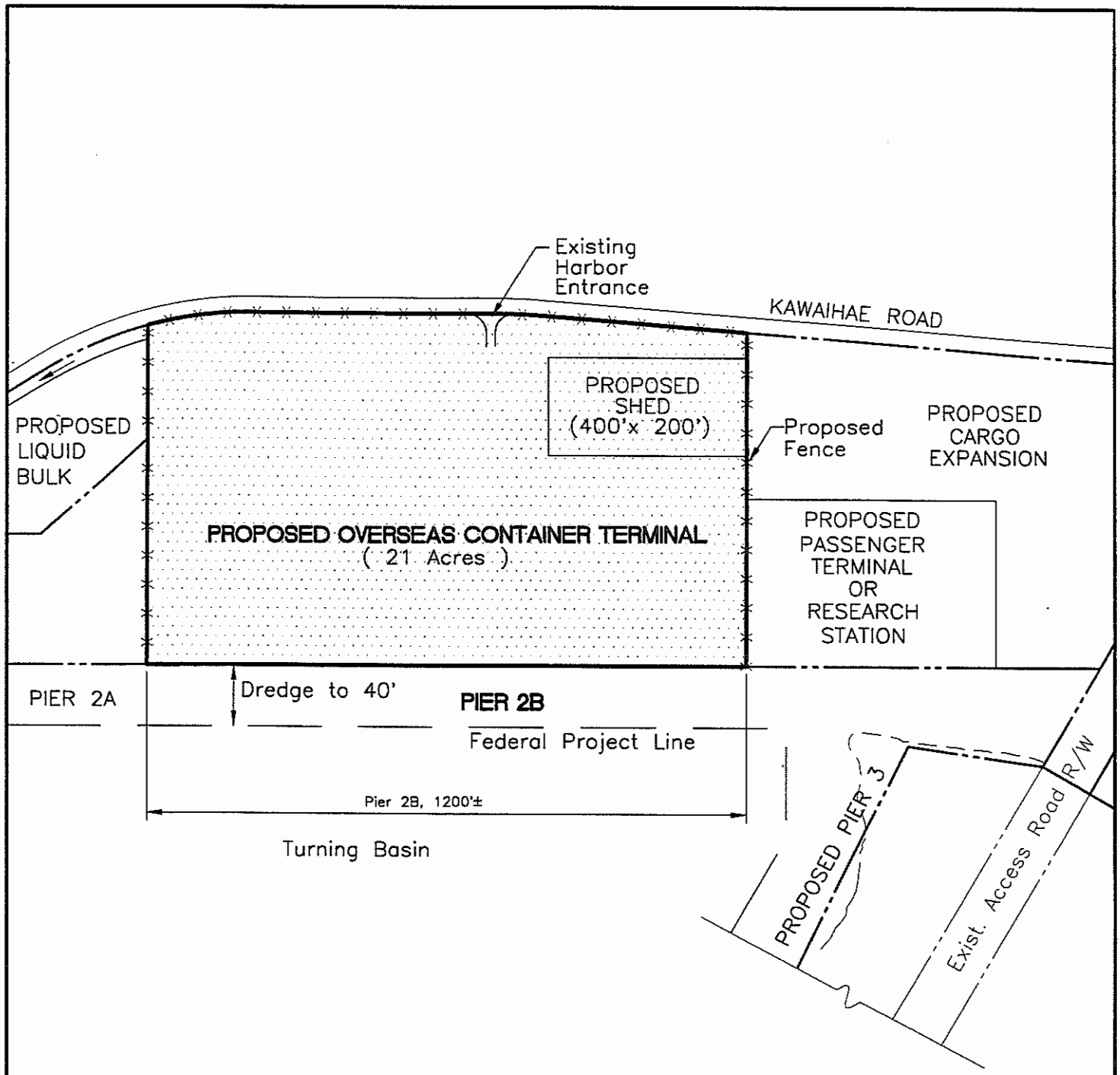

Figure 19
2020 Master Plan Improvements
Overseas Container Terminal (2008)

KAWAIHAE HARBOR

Scale: 1" = 300'

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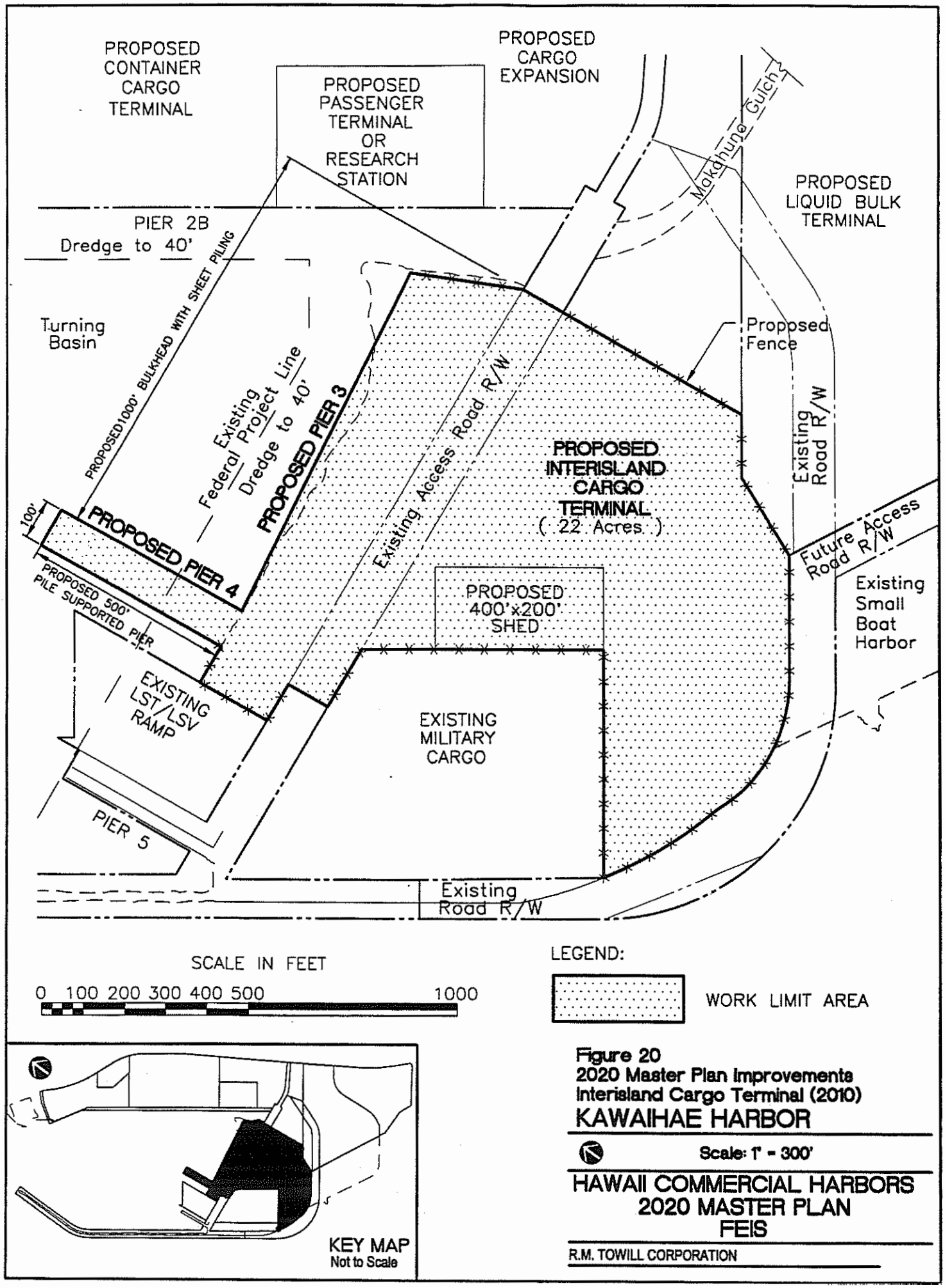

Figure 20
2020 Master Plan Improvements
Interisland Cargo Terminal (2010)

KAWAIHAE HARBOR

Scale: 1" = 300'

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The terminal requires overhead lighting, perimeter security fencing, and utilities of electricity, water, wastewater collection, and telephone.

2.7 SCHEDULE AND COST

Proposed improvement projects listed in TABLE 3 and TABLE 4 above would commence in 2002 and extend throughout the planning horizon to 2020. It is the practice of Harbors Division to review and amend harbor master plans every five years. ***A re-evaluation of the proposed improvements will be done every five years to see if any conditions have changed requiring a new Environmental Assessment or Environmental Impact Statement.***

Cost for implementation of the Hawaii Commercial Harbors 2020 Master Plan is broadly estimated by Harbors Division planners at $150-300 million (Personal Communication, Glenn Soma, Harbors Division, 2000). This estimate is preliminary due to the conceptual level of planning at this time. ***State of Hawaii funds and land will be utilized for the proposed harbor development. No federal funds will be used.***

CHAPTER 3

AFFECTED ENVIRONMENT, POTENTIAL IMPACTS AND PROPOSED MITIGATION MEASURES

3.1 CLIMATE

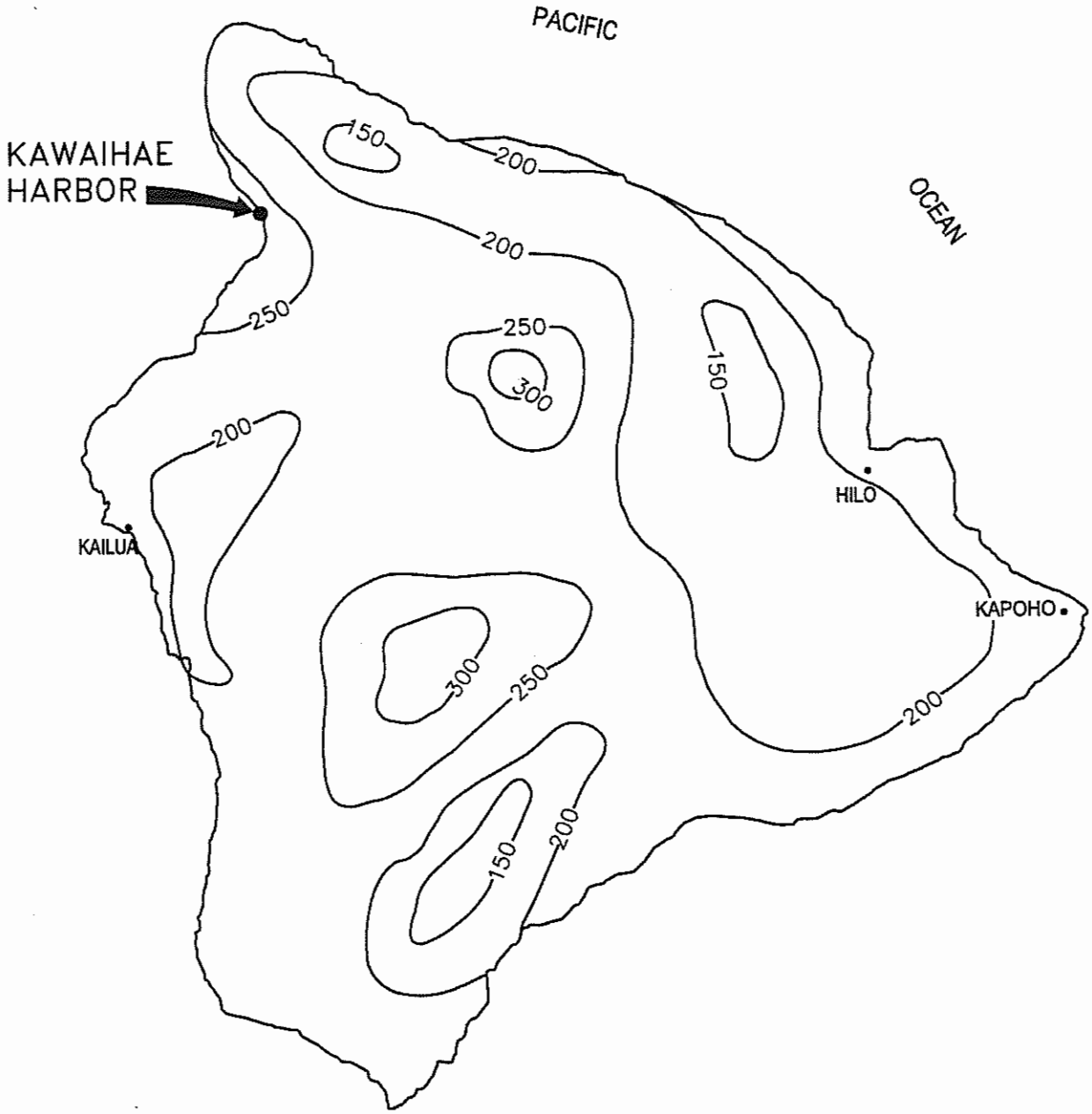
3.1.1 Existing Conditions

Hilo Harbor. Hilo's climate is characterized by abundant sunshine and rainfall, relatively constant temperatures, and the infrequency of severe storms. With a mean annual rainfall of approximately 130 inches, rain falls some 300 days during the year. December through March are the wettest months (SDOT, 1993).

Wind patterns in Hilo are sharply diurnal (having a marked difference between day and evening). Dominant easterly tradewinds prevail during the day (9 a.m. to 8 p.m.). In the evening (9 p.m. to 8 a.m.), cooler westerly winds sweep down the slopes of Mauna Loa. Monthly temperatures in the project area of Hilo Harbor are in the range of 78 degrees Fahrenheit mean temperature in August and 70 degrees Fahrenheit mean temperature in December. Temperatures of 80 degrees and higher are not uncommon throughout the year (University of Hawaii at Hilo, 1998).

Kawaihae Harbor. The general climate of Kawaihae is very arid, with 16.33 inches of rainfall per year (National Climatic Data Center, 2000). The area also is characterized by intense sunlight (FIGURE [10] ***21***). The harbor is protected from northeasterly storms by the Kohala Mountains and from southerly storms by high elevations to the south (SDOT, 1993).

Kawaihae Harbor frequently experiences windy conditions. Wind speeds vary between 5 and 20 miles per hour, although there can be prolonged periods of higher or lower velocities. Over 35 percent of the time the winds exceed 13 miles per hour (U.S. Soil Conservation Service, 1973). Wind conditions at Kawaihae vary greatly with offshore and onshore breezes, with easterly and westerly directions predominating over 70 percent of the time. During periods of strong tradewinds, wind approaches the area from the east between the Kohala Mountains and Mauna Kea. Kona storms generate occasional strong winds from the south during winter (SDOT, 1993). FIGURE [11] ***22*** shows the wind patterns around several volcanoes that cause the intense wind conditions often experienced at Kawaihae Harbor. The map indicates that high wind conditions typically occur[ring] in mid-afternoon (approximately 2 pm) (University of Hawaii at Hilo, 1998).



NOTE: WATTS PER SQUARE METER (w/m^2)

Figure [10] 21
Average Annual Solar Radiation Intensity
KAWAIHAE HARBOR
Source: University of Hawaii at Hilo, 1998

Not to Scale

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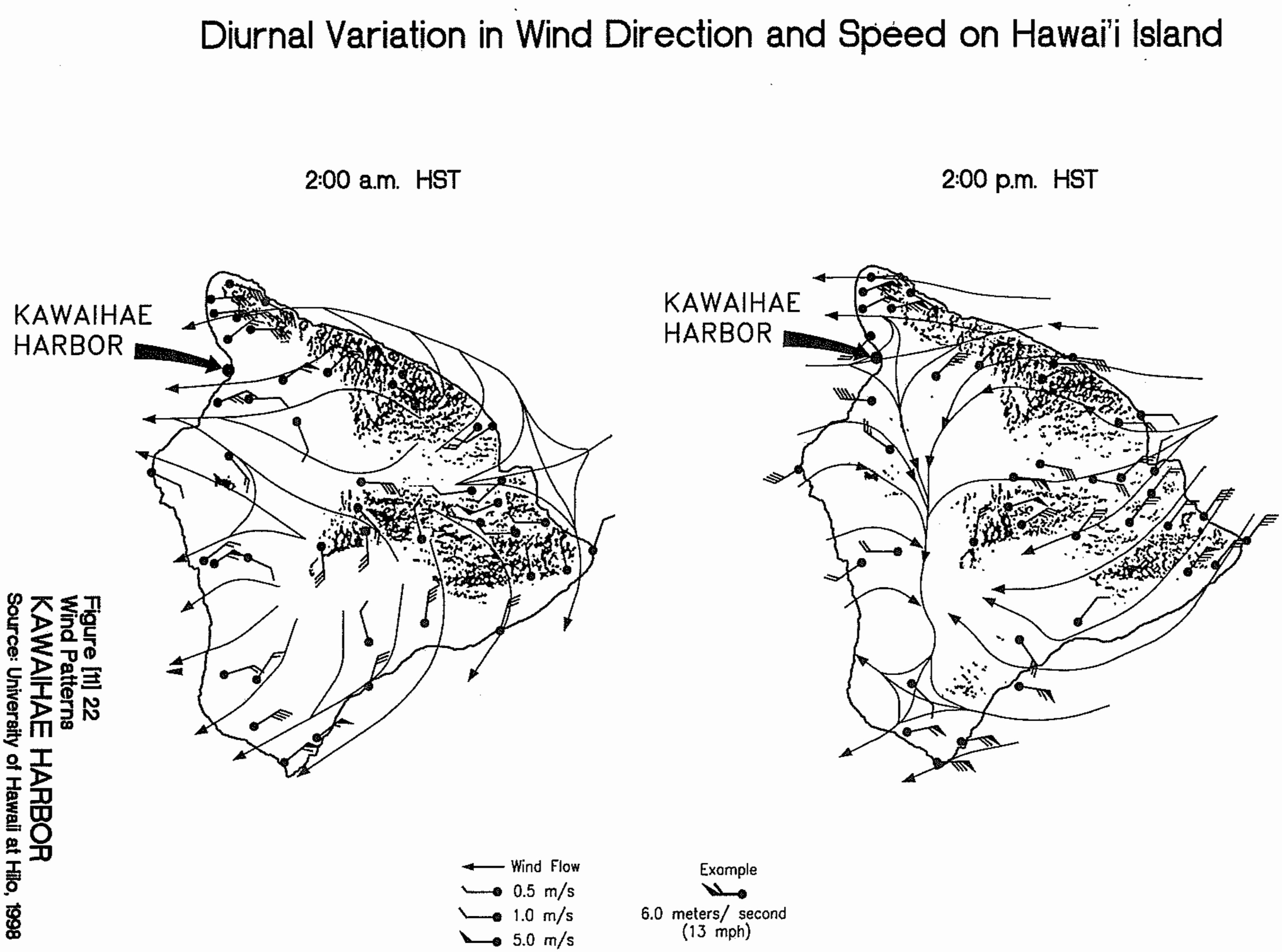

Figure [11] 22
Wind Patterns
KAWAIHAE HARBOR
Source: University of Hawaii at Hilo, 1998

Not to Scale

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3.1.2 Potential Impacts

Improvements under the 2020 Master Plan improvements will not affect climate in either location. However, proposed projects will be affected by climatic conditions such as rainfall in Hilo and wind in Kawaihae. Impacts and mitigation measures for these climatic factors are discussed in Section 3.6 NATURAL HAZARDS).

3.1.3 Potential Mitigation Measures

Since there are no expected impacts, no mitigation measures are proposed.

3.2 REGIONAL GEOLOGY, TOPOGRAPHY AND SOILS

Regional Geology. Hawaii, the largest island of the Hawaiian Archipelago, covers an area of approximately 4,000 square miles. The island was formed by the activity of five shield volcanoes (FIGURE [12] ***23***):

- Kohala (5,505 feet), which is long extinct.
- Mauna Kea (13,784 feet), which has had activity during recent geologic time.
- Hualalai (8,251 feet), which last erupted in 1801.
- Mauna Loa (13,679 feet) and Kilauea (4,040 feet), which are both still active.

Hilo is located on the eastern flank of the Mauna Loa Volcano. Kawaihae Harbor is located on the southwestern flank of the Kohala Mountains (Geolabs, 1999a and 1999b).

3.2.1 Existing Conditions

Hilo Harbor. Hilo Harbor is a relatively flat area (U.S.G.S. Topographical Map). The commercial harbor is situated on land reclaimed from the bay by the placement of coralline fill materials over coralline lagoonal (silt) deposits overlying basalt formations. Based on borings taken from a Board of Harbor Commissioners Drawing dated January 1924, the fill materials of the landside harbor area are underlain by soft mud deposits and loose finger and tree corals extending to depths of about 35 to 60 feet below the existing ground surface (Geolabs, 1999b).

Kawaihae Harbor. Kawaihae Harbor is located at sea level and is a relatively flat area (U.S.G.S. Topographical Map). The site slopes down gently toward Kawaihae Harbor on the southwest and toward a drainage ditch on the northeast. The existing ground elevations at the project site range from approximately +9 to +15 feet Mean Sea Level (Geolabs, 1999a).

Most of the project area is comprised of coral fill from the original dredging of the harbor in the 1960s. Borings taken in 1999 indicate surface fills extending to depths from about 8 to 13 feet below the existing ground surface. The fills encountered generally consist of dense sandy coral

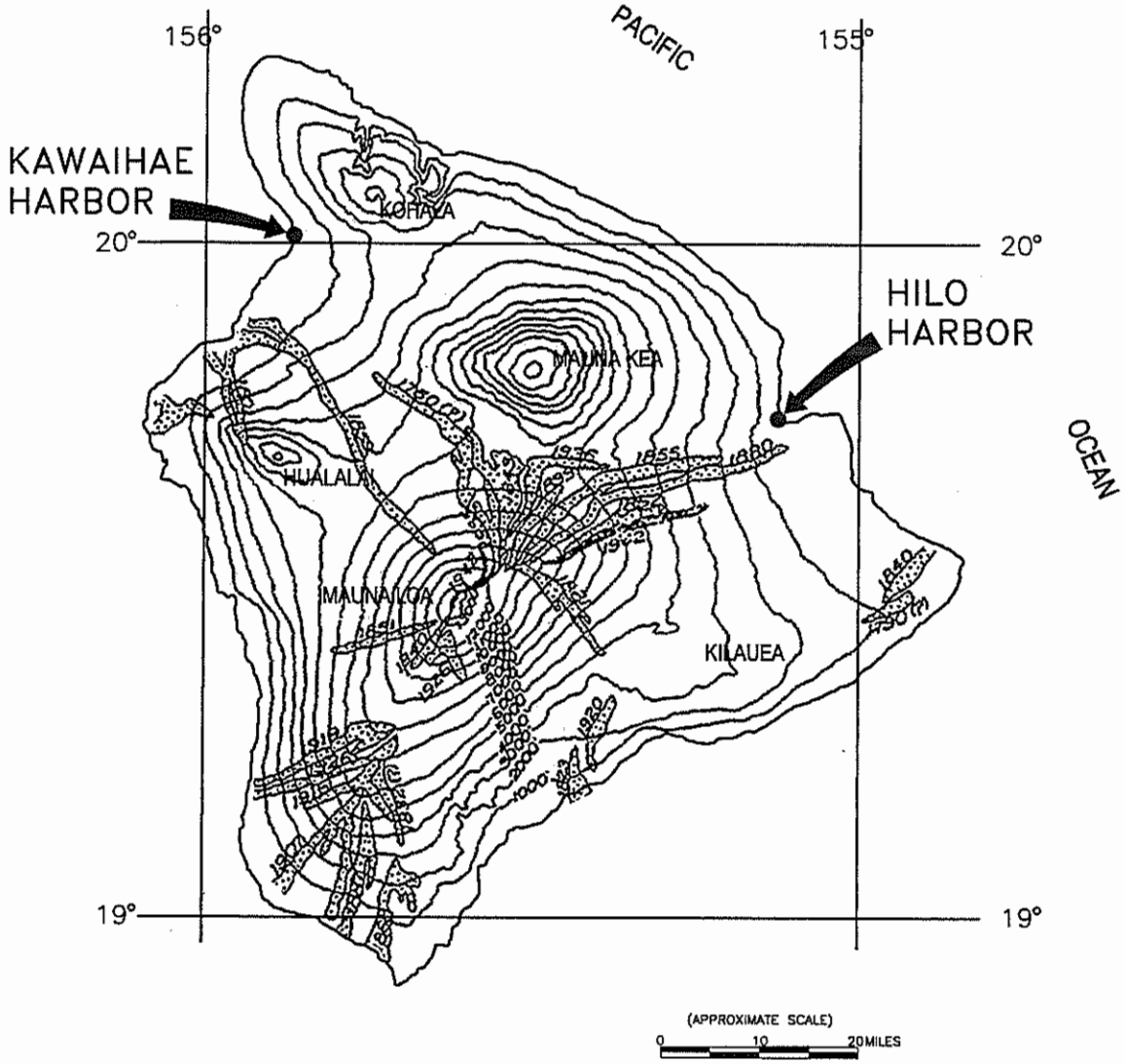

Figure [12] 23
Volcanoes of the Island of Hawaii
Source: Stearns, 1946

Not to Scale

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gravel and coral gravelly sands with some loose pockets. The fills are generally underlain by lagoonal deposits consisting of loose to dense silty sands and soft clayey deposits extending to the maximum depth of the borings of about 21.5 feet below the existing ground surface (Geolabs, 1999a). The remainder of the site supports kiawe forest on KOC or "Kawaihae extremely stoney very fine sandy loam" soils (U.S. Soil Conservation Service, 1973).

3.2.2 Potential Impacts

The fill soils in the project areas may experience disruption as a result of construction activities such as pile driving as well as drilling and excavations for piers, utilities and drainage improvements.

Planned dredging of berths at each harbor will require disposal of dredging spoils. Harbors Division intends to deposit dredging spoils from Hilo Harbor in the ocean dump site approved by the U.S. Environmental Protection Agency. Stockpiling of dredging spoils of coral on the vacant areas of Kawaihae Harbor would slightly alter the topography. It also would be likely to increase windborne dust.

Planned construction of a liquid bulk terminal in the coral stockpile area of Kawaihae Harbor (see FIGURE 9, CHAPTER 2) will increase the potential for soil contamination from petroleum spills, either from tank leakage or from underground or aboveground pipe leakage.

3.2.3 Proposed Mitigation Measures

Hilo Harbor. Some of the paved areas of Hilo Harbor have been susceptible to subsidence. For example, a recent geotechnical study of concrete structures in the Pier 1 area found that tidal fluctuations, disposal methods for drainage and underground springs may contribute to subsidence (Geolabs, Inc., 1999b). Any paving or repaving of surface areas in Hilo Harbor will have to address this condition in the design.

Harbors Division will apply for all the required permits for disposing of dredging spoils from Hilo Harbor. If the spoils from Hilo are comprised of basalt, the dredging spoils could be reused in the project as crushed material for the base course for pavement. Any basalt spoils could be sent to an asphalt plant for use in making asphalt or [in] to a landfill ***for use*** as a cover.

Kawaihae Harbor. Based on geotechnical studies at Kawaihae Harbor, dense surface fills encountered at the site should provide good subgrade support for asphaltic concrete and reinforced concrete pavements.

Dredged coral spoils will be stockpiled on-site for use as fill material in future harbor projects. Measures will be taken to prevent fugitive dust from mulching by planting a vegetative cover.

collected. Oils in the water are skimmed off before being discharged into the ocean.

- Permanent floating oil boom - this is a more long-term measure in which booms would be placed around storm drainage outlets to confine and retain oily waste from runoff.

3.4 GROUNDWATER

3.4.1 Existing Conditions

Hilo Harbor. The harbor area is not a groundwater source for drinking water (R.M. Towill Corporation, 2000a). Geotechnical borings in the area of Pier 1 conducted in 1999 indicate groundwater was encountered at depths of about 8 to 8.5 feet below the existing ground surface. The groundwater is primarily comprised of seawater. It is likely that water levels encountered in the borings may be influenced by the tide, seasonal precipitation and storm surge conditions (Geolabs, 1999b).

The lava formation beneath Hilo Harbor area appears to be of pahoehoe flow, which is characterized by a smooth, rope-like or billowy surface and an internal structure of vesicular (porous) rock. In general, the basalt formations in the area are considered to be relatively permeable rock and can transmit water quite readily in the horizontal and vertical directions. Water is normally transmitted through the porous rock matrix, along fractures and cavities/voids, and along clinker layers. Therefore, the permeability of the basalt will be highly dependent on the presence of fractures, cavities, and clinker layers (Geolabs, 1999b).

Kawaihae Harbor. The harbor is not a groundwater source for drinking water (R.M. Towill Corporation, 2000b). Vertical stratification of the seawater within the harbor is minimal, indicating that there is relatively little groundwater input to the harbor basin (AECOS, Inc., 2000). Groundwater in the Kawaihae area occurs as a basal water table in saturated volcanic rocks at or very near sea level. Groundwater beneath the harbor area is believed to be highly brackish water that occurs as a thin lens floating over saline groundwater (R.M. Towill Corporation, 2000c).

In a recent geotechnical study of Kawaihae Harbor, groundwater was encountered in the borings ranging from approximately 10.3 to 12 feet below the existing ground surface. Due to the proximity of the Pacific Ocean, groundwater levels are expected to change with tidal fluctuations. Seasonal precipitation, runoff, and other factors may also influence the groundwater levels at the project site (Geolabs 1999a).

3.4.2 Potential Impacts

Hilo Harbor. Although no development of liquid bulk facilities is proposed for Hilo Harbor under the 2020 Master Plan, existing underground pipelines for petroleum products have the potential to leak into groundwater and cause contamination. Although no leakage was documented or observed at Hilo Harbor during a Phase I Environmental Site Assessment in August 2000 (R.M. Towill Corporation, 2000a and Section 3.11.1), it is possible that subsurface contamination exists either on site or from the adjacent fuel handling facilities. If present, this contamination in soils or groundwater may be encountered during construction of proposed pier or building facilities.

Kawaihae Harbor. A Phase I Environmental Site Assessment of Kawaihae Harbor in August 2000 revealed potential ground water contamination due to liquid bulk operations at Kawaihae Harbor. These operations include approximately 15 large, above-ground petroleum storage tanks, dockside petroleum unloading facilities, and pipelines for transporting the petroleum product to storage tanks (R.M. Towill Corporation, 2000b). The proposed development at Kawaihae Harbor includes a new liquid bulk terminal in the current stockpile area (see FIGURE 9. CHAPTER 2). This development will increase the potential for leakage of petroleum product into groundwater and construction activities on the site may encounter contaminated soils or groundwater. These materials will be required to be properly managed during the construction project.

3.4.3 Proposed Mitigation Measures

Hilo Harbor. Harbors Division will continue to periodically monitor environmental conditions in the liquid bulk pipelines of Hilo Harbor to ensure that petroleum leakage does not contaminate groundwater or the ocean.

Kawaihae Harbor. Design and construction of all new above-ground tanks will be in accordance with DOH and EPA regulations concerning precautions such as underground liners and construction of berms to contain leakage. In addition, design of pipelines to serve the liquid bulk terminal will consider and mitigate the potential for petroleum spills that could result in contamination of the coral fill and underlying soil. This will be in concert with the existing Clean Island Council's emergency response plans for spills.

3.5 TRAFFIC AND ROADWAYS

A traffic analysis at Hilo Harbor and Kawaihae Harbor was completed by Julian Ng, Incorporated, traffic consultant, in November 2000. The Traffic Analysis Report, Hawaii Commercial Harbors

2020 Master Plan is attached as APPENDIX B. The purpose of the traffic analysis was to evaluate existing and future traffic conditions in the vicinity of the two harbors and to identify roadway improvements that will be necessary to provide adequate access to the harbors when the 2020 Master Plan improvements are completed.

The "Level of Service" (LOS) concept which was utilized in the traffic analysis to describe traffic conditions is derived from the Highway Capacity Manual. Six levels, using letters A through F, are used to indicate how acceptable traffic conditions are at a given time and place. At the extremes of this scale, Level of Service A indicates low densities of vehicles or no delays and Level of Service F describes very high densities and very long delays at intersections. Levels of Service A, B and C are considered acceptable traffic conditions. ***"Density" is the number of vehicles per lane-mile on a segment of roadway. Density is dependent on the number of lanes, volume (rate of flow in vehicles per hour), and speed of the traffic stream (in miles per hour).***

3.5.1 Existing Conditions

Hilo Harbor. The primary access to Hilo Harbor is along Kalanianaole Avenue from Kanoelehua Avenue. There are currently two access roads leading into the property. Kuhio Street enters the property at the main gate. A second access road has been paved recently and leads to the container yard used by Matson on the east side of the project site.

The November 2000 traffic study of the vicinity of Hilo Harbor indicated that segments of Kamehameha Avenue east of Kanoelehua Avenue and on Kalanianaole Street west of Kuhio Street operate poorly during existing peak hours, due to high volumes on narrow streets. The unsignalized intersections of Kalanianaole Avenue with Silva Street and with Kuhio Street are in close proximity with each other and were analyzed as a single unsignalized intersection (see FIGURE 2, CHAPTER 1 for a project site map of the harbor area).

The analyses show very long delays and poor "Level of Service" (LOS) for traffic from Silva Street. All traffic leaving or entering Hilo Harbor passes through the signalized intersection of Kamehameha Avenue and Kanoelehua Avenue. Analyses of this intersection indicate that it is presently operating at under capacity conditions in the AM Peak Hour and near capacity conditions in the PM Peak Hour. Existing levels of service in the vicinity of Hilo Harbor are shown in TABLE 5. On this and the following table, the numbers shown for roadway segments indicate *density* (number) of vehicles; numbers for unsignalized intersections indicate the average delay in seconds; and letters indicate the Level of Service.

TABLE 5
Existing Levels of Service
Vicinity of Hilo Harbor

	AM Peak Hour Density	AM Peak Hour LOS	PM Peak Hour Density	PM Peak Hour LOS
Roadway segments (density, LOS)				
Kamehameha Avenue west of Kanoelehua Ave.				
westbound	18.9	B	20.3	C
eastbound	19.4	B	22.4	C
Kamehameha Avenue east of Kanoelehua Ave.				
westbound	45.0	E	44.8	E
eastbound	50.8	F	45.9	F
Kalanianaole Avenue west of Kuhio Street				
westbound	37.8	E	30.4	D
eastbound	32.9	D	28.6	D
Kalanianaole Avenue east of Kuhio Street				
westbound	31.0	D	22.0	C
eastbound	24.6	C	23.1	C
Kanoelehua Avenue south of Kamehameha Avenue				
southbound	16.3	B	19.9	B
northbound	16.6	B	18.1	B
Unsignalized Intersection, Kalanianaole Avenue, Silva Street, Kuhio Street (average delay in seconds, LOS)				
Kuhio Street approach	18.6	C	12.9	B
left turns to Silva Street	8.8	A	8.6	A
left turns to Kuhio Street	9.6	A	8.7	A
Silva Street approach	163.1	F	57.1	F
Signalized Intersection, Kanoelehua Avenue and Kamehameha Avenue				
Critical Movement Sum	1,188		1,234	
Overall intersection condition	under capacity		near capacity	

Source: Julian Ng, 2000

Kawaihae Harbor. There are currently three access roads leading to the commercial harbor off Kawaihae Road. The middle access road is the primary entrance to the harbor and is used by all industrial vehicles entering the harbor area. The northernmost access road leads to Pier 1, two small sheds and a small container yard. It is not currently used because Young Brothers has moved operations to the area of Pier 2A. The southernmost access road is partially paved. It is used by military vehicles to gain access to the military area LST/LSV (landing ship tank/landing ship vehicle) ramp and by pleasure boaters to access the small boat anchorage area in the commercial harbor.

In Kawaihae, acceptable (LOS C or better) conditions were found for roadway segments and at intersections. TABLE 6 shows the estimates of existing peak hour volumes at Kawaihae Harbor. Unsignalized intersection analyses of these volumes show acceptable existing conditions.

TABLE 6
Existing Levels of Service
Vicinity of Kawaihae Harbor

	AM Peak Hour		PM Peak Hour	
	Density	LOS	Density	LOS
Roadway segments (density, LOS)				
Akoni Pule Highway, north of harbor				
northbound	5.4	A	11.0	A
southbound	10.4	A	10.3	A
Kawaihae Road, south of harbor				
northbound	11.2	A	15.0	B
southbound	11.3	A	15.7	B
Queen Kaahumanu Highway, south of Kawaihae Rd.				
northbound	9.2	A	18.5	B
southbound	17.7	B	15.2	B
Kawaihae Road, east of Queen Kaahumanu Highway				
westbound	20.3	C	16.3	B
eastbound	8.4	A	21.4	C
Unsignalized Intersections (average delay in seconds, LOS)				
Kawaihae Harbor access road at Kawaihae Road				
left turns from Kawaihae Road	7.9	A	7.8	A
left turn to Kawaihae Road	11.4	B	11.8	B
right turn to Kawaihae Road	9.5	A	10.1	B
Queen Kaahumanu Highway at Kawaihae Road				
left turns from Kawaihae Road	8.1	A	8.1	A
left turn to Kawaihae Road	20.4	C	21.5	C
right turn to Kawaihae Road	9.1	A	11.1	B

Source: Julian Ng, 2000

3.5.2 Potential Impacts

Hilo Harbor. Future traffic volumes at the critical intersections near the commercial harbors have been estimated for the year 2020 by factoring existing traffic volumes. Future traffic movements in and out of Hilo Harbor were estimated to increase by 40% over existing volumes as a result of the harbor development planned for year 2020. Other, non-harbor traffic volumes were projected to increase by 30% to 50% near Hilo Harbor.

The conclusion of the traffic analysis was that a single access to Hilo Harbor from Kalanianaole Street would be adequate until year 2020. However, the Hawaii Commercial Harbors 2020 Master Plan includes access roads to separate the access to differing functions within the harbor area. Intersection levels of service would be improved if these access roads are provided (Julian Ng, Incorporated, 2000).

Kawaihae Harbor. Traffic volumes in and out of Kawaihae Harbor were estimated to increase 200% over existing volumes. Other, non-harbor traffic volumes were expected to increase by 110% near Kawaihae Harbor.

The conclusion of the traffic analyses for Kawaihae Road is that a decrease in through traffic near the harbor and the addition of a second access road from Kawaihae Road would provide acceptable peak hour conditions along the roadway and at the critical intersections (Julian Ng, Incorporated, 2000). FIGURE 9, CHAPTER 2, shows the location of the three access road intersections.

In Kawaihae, a new two-lane road from Queen Kaahumanu Highway to Akoni Pule Highway that will bypass the harbor area is listed as a Tier 1 ***Project*** (before 2004) in the County of Hawaii's *Long Range Land Transportation Plan* (1998). Future traffic volumes assuming no bypass highway, a fourfold increase in harbor traffic, and increases in other non-harbor traffic equal to +3% per year for 25 years were projected and these volumes were evaluated. Two roadways into the harbor facilities (each carrying half the harbor traffic) were assumed. A single entrance to the harbor was also evaluated.

The analyses of future conditions at the Queen Kaahumanu Highway intersection with Kawaihae Road show that: 1) traffic signals will be needed and 2) even with signals, the intersection would be near capacity. A bypass highway will provide an opportunity to mitigate these poor conditions. However, if there is no bypass highway, intersection conditions would be acceptable if two access roads were provided (three are included in the 2020 Master Plan). If only a single access road were provided, exiting traffic wishing to turn left would have very long delays (more than 300 seconds to turn left off Queen Kaahumanu Highway to Kawaihae Road) (Julian Ng, Incorporated, 2000).

Regional Transportation Perspective. From a regional transportation perspective, the implementation of the roadway improvements identified in the County of Hawaii's *Long Range Land Transportation Plan* (1998) will be necessary to achieve acceptable peak hour conditions along the project roadways and at the critical intersections. For both harbors, implementation of roadway improvements previously identified in an islandwide study will be necessary to maintain adequate access to the harbor facilities. These improvements include:

- In Hilo, widening of Kalanianaole Street (Kamehameha Avenue to Kuhio Street) to five lanes (two in each direction plus a left turn lane) (Tier 1);
- Construction of a new roadway bypassing the Kawaihae Harbor area (Queen Kaahumanu Highway to Akoni Pule Highway) (Tier 1);
- Construction of a new roadway between Waimea and Kawaihae (Mamalahoa Highway to Queen Kaahumanu Highway) (Tier 2); and
- Widening of Queen Kaahumanu Highway south of Kawaihae Road (Tier 3).

"Tiers" were used in the *Long Range Land Transportation Plan* (1998) to identify a timetable for the proposed improvements. Tier 1 projects were to be programmed for construction prior to 2005, Tier 2 between 2006 and 2010, and Tier 3 between 2011 and 2020.

An additional turn lane in Hilo from westbound Kamehameha Avenue to southbound Kanoelehua Avenue also was identified by the EIS trafffic consultant as a mitigation measure to improve conditions and provide adequate access. A new project could be identified as "Widening of Kamehameha Avenue (east of Kanoelehua Avenue) to five lanes" (Julian Ng, Incorporated, 2000).

3.5.3 Proposed Mitigation Measures

The conclusion of the traffic study is that the proposed access roads at each harbor will improve traffic flow to acceptable levels, therefore no mitigation is necessary.

- At Hilo Harbor, the 2020 Master Plan indicates that additional access roads will be constructed to separate the access from differing functions within the harbor area. Intersection levels of service will be improved to acceptable levels when access roads are provided.
- Likewise, at Kawaihae Harbor, planned access roads are expected to result in an acceptable level of service through 2020.

From a regional perspective, traffic conditions at the harbors will be acceptable if the improvements listed above are implemented on the schedule indicated by the "Tiers." Harbors Division will monitor the ongoing implementation of these projects by the State Department of Transportation, Highways Division.

3.6 NATURAL HAZARDS

3.6.1 Existing Conditions

The Island of Hawaii is susceptible to five main types of natural hazards; tsunami, volcanic eruption, earthquakes, hurricanes and flooding. Natural hazards such as hurricanes, flooding and tsunami are unavoidable for coastal harbor areas.

- **Tsunami.** Most tsunami affecting the Hawaiian Islands come from sources in the zone of mountain building that borders the Pacific Ocean. Hawaii has experienced nine damaging

tsunami since 1820. An earthquake in the Aleutian Islands caused the 1946 tsunami, which drove water heights to 10 meters at Hilo. The Chilean tsunami of 1960 struck the shore of Hilo Bay at 65 kilometers per hour and drove water to as high as 11 meters (University of Hawaii at Hilo, 1983). A tsunami approached the Kawaihae area in 1946 out of the northwest and destroyed the pier constructed in 1937 (Cultural Surveys Hawaii, 1991).

- **Volcanic eruptions.** Because of its location on the slopes of the active volcano Mauna Loa, Hilo is particularly exposed to the potential hazard of lava flows from volcanic eruption.
- **Earthquakes.** Since the entire Island of Hawaii is in Zone 3 category for seismic activity, Hilo and Kawaihae Harbors share this designation according to the Uniform Building Code. Zone 3 requires public buildings and certain types of private buildings to meet structural design standards for earthquake resistance (Nishimura, 1996).
- **Hurricanes.** Of the eight hurricanes known in the Hawaiian Islands since 1950, only two minor ones, Fico in 1978 and Estelle in 1986, affected the Island of Hawaii (University of Hawaii at Hilo, 1983).
- **Flooding**. Sudden high waves and the strong currents they generate are perhaps the most consistent and predictable coastal hazards in Hawaii (University of Hawaii at Hilo, 1998). Because the subject harbors are coastal facilities, the project sites are susceptible to occasional flooding. Breakwaters at Hilo and Kawaihae Harbors were constructed by the U.S. Army Corps of Engineers to minimize ocean surges and flooding.

Hilo Harbor. Flood zones recorded by the National Flood Insurance Program (FIGURE [13] ***24***) indicate that the area[s] of Hilo Harbor [are] ***is*** susceptible to a 100-year flood, 100-year coastal flood with velocity (wave action) with base flood elevations determined, flood depths of 1-3 feet indicating areas of ponding, and 500-year flood (Federal Emergency Management Agency, 1982). Portions of Hilo Harbor are in a designated tsunami inundation zone. The harbor is also located in a Lava Flow Hazard Zone 3.

Kawaihae Harbor. Kawaihae Harbor is located in flood zones comparable to those described above for Hilo Harbor by the Federal Emergency Management Agency (FIGURE [14] ***25***). This facility also is in Lava Flow Hazard Zone 3. Wind is a natural hazard at Kawaihae Harbor as well (Section 3.1 CLIMATE). The location of the facility frequently exposes vessels to winds at gale force (34 mph) and above. In the past this has caused occasional damage to barges and small boats berthed at the harbor. Kawaihae Harbor also experiences storm surges from tropical disturbances in the Pacific Ocean.

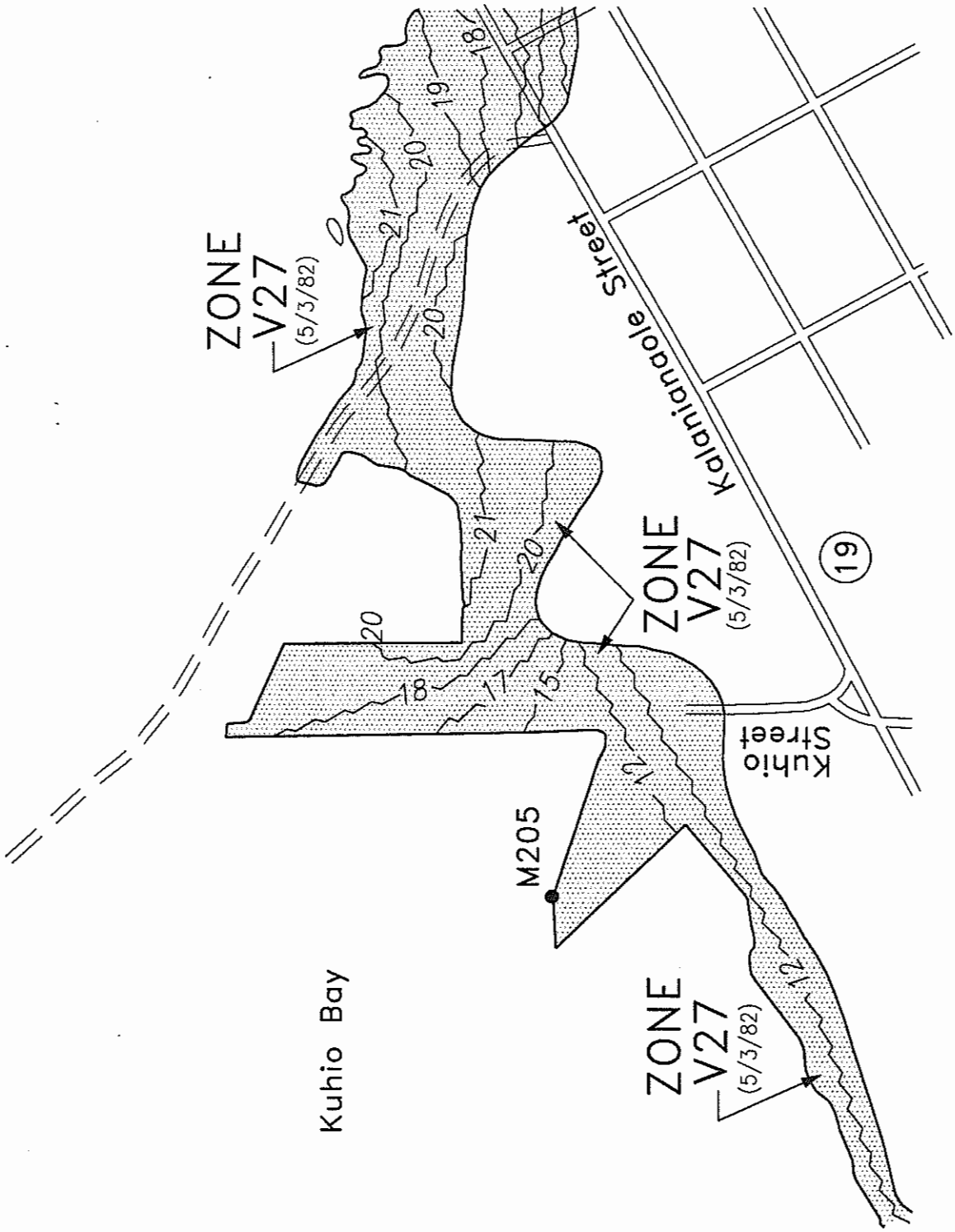

Figure [13] 24
Flood Zone Map
HILO HARBOR
Source: Federal Emergency Management Agency, 1988

Not to Scale

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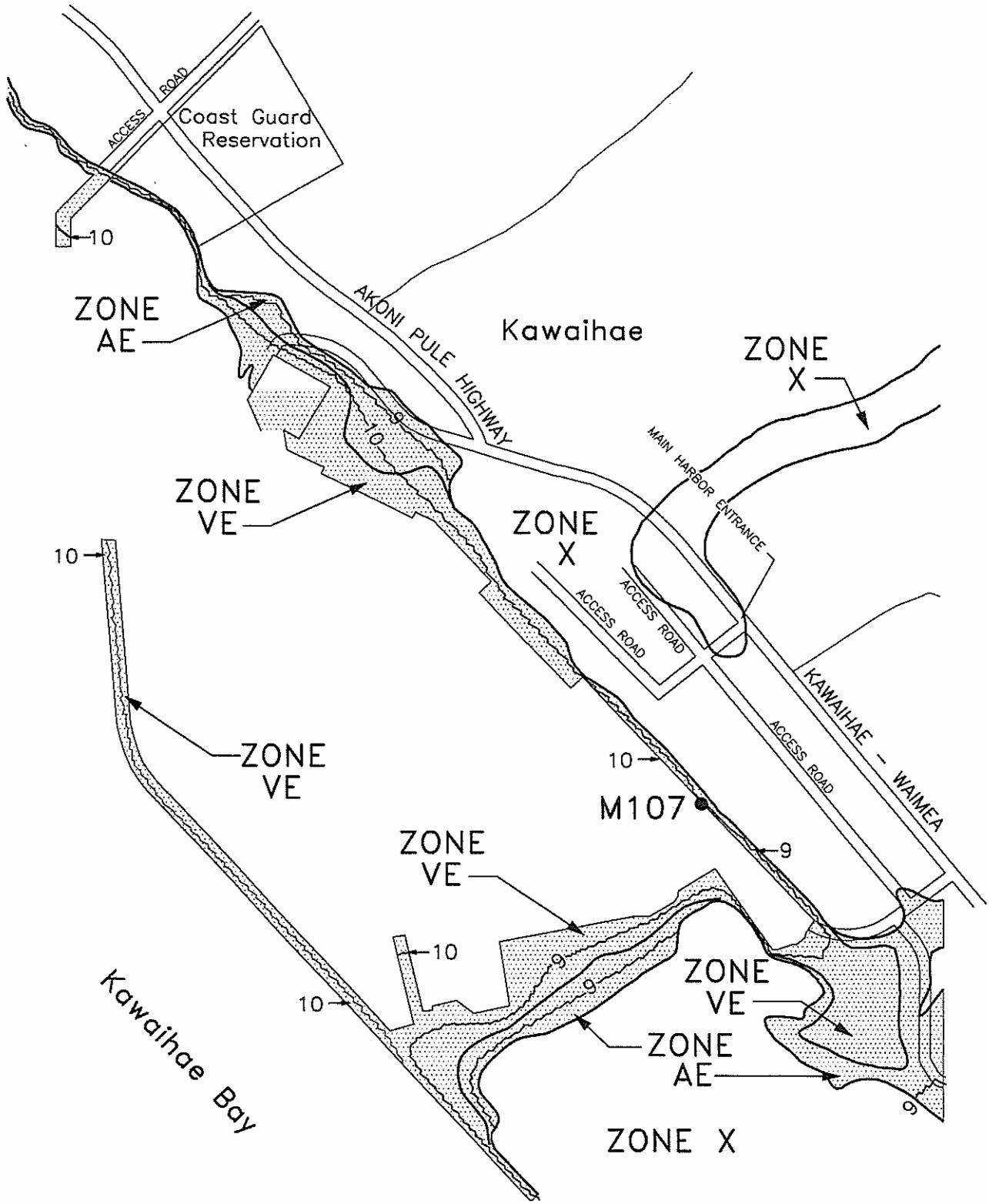

Figure [14] 25
Flood Zone Map
KAWAIHAE HARBOR
Source: Federal Emergency Management Agency, 1988

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3.6.2 Potential Impacts

The more improvements are implemented at the harbors, the more harbor facilities will be susceptible to the various natural hazards listed above.

3.6.3 Proposed Mitigation Measures

To mitigate damage from earthquakes and hurricanes, planned harbor improvements will ensure that new facilities are designed to present codes which offer some protection from damage. To mitigate tsunami and storm surge impacts, engineering analyses will be performed that will determine proper design criteria. On an ongoing basis, personnel at both harbors will coordinate with County of Hawaii Civil Defense to implement established procedures in the event of a flood or tsunami. At Hilo Harbor, design of piers will consider the impacts of harbor surge and wind conditions. At Kawaihae Harbor, design of improvements will consider prevailing strong wind conditions and their potential effect on cargo handling and berthing of vessels.

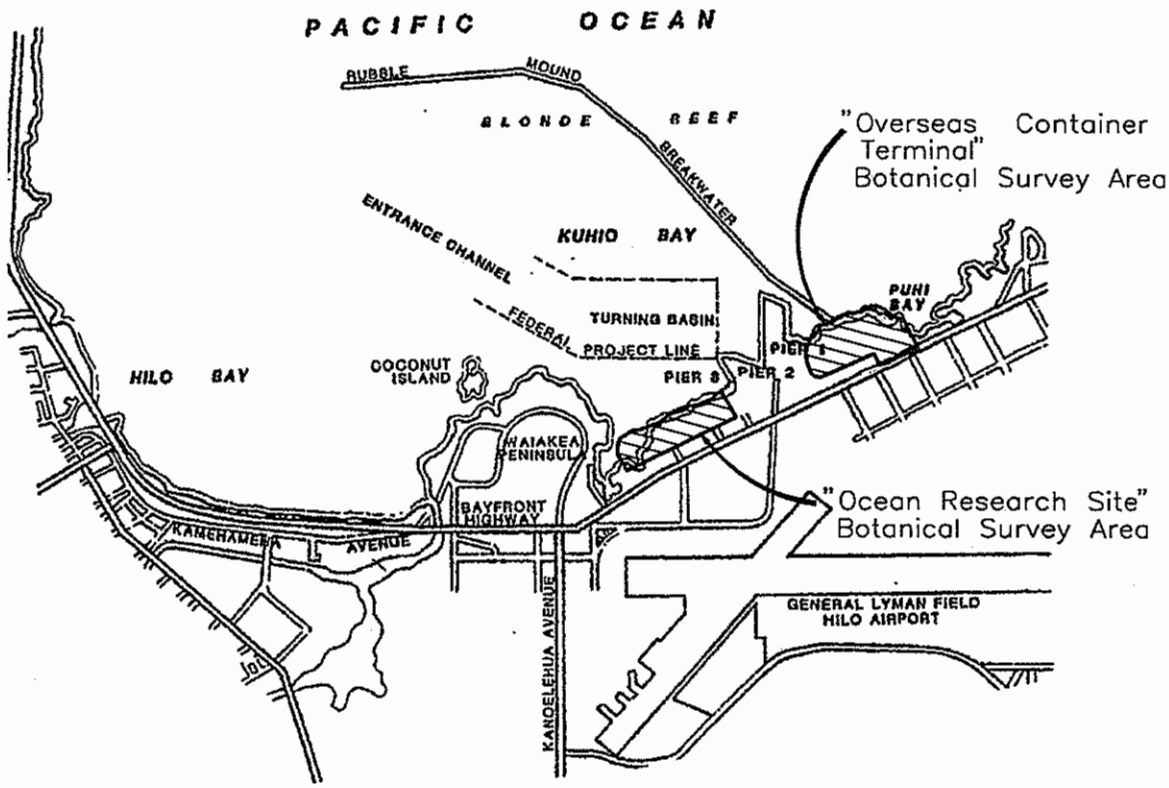
3.7 TERRESTRIAL BIOLOGY

3.7.1 Existing Conditions

Hilo Harbor. Observed fauna include cats (*Felix domesticus*), dogs (*Canis familiaris*), barred doves (*Feopelia striata*), rats (*Rattus ssp.*) and finches (*Cardopacus mexicanus frontalis*) (Palapala, 1994; Corroborated by personal communication, 15-year Hilo Harbor employee, October 2000).

A botanical survey of Hilo Harbor was conducted by Char & Associates, Inc. in September 2000. The Botanical Survey - Hilo Harbor is attached as APPENDIX C. This survey focused on the undeveloped portions of the Hilo Harbor property proposed for the overseas container terminal (Radio Bay) and the ocean research facility (proposed Piers 5 and 6). FIGURE [15] ***26*** shows the specific areas surveyed.

The botanical survey found that the vegetation on the undeveloped portions of the two surveyed parcels of Hilo Harbor is dominated by introduced or alien plant species such as bingabing, Chinese banyan, California grass, etc. This is not surprising as the two parcels appear to have been disturbed for a long time. Remnants of former structures, such as concrete blocks, were found on both parcels (Char & Associates, 2000).



LEGEND:

Areas Surveyed for Botanical Studies

Figure [15] 26
Areas Surveyed for Botanical Studies
HILO HARBOR
Source: Char & Associates, 2000a

Not to Scale

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TABLE 7 summarizes the findings of the botanical survey at Hilo Harbor. A full inventory of all plant species encountered in the survey is included in APPENDIX C.

TABLE 7
Botanical Survey Summary - Hilo Harbor
September 2000

	Number of Species Observed	Percentage of Total
Threatened Species	0	0%
Endangered Species	0	0%
Introduced Species	60	85%
Species Originally of Polynesian Introduction	3	4%
Species Native* to the Hawaiian Islands	8	11%
Total Species Observed	71	100%

* All the native species are indigenous, that is, they are native to the Hawaiian Islands and elsewhere. These plants are the pakahakaha fern *(Pleopeltis thunbergiana)*, moa *(Psilotum nudum)*, koali'awe *(Ipomoea indica)*, seabean *(Mucuna gigantea)*, popolo *(Solanum americanum)*, hau *(Hibiscus tiliacous)*, *Pycreus polystachyos* sedge, and hala *(Pandanus tectorius)*.

Source: Char & Associates, 2000

Ocean Research Site

Existing homes and landscaped lawns and plantings cover most of the site. These contain commonly grown ornamental species such as coconut *(Cocos nucifera)*, areca palm *(Chrysalidocarpus lutescens)*, avocado *(Persea americana)*, various croton *(Codiaeum variegatum)* hibiscus *(Hibiscus rosa-sinensis)*, plumeria *(Plumeria rubra)* cultivars, papaya *(Carica papaya)*, and Alexandra palm (*Archontophoenix alexandrae*).

Overseas Container Terminal

The forest here is from 50 to 80 feet tall and consists of a mixture of trees which include Chinese banyan, ironwood, guaruma *(Cercropia obtusifolia)*, melochia *(Melochia umbellata)*, bingabing, African tulip tree *(Spathodea campanulata)*, mango *(Mangifera indica)*, coconut, avocado, and *Eucalyptus* sp. Stands of ironwood, false kamani, and tree heliotrope *(Tourneforthia argentea)* are found along the shoreline.

Kawaihae Harbor. As far as terrestrial zoology is concerned, doves (*Feopalia striata*) and cardinals (*Cardinalis cardinalis*) have been observed (Personal communication, Winona Char, 2000). A botanical survey of Kawaihae Harbor was conducted by Char & Associates, Inc. in September 2000. Botanical Survey - Kawaihae Harbor is attached as APPENDIX D. Two vegetation types are recognized on the project site: *ruderal or weedy, wayside vegetation* covering the disturbed portions of the property, and *kiawe forest* occurring on the undisturbed areas. See FIGURE [16] ***27*** for the area of Kawaihae Harbor surveyed for botanical resources.

TABLE 8 summarizes the findings of the botanical survey at Kawaihae Harbor. All of the plants can be found in similar lowland, dry, disturbed habitats. An inventory of all the plants observed within the two vegetation types is presented in the plant checklist in APPENDIX D.

TABLE 8
Botanical Survey Summary - Kawaihae Harbor
September 2000

	Number of Species Observed	Percentage of Total
Threatened Species	0	0%
Endangered Species	0	0%
Introduced Species	17	77%
Species Originally of Polynesian Introduction	1	5%
Species Native to the Hawaiian Islands and Elsewhere	4	18%
Total Species Observed	22	100%

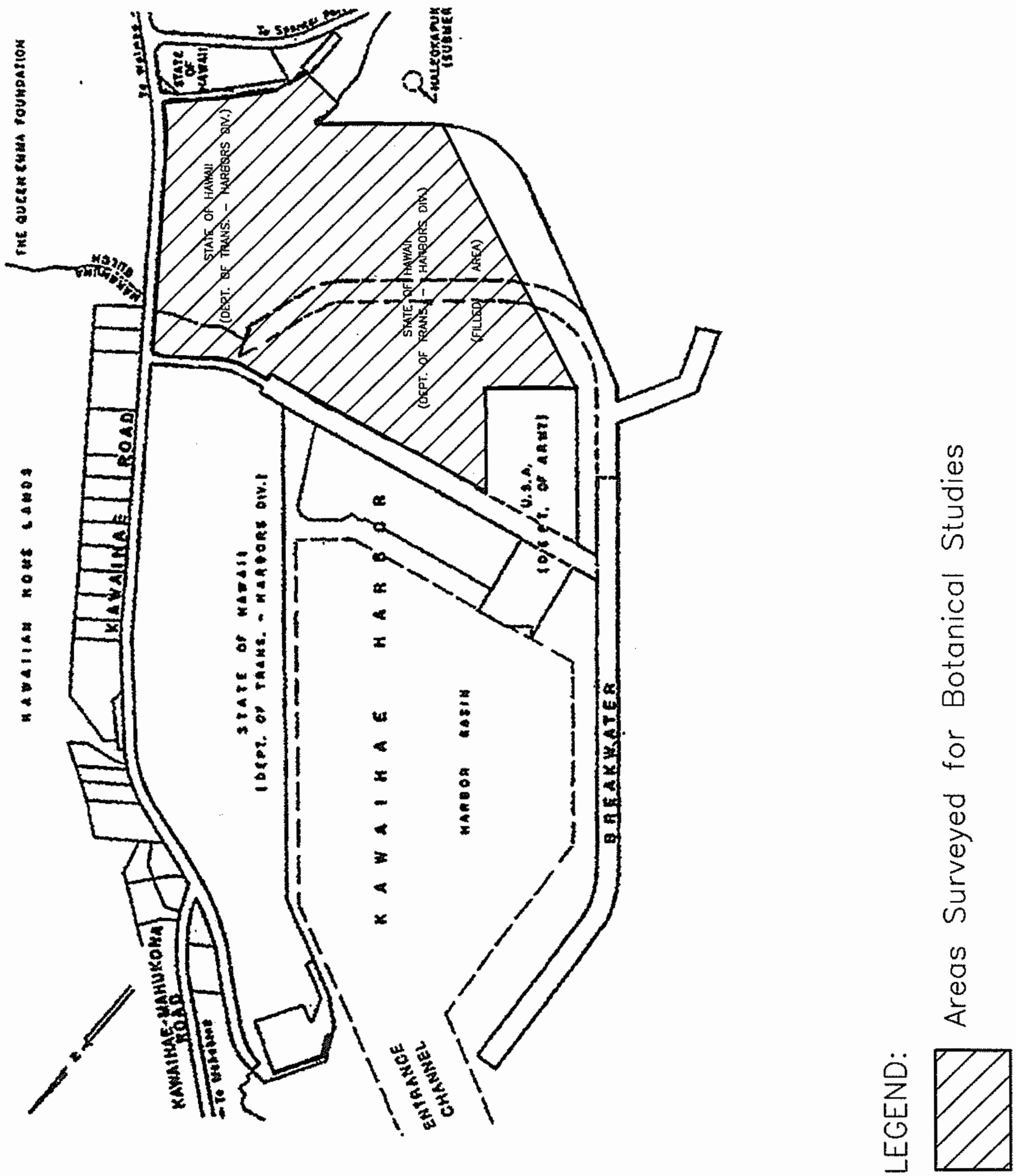

Figure [16] 27
Areas Surveyed for Botanical Studies
KAWAIHAE HARBOR
Source: Char & Associates, 2000a

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Area with Ruderal Vegetation

The fill/stockpile area is proposed for development. The vegetation on this heavily disturbed area is composed of a weedy mixture of species, primarily the introduced buffelgrass and *Atriplex eardleyae* with scattered patches of kiawe.

Ruderal or weedy, wayside vegetation occurs on this disturbed area covered by coral fill. Piles of coral as well as boulders, soil, concrete pilings, etc., are stockpiled on this portion of the project area. Much of the site is barren with vegetation cover of 5% to 20% in most places. Closer to the edges of the disturbed area where it adjoins patches of kiawe trees, the weedy cover is 40% to 50%.

Kiawe Forest

Kiawe forest is found between the coral fill/stockpile area and the highway. The tree canopy cover is closed in most places, i.e., the branches of the trees overlap and cover is 60% or more. The trees are occasionally cut for firewood as evidenced by old stumps and cut branches scattered here and there.

The undisturbed portion of the property, between the fill/stockpile area and the highway, supports kiawe forest; no development is planned for this area.

3.7.2 Potential Impacts

The proposed development of the two parcels is not expected to have a significant negative impact on the terrestrial biological resources. There are no biological reasons to impose any restrictions, conditions, or impediments to proposed development of these two parcels.

3.7.3 Proposed Mitigation Measures

Since no adverse impact is expected, no mitigation measures will be required.

3.8 MARINE BIOLOGY

A survey of marine biology in each harbor area which could be impacted by project improvements was completed by AECOS, Inc., in September 2000. Most of the following information is drawn from Review of Water Quality and Biology for the Kawaihae and Hilo Harbors for the 2020 Master Plan, attached as APPENDIX E.

Marine Biological Research Methodology. Comparable research methodology was used to study the marine biology of both harbors. Using SCUBA, an investigator familiar with the biota found in Hawaiian harbors and on coral reefs in Hawaii conducted a series of dives along the harbor wall and piers and down to the design depth of the harbor (35 feet) noting the dominant algae, invertebrates and fishes that were encountered and recording their identities on underwater paper. For organisms requiring closer inspection to determine their identification, samples were taken, stored in a cooler and held frozen until they could be inspected under a dissecting microscope (AECOS, Inc., 2000).

3.8.1 Existing Conditions

Hilo Harbor. Sections of Hilo Harbor surveyed on September 23, 2000 were: 1) the southeast pier wall and shallow area along the northeast jetty of the small harbor called Radio Bay; 2) from the boulder reinforced shoreline at the east end of Pier 3 along the undeveloped shoreline proposed for Pier 4; 3) the offshore area along the proposed Pier 5-6 alignment; and 4) the pilings at the end of Piers 2-3, where dolphins are proposed to be constructed.

A summary of the marine biological survey results is shown in TABLE 9. The taxa of the 76 organisms recorded on the survey are provided in detail in APPENDIX E.

TABLE 9
Marine Biological Survey Summary - Hilo Harbor
September 2000

	Number of Species Observed
Threatened Species (Green sea turtle, *Chelonia midas*)	1 ***(one individual observed)***
Endangered Species	0
Microalgae	9
Invertebrates	***29***
Fish***es***	***24***
Total Species Observed	***63***

Radio Bay

With its lack of circulation with the open ocean, this basin is the most stagnant area in the harbor. This is reflected in the resident biota which is dominated by forms usually found in harbor areas. No invertebrates usually associated with coral reefs were found. The pier wall along the harbor's southeast side extends vertically to the bottom at about 3 meters ("m") (10 feet) depth, where conditions are very turbid with visibility of less than 1 m, and the sediments are extremely fine, jelly-like silt. The prominent feature in the water column is an approximately 1 m (3 ft) thick surface layer of cold, fresh to brackish water that exists to some degree throughout the harbor but is most pronounced in Radio Bay. Virtually no marine macro-organisms occur in the intertidal zone affected by this freshwater lens, which was approximately 5 degrees C (9 F) cooler than the more saline water below. Below this zone the subtidal community is heavily dominated by nonindigenous barnacles, small *Chthamalus proteus* in the upper few cm (inch) of the zone and the larger *Balanus reticulatus* and *Balanus trigonus* below. The balanids are extremely abundant, making up over 95% of the benthic organisms found on the pier wall. The only fish observed in the area were a single jack (Carangidae) and a school of *iao*, *Pranesus insularum* (AECOS, Inc., 2000).

The marine biologist conducting the above investigation encountered what appeared to him to be a rock wall in Radio Bay that he conjectured might be part of a "former fishpond" (AECOS, Inc., 2000). A subsequent dive by qualified archaeologists into Radio Bay to observe this "wall" revealed that the rocks in question were merely construction rubble (Haun & Associates, 2000).

Prospective Pier 4

Observations along this entire shoreline of approximately 550 m (180 feet) recorded 7 macroalgae, 15 macroinvertebrates and 10 fishes for a total of 32 macro-organisms, the largest number that were observed in any of the areas in Hilo Harbor. This area begins at the east end of Pier 3 where the bottom is a rock reinforced sloping wall down to 11m depth where the bottom is fine silt, with some rock rubble at intermediate depths. The rubble-and-rock wall supports abundant macroalgae with a coating of fine sediment. Many invertebrates were found in this area not seen elsewhere along this shoreline, such as two of the only four octocorals that occur in Hawaii, the native *Arbacia bicolor*, and the introduced *Carijoa riisei*. Other invertebrates recorded were various species of sponges and two hard corals *Pocillopora damicornis* and *Montipora capita*, which were present but not common.

This area, called Baker's Beach, is perhaps the only white sand beach in the Hilo area and reportedly was man-made from coral dredged from Hilo Bay between 1925 and 1930 (Sun, Low Tom & Hara, 1977; Kelly et al., 1981). Offshore of this shoreline the bottom flattens out at a depth of approximately 2.5 m (8 ft) with a substratum of pebbles and cobbles in sand and silt. The only

common macrofauna are various sponges growing on the rock surfaces. Further out, the bottom becomes mostly medium to fine white sand with numerous burrow openings interspersed with cobbles and patches of consolidated coral rubble.

Pier 5-6 Alignment

The area in the approximate location of the proposed Pier 5-6 alignment was surveyed by starting about 300 m (1,000 ft) offshore and swimming shoreward on a bearing of 185°. Depth along most of this transect was about 3.5 m (11 feet). The substratum was coarse white sand with intermittent outcrops of coral rubble, both with a fine silt coating. Sand cover became more abundant with approach to the shoreline and was about 95% of the substratum for most of the length of the transect.

Because of lack of solid substratum and vertical relief, few species of macrobiota occurred along this transect. Only three species of algae, 9 invertebrates and 6 fishes were recorded, for a total of 18 species, the second lowest on these surveys. Two uncommon invertebrate species of interest usually occurring on coral reefs were found along this transect, the stinging pen hydroid *Gymnangium hians* and the encrusting hard coral *Psammacora verrilli.*

End of Piers 2 and 3

The area offshore of the end of Pier 3 proposed for location of mooring dolphins is a flat fine silt bottom in 11.5 m (38 feet) depth, with high turbidity and no apparent macrobiota. The pier pilings at the end of Pier 2-3 were inspected and found to have a limited but interesting community of macroinvertebrates and fishes. Only 5 invertebrates and 9 fishes were recorded on or near the pilings. However, these included two introduced invertebrates, the hydroid *Pennaria disticha* and the bryozoan *Schizoporella* sp., not found elsewhere on the survey but are generally common in Hawaiian harbors. Also found here was the introduced octocoral, *Carijoa riisei*, which was otherwise found only at the beginning of the Pier 4 transect and was very abundant on pilings at the end of Pier 3, and the only lobster (*Panulirus pencillatus*) observed on these surveys. Also unique for this station were the fishes the Moorish Idol (*Zanclus cornutus*), the Pennant Butterflyfish (*Heniochus diphreutes*) and the Racoon Butterflyfish (*Chaetodon lunula*) more commonly seen under reef conditions, and one green sea turtle, *Chelonia midas.*

Kawaihae Harbor. A survey of marine biology in Kawaihae Harbor was conducted on September 16 and 17, 2000 using comparable methodology to that performed for Hilo Harbor and described above under Section 3.8, "Marine Biological Research Methodology." The results of this survey are summarized in TABLE 10. Information about the 116 taxa found in the harbor area may be found in APPENDIX E.

TABLE 10
Marine Biological Survey Summary - Kawaihae Harbor
September 2000

	Number of Species Observed
Threatened Species (Green sea turtle, *Chelonia midas*)	1 ***(one individual observed)***
Endangered Species	0
Invertebrates	56
Fishes	59
Total Species Observed	116

Due to its location on the leeward coast of the Island of Hawaii and its relative accessibility to unrestricted oceanic circulation, the biotic conditions of Kawaihae Harbor are more typical of near-shore coastal environments than those that might be found in restricted harbors with more turbid and nutrient enriched water masses. Within the harbor, a distinct contrast can be seen between the conditions in the dredged but undeveloped areas such as proposed Piers 3-5 compared with the dredged and developed areas at Pier 2 and the dolphins at proposed Pier 5. In these latter areas, where artificial substrata provide settling surfaces for filter feeding invertebrates, the harbor biota now more closely resembles that in harbors elsewhere in Hawaii. It is likely that the proposed development/expansion within the harbor basin will continue this transition to fewer near-shore coastal invertebrates and fishes, with generally reduced overall diversity (AECOS, Inc., 2000).

The harbor was surveyed for marine biological resources in the following segments (refer to FIGURE 9 in CHAPTER 2 for location of 2020 Master Plan Improvements at Kawaihae Harbor).

Pier 1

A total of 60 organisms was recorded along Pier 1, which included 31 invertebrates dominated by corals and echinoderms, and 29 species of fish. This was the highest number of invertebrates and total organisms observed of the five areas surveyed at Kawaihae, and all were sighted along the relatively short span of coral regrowth corresponding to the area proposed for dredging of existing Pier 1 (AECOS, Inc., 2000). Kawaihae's commercial harbor area was dredged in the 1960s. The coral heads along the existing piers have regrown since that time. Coral may similarly regenerate in the future following proposed dredging of harbor areas.

Pier 2a

In this area numbers of invertebrates decreased from the 31 species (found along the relatively short distance of prospective Pier 1) to 13 species along the entirety of Pier 2a. A similar reduction occurred in the numbers of fish species sighted, from 60 at Pier 1 to 30 along Pier 2a, resulting in a total number of only 60 taxa observed along the entirety of Pier 2a (AECOS, Inc., 2000).

This is the main pier area for the harbor, and it consists of concrete pier pilings about 0.6 m (2 ft) in cross section that extends from the surface down to the harbor bottom at 11 m (36 ft) depth. The deck of the pier is supported by these piers, and the sheet piling wall of the pier is recessed about 10 m from the pier's edge, forming a large area underwater which is dimly lit where the bottom slopes gradually up to the pier wall. The bottom substratum under the pier is coarse sand and water is turbid. These factors have prevented settlement and growth of corals under the pier, although the corals *Montipora capitata* and *Porites lobata* are common on the pier pilings near the edge of the pier where light is sufficient to support them. *M. capitata* colonies on the pier pilings are sometimes quite large, reaching 0.5 m (1.6 ft) in longest diameter. Going eastward along the pier toward the head of the harbor, the dominant biota on the pier pilings changes from near-shore coastal organisms to types more commonly found in Hawaiian harbors, such as polychaetes, tunicates and especially bryozoans (AECOS, Inc., 2000).

Pier 2b Site

The decreasing numbers of species observed along Pier 2a continues in this area, with only 13 invertebrates and 20 fishes recorded, for a total of 33 species in this small area near the head of the harbor. This location also had the highest water turbidity of any area on the survey, which may in part be a factor in the low number of organisms observed, especially for the fishes (AECOS, Inc., 2000).

This area is designated for future expansion as a passenger terminal, research station and/or cargo expansion area. At present it is composed of wooden docks at the east end of Pier 2 that are being used to moor sailboats and other pleasure craft. The docks lie outside lava boulders used to surface the limestone substratum, which extends to 7 m (23 ft) depth at the shoreline. Coral is more abundant here than along Pier 2a. Live coral coverage as high as 30% cover near the surface decreases with depth down to its limit at about 5 m (16 ft), with most of the coral and fishes occurring near the surface at less than 2 m (6 ft) (AECOS, Inc., 2000).

Piers 3-5 (proposed) Site

This area extends along the southeast shoreline of the harbor to the jetty that protects the harbor's seaward side. Planned usage is for an inter-island cargo area (Pier 3) along most of the existing

shoreline and a military cargo area (Pier 4) on the seaward 100 m (300 plus feet), with a small pier (Pier 5) at the beginning of the jetty on the seaward side of the existing LST/LSV ramp (AECOS, Inc., 2000).

Also observed in this area are small mollusk shells [of the species which appear to be gathered by one individual]. According to wildlife biologists at the U.S. Fish & Wildlife Service, these mollusks are common and were most likely dredged from former coral reefs as opposed to something that grows there now (Personal Communication, Kevin Foster, Wildlife Biologist, U.S. Fish and Wildlife Service (USFWS), 2000). According to the head malacologist (shell expert) at Bishop Museum, there are no threatened or endangered intertidal species in the Hawaiian Islands (Personal Communication, David Cowey, Ph.D, 2000). Therefore the mollusks found at Kawaihae Harbor are not considered threatened or endangered.

Off the beach and shoreline rocks, the bottom slopes down at about a 30 degree angle to a coarse sand and rubble bottom at about 5 m (16 ft) depth. Above this depth the substratum is mostly rocky outcrops separated by rock cobbles and coarse sand which continue up to the shoreline which is composed of lava boulders which form the small tidepools. On the hard substratum at 3 m coral is common, ranging from about 25% coverage near the head of the harbor to about 80% near the southwest end of the proposed Pier 3. The boulders and outcrops provide substantial vertical relief and habitat for reef fish and motile invertebrates. Most of the coral coverage on the hard substratum is *Porites lobata* and *Pocillopora meandrina,* but *Pocillopora damicornis, Montipora patula, Porites compressa, Leptastrea purpurea, Porites evermanni* and *Pavona varians* were also present. Twenty-five invertebrate species and 34 fish species were recorded along this segment of the survey, for a total of [58] ***59*** species, the second highest total number on the survey. The area is primarily a marine environment with limited diversity due to it being enclosed and somewhat restricted from the open ocean. Near the northeast side of the LST/LSV boat ramp, coral broadens to be about 50 m (164 ft) wide with approximately 80% coverage of mostly *Porites compressa* down to about 5 m (16 ft) depth, despite high turbidity and fine sediments occurring on the bottom (AECOS, Inc., 2000).

On the other side of the LST/LSV ramp at the proposed site of Pier 5 presently are dolphins with concrete legs that provide habitat for different types of organisms than those occurring along the rest of this shoreline, species that are more typical of harbor biota. This was the only location where the bryozoans *Amathia distans* and *Diaperoecia intricata*, and the ascidian *Herdmania momus* were found. These are dominant organisms in Oahu harbors, and their presence within Kawaihae harbor suggests that they could become more common if additional concrete substratum were to become available from harbor development (AECOS, Inc., 2000).

End of Harbor Breakwater

This segment of the survey was conducted on the reef from just inside of the end of the harbor jetty around to its seaward side outside the harbor (FIGURE [17] ***28***). Despite the relatively small area surveyed in this location of undredged reef, 56 species were recorded, composed of two calcareous algae, 19 invertebrates and 35 reef fishes, the highest number found on the survey (AECOS, Inc., 2000).

In this area the reef rises steeply out of the dredged channel from about 13 m (43 ft) to the reef edge at about 1.5 m (5 ft) depth. Environmental conditions are characterized by high water clarity and abundant coral coverage of about 75% with large coral heads and high vertical relief, which provides substantial habitat and refuge for fishes (AECOS, Inc., 2000).

3.8.2 Potential Impacts

Hilo Harbor. The impacts as a result of the proposed development at Hilo Harbor include:

- **Radio Bay -** (14 taxa observed) Marine life diversity is low in this area because of high turbidity and the water's top 1 m (3 ft) layer of cold, brackish water. Along the proposed new pier in this area, the existing low-diversity benthic community will be replaced by dredging, pile driving and pier construction.
- **Prospective Pier 4** - (32 taxa observed) Observations along this shoreline included the largest number of macro-organisms found in the Hilo Harbor area. This area also contained wo of four species of native (but not rare) octocorals. The relatively sparce coral in this area will be subject to dredging, pile driving and pier construction.
- **Pier 5-6 Alignment -** (18 taxa observed) Because of the sandy bottom with outcrops of coral rubble, few species of macrobiota were observed in this area, although two uncommon species of invertebrates were found. The proposed dredging, pile driving and pier construction in this area is not expected to result in any significant adverse impact to marine life.
- **End of Piers 2-3 -** (14 taxa observed) This is the area in which the threatened green sea turtle, *Chelonia midas*, was observed. The benthic community was limited to those that are prevalent along pilings. [Since] [t] ***T***his area is slated for the construction of mooring dolphins, which will likely have little impact to marine life because the current macrobiota exist in that environment already.

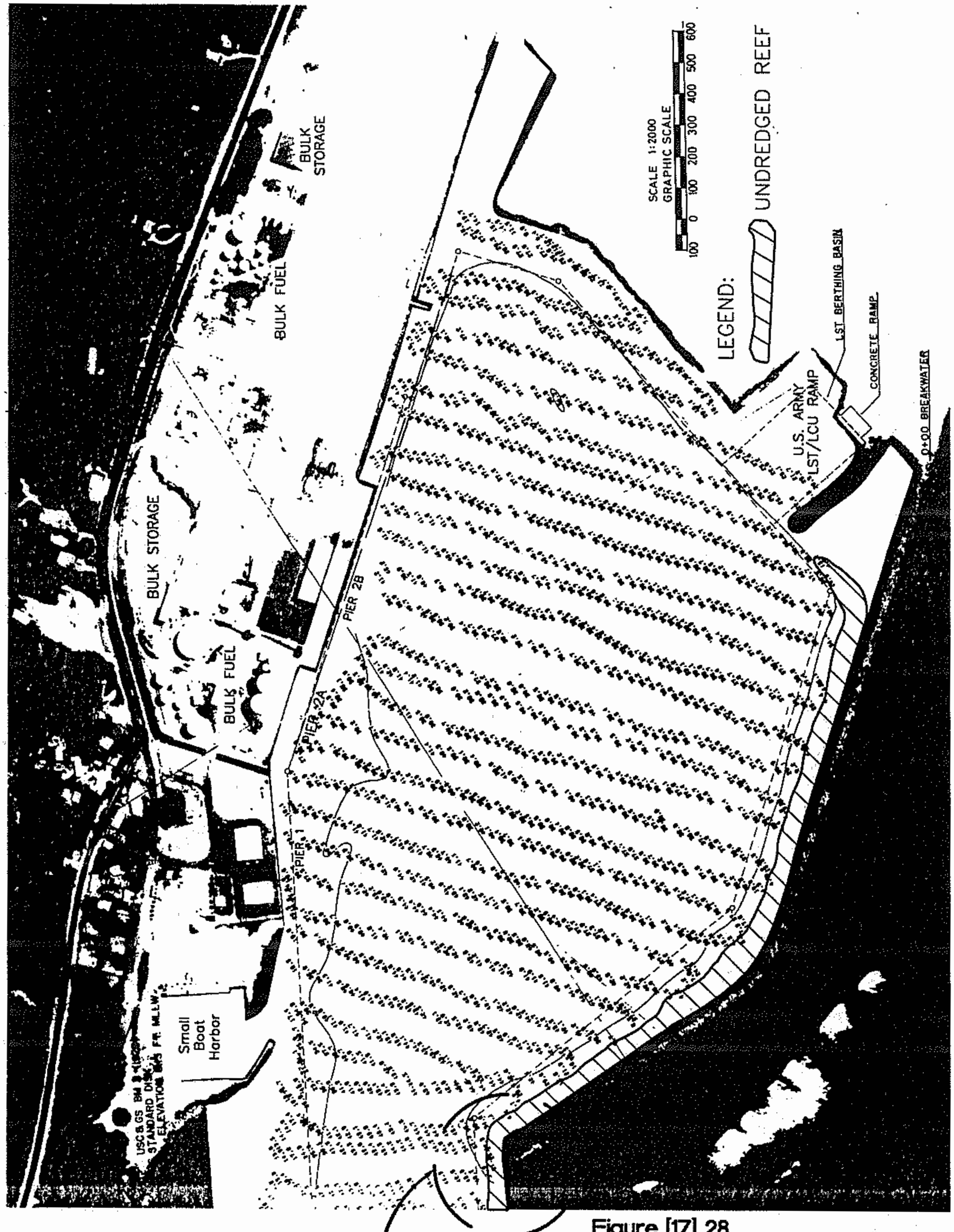

Figure [17] 28

Location of Undredged Reef
Kawaihae Harbor

Source: DOT-Harbors Division, 1999

Scale as shown

HAWAII COMMERCIAL HARBORS
2020 MASTER PLAN
FEIS

R.M. TOWILL CORPORATION

Kawaihae Harbor. The marine biology of the area is likely to be affected by proposed development at Kawaihae Harbor as follows:

- **Pier 1** - (60 taxa observed) Dredging of the pier face area will affect the live coral along the sheet metal piling that forms the harbor wall along the pier. The live coral coverage of 30% on the southern end of Pier 1 will be decreased and more closely resemble the rubble bottom of the rest of the pier after dredging. The dredged areas will also likely have fewer fish.
- **Pier 2a** - (60 taxa observed) Pier 2a's construction does not promote coral growth, so dredging in this area will not have adverse affects on coral. Because the eastward part of Pier 2a currently supports marine animals commonly found in harbors and decreased biodiversity compared to Pier 1, dredging is not expected to have an adverse affect on marine life in this area.
- **Pier 2b** - (33 taxa observed) This area, now a wooden dock, is slated for dredging and pier construction under the 2020 Master Plan. Live coral coverage along Pier 2b mostly occurs only to a depth of less than 2 m (6 ft). The turbidity in this area discourages fish population, so dredging is not likely to decrease fish populations.
- **Piers 3-5 (Proposed)** - ([58] ***59*** taxa observed) This area is planned for: dredging, pier construction; clearing, grading, paving of terminal area; and construction of sheds. Formed by the dredge tailings material from the original harbor construction, this area is a marine environment with limited diversity because of its enclosure within the harbor and restriction from the ocean. Dredging and excavating will reduce the current coral coverage which ranges from 25-80 [percent]%. The resulting marine community will likely be more like that found commonly in harbors (containing bryozoans and ascidian). Pier and terminal construction along the current shoreline of the coral stockpile will remove or cover small mollusk shells currently common in this area. However, the U.S. Army LST/LSV ramp, in which these shells have been observed, will remain available to the public except when explosives are being loaded or unloaded, a use restriction that is currently in force and will continue for safety reasons.
- **End of Harbor Jetty** - ([55] ***56*** taxa observed) Although this small area (FIGURE [17] ***28***) is not slated for development, it contains the most diverse coral reef environment found in the harbor. All remaining coral along the undredged area leading to the jetty area would be susceptible to increased turbidity during dredging (FIGURE [17] ***28***).
- **Inner Harbor** - This was the area in which the threatened green sea turtle (*Chelonia mydas agassizi*) was observed. It is possible that planned construction activities in the waters of the harbor could harm one of these animals passing through the waters of the commercial harbor.

3.8.3 Proposed Mitigation Measures

Hilo Harbor. The marine biological survey concluded there is low diversity of marine life and coral in the harbor. Most of the benthic community is typical of long-time harbor areas and is not likely to be substantially changed by the proposed harbor development. However, any dredging or pier construction in the harbor should consider the possibility that a threatened green sea turtle

(*Chelonia Midas*) could enter the harbor and be injured by the activity. A siltation curtain around the construction area will prevent any turtle from being harmed by the construction activity.

Kawaihae Harbor. The installation of a silt curtain during dredging and construction will minimize the danger of turbidity within the commercial harbor that could harm the marine life typical of near-shore coastal environments, especially the coral reef environment that exists along the harbor side of the breakwater which is outside past dredgings (FIGURE [17] ***28***). Because of the nature of this coral reef, a second siltation curtain could be erected as an extra safeguard. Harbors Division also will evaluate the feasibility of transplanting corals that would have been eliminated by the project. This type of transplantation was attempted at Kawaihae in the past as described in Jokiel et al., 1999. Although small mollusk shells will be removed from project areas, the U.S. Army LST/LSV area will provide continued gathering opportunities in the commercial harbor area.

Another mitigation measure to protect undredged coral along the breakwater of Kawaihae commercial harbor will be to plan construction for periods in which coral is not reproducing (spawning). This typically occurs in the summer months, particularly June and July. Because coral species are very predictable in terms of their timing for spawning, determining the approximate timing of their reproductive cycle should not be difficult (Personal Communication, David Gulko, DLNR Division of Aquatic Resources, 2001).

3.9 THREATENED AND ENDANGERED SPECIES

3.9.1 Existing Conditions

Hilo Harbor. None of the terrestrial animals or plants found on the unmaintained portions of the two parcels is a threatened or endangered species or a species of concern (U.S. Fish & Wildlife Service, 1999). All of the plants can be found in similar wet, disturbed, windward habitats throughout most of the main Hawaiian Islands (Char & Associates, 2000).

Only one protected species was observed in Hilo Harbor: the *honu* or Pacific green sea turtle (*Chelonia midas*). The project are is not prime habitat for these species. Turtles may, however, wander into the harbor from Hilo Bay (AECOS, Inc., 2000). The *honu* is protected by both State and Federal endangered species laws[:]. ***It is*** listed as a threatened species by both the Department of Land and Natural Resources (DLNR, 1998) and U.S. Fish & Wildlife Service (***Code of Federal Regulations*** (CFR), 1999; USFWS, 2000).

Kawaihae Harbor. None of the plants found on the unmaintained portions of the two parcels is a threatened or endangered species or a species of concern (USFWS, 1999). All of the plants can be found in similar lowland, dry, disturbed habitats.

The honu or Pacific green sea turtle (*Chelonia mydas agassi*) is the only protected species observed in Kawaihae Harbor. The project area is not habitat for this threatened species, which may, however, regularly wander into the harbor (AECOS, Inc., 2000). This species is protected by both State and Federal endangered species laws[:]. ***It is*** listed as a threatened species by both the Department of Land and Natural Resources (DLNR, 1998) and U.S. Fish and Wildlife Service (CFR, 1999).

3.9.2 Potential Impacts

It is possible that without proper precautions, one or more threatened green sea turtles could be harmed by planned dredging and pier construction. However, green sea turtle habitat will not be affected because neither harbor is habitat for this animal.

3.9.3 Proposed Miitigation Measures

Because of the occasional presence of a threatened species within both harbors, Harbors Division will maintain close coordination and consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service during project planning and pier construction. The threatened green sea turtle will be protected from dredging and pier construction activities through the use of at least one siltation curtain at each harbor location. This flexible fabric curtain will create a barrier from construction, preventing the turtles from entering an area of potential harm. ***Technologies that would be considered as an alternative to blasting are the use of cutterheads, drag line operations or roadcutters, to dredge designated areas. Other alternatives to blasting, such as technology using pre-drilling and expansion gels to split rock, will also be considered. Construction methodology will attempt to minimize the possibility of inadvertent taking of any green sea turtles.***

3.10 ALIEN SPECIES

3.10.1 Existing Conditions

There are fundamentally two ways in which alien species can be introduced through harbor operations. One is through alien species *in cargo*. The other is the introduction of non-indigenous marine organisms *into harbor waters* by: 1) release during ballast water discharge from a ship, 2) release of "graywater" (water from drains on ships that can contain harmful chemicals) or 3) attachment to the bottom of ships' hulls in what is known as "hull-growth."

Cargo

Overseas and international cargo is currently offloaded and inspected at Honolulu Harbor. It is subsequently loaded onto interisland vessels for transport to Hilo and Kawaihae commercial harbors. Therefore, cargo being offloaded at the two subject harbors has already been inspected

and is therefore less likely to be carrying harmful alien species. Passengers on cruise ships could be considered "cargo." They also can bring in alien species through agricultural products. Another possible cargo problem are "stowaways" such as rats.

Ballast Water Discharge

Ballast water is used to increase a ship's manageability and safety and for maximum sailing efficiency and stability. Ballast water is taken in and discharged by vessels at varying rates and volumes. ***A recent study of marine nonindigenous [introduced] species in Hawaii concluded the following: "Hawaii is a net importer of bulk cargo and manufactured goods, and therefore receives less ballast water than regions that are net exporters of these items" (Godwin and Eldredge, 2001). This is because ballast water is taken on in the loading rather than unloading phase of port operations.*** According to the Hilo Harbormaster, ships do not discharge ballast water in or near either of the subject harbors. ***This is consistent with the fact that the harbors' cargo operations are focused primarily in the offloading process.***

Graywater

Ships discharge "graywater" into the sea which contains used water from drains and showers. Sometimes it also contains harmful chemicals used on ships such as cleaning fluids that can cause damage to marine life.

Hull-Growth

Organisms found growing on the hulls of ships include microscopic invertebrates, barnacles, algae, mollusks and crustaceans. Hull-growth tends to occur when ships stay at anchor or in harbors for extended periods of time, giving organisms a chance to establish themselves. ***Alien species may need little time to transfer from host vessels to other vessels and spread to other harbors. However, the amount of time needed for transfer of organisms is a point of conjecture, even among the experts on this subject.***

It is in ships' best interest to keep biofouling such as hull-growth to a minimum, as it creates friction which increases fuel cost. Hull-growth on cruise ships is discouraged because the cost of building and maintaining cruise ships prompts owners to keep them in service as much as possible. Also, the expectation of cruise passengers to move frequently from port to port decreases the amount of time in any one harbor where hull-growth might have a chance to occur.

3.10.2 Potential Impacts

Hilo Harbor.

Cargo

The threat of alien species introduction through cargo is reduced because nearly all of the overseas goods destined for Hawaii are received and inspected at Honolulu Harbor. The goods are then transferred to interisland vessels rather than foreign vessels and transported to harbors on the Island of Hawaii.

Ballast Water Discharge

Several factors will decrease the threat of successful alien species introduction through ballast discharge. First, 99% of cargo vessels visiting Hilo Harbor and Kawaihae Harbor are interisland barges and tugboats. Any ballast water in these vessels contains only local seawater. Second, ballast water discharge from foreign cruise ships reportedly does not occur in or near the subject harbors. Third, the release of nonindigenous marine species, whether from ballast water or hull-growth, into a new coastal environment does not necessarily constitute their successful introduction. An alien species must have the ability to form established populations to complete a successful introduction. Limiting the number of a given species in ballast water reduces the chances of the successful establishment of reproducing populations in receiving waters.

Discharged ballast water will be seen as a threat nonetheless. Virtually all organisms less than one centimeter in size that are adjacent to the vessel – either swimming naturally, stirred up from bottom sediments, or rubbed off harbor pilings – could be ballasted into a vessel. Such organisms include viruses, bacteria, protozoa, fungi, algae, plants, zooplankton and fish. Locally, the goby species *Mugiligobius parvus* which is indigenous to the Philippines has established itself in Hawaii's coastal waters (NRC, 1996).

Among the plants transported, phytoplankton, especially diatoms and dinoflagellates, have been found to be particularly common in ballast water (Carlton, et. al., 1993). Ciguatera toxin is a poison caused by the nonindigenous marine dinoflagellate *Gambierdiscus toxicus*, which is found in association with certain red and brown algae. *G. toxicus* poisons fish (through ingestion of algae or herbivorous fish) and can cause poisoning in humans when contaminated fish are consumed. Ciguatera fish poisoning has been reported more frequently in recent years because there is an increase in knowledge and awareness of fish poisoning, and there is an increase in *G. toxicus* that come from discharge of contaminated ballast water (Parsons, Brinkerhoff, 1995). In some coastal areas, construction activities have been linked, albeit tenuously, to the increase in the presence

of ciguatera toxin in marine organisms (HOMRC, 1991; Will Chee – Planning,1999). Hilo Harbor is characterized by physical conditions which are not conducive to proliferation of *G. toxicus*, including high turbidity levels, water temperatures below 25 degrees C, and the influx of groundwater. As a result of these limitations, it is unlikely that ciguatera poses a serious threat as either an invasive species or a human health risk within Hilo Harbor where the vast majority of foreign vessels are expected within the planning period to 2020.

Graywater

Cruise ships might discharge graywater into harbors. Monitoring of this is a function of the U.S. Coast Guard.

Hull-Growth

Cargo. A recent study of marine nonindigenous species concluded the following: "The ports of Honolulu and Barber's Point Harbor are the hubs of commercial maritime shipping activity in Hawaii, and would be the primary receiving areas for marine nonindigenous species (NIS) transported in this pathway" (Godwin and Eldredge, 2001). Neighbor island ports such as Hilo Harbor and Kawaihae Harbor are not subject to the same level of threat as that experienced by Honolulu and Barbers Point Harbors which are the primary harbor gateways for the State.

Cruise Ships. The proposed projects will increase the number of foreign cruise ships arriving at Hilo Harbor. This will increase the threat of alien species introduction into that harbor through hull-growth. However, most of the cruise ships entering both subject harbors are part of large cruise ship lines which will likely maintain stricter maintenance schedules on their ships and are concerned with the aesthetic appearance of their ships. Also, the brief visits to ports of call provide poor conditions for introduction of hull-growth.

3.10.3 Proposed Mitigation Measures

Harbors Division will continue to participate in the State of Hawaii Alien Species Task Force to receive the latest information and methods of reducing the threat of alien species introduction.

Cargo

The U.S. Department of Agriculture will continue to inspect agricultural products coming in on vessels, including items passengers may have on board. As needed, they will confiscate illegal agricultural items that could contain alien species. When a foreign cruise ship comes in, the

USDOA will continue to inspect the ship's stores (food), including agricultural products in the kitchen. If prohibited items are found, they will be sealed in refrigerators.

Ballast Water Discharge

At the present time, there are no enforceable laws which regulate ballast water discharge. Concerted efforts are being undertaken by both international organizations and individual governments to establish regulatory mechanisms to monitor ballast water discharge. The main purpose of these efforts is to establish universal regulations which are enforceable in both international and national waters. Such regulations currently passed or in the works include:

- Consultation with DLNR, Division of Aquatic Resources, revealed that a voluntary program is in force in Hawaii under which ships have agreed to exchange ballast water mid-ocean. The U.S. Coast Guard has been enforcing this rule.
- An Executive Order coordinates a federal strategy addressing the environmental and economic threats of foreign marine organisms being discharged into U.S. waters. The order creates an Invasive Species Council that is mandated to develop a comprehensive plan to minimize the economic, ecological, and human health impacts of invasive species and to determine further steps to prevent future introductions (HOISN, 1999).
- ***Under the authority of the National Invasive Species Act, the United States Coast Guard has imposed voluntary guidelines for ballast water management practices, as well as implemented mandatory ballast reporting procedures beginning July 1, 1999 for all vessels entering the United States (Godwin and Eldredge, 2001).***
- In response to the growing trend of state laws regulating ballast water discharges from ships, U.S. ports plan to develop a legislative proposal that would: 1) establish a strong, uniform Federal ballast water management program; and 2) preempt individual state legislation in this area. The objective of the legislation would be to include an amendment to the National Invasive Species Act (NISA) to direct the Coast Guard to make mandatory, with a safety exemption, the current voluntary ballast water exchange provision (AAPA 2000).
- The United Nations - International Maritime Organization (IMO) is a specialized international body devoted exclusively to maritime matters. As part of the continuing efforts to regulate ballast water, the IMO recently developed a draft annex to the International Convention on the Prevention of Pollution from Ships titled, "Regulations for the Control and Management of Ships' Ballast Water and Sediments to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens" (HOISN, 1998).

Until such time that enforceable ballast water regulations are established and promulgated, ships entering the subject harbors should, when practicable, comply with the existing "voluntary ballast water guidelines" established by the IMO. These guidelines are intended to assist governments and appropriate authorities, ship masters, operators, owners, and port authorities in minimizing the

risk of introducing harmful aquatic organisms, pathogens, and associated sediments from ships' ballast water while protecting ships' safety (IMO, 1996).

Particular attention should be given to the "Ships' Operational Procedures" contained in the IMO guidelines. This section outlines specific precautionary practices and ballast water management options. Specific procedures which would reduce the release of alien species include:

- Minimizing the uptake of harmful aquatic organisms, pathogens, and sediments - Avoidance of loading ballast in very shallow waters where propellers stir up sediments and in the darkness when bottom-dwelling organisms may rise up in the water column.
- Removing ballast sediment on a timely basis - Routine cleaning of ballast tanks should, when practicable, be carried out in mid-ocean and in accordance with the provisions of the ships' ballast water management plan.
- Avoidance of unnecessary ballast water discharge - Care should be taken to avoid unnecessary discharge of ballast water that has been taken up in another port.
- Practicing of sound ballast water management options - This includes, when practicable, deep water/open ocean ballast water exchange, non-release or minimal release of ballast water, discharge to reception facilities, ***and*** use of emergent [and new] technologies and treatments.

Technological Measures for Ballast Water Discharge

Once ballast water has been loaded on board, the ideal mechanism for preventing subsequent introductions of nonindigenous aquatic species is to kill or remove the organisms prior to discharging ballast water overboard. This could be achieved by utilizing onboard chemical, physical, biological, or mechanical treatment technologies. There are numerous promising treatment technologies emerging, a few of which are listed below (IMO, 1996):

- Filtration systems
- Oxidizing and nonoxidizing biocides
- Thermal techniques
- Electric pulse and pulse plasma techniques
- Ultraviolet treatment
- Acoustic systems
- Magnetic fields
- Deoxygenation
- Biological techniques

Each of the above technologies, whether utilized individually or in combination, would achieve the goal of neutralizing potentially harmful alien species in an environmentally safe manner before they are discharged into receiving water.

Graywater

Harbors Division will monitor ships in port and report any suspicious happenings to the Coast Guard and/or the State of Hawaii Department of Health. Dockside tanks could be considered for offloading graywater for transportation to nearby sewage treatment plants.

Hull-Growth

Most vessels adhere to regularly scheduled hull cleaning activities as a part of their preventive maintenance program. The State of Hawaii does not currently have a formal program for inspecting hull-growth. In consultation with DLNR, Aquatic Resources Division, it was suggested that the State could consider implementing a program in which either random hull inspections are performed or regular inspections are made at the time a ship enters the harbor.

Regulatory Oversight of Alien Species in Hawaii

The government agencies responsible for dealing with alien species are shown in TABLE 11.

TABLE 11
Regulatory Oversight of Alien Species Control and Introduction in Hawaii

Agency	Overview of Responsibility
United States Department of Agriculture	Inspection and clearance of agricultural items (plant materials and pests) on foreign arriving vessels. Refers some plant pest dispositions to Hawaii Department of Agriculture.
United States Department of the Treasury U.S. Customs Service	Boarding and clearance of foreign arriving vessels, passengers, crew and cargo. Refers plant materials to U.S. Department of Agriculture or State of Hawaii Department of Agriculture and refers animals or animal parts to U.S. Fish and Wildlife Service.
United States Coast Guard	Jurisdiction over all maritime vessels (commercial, private, foreign, U.S. flag ships). Oversees hazardous materials in transit and assists or refers contraband to other federal or state agencies for disposition.

Agency	Overview of Responsibility
United States Department of the Interior Fish and Wildlife Service	Inspection and clearance of wildlife (animals and parts) including alien species and protected, threatened or endangered species on foreign arriving vessels.
State of Hawaii Department of Agriculture	Inspection and clearance of agricultural items (animals, microorganisms, plants and plant parts) on domestic arriving vessels. May take appropriate action on foreign arriving items upon referral by federal agency.
State of Hawaii Department of Land and Natural Resources	Jurisdiction over the unintentional introduction of non-native aquatic species in ballast water and hull-fouling organisms (hull-growth) on all arriving vessels.

Source: Consultation with State of Hawaii, Department of Agriculture and U.S. Fish & Wildlife Service, 2001

3.11 SOLID WASTE AND HAZARDOUS MATERIALS

3.11.1 Existing Conditions

Solid Waste

Information in this section was provided during consultation with the County of Hawaii, Department of Public Works, Solid Waste ***Division***, the U.S. Department of Agriculture (USDOA) and the Hawaii Island Harbormaster.

Hilo Harbor. Solid commercial and industrial waste generated at Hilo Harbor is collected by private waste collection companies and transported to the Hilo Landfill. According to County of Hawaii sources, this landfill is unlined and therefore out of compliance with U.S. Environmental Protection Agency regulations. Ordered to be closed several years ago, the County of Hawaii has applied for annual extensions for the Hilo Landfill to remain open.

At Hilo Harbor the solid waste generated by both U.S. and foreign cruise ships is normally held on the vessels. Solid waste must be stowed according to USDOA regulations. If any type of wet garbage (leftover foodstuffs) must be offloaded in Hilo, foreign ships must place it in plastic bags and put in a refrigerated container. USDOA supervises the loading of wet garbage, locking of the container and shipping to Honolulu where it will be sterilized. Dry garbage, pallets and cardboard from all ships can be offloaded and disposed of in Hilo.

Kawaihae Harbor. Solid waste is collected by private firms from Kawaihae Harbor and transported to the West Hawaii Landfill. Constructed in 1993, this landfill has a design approved by the U.S. Environmental Protection Agency and a useful life of 30 years.

Hazardous Materials

Hilo Harbor. In August 2000 R.M. Towill Corporation assessed potential environmental contamination by hazardous materials at Hilo Harbor. The Phase I Environmental Site Assessment - Hilo Harbor is attached as APPENDIX F.

A site reconnaissance of the property performed on August 9, 2000 found no significant, observable hazardous material-oriented environmental conditions connected with the Hilo Harbor property. This assessment was conducted to determine whether conditions or situations at the site might result in present real or potential hazards, or environmental liabilities as dictated by federal, state, and local statutes and regulations. Specific areas investigated included: historical uses of the subject property; signs of gross surface contamination; hazardous materials and wastes; and the presence of equipment containing polychlorinated biphenyls (PCBs), and underground storage tanks (USTs).

Kawaihae Harbor. R.M. Towill Corporation (RMTC) assessed possible environmental contamination at Kawaihae Harbor in August 2000. Phase I Environmental Site Assessment - Kawaihae Harbor is attached as APPENDIX G.

The site reconnaissance at Kawaihae Harbor found only one observable, adverse environmental condition connected with the property: the Akana Petroleum site has spilled petroleum product on the surface of the soils in their property. The site is bermed to prevent surface run-off of the oils. No information on the presence of a liner to prevent ground water contamination was found.

The harbor property contains several operations that may also potentially contribute to adverse environmental conditions, however, records available at the time of this report did not reveal any problems identified to date. These operations include approximately 15 large, above ground petroleum storage tanks, dockside petroleum unloading facilities, and pipelines for transporting the petroleum product to the storage tanks. The potential exists when these facilities may have leaked causing soil and ground water contamination.

3.11.2 Potential Impacts

Solid Waste

Hilo Harbor. Additional solid waste will be generated with the proposed increase in commercial maritime operations, particularly from interisland cruise ship operations. The County of Hawaii is currently evaluating several alternatives for handling solid waste after the Hilo Landfill closes, which appears imminent (Section 3.11.1). The most likely scenario for handling Hilo's solid waste is to use a central processing station, in which solid waste is sorted then transferred 90 miles by truck to the West Hawaii Landfill.

Proposed construction activities would require land clearing, demolition of existing structures, excavation, drilling, and pile driving operations. These activities would generate construction and demolition (C & D) waste consisting of wooden beams, asphalt, concrete, glass, brick, metal, soil, vegetation, and other miscellaneous building and landscaping materials. These materials will be shipped to the West Hawaii Landfill.

The proposed project will increase the amount of solid waste generated at Hilo Harbor. However, it is not expected to adversely impact solid waste disposal capacities. Planned alternatives to the Hilo Landfill will provide the needed additional capacity to handle solid waste generated by harbor activities. Interisland cruise ships and other harbor users could engage in active recycling that would divert solid waste away from the landfills.

Kawaihae Harbor. Kawaihae Harbor improvements will not result in a significant increase in commercial and industrial solid waste. The capacity of the West Hawaii Landfill is adequate for the period until 2020, although this expected life may be shortened when solid waste from Hilo is transferred to the West Hawaii landfill. Land clearing, demolition of existing structures, excavation, drilling, and pile driving operations at the harbor would generate construction and demolition waste. This waste will be transported to the West Hawaii Landfill.

Hazardous Materials

Hilo Harbor. The following potential environmental concerns were identified during the Phase 1 - Environmental Site Assessment conducted at Hilo Harbor:

- There is a large number of aboveground and underground storage tanks in the harbor vicinity. Potential exists for leakage of petroleum product to the soils and ground water in this area. No evidence was noted to verify this possibility, since no sub-surface investigations were performed for the Phase I Environmental Site Assessment.
- There is a large system of piping that carries the petroleum product from ships at the piers to

the storage tanks. These pipes may leak causing contamination of the soils and ground water in this area. No leakage was observed or documented, however additional investigation may be required to verify this potential problem. Construction of new underground pipelines in support of proposed harbor development will cause further exposure to contamination. Some of the buildings at the harbor contain asbestos-containing building materials. No thorough study was performed to determine the extent of the presence of asbestos or lead-based paint. (R.M. Towill Corporation (RMTC), 2000)

Kawaihae Harbor. Based on the available information reviewed, the Phase I Environmental Assessment concluded that the only significant potential for environmental liability on this property is the presence of the underground storage tanks, above ground petroleum storage tanks, associated piping and loading facilities and surface contamination present at the Akana Petroleum property.

As a result of the hazardous substances (asbestos and lead-based paints) present in buildings to be demolished, demolition could result in the release and spreading of such contaminants into the environment. Excavation equipment could damage or rupture remnant underground storage tanks or fuel lines.

Potential adverse impacts to construction personnel include possible exposure to both known and unknown hazardous materials and wastes present in existing structures or the surrounding environment.

3.11.3 Proposed Mitigation Measures

Solid Waste

Potential impacts to the Hilo Landfill in the short term and the West Hawaii Landfill in the long term can be minimized through recycling efforts. Harbors Division will actively encourage recycling efforts by interisland cruise ships, as they are and will be the largest contributors to additional solid waste at Hilo Harbor. Harbors Division will also encourage the use of on-board incinerators on interisland ships. Interisland cruise ship operators have not yet begun such upgrades but are planning to do so. On-board incinerators would reduce the amount of solid waste generated by cruise ships and would allow them to hold larger quantities aboard the vessel for longer periods of time.

During the design and construction phases of the proposed improvements, Harbors Division will develop and implement a construction and demolition recycling plan. A recycling program would effectively recover building materials which could contain potentially hazardous substances (such

as batteries, mercury containing thermostats, asbestos, liquid wastes, oils, paints, solvents, refrigerant fluids, tires and liquid filled transformers) and prevent them from being disposed of in an unlined landfill. [The construction and demolition recycling plan would also consider the designation of Harbors property and infrastructure development for industries such as reuse, recycling, and remanufacturing that depend heavily on interisland, interstate and international shipping.]

Foreign solid waste generated by carriers, which left foreign ports and their first port of entry to the United States is Hawaii, must comply with the U.S. Department of Agriculture regulations cited in the DEIS. The Office of Solid Waste Management regulates facilities that process foreign wastes for disposal within the state. Therefore, all foreign waste removed from ships shall be directed to a State Department of Health permitted foreign waste facility. Other wastes (e.g. domestic municipal solid waste) generated aboard domestic cruise ships shall also be disposed of at a State permitted solid waste facility.

Any final disposition of incinerator ash generated by on-board incinerators of cruise ships shall be disposed of at a State Department of Health (DOH)-permitted municipal solid waste (MSW) ash monofils or other permitted disposal facilities approved by DOH to accept solid waste ash. Any cruise ship firm wishing to dispose of solid ash waste would have to meet federal Resource Conservation and Recovery Act, Subtitle D requirements as imposed by individual DOH-approved landfills or disposal facilities.

Hazardous Materials

All known utilities and underground pipelines will be identified by the demolition and construction contractor and subsequently disconnected or removed prior to site work. All fuel storage tanks, hazardous materials (including asbestos building material and lead-based paint), and transformers (potential sources for polychlorinated biphenyls (PCBs) present in structures planned for demolition, will be managed in accordance with measures agreed upon by the State Department of Health (DOH). These measures may include the removal, on-site stabilization, and if feasible recycling of hazardous materials to avoid the potential for release into the environment.

An inspection will be performed in the harbor buildings to determine if these contaminants are present on the property to assist future construction and demolition projects.

Construction of buried pipelines will be in accordance with established codes that call for double containment of pipelines carrying hydocarbons. Corrosion-resistant materials and leak detection stations must be used. Design and construction of new inground or underground storage tanks will conform to current regulations concerning berms and liners.

Additional environmental investigation will be undertaken if excavation or earthwork is proposed for areas identified with hazardous materials on the Akana Petroleum site. These investigations would involve the determination of the extent and concentration of petroleum hydrocarbons in work areas. If identified, these contaminated materials would require proper management, treatment or disposal, and proper worker protection during the work.

A site-specific Health and Safety Plan will be prepared prior to construction. The plan will identify safe working conditions for construction in areas of known flammable products and/or vapor contamination. The contractor is required to comply with all conditions of the Health and Safety Plan, which will ensure that workers will not be exposed to unacceptable safety risks. Compliance with the site-specific Health and Safety Plan, DOH Regulations, and other permit requirements, will assure that no significant impacts from hazardous materials or site contamination will occur during construction activities or facility operations. Safety measures will include proper techniques for monitoring the presence of flammable vapors in the air, response protocol, personal protective equipment, use of allowable tools, and mechanical measures, as appropriate.

The potential for petroleum contamination will be addressed during the project design and construction phases and incorporated into contract and bid documents. Where appropriate, the design and construction phases will be completed in compliance with *Guidance on Construction Activities Encountering Area-Wide Petroleum Contaminated Soils* (DOH Guidance) and other applicable Federal and State laws and regulations.

The contractor shall be responsible for taking the safety, contamination management, and documentation actions required by the DOH Guidance on Construction Activities. Compliance with the DOH Guidance involves the protection of workers and public health and safety; immediate notification of the DOH; documentation of the locations of contaminated areas; and proper management of contaminated excavated materials.

It is expected that most of the excavated materials will be returned to trenches and safely covered on-site. However, if some contaminated materials cannot remain on-site, they will be sampled, analyzed, and appropriately disposed of at DOH-approved facilities. Transport of the materials will also comply with State and Federal regulations regarding the transport of hazardous or petroleum contaminated materials. It is expected that a minimal amount of material will be removed from the property. Disposal of the materials will also comply with all State requirements and site-specific permits at the disposal site.

Normal operations at the proposed project sites would not expose the public or site workers to hazardous substances. Tenants on the site will be required to inform workers, through regular training sessions and use of operational manuals, about standard procedures for use of all equipment, especially equipment which may contain or use hazardous materials. Training will

identify procedures to follow in the event of equipment malfunction or other emergency. Thus, no significant long-term impacts associated with exposure to hazardous materials are anticipated.

3.12 UTILITIES

3.12.1 Existing Conditions

The two harbors are industrialized areas served by a variety of public services and utilities including energy and communication, water supply, wastewater collection and fire protection.

Energy and Communication

All of the proposed project sites are provided with electrical and telephone services by Hawaii Electric Light Company (HELCO) and Verizon Hawaii (formerly GTE Hawaiian Tel), respectively. Most of the existing structures on the project sites were not designed with energy efficiency standards in mind.

Water Supply

For both harbors, water supply for the proposed improvements will be dependent on the adequacy of water source, storage and transmission facilities provided through the County of Hawaii's Department of Water Supply.

Hilo Harbor. Until 1998, Hilo Harbor was served by water lines owned by the Department of Water Supply. Now Harbors Division owns the water lines from the main water meter. Harbors Division distributes water to harbor users and tracks usage through an internal meter system for the harbor. Six pipe outlets for water are located on Pier 1 and additional ones on Piers 2 and 3.

Kawaihae Harbor. Kawaihae Harbor facilities are also served by the County of Hawaii, Department of Water Supply. Per the County of Hawaii, Department of Water Supply, a 12-inch water main that will provide improved fire protection to the harbor ***was completed in*** first quarter 2001. Harbors Division operations are served by three water meters. Major harbor tenants such as Young Brothers, Brewer Chemical, Akana Petroleum and Hawaiian Cement also maintain individual meters.

Wastewater Collection

Hilo Harbor. Hilo Harbor is connected to the County of Hawaii sewer system. Wastewater charges are unique for the harbor because although water [enters] ***is provided to*** the harbor for distribution to users, most of the consumption goes into cruise ships which do not in turn produce

wastewater that empties into Hilo's sewer system. A fee arrangement based on this unique situation is in force between Hilo Harbor and the County of Hawaii and renewable annually.

Kawaihae Harbor. At Kawaihae, wastewater is handled by cesspools located beneath the pavement alongside existing sheds and office buildings.

Fire Protection

Both harbors are protected by the County of Hawaii Fire Department.

Hilo Harbor. This harbor is currently served by the Waiakea Fire Station with an estimated response time of three minutes. Hydrant capacity at the harbor is 800 gallons of water per minute. There is currently no fire hydrant within the property. The harbor also has sprinkler systems in the two pier sheds fed by the harbor's water tower.

Kawaihae Harbor. The fire stations nearest to the harbor are located in South Kohala, with a 12-15 minute response time, and Waimea, with a 20-25 minute response time. According to the County of Hawaii Fire Department, the space between hydrants should be no more than 300 feet. Currently, there is 700 feet of space between two of the hydrants serving Kawaihae Harbor.

3.12.2 Potential Impacts

Energy and Communication

The operation of the proposed projects will result in the increased consumption of electricity. All of the proposed project sites will be equipped with telephone communication systems. These systems will not affect the existing communication systems in the project areas.

Water Supply

The potable water demand for the proposed project areas will increase as a result of the more frequent arrivals of cruise ships. Industrial and commercial uses planned at the harbors will require only minimal usage of water for day-to-day activities. The existing water supply system at Hilo Harbor and the recently upgraded water system at Kawaihae Harbor will be able to accommodate projected needs.

Wastewater Collection

Most of the increase in water usage will be for cruise ships, which do not require wastewater collection. Facilities expansion at Kawaihae Harbor will require additional capacity to handle

wastewater, although it will be limited to the facilities provided to employees of commercial harbor-related businesses.

Fire Protection

Hilo Harbor. County of Hawaii Fire Department officials report that additional access will be needed to provide adequate fire protection for the proposed Pier 4, 5 and 6 and Ocean Research facility. The addition of fire hydrants also will have to be evaluated.

Kawaihae Harbor. The recent upgrade in water supply to the harbor has increased fire fighting capacity. However, the spacing of fire hydrants is considered inadequate.

3.12.3 Proposed Mitigation Measures

All of the existing utilities and public services are expected to be sufficient. No significant adverse impacts to existing utilities and public services are expected, and no additional mitigation measures are anticipated to be necessary.

Energy and Communications

Proposed project buildings, activities, and site grounds will be designed with energy saving considerations in mind. Energy usage at the proposed project sites will be designed in accordance with Hawaii Revised Statutes, Chapter 343 (State Environmental Policy) and Chapter 226 (State Planning Act). Section 226-18(4), which establishes the promotion of cost-effective energy conservation through the adoption of energy efficient practices and technologies will be given particular attention.

The energy conservation methods which could be considered during the design phase of the proposed projects may include, but are not limited to:

- Maximum cooling load through the use of site shading, orientation, and use of naturally ventilated areas;
- Use of high efficiency indoor and outdoor lamps and lighting;
- Maximum integration of day lighting in building design; and
- Design ***of*** mechanical systems to comply ***with*** energy conserving requirements.

Water Supply

The County of Hawaii, Department of Water Supply has indicated that the existing water supply system is adequate to accommodate the proposed Hilo Harbor and Kawaihae Harbor improvement projects.

To ensure water conservation, proposed buildings and landscapes at the project sites will be designed with water saving considerations in mind. The water conservation methods which could be considered during the design phase of the proposed projects may include, but are not limited to:

- Installation of water efficient fixtures
- Low-volume flush toilets and urinals
- Automatic faucets for sinks and lavatories
- Appropriate landscape plant selection to limit water uptake
- Irrigation with non-potable or reclaimed water

Wastewater Collection

Cesspools at Kawaihae Harbor will eventually have to be replaced with individual wastewater systems, as the County of Hawaii has no plans to provide sewer service to the harbor area. Newly developed areas will construct individual wastewater treatment systems in accordance with DOH regulations.

The Kawaihae Harbor vicinity is in a critical wastewater disposal area as determined by the Hawaii Wastewater Advisory Committee. No new cesspools will be allowed in this area. Continued use of existing cesspools is covered under provisions of Hawaii Administrative Rules, Chapter 11-62, Wastewater Systems. Harbors Division will develop a sewer master plan for Kawaihae Harbor and analyze the feasibility of a centralized collection, treatment and disposal system that conforms to applicable provisions of Hawaii Administrative Rules, Chapter 11-62, Wastewater Systems.

Fire Protection

All future harbor structures and cargo handling activities must conform to existing fire codes. Additional fire hydrants and sprinkler systems will be installed when warranted at the appropriate project sites. ***At Kawaihae Harbor, Harbors Division will*** [evaluate the requirement for fire hydrants to be closer together than currently provided and take appropriate action.] ***ensure that adequate hydrants are provided for the safety of existing and proposed development.*** All on-site fire protection requirements and procedures will be closely coordinated with the Fire Prevention Bureau of the County of Hawaii.

3.13 NOISE

Overview of Noise Exposure. The impacts of sound on the environment are determined by several factors including, sound level (loudness), the duration of exposure to the noise, the

frequencies involved, and the variation or fluctuations in noise levels during exposure. Loudness is measured in units called decibels (dB). Since the human ear is unable to perceive all sound frequencies equally, noise levels are adjusted to correspond to human hearing. This adjusted unit is known as the A-weighted decibel, or dBA.

The noise descriptor currently used by federal agencies to assess environmental noise is the Day-Night Average Sound Level (DNL or Ldn). This descriptor incorporates a 24-hour average of instantaneous dBA levels as read on a standard Sound Level Meter. By definition, the minimum averaging period for the DNL descriptor is 24 hours. Sound levels which occur during the nighttime hours of 10:00 PM and 7:00 AM are increased by 10 dB prior to computing the 24-hour average by the DNL descriptor.

A value of 65 DNL or lower is considered to be an acceptable exterior noise level for residential receptors. This standard is applied nationally including the state of Hawaii. TABLE 12 presents current federal noise standards and acceptability criteria for residential land uses that are present within the general environs of the harbor areas and which may be affected by noise from harbor activities. For industrial/commercial areas such as the two harbors, DNL levels of up to 75 dB are considered "compatible without restrictions" (SDOT, 1999).

TABLE 12
Exterior Noise Exposure Classification
(Residential Land Use)

Noise Exposure Class	Day-Night Sound Level	Equivalent Sound Level	Federal (1) Standard
Minimal Exposure	Not Exceeding 55Ldn	Not Exceeding 55Leq	Unconditionally Acceptable
Moderate Exposure	Above 55 Ldn But not above 65Ldn	Above 55 Ldn But not above 65Leq	Acceptable (2)
Significant Exposure	Above 65 Ldn But not above 75Ldn	Above 55 Leq But not above 65Ldn	Normally Unacceptable
Severe Exposure	Above 75 Ldn	Above 75 Leq	Unacceptable

Notes: (1) Federal Housing Administration, Veterans Administration, Department of Defense, and Department of Transportation

(2) Federal Highways Administration (FHWA) uses the Leq instead of the Ldn descriptor. For planning purposes, both are equivalent if: a) heavy trucks do not exceed 10 percent of total traffic flow in vehicles per 24 hours, and b) traffic between 10:00 PM and 7:00 AM does not exceed 15 percent of average daily traffic flow in vehicles per 24 hours. The noise mitigation threshold used by FHWA for residences is 67 Leq.

In general, the overall existing Ldn levels in the vicinity of the two harbors are influenced by surf noise, motor vehicle traffic, harbor vessels and equipment. Noise related to harbor operations includes on-site motor vehicles, fixed mechanical equipment, and ocean vessel activity. The noise generated from harbor operations is for the most part not radiated beyond the harbor property boundaries. The exception to this is noise radiated by boat whistles and horns. In a study of such whistles for Honolulu Harbor, whistles or horns of large cruise ships were measured at 85 dB at ***a*** 1,000-[feet] ***foot*** distance (Ebisu, 1999).

3.13.1 Existing Conditions

Hilo Harbor. Pier 1 at the center of Hilo Harbor is located the following distances from noise receptors (noise-sensitive land uses such as churches, schools and residential areas):

- Approximately 3,000 feet from the nearest noise sensitive land uses to the east (churches and schools in the Keaukaha area).
- Approximately 3,000 feet from the east-facing hotels along Banyan Drive.
- Approximately 2,300 feet from the existing residential leased lots at Baker's Beach.
- Approximately 2,300 feet from residential development along Keaa Street. (However,

planned development of Piers 4, 5 and 6 will be within 1,000 feet of Keaa Street.)

- Approximately 3,000 feet from Bay Clinic, an outpatient health facility (i.e., providing no overnight care).

The most significant noise contributor in the Hilo Harbor area is Hilo International Airport, which has been the subject of a 2000 noise study by Wilson Okamoto & Associates, Inc., Aries Consultants, Ltd. and Y. Ebisu Associates. According to the 2000 Noise Exposure Map for that study, the ambient noise level in the Hilo Harbor area, including airport noise, was 60-65 Ldn. This measurement is within ranges deemed acceptable for residential development used by the Federal Housing Authority, U.S. Department of Urban Development and Veterans Administration. Therefore it exceeds (is better than) the standards required for commercial and industrial development of 75 Ldn.

Kawaihae Harbor. The harbor is located in a sparsely populated area and the ambient noise level in the project area is generally considered low. On-site observations indicate commercial harbor activities generate noise in relation to the level of harbor activity at a given time. Typical sources of noise are boat traffic and movement of mechanized forklifts, harbor containers and trucks. The harbor is currently a "daylight only" port, so operations that generate noise would most likely not occur during typical quiet hours (10 p.m. to 6 a.m.).

3.13.2 Potential Impacts

Hilo Harbor *and Kawaihae Harbor.*

Discussion in this section applies to both harbors except where indicated as specifically applicable to Hilo Harbor. Exterior noise levels as high as 75 DNL are generally considered acceptable for commercial, industrial, and other non-noise sensitive land uses. The harbor project areas include proposed land uses and activities which fall within the commercial and industrial categories. These proposed land uses and activities are not considered to be noise sensitive. Further, risk of adverse noise impacts within the proposed project areas is considered to be small.

At Hilo Harbor,[R]***residences*** along Keaa street may experience increased noise because of vehicles entering the proposed Piers 4, 5 and 6 areas. The Bay Clinic may experience the same noise exposure. Other ongoing project-related traffic noise levels will minimally contribute to future traffic noise levels. Under the 2020 Master Plan, Baker's Beach residences will not be impacted because they are planned for demolition after current State of Hawaii leases expire in 2015 and these lands are successfully transferred to Harbors Division from the Department of Land and Natural Resources.

Unavoidable but temporary noise impacts may occur during the construction of the proposed harbor improvement projects. The quality of the acoustic environment may be degraded to unacceptable levels during periods of construction because noise from construction activities are

predicted to be audible at adjoining properties. However, none of these noise impacts will occur within the standard 50 feet from a noise sensitive receptor. Construction related noise will be generated by both on-site equipment, (pumps, generators, compressors, jack hammers, rock drills, demolition equipment, and power tools) and vehicles (i.e. trucks, front loaders, backhoes, tractors, graders, pavers or concrete mixers). Pile driving that could be used in the construction of new piers at project sites is anticipated to generate noise levels ranging from 80 dB at 1,000 ft distance to 90 dB at 250 ft distance without mitigation measures. Indoors, typical pile driving noise levels range from approximately 70 to 80 dB for naturally ventilated structures and 58 to 68 dB for air conditioned structures (Ebisu, 1999).

In addition to noise generated by pile driving activities, pile driving induces ground vibrations which have the potential to cause structural and architectural damage to existing structures. Pile driving ground vibrations are measured in peak particle (or ground) velocity (PPV) in units of inches/second. The criteria most commonly used in measuring structural damage induced by pile driving activities is a 2.0 inches/second limit derived from work by the U.S. Bureau of Mines (Ebisu, 1999). A more conservative limit of 0.2 inches/second is also used, and was suggested for planning purposes on the proposed harbor projects because of the repetitive nature of pile driving activities which can increase the risks of damage to adjacent structures.

The intensity of vibration of pile driving activities can be expressed in units known as scaled energy distance factor (SEDF). The SEDF can be converted to measurable distances between the pile driver tip and a receptor to determine PPV levels. SEDF and PPV levels for pile driving activities vary depending upon substrate type and the size of the pile driver used. When pile driving operations must penetrate through coral layers, vibration levels at a receptor (adjacent structure) may exceed the 0.2 inches/second vibration damage criteria, particularly if the receptor is supported by the common coral layer. Actual PPV levels at the receptor are dependent upon both the distance from the pile driver and the size of the pile driver (Will Chee -- Planning, Inc., 1999).

Future sources of noise include harbor vehicles such as heavy trucks, forklifts, sweepers, buses, and ships which will conduct maintenance activities and transport materials and personnel to and from harbor projects. Mechanical equipment such as emergency electrical generators, air conditioning cooling towers, air-conditioning compressors, exhaust fans, and other ventilation systems will be the primary fixed on-site noise sources expected to be located at the harbor project sites. ***At Hilo Harbor,*** [T] *t*our buses entering the proposed passenger terminal and Piers 5 and 6 will increase traffic noise when cruise ships arrive and depart. Cruise ship whistles or horns at approximately 85 dB (at 1,000 feet distance) will be audible from residences along Keaa Street and at Bay Clinic.

3.13.3 Proposed Mitigation Measures

Noise from Construction

Future increases in traffic noise levels will not require traffic noise mitigation measures. However, the following mitigation measures should be implemented if determined to be feasible.

- The use of properly muffled construction equipment should be required.
- If possible, heavy equipment and portable diesel engines and generators should be located at least 400 – 500 feet from residences.
- If feasible, the use of pre-drilling techniques, vibratory pile driving equipment, and bored and cast-in-situ piles to reduce the number of blows and impact noise from pile driving operations.
- The adherence to State Department of Health regulations controlling construction noise limits and construction curfew times. Under DOH permit procedures, construction activities are permitted weekdays between the hours of 7:00 a.m. – 6:00 p.m., and on Saturdays between 9:00 a.m. – 6:00 p.m.

Noise from Future Harbor Operations

Noise generated by harbor vehicles and fixed on-site mechanical equipment must comply with existing State DOH vehicular noise limits and property line noise limits (Hawaii Administrative Rules Title 11, Chapters 42 and 46 respectively). If the noise radiated beyond the harbor property boundaries is at or below the residual background ambient noise levels, noise from these sources will be difficult to hear at the closest noise sensitive receptors.

At Hilo Harbor, [S] ***s***hips generally leave the harbor between 6pm and 8pm unless there is a hazard in the channel. Boat whistles and horns at Hilo's Piers 1 and 2 will produce noise that is audible at the hotels along Banyan Drive as well as residences along Keaa Street and the Bay Clinic. Horns are intermittent in nature, ***and are sounded*** prior to sailing for safety drills [and] ***or*** if a hazard is encountered while entering or leaving the harbor. Harbors Division will request ships using the harbor to refrain from sounding whistles and horns during the hours of 7 a.m. to 5 p.m.

Vibration from Pile Driving

Hilo Harbor. To reduce vibration, the use of pre-drilling techniques, vibratory pile driving equipment, and bored and cast-in-situ piles will reduce the number of blows and impact noise from pile driving operations. ***In the event of blasting, appropriate vibration limits to protect structures and minimize annoyance at potentially affected residential areas will be set in contract specifications. The contractor must retain a blasting consultant to provide a plan and initiate blasting work, including the supervision of initial test***

blasting to establish effects and baseline conditions. Vibration must be monitored at sensitive locations at the beginning of the construction. Monitoring may be eliminated if records show a consistent pattern of compliance with specified vibration levels. Harbors Division must inform potentially affected people living and working in the vicinity about the construction method, probable effects, quality control measures and precautions to be used, and the channels of communication available to them.

Kawaihae Harbor. To reduce vibration, the use of pre-drilling techniques, vibratory pile driving equipment, and bored and cast-in-situ piles will reduce the number of blows and impact noise from pile driving operations. Because of the risk of vibrations from pile driving posed to nearby Puukohola Heiau National Historic Site (CHAPTER 4), alternative methods will be evaluated for pier construction, such as drilling. ***In the event of blasting, the contractor must retain a blasting consultant to provide a plan and initiate blasting work, including the supervision of initial test blasting to establish effects and baseline conditions. Vibration must be monitored at sensitive locations, such as Puukohola Heiau National Monument, at the beginning of the construction. Monitoring may be eliminated if records show a consistent pattern of compliance with specified vibration levels. Harbors Division must inform potentially affected people living and working in the vicinity about the construction method, probable effects, quality control measures and precautions to be used, and the channels of communication available to them.***

3.14 AIR QUALITY

Ambient air pollution concentrations are regulated by Ambient Air Quality Standards (AAQS) under [f] *F*ederal law (Section 40, Part 50 CFR) and State law (Hawaii Revised Statutes, Chapter 11-59). Some of the State AAQS for CO, NO_2 and O_3 are more stringent than the federal standards. However, they may be exceeded once per year. Another difference between State and [f] *F*ederal AAQS is that the former is given in terms of a single standard while the latter is divided into primary and secondary standards (Will Chee – Planning, Inc., 1999).

The State AAQS are intended to "protect public health and welfare and to prevent the significant deterioration of air quality" (State of Hawaii, 1993). The primary [f]*F*ederal AAQS are intended to protect public health with an adequate margin of safety while secondary standards are intended to protect public welfare through the prevention of damage to soils, water, vegetation, animals, wildlife, man-made materials, visibility climate and economic values (40 CFR, Part 50).

TABLE 13 summarizes both the [f] *F*ederal and State AAQS. Each regulated air pollutant has the potential to adversely impact human health or to produce environmental degradation when present in sufficiently high concentrations for prolonged periods of time. Additionally, the State Air-Pollution Control Regulations prohibit visible emissions at the property line of fugitive dust from concentration activities (State of Hawaii, 1993a).

TABLE 13
Summary of State of Hawaii and Federal
Ambient Air Quality Standards

Pollutant	Sampling Period	National AAQS Primary	National AAQS Secondary	State of Hawaii AAQS
Particulate Matter[b]	Annual	50	50	50
	24 hours	150	50	150
Sulfur Dioxide	Annual	80		80
	24 hours	365	1,300	365
	3 hours	–		1,300
Nitrogen Dioxide	Annual	100	--	70
Carbon Monoxide	8 hour	10	--	5
	1 hour	40	--	10
Ozone	1 hour	235	--	100
Hydrogen Sulfide	1 hour	--	--	35
Lead	Quarterly	1.5	--	1.5

[a] All standards represent the maximum allowable concentrations and are expressed in micrograms per cubic meter ([g/m^3) except CO in milligrams per cubic meter (mg/m^3)

[b] Particles are less than or equal to 10 microns aerodynamic diameter.

3.14.1 Existing Conditions

Hilo Harbor. The air quality of the Hilo area is generally excellent as measured by the the State of Hawaii, Department of Health, Clean Air Branch at its air quality monitoring station. TABLE 14 shows the average 1999 annual data on two measures of air quality:

TABLE 14
Air Quality Measurements at Hilo Harbor

Air Quality Measurement	Standard (no greater than)	1999 Hilo Measurement (Annual Average)
Particulate matter (PM10) or 10 microns or less in diameter	50	11
Sulpher dioxide (SO_2)	80	2

Source: State of Hawaii, Department of Health, Clean Air Branch, 2000

Kawaihae Harbor. The study area is a generally under-developed area characterized by good air quality, with no sources of industrial air pollution nearby. The greatest source of air pollution is periodic eruptions of Kilauea Volcano. In addition, the coral fill area adjacent to the harbor site is a source of dust, particularly during periods of high wind (U.S. Army Engineer Division, 1994).

The air quality monitoring station closest to Kawaihae Harbor is located about 28 miles from the project site, mauka of Kona International Airport. The "Huehue" station is operated by Hawaii Electric Light Company. Readings of air contaminants taken during March and April 2000 are shown in TABLE 15 below, showing actual air quality significantly beneath (better than) standards.

TABLE 15
Air Quality Measurements Near Kawaihae Harbor

Air Quality Measurement	Standard (no greater than)	1999 Huehue Measurement (Annual Average)
Particulate matter (PM10)	50	24
Sulpher dioxide (SO_2)	80	13

Source: Hawaii Electric Light Company

3.14.2 Potential Impacts

In the short-term, air quality will be impacted primarily by construction activities at the project sites. Construction vehicular activity will increase automotive pollutant concentrations at the project sites and adjacent streets. Construction activities will generate fugitive dust emissions resulting in an increase of particulate matter (PM_{10}) levels in the project area. Actual emissions can be expected to vary depending on the type of activity conducted on any given day.

Construction at Kawaihae [h]*H*arbor can be expected to result in fugitive dust because of chronically windy conditions at the harbor.

Heavy construction equipment will also emit air pollutants in the form of engine exhaust. Carbon monoxide emissions from large diesel engines are generally about equal to those from a single automobile, however nitrogen dioxide emissions can be quite high. Fortunately, nitrogen dioxide from other sources in the area should be relatively low, so the overall impact of exhaust pollution from construction equipment should be minor.

3.14.3 Proposed Mitigation Measures

The proposed projects will have short-term construction-related impacts on air quality, including the generation of dust and emissions from construction vehicles, equipment, and commuting workers. In the long-term, increased traffic volumes in the vicinity of the project site will contribute minimally to ambient CO concentration levels.

The State of Hawaii, Department of Health (DOH), Clean Air Branch, regulates emissions from certain types of equipment, such as generators and boilers, under Hawaii Administrative Rules, 11-60.1, Pollution Control. Currently no such equipment is anticipated at the proposed harbor facilities. However, if such equipment is utilized on harbor property in the future, equipment owners and/or operators will have to conform to air quality regulations cited above.

The State of Hawaii, Department of Health (DOH), Clean Air Branch, noted during consultation that DOH has become aware that air quality monitoring is being performed near cruise ships at berth in major cruise destinations such as Alaska. DOH is currently considering implementation of a comparable monitoring program to encompass both air quality standards and the presence of "opacity" or readings of smoke from a ship's smokestack. Any citations for air pollution emissions or opacity will be levied by DOH on cruise ship owners. Harbors Division will cooperate with DOH by providing access to harbor facilities to perform air quality monitoring if such a program is implemented in the future.

Dust Control

During the construction period fugitive dust control measures should be implemented to reduce the amount of particulate matter emissions.

Hilo Harbor. On-site dust control can be accomplished through frequent watering of unpaved roadways and areas of exposed soil. The EPA estimates that twice-daily watering can reduce fugitive dust emissions by as much as 50% (U.S. EPA, 1996b). To further minimize fugitive dust

emissions, the paving and/or landscaping of bare earth areas should be implemented as soon as practicable. The amount of watering will depend on the level of disturbance at Hilo Harbor.

Kawaihae Harbor. According to consultation with DOH, watering at Kawaihae Harbor may have to be done much more frequently than at Hilo because of the arid climate and rapid evaporation rates. At some Kona construction sites, watering has to be done once an hour. However, the frequency of watering at Kawaihae will be relative to the amount of ground disturbance. Because of the texture of the coral fill and frequent high winds, another possible mitigation measure is placing a fugitive dust screen between the highway and the harbor to protect motorists on Kawaihae Road from encountering dust while driving.

CO (Carbon Monoxide) Emissions

The proposed project's impact on air quality in the vicinity of major intersections serving the project area will be minimal and will not threaten or contribute to violations of the national AAQS. This restriction would lower traffic congestion, which in turn, would reduce vehicle emissions and CO concentration levels. Mitigation measures for future CO emissions will not be necessary as emission levels associated with the proposed action will be minimal. However, a mitigation measure to reduce vehicle generated CO emissions could be implemented by limiting construction vehicle activity to off-peak hours.

3.15 WATER QUALITY

3.15.1 Methodology

A water quality study was undertaken by AECOS, Inc. in support of this EIS. Review of Water Quality and Biology in Kawaihae Harbor and Hilo Harbor for the Harbors 2020 Master Plan [and] is attached as APPENDIX E. In September 2000 water samples were collected and analyzed by AECOS, Inc. TABLE 16 lists the methods employed to analyze these samples.

TABLE 16
Analytical Methods and Instruments Used for the September 2000 Sampling in Hilo and Kawaihae Harbors, Island of Hawaii

Analyses List	Method	Reference	Instrument
Ammonia	alkaline phenol	Koroleff in Grasshoff et al. (1986)	Technicon AutoAnalyzer II
Chlorophyll a	Method 10200H	Standard Methods 18th Edition (1992)	Turner Model 112 fluorometer
Dissolved Oxygen	EPA 360.1	EPA (1979)	YSI Model 58 DO meter
Nitrate + Nitrite	EPA 353.2	EPA (1993)	Technicon AutoAnalyzer II
pH	EPA 150.1	EPA (1979)	Orion SA 250 pH meter / Ross combination electrode
Temperature	thermister calibrated to NBS cert. Thermometer (EPA 170.1)	EPA (1979)	YSI Model 58 DO meter
Total Nitrogen	persulfate digestion /EPA 353.2	D'Elia et al. (1977) / EPA (1993)	Technicon AutoAnalyzer II
Total Phosphorus	persulfate digestion /EPA 365.1	Koroleff in Grasshoff et al. (1986) / EPA (1993)	Technicon AutoAnalyzer II
Total Suspended Solids (TSS)	Method 2540D (EPA 160.2)	Standard Methods 18th Edition (1992); EPA (1979)	Mettler H31 balance
Turbidity	Method 2130B (EPA 180.1)	Standard Methods 18th Edition (1992); EPA (1993)	Hach 2100P Turbidimeter
Salinity	Bench salinometer	Grasshoff in Grasshoff et al. (1986)	AGE Model 2100

D'Elia, C.F., P.A. Stendler, & N. Corwin. 1977. Limnol. Oceanogr. 22(4): 760-764.

EPA. 1979. Methods for Chemical Analysis of Water and Wastes. U.S. Environmental Protection Agency, EPA 600/4-79-020.

EPA. 1993. Methods for the Determination of Inorganic Substances in Environmental Samples. EPA 600/R-93/100.

EPA. 1994. Methods for Determination of Metals in Environmental Samples, Supplement 1. EPA/600/R-94/111. May 1994.

Grasshoff, K., M. Ehrhardt, & K. Kremling (eds). 1986. Methods of Seawater Analysis (2nd ed). Verlag Chemie, GmbH, Weinheim.

Standard Methods. 1992. Standard Methods for the Examination of Water and Wastewater. 18th Edition. 1992. (Greenberg, Clesceri, and Eaton, eds.). APHA, AWWA, & WEF. 1100 p.

3.15.2 Existing Conditions

Hilo Harbor. Hilo Harbor is classified as a Class B or "wet" embayment by the State Department of Health and is subject to the State's "wet" embayment water quality criteria (TABLE 17). "Wet" criteria apply to embayments when the average fresh water inflow from the land is greater than one percent of the embayment volume per day.

TABLE 17
State of Hawaii "Wet" Water Quality Criteria for Embayments
(HAR §11-54-06)(DOH, 1992)

Parameter	Geometric Mean value not to exceed this value	Value not to be exceeded more than 10% of the time	Value not to be exceeded more than 2% of the time
Total Nitrogen (µg N/l)	200	250.0	350.0
Ammonia (µg N/l)	6	8.5	15.0
Nitrate + Nitrite (µg N/l)	8	14.0	25.0
Total Phosphorus (µg P/l)	25	40.0	60.0
Chlorophyll a (µg/l)	1.50	1.50	3.00
Turbidity (ntu)	1.5	1.0	1.5

Other "standards":

- pH units shall not deviate more than 0.5 units from a value of 8.1, except at coastal locations where and when freshwater from stream, storm drain or groundwater discharge may depress the pH to a minimum level of 7.0.
- Dissolved oxygen shall not decrease below 75% saturation.
- Temperature shall not vary more than 1 C from ambient conditions.
- Salinity shall not vary more than 10% from natural or seasonal changes considering hydrologic input and oceanographic factors.

Source: AECOS, Inc., 2000

Water quality conditions at Hilo Harbor are determined primarily by influxes of surface water runoff from Wailuku River and groundwater. As a result, the harbor has pronounced vertical stratification of salinity/temperature, i.e., there is a well-defined surface layer of low salinity water and a denser, more saline, bottom layer. The flow of fresh basal groundwater to the bay occurs at a nearly constant rate in comparison with surface runoff, which varies with weather conditions. As the influx of freshwater into the harbor increases, there is a corresponding deviation of water quality from optimal conditions, especially in the surface waters. This is particularly evident in increased turbidity (AECOS, Inc., 2000).

Water quality studies of Hilo Harbor taken in 1980 and again in September 2000 resulted in generally the same mean values, except that turbidity in 2000 was somewhat lower and nitrate + nitrite nitrogen

levels were notably higher. Turbidity would be expected to rise with infusions of stormwater. When compared to the mean values in TABLE 15 above, results indicate that the harbor waters are in conformance with salinity, temperature, ***dissolved oxygen (***DO*)* saturation levels and pH. Turbidity, nitrate + nitrite nitrogen, total nitrogen, total phosphorus and chlorophyll typically exceed State criteria, especially in the surface waters. Water quality tends to improve in Hilo Bay away from the shore and the inner harbor (AECOS, Inc., 2000).

Kawaihae Harbor. Kawaihae Harbor is categorized as a Class A embayment by the State Department of Health (HAR §11-54-06; DOH, 1992) and is therefore subject to the State's "dry" embayment water quality criteria (TABLE 18). "Dry" criteria apply to embayments where the average daily fresh water inflow from the land is less than one percent of the embayment volume.

TABLE 18
State of Hawaii "Dry" Water Quality Criteria for Embayments (HAR §11-54-06)(DOH, 1992).

Parameter	Geometric Mean value not to exceed this value	Value not to be exceeded more than 10% of the time	Value not to be exceeded more than 2% of the time
Total Nitrogen (µg N/l)	150.0	250.0	350.0
Ammonia (µg N/l)	3.5	8.5	15.0
Nitrate + Nitrite (µg N/l)	5.0	14.0	25.0
Total Phosphorus (µg P/l)	20.0	40.0	60.0
Chlorophyll a (µg/l)	0.50	1.50	3.00
Turbidity (ntu)	0.4	1.0	1.5

Other "standards":

- pH units shall not deviate more than 0.5 units from a value of 8.1, except at coastal locations where and when freshwater from stream, storm drain or groundwater discharge may depress the pH to a minimum level of 7.0.
- Dissolved oxygen shall not decrease below 75% saturation.
- Temperature shall not vary more than 1 C from ambient conditions.
- Salinity shall not vary more than 10% from natural or seasonal changes considering hydrologic input and oceanographic factors.

Vertical stratification in salinity/temperature in Kawaihae Harbor is minimal, indicating that there is relatively little groundwater input to the harbor basin. As a result, water quality conditions inside and outside the harbor are essentially the same. The lack of significant surface water discharge and groundwater inputs along this section of the coast is the primary reason for the generally excellent water quality conditions in this harbor (AECOS, Inc., 2000).

A comparison of water quality conditions at Kawaihae Harbor, as measured in 1991 and again in September 2000, with the State water quality criteria in TABLE 16 above suggests that the harbor is

generally in conformance with all criteria[.] [A] ***with the*** possible exception [is] ***of*** turbidity. The progressive increase in turbidity with depth apparent in March 1991 data suggests that sediment has accumulated in significant amounts on the harbor floor over the years. Periods of turbulence, such as ***during*** high wind conditions or the movement of large vessels into and out of the harbor, may increase turbidity levels throughout the water column, as noted by the divers on September 16, 2000. Since turbidity levels were well within the State criteria during the September 1999 sampling events, further monitoring would be required to determine whether long-term mean levels exceed[ed] the State criteria.

3.15.3 Potential Impacts

Hilo Harbor. There are ongoing concerns concerning the potential for leakage of petroleum or other toxic liquid bulk materials into the harbor (Section 3.11.2) and petroleum spills.

The primary impact to water quality during the proposed construction activities within the harbor is a likely temporary increase in turbidity in the water column when the bottom area of the harbor is disturbed by dredging and pier construction. Turbidity also occurs [now each time a ship] ***during rough ocean conditions and when vessels*** enter[s] or leave[s] the harbor. Secondary impacts could include lowering of the DO levels and an increase in nitrogen and phosphorus levels in the disturbed area due to mixing of bottom sediments into the water column.

Construction activities that require dewatering in areas that may contain petroleum hydrocarbons may prompt the need for water treatment prior to release of the water to surface water or groundwater sources.

Kawaihae Harbor. This harbor also has ongoing concerns concerning possible leakage of petroleum or other toxic liquid bulk materials into the harbor (Section 3.11.2) as well as petroleum spills. These concerns will heighten with construction of a larger new liquid bulk terminal. However, a new terminal will have to be constructed under stricter protective guidelines.

The primary water and secondary water quality impacts to be expected from harbor-related construction activities in Kawaihae Harbor will be similar to those described above for Hilo Harbor. Since Kawaihae Harbor has significant coral deposits, turbidity during dredging and pier construction could potentially harm remaining coral communities within Kawaihae Harbor (Section 3.8 MARINE BIOLOGY).

Construction activities that require dewatering in areas that may contain petroleum hydrocarbons may prompt the need for water treatment prior to release of the water to surface water or groundwater sources.

3.15.4 Proposed Mitigation Measures

Harbors Division will continue to support the work and provide space for the equipment of the Clean Island Councils at both harbors. The Clean Islands Council[s] at each subject harbor are responsible for responding to any toxic spill within harbor waters. Response equipment is stored at each harbor and trained personnel are available to deploy the emergency measures.

Water quality can be protected from dredging and pier construction through several safeguards at both harbors.

- **Background Water Quality Analysis.** To reduce potential impacts from construction, a background water quality analysis should be conducted in each harbor before construction. Throughout the construction period, daily monitoring should continue to measure any degradation (AECOS, Inc., 2000).
- **Siltation Curtains.** Siltation curtains made of flexible fabric will create a barrier between the construction area and the harbor area and thereby reduce turbidity. This will reduce disturbance during construction and minimize potential impacts on the surrounding marine environment.
- **Siltation Basins.** During construction, siltation basins will capture muddy water and only allow clear water to be discharged into the harbors.

Hilo Harbor. Because Hilo Harbor is the receiving basin for runoff from the Wailuku River, it is likely that major sediment deposits have accrued over the years in the vicinity of proposed pier construction areas. Thus, greater perturbations in turbidity and nutrient levels in the water column might be expected, necessitating greater care and caution in the deployment and maintenance of siltation curtains around construction activities (AECOS, Inc., 2000).

Kawaihae Harbor. At Kawaihae Harbor, if silt escapes from the first siltation curtain, a second curtain should be erected to further protect undredged coral communities along the inner harbor breakwater from harm due to turbidity (AECOS, Inc., 2000). During construction, siltation basins should be installed to protect the harbor waters from construction-related sediments entering the harbor area through runoff. Since turbidity levels were well within the State criteria during September 1999 sampling events, further monitoring will be required to determine whether long-term mean levels exceeded the State criteria.

Another mitigation measure to protect undredged coral within Kawaihae Harbor will be to plan construction for periods in which coral is not reproducing (spawning). This is generally in the summer months, particularly June and July. Coral species are very predictable in terms of their timing for spawning, so determining the approximate timing should not be difficult (Personal Communication, David Gulko, DLNR Division of Aquatic Resources, 2001).

CHAPTER 4
SOCIAL ENVIRONMENT:
EXISTING CONDITIONS, POTENTIAL IMPACTS AND PROPOSED MITIGATION MEASURES

4.1 POPULATION

4.1.1 Existing Conditions

Regional Population. Hilo Harbor is located in the South Hilo district and Kawaihae is located in South Kohala district of the County (Island) of Hawaii. Historical population growth statistics for these districts are discussed below and presented in TABLE 19.

- South Hilo population remained constant at approximately one-third of the County of Hawaii population.
- In contrast, the population of the South Kohala district nearly doubled from 1980-1995, although it still represented only 12% of the total island population in 1995.
- The growing community of Waimea and resort development along the Kohala Coast resorts account for most of the growth in the South Kohala district.
- The population of Kawaihae has remained relatively stable in comparison (R.M. Towill Corporation, 2000).

TABLE 19
Population Growth
County of Hawaii Districts

District	1995 Population	% of Total County of Hawaii	% Population Growth in District 1980 to 1990
South Hilo District (location of Hilo Harbor)	45,790	33.3%	5.6%
South Kohala District (location of Kawaihae Harbor)	12,098	8.8%	98.4%
County of Hawaii	137,391	100%	14.1%

Source: State of Hawaii Data Book, 1999, State of Hawaii, Department of Business, Economic Development and Tourism

The population growth for the Island of Hawaii is projected to be approximately 20 percent over the period 2000 to 2025. The population is expected to be evenly divided between east Hawaii, including Hilo, and west Hawaii, including Kawaihae (Harris, 1994). The expected population growth will increase the demand for imported goods arriving through both of the island's commercial harbors.

Hilo Harbor. As an industrial and commercial area, Hilo Harbor currently has no on-site resident population. However, residential dwellings are adjacent to Hilo Harbor on what is known as Baker's Beach.

Illegal temporary shelters formerly located on the undeveloped shore of Radio Bay have been removed as of January 7, 2001. These shelters were noted in site visits for consultant studies performed during September and October 2000 (Haun & Associates, 2000; AECOS, Inc.. 2000; Char & Associates, 2000).

Baker's Beach Residences

The shoreline west of the harbor facilities is State of Hawaii land known as Baker's Beach (FIGURE [18] ***29***) which is currently under the jurisdiction of the State of Hawaii, Department of Land and Natural Resources. This area (located in TMK (3) 2-1-07) contains 17 houselots on leased land. TABLE 20 shows the TMK parcel numbers and associated acreage. These parcels contain mostly beach cottage structures. All leases terminate in 2015. The beach homes currently are the home to a total of approximately 30-40 individuals (Personal Communication, Harbormaster, 2000).

Baker's Beach was formed with dredging spoils resulting from: (a) harbor dredging that occurred between 1925 and 1930 and (b) reduced wave energy caused by the new breakwater. Today, there is very little sand present. According to a resident of the area, a man in his 80s, the 1946 tsunami removed much of the sand (Haun & Associates, 2000). FIGURE [19] ***30*** shows the past changes in the shoreline of Baker's Beach.

Kawaihae Harbor. There is no resident population within or adjacent to the industrial and commercial harbor area.

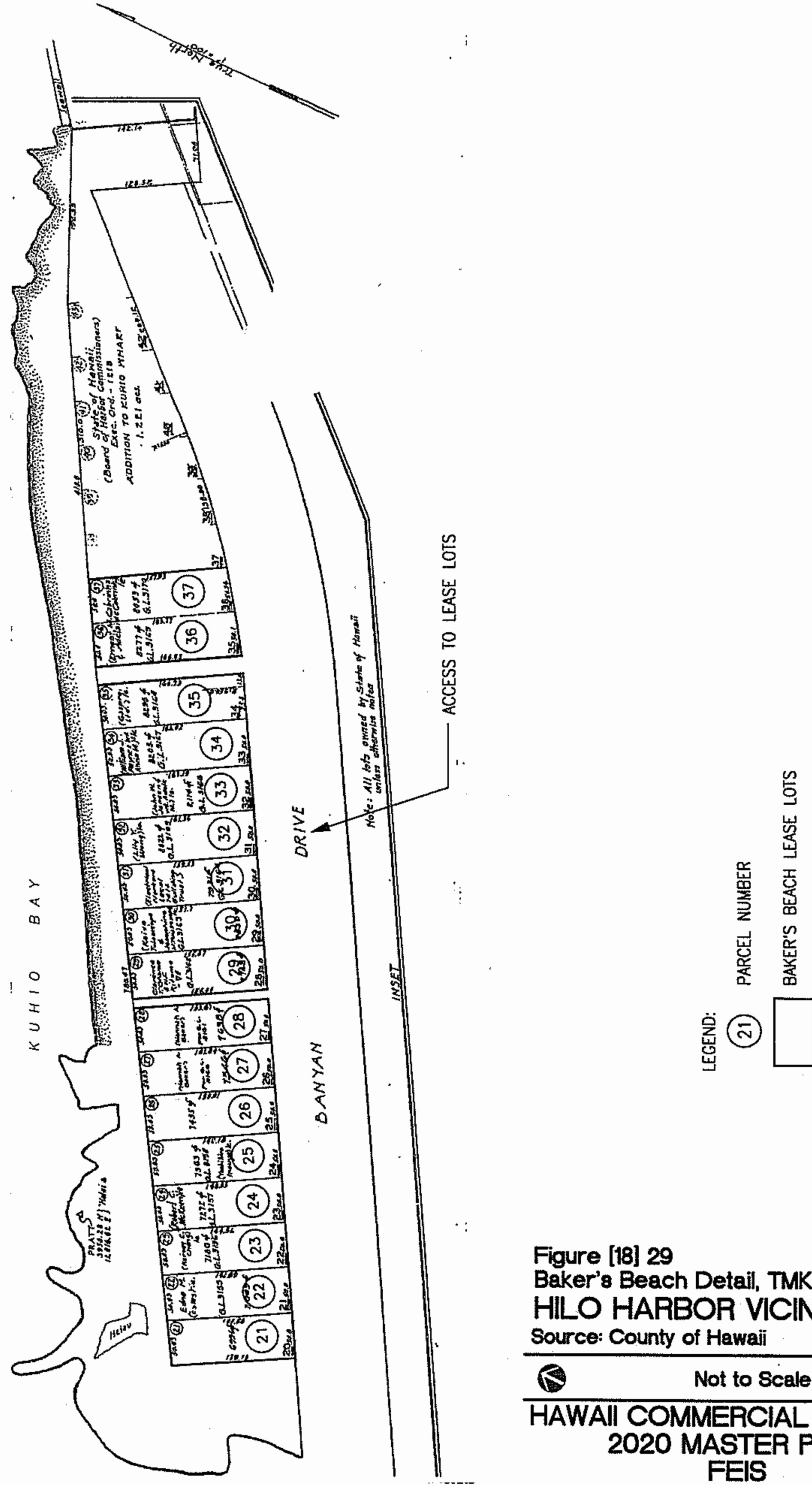

Figure [18] 29
Baker's Beach Detail, TMK (3) 2-1-07

HILO HARBOR VICINITY

Source: County of Hawaii

Not to Scale

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TABLE 20
Baker's Beach Leased Residential Lots
TMK (3) 2-1-07

Parcel Number	Area (in Square Feet)
21	6996
22	7089
23	7180
24	7272
25	7363
26	7455
27	7546
28	7638
29	7748
30	7839
31	7931
32	8022
33	8114
34	8205
35	8296
36	8277
37	8053

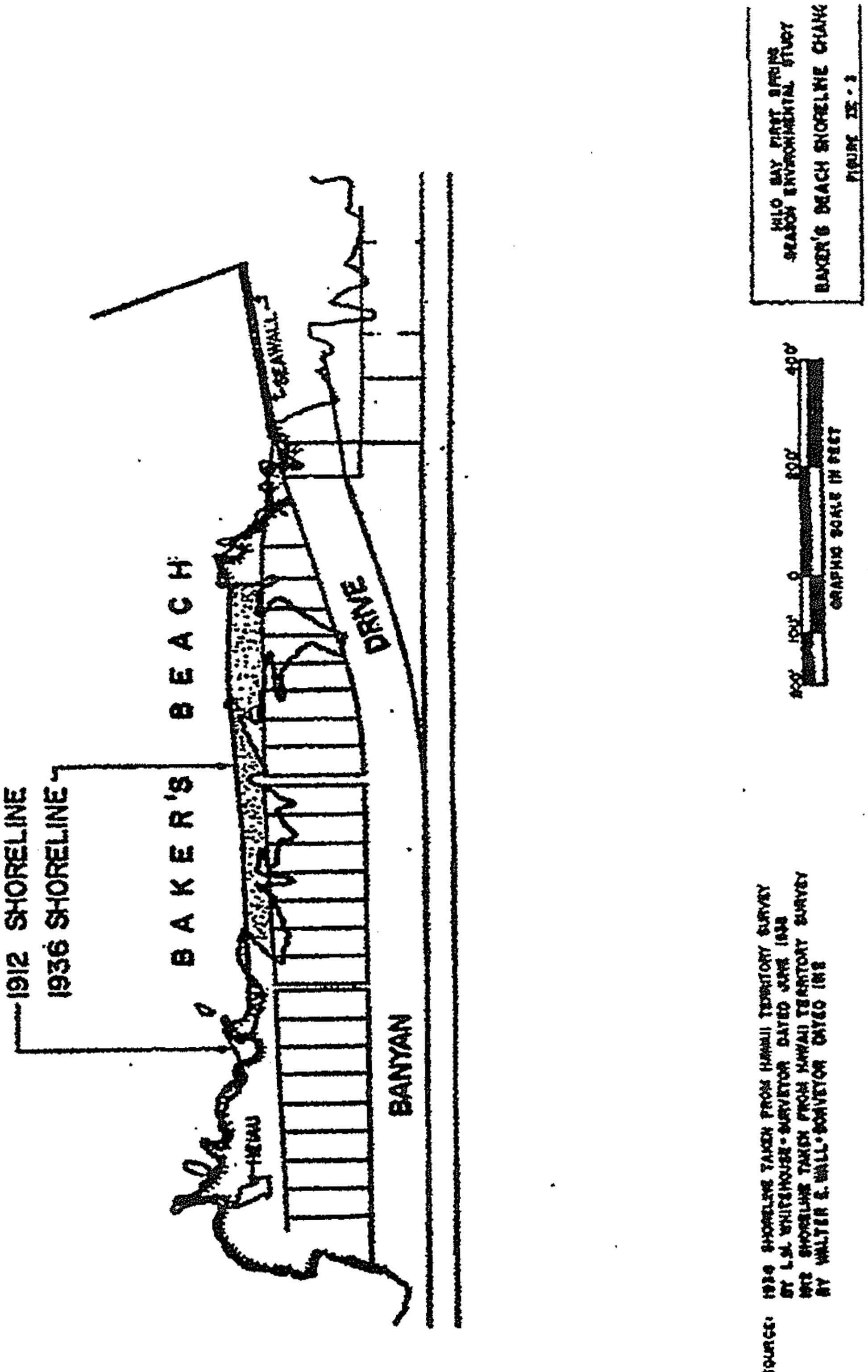

Figure [19] 30
Baker's Beach Shoreline Changes
(from Kelly et al. 1981)

HILO HARBOR VICINITY
Source: Haun & Associates, 2000

Not to Scale

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4.1.2 Potential Impacts

Hilo Harbor. Proposed construction of new Piers 4, 5 and 6, cruise ship passenger terminal and Ocean Research Facility in the western area of the harbor will require demolition of the houses on Baker's Beach. However, in the 2020 Master Plan construction is planned to occur after the termination of existing land leases in 2015. This precludes the need for relocation.

Kawaihae Harbor. No impacts are expected from proposed development under the 2020 Master Plan, as there is no resident population in the commercial harbor area.

4.1.3 Proposed Mitigation Measures

This report assumes that eviction proceedings in the Radio Bay area will result in no population in that area. In the western area designated for proposed Piers 5 and 6, construction of improvements is scheduled for after the termination of the lease of the residential lots on Baker's Beach.

4.2 ECONOMICS AND EMPLOYMENT

Economic Impact of Harbor Development. As presented in CHAPTER 2, the economic viability and growth potential of Hawaii is closely tied to its essential infrastructure, including harbors. In 1992, the major harbor industries of Hawaii produced $1.934 billion in direct sales. That year, Hawaii's Gross State Product amounted to $33 billion. Fully a third, or $10.3 billion, of that amount in the form of goods and services passed through the State's commercial harbors. Harbor industries employed 8,298 people in Hawaii in 1992 (McDonald and Deese, 1994; Lee and Olive, 1994, adjusted by SMS Research for major commercial harbor industries).

The economic importance of harbor development and improvement can be illustrated by describing potential adverse impacts of imposing restraints upon such activities. Findings from an input/output model developed for Harbors Division suggest that the negative impacts of curtailed harbor industry growth are potentially substantial. The study found that limiting harbor development and improvements by just 1% per year less than the estimated 2% annual increase in the real value of the Gross State Product through the year 2020 would result in the following adverse impacts:

- Sales and employment of the major harbor industries would realize only 76.6 percent of their potential;
- Hawaii's Gross State Product would be 2.1% lower; and
- Estimated statewide employment would be reduced by 0.5%.

4.2.1 Existing Conditions

Hilo Harbor. Hilo Harbor and its tenants account for direct employment of approximately 77 persons, including Harbors Division employees and those of Matson, Young Brothers, U.S. Coast Guard, HT&T (stevedores) and CSX (formerly SeaLand) (Personal communication, Harbormaster,

2000). This harbor makes possible the growing and lucrative passenger cruise ship market that is becoming an ever-increasing economic force in Hilo.

Kawaihae Harbor. The harbor provides direct employment for approximately 26 persons, including the Harbors Division employees and those of Unocal, Hawaiian Cement, Akana Petroleum and Young Brothers. This harbor is economically important because it is the gateway for the importation of goods for the entire region of west Hawaii which contains the growing Kona metropolitan area, Waimea and the resorts of the Kohala Coast.

4.2.2 Potential Impacts

Overall, constraints on harbor development that limit annual statewide harbor industry growth to 1 percent would impact the State's economy by a combined loss of $11.7 billion through 2020 (SDOT, 1997). Because of the economic impact of constraining harbor development, economic impacts of the proposed development Hilo Harbor and Kawaihae Harbor improvements will be favorable.

- In the short term, construction expenditures will have an overall beneficial impact on the local construction industry, and construction activities will benefit the community indirectly through the creation of jobs.
- In the long term, expanded harbor operations will stimulate direct maritime expenditures, create port-related jobs, and develop new businesses. Harbor operations will require support businesses to supply ships, handle cargo, and provide other services.
- Implementation of the proposed projects and resultant harbor expansion will stimulate harbor-related business enterprises and increase local employment. The combined increased business activities in the commercial shipping, fishing and tourism industries will result in increased state tax revenues, in the form of excise, individual, and corporate taxes.
- The tourism industry should also experience beneficial economic impacts as a result of the proposed projects as a result of the new and expanded facilities. Turning away of cruise ships because of lack of berthing space will be avoided by increasing the available infrastructure.

The proposed harbor development would provide essential infrastructure that will allow the Island of Hawaii to continue its economic growth. In addition, harbor improvements are likely to generate additional employment due to increases in:

- Port calls by cruise ships, increasing demand for tourism-related business;
- Cargo handling activity; and
- Capacity to ship agricultural products from the growing diversified agriculture business on the Island of Hawaii, particularly forest products.

4.2.3 Proposed Mitigation Measures

Since all potential impacts appear to be beneficial, no mitigation measures in the area of economics and employment will be necessary.

4.3 ARCHAEOLOGICAL AND HISTORIC RESOURCES

4.3.1 Existing Conditions

Hilo Harbor. The following information is drawn from the Haun & Associates archaeological survey of Hilo Harbor. A search of DLNR-HPD, the archaeological report database, and other sources identified 16 archaeological studies of the ahupua'a of Waiakea that covered approximately 1,400 acres between sea level and 1,500-foot elevation (FIGURE [20] ***31***). None of the previous studies included the Hilo Harbor project area. The only traditional Hawaiian sites identified by the studies are a heiau next to the West Project Area (Kam, 1983) (FIGURE [21] ***32***), the Puna Trail and five ahu reported by Hammatt. The absence of traditional sites is attributed to the massive ground disturbance of sugar cane cultivation and commercial and residential development of the Hilo area.

In 1974, the Hilo Harbor Breakwater, adjacent to the East Project Area, was documented during the Statewide Inventory of Historic Places by DLNR and was assigned State Inventory of Historic Places (SIHP) number 10-35-7441. Kam (1983) reported the identification of a heiau by Cox. The site appears on tax maps near the western boundary of the West Project Area, but was otherwise undocumented.

McEldowney (1979) lists 53 traditional Hawaiian sites for Waiakea and 31 historic sites, primarily buildings. Most of the traditional sites were located by Hudson (1932) and Kikuchi (1973). The remaining six sites were identified during the Statewide Inventory. Nearly all were situated along the coast. The sites include 17 fishponds, seven burials, six platforms, five enclosures, three heiau including one previously identified by Stokes, three house foundations, three trail segments, two shrines, several miscellaneous features, and two complexes of platforms, enclosures, and terraces.

<u>October 2000 Archaeological Survey of Hilo Harbor</u>

The absence of traditional sites within the project areas probably results from the extensive disturbance caused by construction activities associated with the breakwater and port facilities,

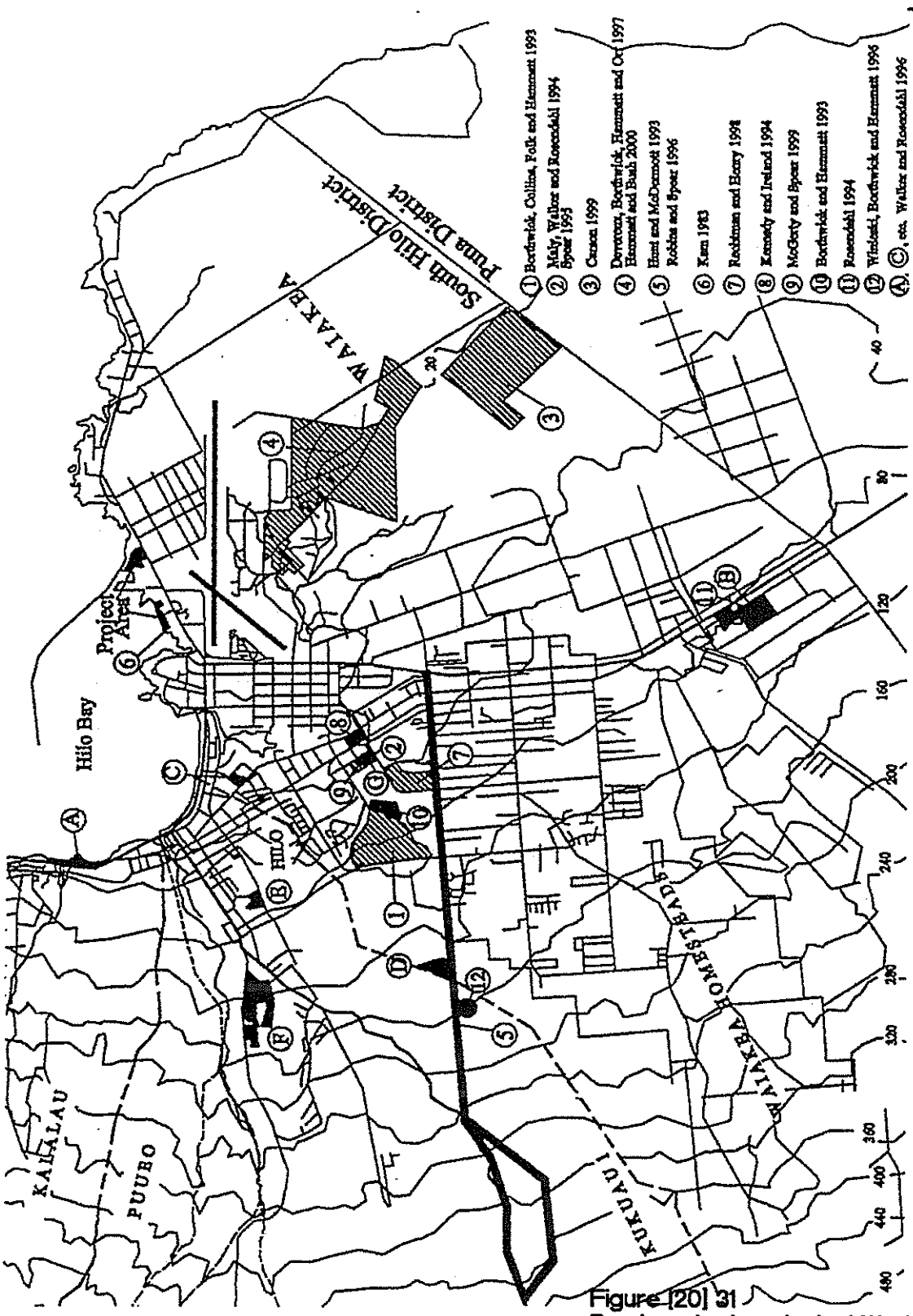

Figure [20] 31
Previous Archaeological Work (Studies)
HILO AREA
Source: Haun & Associates, 2000

Not to Scale

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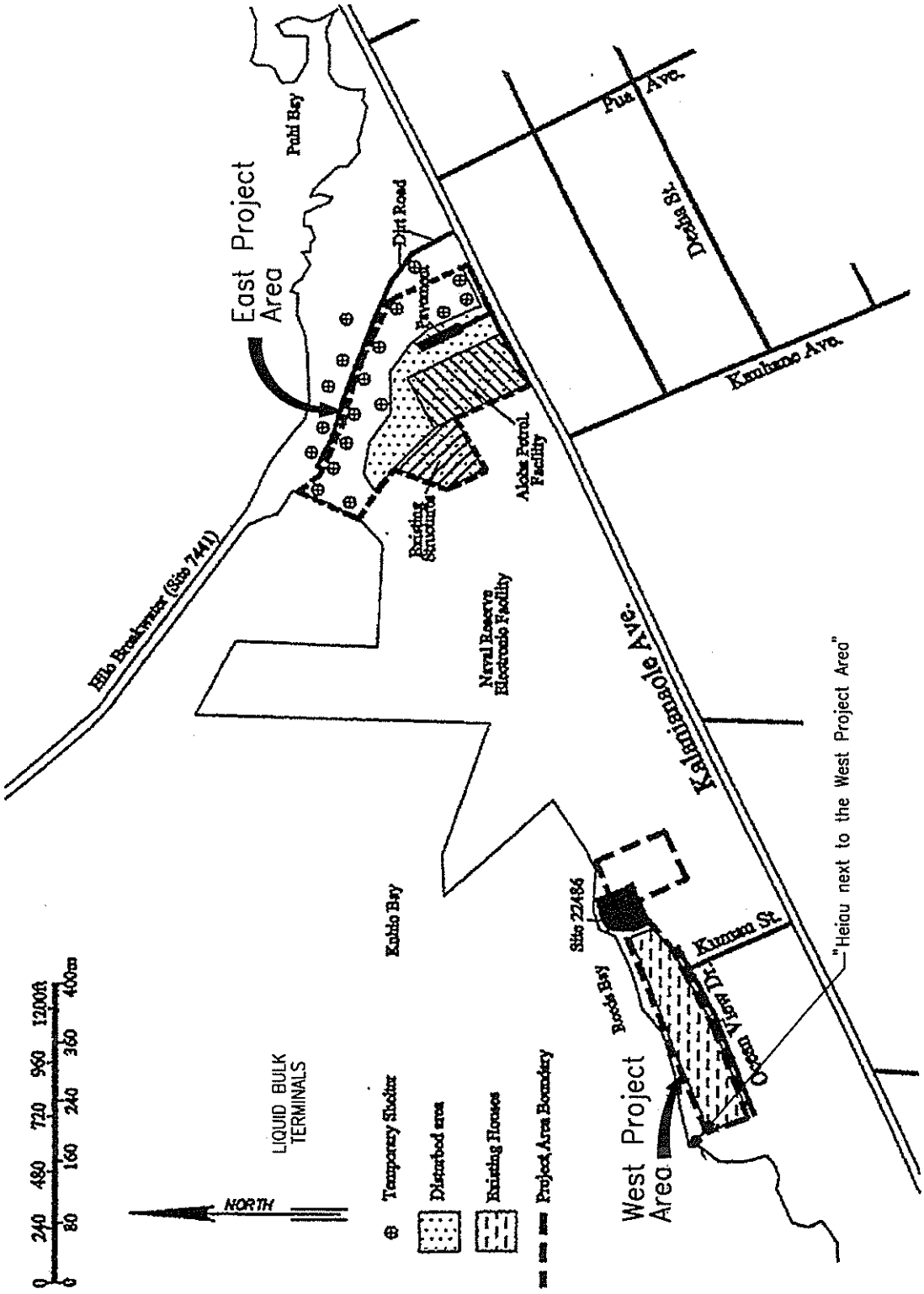

Figure [21] 32
2000 Archeological Study Locations
"East Project Area" and
"West Project Area"
Source: Haun & Associates, 2000

Not to Scale

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and with the construction of residences within the Baker's Beach Lease Lots along the shoreline in the West Project Area. The presence of a possible heiau near the West Project Area conforms to expectations for traditional site types in the vicinity of the project area. No surface evidence of subsurface cultural deposits was identified and it is unlikely that such deposits would be present because there is very little soil over the lava bedrock in the area and because the area has been extensively disturbed by construction activity and periodic tsunami inundation (Haun & Associates, 2000).

Site 22486

These structural remains probably represent port-related facilities because the curb-lined road at the site extends to the east toward the developed portions of the port. The site consists of four concrete features: two concrete slabs, a set of parallel concrete curbs and two displaced sections of concrete slab located at the water's edge. These features are in fair condition and are altered (Haun & Associates, 2000). For more details and a site map, see APPENDIX H.

Sites identified and relocated from past studies during the survey are assessed for significance based on the criteria outlined in the Rules Governing Procedures for Historic Preservation Review (DLNR 1998: Chapter 275). According to these rules, a site must possess integrity of location, design, setting, materials, workmanship, feeling, and association and shall meet one or more significance criteria. Site 22846 was assessed as solely significant under Criterion "d:" "Have yielded, or is likely to yield, information important for research on prehistory or history." The site has yielded information important for understanding historic land use in project area (Haun & Associates, 2000).

Pursuant to DLNR (1998) Chapter 275-6 (d), the initial significance assessments provided by Haun & Associates are not final until concurrence from the DLNR State Historic Preservation Division has been obtained. Such concurrence was requested [via letter to SHPD (Appendix A).] ***and was granted by SHPD on January 30, 2001 (APPENDIX A-1, EISPN Comment Letters and Responses).***

Underwater Rock Pile in Radio Bay

The marine biologist conducting the biological investigation at Hilo Harbor encountered what appeared [to him] to be an underwater rock "wall" in Radio Bay that he conjectured "may mark the location of a former fishpond" (AECOS, Inc., 2000). A subsequent dive by archaeologists in Radio Bay to observe this underwater area revealed that the rocks in question were merely construction rubble (Haun & Associates, 2000).

Kawaihae Harbor. Archaeological information for Kawaihae Harbor was drawn from a comprehensive assessment of the Kawaihae region prepared by Cultural Surveys Hawaii in 1991. This study drew on many other previous archaeological and historic assessments of the area. It also included oral histories taken from Kawaihae residents regarding the harbor area.

The two ahupua'a of Kawaihae, known as 1 and 2, have been the focus of numerous archaeological surveys (Kelly, 1974; Kelly and Nakamura, 1981; Barrere, 1983; Clarke, 1983; Clarke, 1986 and Cultural Surveys Hawaii,1991). Kawaihae Harbor is located in the lowland area of Kawaihae 2, known as "Hikina."

Kawaihae Harbor site is primarily a coral stockpile formed from dredge tailings after the current harbor was created on the site of a coral reef in the 1960s. An archaeological reconnaissance of the Kawaihae region showed no historic or archaeological sites within the harbor boundaries (Cultural Surveys Hawaii, 1991).

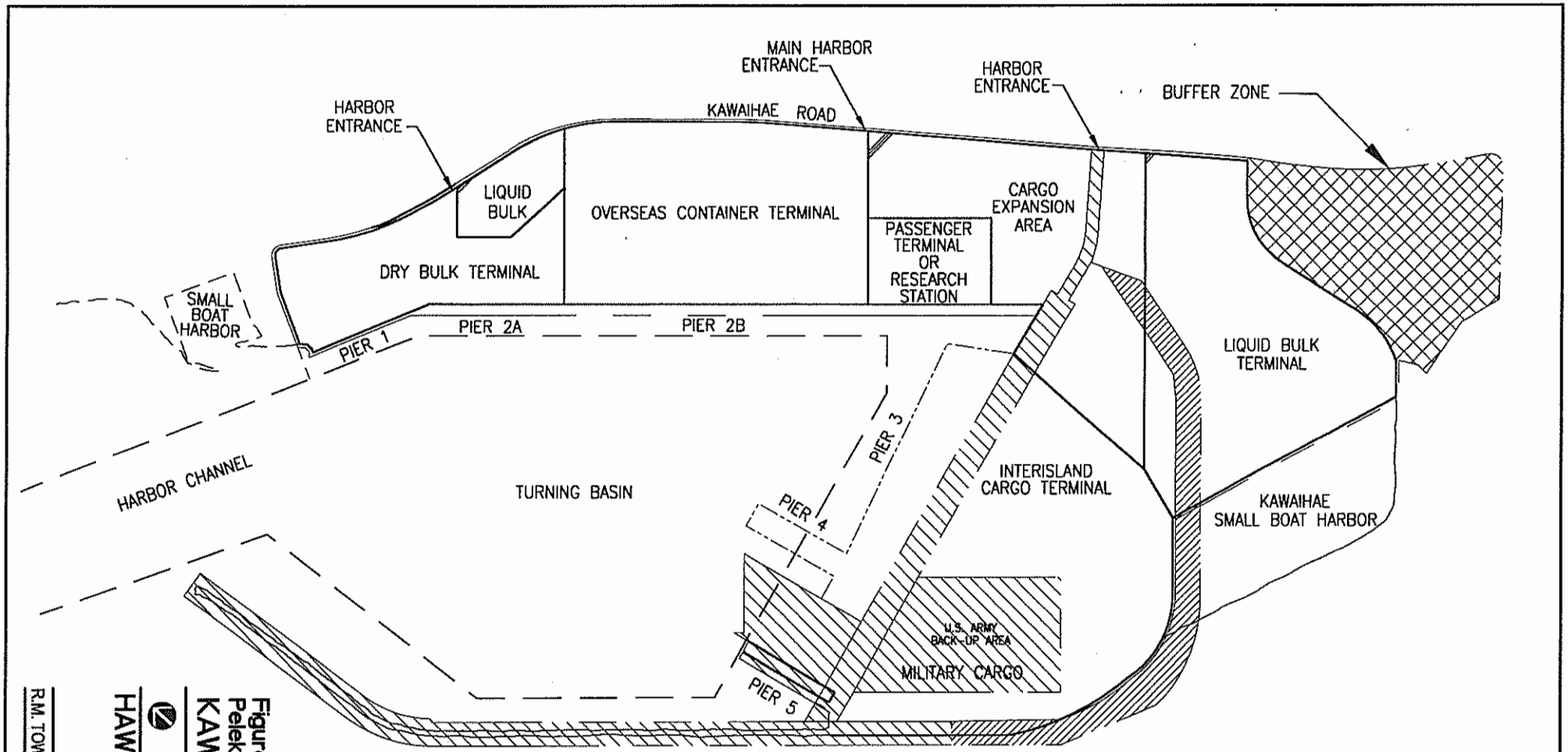
Kawaihae Harbor is near some very significant archaeological sites. Approximately 0.8 miles to the southeast from the harbor is the Puukohola Heiau National Historic Site. The submerged Hale o Kapuni ("Shark") heiau is located south of the harbor property. The submerged heiau has been somewhat covered over by sedimentation (Cultural Surveys Hawaii, 1991; Personal Communication, John Keola Lake, 2001).

Cooperative Agreement No. H-98-8, currently in force between the United States Department of the Interior, National Park Service and the Harbors Division, provides that the so-called Pelekane lands are to be used as a state-owned "buffer zone" that separates the archaeologically significant Puukohola Heiau National Historic Site from the commercial harbor area (FIGURE [22] ***33***). As stated in the Hawaii Commercial Harbors 2020 Master Plan, the Harbors Division intends to preserve all lands as provided by the above referenced agreement as a buffer zone.

4.3.2 Potential Impacts

Hilo Harbor. The proposed construction of an interisland terminal will require destruction of Site 22486.

No visitation or ritual use of the unconfirmed heiau site west of the harbor was observed during the archaeological survey (Haun & Associates, 2000). However, access to this site could be increased by proposed development in the Baker's Beach area (Piers 4, 5 and 6 and Ocean Research facility).



LEGEND:

- PROPERTY LINE
- FEDERAL PROJECT LINE
- U.S ARMY EXECUTIVE ORDER 1759 (1959)
- U.S ARMY EXECUTIVE ORDER 2142 (1964)
- BUFFER ZONE UNDER COOPERATIVE AGREEMENT No. H-89-8 BETWEEN U.S. DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE AND DOT-HARBORS DIVISION

SCALE IN FEET

0 100 200 300 400 500 600 1200

Figure [22] 33
Pelekane Lands Buffer Zone
KAWAIHAE HARBOR

Scale: 1" = 600'

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The planned construction of piers and associated dredging at the harbor will require drilling and possibly controlled blasting.

Kawaihae Harbor. The planned construction of piers and associated dredging at the harbor will require drilling and possibly controlled blasting. These activities would result in noise and vibration that could affect the rock walls of nearby Puukohola Heiau National Historic Site (see Section 3.13, NOISE).

4.3.3 Proposed Mitigation Measures

Hilo Harbor. Since no significant archaeological sites were found, no mitigation measures are recommended (Haun & Associates, 2000). Concurrence with the State Historic Preservation Office will have to be obtained before this recommendation can be implemented. The mapping, written descriptions, and photography at Site 22486 adequately document it and no further work or preservation is recommended.

Technologies that would be considered as an alternative to blasting at Hilo Harbor during the dredging process are the use of cutterheads, drag line operations or roadcutters, to dredge designated areas. Other alternatives to blasting, such as technology using pre-drilling and expansion gels to split rock, will also be evaluated.

Kawaihae Harbor. Under the 2020 Master Plan, Harbors Division will retain the current buffer zone between the Puukohola Heiau National Historic Site and Kawaihae Harbor.

Risk of vibrations from pile driving and/or blasting posed to nearby Puukohola Heiau National Historic Site (CHAPTER 4) will be evaluated during the design phase. If the risk is determined to be prohibitive, alternative methods will be considered for dredging and pier construction. [, such as drilling.] ***Technologies that would be considered as an alternative to blasting at Kawaihae Harbor during the dredging process are the use of cutterheads, drag line operations or roadcutters, to dredge designated areas. Other alternatives to blasting, such as technology using pre-drilling and expansion gels to split rock, will also be evaluated.***

4.4 TRADITIONAL CULTURAL PRACTICES

4.4.1 Existing Conditions

Hilo Harbor.

Cultural History

Hilo Harbor is located in the ahupua'a of Waiakea in the district of South Hilo. Prehistoric use of the Hilo Harbor site likely included habitation, fishing and collecting of marine resources, burial and ritual. However, the construction activity associated with the breakwater and harbor facilities in the early 1900s probably destroyed most sites in the project area (Haun & Associates, 2000).

The current harbor location was away from traditional population centers in Hilo. A review of the Land Commission Awards in the mid-1800s showed the focus of community life was on the Waiakea Pond and Wailoa River, not in the current harbor area. The EIS archaeologist, Alan Haun, Ph.D, concluded there was probably scattered habitation along the coast in the area of the present harbor which probably contained a few fishponds and burial sites, all of which would have been destroyed with harbor construction during the early 1900s. Further, the October 2000 archaeological survey of Hilo Harbor showed no evidence of visitation to or continued use of the unconfirmed "heiau" located near the project site (Personal Communication, Alan Haun, Ph.D, 2000).

Oral Histories Regarding Traditional Cultural Practices

The following description of cultural practices within the harbor area over the last half century in the Hilo Harbor area is based on a December 2000 informant interviews with: 1) Mr. John Moses, who is a Native Hawaiian, life-long Hilo resident and 44-year employee of the Harbors Division, based at Hilo Harbor and 2) Mr. Ian Birnie, the current Hilo Harbormaster. These were some of their observations regarding historic usage of the harbor:

- Recreational fishing has occurred in the harbor for as long as Mr. Moses can recall.
- Per the Harbormaster, an additional structure existed between the harbor and residences on Baker's Beach that was used as a military officers' club during World War II. It was later converted to living quarters for the Hilo Harbormaster. Mr. Birnie believes that Site 22846 (see section 4.3.1) is the foundation of that structure, where as a young man he visited the former Harbormaster who was a family friend.
- All houses along Baker's Beach were standing before and after the 1960 tsunami, according to Mr. Moses. He also said that the large house now used by Hawaiian Electric Light Company (HELCO) as a meeting hall for its employees used to be our informant's residence. HELCO had

planned to move the structure to the beach but the force of the tsunami actually moved it to the waterfront.

Mr. Moses' oral history account is found in APPENDIX I.

Mr. John Keola Lake is a native Hawaiian whose oral history with regard to the Kawaihae ahupua'a is presented below in this section. Mr. Lake offered the following information from his knowledge of traditional cultural practices in Hilo:

- Hilo had the ideal characteristics for a typical early Hawaiian settlement because it was flat, had abundant rainfall and a calm harbor (Hilo Bay).
- Mr. Lake corroborated the facts that population and commerce were centered around the mouth of the Wailoa River and Waiakea Pond, and not the current harbor site, because navigation was possible from the ocean. He also said that the only traditional cultural practice associated with the coastline where Hilo Harbor is now located was fishing.
- The nearby "Ice Pond," where cold fresh water pours in to the bay through an underwater spring, has long been a point of interest in Hilo.
- Mokuola, now called Coconut Island and located one mile from the current harbor, was a traditional "birthing place" for Hawaiian women.
- Pertaining to traditional land uses in the harbor area, nearby Keaukaha was known for orchards. South of Waiakea Pond were taro patches. In Panaewa, where Hilo International Airport is now located, there was another orchard with coconut trees and lauhala.

Mr. Lake's oral history account is found in APPENDIX J.

Kawaihae Harbor.

Cultural History

The first traditional account of Kawaihae was in the context of a disastrous raid by a Maui chief. The account indicated a large population in the uplands and a small population of "lower Kawaihae" near the shoreline. Several accounts indicated that the populace of the coastal area often left for significant periods of time to farm in the Waimea area (Cultural Surveys Hawaii, 1991).

The most significant archeological resource of the *ahupua'a* Kawaihae 2 near the shoreline, and directly above Kawaihae Harbor, is the sacred heiau Puukohola, which is a registered National Historic Site. This heiau was reconstructed by Kamehameha circa 1791. Near the heiau were several royal and alii residences which has prompted archaeologists to state, "Kawaihae has been well known as the residence of kings" (Cultural Surveys Hawaii, 1991).

In the early historic period, Kawaihae's shoreline was, as it is today, the best anchorage in west Hawaii. As a result, there are many early reports of settlements there. The few native huts scattered along the shore were repeatedly destroyed by enemies. The most well-constructed buildings housed the canoes. Post-Contact, the shoreline of Kawaihae became a center for shipment of cattle and vegetables from Waimea. Interisland steamship traffic resulted in commercial development of warehouse and loading facilities as well as animal enclosures (Cultural Surveys Hawaii, 1991).

Oral Histories regarding Traditional Cultural Practices

Extensive oral histories with long-term Kawaihae residents were taken in preparation of the 1991 archaeological study of the Kawaihae area cited by Cultural Surveys Hawaii. Informants and their ages in 1991 included Mr. William Akau, age 62; Mr. Masaru Doi, age 73; and Mr. Eddie La'au, Jr. In November 2000, two Native Hawaiians from the Island of Hawaii who were consulted for names of informants in the Kawaihae area also suggested speaking to Mr. Akau and Mr. La'au. This reinforces the continuing relevance of oral histories they provided in the past.

Interviews relating to traditional cultural practices in the harbor area indicated that dredging and construction of the harbor in the 1960s eliminated most of the practices that existed previously. Relevant highlights of the oral histories include:

- Several families had fishponds that were eliminated by construction of the harbor.
- Where mullet fishing used to occur in the nearby "Shark" heiau, sedimentation from storm runoff had resulted in reduced fish stocks.
- Fishing was seasonal with less activity in the winter months. "All three informants emphasized how good the fishing used to be before the present harbor was dredged. While a variety of fishing activity went on, akule fishing, aku fishing and bait nehu catching were emphasized...The fishing brought many non-Hawaiians to live and work at Kawaihae."
- The tsunami of 1946 wiped out all commercial fishing activity because the fishponds in the Kawaihae area filled with debris. Stated one informant, "It was the beginning of the end for the Kawaihae fishing village. People left."
- The interviewer observed that "Curiously, the construction of a massive deep draft harbor was a source of little comment. It did cause the condemnation of homesteads around the fishpond." (Cultural Surveys Hawaii, 1991)

An additional oral history account of the Kawaihae ahupua'a was taken in January 2001 from Mr. John Keola Lake. Mr. Lake is the Kahuna Nui (high priest) for Puukohola Heiau in Kawaihae. During consultation with National Park Service, Mr. Daniel Kawaiaea, Superintendent of the Puukohola Heiau National Historic Site, referred R.M. Towill Corporation to Mr. Lake as a key informant for traditional cultural practices on the Island of Hawaii, particularly Kawaihae.

Mr. Lake, a teacher of Hawaiian oral tradition and chanting for 38 years, conducted intensive research of the Kawaihae area prior to becoming Kahuna Nui. He provided the following information relative to traditional cultural practices in the Kawaihae ahupua'a:

- Puukohola Heiau is the equivalent of the "State temple of the Hawaiians."
- Post-contact, the area around Kawaihae Harbor was named the Pelekane lands, referring to the British sailors who came into the developing port.
- Pre-contact, Kawaihae Bay was a peaceful harbor for the alii. Activities focused on the sea, such as gathering of limu in brackish water where streams flowed into the ocean. The limu was used to feed the fish in fishponds along the shore. Along the shoreward side of the reef, Hawaiians would gather crabs, squid and shallow-water fish. On the seaward side of the reef they would go deep sea diving.
- The brackish water enabled growing of mahaloa which was used for weaving fine mats and hats.
- Recreational activities included swimming, deep sea fishing, shoreline fishing and canoeing. Along the coast, the best diving spot was at Hapuna.
- Kawaihae Harbor was a bustling harbor area where cattle were brought from ranches in Waimea for transport to Honolulu. Cattle were driven down what is now Kawaihae Road as recently as the 1940s.

4.4.2 Potential Impacts

With the exception of fishing, traditional cultural practices are not in evidence at either harbor because neither location was a significant historical habitation site, and ***because of*** the high degree of disturbance from natural forces (tsunami) and harbor construction. Oral histories corroborate this. Further, recreational practices are not planned to be curtailed from current levels at either harbor under the 2020 Master Plan (see Section 4.6, RECREATIONAL RESOURCES).

4.4.3 Proposed Mitigation Measures

As there are no significant impacts to traditional cultural practices, no mitigation measures are recommended.

4.5 SCENIC RESOURCES

4.5.1 Existing Conditions

Hilo Harbor. Scenic areas of Hilo Bay include Mauna Loa and Mauna Kea, the graceful arch of the nearly two-mile harbor breakwater, the small boat area in Reed's Bay, and Coconut Island fronting the hotels on nearby Banyan Drive. Views toward the harbor and Hilo Bay are enjoyed by the hotels on the east side of Banyan Drive and from a distance from the north coast of the bay (FIGURE [23] ***34***).

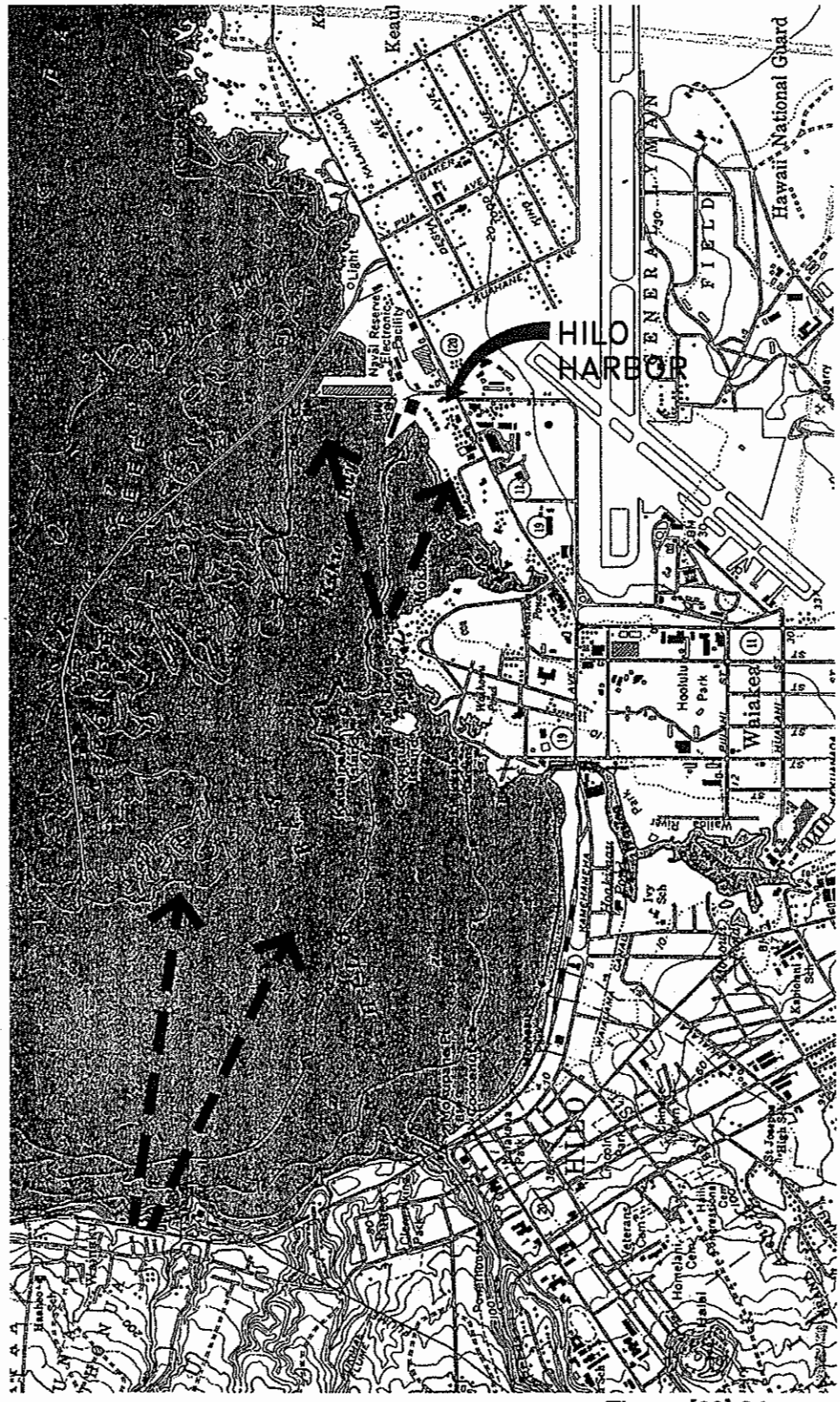

Figure [23] 34
View Planes and Scenic Vistas
HILO HARBOR VICINITY
Source: R. M. Towill Corporation

Not to Scale

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Kawaihae Harbor. The harbor is visible below the prominent hilltop where Puukohola Heiau National Historic Site is located and from along Kawaihae Road (FIGURE [24] ***35***).

4.5.2 Potential Impacts

Hilo Harbor. The construction of proposed Piers 5 and 6 will alter the shoreline of Hilo Harbor. These piers will be used by cruise ships using the proposed passenger terminal. The vista from the hotels on Banyan Drive and from the Alaealea Point area (FIGURE [22] ***33***) will include the new piers. However, hotel guests frequently remark positively about the attractiveness and festive atmosphere that the docking of cruise ships presents (Personal Communication, Harbormaster, 2001).

Kawaihae Harbor. Alteration of the shoreline through construction of proposed Piers 3, 4 and 5 and a liquid bulk terminal will affect the coastal vista from Puukohala Heiau National Historic Site, approximately one mile from Kawaihae Harbor. Sheds for the new interisland terminal and storage tanks for the proposed liquid bulk terminal would be visible from mauka areas and from the Puukohola ***Heiau*** National Historic Site. Construction of piers will make the shoreline more regular but not significantly alter the landscape. The light-colored coral stockpile area already visible will be replaced by asphalt pavement. A regular pier edge will replace the existing jagged-edged coral stockpile.

Since Kawaihae Road is on the same elevation as the harbor, improvements will be visible from Kawaihae Road to the extent that they are elevated above the ground, e.g. liquid bulk storage tanks.

4.5.3 Proposed Mitigation Measures

Hilo Harbor. There are no mitigation measures that would completely alleviate the visual impacts from the east-facing Banyan Drive hotels resulting from the construction of additional piers. However, watching the activity of the harbor and the comings and goings of cruise ships is popular with hotel guests.

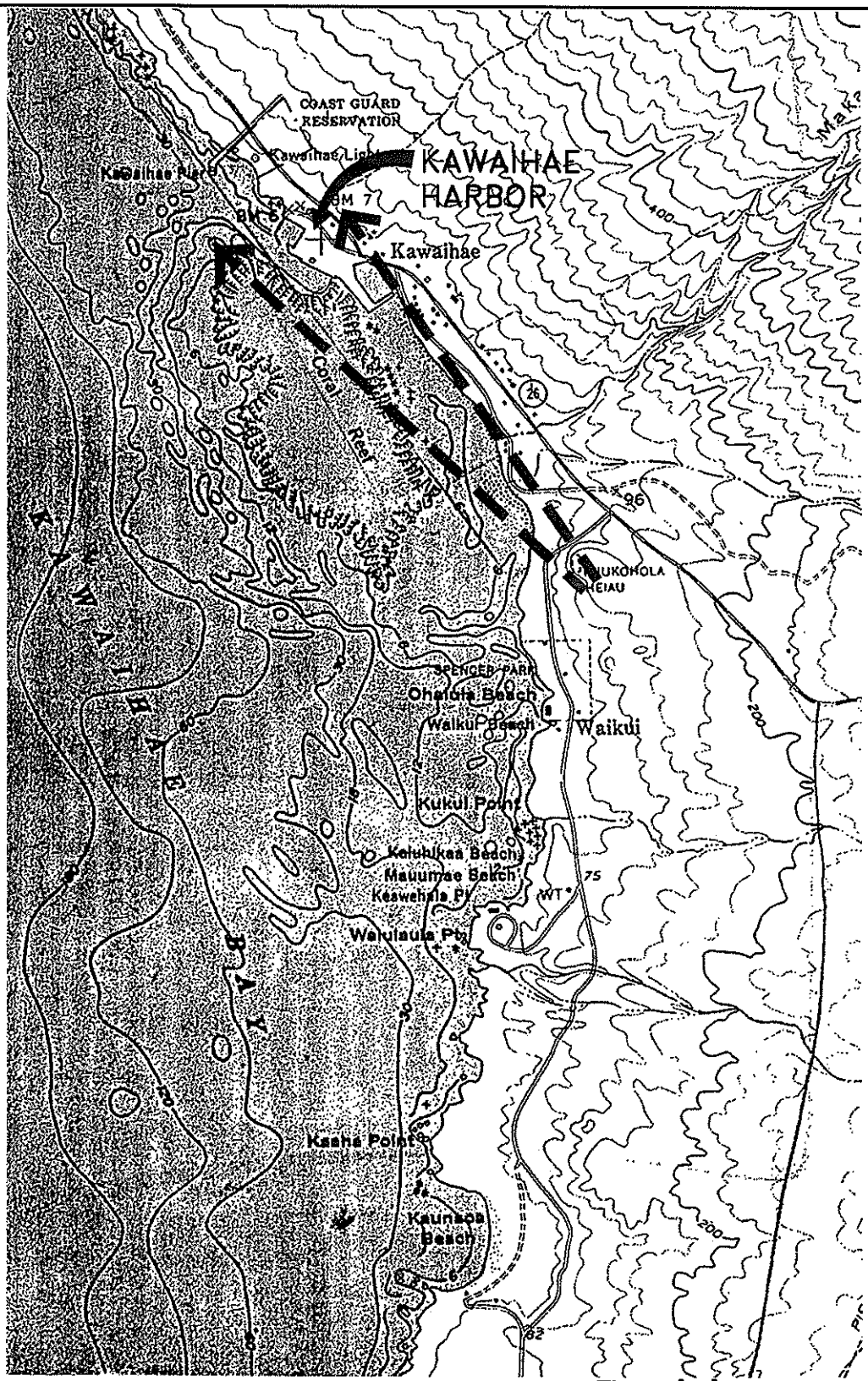

Figure [24] 35
View Planes and Scenic Vistas
KAWAIHAE HARBOR VICINITY
Source: R. M. Towill Corporation

Not to Scale

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To reduce the visual impact of improvements from Kalanianaole Avenue, Harbors Division will provide landscaping as a buffer.

Kawaihae Harbor. Visual impacts from Puukohola Heiau National Historic Site will be reduced by selection of paint colors for sheds and potential liquid bulk tanks and pipelines.

4.6 RECREATIONAL RESOURCES

As industrial areas, the two harbors do not provide formal recreational opportunities. However, each harbor provides access to the public for recreational waterfront uses as follows.

4.6.1 Existing Conditions

Hilo Harbor

Fishing

The main recreational activity at Hilo Harbor is fishing off the three piers and in Radio Bay. Daytime access to the harbor for fishing is relatively unrestricted. Fisherman must vacate areas that are being actively used for cargo handling or cruise ship berthing or when a fuel barge is berthed at a particular pier. Nighttime fishing (6 p.m. to 6 a.m.) is allowed with a fishing permit. Over 7,000 five-year, free-of-charge fishing permits for Hilo Harbor had been granted by the Harbors Division as of December 2000. On a typical day, approximately 30 people can be found fishing at the harbor (Personal Communication, Harbormaster, 2000).

Twice annually, fishermen compete in the islandwide Casting Club fishing tournament and use Hilo Harbor as one of their fishing sites. Ulua weighing 50-70 pounds have been caught off the dock. More frequent catches are papio and halalu caught off the end of Piers 1 and 3 and mullet in Radio Bay (Personal Communication, John Moses, 2000).

Harbors Division's unwritten policy is to be supportive of fishing at Hilo Harbor because it meets community recreational needs and helps keep the harbor area secure -- in the past people fishing have been known to report suspicious activity at the harbor. The system of unrestricted daytime fishing and nighttime fishing by permit appears to be acceptable to both harbor management and the fishing community.

Mooring of Recreational Vessels

Radio Bay is often the temporary mooring site for itinerant recreational vessels. This area has ladders that lead up to the harbor.

Kawaihae Harbor

Fishing

Fishing at Kawaihae Harbor is available to the public during daylight hours with no permits required. Fishing occurs along the existing piers of the harbor and in the area designated as a fishery under the jurisdiction of the Department of Land and Natural Resources.

Recent vandalism and nighttime loitering have prompted Harbors Division to erect a chain-link fence to restrict vehicular access to the coral stockpile area at night, although nighttime fishing is still allowed.

Mooring of Recreational Vessels

Kawaihae Harbor is bordered north and south by small boat harbors which are administered by the State Department of Land and Natural Resources (DLNR). The northernmost small boat harbor has shoreside facilities including a boat ramp and rest rooms. The southernmost small boat harbor is unimproved except for a harbor breakwater constructed by the U.S. Army Corps of Engineers.

Cooperation between DLNR and Harbors Division has allowed small boats to moor within the breakwater in the commercial harbor area. Consultation with DLNR revealed that as of December 2000, within the harbor basin 34 Mooring Permits (Form LNR 3-137) were in force along the southeast perimeter of the inner harbor. This area provides access to the shore through use of a small wooden pier (FIGURE [25] ***36***).

When granted, mooring permits within the harbor basin managed by Harbors Division carry the following attachment from DLNR that must be signed by the mooring assignee:

> "Your mooring assignment is provisional based upon the future needs of the harbor. While we do not anticipate the Harbors Division expanding their operations in the near future we must be prepared for that contingency. Your mooring assignment is based upon this possibility ... We therefore must inform you in advance that should the Harbors Division reclaim the mooring area you will be required to move your vessel upon ninety (90) days notice. [Neither] the

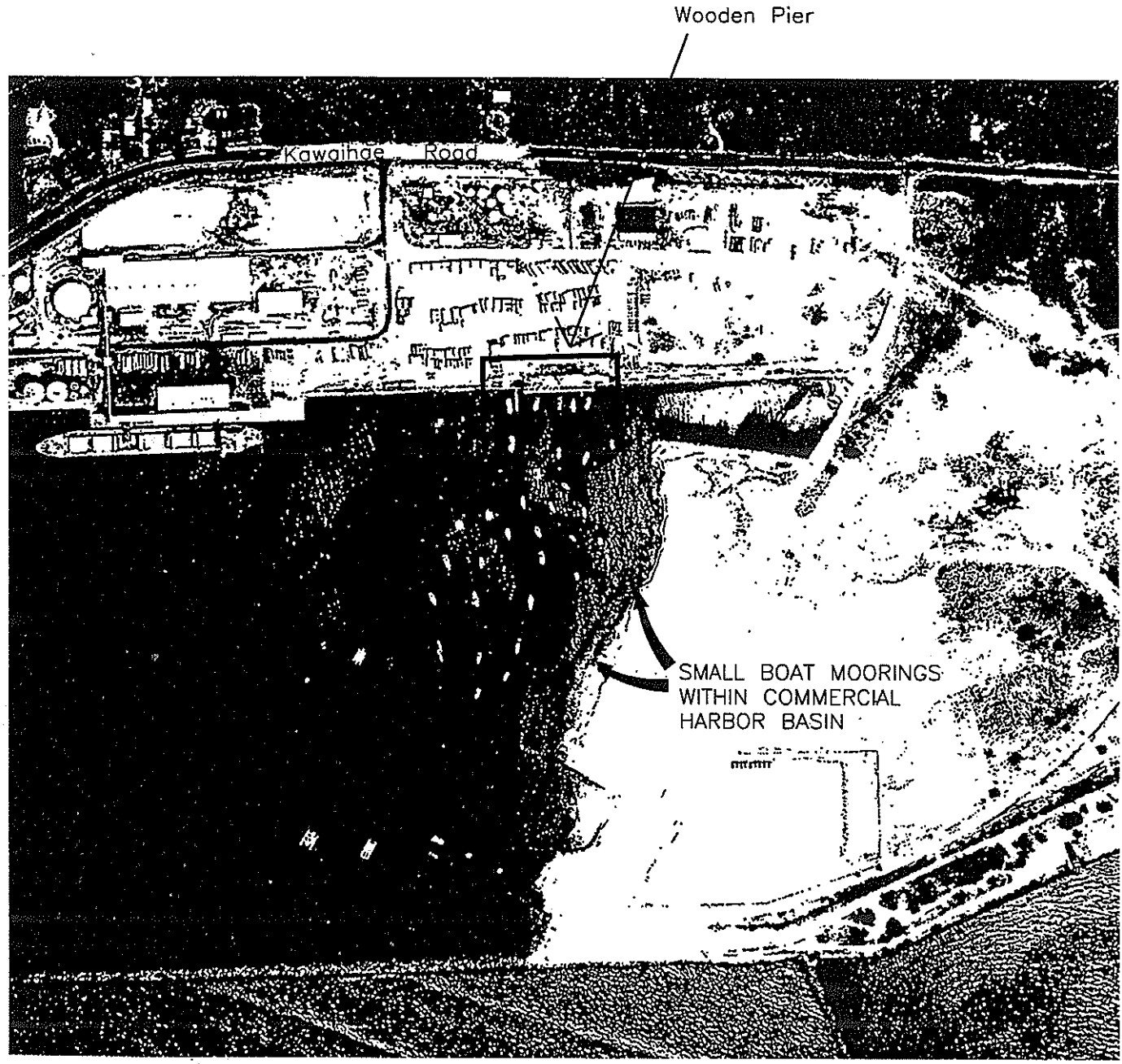

Figure [25] 36
Location of Small Boat Moorings
KAWAIHAE HARBOR
Aerial Photography by R. M. Towill Corp.

Not to Scale

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Harbors Division nor DLNR-Boating Division makes any assurances that another mooring will be available at Kawaihae Harbor or any other facility."

Waterfront Activities

The following observation was made by the marine biologist who spent several days surveying the marine environment at Kawaihae Harbor for this EIS: "At present the shoreline along the southeast side of the harbor is a beach area that was formed from dredge tailings material when the present harbor was formed. Although the beach is not particularly attractive and is composed of packed sediment and cobbles it is apparently quite popular with the public for recreational use, approximately 30 people having been observed to use the area each day on September 16 and 17, 2000 (a Saturday and Sunday) when the present survey was conducted. This popularity is apparently because rocks dredged up to near the shore in harbor construction form small tide pools and quiet swimming areas that are used by families with small children" (AECOS, Inc., 2000).

Surfing and sailing recreation facilities are accommodated in the harbor area but occur outside the breakwater.

- The organization Pua Kailima o Kawaihae is a non-profit organization which supports continued access to the shoreline, particularly for surfing. Under a 1998 Cooperative Agreement with Harbors Division, the organization maintains a "cultural surf park" on 0.86 acre[s] on the ocean side of the military LST/LSV ramp. In its designated area the group has constructed outdoor showers, a storage area for surfing and sailing vessels and a landscaped area with a sign bearing the name "Pua Kailima o Kawaihae."
- Near the southerly small boat harbor the YMCA conducts a youth sailing program at the harbor using a building originally constructed for filming of a television series "Wind on Water" and later abandoned. The structure has no restrooms. Several outrigger canoe clubs use the calm waters of the inner harbor for practice and racing. The non-profit educational organization associated with the sailing canoe Makalii has been provided temporary shed space free of charge at the harbor until Harbors Division is able to find a paying tenant.

4.6.2 Potential Impacts

Hilo Harbor.

Fishing

The area available for fishing off improved piers will be increased since no fishing is possible along the entire Baker's Beach coastline. Piers 4, 5 and 6 will provide improved surfaces for fishing that currently do not exist. Dredging and construction of proposed Piers 4, 5 and 6 could result in changes in tidal currents in Reed's Bay and the circulation of water. This could affect the movement of fish through Hilo Bay, particularly during construction.

Recreational Vessels

No impact is seen for recreational vessels in Hilo Harbor, as they will continue to be able to use Radio Bay area for transient mooring under the 2020 Master Plan.

Kawaihae Harbor. The existing fishery area will be retained in the planning of new piers. It is possible that dredging and pier construction will reduce the diversity of fish in the harbor area. This is evidenced currently by the current difference in marine biological diversity between pier areas and unimproved areas.

Recreational Vessels

Construction of Piers 4, 5 and 6 will require all small boats to find alternate mooring sites because of the location of the piers. Also, the wooden pier currently used by boaters for access to the harbor will be replaced by a commercial pier. As illustrated by the wording of boat mooring contracts quoted above, small boat owners have formally acknowledged official notice that their individual mooring within the harbor is on a provisional basis pending future harbor development.

Completion of improvements within the southernmost small boat harbor will potentially provide alternate mooring sites for these boats. Removal of small boats from the commercial harbor will result in a larger turning basin for vessels maneuvering into the piers. This will in turn result in safer conditions for commercial vessels operating in the harbor.

Swimming and other Waterfront Activities

Under the 2020 Master Plan, swimming will be curtailed to the undeveloped shoreline of the U.S. Army LST/LSV ramp and within the small boat harbors. Sailing and surfing will be able to continue because these activities take place outside the harbor.

Outrigger canoe paddling practice could eventually be restricted to the two small boat harbors when harbor development increases in the future. However, Harbors Division has no plans to restrict access to the commercial harbor for canoe paddlers unless the harbor is truly busy and the safety of the paddlers is jeopardized. Commercial vessels rarely use the harbor on Saturdays and there is usually no conflict with paddling except when a vessel is arriving or departing the commercial harbor (Personal Communication, Harbormaster, 2001).

4.6.3 Proposed Mitigation Measures

Hilo Harbor. Construction of piers which are designed as decks supported by concrete piles (see section 2.5.4) will minimize the disruption of tidal currents and circulation of water that could affect fishing in Hilo Bay that could affect fishing at the harbor.

Kawaihae Harbor. With regard to the eventual need to eliminate mooring of small vessels in the commercial harbor, Harbors Division will continue to encourage the Department of Land and Natural Resources to develop the southernmost small boat harbor shore access and amenities.

4.7 LAND TENURE

4.7.1 Existing Conditions

Issues related to land tenure pertinent to the 2020 Master Plan include: 1) the need for transfers of title for certain parcels that will be required for proposed development at Hilo Harbor; and 2) the use of ceded lands for harbor development.

Hilo Harbor.

Need for Land Transfers

Certain areas must be transferred to the Harbors Division for the proposed harbor development to proceed within TMK (3) 2-1-07 (FIGURE[26] ***37***). Harbors Division will request transfer of the Baker's Beach Lease Lots and the access road that leads to them from DLNR in order for development of Piers 4, 5 and 6 to proceed. The possibility of providing a pedestrian walkway

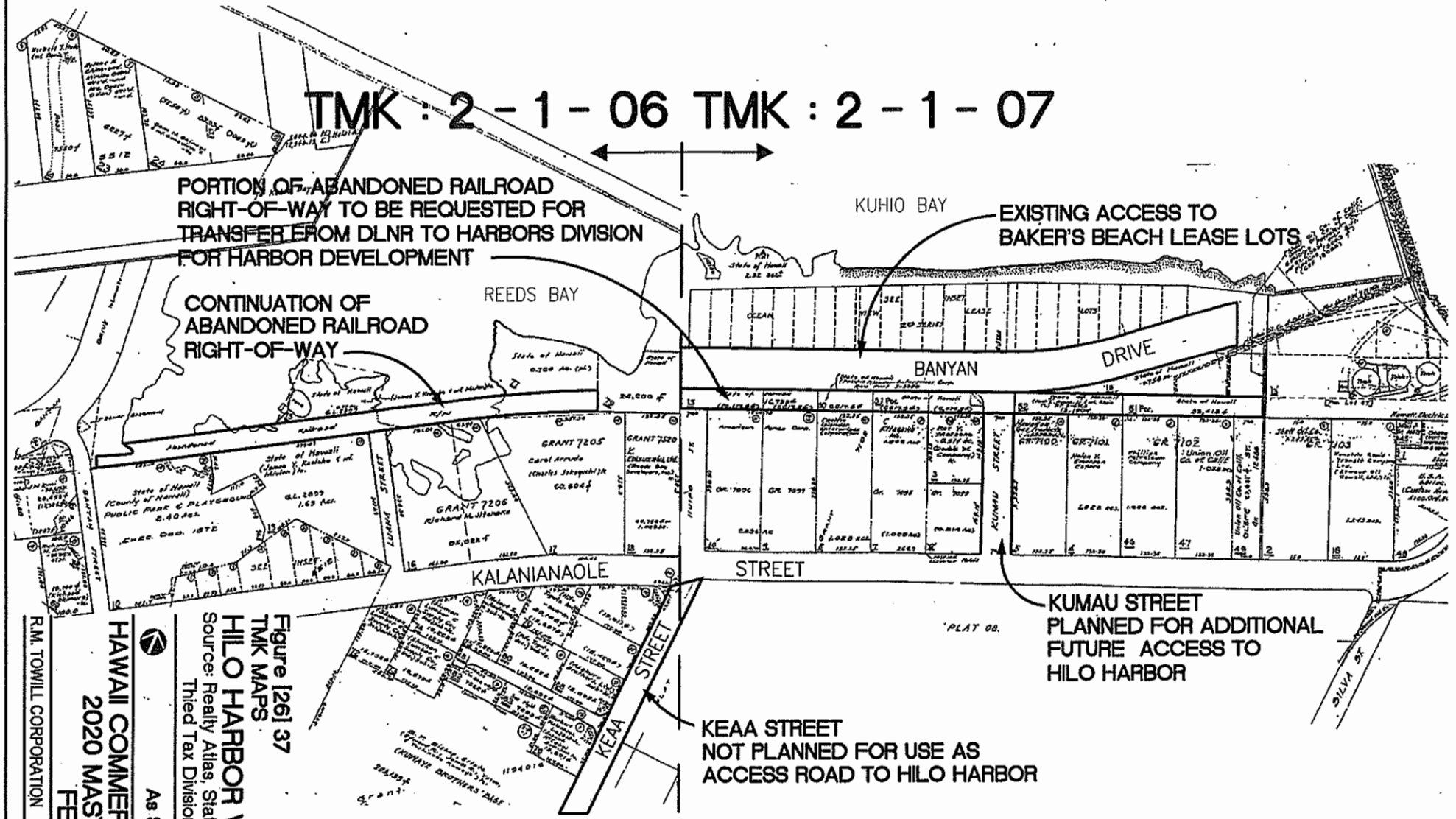

Figure [26] 37
TMK MAPS

HILO HARBOR VICINITY

Source: Realty Atlas, State of Hawaii,
Thied Tax Division, County of Hawaii

As Shown

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along an abandoned railroad right-of-way which extends into TMK (3) 2-1-06 will be discussed at that time. Access to the proposed Piers 4, 5 and 6 will be through Kumau Street, which is the current access to the Baker's Beach Lease Lots, rather than through nearby Keaa Street.

Ceded Lands

According to the Harbors Division Property Management records, only a very small area of Harbors property is located on ceded lands (FIGURE [27] ***38***).

Kawaihae Harbor.

Ceded Lands

According to Harbors Division Property Management records, portions of Kawaihae Harbor are located on ceded lands (FIGURE [28] ***39***). When Hawaii became a State in 1959, the disposition of former Crown and Government lands (ceded lands) were established in section 5 of the Admission Act. Section 5(f) of the Admission Act provides that these lands and the income and proceeds derived from them are to be held in trust by the State of Hawaii. Submerged lands in the State of Hawaii are a part of the ceded lands trust. Section 5 of the Admission Act states that ceded lands are to be utilized for the making of public improvements and the provision of lands for public
use. The proposed improvements at Kawaihae Harbor are consistent with these purposes for ceded lands.

4.7.2 Potential Impacts

Hilo Harbor. If Harbors Division is unable to obtain the transfer of lands from DLNR at Hilo Harbor, development of Piers 4, 5 and 6, cruise ship passenger terminal and Ocean Research Facility will not be able to proceed.

The possible pedestrian walkway along the abandoned railroad right of way would increase access to the harbor for cruise ship passengers to the Banyan Drive area and Hilo Town.

Kawaihae Harbor. The proposed improvements under the 2020 Master Plan would result in further development of ceded lands that are currently unimproved.

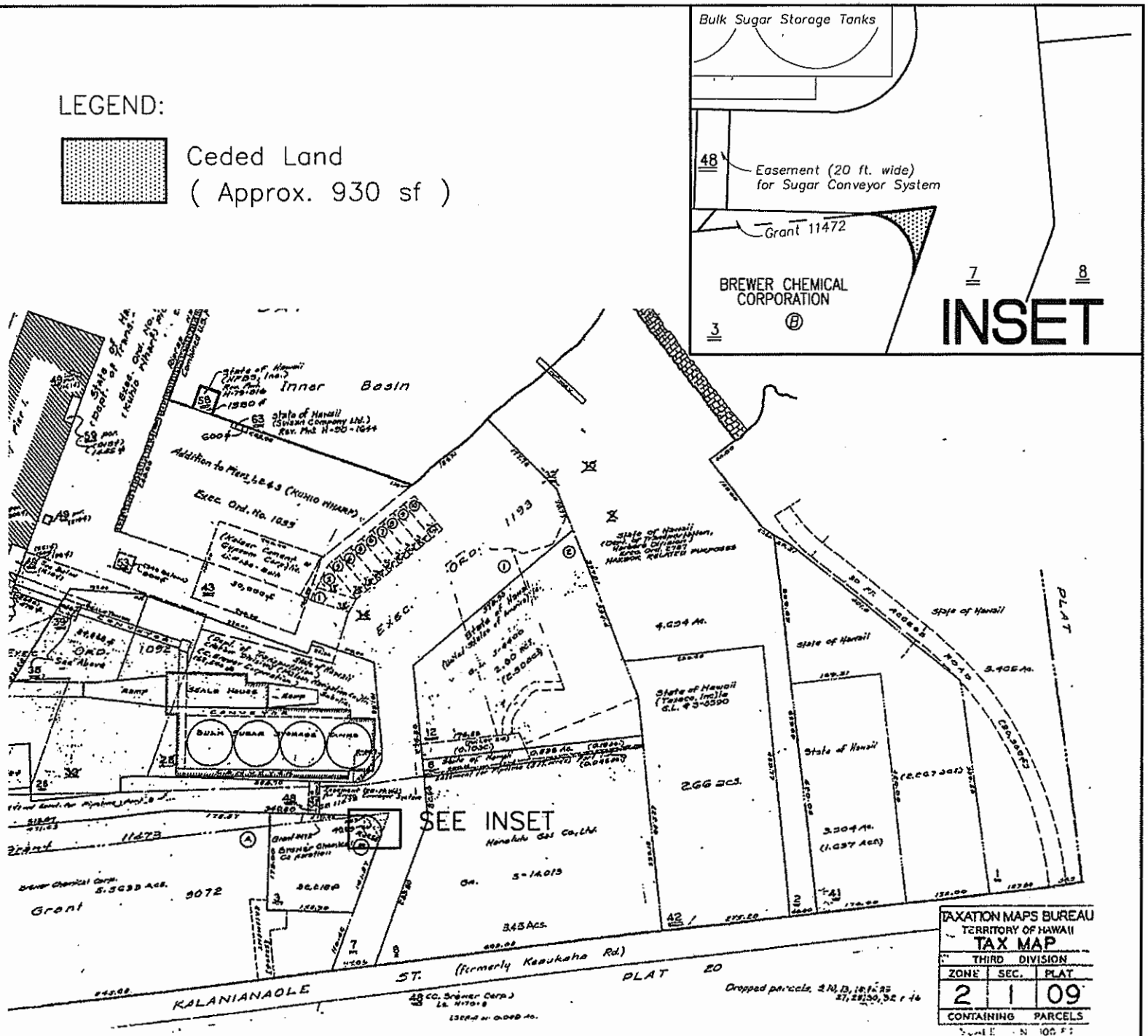

Figure [27] 38
CEDED LAND
HILO HARBOR
Source: Harbors Division Property Management

Not to Scale

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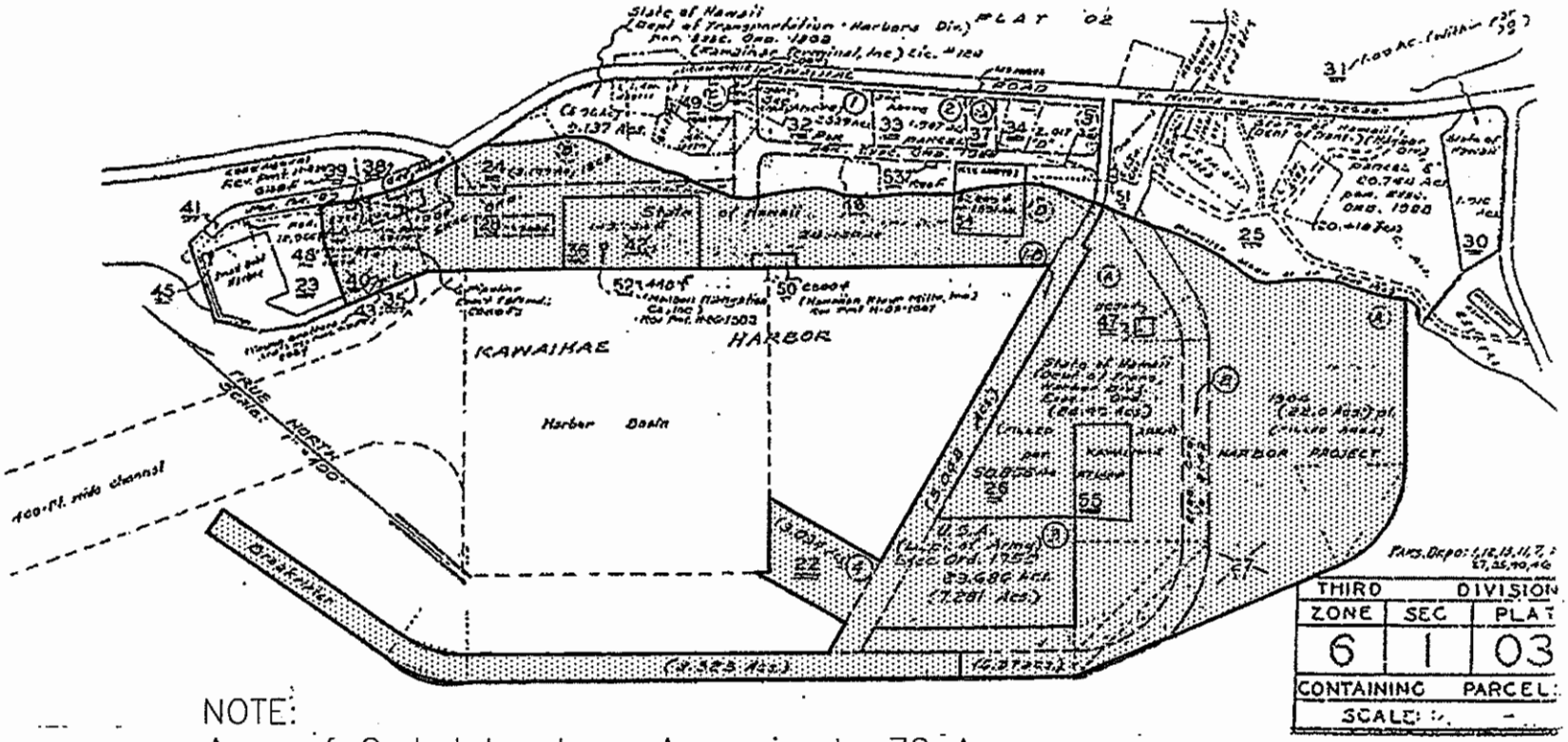

NOTE:
Area of Ceded Lands = Approximate 72 Acres, including the breakwater area.

LEGEND:

Ceded Lands

SCALE IN FEET
0 100 200 300 400 500

Figure [28] 39
CEDED LAND
KAWAIHAE HARBOR
Source: Harbors Division Property Management

As Shown

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4.7.3 Proposed Mitigation Measures

Hilo Harbor. Harbors Division must successfully complete the needed land transfers and agreements with other governmental agencies cited above in order for certain harbor improvements to proceed as described above (Section 4.7.2). No mitigation measures are proposed for the issue of the use of ceded lands because the harbor improvements are in concert with the established purposes.

Kawaihae Harbor. No mitigation measures are proposed, as Harbors Division plans to continue to use ceded lands at Kawaihae Harbor in a manner consistent with the Admissions Act.

CHAPTER 5
RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

5.1 APPLICABLE ENVIRONMENTAL RULES AND REGULATIONS

The EIS preparation and review process is pursuant to all applicable [f]*F*ederal, State and [c]*C*ounty environmental statutes, rules, regulations and ordinances. This includes, but is not necessarily limited to, the following:

National Environmental Policy Act of 1969
Section 7, Endangered Species Act
Section 106, National Historic Preservation Act of 1966, as amended
Clean Water Act, as amended
Coastal Zone Management Act
Chapter 343, Hawaii Revised Statutes
Title 11, Chapter 200, State of Hawaii, Department of Health Administrative Rules

5.2 FEDERAL LAND USE PLANS AND POLICIES

Land use policies, plans, and controls administered by the Federal government which affect the proposed action are described in the following sections.

5.2.1 Clean Water Act (CWA)

The Clean Water Act, Section 404:

- Defines requirements for discharges of dredged or fill materials in waters of the United States.
- Sets limits on such discharges.

Permit approvals are obtained from the Army Corps of Engineers (ACOE). [Other planned improvements could require an Approval of Drainage Outfall by ACOE.]

According to 33 CFR 232.2 (d)(3)(ii), a Section 404 permit would not be required for any incidental movement of dredged material occurring during normal dredging operations (defined as dredging for navigation in navigable waters of the United States).

It is likely that a Section 404 Permit will be required for the proposed actions at both harbors because of plans for dredging as well as "infilling" during piling operations that would be considered a discharge of fill material in the water.

5.2.2 Water Quality Certification (Section 401 Clean Water Act)

A Water Quality Certification (WQC) is required when proposed construction or operation may result in discharges into State waters pursuant to the Federal CWA. In Hawaii, the State Department of Health (DOH) has authority for project review and issuance of the WQC under Hawaii Revised Statutes (HRS) Chapter 342D and associated Hawaii Administrative Rules (HAR) 11-54.

Since it has been determined that the proposed action will result in the discharge of fill materials requiring a CWA Section 404 permit, a CWA Section 401 Water Quality Certification (WQC) will also be required.

5.2.3 NPDES Permit (Section 402 Clean Water Act)

A NPDES permit will be required for the proposed harbor improvements. Discharges of point sources of pollutants into surface waters of the U.S. are regulated under the National Pollutant Discharge Elimination System (NPDES) program, pursuant to CWA, Section 402. In Hawaii, the DOH administers the NPDES program under HAR 11-55.

NPDES permits are available under General or Individual categories. General permits are available for activities that meet specific criteria, such as construction-related storm water discharges, hydrotesting, and construction dewatering. The Individual Permit has greater flexibility, but involves a longer process, including Public Notice of Permit Application.

Separate Notices of Intent (NOIs) are required for NPDES General Permit coverage for hydrotesting, dewatering, or discharges to surface waters of construction-related stormwater from sites equal to or greater than 5 acres in size. Discharge of dewatering effluent associated with dredged sediment would require NPDES permit coverage as well. The NOI submitted with the NPDES permit application requires development of a Best Management Practices plan, in accordance with HAR 11-55. Discharges for storm water associated with construction activity,

hydrotesting, dewatering and any industrial discharge under the proposed project will require NPDES permit approvals from DOH.

5.2.4 Rivers and Harbors Act

The Rivers and Harbors Act (RHA), Section 10, requires the issuance of a Department of the Army permit for any activity that obstructs or alters navigable waters of the U.S., or modifies the course, location, condition, or capacity of any port, harbor or refuge, or enclosure within the limits of any breakwater or of the channel of any navigable water. The USACE was consulted and has confirmed that a permit under Section 10, Rivers and Harbors Act, will be required for the proposed action.

5.2.5 Marine Protection, Research, and Sanctuaries Act

Section 103 of the Marine Protection, Research and Sanctuaries Act (MPRSA) (33 U.S.C. 1413) authorizes the USACE to issue permits for the transportation of dredged material for the purpose of dumping in ocean waters. Section 103 prohibits disposal activities that would unreasonably degrade or endanger human health or the marine environment.

The EPA and USACE have joint authority for regulating ocean disposal of dredged material and for managing ocean dredged material disposal sites (ODMDS) in the Hawaiian Islands. Under the MPRSA, Section 103, the USACE in coordination with the EPA has the authority to issue permits for ocean dumping. A USACE permit under Section 103 will not be required for Kawaihae Harbor, since dredged spoils will be kept on Harbors Division property. However, the proposed action in Hilo Bay will require such a permit because of the intended use of the EPA ocean dumping site for dredging spoils resulting from Hilo Harbor development.

5.2.6 Endangered Species Act and Marine Mammal Protection Act

The Endangered Species Act of 1973 and the Marine Mammal Protection Act of 1972 require that actions will not jeopardize the continued existence of endangered or threatened marine and terrestrial plant and animal species. The U.S. Fish and Wildlife Service (USFWS) has jurisdiction over certain Federally-listed threatened and endangered (T&E) species that occur in terrestrial and marine environments. The National Marine Fisheries Service (NMFS) has jurisdiction over marine mammals and fishes. The two agencies share responsibility for listed T&E sea turtles.

As discussed in Section 3.9, it is not anticipated that there will be any significant impacts to T&E marine and non-marine species as a result of the proposed project. However, protected marine species are known to "wander into" both harbors. Therefore, close coordination and consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service will be maintained during project planning and construction.

5.2.7 National Historic Preservation Act

Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations (36 CFR 800), are intended to provide for the protection and use of historic properties for the benefit of the public. The State Department of Land and Natural Resources - Historic Preservation Division (SHPD), oversees the historic preservation compliance process. The SHPD determines whether any historic sites exist and their historical significance.

As mentioned in Section 4.2, the archaeological investigation report determined that there were no significant historic structures on the project sites. Should the State Historic Preservation Division determine otherwise, then appropriate mitigation and preservation measures will be developed.

5.2.8 Native American Graves Protection and Repatriation Act

The proposed project will be conducted in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA). NAGPRA, which was passed into law in 1990, is intended to protect Native American (including [n]*N*ative Hawaiian) burial sites. NAGPRA sets guidelines for the removal and subsequent repatriation of human remains and associated burial objects on Federal, Indian, and [n]*N*ative Hawaiian lands.

NAGPRA requires consultation with [n]*N*ative Hawaiian organizations, including the Office of Hawaiian Affairs and the State Historic Preservation Division (DLNR) if Hawaiian burials are encountered. Because of the highly disturbed nature of each harbor, it is unlikely that any human burials exist within the project site areas. However, should human remains be encountered, the above NAGPRA requirements will be met.

5.2.9 National Marine Sanctuaries Act

A Hawaii Whale Sanctuary is located near Kawaihae. ***The National Marine Sanctuaries Act, 16 U.S.C. 1431 ET.SEQ., as amended by Public Law 104-283, includes the following among its purposes and policies: (1) to identify and designate as national marine sanctuaries areas of the marine environment which are of special national significance; and (2) to provide authority for comprehensive and coordinated conservation and management of these marine areas, and activities affecting them, in a manner that which complements existing regulatory authorities. Any development under the Hawaii Commercial Harbors 2020 Master Plan will comply with the National Marine Sanctuaries Act.***

5.2.10 Coastal Zone Management Act

The purpose of the Coastal Zone Management Act of 1972, as amended through P.L. 104-150, The Coastal Zone Protection Act of 1996, is to "preserve, protect, develop, and where possible, restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations" (National Oceanic and Atmospheric Administration, 2001).

According to the State of Hawaii, Coastal Zone Management Program Office, "Under the Federal consistency provisions of the Coastal Zone Management Act of 1972, as amended, all Federally licensed or permitted activities affecting the coastal zone must be conducted in a manner consistent with the State's approved management program. The State of Hawaii management program was approved September 1978. Consequently, any non-Federal applicant for a Federal license or permit is required to furnish a certification that the proposed activity will comply with the State's coastal zone management program. Generally, no permit will be issued until the State has concurred with the applicant's certification" (State of Hawaii, Office of Planning, 1987). Any development under the Hawaii Commercial Harbors 2020 Master Plan will comply with the Coastal Zone Management Act. See also Section 5.3.4, Coastal Zone Management Program, under "State Land Use Plans and Policies."

5.3 STATE LAND USE PLANS AND POLICIES

5.3.1 Hawaii State Plan (HRS 226)

The Hawaii State Plan is provided for under Hawaii Revised Statutes, Chapter 226, (1995) to serve as a guide for the future growth of the State of Hawaii. The Hawaii State Plan identifies goals, objectives, policies, and priorities for the development and growth. It provides a basis for prioritizing and allocating the states limited resources, including public funds, services, human resources, land, energy and water. The Hawaii State Plan establishes a system for the formulation and program coordination of State and County plans, policies, programs, projects, and regulatory activities and facilitates the integration of all major State and County activities.

The proposed action is consistent with the objectives and policies of the Hawaii State Plan. Specifically, the proposed action will increase and diversify the State's economic base through upgrading facilities for the shipping and tourist industries. Described below are sections of the Hawaii State Plan's goals, objectives, and policies that are relevant to the proposed action.

Part I - Goals, Objectives, and Policies

Hawaii State Plan, SEC. 226-8 Objectives and policies for the economy - visitor industry.

(b)(1) Support and assist in the promotion of Hawaii's visitor attractions.

Hawaii State Plan, SEC. 226-10 Objective and policies for the economy - potential growth activities.

(a) Planning for the State's economy with regard to potential growth activities shall be directed towards achievement of the objective of development and expansion of potential growth activities that serve to increase and diversify Hawaii's economic base.

(b) To achieve the potential growth activity objective, it shall be the policy of this State to: Facilitate investment and employment in economic activities that have the potential for growth such as diversified agriculture, aquaculture, apparel and textile manufacturing, film and television production, and energy and marine-related industries.

(5) Promote Hawaii's geographic, environmental, social, and technological advantages to attract new economic activities into the State.

(7) Increase research and the development of ocean-related economic activities such as mining, food production, and scientific research.

Hawaii State Plan, SEC. 226-11 Objectives and policies for the physical environment land-based, shoreline, and marine resources.

(a) Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:

(1) Prudent use of Hawaii's land-based, shoreline, and marine resources.

(2) Effective protection of Hawaii's unique and fragile environmental resources.

(b) To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:

(1) Exercise an overall conservation ethic in the use of Hawaii's natural resources.

(2) Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.

(3) Take into account the physical attributes of areas when planning and designing activities and facilities.

(4) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.

(5) Pursue compatible relationships among activities, facilities, and natural resources.

(6) Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.

Hawaii State Plan, SEC. 226-17 Objectives and Policies for Facility Systems - Transportation

(1) Provide for improved accessibility to shipping, docking, and storage facilities.

(2) Encourage transportation systems that serve to accommodate present and future development needs of communities.

(3) Increase the capacities of airport and harbor systems and support facilities to effectively accommodate transshipment of storage needs.

(4) Encourage the development of transportation systems and programs which would assist statewide economic growth and diversification.

Hawaii State Plan, SEC. 226-1O3 Economic priority guidelines.

(a) Priority guidelines to stimulate economic growth and encourage business expansion and development to provide needed jobs for Hawaii's people and achieve a stable and diversified economy:

(1) Seek a variety of means to increase the availability of investment capital for new and expanding enterprises.

(A)(iv) Reinvest in the local economy.

(6) Encourage the formation of cooperatives and other favorable marketing or distribution arrangements at the regional or local level to assist Hawaii's small-scale producers, manufacturers, and distributors.

10 (b)(4) Encourage visitor industry practices of activities which respect, preserve, and enhance Hawaii's significant natural, scenic, historic, and cultural resources.

5.3.2 State Functional Plans

State Functional Plans are the primary guidelines for implementing the Hawaii State Plan. In contrast to the Hawaii State Plan which establishes long-term objectives, the State Functional Plans serve to establish objectives for shorter-term actions. Described below are specific sections of State Functional Plans which contain overall themes, goals, objectives, and policies, that relate to the proposed action.

State Transportation Functional Plan

The following sections of the State Transportation Functional Plan are relevant to the proposed improvements identified in the 2020 Master Plan:

Objective 1A: Expansion of the transportation system.

1) Increase transportation capacity and modernize transportation infrastructure in accordance with existing master plans and laws requiring accessibility for people with disabilities.

As public facilities, with public accommodations, the final designs for cruise passenger terminals will be required to comply with Titles II and III of the Americans with Disabilities Act of 1990 (ADA). Sections with particular significance to the proposed projects are following: Section 226 (New Facilities), Section 227 (Alterations of existing Facilities), and Section 303 (New Construction and Alterations in Public Accommodations and Commercial Facilities).

Objective 1D: Identify reserve and acquire land for future transportation improvements.

State Conservation Lands Functional Plan

The objective of the State Conservation Lands Functional Plan is to provide for a management program allowing for judicious use of the State's natural resources balanced with the need to protect these resources to varying degrees. Objectives and policies that would be met by the completion of the proposed projects are presented below.

Objective IIE: Promotion and marketing of appropriate natural resources designated for commercial development.

Policy IIE(4): Assist the fishing industry to develop new markets and improve production and processing of fishery products.

5.3.3 State Land Use Law (Hawaii Revised Statutes, Chapter 205)

The State of Hawaii classifies all land into four districts: Urban, Conservation, Agricultural, and Rural. Changes to the boundaries of any conservation district and other districts greater than 15 acres must be approved by the State Land Use Commission. Changes to boundaries of districts other than conservation districts of less than 15 acres can be approved by the county land use authority.

The proposed action would involve activity on two land classes - Urban and Conservation. County of Hawaii land uses within the Urban District are regulated by the [through the] Zoning Code. The State Department of Land and Natural Resources regulates land uses in the Conservation District, including submerged lands in each harbor.

Harbors Division has an existing Conservation District Use Permit from the BLNR for any maritime construction activities in the harbors which would allow construction of the proposed projects to proceed.

5.3.4 Coastal Zone Management Program (Special Management Areas)

The Coastal Zone Management Act of 1972 (P.L. 92-583) is administered in Hawaii by the Office of Planning of the Department of Business, Economic Development, and Tourism.The objectives and policies of the Hawaii Coastal Zone Management (CZM),as set forth in Hawaii Revised

Statutes, Chapter 205A are to provide recreational resources; protect historic, scenic, and coastal ecosystem resources; provide economic uses; reduce coastal hazards; and manage development in the coastal zone.

Chapter 205A outlines controls and policies for development within an area along the shoreline referred to as the Special Management Area (SMA). SMA policies relating to the proposed action are administered by the County of Hawaii. Environmental concerns are also addressed through the CZM consistency review process. The entire Island of Hawaii is within the coastal zone area affected by the CZM Act.

5.3.5 Hawaii Long Range Land Transportation Plan

This plan, developed specifically for the Island of Hawaii, is utilized in developing a Statewide Transportation Plan that fulfills requirements of the Intermodal Surface and Transportation Efficiency Act (ISTEA) of 1991. The major outputs of this plan are forecast of transportation demand, potential transportation improvements, and a resulting long range land transportation plan. Projects are "tiered" within future time frames according to their priority.

5.3.6 Statewide Transportation Plan (STP)

The Department of Transportation - Highways Division is responsible for developing the Statewide Transportation Plan based on the Long Range Land Transportation Plan for each county (Section 5.3.5).

5.4 COUNTY OF HAWAII PLANS AND POLICIES

5.4.1 General Plan for the County of Hawaii

The County of Hawaii's General Plan is the policy document for the long-range comprehensive development of the Island of Hawaii. The General Plan provides direction for the future growth of the County (County of Hawaii, 1989). The General Plan is currently undergoing revision and is before the County Planning Commission for review. The 2020 Master Plan is consistent with the [following] policies in the currently-approved General Plan for the County of Hawaii, as follows:

Economic

The County of Hawaii shall encourage the development of the tourism industry which is consistent with the social, physical, and economic goals of the County. ***This includes tourism destinations along the coast in South Kohala and tourism activities in Hilo.***

Environmental Quality

The County of Hawaii shall take positive action to further maintain the quality of the environment for residents both in the present and in the future. ***Potential environmental impacts of the 2020 Master Plan and proposed mitigation measures are presented in Chapters 3 and 4 of this FEIS.***

Flood Control and Drainage

In areas vulnerable to severe damage due to the impact of wave action, restrictive land use and building structure regulations must be enacted relative to the potential for loss of life and property. Only uses which cannot be located elsewhere due to public necessity and character, such as maritime activities and the necessary public facilities and utilities, would be allowed in these areas. ***Harbor facilities fall into the category of "uses which cannot be located elsewhere." All planned harbor development will follow land use regulations for flood-prone areas.***

Natural Resources and Shoreline

The County of Hawaii should require users of natural resources to conduct their activities in a manner that avoids or minimizes adverse effects on the environment. ***Harbor activities will not utilize natural resources, but Harbors Division will follow all applicable environmental regulations as well as implement mitigation measures to eliminate or minimize potential impacts.***

Public Facilities

The County shall coordinate with appropriate State agencies for the provision of public facilities to serve the needs of the community. ***The 2020 Master Plan was developed collaboratively with County of Hawaii officials to ensure that harbor facilities will serve the needs of the two subject communities.***

Transportation

Provide a transportation system whereby people and goods can move efficiently, safely, comfortably and economically. ***The 2020 Master Plan provides essential infrastructure for the Island of Hawaii.***

5.4.2 County of Hawaii Zoning *and Land Use Designations*

Hilo Harbor is located in MG-1A and Open zoning designations. Kawaihae Harbor is in MG-1A, Open/RM-1.5 and Open. No changes in zoning are anticipated with this project. ***The County of Hawaii land use designations are Industrial for Hilo and Industrial/Open for Kawaihae Harbor.***

5.5 RELATED LAND USE PLANS

Consultation with the State Office of Planning, Hawaii County Planning Department and the Department of Hawaiian Home Lands revealed the following land use plans that are relevant to the proposed development. The most recent plan cited in consultation for South Kohala was dated 1992. No relevant plans for development in Hilo were noted.

5.5.1 West Hawaii Regional Plan (1989)

This plan was commissioned by the State Office of Planning to coordinate State activities and capital improvements and provide guidance for land use decision making. The South Kohala area where Kawaihae Harbor is located was characterized as dominated by the tourist industry, with major resorts the primary economic engine. Kawaihae Harbor is mentioned as critical infrastructure for both military activities through the Landing Ship Tank facility and for cargo. In this plan, the Kawaihae to Waikoloa area is seen as a "support community" for the West Hawaii Region or "large, new residential communities that would house employees of the region and offer a range of support services, convenience stores, and other community facilities." The plan recognizes the need for commercial harbor expansion at Kawaihae to support the development of West Hawaii Region:

> ***"The Kawaihae to Waikoloa area is a logical area [for a support community] given its wide variety of existing and proposed land uses: the expansion of Kawaihae deep draft Harbor; the urbanization of Hawaiian Home Lands at Kawaihae for industrial,***

commercial, agricultural-pastoral, and residential homesteading purposes; the planned expansion of Waikoloa...and the common set of infrastructure problems facing the Kawaihae-Waikoloa area, i.e., road development/realignment and water availability" (Office of Planning, 1989).

5.5.2 Kawaihae Ten-Year Master Plan, Kawaihae, South Kohala, Hawaii (1992)

The Department of Hawaiian Home Lands owns approximately 10,000 acres in the Kawaihae Area. The Ten-Year Master Plan covers 2,115 acres in the southwest corner of the property. Proposed land uses include 1,197 acres of residential land uses plus community facilities, commercial and industrial development and a town center. Approximately 227 acres of the property, located directly across Kawaihae Road from Kawaihae Harbor, is planned for industrial use.

If the Department of Hawaiian Home Lands follows through with this plan it could create a an opportunity for future expansion of harbor-related industrial land uses on DHHL lands. During past development of the harbor, liquid bulk pipelines were constructed with an eye to developing liquid bulk storage facilities on the DHHL lands, although this was never implemented.

5.5.3 Plans by the Puukohola Heiau National Historic Site

The Director of this National Park Service (NPS) facility indicates that its main activities will continue to be protection of the heiau and studies to understand it better, and to help the public understand the importance of existing sites. Future land use plans include construction of a new visitor center and maintenance facility on Federal property. The NPS will continue to use a trail through Harbors Division lands (under Cooperative Agreement) to access the John Young house. Eventually the Harbors Division lands will be used to access the Pelekane lands below the Puukohola temple. In conjunction with that, NPS plans to remove the "Old Spencer Road" on Federal property (Personal Communication, Daniel Kawaiaea, May 2001).

5.6 RELATED LAND USE COMMISSION DOCKETS AND OTHER PROJECTS

A review in May 2001 of the Land Use Commission's approvals and pending land use reclassifications yielded the information contained in Sections 5.6.1, 5.6.2 and 5.6.3.

5.6.1 Land Use Reclassifications - Hilo Harbor Vicinity (South Hilo)

The most recently approved land reclassification in the Hilo area was in 1994. The reclassification was for 288 acres from residential to agricultural district for Brewer Properties. There is currently a pending land use reclassification before the Land Use Commission for 885 acres owned by the Newton Family Limited Partnership to convert lands from Conservation to Agricultural to allow subdivision of lots among family members.

5.6.2 Land Use Reclassifications - Kawaihae Harbor Vicinity (South Kohala)

The only major land use reclassification in South Kohala in the past ten years involved reclassification from the Agricultural to Urban District for the Hapuna Beach Resort in 1994 (317 acres). This resort property has been developed. Previous dockets also involved properties which have been developed for some time, such as Kohala Ranch (1988) and Mauna Lani Resort (1986).

5.6.3 Other Projects

The Final Environmental Impact Statement for the Saddle Road Extension, South Kohala, North Kona, was accepted in 2000 and a portion of the project is now in design. The closest point from that project is approximately 23 road miles from Kawaihae Harbor and 10 road miles from Hilo Harbor (Personal Communication, Bruce Meyers, Okahara & Associates, 2001). The Kawaihae 1.0 Million Gallon Tank, for which a Draft Environmental Assessment was prepared in 2000, is currently inactive. This parcel is approximately 4,000 feet directly north of the Kawaihae Harbor entrance, at the 280-foot elevation. The proposed tank is located on property of the State of Hawaii, Department of Hawaiian Home Lands. This information was obtained as a result of consultation with the County of Hawaii, Departments of Planning and Public Works.

5.7 CUMULATIVE IMPACTS OF RELATED PROJECTS

With the exception of the Department of Hawaiian Home Lands Master Plan for Kawaihae, the primary projects slated for the South Kohala in the past ten years have already been implemented and are primarily resort developments. No major projects are slated for South Hilo. Because of the time elapsed since development of the South Kohala resorts, the associated mitigation measures have been required to be implemented. As a result, no significant cumulative impacts are expected from related projects.

CHAPTER 6
NECESSARY PERMITS AND APPROVALS

The following permits and approvals may be required prior to project construction. As design for the proposed harbor improvements proceeds, Harbors Division will continue its consultation with the following agencies to ensure that all required permits are obtained.

County of Hawaii permits are not required for actions taken by Harbors Division, pursuant to Section 266-2(b), Hawaii Revised Statutes. However, actions by *tenants* on Harbors Division property would be subject to County of Hawaii permitting ***such as Special Management Area Permit, Shoreline Setback Variance, Flood Hazard Controls, Grading, Grubbing, Excavating and Stockpiling Permits, and Building Permits. Approval of "Drainage Outfall" and "Rivers and Harbors Act" were struck as a result of consultation with the U.S. Army Corps of Engineers. These are covered by Department of the Army permits.***

Permits or approvals listed below are organized by Federal, State and County requirements. The column entitled "Order" denotes the order in which Harbors Division is likely to apply for the listed permits.

Permit or Approval	Level of Government	Granting Agency	Why Required	*Order*
Department of the Army Permit	Federal	U.S. Army Corps of Engineers	Construction of structures or work within navigable waters	*3*
[Approval of Drainage Outfall]	[Federal]	[U.S. Army Corps of Engineers]	[Construction of drainage outfall]	*N/A*
Section 103 Marine Protection, Research and Sanctuaries Act	Federal	U.S. Army Corps of Engineers	Handling and disposal of dredged materials in ocean waters	*15*
[Rivers and Harbors Act]	[Federal]	[Dept. of the Army]	[Activities that obstruct or alter navigable waters]	*N/A*

Permit or Approval	Level of Government	Granting Agency	Why Required	*Order*
401 Water Quality Certification	State of Hawaii	Dept. of Health	Work near a body of water	***2***
National Pollutant Discharge Elimination System (NPDES) Permit	State of Hawaii	Dept. of Health	Increasing the quantity of any discharge and storm water runoff	***9***
Coastal Zone Management Federal Consistency Determination	State of Hawaii	Office of Planning	All lands and waters in the [s]***S***tate	***1***
Historic Preservation Review	State of Hawaii	Dept. of Land and Natural Resources	Sites over 50 years old	***7***
Federal Section 106 Review, Protection of Historic Properties	State of Hawaii	Dept. of Land and Natural Resources	Initial consultation	***8***
Shore and Shorewaters Permit	State of Hawaii	Dept. of Land and Natural Resources	Placing or erecting any structure in shorewaters	***5***
Conservation District Use Permit	State of Hawaii	Dept. of Land and Natural Resources	Lands designated by the [s]***S***tate, including submerged lands	***4***
Public Land Dispositions	State of Hawaii	Dept. of Land and Natural Resources	State-owned lands including submerged lands	***16***
State Highways Permit	State of Hawaii	Dept. of Transpor-tation	Construction work within or next to State Highway right-of-way	***14***

Permit or Approval	Level of Government	Granting Agency	Why Required	*Order*
Non-Covered Source Air Permit	State of Hawaii	Dept. of Health	Minor source of air pollution (during construction)	***12***
Permit to Construct a Wastewater System	State of Hawaii	Dept. of Health	Construction of waste water system	***10***
Hazardous Waste Permit	State of Hawaii	Dept. of Health	Treatment, disposal and storage of hazardous waste	***11***
Asbestos Regulations	State of Hawaii	Dept. of Health	Removing or managing asbestos	***13***
Shoreline Certification	State of Hawaii	DAGS DLNR	Shoreline determination	***6***
[Special Management Area Permit (Major)]	[County of Hawaii*]	[Planning Dept./ Planning Commission]	[Any activity classified as development that has a value of $125,000 or more or that will have significant environmental or ecological effect]	***N/A***
[Shoreline Setback Variance]	[County of Hawaii*]	[Planning Dept.]	[Construction or subdivision activities in shoreline areas]	***N/A***
[Flood Hazard Controls]	[County of Hawaii*]	[Dept. of Public Works]	[Any development in a flood zone area]	***N/A***

Permit or Approval	Level of Government	Granting Agency	Why Required	*Order*
[Grading, Grubbing, Excavating, and Stockpiling Permits]	[County of Hawaii*]	[Dept. of Public Works]	[Any excavation or fill, the removal of vegetation from the surface of the ground, or purposeful accumulation and set-aside of loose soil]	***N/A***
[Building Permit]	[County of Hawaii*]	[Dept. of Public Works]	[Erecting, constructing, enlarging, demolishing, or altering any building or structure]	***N/A***

Source: Guide to State Permits and Approvals for Land and Water Use and Development, State of Hawaii, Office of Environmental Quality Control, 1996.

[*County of Hawaii permits are not required for actions taken by Harbors Division, pursuant to Section 266-2(b), Hawaii Revised Statutes. However, actions by tenants on Harbors Division property would be subject to County of Hawaii permitting.]

CHAPTER 7
AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONSULTED IN THE PREPARATION OF ENVIRONMENTAL IMPACT STATEMENT

7.1 SCOPING AND CONSULTATION PROCESS

This section describes the EIS consultation program and lists all agencies, organizations and individuals who have been consulted in preparation of this EIS.

OEQC Planners Meeting

On October 31, 2000, representatives of the Harbors Division presented an overview of the Hawaii Commercial Harbors 2020 Master Plan at a Planner's Meeting sponsored by the Department of Health, Office of Environmental Quality Control. This meeting also included representatives of the Department of Health, Environmental Planning Office and the Office of Planning, Coastal Zone Management Program.

Environmental Impact Statement Preparation Notice

An Environmental Impact Statement Preparation Notice was published in the Office of Environmental Quality Control Bulletin on November 8, 2000. Comment letters received, and responses to those letters, are contained in APPENDIX A. The organizations and parties listed below received a copy of the Environmental Impact Statement Preparation Notice.

Federal Agencies
- Program and Project Management, U.S. Army Corps of Engineers
- Pacific Islands Ecoregion Manager, Department of the Interior, U.S. Fish & Wildlife Service
- Superintendent, National Park Service, Pacific Islands Support Office
- Civil Engineering Unit, U.S. Coast Guard

State Agencies
- State of Hawaii, Director, Department of Hawaiian Home Lands
- State of Hawaii, Director, Department of Health, Office of Environmental Quality Control
- State of Hawaii, Administrator, Department of Transportation, Harbors Division
- State of Hawaii, Director, Department of Health
- State of Hawaii, Chairperson, Department of Land and Natural Resources
- State of Hawaii, Administrator, Office of Hawaiian Affairs
- Director, Office of Planning

County Agencies
- Director, County of Hawaii, Department of Public Works
- Director, County of Hawaii, Planning Department

Private Organizations
- Kawaihae Boating Association
- Kawaihae Hawaiian Homes Community Association

Libraries
- Kailua-Kona Public Library, Kailua-Kona, Hawaii
- Hilo Public Library, Hilo, Hawaii
- Bond Memorial Library, Kapaau

Consultation during the EIS Preparation Process

The following agencies, organizations and individuals were consulted in the preparation of the Draft Environmental Impact Statement ***and/or Final Environmental Impact Statement***.

Federal Agencies
- U.S. Department of the Interior, National Park Service
- U.S. Army Corps of Engineers
- U.S. Department of the Interior, Fish & Wildlife Service
- U.S. Department of Agriculture
- U.S. Department of the Treasury, Customs Service
- ***U.S. Environmental Protection Agency***
- ***U.S. Coast Guard***

State Agencies
- Department of Transportation
  - Harbors Division
  - Highways Division
  - Airports Division
- Department of Health
  - Environmental Planning Branch
  - Clean Air Branch
  - Clean Water Branch
  - Office of Environmental Quality Control
  - ***Wastewater Branch***
  - ***Solid and Hazardous Waste Branch***
- Department of Land and Natural Resources
  - Boating Division
  - Division of Aquatic Resources
  - Land Division
    - State Historic Preservation Office
- Department of Business, Economic Development & Tourism
  - Research and Economic Analysis Division
  - DBEDT Library

Office of Planning
Land Use Commission
- ***Department of Hawaiian Home Lands***

County of Hawaii
- Planning Department
- Building Department
- Department of Public Works
  - Highways Maintenance
  - Engineering ***Division***
  - Wastewater Division
  - Solid Waste Division
- Civil Defense
- Fire Department
- Department of Water Supply

Private and Community Organizations
- Matson
- Young Brothers
- Kawaihae Boating Association (Tim Tinker)
- Pua Kailima o Kawaihae (David Barclay)
- Bishop Museum (David Cowey)
- Akana Petroleum

Individuals
- John Moses
- John Keola Lake
- Pete Hendricks
- Momi Subiono
- ***Liz DeRoche***
- ***Josephine Keliipio***
- ***Jesse Wolf***
- ***Petitions signed by community members (see APPENDIX 1-B, Public Comment Period)***

7.2 2020 MASTER PLAN PUBLIC INVOLVEMENT PROCESS

7.2.1 User Group Organization

Harbors Division sought the input of harbor users and the public throughout the development of the Hawaii Commercial Harbors 2020 Master Plan. A total of 14 meetings of the two Hawaii Commercial Harbors 2020 Master Plan User Groups were conducted from May 22, 1997 to July 22, 1998.

- FIGURE [29] ***40*** is the organization chart for the User Group that shows how the group was divided into subgroups to focus on each harbor.

HAWAII COMMERCIAL HARBORS
2020 MASTER PLAN UPDATE

ORGANIZATIONAL CHART

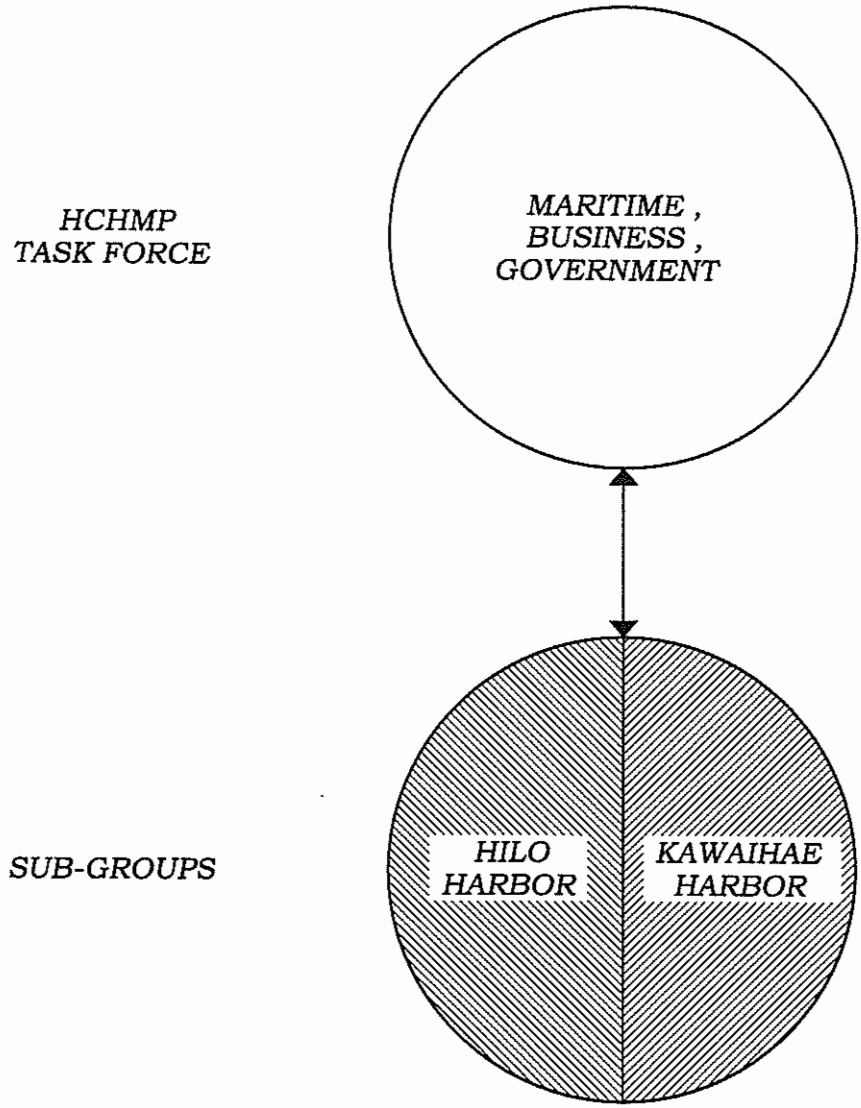

Figure [29] 40
Users Group Organization Chart
Source: DOT-Harbors Division, 1999

HAWAII COMMERCIAL HARBORS
2020 MASTER PLAN
FEIS

R.M. TOWILL CORPORATION

- FIGURE [30] ***41*** depicts the Task Flow Diagram showing the work flow that culminated in the publishing of the Hawaii Commercial Harbors 2020 Master Plan document by Harbors Division in August 1998.
- FIGURE [31] ***42*** shows the Governor's Approval document signed in August 1998 with the "unanimous" endorsement of representatives of the interisland cargo industry, bulk cargo industry, overseas container industry and passenger (cruise) ship industry.

User Group Participants

Federal Agencies
Department of the Army
National Park Service
U.S. Army Corps of Engineers
U.S. Army Garrison-Hawaii
U.S. Army, Pohakuloa Training Area, Island of Hawaii
U.S. Customs Service
U.S. Department of Agriculture
[NCRS] ***Natural Resources Conservation Service***

State Agencies
Department of Health, Office of Environmental Quality Control
Department of Land and Natural Resources (Boating, Aquatic Resources, Land Division)
Department of Business, Economic Development and Tourism (Land Use Commission)
Department of Hawaiian Home Lands
Department of Transportation (Statewide Transportation Planning, Harbors Division, Airports Division, Hawaii District Office, Highways Division)
Office of Hawaiian Affairs
Office of Planning
University of Hawaii (Marine Center and College of Agriculture)

County of Hawaii
Planning Department
Department of Public Works
Department of Research and Development
Civil Defense
Fire Department

Private and Community Organizations and Elected Officials
All Ship and Cargo Surveys, Ltd.
Akana Petroleum, Inc.
American Hawaii Cruises
Aquatic Perceptions/Banyan Adventure Company
Clean Islands Council
Coldwell Banker Properties
Dillingham Construction Pacific

HAWAII COMMERCIAL HARBORS
2020 MASTER PLAN

TASK FLOW DIAGRAM

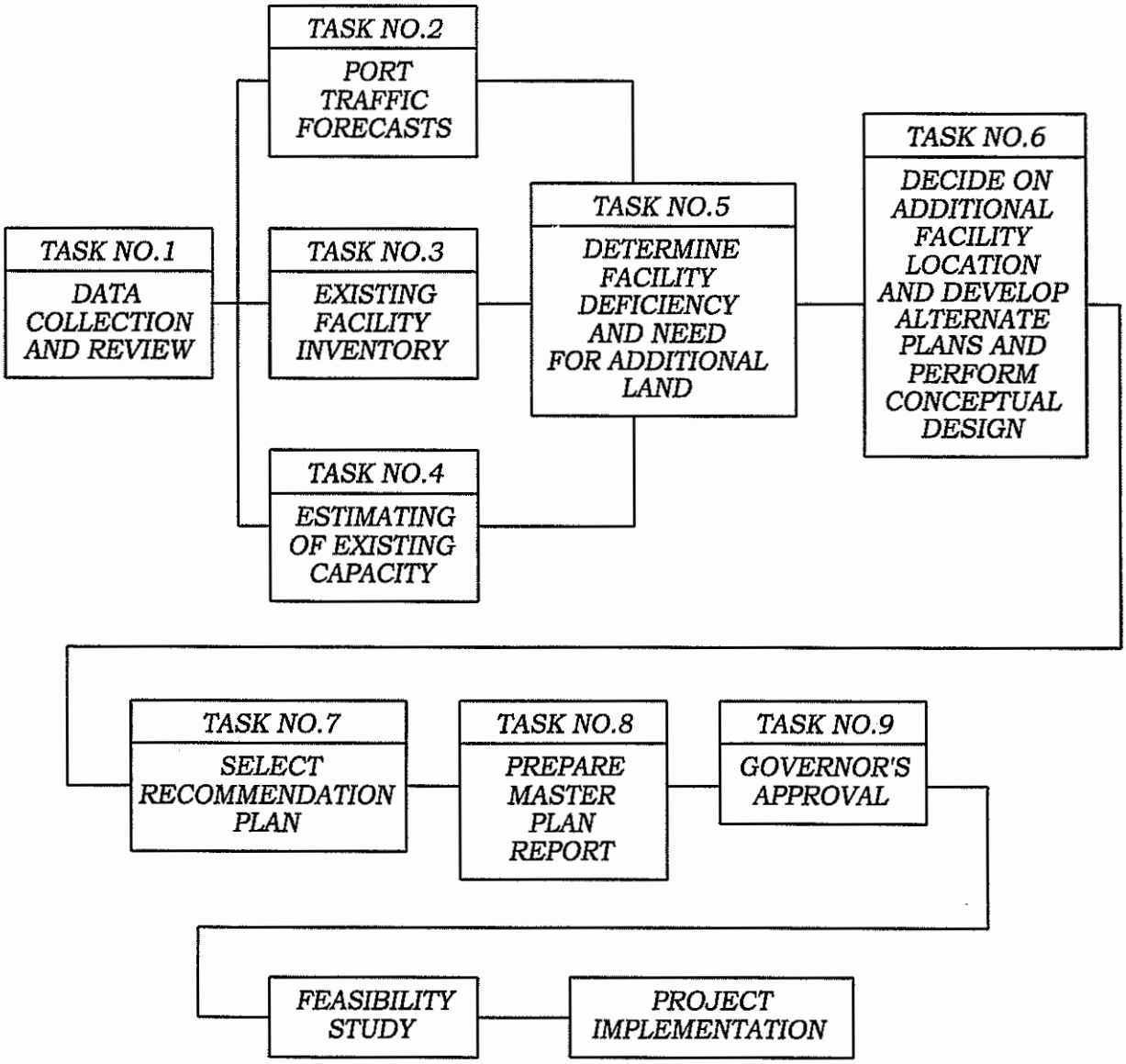

Figure [30] 41
Plan Preparation
Task Flow Diagram
Source: DOT-Harbors Division, 1999

FIGURE [31] *42*

Governor and Industry Approval of the

Hawaii Commercial Harbors 2020 Master Plan

Source: Hawaii Commercial Harbors 2020 Master Plan, Harbors Division

TO: THE HONORABLE BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

FROM: KAZU HAYASHIDA
DIRECTOR OF TRANSPORTATION

SUBJECT: HAWAII COMMERCIAL HARBORS 2020 MASTER PLAN

The Hawaii Commercial Harbors 2020 Master Plan has been prepared as a long-range guide for the development of the island of Hawaii's commercial ports. This document updates the 2010 Master Plans for Hilo and Kawaihae Harbor. The planning task force, having jurisdictional concerns and having been duly consulted, recommends the attached plan for your approval.

Kazu Hayashida
KAZU HAYASHIDA
Director of Transportation

8/7/98
Date

The Hawaii Commercial Harbors 2020 Master Plan represents an involved, cooperative effort of private enterprise and government service. Many concerned business operators and harbor users, at one time or another, participated in every step of the plan's development. The planning task force, on behalf of all who have assisted, unanimously endorses this plan.

For the Inter-Island Cargo Industry

Russell C.
For the Overseas Container Industry

For the Bulk Cargo Industry

William F. Kimura
For the Passenger Ship Industry

☒ APPROVED ☐ DISAPPROVED

Benjamin J. Cayetano
BENJAMIN J. CAYETANO
Governor, State of Hawaii

Aug. 7, 1998
Date

Private and Community Organizations and Elected Officials (continued)
Hamakua Timber
HAVO (Hawaii Volcanoes)
Hawaii Island Chamber of Commerce
Hawaii Island Economic Development Board
Hawaiian Cement
Hawaiian Homesteader Waimea/Hawaiian Civic Club
HT&T (stevedore firm)
Kamehameha Schools
Kawaihae Boating Association
Kawaihae Hawaiian Homes Community Association
Kawaihae Cogen
Kona Kohala Chamber of Commerce
Kona Outdoor Circle
Kuwaye Trucking
Leo A. Daly
Matson Navigation Company
Mauna Kea [SWCD] ***Soil and Water Conservation District***
Mauna Loa Diving Service
Nasaki & Associates
Norton Lilly Hawaii
Pua Kailima O'Kawaihae
SeaLand Service
Skinoustries
Suisan Company, Ltd.
The Gas Company
Tosco/76
Waimea Hawaiian Home Land Association
Waimea Hawaiian Homesteaders
Waldron Steamship Co., Ltd
Young Brothers
Young Brothers, Kawaihae

Individuals
Jonathan Cole
David Kamalani
Kaipo Kamalani
Wesley Wong
Roy Forbes
Allie Forbes

7.2.2 Hawaii Commercial Harbors 2020 Master Plan Public Process

TABLE 20 summarizes the User Group and Public Information Meetings conducted in 1997 and 1998 to collaboratively develop the proposed harbor improvements of the 2020 Master Plan.

TABLE 21
Summary of Proceedings
Meetings Conducted in Preparation of
Hawaii Commercial Harbors 2020 Master Plan

	Meeting Date	Purpose	Location	Discussion Points (paraphrased from minutes)
1	May 22, 1997	User Group	Hilo Airport, Hawaii	• Start-up meeting, including introductions and participant expectations • Agreement to treat both commercial harbors together • Review of organization chart and project workflow • Agreement on objective for the Hawaii Commercial Harbors 2020 Master Plan: "To enhance the lives and economy of the Island of Hawaii, the Hawaii Commercial Harbors 2020 Master Plan will be developed in open forums between public, private and community agencies as commercially viable, proficient, consensual, long-range development guide for both Hilo and Kawaihae harbors"

	Meeting Date	Purpose	Location	Discussion Points (paraphrased from minutes)
2	July 19, 1997	User Group	Hapuna Beach Prince Hotel, Hawaii	• Agreement on process goals for the User Groups. • Agreement on methodology and assumptions for forecasting of future cargo handling needs at the Harbors (compare historical cargo volumes to Gross State Product and apportion cargo tonnage between import vs. export, rate of containerization, mix of containers. • Agreement on assumption for "cargo split" between Hilo and Kawaihae (proportion of total Island of Hawaii cargo). • Plan individual sessions to deal with particular issues, e.g. containerized cargo, interisland cargo, petroleum and forest products • Overview of cruise ship industry.
3	July 24, 1997	User Group	Hilo Airport	• Future facilities requirements for containerized cargo, liquid bulk (fuel) and dry bulk (forestry products, cement, coal). • Agreement on assumptions to underlying cargo demand analysis.
4	August 27, 1997	User Group	Hapuna Beach Prince Hotel	• Agreement on assumptions for general cargo, containerization (75% containerization and 25% breakbulk) and mix of types of containers.
5	October 1, 1997	User Group	Hilo Airport	• Review of cruise ship industry outlook • Military requirements • Possible ferry service • Roadways
6	November 4, 1997	User Group	Keahole Kona International Airport	• Navigational needs • Pua Kailima o Kawaihae • Fishing policy • Buffer zone for Puukohola Heiau National Historic Site
7	December 10, 1997	User Group	Hilo Airport	• Brainstorming and evaluation of development alternatives for the two harbors.

	Meeting Date	Purpose	Location	Discussion Points (paraphrased from minutes)
8	January 28, 1998	User Group	Hilo Airport	• Brainstorming and evaluation of development alternatives for the two harbors.
9	February 25, 1998	User Group	Keahole-Kona International Airport	• Brainstorming and evaluation of development alternatives for the two harbors.
10	March 25, 1998	User Group	Mauna Kea Beach Hotel	• Presentation by Akana Petroleum of Kawaihae Harbor on future plans for expansion at the harbor.
11	May 6, 1998	User Group	Hilo Airport	• Presentation by Harbors Division on two alternative development schemes for Hilo Harbor and Kawaihae Harbor. • Agreement to provide berthing for new research vessel in Hilo Harbor but not to relocate the entire research facility from Honolulu.
12	June 10, 1998	Public Information Meeting	State Office Building, Hilo	• Presentation of 2020 Master Plans for Hilo Harbor and Kawaihae Harbor. • Public comments from representatives of University of Hawaii at Hilo, Harbor Agent, American Hawaii Cruises, Aquatic Perceptions/Banyan Adventure Company, and Land Agent from State Department of Land and Natural Resources.
13	June 17, 1998	Public Information Meeting	Keahole-Kona International Airport	• Public comments on outrigger canoe paddling in Kawaihae Harbor, access roads, siltation of Spencer Beach Park, Native Hawaiian community, cruise ships and fire safety.

CHAPTER 8
ALTERNATIVES CONSIDERED

8.1 OVERVIEW

The analysis of future harbor improvements included consideration of alternatives to address future facility needs. The alternatives evaluated were: 1) the no action alternative; 2) the delayed action alternative; 3) alternative development patterns; and 4) alternative locations.

8.2 NO ACTION ALTERNATIVE

State and Federal legislation require that a "no action" alternative be considered to serve as a baseline against which potential actions can be measured. The No Action Alternative was rejected in favor of the proposed 2020 Master Plan because economic consequences would result in the form of lost revenue opportunity and increased importation costs:

- As the Gross State Product increases in the future, cargo demand also will increase. With no action, the harbors' ability to handle projected increases in cargo demand will be inadequate.
- The cruise ship market involving Hilo Harbor will not develop as anticipated because of lack of berthing space and passenger amenities at the harbor.
- The diversified agriculture industry in east Hawaii and the coffee and flower industries in west Hawaii will have less capacity for export of their products through the harbors. This will constrain growth of these promising ventures and reduce the economic benefit to the Island of Hawaii.
- Goods will have to increasingly be brought into the Island of Hawaii by air because port facilities will be inadequate to accommodate the cargo demand in the harbors. This will greatly increase the expense of importation and cause rises in wholesale and consumer prices on the Island of Hawaii to rise.
- Harbors will be unable to take advantage of the efficiencies of new technology in cargo handling that will reduce cargo handling time and the associated cost.
- There will be no environmental or social impact as described in CHAPTER 3 and CHAPTER 4 ***such as short-term construction impacts, greater threat of alien species introductions, increased risk of liquid bulk spills, increased traffic and reduced recreational opportunities along the coral stockpile shoreline of Kawaihae Harbor.***
- Shell collection by individual***s*** [Momi Subiono] can continue in areas that would have been developed.

[8.3 DELAYED ACTION ALTERNATIVE]

[Under the delayed action alternative, the existing harbor facilities will not be adequate to handle projected increases in cargo and passenger vessel demand. Lack of capacity to bring in cargo to serve growing communities will result. Growing diversified agriculture industries, such as forest products on the Hamakua Coast, will lack capacity to ship their product to markets. Cruise ships will have to be turned away from Hilo Harbor, which will have a negative impact on the economy through lost export revenues. Cruise ship operators will respond negatively to their inability to make desired port calls which may restrict the growth of the Hawaii cruise ship industry.]

8.[4] *3* DEVELOPMENT ALTERNATIVES CONSIDERED

As described in CHAPTER 7, the Hawaii Commercial Harbors 2020 Master Plan was developed cooperatively between the Harbors Division and User Groups of maritime industry representatives, cargo carriers, commercial harbor users, recreational harbor users, government agencies and community groups. The User Group proceedings were focused on collaborative discussion of alternatives for future harbor development. Many ideas regarding future harbor development were discussed by the User Groups (CHAPTER 7). Alternatives considered but not recommended for inclusion in the Hawaii Commercial Harbors 2020 Master Plan are described below in sections 8.[4]*3*.1 and 8.[4]*3*.2.

8.[4]*3*.1 Hilo Harbor Development Alternatives Considered but Excluded from 2020 Plan

TABLE 22 shows Hilo Harbor development alternatives that were considered by the User Groups but excluded. The table summarizes the rationale for exclusion of these development alternatives.

TABLE 22
HAWAII COMMERCIAL HARBORS 2020 MASTER PLAN
HILO HARBOR DEVELOPMENT ALTERNATIVES
CONSIDERED BUT EXCLUDED

Hilo Harbor Development Alternative	Rationale for Exclusion from 2020 Plan
Installation of crane rails	It is not Harbors Division's function to provide stevedoring equipment such as crane rails. Further, no private entity has come forward to provide this equipment. Finally, Harbors Division does not anticipate sufficient demand for crane rails to justify the expense.
Shift interisland operations to Pier 1	This was suggested to provide additional shed space for interisland operations at Hilo Harbor. It would be unnecessary under the plan for proposed Pier 4 which would be targeted for interisland operations, including new shed space.
[Consolidation of cement storage and operations at Kawaihae Harbor]	[Hawaiian Cement is a Harbors Division tenant at both Hilo Harbor and Kawaihae Harbor. This firm has considered several options but currently has no plans to consolidate its operations at Kawaihae Harbor.]
Lengthen Pier 1	This is not feasible without eliminating the entrance to Radio Bay. Several years ago Pier 1 was lengthened with a stub extension.
Transfer jurisdiction for Kalanianaole Street from County of Hawaii to State of Hawaii	This transfer would be under the jurisdiction of the State Department of Transportation, Highways Division.

Hilo Harbor Development Alternative	Rationale for Exclusion from 2020 Plan
Construct new road parallel to Kanoelehua Avenue dedicated to freight movements	This would be under the jurisdiction of the State of Hawaii, Highways Division. Harbors Division is of the opinion that traffic does not justify this action. (The traffic analysis performed for this EIS supports this, by stating that widening of Kalanianole Street would provide an adequate level of service without constructing a new road parallel to Kanoelehua ***Avenue*** (Julian Ng, Incorporated, 2000))
Fish processing plant	The User Group and Harbors Division agreed that there is currently insufficient demand for this, due to low levels of fishing vessel traffic in Hilo Harbor.
Fill in Radio Bay	Although this would increase the area for container operations, it would preclude use of the harbor for berthing of Coast Guard vessels, pilot boat and other frequent transient vessels. According to the Harbormaster, Hilo Harbor has accommodated as many as 28 transient yachts at one time in Radio Bay. Harbors Division would like to retain this capacity within Hilo Harbor.

8.[4]3.2 Kawaihae Harbor Development Alternatives Considered but Excluded from 2020 Master Plan

TABLE 23 shows Hilo Harbor development alternatives that were considered by the Hawaii Commercial Harbors 2020 Master Plan User Groups but excluded. The table summarizes the rationale for exclusion of these development alternatives.

TABLE 23
HAWAII COMMERCIAL HARBORS 2020 MASTER PLAN
KAWAIHAE HARBOR DEVELOPMENT ALTERNATIVES
CONSIDERED BUT EXCLUDED

Kawaihae Harbor Development Alternative	Rationale for Exclusion from 2020 Plan
Installation of crane rails	It is not Harbors Division's function to provide stevedoring equipment such as crane rails. Further, no private entity has come forward to provide this equipment. Finally, Harbors Division does not anticipate sufficient demand for crane rails to justify the expense.
Cold storage facilities for agricultural products	Harbors Division informed the Users Group if private firms such as Waimea flower growers wanted to use cold storage at Kawaihae Harbor, refrigeration is currently available.
Bunkering	Bunkering is refueling of ships. There is currently no current or anticipated demand for this function at the subject harbors. If demand increases, Harbors Division anticipates that a private entity would request to provide the service.
Bulk fiber storage	This was excluded for lack of demand for this capacity at Kawaihae Harbor.
Space for wood chip mill, veneer plant, wood processing and storage facility	There was little support for this alternative due to concerns about impacts of noise, odor and air quality.
Intra/Interisland ferry terminal at Young Brothers current terminal site	Ferry service to West Hawaii would be more likely to terminate in Kailua-Kona because that is the largest population center in west Hawaii.In addition, demand for ferry service to west Hawaii appears insufficient at this time or in the foreseeable future.

Kawaihae Harbor Development Alternative	Rationale for Exclusion from 2020 Plan
Two additional acres of military land to accommodate staging operations	Because Harbors Division allows the U.S. Army to perform staging operations on commercial harbor land, this was considered unnecessary.
U.S. Coast Guard pier at LST landing	This is under the jurisdiction of the U.S. Coast Guard (USCG). Historically, USCG has preferred to locate their base operations for the Island of Hawaii at Hilo Harbor.
[Attenuate harbor surge by extending the breakwater and constructing a groin toward the buoy]	[This is under the jurisdiction of the U.S. Army Corps of Engineers.]
[Construct new breakwater outside existing breakwater]	[This is under the jurisdiction of the U.S. Army Corps of Engineers.]
Increase size of turning basin	This is under the jurisdiction of the U.S. Army Corps of Engineers.

8.[5] *4* ALTERNATIVE LOCATIONS

This alternative would require the construction of alternate harbor facilities on the Island of Hawaii and was not seriously considered. No other sites on the island would provide an economical, feasible alternative location for the proposed actions. Although small boat harbors exist on the Island of Hawaii, none has conditions or infrastructure that would provide for commercial cargo handling or cruise ships. Further, each existing commercial harbor site was carefully selected to offer the most advantageous conditions for harbor location on its respective coast of the Island of Hawaii.

CHAPTER 9
RELATIONSHIP BETWEEN SHORT-TERM USES AND MAINTENANCE OF LONG-TERM PRODUCTIVITY

No short-term exploitation of resources have been identified that will have negative long-term consequences. The proposed projects, which are necessary to meet increased demand for cargo handling and cruise ship berthing, will be implemented over a twenty-year period. The 2020 Master Plan is a logical extension of current facilities that was conceived and supported by a consortium of government and community leaders as well as harbor users. The improvements will be designed and constructed to last for decades.

The principal long-term benefits of the 2020 Master Plan are:

- The ability to provide adequate infrastructure for needed cargo operations and cruise ship passengers;
- Continued productive use of the property with greater efficiencies than now experienced; and
- The provision of essential infrastructure through industrial and commercial facilities that will better serve the residents of the Island of Hawaii.

Development of the harbors is not expected to pose any long-term or short-term risks to health and safety. Harbors Division will follow Best Management Practices in implementing all improvements and mitigation measures. Access roads to both harbors will be improved to provide acceptable future traffic conditions. The project at Hilo Harbor will improve access to the shoreline along the current Baker's Beach, which is currently used only by fewer than 20 residential lots with a total population of 30-40 people and currently accessed through a road paved with only coral. The development in this area of the harbor will also improve access to the "heiau" site east of the proposed Hilo Harbor eastern boundary. This area is currently reached only through residential property.

Proposed Piers 4, 5 and 6 at Hilo Harbor will replace the man-made shoreline in the Baker's Beach area. The jagged shoreline of the coral stockpile at Kawaihae Harbor will be made regular by the construction of piers.

As discussed throughout Chapter 3, specific measures to mitigate potential adverse environmental impacts will be implemented by Harbors Division in the design, construction and operations phases of the proposed harbor improvements. No long-term losses of resources are anticipated. Significant archaeological sites are not present at either harbor location and will therefore not be an issue.

Foregoing or delaying harbor improvements would mean less than optimum use of the facilities and would result in lower levels of cargo and passenger service and convenience.

CHAPTER 10
ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Implementation of the 2020 Master Plan and its associated construction of facilities will result in the irreversible and irretrievable commitment of certain natural and fiscal resources. Major resource commitments include: 1) the land on which the various improvements will be located; 2) use of public funds; 3) construction materials; 4) manpower; 5) increased fuel consumption; 6) water; 7) energy; 8) the use of State-owned leased lands near Hilo Harbor; and 9) use of the de facto recreational area at Kawaihae Harbor to allow expanded commercial harbor development. These commitments must be weighed against the projected benefits which will be derived from the projects, the consequences of taking no action, or implementing other less beneficial uses of the project site.

[A significant portion of both harbor properties will remain as open space, albeit with harbor operations.] At each harbor, the undeveloped shoreline areas would be irretrievably changed in shape and character. The coralline shoreline of Baker's Beach and the current dwellings on State-owned leased land would be replaced by piers. At Kawaihae Harbor, recreational uses of the area proposed for Piers 3, 4 and 5 would be curtailed in the short-term during construction and eliminated in the long-term, with the exception of fishing off the piers. ***At Hilo Harbor, recreational fishing opportunities will increase with the addition of new piers.***

The commitment of resources required to accomplish the proposed improvements includes building materials [and labor] which are irretrievable. Construction of improvements and use of commercial cargo and passenger vessels would require the consumption of petroleum products and petroleum-based electrical generation.

CHAPTER 11
GLOSSARY

BALANID: A term referring to a family of acorn barnacles, i.e. Family Balanida.

BASIN, TURNING: An area of water or enlargement of a channel that is used for turning vessels around.

BERTH: The water area, at the waterfront edge of a wharf, reserved for a vessel, including the wharf accessories such as bollards.

BOLLARD: A thick, low post of steel mounted on a wharf, to which mooring lines from vessels are attached.

BOW: The front of a vessel.

BREAK-BULK CARGO: General cargo conventionally stevedored and stowed as opposed to bulk, unitized or containerized cargo.

BREAKWATER: An engineering structure to afford shelter from wave action; may also be called a jetty or revetment.

BULK CARGO: Cargo stowed without benefit of package or container. Bulk cargo is shipped loose, as in grains or liquid.

BULK CONTAINER: Containers of various lengths designed for carriage of liquid or dry commodities in bulk. See Container Types below.

BUNKERING: Refueling of ships.

CHANNEL: A deeper part of the entrance to a harbor, usually dredged to a certain depth for safety of vessels.

CONTAINER: A single rigid, non-disposable cargo box and as the case may be: ventilated, insulated, reefer, flat rack, vehicle rack or open top container with/without wheels or bogies attached not less than 20 feet in length, having a closure or permanently-hinged door, that allow ready access to cargo. All types of containers will have construction, fittings and fastenings able

to withstand, without permanent distortion, all the stresses that may be applied in normal service use of continuous transportation.

CONTAINER EQUIVALENTS (FEU/TEU): Forty-foot equivalents; twenty-foot equivalents. The internationally recognized standard conversion basis for counting containers in a lot (only as number and not as weight) comparable with other lots.

CONTAINER YARD (C.Y.): The location at all container terminals designated, by carrier, in the port.

CONTAINER (TYPES): The basic container is a closed metal or reinforced box with fixtures for stacking, lifting and handling, and attachment to truck beds. Variations include: refrigerated units (reefers), and special types for the transportation of bulk cargo, automotive equipment, livestock, liquids, etc. Cargo carried by containers can include practically everything but the following: dry or liquid bulk products which are shipped in large quantities, such as coal, ore or petroleum; or commodities that cannot generally be containerized economically because of their nature, size and weight.

CONTAINERIZED CARGO: Cargo that can fit into a container physically, conveniently, and economically.

CRANE: A machine for hoisting weights or cargo moving them vertically/horizontally for limited distances and lowering them to new locations.

CRANE, CARGO: A crane especially adapted to the transferring of cargo between a vessel's hold and a wharf or lighter.

CRANE, GANTRY: A crane or hoisting machine mounted on a frame or structure spanning an intervening space.

DOLPHIN: An isolated cluster of piles used as a support of mooring devices or marker lights.

DRAFT: The depth of a vessel below the waterline, measured to the lowest point of the hull, the bottom of the propeller, or other reference point.

DREDGE: 1) To excavate material from the bottom of a body of water. 2) A machine for excavating material from the bottom of a body of water classified by types of excavating equipment used thereon, as bucket dredges, dipper, hopper, hydraulic.

DREDGING SPOILS OR DREDGING MATERIALS: Byproduct of dredging process; the residual accumulated silt that must be disposed of.

DRY BULK: Non-liquid cargo stowed without benefit of package or container, i.e., shipped loose, as in grains or cement powder.

DRY BULK TERMINAL: An area used for stowage, loading and offloading of dry bulk.

GENERAL CARGO: ***Miscellaneous cargo of varying quantities and sizes which are organized at the terminal for subsequent shipment to a common port or regional destination.***

HARBOR: An area of water affording a natural or artificial haven for ships. In a proper and more limited sense, an area separated by natural or artificial indentations of shore line from the main body of water, as the area within two headlines or points between which run the main ship channels leading to an open sea.

JETTY: An engineering structure at the mouth of a harbor to control the water flow and currents, to maintain depth of the channel and protect harbor or beach.

LIQUID BULK: Cargo stowed without benefit of package or container, i.e., shipped loose, as in petroleum or oil.

LIQUID BULK TERMINAL: An area where liquid bulk cargo is loaded on and off ships, stored, and dispensed. Liquid bulk can be stored in above-ground or underground tanks.

MARSHALLING: Organizing of cargo.

MOORING: A place at which or an object to which a vessel can be moored, or "made fast."

PIER: The location in a seaport at which cargo arrives or departs. A dock for loading or unloading ships or vessels. A type of wharf; running at an angle with the shore line of the body of water. See "Wharf."

REEFER: Refrigerated container.

REVETMENT: A facing for protecting a jetty.

ROLL-ON/ROLLOFF (RO/RO): Cargo which is rolled or driven on and off vessels through bow or stern ramps on side cargo doors.

SHIP: A large oceangoing vessel propelled by engines.

STERN: The back or rear of a vessel.

STEVEDORE, STEVEDORING: A person or company engaged in loading and unloading ships. Stevedoring: loading and unloading of ships by stevedores.

STOWAGE: Storage.

TEU: Twenty-foot-equivalent unit. The common unit used in indicating the capacity of a container vessel or terminal. A 40-foot container is equal to two TEUs.

TERMINAL: 1) A berthside area where cargo is loaded to and discharged from vessels. 2) A depot - usually inland where containers are brought for unloading.

TRANSSHIPMENT: To transfer from one ship, truck or other conveyance to another.

TURN-AROUND TIME: The period during which a transport vehicle is confined to port, terminal or warehouse, loading or unloading.

UNITIZED CARGO: Cargo arranged in units.

VESSEL: A craft for traveling on water.

WHARF: A structure on the shore of or projecting into a harbor so that vessels may be moored alongside to load or unload or lie at rest.

CHAPTER 12
ACRONYM LIST

AAPA	American Association of Port Authorities
AAQS	Ambient Air Quality Standards
ADA	Americans with Disabilities Act
AECOS	The consulting firm which performed the "Review of Water Quality and Biology in Kawaihae and Hilo Harbors for the Harbors 2020 Master Plan Implementation EIS" (Appendix E)
BMP	Best Management Practices
BMPP	Best Management Practices Plan
C	Celsius
C&D	Construction and demolition, a type of "waste" material
CFR	Code of Federal Regulations
CO	Carbon monoxide
CZM	Coastal Zone Management, referring to the Coastal Zone Management Act of 1972 (P.L. 92-583), and Chapter 205A by the same name
DAR	State of Hawaii, Department of Land and Natural Resources, Division of Aquatic Resources
Db	Decibels (measurement of sound)
DbA	A-weighted decibel, corresponding to human hearing range
DBEDT	Department of Business and Economic Development and Tourism, State of Hawaii

DEIS	Draft Environmental Impact Statement
DLNR	Department of Land and Natural Resources, State of Hawaii
DNL	Day-Night Average Sound Level (also known as Ldn)
DO	Dissolved oxygen
DOH	Department of Health, State of Hawaii
DOT	Department of Transportation, State of Hawaii (ALSO SDOT)
EIS	Environmental Impact Statement
EPA	See "USEPA"
FHA	Federal Housing Administration
FEIS	Final Environmental Impact Statement
FT	Foot or feet
HAR	Hawaii Administrative Rules
HAVO	Hawaii Volcanoes Observatory
HOISN	Hawaii Ocean Industry and Shipping News (publication)
[HPD]	[Historic Preservation Division] ***See SHPD***
HT&T	Stevedore firm providing services to Hilo Harbor
HUD	U.S. Department of Housing and Urban Development
IMO	International Maritime Organization
ISTEA	Intermodal Surface and Transportation Efficiency Act of 1991
LST/LSV	Landing Ship Tank/Landing Ship Vehicle

LOS	Level of Service (traffic engineering term)
M	Meters
MG-1A	Zoning code for County of Hawaii pertaining to General Industrial lands, with 1,000 square feet of land area required per building site
MGD	Millions of gallons per day
MLLW	Mean Lower Low Water – level of water susceptible to flooding
MPRSA	Marine Protection, Research and Sanctuaries Act (33 U.S.C. 1413)
NAGPRA	Native American Graves Protection and Repatriation Act (NAGPRA)
NCDC	National Climatic Data Center
NRCS	***National Resource Conservation Service***
NMFS	National Marine Fisheries Service, U.S. Department of the Interior
NPDES	National Pollution Discharge System, Section 402, Clean Water Act
NPS	National Park Service, U.S. Department of the Interior
NRC	National Research Council
ODMDS	Ocean Dredged Material Disposal Sites
OEQC	Office of Environmental Quality Control, Department of Health, State of Hawaii
ORCA	Ocean Research Consulting and Analysis
PCBs	Containing "polychlorinated biphenyls"
pH	Measure of acidity
PM_{10}	Measurement of particulate matter in the air

PPV	Peak particle velocity – measurement of ground vibrations
RM-1.5	Zoning code for County of Hawaii pertaining to Multi-Family Residential Districts, with 150 feet square feet of land area required per dwelling
RO/RO	Roll on/Roll off harbor facilities (see GLOSSARY OF TERMS for definition)
SDOT	State of Hawaii, Department of Transportation
SEDF	Scaled energy distance factor
SHP[O]***D***	State Historic Preservation [Office] ***Division***, Department of Land and Natural Resources, State of Hawaii
SS	"Steamship" – precedes the name of a ship, e.g. SS Constitution
USA	United States Army
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USCS	United States Customs Service, Department of the Treasury
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service, Department of the Interior
UST	Underground Storage Tank
VA	Federal Veteran's Administration
WQC	Water Quality Certification, Section 401, Clean Water Act
YMCA	Young Men's Christian Association

CHAPTER 13
REFERENCES

AECOS, Inc., for R.M. Towill Corporation, 2000, ***Revised 2001.*** Review of Water Quality and Biology in Kawaihae and Hilo Harbors for the Hawaii Commercial Harbors 2020 Master Plan EIS.

American Association of Port Authorities (AAPA), October 16, 2000a. "News Release: U.S. Ports Endorse Ballast Water Management Legislation." http://www.aapa-ports.org.

_____, 2000b. "Port Facts and Statistics: U.S. Public Port Facts." http://www.aapa-ports.org.

Belt Collins Hawaii, for State Department of Transportation, Airports Division, 1991. Hilo International Airport Master Plan Final Document.

_____, for The Ritz-Carlton Hotel Company, 1987. Final Environmental Impact Statement, The Ritz-Carlton at Mauna Lani, Mauna Lani Resort, South Kohala, Hawaii.

C.E. Maguire and R.M. Towill Corporation, for Pacific Division, Naval Facilities Engineering Command, 1977. Ammunition Port Facilities, U.S. Naval Magazine, Guam, Mariana Islands.

Char, Winona P., for R.M. Towill Corporation, 2000. Botanical Survey, Hilo Harbor, South Hilo District, Hawaii.

_____, for R.M. Towill Corporation, 2000. Botanical Survey, Kawaihae Harbor, South Kohala District, Hawaii.

Code of Federal Regulations (CFR), 1999. Title 50 - Wildlife and Fisheries, Part 17 - Endangered and Threatened Wildlife and Plants, Subpart B - Lists.

County of Hawaii, Planning Department, 1989. General Plan Hawaii County.

Cultural Surveys Hawaii, Revised 1991. Archeological Survey and Testing, Kawaihae 1 (Komohana), South Kohala, Hawaii.

Ebisu, Y. & Associates, 1999. Acoustic Study for the Oahu Commercial Harbors 2020 Master Plan, Immediate Phase.

First Hawaiian Bank, 2000. Economic Forecast, Big Island Edition.

Geolabs, Inc., for the State Department of Transportation, Harbors Division, 1988. Geotechnical Engineering Exploration, Kawaihae Harbor Improvements, Kawaihae, South Kohala, Hawaii.

_____, for the State Department of Transportation, Harbors Division and Wesley R. Segawa & Associates, Inc., 1999a. Geotechnical Engineering Exploration Pave Additional Barge Terminal Area Kawaihae Harbor.

_____, for the State Department of Transportation, Harbors Division, 1999b. Geotechnical Engineering Exploration Pier 1 Shed Office, Hilo Harbor, Island of Hawaii.

Godwin, L.S. and L.G. Eldredge, for Bishop Museum, 2001. South Oahu Marine Invasions Shipping Study.

Harris, Frederick R., 1994. Land Transportation Master Plan for Hawaii County, 2020 Population Distribution by Judicial District.

Haun & Associates, for R.M. Towill Corporation, 2000. Archeological Inventory Survey, Hilo Harbor Facilities Expansion.

Hawaii Electric Light Company, May 2000. Kakahiaka/Huehue Similarity Analysis.

Hawaii Ocean Industry and Shipping News (HOISN), October-November 1998. Regulatory News - "IMO to meet on Ballast Water Regulations."

Hawaii Ocean Industry and Shipping News (HOISN), April-May 1999. "Feds to Study Foreign Ballast Water."

Hawaii Ocean and Marine Resources Council, 1991. Hawaii Resources Management Plan - Technical Report.

Heliker, Christina, U.S. Government Printing Office, 1990. U.S. Geological Survey, Volcanic and Seismic Hazards on the Island of Hawaii.

International Maritime Organization (IMO), 1995. Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens.

Jokiel, P.L., E.F. Cox, F.T. Te, and D. Irons, 1999, for U.S. Fish & Wildlife Service, Pacific Islands Ecoregion, Honolulu. Mitigation of Reef Damage at Kawaihae Harbor through Transplantation of Reef Corals.

Kayal, Michele, "Cruise Inspections on Rise," Honolulu Advertiser, May 23, 2001.

Kelly, M., B. Nakamura, and D.B. Barrere, 1981. Hilo Bay: A Chronological History.

Lee and Olive, 1994. Size and Growth Potential for Hawaii's Maritime Industry.

Leo A. Daley, 1999, for State of Hawaii, Department of Transportation, Harbors Division. Statewide Cruise Facilities Study.

M&E Engineering, for U.S. Engineer District, Honolulu, 1980. Hilo Area Comprehensive Study, Geological, Biological and Water Quality Investigations of Hilo Bay.

Merritt, Frederick S., Editor, 1983. Standard Handbook for Engineers.

National Climatic Data Center (NCDC), 2000. http://www.noaa.gov.

National Oceanic and Atmospheric Administration (NOAA), 2001. "Coastal Zone Management Act of 1972," http://www.ocrm.nos.noaa.gov/czm.

National Oceanic and Atmospheric Administration (NOAA), 2001. "The National Marine Sanctuaries Act," http://www.sanctuaries.noaa.gov/natprogram/nplegislation/nplegislationact.

National Research Council (NRC), for Committee on Ships' Ballast Operations - Marine Board Commission on Engineering and Technical Systems, 1996. Stemming the Tide - Introductions of Nonindigenous Species in Ships' Ballast Water.

Ng, Julian & Associates, for R.M. Towill Corporation, 2000. Traffic Analysis Report, Hawaii Commercial Harbors 2020 Master Plan.

Nishimura, Brian, Planning Consultant, 1996. Final Environmental Assessment and Negative Declaration, Hilo Harbor Improvements Access Road, Hilo, Hawaii, Job H.C. 5268.

Ocean Research Consulting and Analysis (ORCA)/Cheney, D.P., for U.S. Army Corps of Engineers, Pacific Ocean Division, Honolulu, 1981. West Hawaii Coral Reef Inventory.

Palapala, Ink, 1987. Subsistence Homesteads: A Community Management Plan for Department of Hawaiian Home Lands Keaukaha Tract II.

Planners Collaborative, for State of Hawaii, Department of Hawaiian Home Lands, 1985. Kawaihae Development Plan.

Quinn, Alonzo, 1961. Design and Construction of Ports and Maritime Structures.

R.M. Towill Corporation, for the County of Hawaii, Planning Department, 1991. Keahole to Kailua Development Plan.

_____, for State of Hawaii, Department of Hawaiian Home Lands, 1992. Final Environmental Impact Statement, Kawaihae Ten-Year Master Plan, Kawaihae, South Kohala, Hawaii, State of Hawaii.

_____, for State of Hawaii, Department of Hawaiian Home Lands, 2000. Draft Environmental Assessment, Kawaihae 1.0 Million Gallon Tank, Kawaihae, South Kohala, Island of Hawaii.

_____, for State of Hawaii, Department of Health and Department of Accounting and General Services, 1999. Final Environmental Assessment, Residential Children's Facility, Hilo, South Hilo District, County of Hawaii.

Scott, Glenn, "Cruising's master plan: Preparing for record expansion," Honolulu Advertiser, December 3, 2000.

SMS Research and Consulting, for State Department of Transportation, Harbors Division, 1997. Economic Impact Assessment of Hawaii's Harbors.

State of Hawaii, Department of Business, Economic Development and Tourism, July 1999a. "Tourism Looks to the Future." http//www.hawaii.gov/dbedt

_____, July 1999b. "The Emerging Cruise Ship Market."

State of Hawaii, Department of Business, Economic Development and Tourism, 1999c. State of Hawaii Data Book.

State of Hawaii, Department of Health, Clean Air Branch, January - December 1999. Summary Air Quality Statisics, 1099 Waianuenue Avenue (Hilo).

State of Hawaii, Department of Health, Office of Environmental Quality Control, 1997. A Guidebook for the Hawaii State Environmental Review Process.

_____, 1997. Guidelines Assessing Cultural Impacts.

_____, 1996. A Guide to State Permits and Approvals for Land and Water Use and Development.

State of Hawaii. Title 11, Hawaii Administrative Rules, Chapter 59, "Ambient Air Quality Standards", Hawaii State Department of Health; November, 1993(a).

State of Hawaii. Title 11, Hawaii Administrative Rules, Chapter 60, "Air Pollution Control", Hawaii State Department of Health; November, 1993(b).

[*]State of Hawaii, Department of Transportation, 1999. Hawaii State Department of Transportation Recommendations for Local Land Use Compatibility with Yearly Day-Night Average Sound Levels (DNL).

State of Hawaii, Department of Transportation, Harbors Division, 1985. Final Environmental Impact Statement for Development of Kawaihae Boat Harbor, Kawaihae, Hawaii.

_____, 1989. 2010 Master Plan for Hilo Harbor.

_____, 1993. Port Hawaii: Commercial Harbors System Handbook.

_____, May 22, 1997. Hawaii Commercial Harbors 2020 Master Plan Users Group, Meeting #1 Summary.

_____, June 19 1997. Hawaii Commercial Harbors 2020 Master Plan Users Group, Meeting #2 Summary.

_____, July 24, 1997. Hawaii Commercial Harbors 2020 Master Plan Users Group, Meeting #3 Summary.

_____, August 27, 1997. Hawaii Commercial Harbors 2020 Master Plan Users Group, Meeting #4 Summary.

_____, October 1, 1997. Hawaii Commercial Harbors 2020 Master Plan Users Group, Meeting #5 Summary.

_____, November 4, 1997. Hawaii Commercial Harbors 2020 Master Plan Users Group, Meeting #6 Summary.

_____, December 10, 1997. Hawaii Commercial Harbors 2020 Master Plan Users Group, Meeting #7 Summary.

_____, January 28, 1998 Hawaii Commercial Harbors 2020 Master Plan Users Group, Meeting #8 Summary.

_____, February 25, 1998. Hawaii Commercial Harbors 2020 Master Plan Users Group, Meeting #9 Summary.

[*Note: State of Hawaii, Department of Transportation is referred to in textual cites as "SDOT"]

_____, March 25, 1998. Hawaii Commercial Harbors 2020 Master Plan Users Group, Meeting #10 Summary.

_____, May 6, 1998. Hawaii Commercial Harbors 2020 Master Plan Users Group, Meeting #11 Summary.

_____, June 10, 1998. Hawaii Commercial Harbors 2020 Master Plan Users Group, Public Information Meeting Summary.

_____, June 17, 1998. Hawaii Commercial Harbors 2020 Master Plan Users Group, Public Information Meeting Summary.

_____, July 22, 1998. Hawaii Commercial Harbors 2020 Master Plan Users Group, Meeting Summary.

_____, 1998. Hawaii Commercial Harbors 2020 Master Plan.

_____, 1998. Photo Reconnaissance of Archaeological Sites at Kawaihae Harbor in the Area of the Cooperative Agreement between the Department of Transportation, Harbors Division, and the National Park Service

State of Hawaii, Department of Transportation, Highways Division, in Cooperation with the County of Hawaii, Department of Public Works, 1998. Hawaii Long-Range Land Transportation Plan.

State of Hawaii, Office of Planning, Coastal Zone Management Program Office, 1987. Federal Consistency with Approved Coastal Zone Management Programs.

State of Hawaii, Office of Planning, 1989. West Hawaii Regional Plan.

Stearns, Harold, in cooperation with the Geological Survey, U.S. Department of the Interior, 1946. Geology of the Hawaiian Islands.

University of Hawaii at Hilo, 1993. Atlas of Hawaii.

University of Hawaii at Hilo, 1998. Atlas of Hawaii.

U.S. Army Engineer District, Honolulu, Fort Shafter, Hawaii, 1963. Survey for Navigation, Kawaihae Harbor, Boring Log.

U.S. Army Engineer Division, Pacific Ocean Honolulu District, Honolulu, Hawaii, 1987, Kawaihae Harbor Condition Survey, Kawaihae, Hawaii.

_____, 1994. Final Environmental Impact Statement for Kawaihae Harbor for Light-Draft Vessels, Hawaii, Hawaii.

U.S. Department of Defense, Department of the Army Corps of Engineers, Pacific Ocean Division, June 1978. Draft Supplement to the Final Environmental Impact Statement.

U.S. Federal Emergency Management Agency, 1982. FIRM (Flood Insurance Rate Maps) for Hilo and Kawaihae.

U.S. Fish & Wildlife Service, 2000. http://www.fws.gov and http://www.endangered.fws.gov.

U.S. Geological Survey, 1963. Topographical Maps, Hilo and Kawaihae.

U.S. Soil Conservation Service, December 1973. Soil Survey of Island of Hawaii, State of Hawaii.

Will Chee - Planning, for State Department of Transportation, Harbors Division, 1999. Final Environmental Impact Statement for the Oahu Commercial Harbors Master Plan, Immediate Phase.

Wilson Okamoto & Associates, Inc., Aries Consultants Ltd. and Y Ebisu & Associates, for State of Hawaii, Department of Transportation, Airports Division, 2000. Hilo International Airport Noise Compatibility Program Report (Draft Volume II).

Woolsey, Miyabara & Associates, Inc., for State of Hawaii, Department of Transportation, Harbors Division, 1985. Final Environmental Impact Statement for Development of Kawaihae Boat Harbor, Kawaihae, Hawaii.

CHAPTER 14
LIST OF PREPARERS

Preparer	Project Role
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Chester T. Koga, AICP	*Project Manager for EIS Preparation*
Gail W. Atwater, AICP	*EIS Preparer; Oral History*
David Gerow	*Environmental Site Assessments*
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CHAPTER 15
UNRESOLVED ISSUES

The year-long master planning process with harbor User Groups and EIS consultation process yielded substantial input from harbor users, government agencies, businesses, private interest groups and individuals. Comments were received for on the EISPN and the DEIS (see Appendix A) which provided input on issues and concerns relative to the proposed action.

The issues raised during the consultation program have been resolved in this FEIS, with the exception of the transfer of the Baker's Beach lease lots from the Department of Land and Resources to enable construction of the passenger terminal at proposed Piers 5 and 6.

The Department of Transportation, Harbors Division is aware that additional concerns regarding the proposed development may arise in the future. Therefore, Harbors Division will continue to work with harbor users, government agencies, private interest groups and the public so that project plans meet project objectives and take into consideration the concerns of agencies and the public.

CHAPTER 16
ADVERSE IMPACTS THAT CANNOT BE AVOIDED

Adverse impacts that cannot be avoided during the construction period at both harbors will include increased noise; construction-related traffic; degraded water quality during dredging; generation of construction and demolition waste; and vibration from pile driving.

Adverse impacts that cannot be avoided following construction at both harbors will include greater exposure to the introduction of alien species borne by foreign and domestic vessels; alteration of the shoreline; and increase in ambient noise levels.

In addition:

- *Hilo Harbor's passenger terminal will generate increased noise for residences on Keaa Street and Bay Clinic and residential property will be converted to commercial harbor use.*
- *Kawaihae Harbor will have increased potential for fuel spills; decreased area for public recreation; increased exposure to turbidity for areas with coral; and removal of private boat moorings currently in the commercial harbor.*