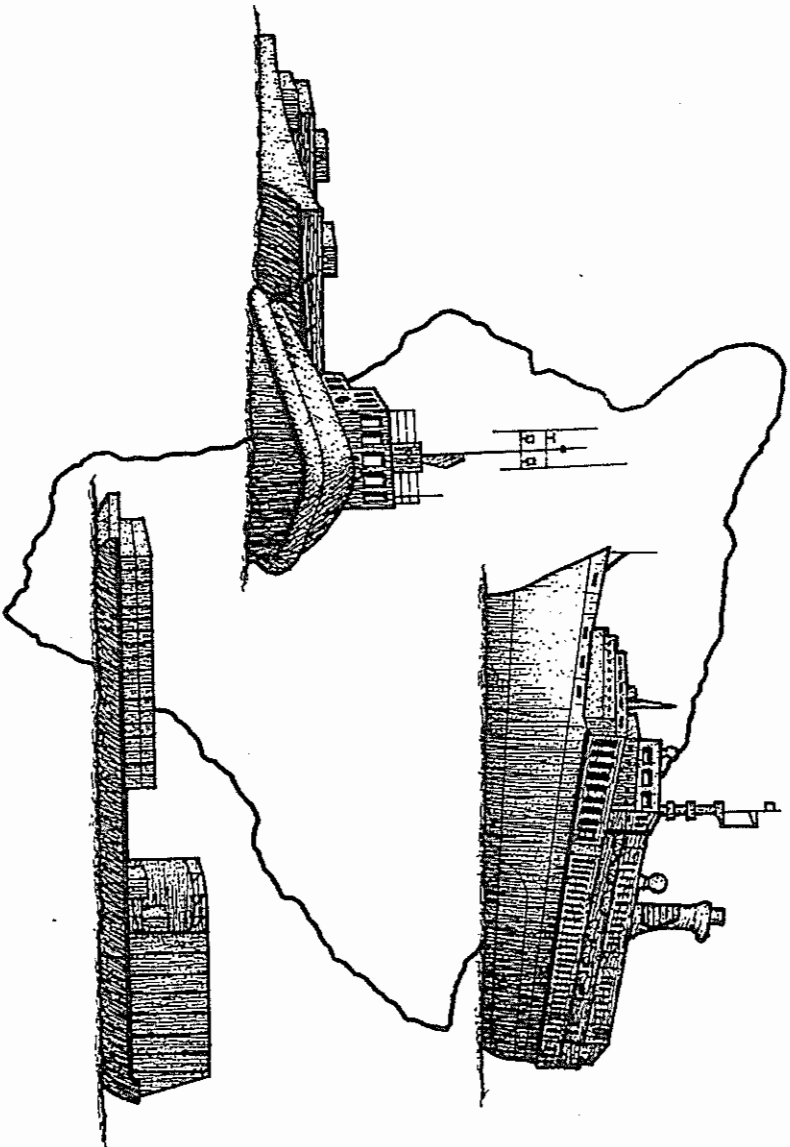


# HAWAII COMMERCIAL HARBORS

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## 2020 MASTER PLAN



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HARBORS DIVISION  
AUGUST 1998

**HAWAII COMMERCIAL HARBORS  
2020 MASTER PLAN**


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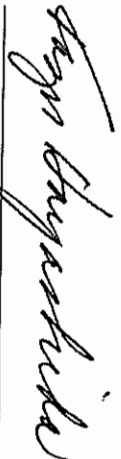
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TO: THE HONORABLE BENJAMIN J. CAVETANO  
GOVERNOR OF HAWAII

FROM: KAZU HAYASHIDA   
DIRECTOR OF TRANSPORTATION

SUBJECT: HAWAII COMMERCIAL HARBORS 2020 MASTER PLAN

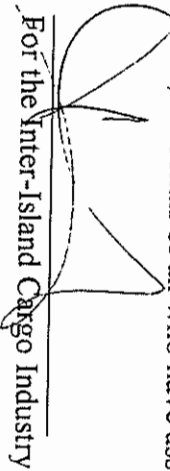
The Hawaii Commercial Harbors 2020 Master Plan has been prepared as a long-range guide for the development of the island of Hawaii's commercial ports. This document updates the 2010 Master Plans for Hilo and Kawaihae Harbor. The planning task force, having jurisdictional concerns and having been duly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



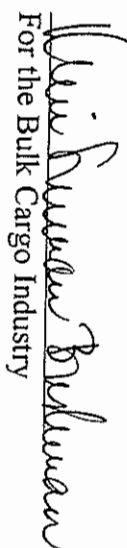
KAZU HAYASHIDA  
Director of Transportation

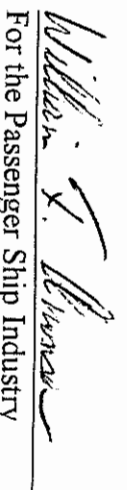
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Date

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

  
For the Overseas Container Industry

  
For the Bulk Cargo Industry

  
For the Passenger Ship Industry

APPROVED     DISAPPROVED

  
BENJAMIN J. CAVETANO  
Governor, State of Hawaii

Aug. 7, 1998  
Date

## EXECUTIVE SUMMARY

The Hawaii Commercial Harbors 2020 Master Plan is a guide to develop, maintain and enhance the island's commercial harbor system to ensure its efficient, safe, accessible and economical operations.

The objectives of the Master Plan are:

To plan the proper development of Hilo and Kawaihae harbors, thereby facilitating maritime shipments of the essential commodities required by Hawaii's citizenry;

To optimize the utilization of land and water resources committed to marine cargo, passenger and fishing operations in an economically responsible manner;

To provide terminals, other harbor resources and access to these facilities in locations within Hilo Bay, Kawaihae Bay and other sites in a manner that best relates to and serves Hawaii's port system in an efficient, safe and secure manner;

To minimize the impact on environmental quality and recreational opportunities contiguous with Hawaii's port facilities.

Lounging idyllically in the midst of the Pacific Ocean, Hawaii enjoys a tranquil separation from continental stresses. Islanders pay for this isolation, however, with a necessary dependence on ocean shipping to supply their everyday needs. Hawaii imports 80 percent of its food and merchandise. 98.6 percent of these imports - food, clothing, building materials, cars, fuel, etc. - is shipped by sea. As there is no feasible alternative to this procurement process, ocean shipping is Hawaii's primary life-sustaining enterprise.

Hawaii's maritime cargo operations have evolved from the use of simple sailing ships and the labor of seamen to incredibly large, specialized ships with a wide array of shipping containers and mechanized cargo handling methods. This evolution places an urgent demand on the commercial harbor to provide the facilities, space, utilities, roadways and authorizations necessary to facilitate the receipt of Hawaii's essential cargoes. The State's commercial harbors have become shipping's and Hawaii's life-line infrastructure. Ocean cargo carriers, with their specialized requirements, can only deliver their commodities through these commercial harbors.

While attempting to establish the economic importance of the port system, it rapidly became evident that commercial harbor operations are not a normal income-producing activity. The port system does not compete with the revenue streams of industrial warehouses, shopping centers, tourist attractions or restaurants - it provides for the construction, supply and support of these businesses, making them possible. The port system should not be viewed as an economic activity, but as the State's primary infrastructure, sustaining the quality and modernization of Hawaii's lifestyles. The commercial harbor is an island's initial facility requirement.

## *Executive Summary*

Like the 2010 Master Plans for Hilo and Kawaihae Harbor, the 2020 Master Plan will provide a general, long-range guide for commercial harbor development, based on the knowledge and experience of the users of the facilities and their anticipation of future trends. The 2020 Master Plan remains flexible, allowing adaptations to changing economic, social, land use policy and other forces that shape harbor developments. Planning documents are usually updated every five years to address such changes.

Hilo Harbor is the older of the two. Established by King Kamehameha as the seat of his provincial government, Hilo Harbor enjoyed the prestige of royalty. As Hilo Harbor evolved as a supply port for the California Gold Rush and the whaling industry, and as a point of origin for the sandalwood trade, its ability to accommodate more and larger shipments of cargo grew. With this growth, the town of Hilo enjoyed prosperity and an accompanying growth as the seat of both Territorial and State governments.

Hilo Harbor in the year 2020 is envisioned with new piers, an overseas container terminal, an inter-island cargo terminal, liquid and dry bulk cargo facilities, a cruise ship terminal, accommodations for commercial fishing, military cargo and ocean research operations. Adequate berthing for the anticipated number and types of vessels and the necessary roadways to support these operations is included in the master plan.

Kawaihae Harbor was conceived in part to alleviate some of Hilo Harbor's congestion. Kawaihae Harbor also provides maritime access for the commerce required by the island's growing western communities. It is now apparent that Kawaihae Harbor is poised to service west Hawaii as a modern transportation facility, providing essential commodities and commerce for its growing businesses and industries.

Kawaihae Harbor's plans similarly reflect improvements through additional pier construction, an overseas container terminal, an inter-island cargo terminal, liquid and dry bulk cargo facilities, an alternate cruise ship terminal, a military cargo terminal, ocean research accommodations, navigational improvements and adequate, though shared, berthing for the anticipated number and types of commercial vessels and the necessary roadways to support these operations.

Detailed technical, financial and environmental studies will be undertaken before these recommendations are implemented. If these studies prove the recommendations infeasible and result in changes to the proposed scope of improvements, the Harbors Division will again seek input from the users to validate the modifications.

Almost everything Hawaii uses is imported and practically all of these imported goods are shipped by sea. This statement underscores the importance of the port system to the State and its visitors and justifies the provision of resources for the maritime industry as it evolves in response to the changing needs of the people.

## **I. INTRODUCTION**

The State Department of Transportation oversees air, land and water transportation facilities through the administration of three divisions - Airports, Highways and Harbors. The Harbors Division is responsible for administering the State-owned or controlled harbor facilities used by commercial cargo, passenger and fishing operations. Chapter 266, Hawaii Revised Statutes, delineates this responsibility as the control, management, use and regulation of commercial harbors and their improvements - anchorages, moorings, ports, docks, piers, quays, wharves, bulkheads, landings and roadsteads.

The State of Hawaii receives the bulk of its goods through its commercial harbors, and with the exception of Lanai's Kaunapau Harbor which is privately-owned, the Harbors Division manages the harbor traffic, berthing, landside use and facility development of these deep-draft, commercial harbors.

While the Harbors Division historically addressed the long-range development plans of each individual harbor with separate commercial harbor master plans, the Harbors Division, beginning with the Oahu Commercial Harbors 2020 Master Plan, realized that each island's harbors are interdependent on each other's operations. Hawaii's petroleum shipments illustrate this dependency. All of the island's petroleum products are currently shipped to Hilo Harbor. Fuel destined for Kona is shipped and pumped to petroleum storage facilities in Hilo then trucked over to the west side of the island. Any pipeline petroleum facilities in Kawaihae Harbor will reduce the volume of petroleum product shipments and the number of calls of fuel barges to Hilo Harbor. Clearly, Hilo and Kawaihae harbors are dependent harbors, whose activities are closely entwined. The harbor operators' shared use of these ports warrants this concurrent planning effort.

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Kawaihae Harbor was conceived in part to alleviate some of Hilo Harbors' congestion. Kawaihae Harbor also provides maritime access for the commerce required by the island's growing western communities. It is now apparent that Kawaihae Harbor is poised to service west Hawaii as a modern transportation facility, providing essential commodities (food, clothing, building materials, automobiles, fuel) and commerce for the growing businesses and industries.

Plans for either of these harbors will impact the other. The Harbors Division has therefore decided to combine the planning for Hilo and Kawaihae harbors into a single Master Plan, and treat the planning considerations for both as an interrelated entity.

Until approximately 38 years ago, cargo moved in virtually the same break-bulk or bulk form. Cargo was shipped in either the general cargo or bulk cargo carrier, whose only changing characteristics were a relatively slow growth in size. Harbor facilities were fairly simple and standardized for the predominant, general cargo vessels, with specialized berths for the few dry and liquid bulk carriers in operation. With few exceptions, the maritime industry was relatively static and predictable.

When Matson pioneered the use of 24-foot containers and revolutionized commercial shipping on August 31, 1958, however, the industry's development and operations experienced dynamic and radical changes. Cargo containers and cargo ships have become highly specialized. Because of these changes, the port industry has implemented significant improvements in its berth and terminal facilities in a relatively short span of time.

Today, ships, cargo and shipping methods continue to evolve, challenging the port industry and placing serious demands on available waterfront properties. This industry-wide concern is reflected in a recent survey by the American Association of Port Authorities, to which responding ports identified facilities development and improvement as their number one strategic planning issue.

Other factors that impact commercial harbor planning include:

- the potential increase in ocean cruise passenger vessels with Hawaii as a planned port-of-call;
- technological advancements in the load carrying capacities of cargo handling equipment, and in larger, faster cargo vessels;
- changes in Federal participation in navigational improvement projects and maintenance of commercial deep draft harbors, where more financial responsibility will be imposed on the State;
- an increased interest in encumbering lands needed for maritime facilities for other non-maritime purposes;
- the declining activity of Hawaii's ship building industry;
- an increase in ocean recreation opportunities for the visitor industry, such as the larger dinner cruise boats; and
- the growing financial responsibility of the Harbors Division to implement and maintain these, and future recommendations.



## Chapter 1. Introduction

The normal budgetary period is five to six years. Nine years have elapsed since the approval of both the Hilo and Kawaihae Harbor Master Plans which were completed and signed in 1989. Their projections have been reviewed and adjusted to reflect current economic scenarios. The Hawaii Commercial Harbors 2020 Master Plan uses these indicators to map out the infrastructure required by the carriers of the State's essential commodities.

Like the 2010 Master Plans, the Hawaii Commercial Harbors 2020 Master Plan will provide a general, long-range guide for commercial harbor development, based on the knowledge and experience of the users of the facilities and their anticipation of future trends. Detailed technical and environmental studies will be undertaken before these recommendations are implemented. If these studies prove the recommendations infeasible and result in alterations to the scope of improvements, the Harbors Division will again seek input from the users to validate the modifications.

A report prepared for the Department of Business, Economic Development and Tourism, *Size and Growth Potential of Hawaii's Maritime Industry* (Lee and Olive, 1994), cites Hawaii's dependence on ocean shipping for 98.6 percent of its imported goods. This validation of the port system's value also justifies the provision of resources for the maritime industry as it evolves in response to the changing needs of the people.

## **II. PLANNING OBJECTIVES**

The State DOT Harbors Division's jurisdiction over commercial harbor facilities is primarily directed at the movement of cargo, passenger and fishing vessels entering, leaving, or traveling within the State, and the facilities and supporting services for loading, off-loading, and handling of these vessels, their cargo and passengers. The Hawaii Commercial Harbors 2020 Master Plan therefore supports the port system's primary mission with this long-range planning guide for the development of safe, efficient, economically viable harbor facilities. Developed by a consortium of the maritime industry, other ancillary harbor users and government agencies, this Master Plan addresses the desperate need for harbor space by these focal maritime operations which are paramount to the welfare of the State.

Harbor planning covers several broad areas of concern: maritime cargo handling including containerized, general, neobulk, dry and liquid bulk cargoes; passenger vessels including ferries, charter fishing boats, cruise and excursion ships; domestic and foreign commercial fishing; ship building, repair and maintenance operations; navigational concerns; and assorted ancillary activities. Each is significant in that they need either land, water or berths to function - resources which the State has traditionally provided.

This maritime planning effort was conducted in accordance with the following objectives:

1. Plan the proper development of Hilo and Kawaihae harbors, thereby facilitating maritime shipments of the essential commodities required by Hawaii's citizenry.
2. Optimize the utilization of land and water resources committed to marine cargo, passenger and fishing operations in an economically responsible manner.
3. Provide terminals, other harbor resources and access to these facilities in locations within Hilo Bay, Kawaihae Bay and other locations in a manner that best relates to and serves Hawaii's port system in an efficient, safe and secure manner.
4. Minimize the impact on environmental quality and recreational opportunities contiguous with Hawaii's port facilities.

### **III. ECONOMIC IMPACT OF HAWAII'S PORT SYSTEM**

The State of Hawaii has come to realize that its economy is fragile and heavily dependent on tourism's revenues. Much emphasis is being afforded the visitor industries with high growth rates and which employ larger segments of the workforce. While this is a necessary strategy, the State must not neglect the infrastructure on which these industries are all dependent - Hawaii's port system.

#### **A. VALUE OF THE PORT SYSTEM**

##### **I. ECONOMIC ACTIVITY**

In 1992, the major harbor industries produced \$1,933,900,000 in direct sales (MacDonald and Deese, 1994; Lee and Olive, 1994, adjusted by SMS Research for major commercial harbor industries.) That year, while Hawaii's Gross State Product amounted to \$33 billion, \$10.3 billion in imports passed through the State's commercial harbors - a third of the value of goods and services produced in Hawaii. Similarly, a third of the tourists' expenditures in 1992 was on goods that were largely imported through Hawaii's port system.

Commercial harbor activity is best described in these categories: ocean transportation; ship building & repair; commercial fishing; ocean recreation; and their support industries. Harbor users range from the major cargo carriers to commercial fishermen and charter boat operators with a single vessel. Other shipping and manufacturing operations (i.e., cement distribution and foreign trade zones) also occupy harbor lands.

Ocean transportation supports every sector of the State's economy by bringing in 98.6 percent of all imported food, building materials, manufactured goods and energy products (Lee and Olive, 1994.) Ocean transportation activity, understandably, keeps pace with Hawaii's fluctuating economy. Ship building & repair, however, is a slower-growth sector of the harbor industries, impacted by the absence of local parts-manufacturers. Parts for building and repairing ships must be ordered and imported from outside the State, resulting in lengthy delays, additional shipping charges and higher costs of doing business.

Commercial fishing and ocean recreation are export industries, bringing overseas income to Hawaii (MacDonald and Deese, 1995.) While both have experienced strong growth, ocean recreation's potential appears particularly favorable. Ocean recreation's charter, excursion and cruise vessels, part of the larger visitor industry sector, transport tourists to some of Hawaii's distinctive and popular attractions. While definitive growth analyses are currently not available, the sentiment is that ocean recreation's potential is one of explosive growth.

## **2. EMPLOYMENT**

Harbor industries directly accounted for 8,298 jobs in 1992 (MacDonald and Deese, 1994; Lee and Olive, 1994, adjusted for commercial harbor industries by SMS Research.) Although the number of jobs is relatively small, the harbor industry employment trend reflects Hawaii's dependence on ocean transportation. A six-month long dock strike in 1949 led to a surge in unemployment from about 5 percent in 1948 to an annual average of 11 percent in 1949. Reductions in the per capita personal income trend of 10 percent and the Gross Territorial Product trend of 12 percent, occurring in both 1949 and 1950, could be attributed to this dock strike.

Commercial harbor industry employment is therefore indicative of Hawaii's dependence on ocean shipping. Major disruptions in harbor employment impact the flow of maritime commerce with serious implications for the State.

## **3. ECONOMIC IMPACT ASSESSMENT**

Commercial harbor facilities have traditionally been developed to satisfy the requirements of harbor users. The Harbors Division convenes user group meetings to solicit user needs and plan the appropriate improvements. Thus far, Harbors Division's plans and developments have served the users well. Recent slowing economic trends, however, are requiring the justification of Harbors Division's special fund expenditures with the determination of larger economic benefits than project development costs. Because the individual harbor projects do not necessarily generate the income necessary to justify the costs of development, a study entitled the Economic Impact Assessment of Hawaii's Harbors determined the economic value of the entire port system (September 1997).

The Economic Impact Assessment establishes the port system's vital function as an integral component of the State's economy. While it is common knowledge that 98.6 percent of Hawaii's imported goods come through the harbors, it has been extremely difficult to quantify this statement with a dollar value.

The analysis of Hawaii's harbors shows that many benefits are derived from investment in the port system, including extra sales realized, tax revenues created, incomes generated and jobs provided. These values quantify the economic benefits and were compiled with the public service functions performed by the entire system into a concise, accountable analysis. This analysis can be used to:

- assess the impact of new commercial harbor facilities construction;
- establish the economic benefits of harbor/channel dredging;
- assess the impact of intermodal facilities development;
- allocate harbor investments;
- rank facilities investment plans;
- justify investments in cruise terminal development.

- determine the impacts of master plan development;
- develop the harbor's revenue financial model;
- link the financial model to the impact models; and
- evaluate the effect the port system has on the cost of goods, the consumer and on the State's overall economy.

## **B. HAWAII'S DEPENDENCE ON COMMERCIAL HARBOR ACTIVITY**

### **1. THE COMMERCIAL HARBOR - HAWAII'S PRIMARY INFRASTRUCTURE**

Lounging idyllically in the midst of the Pacific Ocean, Hawaii enjoys a tranquil separation from continental stresses. Islanders pay for this isolation, however, with a necessary dependence on ocean shipping to supply their everyday needs. Hawaii imports 80 percent of its food and merchandise. 98.6 percent of these imports - food, clothing, building materials, cars, fuel, etc. - is shipped by sea. As there is no feasible alternative to this procurement process, ocean shipping is Hawaii's primary life-sustaining enterprise.

Hawaii's maritime cargo operations have evolved from the use of simple sailing ships and the labor of seamen to incredibly large, specialized ships, with a wide array of shipping containers and mechanized cargo handling methods. This evolution places an urgent demand on the commercial harbor to provide the facilities, space, utilities, roadways and authorizations necessary to facilitate the receipt of Hawaii's essential cargoes. The State's commercial harbors have become shipping's and Hawaii's life-line infrastructure. Ocean cargo carriers, with their specialized requirements, can only deliver their commodities through these commercial harbors.

While attempting to establish the economic importance of the port system, it rapidly became evident that commercial harbor operations are not a normal income-producing activity. The port system does not compete with the revenue streams of industrial warehouses, shopping centers, tourist attractions or restaurants - it provides for the construction, supply and support of these businesses, making them possible. The port system should not be viewed as an economic activity, but as the State's primary infrastructure, sustaining the quality and modernization of Hawaii's lifestyles. The commercial harbor is an island's initial facility requirement.

## **2. HARBOR DEVELOPMENT AND IMPROVEMENT**

To determine the importance of harbor development and improvement, models of the State's economy were used to estimate the impact of constraints on commercial harbor development/improvement. Preliminary findings from an input/output model developed for Harbors Division (SMS Research, based on 1992 data and the State's input/output models maintained by DBEDT) suggest that the negative impacts of curtailed harbor industry growth are substantial.

Imposing restraints on commercial harbor development/improvement will in turn limit the growth of harbor industries by the aggravation of: (a) chronic problems (lower efficiencies of cargo movements, for example); (b) threshold problems (i.e., a harbor cannot provide enough space for neobulk cargo operations); and (c) emergencies that arise at unforeseen moments and temporarily affect cargo operations. If the result of limiting harbor development/improvement reduces harbor industry growth by even 1 percent per year less than the estimated 2 percent annual increase in the real value of the Gross State Product through the year 2020:

- 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 percent lower; and
- Estimated statewide employment would be reduced by 0.5 percent.<sup>1</sup>

Harbor development constraints that limit annual harbor industry growth to 1 percent would impact the State's economy by a combined loss of \$11.7 billion (1992 dollars) through 2020. While the 1 percent per annum reduction in growth is only an assumption, it is plausible to expect that harbor industries would not grow as quickly without the planned improvements. Ignoring the importance of harbor development and improvement and thus allowing current harbor facilities to fade into obsolence will prove to be a highly imprudent action.

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<sup>1</sup> All estimates are findings derived from economic studies developed by SMS Research for Harbors Division. Dollar values are constant 1992 dollars. Assumptions concerning unconstrained growth are from DBEDT's Population and Economic Projections for the State of Hawaii to 2020, June 1996. Constrained growth estimates are based on the input/output model of the State economy in 1992, with analysis of impact scenarios in which demand for major port industries is constrained.

## **IV. HARBOR HISTORY**

The Island of Hawai'i is currently served by two deep-draft commercial harbors. Hilo Harbor is the primary commercial port and is located at the eastern end of Kauhio Bay on the windward, or eastern coast of the island. The second port is Kawaihae Harbor, which is located along the leeward, or western coast of the island.

Hilo Bay can be described as a broad indentation in the Big Island's northeastern coastline. "Hilo", translating from Hawaiian as "crescent moon", accurately denotes the physical shape of the Bay. At the southeastern end of the bay is a natural harbor that is protected by a coral reef running out from where the present day breakwater begins (Fig. 1). To the south of the reef is a deep passage of about a half mile wide and historically, surf would break over it only in violent weather. A soft, silty bottom characterizes the harbor area along the entire length of the 35 foot wide navigational channel. The present day shoreline of Hilo is generally rocky with exceptions occurring at Bayfront, Reed's Bay, Baker's Beach and Radio Bay.

Kawaihae Bay is an indentation in the Island of Hawai'i's rocky northwestern coastline. Kawaihae Harbor is a manmade port on the northeastern corner of the bay and is located approximately 28 miles north of Kona Airport. The harbor basin was constructed to be 1,050 feet wide, 1,750 feet long on the northeastern side, and 1,050 feet long on the southwest side (Fig. 2). The entrance channel is 40 feet deep and the harbor basin has a project depth of 35 feet.

The State of Hawai'i's geographical location mandates that nearly all imported goods arrive via island ports. Honolulu Harbor, on the Island of O'ahu, serves as the hub of Hawai'i's commercial harbor system from where inter-island cargo distribution branches out to serve the neighbor islands. As the population and commercial activities increase on the Island of Hawai'i, Hilo and Kawaihae Harbors' role in the inter-island distribution system continues to grow as well.

In general, the growth of the economy and population levels over time on the Island of Hawai'i have coincided with the level of sophistication of the Big Island's port facilities. Kawaihae Harbor was planned and constructed during the 1960s and 1970s; therefore, its role in the growth of commerce on the Island of Hawai'i has been somewhat limited. By contrast, since its humble western beginnings as a trading port for seafarers in the early 1800s, Hilo Harbor has experienced firsthand the extent of technological and operational changes of the maritime industry over the years. As a consequence of harbor users' changing needs, there have been numerous strategic improvements to Hilo's natural port.

Hilo Harbor is characterized by a number of activities in and around the harbor. Originally, it was designed for handling cargo operations and it now has a variety of special equipment, such as refrigeration plugs and crane rails, that are maintained by the terminal users and operators. In recent years, there has been more interest in expanding its passenger services operations. However, like

many of the other harbors throughout the State, the further expansion of Hilo Harbor has been somewhat curtailed by the urbanization of adjacent land areas. To better understand the relationship of Hilo Harbor to the development that has occurred around it, a more thorough understanding of the Harbor's history is required.

When we look back at the oral histories describing the exploits of chiefs in the Hawaiian Islands, we can find the first mention of Hilo Bay being inhabited by early Hawaiians. In the 16th-century 'Umi-a-Lihoa became the first to unify the Island of Hawai'i when he invaded each district chiefdom. At Waiakea, a portion of the land surrounding Hilo Bay, 'Umi took the chiefdom of the Hilo chief Kulukulu'a. The descendants of 'Umi and his wife from the Maui ruling line were called the "Hilo" chiefs and controlled Hamakua, Hilo, and Puna. This center of political strength was pitted against the chiefs centered in Kona as a rivalry over the ruling of the Big Island continued for several centuries.

Finally in 1791, after a ten year struggle over the chiefdoms on the Island of Hawai'i with his cousin Kiwala'o, Kamehameha reunited the island. During the planned invasions of the neighboring islands, Kamehameha prepared his war canoes at Hilo. By 1795, Kamehameha had taken the islands of Maui and Molokai before his triumph over the O'ahu forces at the Battle of Nu'uanu. After several failed attempts to invade Kaua'i, Kaunua'i, the paramount chief of Kaua'i, came to O'ahu in 1810 to cede his chiefdom to Kamehameha. Upon his death in 1819, the king's personally held lands, including those at Waiakea, were descended to Liholiho, his son and heir to the Kingdom of Hawai'i.

Hilo's political importance can probably be traced to the fact that it was an ideally suited location for inhabitation. It has been determined that the Hilo area had five zones of prehistorical land use: Coastal Settlement, Upland Agricultural, Lower Forest, Rainforest, and Sub-Alpine or Montane. Among these uses, Hilo was well known for the many birds in its Rainforest Zone, or the area between the 2,500 and 5,500 foot elevation. The yellow feathers obtained from these birds were used in the manufacturing of capes, cloaks, and leis for Hawaiian chiefs. The Lower Forest Zone lands, between 1,500 to 2,500 foot in elevation above Hilo Bay, were famous for the great *koa* trees that were used to make war canoes for the reigning Hilo chiefs.

The Coastal Settlement Zone was characterized by the numerous fishponds in the Waiakea and Waialama Rivers. These spring-fed ponds were stocked with the fry of mullet (*'ama'ama*) and milkfish (*awa*). There were also at least two shore ponds within Hilo Bay. These ponds were natural indentations of the shoreline and required little in the way of rock walls. It is presumed that these ponds were used for the storing of excess fish rather than for fish culture.

When the first Western traders arrived in Hilo, there were several thousand Hawaiians living in thatched houses around the bay area. The first traders were involved in the sandalwood trade from the Hawaiian Islands to China. It is believed that by 1815, Kamehameha had developed a monopoly on this valuable wood, using the chiefs at Hilo and other ports as his agents. With the accession of his son Liholiho, other chiefs were allowed to participate in the trade. Through reckless exploitation of this natural resource, the forests were depleted by the 1830s.



One of the first documentations of the recognition of Hilo's harboring potential was in 1825 when Captain George Anson Byron brought back the bodies of Liholiho and his wife Kamamahu after they died of measles during their visit to London in July of 1824. On his way to Maui and O'ahu, he anchored his ship outside Hilo to ascertain whether the bay would be a suitable anchorage. Lord Byron was pleased to find the bay to be of superior quality for anchoring and the Waialuku River as being a convenient watering place for ships. After making necessary calls at neighboring islands, he returned to Hilo with Princess Ka'ahumanu. She ordered that Hilo Bay was henceforth to be known as Byron Bay in commemoration of the first entry into the bay by a man-of-war. From that point on the large coral reef in the bay, Blonde Reef, was thereby associated with Byron's vessel, the H.M.S. *Blonde*.

The first missionaries to visit the Hilo area arrived from Tahiti in 1822 with a delegation from the London Missionary Society. After touring the island, several missionaries established residences in Hilo and were placed under the protection of Princess Ka'ahumanu and the government. It took several months for the local people to be converted to the new religion, but by 1825, several biblical schools were in operation in Hilo and people were attending church services with regularity (Fig. 3).

Whaling ships in Hilo were first mentioned by missionary accounts in 1824 and within five years, Hilo was regularly visited by whalers, though not in the same high numbers that stopped in at Honolulu and Lahaina. In the late 1830s and early 1840s Hilo was not as popular with sailors because of the lack of liquor and women, being a consequence of the strong missionary influence on the local people. It appears that the large majority of the whaling ships that visited Hilo were American and, therefore, were homeward bound from the Arctic region. By 1859, when petroleum was discovered as a substitute for whale oil, the whaling trade fell off, and visits by whalers dropped considerably.

After the earlier missionary dominance in the Hilo area, the period between 1840-1898 was marked by increasing levels of American business interests that eventually led to Hawai'i's annexation. Between 1840-1841, the United States Exploring Expedition, headed by Commodore Charles Wilkes, surveyed Hilo and the surrounding area (Fig. 4). His review of the area also praised Hilo Harbor as an excellent port.

As early as 1842, it was noticed that the number of visitors to the volcano was increasing. Since many of the volcano visitors arrived at Hilo, as the number of visitors increased, so did the number of businesses servicing them. Overnight accommodations became available, as well as horses to rent and places to eat, usually termed "coffee houses."

In 1848, after merchants advocated for additional security for their capital investments in commercial agriculture, the Hawaiian Government instituted the Great Mahele. This act divided all the land in the islands between the king, the 245 chiefs, and the individual commoners. With the newly established institution of private ownership and the market flooded with cheap real estate, foreign merchants could easily purchase land for commercial agricultural ventures.

Although sugarcane was cultivated by Hawaiians, it was not until the arrival of foreigners that the

processing of cane into sugar was introduced. In 1840, the Wilkes Expedition mentioned several successful mills and sugarcane plantations operated by Chinese and Governor Adams with as much as 40 to 50 tons of sugar being exported from Hilo Bay. Transportation to the mills on the bay was often difficult and usually required the use of a bullock cart. Other businessmen tried inventive transportation methods with one entrepreneur even constructing a wind-driven railway in which cars were fitted with great sails to be hoisted when the wind was fair. The missionary accounts report that by the early 1860s, enormous tracts of land were being appropriated to foreigners for the purpose of cultivating and milling sugarcane commercially.

By 1870, one of these early entrepreneurs, by the name of Thomas Spencer, had 105 acres under sugarcane cultivation, 166 workers on his payroll, and 105 tons of sugar having been processed at his mill. For Spencer and other entrepreneurs, it was the Reciprocity Treaty of 1876 that dramatically increased the viability of their operations by allowing products to enter the United States duty free. By 1880, there were nine sugar planters and plantations within 3-1/2 miles of Hilo town.

Until about 1863 there were no wharves or piers in Hilo Bay. Sometime in the mid-19th century, Reed's Landing, east of the mouth of the Waioa River, was financed by the businessman W.H. Reed. There was also a landing on the Waioa River that was built sometime in the mid-1840s. The first recorded improvement to Hilo Harbor was a stone pier constructed by merchant Thomas Spencer in 1861. It was also observed at this time that Spencer's Landing was constructed using stones that were gathered from the Mokuola (Coconut Island) *heiau*.

In 1863 a small boat wharf was constructed by Hitchcock and Coney at the foot of Waiannuenu Street in Hilo town. In 1865, this wharf was replaced by an iron-pile wharf constructed by Lydgate and Young Iron Works. The iron pile wharf, extended in 1889-1890, was used to land both passengers and freight from lighters.

No other wharves were built at Hilo Bay until the 1890s and consequently, landing at Waiakea was the source of increasing conflict between harbor users. Between the years of 1860 to 1890, the population of Hilo increased from 4,742 to 9,935. With this increase in population and commercial development after the Reciprocity Treaty of 1876, there was growing demand for the government to create better harbor facilities.

With technological advances in ground transportation, business leaders were willing to support the building of harbor facilities on the Waiakea side of Hilo. It was recognized that while these port facilities were distanced further from business activities in downtown Hilo, a wharf built on the Waiakea side of the harbor could take advantage of the calmer waters behind Blonde Reef. By 1895, the development of harbor facilities on the Waiakea end of Hilo Bay was an important issue and the government of the Republic of Hawaii went ahead with an appropriation of \$60,000 for three eastern Hilo Harbor projects (Fig. 5) : \$10,000 for a small boat landing east of the Waioa River, \$27,000 for a ship wharf south of Coconut Island, and \$23,000 for a breakwater to protect the ship wharf.

In 1897, the government boat landing was constructed first in order to alleviate the problem of

disembarking passengers and freight when the seas were too rough on the Hilo side of the bay or when it was too shallow for boats to go up the Waiakea River. The boat landing was specified to have a timber wharf extending 30 ft seaward and measuring 100 ft across. The front end rested on iron piles driven into the rock bottom while the back end rested on a concrete retaining wall. On top of the wharf was a 60 ft by 80 ft shed covering two thirds of the dock. The Minister of the Interior noted that the boat landing “soon proved itself inadequate for almost any purpose.” Consequently, the landing was leased to Hackfeld & Co., who used it as a warehouse and landing for several years.

The government ship wharf was built between 1897 and 1899. Original plans called for a wharf 250 ft long by 60 ft wide, extending to water 22 ft deep in the bay. The wharf was also provided with a shed, which was deemed essential in a district as wet as Hilo.

By 1900, the Hilo’s population had grown to 19,785. Residents were serviced by inter-island ferry steamers twice a week, regular service to San Francisco by Matson, and a biweekly steamer service to New York via connections on the east side of the Isthmus of Coatzacoalcos, Mexico. To increase the number of days with safe mooring in the harbor, the populace began to voice their concern that a breakwater was necessary.

The debate over whether to build a breakwater at Hilo Harbor was a long and complicated one. In the preliminary examination of Hilo Harbor, it was estimated that according to actual tonnage of the port, estimated savings in freight costs warranted harbor improvements to the extent of \$1,172,595. A 6,600 ft breakwater was recommended by the U.S. Engineer Office, but the cost of the breakwater was estimated to cost \$2,092,595. Since the cost/benefit ratio was so low, the Division Engineer initially refused to endorse the project. Although the cargo traffic did not warrant the project, the Hilo Railroad Company was able to successfully lobby congress by assuring them that they would extend the railroad down the Hamakua Coast. As a result, in 1907, the United States Congress decided to appropriate \$1.7 million for the construction of the breakwater.

After a considerable engineering study, it was decided that the breakwater would consist of “rubble mound” construction, beginning about 6,000 ft east of Coconut Island, and extending for about 10,000 ft along the Blonde Reef. Each stone was specified to weigh between 130 and 150 pounds per cubic foot, and range in the size of one to eight tons each. The slopes consisted of stones roughly rectangular in shape and they were laid in steps. The total amount of stone required for the construction was estimated at 930,000 tons.

Different sections of the breakwater were bid on and constructed by four different contractors (Fig. 6). The first section of the breakwater, was completed between 1908 to 1910 by D.E. Metzger. The second section was completed in 1911 by Lord and Young. The third was constructed between 1912 and 1918 by both Philadelphia Breakwater Co. and the American Surety Company. The fourth through sixth contracts, awarded to Hawaiian Dredging Company, were constructed between 1918 and 1930.

In the early 1900s, several new industries began production that had strong impacts on the harbor’s

facility needs. In 1909, the Pahoa Lumber Mill secured a contract with the Santa Fe Railway Company to provide 2.5 million cross ties and 2,500 sets of switch ties. All of these items were shipped directly out of Hilo to California and therefore, required special docking facilities. Two pineapple canneries also came on line at about this time. To ship the 50,000 tons of fruit a year aboard California-bound freighters, the railroad company completed an 800-ft-long wharf in 1903. Although the Hilo Fruit Company produced some 7,500 cases of pineapples in 1908, on the Island of Hawaii, the sugar industry was still king. There were numerous sugar mills along the Hamakua coast and after the Hilo RR completed the Hamakua extension of their line in 1913, almost all sugar produced there was transported to Hilo Harbor on the railroad. In Hilo, however, neither of the two mills depended on the railroad. One of the exceptions was the Hilo Sugar Company, which loaded sugar over a wall at Alealea Point. The other was the Waiakea Mill, which was located at the inland end of the Waiakea fishpond (Fig. 7). This mill interestingly used barges to transport sugar from the mill to ships moored in the harbor through a lock at the fishpond wall that separated the pond and its fish from the Wailoa Stream.

The Hilo Railroad Company first became operational in 1900 when it constructed a terminal in Waiakea about a mile and a half east of Hilo town. A 60 ft by 80 ft boat wharf was also constructed a short way up on the eastern bank of the Wailoa River near the terminal and was equipped with tracks and derrick for the unloading of heavy equipment. In their first year, the Hilo Railroad Company laid a total of 22 miles of railroad line. The construction of the original railroad wharf, which had been abandoned by the Hilo Dock Co. in 1902, was completed by the Hilo Railroad Company in December of 1903 to accommodate coal cargoes. Nearby, a new sugar warehouse was constructed with a capacity of 15,000 bags. Two bridges were also built across the Wailoa River, connecting Waiakea and Hilo town, and the waterfront line to the new railroad wharf.

In 1912, it was decided to remove the old government wharf located between Kalauokukui Point and Coconut Island. A new government wharf was built one mile east of Coconut Island and thereby designated as "Kuhio Wharf", or Pier 1 (Fig. 8). The structure was specified to be 1,200 feet long and 180 feet wide. The shed atop the wharf was 1,170 feet long on the west side, 43 feet wide on the shore end, and 53 feet wide at the makai end. A sunken alley 4 feet deep by 27 feet wide, was equipped with standard gauge rail along its entire length for the easier unloading of bags of sugar from boxcars. In addition, Pier 1 was constructed to have a double line of railroad tracks extended along the entire length of the apron. A separate contract was awarded by the government for the dredging of 35 feet below mean low-water around the vicinity of the planned wharf. The total cost of these harbor improvements to the Territorial Government was \$303,000.

Despite the large role the railroad played in the development of harbor facilities, it became more difficult for railroad operators to maintain profitability in the early part of the 20th century. Certain harbor improvements, such as the construction of the breakwater, helped to reinforce the viability of the railroad. The hauling of rock fill increased revenues for the Hilo Railroad Company for several years, but when they were unable to meet their debt service in 1916, they were forced to reorganize. As a result, a new board of directors consisting of plantation owners took over operations under the auspices of the Hawaii Consolidated Railroad. The company managed to continue operations for

for another thirty years until the increase in use of trucks for hauling came and the collapse of a key bridge after the 1946 tsunami threatened the viability of the company once again. This time, the stockholders of the Hawaii Consolidated Railway voted not to spend \$500,000 to rebuild the railroad and instead liquidated their assets in 1946.

In response to a series of storms that caused Waialama Stream to inflict damage to roads and bridges within the town of Hilo, the Department of Public Works recommended the filling and draining of Waialama Stream and its adjacent wetlands. Between 1915 and 1917, 33 acres of land were filled and a canal was constructed between Waialama and Waiioa Streams to drain the area's water. After using the cut material from the canal to fill the wetlands, an additional 200,000 cubic yards of fill material was obtained from the fine-grain black sand beach adjacent to Waialama Stream. In the years between 1917 to 1923, a similar project was undertaken at Ponehawai where the County of Hawai'i undertook the drainage of a 288,785 square-ft area. To fill Ponehawai marshland, an additional 250,000 cubic yards of black sand was pumped from the beach.

As the Hilo breakwater was being completed, the Legislature of the Territory of Hawai'i appropriated \$250,000 for construction of another wharf. The construction of Pier 2 took place between 1921 and 1923 for the contract price of \$479,279. It consisted of a reinforced concrete pile supported wharf 110 feet wide and 528 feet long, with a shed 77 feet wide by 374 feet long. A double line of railroad tracks was extended along the entire length of the wharf on the berthing side.

Construction of another wharf, Pier 3, took place between 1926 and 1927. Pier 3 was planned to be a reinforced concrete wharf joined to and made part of Pier 2 (Fig. 9). The construction consisted of a berthing space of 175 feet on the harbor end and a 600 foot slip on the side. Pier 3 also had a double line of railroad tracks extended along the entire length of the wharf. Just west of Piers 2 and 3 was the creation of Baker's Beach, a manmade shoreline created from coral dredged from the bay between 1925 and 1930.

When the three wharves were completed in 1927, the Board of Harbor Commissions engaged in various dredge and fill projects. In 1928, the harbor end of Pier 3 was dredged and widened. That same year, a retaining wall was constructed on the east side of Pier 1, to extend the pier a distance of one hundred and thirty feet. The area between the retaining wall and Pier 1 was then filled in with material taken from the harbor.

On the eve of World War II, it was agreed by the harbor users that the mechanical conveyor system for bagged sugar was obsolete. With new interest in bulk sugar shipments, a facility for bulk sugar was planned. However, with the war and threat of attack from Japanese submarines, the project was delayed. After the war, another disaster struck Hilo when the 1946 tsunami hit Hilo, causing the loss of 96 lives in Hilo and \$1.3 million in damage to harbor facilities.

As the sheds at Pier 1 and 2 were destroyed by the tsunami, temporary structures were put in place for harbor users (Fig. 10). After assessing damages, complete re-building of the Hilo Bay facilities began in 1948. Having also suffered substantial damage, the Hilo breakwater had to be repaired at

a cost of \$1.5 million. With delays from World War II and the devastating effects of the tsunami, it was not until 1948 that Matson Navigation Co. began work on the much anticipated bulk sugar equipment. The construction consisted of four 10,000 ton steel silos with necessary conveyor systems, weighing scales and gantry cranes for handling bulk sugar.

Essentially, the harbor facilities as reconstructed in 1947 and 1948 remain until the present day. Other uses in and around Hilo Harbor have been formally and informally defined over the past fifty years. With the phasing out of sugar plantations in the mid-1990's, cargo handling facilities related to the storage and pumping of molasses were demolished to make way for the growing diversified agriculture industry and container space demands. In the 1960s, with the population of Hilo at about 26,000, facilities were added to accommodate additional maritime traffic in the harbor. To allow two vessels to berth simultaneously, Pier 1 was extended from 1170 to 1270 feet in 1962. In 1966, the areas around Piers 1, 2 and 3 were dredged to a depth of 35 feet. In 1971, the shed over Pier 2 was extended 7 bays at a cost of \$201,500. That same year, it was also decided to expand the container yard at Pier 1 by 45,000 square feet.

Harbor improvements continued at a rapid pace into the next decade. In 1980, a warehouse for the storage of bagged sugar was removed from near Piers 2 and 3 to provide additional space for containers. Also in that year, a small dock extension was built between Pier 1 and 2 to permit end-loading and unloading of vessels that use the roll-on-roll-off technique for transportation of freight. In 1983, there was a 27,000 square feet expansion of the container yard for \$100,373. In 1987, Piers 1 and 3 were re-dredged to a depth of 35 feet.

In 1993, as the population of Hilo was reaching 38,000, it was decided to make additional improvements to Hilo Harbor's container yard facilities. The area behind Pier 3 was paved in order to better handle inter-island cargo. At the same time, the former Department of Agriculture property was acquired, an old fumatorium building was demolished, and the site was paved for additional cargo handling space. In 1995, a 2.8 acre expansion of the cargo yard on the south side of the harbor was completed.

Presently, Radio Bay is the name used for the inner Kuhnio Bay area between the breakwater and the eastern side of Pier 1. It is mainly used by transient boaters while Reed's Bay is designated for sailboats that require permanent moorings. Today, there are docking facilities for Hilo's fishing fleet, at the Wailoa Small Boat Harbor. Larger fishing boats and long-liners still have to berth at one of the piers in Hilo Harbor. The Wailoa Small Boat Harbor is also the location of the wholesale fish market where each morning fishermen sell their catch to retailers, restaurants, and hotels.

At present day, the old Waiakea Fishpond is no longer enclosed by a wall with a sluice gate and barge lock. An arched walking bridge now spans the former site of the wall, giving little indication of its past use. However, mullet are still known to inhabit the pond, and now that the pond is part of the Wailoa State Park, fishing for them continues to the present time.

Although a former bridge was destroyed by the 1960 tsunami, residents and tourists can now cross

a new cement bridge from the Waiakea Peninsula to Coconut Island. In addition to the natural beauty of the island, visitors are still able to view the famous diving tower, which was used by the military during training exercises.

Although it had a less prominent position in the developmental history of the Big Island, Kawaihae Harbor has also been important to Hawai'i's maritime development for several hundred years. Kawaihae was visited by Westerners as early as 1792 when Captain Vancouver landed there and presented Kamehameha with a bull and cow - the first cattle in Hawai'i. It was a whaling port as early as 1845 and had a pier there as early as the 1850s.

Kawaihae grew in importance over the years and by 1859, it had a lighthouse as well as the first rail system on the island. As it became an important supply port for the export of cattle, the Territory of Hawai'i built a pier there in 1937.

In response to the increasing population and economic forces on the western sector of the island, the Federal government authorized the Kawaihae Harbor Project as part of the Rivers and Harbors Act of 1950. The harbor's navigational improvements and protective structure were completed by the U.S. Army Corps of Engineers in 1962. It consists of a 2,650 feet long rubble mound breakwater and a harbor basin.

As part of the development of the small boat harbor to the south of Kawaihae Harbor, the federal government undertook Project Tug Boat between 1969-70. This government experiment set off three explosive blasts to see if it was feasible to create harbors and channels with explosive charges, both nuclear and non-nuclear. After completion of the eight experimental explosions, the U.S. Army Corps of Engineers built an additional 850-foot-long breakwater to shelter the new basin.

Today, Kawaihae Harbor is generally unimproved, with the exception of the inter-island barge and overseas terminals. 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 boats, and has a boat launching ramp at the northeast corner for trailer boaters and canoeing activities. The U.S. Army owns and operates a landing ramp in the inner southwest corner of the basin on approximately 10 acres of land. The southeastern corner of the inner basin area 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.

Direct barge service to Kawaihae began in 1982. In that year, the channel and turning basin were deepened to a depth between 53 to 40 ft, mitigating surge conditions and reducing delays and damage to vessels. In 1983, a 2,400 square-foot shed was built for the protection of perishable farm products awaiting barge shipment. In the fall of 1986, an inter-island container operator began direct transshipment service to Kawaihae and was operating in the unimproved area adjacent to the overseas terminal building. This inconvenience was mitigated in 1992 when .5 acres of cargo handling yard



was added for overseas cargo and 1 acre of the container yard was paved for inter-island cargo. In that same year, existing silos were removed in the area while a new bridge was added to connect existing and new inter-island terminals.

By the early 1990s, more than 22,000 residents were served by the Kawaihae Harbor and, subsequently, several other harbor improvement projects were undertaken. In 1992, there was a 550 foot extension of the overseas pier along with dredging to increase the draft in front of the facility. Associated work at the harbor included the construction of a 38-foot extension of the marginal wharf, demolition of the existing dock, and the construction of a new 40-foot loading dock and two dinghy storage racks.

A current project at Kawaihae Harbor is the construction of the Small Boat Harbor. This joint Federal and State project is projected to cost \$9.2 million and accommodate 90 vessels (Fig. 11) It includes the dredging of a new access channel, the extension of the west breakwater, and the construction of a center mole. When State funds become available, construction of the shore side improvements will be undertaken.

In recent years there has been an increase in shipping activities at Kawaihae Harbor; however, the level of cargo movement through Hilo Harbor continues to remain stable. These trends indicate that Hilo Harbor will continue to play an important role in the growth and economic development of the Big Island. In addition to servicing the needs of an increasing resident population, Hilo Harbor will be required to meet the demands of a growing diversified agriculture industry. Additionally, Hilo's facilities will be monitored closely so that they meet the demands of the growing local, national and international ocean passenger cruise ship industries. Finally, the harbor facilities at Hilo will continue to be modified to be compatible with technological changes in the cargo handling industry. For example, most of the pier aprons will need to meet anticipated changes in cargo handling, such as the accommodation of longer and heavier containers.

Due to the anticipated growth of the resort complexes and residential subdivisions in the region, it is expected that maritime traffic will continue to increase at Kawaihae Harbor. As in the case of Hilo, Kawaihae is expected to be faced with an increase in ocean passenger vessel calls. Therefore, it is important that the facilities of both Hilo and Kawaihae Harbor be constantly evaluated and modified to meet the ever-changing port demands generated by Hawai'i's growing population and economy.



## V. METHODOLOGY

### A. ORGANIZATION

"Hili hewa ka mana'o ke 'ole ke kukakuka."  
*Ideas run wild without discussion.*

"He 'ike 'ana ia i ka pono."  
*It is a recognizing of the right thing.*

The Harbors Division operates in consideration of the users of its facilities and with the acknowledgement that its developments have direct and immediate effects on these users. With this in mind, the Harbors Division hosts periodic user group meetings to discuss the operations, deficiencies, designs, progress and modification of harbor projects. The 2020 Master Plan was constructed in this consultative manner.

Developing a proper long-range plan for the State's intricate port system is a complex undertaking. The vast number of interests concerned with either the workings of the life-sustaining commercial harbor or the prime waterfront locations occupied by harbor facilities present a wide and often conflicting array of desires. In the belief that an organized forum of these interests would be able to ferret out the best solution, a large task force was assembled to state the problems, resolve the conflicts and plan the critical future of Hilo and Kawaihae's commercial harbors.

#### 1. TASK FORCE

The Hawaii Commercial Harbors 2020 Master Plan is a concerted effort of the maritime industry, associated harbor users and government service. Representatives of these interests met as a task force in the initial orientation meeting on May 22, 1997. Private industries represented in the initial and subsequent task force meetings included petroleum companies, inter-island and overseas cargo carriers, a cement company, timber harvesting operations, stevedores, cruise ship agents, commercial fishing operations and electric power generators.

The island of Hawaii being so large and Hilo Harbor and Kawaihae Harbor being located on the east and west sides of the island, respectively, it was decided that the task force should be divided into two groups - Hilo Harbor Users and Kawaihae Harbor Users. The Hilo Harbor Users met in either the State Office Building or the Hilo Airport conference rooms. Kawaihae Harbor Users met in various locations on the west side including the Keahole-Kona Airport, the Hapuna Prince Beach Hotel and the Maunakea Beach Hotel. Many of the participants continued to attend both Hilo and Kawaihae Harbor meetings. Task force members in both meeting groups were respectful of others' requirements.

## **2. USER GROUPS**

The following list of issues and needs were determined by extensive discussions among the members of the user groups. Often, participants found it necessary to take the issue(s) to their associates for consideration and concurrence. While this practice of conferring with harbor users is standard procedure for the Harbors Division, the varying interests and long-range projections of the individual members complicated the effort.

### **HILO HARBOR FACILITIES**

#### **OVERSEAS CONTAINER TERMINAL(S)**

- No maintenance, break-bulk, freight forwarding accommodation areas.
- Outdated infrastructure - modernize for emerging economic trends.
- Expansion of paved container yard space.
- Increased open storage facilities for overseas shipping (containers, automobiles, breakbulk).
- Cold storage of agricultural products.
- Mixed uses too close (e.g.; passengers and cargo).
- Is Pier 1 shed properly sized? Might be too big. Demolish Pier 1 shed.
- Lengthening Pier 1.
- Installation of crane rails.
- Reduce surge at Pier 1 by installing wave absorbers under the pier.

#### **INTER-ISLAND CARGO TERMINAL(S)**

- Outdated infrastructure - modernize for emerging economic trends.
- Increased open storage facilities.
- Cold storage of agricultural products.
- Installation of crane rails.
- Shift inter-island operations to Pier 1.
- Demolish Pier 2 shed. Construct new shed and office away from pier.
- Reinforce Pier 2 apron and container yard for heavier equipment.
- Reinforce Pier 3 and add RO/RO stern berth.
- Acquisition of lands to the west of Hilo Harbor for an expanded inter-island yard.
- Construction of Pier 4 as a 1,000' marginal wharf for inter-island barge berthing and operations.
- Construction of a RO/RO berth on Pier 4.
- A western access road for Pier 4.
- Construct a new pier joining Piers 3 and 4.

## **LIQUID BULK CARGO TERMINAL(S)**

Consideration of shared storage needs between Harbors and Airports.  
Bunkering.  
Additional petroleum product hatches.  
Fuel barge accommodations at Pier 3.

## **DRY BULK CARGO TERMINAL(S)**

Forestry products: Approximately 1 acre for veneer storage.  
Cement: Cement storage and operations facility to be consolidated at Kawaihae.  
Coal: As coal is loaded on to trucks at the pier and taken out of the harbor, there is no need for space within the harbor. There does not appear to be much growth in coal demand.

## **PASSENGER TERMINAL(S)**

Pier 1 ugly.  
Outdated infrastructure - modernize for emerging economic trends.  
Lengthening Pier 1.  
Cruise ship berthing at Pier 1.  
Passenger terminals for Hilo.  
Modifications to Pier 1 shed to enhance passenger operations.  
Mixed uses too close (e.g., passengers and cargo).  
Cruise ship accommodations at Pier 3.  
Cruise ship pier closer to the hotels, possibly at Coconut Island, with restrooms and retail operations.

## **MILITARY REQUIREMENTS**

LST/LSV accommodations at the existing RO/RO ramp.

## **NAVIGATION**

More berths.  
Dredging area between Piers 3, 4 and 5

## **ROADWAYS**

Vehicular access into Hilo Harbor and interaction with operations.  
Main thoroughfares that interface harbors, highways and airports should be placed under State jurisdiction.

- Transfer Kalanianaʻole Avenue from County to State jurisdiction.
- Improve connecting roadways between Hilo Harbor and Hilo Airport.
- Widen Kalanianaʻole to four lanes.
- Construct a new road parallel to Kanoelehua - dedicated to freight and military movements.
- Improve/reconfigure Kanoelehua and Kalanianaʻole intersection.
- Construct access road for Pier 4.

#### **COMMERCIAL FISHING**

- Domestic and foreign fishing village for the fishing industry.
- Fish processing, ice house.
- New pier in Radio Bay.

#### **EXPANSION**

- Consider more than harbor boundaries.
- Difficult to expand.
- Fill in Radio Bay.
- Dredging/deepening Radio Bay with new pier for research vessels.
- Encouraging Coast Guard to expand facilities.
- Expand Hilo Harbor lands to the west.
- Development of Hilo Harbor's west side.
- Construction of Pier 4 - the eastern berth for passenger ships and the western berth for the Coast Guard cutter.

### **KAWAIIHAE HARBOR FACILITIES**

#### **OVERSEAS CONTAINER TERMINAL(S)**

- Increased open storage facilities.
- Installation of crane rails.
- Cold storage of agricultural products.
- Overseas container operations at Pier 2 and backlands.

## **INTER-ISLAND CARGO TERMINAL(S)**

- Increased open storage facilities for inter-island shipping (containers, automobiles, breakbulk.
- Develop an inter-island cargo terminal at the coral stockpile.
- Construct a RO/RO berth for the inter-island cargo terminal.
- Cold storage of agricultural products.
- Installation of crane rails.

## **LIQUID BULK CARGO TERMINAL(S)**

- Jet fuel storage.
- Consideration of shared storage needs between harbors and airports.
- Bunkering.
- Additional petroleum product hatches.
- Accommodations for bulk operations at Pier 2.
- Consolidate fuel storage either at the coral stockpile or along Kawaihae Road.
- Tosco remains in current location with some expansion.
- Liquid bulk (petroleum) facilities extend along mauka edge of overseas yard.
- Liquid bulk expansion area mauka of the overseas container yard.

## **DRY BULK CARGO TERMINAL(S)**

### **Forestry Products**

- Bulk fiber storage.
- Space for wood chip saw mill, veneer plant, wood processing and storage facility.
- Wood chip facility in the southwest corner.
- Accommodations for bulk operations at Pier 2, Kawaihae Harbor.

### **Cement**

- Bulk cement storage.
- Expand the existing cement facilities into the area currently occupied by Young Brothers, Inc.
- Accommodations for the cement ship (20,000 dwt, self-unloading) at Pier 2.

## **PASSENGER TERMINAL(S)**

- Increased passenger use.
- Construct a cruise ship passenger terminal at the coral stockpile.
- Intra-island/inter-island ferry terminal at Young Brothers' current terminal site.

## **MILITARY REQUIREMENTS**

- Maintain space for military operations.
- Maintain tank trail which is still used by Marine Corps.
- Two additional acres to the east to accommodate staging operation.
- Retain about a hundred yards of beach next to the LST ramp for Army operations.
- Construct a Coast Guard pier at the LST Landing.

## **NAVIGATION**

- Safe sea and land access into Kawaihae Harbor.
- Size of turning basin (too small).
- Draft of harbor.
- Dredging Kawaihae Harbor and turning basin.
- Deepen the harbor to 40 feet to accommodate oil tankers.
- Strong winds at Kawaihae.
- Surge at Kawaihae Harbor.
- Attenuate harbor surge by extending the breakwater and constructing a groin toward the buoy.
- Construct a groin north of the boat harbor to attenuate surge.
- Mitigate siltation and sedimentation along the coastline.

## **ROADWAYS**

- Safe access into Kawaihae Harbor.

## **EXPANSION**

- More berths.
- Construct a new breakwater outside of the existing breakwater. Either fill it in for additional operating land or construct a pier for more berthing.

## **OTHER FACILITIES**

- Comprehensive distribution center.
- No ship repair facilities on premises.
- Floating drydock.
- Foreign Trade Zone.
- Ocean mining.
- Maritime academy - training center.
- Major telecommunications center.
- Pacific Disaster Center.

No development in the existing buffer zone currently managed by National Park Service.  
National Park Service mitigate view plain impacts at Kawaihae Harbor.  
Transfer of Pelekane (current buffer zone) to National Park Service.  
Transfer of Pelekane to Office of Hawaiian Affairs.  
Reduce visual impact of harbor developments.  
Landscaping along Kawaihae Road.  
Pua Kalima O' Kawaihae.  
Add a retail shopping center to the area currently occupied by Young Brothers, Inc.  
Expand the north boat harbor into the area currently occupied by Young Brothers, Inc.  
Relocate the cattle pens nearer to the new inter-island cargo yard.

## **OPERATIONS**

**Security.**  
Lease, property management issues - how users interact with Harbors Division.  
Interaction with recreational boaters.  
Recreational fishing policy.  
No retailing.  
Jurisdictional issues.  
Emergency response concerns - potential for oil spill, limited response capabilities.  
Natural disaster response.  
Fire protection.  
Disaster preparedness.  
Alien species.  
Cost of operating business in the harbor.  
Harbor fees structure.  
Clearer definition of the term "maritime related."  
Simplify Harbors administration (including DLNR Boating).  
Not integrated with Airports and Highways Divisions.  
Integrating Department Of Transportation and State of Hawaii.  
Support and coordination with Office of Planning.  
Contentious relationship with Office of Hawaiian Affairs.  
Consolidate into one State plan (State 2020 plan).  
Kawaihae located in a culturally sensitive area.  
Environmental impacts (e.g.; air quality) of both harbors.  
Home-porting cruise ships, foreign fishing fleets, SOEST and government vessels.

## **TECHNICAL ANALYSES**

2020 demographics.  
Consider technological changes that might affect cargo operations.

- Need statistics of refrigerated agricultural products, cruise ships, proposed changes in cargo operations.
- Cargo split between Hilo and Kawaihae harbors.
- Technological changes of passenger ships - configuration and needs.
- Increased passenger use.
- New federal regulations on foreign flag ships.
- Traffic flow.

## B. DATA GATHERING

Investigations and data gathering efforts in support of the planned harbor developments included mailed questionnaires, personal interviews and research. Research was conducted on the prior studies, related planning documents, current and historical wharfage statistics, associated data compilations and socio-economic studies listed below:

- State of Hawaii Data Book*
- Harbors Division wharfage statistics
- U.S. Army Corps of Engineers' Waterborne Commerce of the United States*
- Cargoes, Matson's First Century in the Pacific*, William Worden
- Interisland Ocean Freight Services in Hawaii*, 1975 P. V. Garrod
- Saluting the Aloha Spirit American Hawaii's First Decade*, Allan E. Jordan, 1990
- Size and Growth Potential of Hawaii's Maritime Industry*, Donna J. Lee & Cristina A. Olive, Department of Agricultural & Resource Economics & Sea Grant College Program, June 1994
- DBEDT Quarterly Statistical & Economic Reports*
- Hawaii; A Students' Guide to Localized History*, Gerrit P. Judd, Copyright 1966, Teachers College Press.
- A History of Hawaii*, Ralph Kuykendall, Copyright 1926, The Macmillan Company.
- 'Olelo No'eanu*, Mary Kawena Pukui, Copyright 1983, Bishop Museum Press.
- Hilo Bay: A Chronological History. Land and Water Use in the Hilo Bay Area, Island of Hawaii*, Bernice P. Bishop Museum, prepared for the U.S. Army Engineer District, Honolulu, March 1981.
- 2010 Master Plan for Hilo Harbor*, Harbors Division, Department of Transportation, State of Hawaii, May 1989.
- 2010 Master Plan for Kawaihae Harbor*, Harbors Division, Department of Transportation, State of Hawaii, July 1989.
- Baseline Environmental Investigation of Hilo Harbor*, Neighbor Island Consultants, prepared for the U.S. Army Corps of Engineers, 1973.
- Report to the Governor*, Department of Transportation, State of Hawaii, 1985-1996.
- Population and Economic Projections for the State of Hawaii to 2020*, *DBEDT 2020 Series*, *Report of Results and Methodology*, Research and Economic Analysis Division, Department of Business, Economic Development, and Tourism, State of Hawaii, May 1997.



Data collected and documented through this research was valuable in establishing past trends and methods of operation. Efforts to ascertain current market and operating data was conducted in part through the user group meetings, surveys and personal interviews. The users were assured that any confidential information provided would not be divulged, therefore the technical data analyses are being set aside as a separate study and not being included as part of the 2020 Master Plan.

### **C. 2020 PROJECTIONS**

The research and data collection efforts produced "container loads" of pertinent cargo information. The abundance of available cargo statistics, however, was complicated by a wide range of categories and units. In an attempt to standardize the assortment, initial efforts focused on making sense of the weights of the cargo commodities as each commodity's weight in short tons (2,000 pounds) is estimated in the Harbors Division's Wharfage Statistics. Valid socio-economic indices from a collection of DBEDT's "The State Data Book" were compared to the history of cargo tonnages. High correlations between the annual weight of all cargo shipped to/from the island of Hawaii and Per Capita Gross State Product (in 1982 dollars) were established and used to project 2020 estimates of cargo tonnage. This methodology works well with the inter-island cargo category whose mainstay, "general merchandise," is reported in short tons.

Overseas cargo (including containers and automobiles), however, is not reported by tonnage, but by units. Each container, regardless of its size, is reported as one unit. Automobiles, again regardless of size, are also reported by the number of units shipped, rather than the tonnage. The effort to estimate the 2020 quantity of overseas container cargo was thus redirected to compiling the historical record of containers, standardized by Twenty-Foot-Equivalent-Units (TEU). A twenty-foot container equals one TEU, a twenty-four foot container equals 1.2 TEU, a forty-foot container equals 2 TEU, and a forty-five foot container equals 2.25 TEU, etc. Overseas TEU evidences a strong correlation with the Gross State Product in 1982 dollars. A regression analysis of the Gross State Product (82\$) and overseas TEU was linked to the "Population and Economic Projections for the State of Hawaii to 2020" to produce the estimated 2020 quantity of overseas container cargo.

Cargo activities that were correlated with historical socio-economic indices were then applied to the appropriate, incremental, 2020 baseline forecasts to establish future quantities of cargo. The spatial requirements for handling the forecast cargo volumes were determined by the application of commonly used port planning formulae to these projected cargo quantities.

Hilo Harbor's available acreage is not sufficient for the projected 2020 inter-island and overseas cargo volumes. The Hilo Harbor user group thus suggested a westward expansion of harbor lands to accommodate the estimated 2020 needs of the cargo carriers.

The luxury cruise industry is experiencing and forecasting enormous growth. Many of the cruise lines are building a record number of new ships. The Caribbean winter cruise market is already reportedly saturated, and the Alaskan summer cruise market is supposedly nearing its saturation point. The cruise lines, understandably, are looking for new destinations. With the proper infrastructure, Hawaii could become an active destination of the cruise liners, particularly between the Caribbean winter and Alaskan summer seasons. There was therefore a significant effort to plan a cruise ship terminal in Hilo Harbor and set aside an area for an alternate cruise ship terminal in Kawaihae Harbor. The desire for other maritime tourist operations were not as pronounced. Commercial fishing vessels' accommodations will be provided as required. While records of commercial fishing activity are available, it is difficult to project future quantities/locations of pelagic fish, and therefore difficult to project the size of this industry and its required 2020 facilities.

## **VI. RECOMMENDATIONS THROUGH THE YEAR 2020**

### **Discussion of Maritime Activities, Recommendations and Alternatives**

The discussions, recommendations and alternatives of this chapter are organized by the major facility improvements suggested, discussed and agreed upon by the members of the Hawaii Commercial Harbors 2020 Master Plan's task force. The facilities that satisfy these recommendations will be designed and constructed when the projects' financial and environmental concerns are properly addressed.

### **A. OVERSEAS CONTAINER CARGO TERMINAL(S)**

#### **DISCUSSION**

Hawaii depends almost entirely on the ocean shipping industry to transport its essential commodities (food, clothing, fuel, building materials, automobiles, etc.) and local products (pineapple, sugar, molasses, livestock, diversified agriculture, etc.) to and from the neighbor islands, the mainland, and various foreign countries. Developed island economies are typically dependent on ocean shipping for their sustenance.

The importance of cargo shipping to our State cannot be overstated. This Master Plan therefore begins with the facilities and services required by the overseas cargo carriers. While the economic value of commercial fishing, ocean mining, passenger cruises, excursions and ferries, etc. cannot be denied, commercial harbor planning must first address Hawaii's life-sustaining cargo operations. The requirements of the ocean cargo carriers must be given priority.

Based on the throughput of containers (counted in 20-foot equivalent units or TEUs) the American Association of Port Authorities ranked Honolulu Harbor as the tenth busiest of all 75 North American container ports in 1995. Yet, in a selected study of thirteen of these comparable ports (SMS Research, 1996), Honolulu Harbor's cargo acreage places it in the lower 31 percent of this range. This discrepancy between the large number of containers handled and the limited cargo acreage available suggests that Honolulu Harbor's cargo handling efficiencies are constrained by a lack of space.

A recent evolution in the method of retail inventory management further exacerbates the cargo movement problem. Supplies are now ordered and scheduled to arrive "just in time" to replenish depleted stocks. This practice reduces the need for individual storage facilities, but places the burden of timely delivery on the cargo carriers. The commercial harbor cargo yards, therefore, have been transformed into the State's "warehouses," further complicating the orchestration of cargo movements.

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"Just in time" shipping also limits the potential for direct overseas cargo shipments to the neighbor islands. Container vessels have such large capacities that it would take weeks to fill a ship with a neighbor island's orders and justify a direct shipment. Merchants (especially grocers) will not tolerate such infrequent deliveries of their merchandise.

An integral step in the development of a valid 2020 plan was the substantiation of the cargo carriers' facility requirements. This was accomplished by projecting cargo volumes through the year 2020 and conceptualizing the facilities necessary to support this amount of cargo.

Projections of future cargo volumes, however, proved a strenuous task. In examinations of past cargo records, it was discovered that cargo shipments were recorded in various modes (short tons, revenue tons, TEUs, etc.), separated into multitudinous categories (liquid propane, crude oil, jet fuel, diesel, coal, clinkers, sand, breakbulk, general cargo, cars, livestock, etc.). The volume of cargo alone made this one of the more time consuming tasks of this planning effort. Once the past cargo records were organized and documented in a consistent format, correlating socio-economic projections were applied to establish a valid 2020 prognosis of the volume of cargo expected in Hawaii's commercial harbors. The projected volume of cargo was then applied to commonly used port planning formulae to determine the space required to manage this amount of cargo.

The estimates of space required by the year 2020 are considerably greater than the land currently available for port operations in Hilo. Maritime property on the "Big Island" is a valuable and scarce commodity, and cargo carriers have had to make do with the little that is available. This plan attempts to adjust the space requirements for the projected 2020 volume of cargo, acknowledging that cargo carriers must continue to make the best use of allotted space, devise appropriate operational schemes and attempt to deal with the inefficiencies associated with this lack of space.

The need for services that support shipping is largely determined by the demand for shipping, and the demand for shipping is dictated by the local economy. Current projections for Hawaii's economy in the year 2020 dictate the development of significant, consistently well-planned commercial harbor facilities. Otherwise, competition for scarce resources, such as berthing and backup lands for cargo handling, can slow industry growth, cause congestion in the harbor and on the roadways, and raise the costs of merchandise.

### **RECOMMENDATIONS**

In 1986, 25,711 TEUs of overseas containers moved through Hawaii's port system. The volume of container shipments grew to 40,853 TEUs by 1991, and reached 47,340 TEUs in 1996. The overseas container volume is projected to top 110,300 TEUs by the year 2020. When computed into acreage requirements, the 110,300 TEUs amount to approximately 41 acres of overseas container cargo yards. To satisfy these requirements, 2020 overseas container operations are recommended at:

- Pier 1, Hilo Harbor with 20 acres of cargo yard;

- Pier 3, Kawaihae Harbor with 21 acres of cargo yard;
- A cargo expansion area for growth beyond the year 2020 is located adjacent to the overseas container yard at Kawaihae Harbor.

## **B. INTER-ISLAND CARGO TERMINAL(S)**

### **DISCUSSION**

This classification is used for inter-island cargo as well as for neobulk commodities moving in large, unitized loads. Although inter-island and neobulk cargoes are increasingly shipped in containers, certain commodities such as newsprint, lumber, steel, construction components, heavy equipment and vehicles can be efficiently loaded and transported without containerization, and continue to move in unitized form.

The inter-island system of cargo distribution is the principal means by which neighbor island communities receive and export their cargo. This system has Honolulu Harbor as its hub or point of distribution and consolidation. Because of Oahu's large population and the corresponding high demand for goods, container vessels are used to reduce the costs of shipping to Honolulu. In Honolulu Harbor, containers are off-loaded by destination. Oahu's cargo is loaded onto trucks for delivery. Cargo destined for the neighbor islands is transferred onto barges for shipment. Until the neighbor islands' demand for commerce or volumes of exports qualify for similar direct overseas shipments, this system of distribution will remain an integral part of the neighbor island economy.

Like the overseas cargo trade, operating and capital costs will influence the trend of more container use in the inter-island trade. Also similar to the overseas trade, inter-island shipping's operational and capital investment costs are leading to larger vessels and larger capacity handling equipment. The growth of diversified agriculture and forestry products could lead to more inter-island cargo traffic in terms of frequency as well as tonnage, due to the time sensitiveness of agricultural products. Growth of the neighbor islands' populations, tourist industries, construction activities and general economies will affect inter-island shipping in a similar manner. Facility improvement plans for inter-island operations consider these trends.

### **RECOMMENDATIONS**

The 2020 projections for general cargo total 793,278 short tons, which when computed into acreage requirements, result in 43 acres of inter-island cargo yard. To satisfy this requirement, inter-island cargo terminals are recommended at:

- Pier 4, Hilo Harbor with 21 acres of cargo yard;

- Piers 5 and 6, Kawaihae Harbor with 22 acres of cargo yard;
- A cargo expansion area for growth beyond the year 2020 is located adjacent to the inter-island cargo yard at Kawaihae Harbor.

### **C. BERTHS**

#### **DISCUSSION**

Berthing is becoming more of a concern as the number of calls to each harbor continue to increase while the number of berths remain static. The various cargo carriers, cruise ship operators, commercial fishermen, ocean research and military cargo operations share existing berths. Even with the new berths recommended for construction, vessels will continue to share commercial harbor facilities.

#### **RECOMMENDATIONS\***

To accommodate the wide variety of commercial harbor operations, the following are recommended:

- Container berths at Pier 1, Hilo Harbor and Pier 3, Kawaihae Harbor;
- Inter-island cargo berths at Pier 4, Hilo Harbor and Piers 5 and 6, Kawaihae Harbor. The RO/RO berth at Hilo Harbor is planned at the junction of Piers 4 and 5. The junction of Piers 3 and 4 is an alternative RO/RO berth. Kawaihae Harbor's Pier 6 is its RO/RO berth;
- Dry bulk cargo berths at Pier 1, Hilo Harbor and Piers 1,2 and 5, Kawaihae Harbor;
- Liquid bulk cargo berths at Pier 3, Hilo Harbor and Piers 2 and 5, Kawaihae Harbor;
- Commercial fishing berths are provided at available piers and at Radio Bay, Hilo Harbor;
- Passenger vessel (ferry, cruise ship, etc.) berths at Piers 1 and 5, Hilo Harbor and Pier 4, Kawaihae Harbor. Alternate berthing sites for passenger vessels in Hilo Harbor are at an extended Pier 2, a new pier at the northern end of Pier 1, and a new pier at Coconut Island;
- Military cargo (including Coast Guard) berths at the existing RO/RO berth and Radio Bay, Hilo Harbor, and the LST/LSV ramp and Pier 7, Kawaihae Harbor;
- Research vessel berths at Pier 6 and Radio Bay, Hilo Harbor and Pier 4, Kawaihae Harbor.

*\* Other than at Kewalo Basin/Annex, berthing within the State's commercial harbors is generally*

*not permanently assigned. Vessels entering port are directed to their berths according to the shoreside facilities required and the availability of such berths.*

*The recommended berth allocations contained in this chapter serve as an informal guide for vessel placement. More importantly, these allocations indicate the facilities required to accommodate the kinds and numbers of vessels anticipated by the year 2020.*

## **D. ROADWAYS**

### **DISCUSSION**

Roadways are an integral component of the commercial harbor infrastructure. Sufficiently-sized entrances/exits to cargo yards, convenient access to major thoroughfares, and the reduction or elimination of traffic congestion are all necessary for efficient cargo movement between ship and store.

### **RECOMMENDATIONS**

The 2020 Master Plan recommends:

- Five access roads at Hilo Harbor;
- The eastern access road may also serve as the Corps of Engineers' access to the breakwater;
- The improvement of all supporting roadways and intersections, including Kalanianaʻole Street, Kanoelohua Street, Silva Street and the Kawaihae Bypass Road;
- Because Kawaihae Harbor lands are directly adjacent to Kawaihae Road, access roads will be cognizant of local traffic constraints and include the proper safety measures.

## **E. PASSENGER TERMINAL(S)**

### **DISCUSSION**

In anticipation of a "boom" in the number of ocean cruise passengers, the international cruise industry is building a record number of new passenger ships. The domestic cruise industry, reportedly experiencing saturation of the Caribbean market and the Alaskan market's approach of its limit, is reaching out to new markets. As these cruise lines investigate new destinations, local ship agents are receiving increased inquiries for new and additional cruise ship calls. Hawaii's inter-island cruise line, acting on internal market studies and near-capacity bookings of its existing ship, is actively pursuing the acquisition of a second vessel and the construction of another ship by an American shipyard.

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Recognizing the potential growth of this industry, the Chamber of Commerce of Hawaii has agreed to promote Hawaii as a destination for both foreign and domestic cruises.

The State of Hawaii is actively pursuing inter- and intra-island ferry operations to provide alternatives to existing commuter services and to supplement the economy.

### **RECOMMENDATIONS**

- While Hawaii offers a prime location for ferry operations and an excellent destination for cruise passengers, passenger terminal facilities are largely lacking. This discrepancy is addressed by the recommendation to construct a primary passenger terminal at Pier 5, Hilo Harbor and an alternate terminal at Pier 4, Kawaihae Harbor.
- Alternate sites for Hilo Harbor's passenger terminal are at Pier 1, Pier 2 and Coconut Island.

### **F. NAVIGATIONAL IMPROVEMENTS**

#### **DISCUSSION**

Harbor surge, the size and depth of the harbor turning basins, and the configuration of the harbor channels were the navigational concerns stated by the task force members. The Harbors Division will coordinate the efforts of the U.S. Army Corps of Engineers to remedy the problems.

#### **RECOMMENDATIONS**

The following alterations are recommended to ease the harbor's navigational problems.

- Wave absorbers under Pier 1, Hilo Harbor to attenuate harbor surge;
- Dredging the area between Piers 3, 4 and 5, Hilo Harbor to a depth of 35 feet;
- Modifying the configuration or boundaries of Hilo Harbor's turning basin to permit construction or extensions of piers.
- Construction of jetties to attenuate harbor surge at Kawaihae Harbor;
- Dredging Kawaihae Harbor's turning basin to a depth of 40 feet.



## **G. DRY BULK CARGO TERMINAL(S)**

### **DISCUSSION**

Dry bulk cargo includes cement, scrap metal, coal and forestry products, and constitutes a significant percentage of the island's total cargo tonnage. Cement and concrete products are the construction industry's "building blocks." Scrap metal recycling operations remove unsightly abandoned vehicles. Forestry products may replace sugar as the island's primary export commodity.

### **RECOMMENDATIONS**

- Forestry products (veneer) require an acre of cargo yard at Hilo Harbor and six acres (wood chip operations) at Kawaihae Harbor;
- Bulk cement operations will occupy about an acre of Kawaihae Harbor lands;
- Scrap metal operations project a need for two acres of cargo yard at Kawaihae Harbor.

## **H. LIQUID BULK CARGO TERMINAL(S)**

### **DISCUSSION**

The island's petroleum supplies are shipped to Hilo Harbor and dispersed via truck throughout the island. While petroleum storage terminals have been proposed at Honokohau Harbor and in the proximity of the Keahole-Kona Airport, Kawaihae Harbor provides an immediate terminal site.

### **RECOMMENDATIONS**

Although there are valid concerns over petroleum storage facilities in Kawaihae Harbor, it is understood that the cost to relocate these facilities to a more remote area is prohibitive, and the adjacent Hawaiian Home Lands are not prepared to accommodate these operations in the immediate future. In any case, some means of bulk storage is required in the vicinity for vessel bunkering and ultimate distribution throughout west Hawaii.

- The existing petroleum hatches will remain at Pier 3, Hilo Harbor;
- The existing TOSCO facility will remain at Kawaihae Harbor;
- A public liquid bulk terminal is proposed at the coral stockpile, Kawaihae Harbor;
- Liquid bulk transfers are also possible at Piers 2 through 5, Kawaihae Harbor.

## **I. COMMERCIAL FISHING**

### **DISCUSSION**

Since 1985, the fishery picture in Hawaii has changed rapidly and in unforeseen ways. The tuna cannery closed, resulting in a substantial decline in landings for what once was the largest fishery for the State - the aku (skipjack tuna) pole-and-line fishery. Hawaii did not become a base and trans-shipment point for purse seine-caught tuna and troll-caught albacore. Foreign longliners were excluded from the United States (U.S.) 200-mile Exclusive Economic Zone (EEZ) surrounding the State and have been replaced by a fleet of American longline vessels employing new methods for targeting bigeye tuna and broadbill swordfish.

With few exceptions, however, the catch of pelagic fish has increased greatly in landings and value. Hawaii's commercial landings are at a record high in value with some estimates for 1990 near \$50 million. Exports of tuna and swordfish to Japan and the mainland U.S. account for a large percentage of the catch. New and improved facilities are likewise required to support this lucrative industry.

### **RECOMMENDATIONS**

It is difficult to project future quantities/locations of pelagic fish and subsequently difficult to project the size of the commercial fishing industry and its required 2020 facilities. The Department of Land and Natural Resources' Division of Boating and Ocean Recreation currently manages and maintains Hawaii's commercial fishing facilities on the island of Hawaii. To assist in these accommodations:

- Commercial fishing berths and accommodations are provided at available berths and/or Radio Bay, Hilo Harbor.

## **J. MILITARY CARGO**

### **DISCUSSION**

The U.S. Army owns land on the coral stockpile at Kawaihae Harbor under a Governor's Executive Order. Military cargo, including provisions, troops, vehicles and explosives are transported through this facility. The U.S. Army Corps of Engineers has the responsibility for constructing and maintaining the harbors' navigational improvements, including the breakwaters, and must be provided access to them.

### **RECOMMENDATIONS**

- In addition to the lands under their Executive Order in Kawaihae Harbor, the Army is provided 100 yards of beach access east of the LST/LSV ramp. The area west of the ramp

is added to their jurisdiction for the Corps of Engineer's access to the breakwater;

- Pier 7, Kawaihae Harbor, will be constructed as berthing for Coast Guard vessels;
- The existing RO/RO berth in Hilo Harbor will also serve as a LST/LSV berth;
- Coast Guard vessels will utilize Radio Bay or Pier 6, Hilo Harbor.

## **K. OCEAN RESEARCH**

### **DISCUSSION**

While not a true function of the commercial harbor, Hawaii's dearth of maritime facilities make it difficult for the university's ocean research operations to secure the appropriate sites. Hawaii's commercial harbors, therefore, provide some of the facilities required by ocean research operations.

### **RECOMMENDATIONS**

- Ocean research operations are permitted berthing for their vessels and adjacent landside accommodations at Pier 6, Hilo Harbor and Pier 4, Kawaihae Harbor.

## **L. ADDITIONAL RECOMMENDATIONS**

- At Kawaihae Harbor, an area adjacent to both overseas and inter-island cargo terminals is delineated for cargo yard expansions as they become necessary.
- The southeast corner of Kawaihae Harbor lands is a potentially significant historical site. These lands will not be developed for commercial harbor operations until cargo volumes dictate the expansion and the proper archaeological and environmental studies are conducted.
- A cultural, recreational organization, Pua Ka'iilima O' Kawaihae, is afforded temporary space for their activities on the western edge of the coral stockpile at Kawaihae Harbor.

## **VII. MAPS**

## **VIII. ENVIRONMENTAL CONSIDERATIONS**

### **A. APPLICABLE ENVIRONMENTAL LAWS, RULES, REGULATIONS AND PERMITS**

Any project that proposes work or discharges material in U.S. navigable waters must demonstrate compliance with a number of Federal laws and Executive Orders, which include:

- Section 10 of the Rivers and Harbors Act, Sections 401 and 404 of the Federal Clean Water Act Amendments (P.L. 95-217), and applicable implementing regulations. These laws stipulate that a permit is required for work performed in or affecting navigable waters which will have an impact on navigable capacity and for certain discharges of dredged or fill material into waters of the United States. This is of particular concern to the Federal Government.
- Section 307 of the Coastal Zone Management (CZM) Act (P.L. 92-583), as amended and applicable implementing regulations;
- Noise Pollution and Abatement Act (P.L. 91-604) and applicable implementing regulations;
- Clean Air Act (P.L. 90-148), as amended, and applicable implementing regulations;
- Section 208 of the Federal Water Pollution and Control Act Amendments (P.L. 92-500), Safe Drinking Water Act (P.L. 93-523), and applicable implementing regulations;
- National Historic Preservation Act (P.L. 89-665), and applicable implementing regulations;

A number of State plans, policies and controls provide guidelines for development within the State of Hawaii. These guidelines include the Hawaii State Plan, State Functional Plans, State Land Use Plan, Kakaako Community Development District Plan and Conservation District Law.

The Hawaii State Plan was developed to serve as a guide for future development of the State of Hawaii in the areas of population growth, economic benefits, enhancement and preservation of the physical environment, facility systems maintenance and development, and socio-cultural advancement. The Plan identifies, in general, the goals, objectives, policies and priorities for the development and growth of the State. Guidelines have been provided in the Plan to give direction to the overall development of the State. The following describes the relationship and compatibility of the proposed project with the overall plans for the State of Hawaii as set forth in the Hawaii State Plan, Chapter 226 of the Hawaii Revised Statutes, as amended:

Population (HRS Section 226-5);

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Economy (HRS Section 226-6, -8, and -10);

Physical Environment (HRS Section 226-11, -12, and -13);

Facility Systems (HRS Section 226-14 through -18);

Socio-Cultural Advancement (HRS Section 226-20, -21, -23, -24, -25, -26 and -27).

Twelve State Functional Plans were adopted by the State legislature in April 1984. These plans were formulated to specify in greater detail the policies, guidelines and priorities set forth in the Hawaii State Plan. The twelve functional plans include: Energy, Transportation, Water Resources, Historic Preservation, Recreation, Health, Education, Housing, Conservation Lands, Higher Education, Agriculture and Tourism. Except for the Housing Functional Plan, which is a part of the Kakaako Mauka Area Plan, and the Agricultural Functional Plan, all of the plans relate directly to the proposed Makai Area Plan.

The purpose of the Kakaako Makai Area Rules is to enable the Hawaii Community Development Authority (HCDA) to implement the policies and programs relating to the Kakaako district. The current makai area rules have been developed as a separate document which supports the recommendations of the Honolulu Waterfront Master Plan and the revised Makai Area Plan.

The Honolulu Waterfront Master Plan is a result of the 1988 Legislative Session's tasking of the Office of State Planning to prepare a comprehensive master plan for development and improvement of 1,550 acres - a six mile coastal stretch of the Honolulu waterfront, from Ala Wai Yacht Club to the Honolulu International Airport.

The State Land Use Commission designates land use. Projects will be developed in accordance with rules and regulations thereof.

The Conservation District Use Law consists of five subzones which include: 1) "Protective" (P), 2) "Limited" (L), 3) "Resource" (R), 4) "General" (G), and 5) "Special" (S). The conservation area of the Kakaako waterfront is seaward of the shoreline and is categorized as "Resource" subzone. The objective of this subzone is "to develop, with proper management, areas to ensure sustained use of the natural resources of those areas." Permitted uses in this subzone include all permitted uses stated in the Protective and Limited subzones; aquaculture; artificial reefs; and commercial fishing operations.

Other County or State approvals that may be required for individual projects include:

- Building Permit - City/County Building Department;
- Special Management Area (SMA) Permit - City/County Council;

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- Grading/Grubbing Permit - City/County Dept. of Public Works;
- Approval of Drainage Outfall - State Dept. of Health;
- Conservation District Use Permit - State Board of Land and Natural Resources (BLNR);
- Use of State Land - BLNR and State Dept. of Transportation;
- Shorewaters Construction Permit - State Dept. of Land and Natural Resources;
- Permit for Industrial Wastewater Discharge - City/County Dept. of Public Works;
- Shoreline Variance Permit - Dept. of Land Utilization.

The Coastal View Study was prepared to identify significant views from within the SMA boundary islandwide. The focus of this report is the scenic and open space objective of the CZM Act and SMA Permit, and elaborates on implementation of the objectives and policies. The Study divided the island into seven viewsheds which include: 1) North Shore, 2) Koolauloa, 3) Koolaupoko, 4) East Honolulu, 5) Primary Urban Center, 6) Ewa, and 7) Waianae.

The Office of Environmental Quality Control, State Dept. of Health, requires that Environmental Assessments be prepared to determine whether proposed projects produce significant environmental impacts. The eight conditions which stipulate the preparation of an Environmental Assessment and which may trigger the resultant need for an Environmental Impact Statement Preparation Notice are:

- Use of State or County lands or funds;
- Use within Conservation District Lands;
- Use within the Shoreline Setback Area;
- Use within any Historic Site or District;
- Use within the Waikiki Special District;
- Amendments to a County General Plan (except for those initiated by the County);
- Reclassification of Conservation Lands; and
- Construction or modification of helicopter facilities.

The following permits and approvals may be required prior to project construction:

Federal

U.S. Corps of Engineers

- Department of the Army Permit (Section 10 or Section 404) for construction of structures or work in navigable waters.

State of Hawaii

Department of Land and Natural Resources

- Conservation District Use (CDUA) Permit;
- Concurrence of this Department regarding historic sites;
- Notice of Intent to Drill;
- Right of Entry approval for planning and construction work on State-owned lands.

- Dewatering Permit

Department of Transportation

- Written permit for any project involving permanent or temporary construction (Highways - Ala Moana Boulevard and Nimitz Highway);
- Approval for utilities and traffic rerouting.

Office of Planning, Department of Business, Economic Development and Tourism

- Compliance with the Coastal Zone Management Program guidelines.

Department of Health

- National Pollutant Discharge Elimination System (NPDES) Permit;
- Noise Variance Permit;
- Variance for 24-Hour construction;



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- Permit for Air Emissions;
- Notification of work on sewer lines; (Wastewater generated by harbor activities must be collected and transmitted to the City's wastewater facilities. All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems.")

- Section 401 Water Quality Certification.

County of Hawaii

Department of Land Utilization

- Permit for the construction of any structure within the Shoreline Management Area (SMA);
- Shoreline setback variance for construction in the shoreline area.

Department of Public Works

- Grading/Stockpiling Permit (Chapter 10);
- Flood Control (Chapter 27);

Building Department

- Building Permit.

Department of Water Supply

- Notification of drilling project area.

Others

Hawaiian Telephone Company

- Permit or concurrence regarding work on utility lines.

Hawaii Electric Light Company, Inc.

- Permit or concurrence regarding work on utility lines.

Gas Company

- Permit or concurrence regarding work on utility lines.

Cable TV

- Permit or concurrence regarding work on utility lines.

Energy Corridor

- Fuel easement crossings.

## **B. POTENTIAL ENVIRONMENTAL IMPACTS**

In today's environmentally sensitive society, major construction projects are construed as the perpetrators of harmful, environmental actions. Because the recommendations contained in the 2020 Master Plan have the potential for adverse environmental impacts, a cursory environmental assessment of the 2020 proposals is provided in this section. This informal assessment further serves to establish the plan's feasibility by addressing potential regulatory constraints.

Port development projects are typically regulated by both federal and State environmental policies, and occasionally by specific city/county permit procedures. While none of the 2020 plan's recommendations appear to be overwhelmingly intrusive and thus infeasible, the environmental laws, rules, regulations and permits listed under section A of this chapter will be addressed before the Harbors Division proceeds to construct the proposed 2020 projects.

Many of the anticipated environmental impacts are temporary and short-term. Natural processes restore these temporary conditions to their original states. In most cases, it is possible to mitigate adverse environmental impacts and construct the projects within acceptable tolerance levels. The remaining, long-term, adverse environmental impacts are counterbalanced by the essential benefits provided to the general public by the construction of these harbor projects.

Dredging is proposed at both Hilo Harbor and Kawaihae Harbor's turning basins. Environmental considerations for these dredging projects include surface water quality, hydrology, vibration, biological impacts, groundwater contamination and disposal of dredged spoils. Most of the environmental impacts are short-term and can be mitigated.

*Chapter VIII. Environmental Assessment*

The construction of jetties to attenuate ocean surge at Kawaihae Harbor requires that attention be given to surface water quality, hydrologic and biological impacts. Periodic strong surge occasionally restricts maritime activities. The jetties will allow commercial vessels continuous access to the harbors for essential operations and are thus justified by an overall benefit to the public. Short-term, temporary impacts will be mitigated. There does not appear to be any practical alternative to the jetties.

Construction of other improvements within harbor waters, i.e.; marginal wharves, finger piers and moorings, must consider water quality, vibration, noise and biological impacts, which have historically been mitigated.

Landside development projects must address air, water, noise, vibration, dust, emissions, traffic and biological impacts, water quality, land use issues, and site contamination. Mitigation of these environmental impacts is possible and necessary.

Conversely, an environmental benefit of the 2020 recommendations is the potential for ancillary enhancement of the environment. The proposed dredging and silt basin projects at Kawaihae Harbor, for example, could enhance the water circulation and purging of adjacent, nearshore areas.

As the Harbors Division does not foresee any overwhelming adverse environmental impacts resulting from the pursuit of the 2020 recommendations, no insurmountable regulatory obstacles are expected. Approvals through the normal regulatory processes are therefore anticipated. Such approvals have already been granted for similar projects, setting the appropriate precedents. Comprehensive environmental studies of each site will be completed and the necessary approvals secured before individual projects are started.

## **IX. ACKNOWLEDGMENT OF PARTICIPANTS**

The island of Hawaii's commercial harbors are the maritime industry's infrastructure for the receipt and distribution of the State's commerce. Hawaii's economic and social structure is almost totally dependent on the goods imported through its harbors and the services provided by the commercial shippers. The complexities of the various operations found within these harbors replicate the intricacies of the State's technological lifestyle and almost defy attempts to consolidate them into a single master plan.

The tenants and users of Hilo and Kawaihae Harbor were invited to participate in this cooperative effort with the gamut of involved government agencies to establish a long-range planning guide for the development of essential harbor facilities. We proudly wish to acknowledge the overwhelming number of participants who are responsible for this plan:

All Ship and Cargo - James Dorton  
Akana Petroleum Inc. - Al Akana, Stella Akana, Richard Akana, Steve Reese, Dennis Shigeoka  
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DLNR, Land Division - Harry Yada, Charlene Unoki  
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DOT, Airports Division - Eugene Narimatsu, Bob Kawamoto, Dave Hein, Frank Kamahale  
DOT, Harbors Division - Tom Fujikawa, Fred Nunes, Rankal Leong, Steve Kay, Glenn Soma  
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HAVO - Philip Gagoriu  
Hawaii Civil Defense Agency - Wendell Hatada  
Hawaii Fire Department - R. Miyao, Ed Bumatay

*Chapter IX. Acknowledgment of Participants*

Hawaii Island Chamber of Commerce - Julie Hugo, Lani Kahawahi  
Hawaii Island Economic Development Board - Paula Helfrich  
Hawaiian Cement - Jeff Ching, John Shin  
Homesteader Waimea/Hawaiian Civic Club - Nancy Honda  
HT&T - Richard Hill, Pump Searle  
Kawaihae Boating Association - Jeff McConnell  
Kawaihae Cogen - Rodney Kaulupali  
Kawaihae Hawaiian Homes Community Association - JoJo Tanimoto  
Kona Kohala Chamber of Commerce - Marni Herkes  
Kona Outdoor Circle - Kaz Shigezawa  
KSBE - Jeffery Melrose  
Kuwaye Trucking - Wayne Kuwaye  
Leo A Daly - Rod Misawa, Joe Pickard  
Matson - Tony Hanley, Russell Chin  
Mauna Kea SWCD - Mary Ann Pyun  
Mauna Loa Diving Service - Phil Snowden  
Nakasi and Associates - Albert A. Nakaji  
National Park Service, Pu'ukohola Heiau - Daniel Kawaiaea, Jr., Roy Wiley  
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Office of Hawaii Affairs - Jamie Moana Kawauchi, Ruby McDonald  
Office of Planning - Mary Lou Kobayashi  
Port Director, U.S. Customs - George Montgomery  
Sealand Service - Blayne Sato, Kurt Pruitt  
Skinoustrics - James Strandberg  
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Waimea Homesteaders - Mr. and Mrs. Eric Edsman  
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Young Brothers, Kawaihae - Ernie Kawamura  
Jonathan Cole David Kamalani Kaipo Kamalani Wesley Wong Roy and Allie Forbes

## **X. GLOSSARY**

**ABSORPTION (OR CHARGES):** Accrued charges, such as cartage and storage. Sometimes assumed by the carrier for some purpose.

**ACCESSORIAL SERVICES:** Service rendered by a terminal operator or carrier which is subordinate to the principal function or transportation or movement of freight across a terminal (includes weighing, packing, warehousing, etc.)

**AD VALOREM (AD VAL):** According to value. Usually applied to a custom's duty charged upon the value only of goods that are dutiable.

**AISLE SPACE:** Space in cargo sheds or warehouses found necessary by operating experience; also usually required by fire regulation.

**ANCHORAGE:** That portion of a harbor (or designated area outside of harbors) in which ships are permitted to lie at anchor.

**APRON:** That portion of a wharf or pier between the waterfront edge and the (transit) shed. Strictly speaking, from the view point of construction, that portion of the wharf carried on piles beyond the solid fill. Also called Apron Wharf and Wharf Apron.

**BALE CLAMP:** See Cotton Squeezer

**BARGE-ON-BOARD:** LASH/SEABEE/BACAT - Use of specially designed barges or lighter, in which cargo is loaded directly in the barge. The barge is then moved via river and canal networks to a port area to await arrival of an ocean-going barge carrying ship; then hoisted aboard the ship by cranes or elevators.

**BASE:** 1) Home depot of container or trailer. 2) the Floor of a container.

**BASIN, TURNING:** An area of water or enlargement of a channel used for the turning around of vessels.

**BAY, TERMINAL:** An area in a transit shed or warehouse between posts or columns or the area between lateral ceiling beams or trusses projected downward to wharf or warehouse floor, the beams, trusses, columns or posts being numbered or lettered and used to designate the location of goods on wharf in warehouse.

- BERTH:** The water area, at the waterfront edge of a wharf, reserved for a vessel, including the wharf accessories such as bollard .
- BOOKINGS;** The reservations or assignments of space or accommodation aboard a vessel for specific cargo or passengers.
- BOX (BX):** Slang term for container, RO/RO - enclosed container. LASH barge designed with square bow and stern.
- BREAK-BULK CARGO:** General cargo conventionally stowed and stowed as opposed to bulk, unitized or containerized cargo.
- BREAKWATER:** An engineering structure to afford shelter from wave action, may also be called mole, jetty.
- BROKEN STOWAGE:** The waste in any given stowage space or container caused by irregularity in the size and shape of packages.
- BULK CARGO:** Cargo stowed without benefit of package or container, i.e., 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.
- BULLRAIL:** A guard, wooden, concrete or metal, placed along the outer edge of a pier wharf to prevent operating equipment from sliding.
- CARRIED-ON AND CARRIED-OFF (CO/CO):** Breakbulk cargo which is carried on and off the ship by fork-lifts as opposed to LO/LO or RO/RO or bulk loading techniques.
- CARTAGE:** The trucking, draying or carting of freight.
- CELLULAR CONTAINER VESSEL:** Ship specially constructed for the stowage of containers in vertical stacks or cells. Normally 6-7 high below decks and 3-4 high above decks.
- CHANNEL:** The buoyed, dredged and policed fairway through which ships proceed from the sea to their berth or from one berth to another within a harbor.
- CHASSIS:** Special trailer or undercarriage on which containers or RO/RO cargoes are moved over-

the-road.

**CONSIGNEE:** Person or company to whom goods are sent, often the owner of the cargo, when purchase is made F.O.B. country of export.

**CONSIGNOR:** Person who consigns or sends goods to another.

**CONSOLIDATED CARGO:** To combine more than one shipment in a container unit, or pallet for more than one consignee.

**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 the 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 enabling to make the number of containers of a lot (only as number and not as weight) comparable with other lots.

**CONTAINER FREIGHT STATION (C.F.S.):** The physical facility where goods are received by carrier for loading into containers or unloading from containers and where carrier assemblies, holds or stores its containers or trailers.

**CONTAINER YARD (C.Y.):** The location at all container terminals designated by carrier in the port.

**CONTAINER (TYPES): DRY CARGO CONTAINERS:** a) end-loading, fully enclosed; Basic container, equipped with end doors; suitable for general cargo not requiring environmental control while en route. b) Side loading, fully enclosed: Equipped with side doors for use in stowing and discharge of cargo where it is not practical to use end doors. c) Open top: Used for carriage of heavy, bulky or awkward items where loading or discharging of the cargo through end or side doors is not practical. d) Ventilated: Equipped with ventilating ports on ends or sides and used for heat generating cargoes or cargoes requiring protection from condensation damage, e) Insulated: For cargoes which should not be exposed to raped or sudden temperature changes. **SPECIAL PURPOSE CONTAINERS:** f) Refrigerated; Insulated and equipped with a built-in refrigeration system, g) Dry Bulk: designed for carriage of dry bulk cargoes, such as dry chemicals and grains. h) Flat Rack: Used for lumber, mill products, large heavy or bulky items or machinery and vehicles. j) Automotive: For carriage of vehicles. k) livestock: Configured for the nature of livestock carried. l) Collapsible:



Configured for stowage when not in use.

**CONTAINERIZED CARGO:** Cargo that can fit physically, conveniently, and economically into a container.

**COTTON SQUEEZER:** 1) Specialized attachment which enables a forklift to pick up four bales of cotton at a time. 2) Also called Bale Clamp and is used for handling of wool.

**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.

**CRANE, WHARF:** Any crane, located on a wharf or pier designed to serve the vessel alongside.

**DEAD HEADING:** Moving containers in one direction without revenue cargo in container. Standard term throughout U.S. transportation industry.

**DELIVERY:** Transfer of care and custody of containers (full or empty) and/or cargo from carrier to shipper/consignee and/or their legal representative.

**DEMURRAGE:** Penalty charged shippers or receivers of freight, usually at a stated sum per day for detention beyond the free time provided for loading or unloading.

**DISCHARGE:** To remove or unload cargo from a vessel.

**DOCK:** The water area alongside a pier or wharf.

**DOCK, FLOATING:** Submersible platform taking ships on board, enabling the repairing of ships.

**DOCK, DRY:** Basin enabling the repairing of ships by pumping the water outside of it.

**DOCKAGE:** Charge levied against the vessel for the use of berthing area.

**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, hopper, hydraulic.

**DREDGE SPOILS:** Byproduct of dredging process; the residual accumulated silt that must be disposed of.

**DRY CONTAINER:** Containers of various lengths designed for carrier of general cargo (See container types), other than for liquid cargo.

**DRY FREIGHT:** Non-liquified cargo not requiring controlled temperature protection.

**DUNNAGE:** Material used in stowing cargo within a container to prevent movement.

**FENDER PILE:** A pile driven close to a structure of the pier to prevent contact between vessel and structure.

**FLAT CONTAINER (FLAT RACK):** 1) Open-sided container, usually designed with corner posts for structural supports. Used for carriage of special commodities, such as lumber, tractors, etc. 2) Collapsible container.

**FORK PACKETS:** Openings in the bottom supports of containers for the entry of the forks of lift truck.

**FORKLIFT (F.L.):** Unit used for lifting and handling container units, etc.

**FREE ON BOARD (F.O.B.):** Delivered (by the seller) aboard the train, ship, etc. at the point of shipment, without charge to the buyer.

**FREIGHT HANDLING AREA:** Square meters (or feet) of surface floor space between the waterfront edge of the wharf and the line where freight is customarily piled, plus the area of lanes or roadways reserved for the trucking or handling of cargo to and from shipside.

**FREIGHTLINER:** Name first employed by British Railways for their container hauling operation now being used by Transportation Industry generally to denote a fast, specialized container carriage service.

**FULL CONTAINER LOAD (F.C.L.):** Where the load carried in a container equals one of the two operating maxima in weight or volume.

**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.

**HOPPER:** A temporary container for bulk material shaped like a funnel, but with four flat tapering sides arranged like an inverted truncated pyramid, with the large end up and generally open and the small end down and generally closed by a gate or valve.

**INSULATED CONTAINER:** Container possessing protective insulation to minimize effect of external temperatures on the cargo.

**INTERMODAL:** Used to denote ability of containers to change from rail to truck to ship in any order.

**JETTY:** An engineering structure at the mouth of a river or harbor or elsewhere to control the water flow and currents, to maintain depth of channel, to protect harbor or beach.

**LIFT-ON/LIFT-OFF (LO/LO):** Cargo loaded/unloaded by either ship or shore cranes.

**LIGHTER:** A barge or other small craft used in transferring cargo from ship to ship, ship to shore, or vice versa.

**LIGHTERING:** A process in which a barge or smaller vessel transfers cargo between ship and shore.

**MAKAI:** Hawaiian term for "towards the ocean".

**MAUKA:** Hawaiian term for "towards the mountains."

**MOORING:** A place at which or an object to which a craft can be moored, or made fast.

**PALLET:** Basic feature in the mechanized handling of freight. Standard size platform, on which loads can be stacked, constructed for easy movement by forklift or sling. In Europe 1,200 X 1,000 mm pallet is in general use. The English equivalent is 48 in. X 40 in. Growing popularity is the 48 in. X 48 in. pallet.

**PALLETIZED CARGO:** Individual items of cargo loaded on a pallet.

**PAYLOAD:** The carrying capacity of a container.

**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.

**PORT OF ENTRY (U.S.):** Point designated by the President, Secretary of Treasury or Acto of Congress at which Customs Officer is assigned with authority to accept entries of merchandise, to collect duties and enforce various provisions of the Customs and Navigation Laws.

**PUSH TUG/BOAT:** Towboat with square shaped bow and push knees utilized with pushing barges in tow and to load/discharge mother vessel.

**ROLL-ON/ROLLOFF (RO/RO):** Cargo which is rolled or driven on and off the ships, as opposed to CO/CO, LO/LO or bulk loading methods.

**STERN RAMP:** RO/RO and Ferry-ramp enters into or protrudes from stern aperture along center line or at an angle to the center line vessel.

**STORAGE, WHARF:** Goods given warehouse accommodation and warehousing rates and conditions on same are in the wharf shed set aside for that purpose.

**STRADDLE CARRIER (STRAD):** A vehicle on wheels, open in the middle, that can straddle a container or container on chassis and over it from one place to another in a container yard. Capable of straddling rows of containers, two to three high.

**STUFFING:** Loading containers.

**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 devanning.

**TON (T) (Tn) (seldom used):** A unit of measure, may be short ton (St), (2,000 pounds), long ton (Lt) (2,240 pounds); metric ton (Met.ton) (2,204.6 pounds); measurement ton (Mt) (40 cubic feet of space); revenue ton (Rt) (any combination above, as manifested or producing the greatest revenue).

**TOW TRACTOR:** A tractive unit used to tow containers.

**TRANSIT TIME:** A time period for cargo to move between two points (e.g. from a consignor to a consignee). Total transit time is usually calculated by adding the sea time between two given ports, the port handling time, the inland movement time and half of the service frequency.

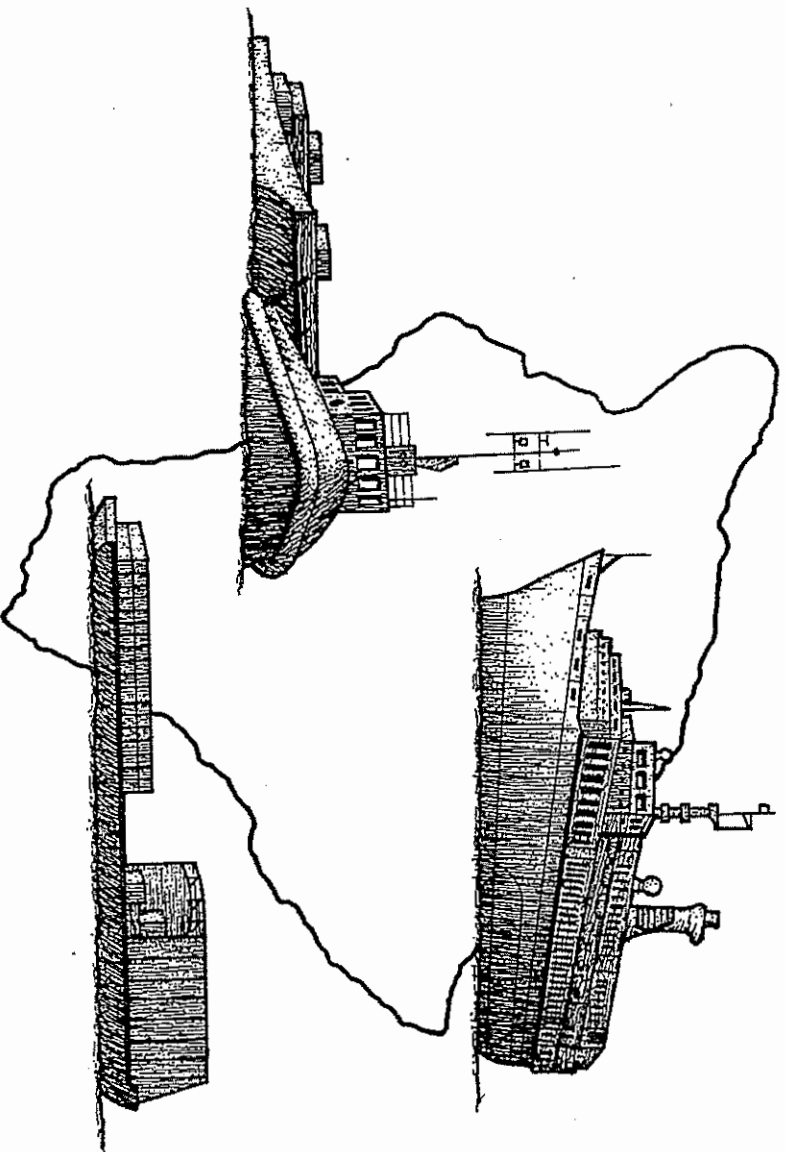
**TRANSIT SHED:** Wharf structure for the short-time storage of merchandise in transit.

**TRIPLE STACKER (T.S.):** Forklift capable of handling containers three high.

**TURN-AROUND TIME:** The period during which a transport vehicle is confined to port, terminal or warehouse, loading or unloading.

# HAWAII COMMERCIAL HARBORS

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## 2020 MASTER PLAN



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HARBORS DIVISION  
AUGUST 1998