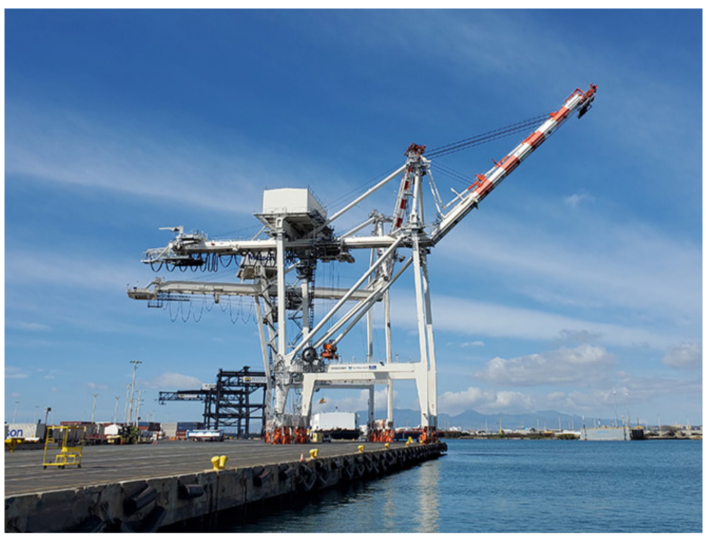

HONOLULU HARBOR 2050 MASTER PLAN

HONOLULU, HAWAI'I, O'AHU

FINAL
November 2022

STATE DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION

Honolulu Harbor is the principal seaport on O‘ahu and is the critical hub of the State’s commercial harbors system. Annually, Honolulu Harbor handles over 12 million tons of cargo, which is distributed throughout the State. Ocean cargo transport remains Hawai‘i’s lifeline and the only viable means to serve and support every facet of the local economy, including tourism, construction, national defense, agriculture, and other industries; about 85 percent of goods we use in Hawai‘i are imported, and 91 percent of those imports comes through the State’s commercial harbors system.

The State of Hawai‘i is dedicated to ensuring that Honolulu Harbor, as the primary of port-of-entry and the hub of the State’s cargo distribution network, continues to operate efficiently and resiliently to sustain the future needs of our islands’ communities and of the maritime industry.

Toward this goal, the Hawai‘i Department of Transportation, Harbors Division (DOTH) has completed this *Honolulu Harbor 2050 Master Plan* (HHMP). The HHMP serves as a long-range, strategic guide that recommends harbor land uses and facility improvements to meet the forecasted demand for cargo, commercial fishing, passenger, and maritime support operations for the coming decades at the State’s principal harbor.

A central focus of the HHMP is to ensure that Honolulu Harbor is prepared to meet the significant challenges to harbor infrastructure and operations posed by climate change and sea level rise (SLR), and to improve port resiliency so that the State’s primary port is able to remain operational following a disaster event. Meeting these challenges will require a clear-eyed understanding of long-range impacts to port facilities posed by climate change and SLR, and a commitment to creative, cooperative, and timely adaptation strategies and investments in harbor infrastructure, as identified in the HHMP.

The development of the HHMP was a collaborative process involving input from harbor users, government agencies, surrounding landowners, the Kānaka Maoli community and the public. Through early and continuous engagement with stakeholders, the HHMP reflects the greater needs of the State and provides informed guidance for DOTH. Our deep gratitude is offered to all those who contributed their time and insight into the planning process.

The HHMP is a critical piece in the safe, efficient, and responsible development of Hawai‘i’s commercial harbors system, which will benefit communities statewide. DOTH will continue working to implement the HHMP and improve the quality of life for Hawai‘i’s current and future population.

Sincerely,

DAVID Y. IGE
Governor of Hawai‘i

Acknowledgements

The Hawaiʻi Department of Transportation, Harbors Division (DOTH) and the HHMP Project Team wish to recognize the contributions and proactive engagement of representatives from all sectors of the maritime industry, government agencies with jurisdiction in the harbor, landowners adjacent to the harbor, and subject matter specialists from academia and the private sector who dedicated their time, *manaʻo* (to reflect and gain insight) and resources to the HHMP planning process. Over the five years of the HHMP development, no request by the Project Team to these individuals and organizations was met with anything less than a timely, diligent, and supportive response. Although their role was advisory only, their contributions, commitment and guidance were not insubstantial and the HHMP would not exist without them.

We wish to extend special thanks to the Hawaii Pilots, P&R Water Taxi and Foss Marine for donating their time and vessels to ensure that the Project Team had a first-hand, water-level view of the harbor facilities, operations and conditions. We would also like to thank Georgette Stevens and Kekoa Graham at Ōlelo Community Media for their impressive expertise helping us pivot to a televised, multi-media broadcast format for the Public Information Meeting which allowed us to continue public outreach during covid pandemic restrictions and ensure that our island community had an opportunity to participate in the planning process.

Members of the Planning Advisory Committee and Technical Advisory Sub-Committees are listed below. The larger record of those who participated on the Technical Advisory Committee and/or through individual interviews is provided in the HHMP appendices. **Section 2.5** in the HHMP describes the planning process and committees' roles.

To all these individuals and the organizations they represent, we extend a heartfelt MAHALO! Your participation in this planning effort has been instrumental in ensuring that Honolulu Harbor, as the principal hub of the State's commercial harbors system, will be prepared to meet the future needs of our islands' communities and of the maritime industry.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ABBREVIATIONS AND ACRONYMS

ADA	Americans with Disabilities Act
AMC	American Marine Corp
AML	Aloha Marine Lines
AMSC	Area Maritime Security Committee
AOAO	Association of Apartment Owners
APHIS	United States Department of Agriculture, Animal and Plant Health Inspection Services
ATDC	Aloha Tower Development Corporation
Bbls	barrels
BFD	Berth Foot Day
BFE	Base Flood Elevation
BWS	City and County of Honolulu Board of Water Supply
CBP	United States Department of Homeland Security, Customs and Border Protection
CCH	City and County of Honolulu
CIP	Capital Improvement Program
COTP	Captain of the Port
CPR	Condominium Property Regime
CMU	concrete masonry unit
CON/RO	combination of containers and roll-on/roll-off
CSH	Cultural Surveys Hawaiʻi
CWA	Clean Water Act
DA	USACE Department of the Army
DAR	Hawaiʻi Department of Land and Natural Resources, Division of Aquatic Resources
dB	decibel
DBEDT	Hawaiʻi Department of Business, Economic Development and Tourism
DLNR	Hawaiʻi Department of Land and Natural Resources
DOA	Hawaiʻi Department of Agriculture
DOH	Hawaiʻi Department of Health
DOT	Hawaiʻi Department of Transportation
DOTA	Hawaiʻi Department of Transportation, Airports Division
DOTH	Hawaiʻi Department of Transportation, Harbors Division
DOT-HWY	Hawaiʻi Department of Transportation, Highways Division
DSM	Hawaiʻi Department of Transportation, Departmental Staff Manual
DSP	Hawaiʻi Division of Land and Natural Resources, Division of State Parks

ECE	Early Cultural Engagement
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
EV	electrical vehicle
FAA	Federal Aviation Administration
FAK	freight-all-kind
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FSP	Facility Security Plan
FT	Foot - measurement
FTZ	Foreign Trade Zone
GMSL	global mean sea level
GSA	Federal Government Services Administration
GSP	Gross State Product
HAR	Hawaiʻi Administrative Rules
HCDA	Hawaiʻi Community Development Authority
HDACS	Harbors Division Annual Cargo Statistics
HECO	Hawaiian Electric Company
HFFC	Hawaiʻi Fueling Facilities Corporation
HHMP	*Honolulu Harbor 2050 Master Plan*
HFD	Honolulu Fire Department
HFS	Honolulu Freight Service
HML	Honolulu Marine, LLC
HNL	Daniel K. Inouye International Airport
HPA	Hawaiʻi Pilots Association
HPU	Hawaiʻi Pacific University
HPV	High Preservation Value
HRS	Hawaiʻi Revised Statutes
ICE	United States Immigration and Customs Enforcement
IES	Island Energy Services
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
IWC	in-water cleaning
KBPH	Kalaeloa Barbers Point Harbor
KCT	Kapālama Container Terminal
KIPA	Keʻehi Industrial Park Association
kV	kilovolt
LCA	Land Commission Awards
LCL	less-than-container load
LEP	Limited English Proficiency
LF	linear foot
LPG	liquified petroleum gas
LRFI	Literature Review / Field Inspection
Lt	long ton
LUO	Land Use Ordinance
MARSEC	Maritime Security Card

Master Plan	*Honolulu Harbor 2050 Master Plan*
MHHL	mean higher-high water
MLLW	mean lower-low water
MOU	Memorandum of Understanding
MPRSA	Marine Protection, Research and Sanctuaries Act
MS4	Small Municipal Separate Storm Sewer System
MSL	mean sea level
MSRC	Marine Spill Response Corporation
Mt	measurement ton
MTSA	Maritime Transportation Security Act
NCL	Norwegian Cruise Lines
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act
NHS	National Highway System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
OCR	optical character recognition
OEI	one engine inoperative
OHA	Office of Hawaiian Affairs
OPSD	Hawaiʻi Office of Planning and Sustainable Development
PA	programmatic agreement
PAC	Planning Advisory Committee
PacIOOS	Pacific Islands Ocean Observing System
PENCO	Pacific Environmental Corporation
PHFS	Primary Highway Freight System
PIM	Public Information Meeting
PSF	pounds per square foot
PSI	Pacific Shipyards International
PSP	Port Security Plan
PPP	Public-Private Partnership
PUC	Public Utilities Commission
PVS	Polynesian Voyaging Society
RHA	Rivers and Harbors Act
RLS	Reconnaissance Level Survey
RO/RO	roll-on/roll-off
ROH	Revised Ordinances of Honolulu 1990
ROM	rough order of magnitude
ROW	right-of-way
RRI	Rapid Reconnaissance Inspection
RSL	relative sea level
SEI	Sea Engineering, Inc.
SBH	Keʻehi Small Boat Harbor

SBI	Sause Bros, Inc.
SF	square foot
SHPD	Hawaiʻi Department of Land and Natural Resources, State Historic Preservation Division
SIHP	State Inventory of Historic Places
SIWWTP	Sand Island Wastewater Treatment Plant
SLR	sea level rise
SLR-XA	Sea Level Rise Exposure Area
SMP	Special Maintenance Projects
SOI	Secretary of Interior
SISRA	Sand Island State Recreational Area
St	short ton
Sub-TAC	TAC sub-committee
TAC	Technical Advisory Committee
TEU	Twenty-foot Equivalent Unit
TGS	20-foot ground slots
TOD	transit-oriented development
TSA	Transportation Security Administration
TWIC	Transportation Worker's Identification Credential
UH	University of Hawaiʻi
UH SOEST	University of Hawaiʻi, School of Ocean, Earth, Science and Technology
USC	United States Code
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Service
VGP	Vessel General Permit
VIDA	Vessel Incidental Discharge Act
WUS	Waters of the United States

GLOSSARY

Aboard On or in a vessel. Synonymous with "on board."

Alongside By the side of a ship or pier.

Anchor (noun) Device usually of metal attached to a ship or boat by a cable and cast overboard to hold it in a particular place by means of fluke that digs into the bottom.

Anchor (verb) To keep hold or be firmly fixed.

Apron That portion of a wharf or pier between the waterfront edge and the (transit) shed. Strictly speaking, from the viewpoint of construction, that portion of the wharf carried on piles beyond the solid fill.

Barge A towed or self-propelled flat-bottomed boat, built mainly for river, canal, and coastal transport of heavy goods.

Basin An area of water or enlargement of a channel used for the turning around of vessels.

Beam The greatest width of the boat.

Berth A location in a port or harbor used specifically for mooring vessels while not at sea.

Berth Foot Day (BFD) Tabulated to determine a vessel's linear berthing used with corresponding mooring allowances and the vessel's port call duration, in relation to the maximum linear berth that is available for the specific berth.

Boat A fairly indefinite term – A waterborne vehicle smaller than a ship.

Bollard A substantial vertical pillar to which lines may be made fast.

Bow The forward part of a boat.

Break-bulk cargo Goods that must be loaded aboard a ship individually, and not in intermodal containers or in bulk, carried by a general cargo ship. See also "Neo-bulk".

Breakwater A structure constructed on a coast as part of a coastal defense system or to protect an anchorage from the effects of weather and longshore drift.

Bridge The location from which a vessel is steered and its speed controlled.

Bulkhead A vertical partition separating compartments; wall built parallel to the shoreline, usually near or at the high-water mark, to mitigate wave and current erosion of the uplands, and often used as a retaining wall to keep uplands from becoming submerged lands.

Bulk cargo Cargo stored without benefit of package or container (i.e., shipped loose), as in grains or liquid.

Bulk carrier A merchant ship specially designed to transport bulk cargo in its cargo holds.

Bull rail A wooden, concrete, or metal guard placed along the outer edge or a pier or wharf to prevent operating equipment from sliding.

Bunker fuel Fuel oil for a ship.

Bunkering Replenishment of a ship's fuel.

Buoy A floating object of defined shaped and color which is anchored at a given position and serves as an aid to navigation.

Call Planned visit by a ship, especially to load or unload passengers or cargo, to obtain supplies, or to undergo repairs.

Captain of the Port (COTP) A U.S. Coast Guard officer, usually a captain, responsible for enforcement of safety, security, and marine environmental protection regulations in a commercial port.

Cargo ship Any sort of ship or vessel that carries cargo, goods, and materials from one port to another, including general cargo ships (e.g., designed to carry break-bulk cargo), bulk carriers, container ships, multipurpose vessels, and tankers. Tankers, however, are routinely thought of as constituting a separate category.

Channel The buoyed, dredged, and policed fairway through which ships proceed from the sea to their berth.

Class (1) A group of naval ships of the same or similar design; (2) A standard of construction for merchant vessels, including standards for specific types or specialized capabilities of some types of merchant vessels. A ship meeting the standard is in class; one not meeting them is out of class.

Container A single rigid, non-disposable cargo box which may be ventilated, insulated, reefer (i.e., refrigerated), flat rack, vehicle rack, or open top container with or without wheels or bogies attached not less than 20 FT 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.

Containerized cargo Cargo that can fit physically, conveniently, and economically into a container.

Conveyor A transfer of handling mechanism that affords continuous movement through application of power or by gravity.

Course The direction in which a boat is steered.

Crane A machine for hoisting weights or cargo moving them vertically/horizontally for limited distances and lowering them to a new location.

Cruise ship A passenger ship used for pleasure voyages, where the voyage itself and the ship's amenities are part of the experience, as well as the different destinations along the way. Transportation is not the prime purpose, as cruise ships operate mostly on routes that return passengers to their originating port. A cruise ship contrasts with a passenger liner, which is a passenger ship that provides a scheduled service between published ports primarily as a mode of transportation. Large, prestigious passenger ships used for either purpose are sometimes called ocean liners.

Current The horizontal movement of water; tidal or no-tidal movement of lake or ocean water.

Cutter In the 20th and 21st centuries, a small- or medium-sized vessel whose occupants exercise official authority, such as harbor pilots' cutters, U.S. Coast Guard Cutters, and UK Border Agency cutters.

Deck The working surface of a pier or wharf or a loading surface on board a ship.

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

Demurrage Penalty charged to 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 A fixed structure attached to shore to which a vessel is secured when in port, generally synonymous with pier and wharf, except that pier tends to refer to structures used for tying up commercial ships and to structures extending from shore for use in fishing, while dock refers more generally to facilities used for tying up ships or boats, including recreational crafts.

Dolphin An isolated cluster or 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.

Dray Any vehicle, typically without sides, used to haul goods, especially one used to carry heavy loads.

Dredge To excavate material from the bottom of a body of water.

Dry-bulk A category of cargo stowed in large, unpackaged amounts, consisting of grain, cotton, coal, etc.

Dry dock A narrow basin or vessel used for the construction, maintenance, and repair of ships, boats, and other watercraft that can be flooded to allow a load to be floated in then drained to allow that load to come to rest on a dry platform.

Dwell time Amount of time that cargo is stored within a yard.

Ebb A receding current

Fender A cushion placed between boats or between a boat and a pier to prevent damage.

Ferry A boat or ship for conveying passengers and goods, especially over a relatively short distance and as a regular service.

Flat rack Containers of various lengths designed for carrier or general cargo other than for liquid cargo.

Flood An incoming current.

Freeboard The minimum vertical distance from the surface of the water to the upper edge of the side of a boat, ship or pier deck.

Freight-All-Kind refers to a consolidated cargo shipment that contains different kinds of goods, but is charged at one unique rate.

Gangway The opening by which a ship is boarded.

Gear A general term for ropes, blocks, tackle, and other equipment.

Harbor An area of water affording a natural or artificial haven for ships.

High-Cube High Cube refers to standard-sized cargo containers with a height of 9 FT 6 IN. A high-cube warehouse building typically has a minimum clear ceiling height of 24 feet to accommodate cargo container movements by wheeled chassis or top-pick equipment. High cube warehouses are typically used for cargo consolidation and deconsolidation operations and storage but are suitable for a variety of maritime support service operations that involve movement of large equipment and materials.

Hull The frame or body of a ship or boat.

ISO-container Containers are used for the intermodal transport or freight. They are manufactured according to specifications from the International Organization for Standardization (ISO) and are suitable for multiple transportation methods such as truck, rail, or ship.

Iwi Kūpuna Native Hawaiian ancestral bones

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, or to protect the harbor or beach.

Layberth A berth used for idle vessels where no loading or unloading takes place.

Liner Any cargo or passenger ship running scheduled service along a specific route with published ports or call, excluding ferries and other vessels engaged in short-sea trading.

Liquid-bulk Liquid cargo that is transported or stored unpackaged in large volumes.

Makai Hawaiian term for "towards the ocean."

Maritime Of or related to the sea (e.g., maritime-dependent use is a use that is dependent on the sea).

Mauka Hawaiian term for "towards the mountains."

Mean Lower Low Water (MLLW) The average height of the lowest tide recorded at a tide station each day during the recording period.

Moor (1) To attach a boat to a mooring buoy or post; (2) To dock a ship; (3) To secure a vessel with a cable or anchor.

Mooring A place at which an object to which a craft can be moored or made fast.

Navigation The art and science of conducting a boat safely from one point to another.

Neo-bulk Cargo or commodities that move in large unitized loads such as newsprint, lumber, steel, construction components, etc. See also "Break-bulk".

Offshore At some distance from the shore; located in the sea away from the coast.

Pier A dock for loading or unloading ships or vessels.

Pile Long slender column usually of timber, steel, or reinforced concrete driven into the ground to carry a vertical load.

Piling Support, protection for wharves, piers, etc.; constructed of piles.

Pilot (1) Navigator; (2) A specially knowledgeable person qualified to navigate a vessel through difficult waters (e.g., harbor pilot, etc.)

Port (1) The left side of a boat looking forward; (2) A harbor.

Pre-gate An initial screening gate prior to reaching the main truck gate with a clerk. Often pre-gates include optical character recognition (OCR) equipment.

Quarter To align a vessel along the line of the keel and the beam.

Radar Acronym for Radio Detection and Ranging. An electronic system designed to transmit radio signals and receive reflected images of those signals from a "target" in order to determine the bearing and distance to the "target."

Range A line formed by the extension of a line connecting two channel points.

Range lights Two lights associated to form a range which often, but not necessarily, indicates the channel centerline. The front range light is the lower of the two and nearer the mariner using the range. The rear light is higher and further from the mariner.

Roll-On/Roll-Off (RO/RO) Cargo that is rolled or driven on and off the ships.

Ship A larger vessel usually thought of as being used for ocean travel.

Shipyard	A facility where ships or boats are built and repaired.
Slip	Water-based parking spot for a boat, typically enclosed on three sides.
Stern	The rear end of a ship/boat.
Surge	A sudden swelling, rolling, or sweeping forward like that of a wave or series of waves.
Tanker	A ship designed to transport liquids in bulk.
Terminal	A berthside area where cargo is loaded to and discharged from vessels.
Tide	The periodic rising and falling of the surface of the ocean and of water bodies.
Ton	A unit of measure, may be short ton (St) (2,000 pounds), long ton (Lt) (2,240 pounds), metric 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).
Towing	The operation of drawing a vessel forward by means of long lines.
Transship	transfer cargo from one ship to another.
Tugboat	A boat that maneuvers other vessels by pushing or towing them. Tugs are powerful for their size and strongly built; some are ocean-going.
Vessel	Any craft designed for transportation on water, such as a ship or a boat.
Voyage	A long journey by ship.
Wharf	A structure on the shore of a harbor or on the bank of a river or canal where ships may dock to load and unload cargo or passengers.

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1.0 EXECUTIVE SUMMARY

1.1 Overview

Since pre-contact times, when Honolulu Harbor was known as "*Ke ʻAwa O Kou*" (the harbor of Kou) and seafaring Hawaiians preferred Waikīkī's oceanfront to the deep-water harbor for landing their shallow-draft outrigger canoes, waterborne transportation has been central to Hawaiʻi's way of life, economic well-being, and identity. In the present day, ocean cargo transport remains Hawaiʻi's lifeline and only viable means to serve and support every facet of the local economy, including tourism, construction, national defense, agriculture, and other industries.

Honolulu Harbor is the principal seaport on Oʻahu and for the State of Hawaiʻi and is the critical hub of the State's commercial harbors system. Honolulu Harbor annually handles over 12 million tons of cargo, including daily essentials such as food and commercial goods, construction materials, fuel, vehicles, and equipment and machinery for local industry. The maritime services that the harbor provides are crucial to the State's population as about 85 percent of goods we use in Hawaiʻi are imported, and 91 percent[1] of those imports comes through the State's commercial harbors system.

To ensure that the State's primary port-of-entry is prepared to continually meet the future needs of our islands' communities and of the maritime industry, the Hawaiʻi Department of Transportation, Harbors Division (DOTH) prepared this *Honolulu Harbor 2050 Master Plan* (HHMP), which updates the previous, *Oahu Commercial Harbors 2020 Master Plan*. DOTH is responsible for planning and designing, building and maintaining, and operating the State's maritime transportation facilities and infrastructure and for coordinating with other agencies in these activities. DOTH is also responsible for efficient utilization of commercial harbor facilities and lands, and for facilitating the conduct of maritime business with harbor stakeholders and the public. DOTH's responsibilities are mandated by Hawaiʻi Revised Statutes (HRS), Chapter 266, *Harbors* and implemented through the Hawaiʻi Administrative Rules (HAR) Title 19, Subtitle 3, Chapters 41 through 44.

1.2 HHMP Purpose

The HHMP adopts a systems-thinking approach that acknowledges that Honolulu Harbor is not just a collection of individual piers, but an interconnected, interdependent harbor system that serves as the State's primary commercial harbor. Therefore, the purpose of the HHMP is to provide a long-

[1] Source: SMS, 2022. Excluded from the calculation is crude oil, which enters Hawaiʻi through an offshore mooring and not through the commercial harbors system.

range strategic framework that provides guidance on harbor-wide as well as pier-specific strategies to ensure Honolulu Harbor can accommodate projected cargo capacity demands in 2050, to ensure port facilities are resilient to the effects of climate change and sea level rise, and to enhance public access and enjoyment of the harbor waterfront. The HHMP provides guidance on optimizing harbor operational efficiency while maintaining flexibility to address emerging trends and technologies, identifies near-, mid-, and long-term projects, and provides considerations and criteria to help DOTH prioritize harbor improvement projects.

1.3 Planning Process

The planning process was guided by five main principles; that the process be transparent, equitable, consultative, data-driven, and supportive of DOTH's mission. It included three general phases:

- **Phase 1: Research, data gathering and studies.** This phase included extensive data gathering through stakeholder interviews (harbor users, government agencies, subject matter specialists), harbor user surveys, research, field visits, and early cultural engagement with Native Hawaiian descendants and organizations. Gathered information was then used to prepare technical studies regarding future economic conditions, projected cargo capacity demand, historic, cultural and architectural resources, and other relevant studies.
- **Phase 2: Alternatives development.** This phase included developing alternatives for harbor-wide and pier-specific recommendations to benefit maritime uses (e.g., cargo operations, commercial fishing, passenger vessels, and maritime support services). In addition, alternatives were developed for public waterfront opportunities that are compatible with maritime uses and diversify/enhance revenue. Proposed public waterfront development is limited to areas that are not well-suited for industrial maritime activities.
- **Phase 3: Preparation of the draft and final HHMP.** This phase included an iterative refinement of alternatives through extensive engagement with technical/planning advisory committees and the general public. The recommended preferred alternatives identified during this process are included in the HHMP.

Stakeholder input and public engagement was integral throughout the planning process. The planning process engaged hundreds of stakeholders and residents through 84 stakeholder surveys/interviews, six technical / planning advisory committee meetings, three early cultural engagement meetings, and one public information meeting. In addition, a public website (https://honoluluharbormp.com) provided updates on current planning activity, upcoming meetings, project background, frequently asked questions, and resources, as well as a contact form that facilitated direct communication with the Project Team.

1.4 HHMP Chapter Guide

A summary of the HHMP document chapter contents is provided in **Table 1.1**.

Table 1.1 – HHMP Chapter Guide

Chapter	Chapter Title	Content
1	Executive Summary	Overview of the HHMP
2	Introduction	HHMP purpose, mission, goals, and planning process
3	Background and Context	Honolulu Harbor's regional, land use, environmental, economic, historical, cultural, and architectural resources, as well as other site-specific information
4	Existing Facilities and Operations	Honolulu Harbor's physical facilities, infrastructure, harbor operations/users, and safety/security services and facilities
5	Future Facility Demand Assessment	HHMP's 2050 cargo projections, capacity and needs assessment, projected spatial demands, and berth utilization/layberth analysis
6	Land Use Plan	Honolulu Harbor's existing land uses and the HHMP's recommended land use alternatives based on the capacity and needs assessment and operational requirements
7	Development Plan	HHMP's recommendations for harbor-wide and pier-specific improvement and description of development constraints
8	Additional Recommendations	HHMP's general recommendations for infrastructure improvements and historical, cultural, and architectural resources as well as issues that extend beyond the scope of the HHMP and/or require multijurisdictional coordination
9	Implementation Plan	HHMP's phasing/prioritization, cost estimates, and permitting requirements for recommended improvements
10	References	Bibliography
Appendices		Meeting documentation, technical studies, resource inventories and other resources

1.5 Capacity and Needs Assessment

One of the key purposes of the HHMP is to ensure that Honolulu Harbor's cargo terminal facilities have adequate capacity to accommodate future cargo throughput needs of our island community. Honolulu Harbor encompasses approximately 360 acres dedicated to handling cargo. This includes container storage yards, automobile storage yards, break-bulk/neo-bulk storage yards, dry-bulk storage yards, liquid-bulk storage tanks, truck gates, and buildings and sheds. An analysis of existing berth, yard and gate capacity was conducted based on existing facility conditions and operations at each cargo terminal. The capacity analysis was compared to cargo throughput projections to determine future harbor facility needs. Cargo throughput, which represents total import and export activity in the harbor, was projected to the year 2050 for six cargo categories: 1) Containerized Cargo; 2) Automobiles; 3) Liquid-Bulk Cargo; 4) Break-Bulk and Neo-Bulk; 5) Sand and Aggregate; and 6) Passengers. **Chapter 5**.

Based on this analysis, Honolulu Harbor is well positioned to handle the projected cargo throughputs to 2050 for all cargo categories, with some relatively minor modifications required to balance the yard and berth capacities and create additional storage capacity for projected container cargo. Container cargo throughput in 2050 is projected to be 2,046,000 Twenty-foot Equivalent Units (TEUs)[2], based on medium projections. With the completion of the Kapālama Container Terminal (KCT), the overall harbor capacity for containers will be 1,860,000 TEU based on the governing capacity of each terminal, while the overall harbor *berth* capacity is 2,320,000 TEU and the overall harbor *yard* capacity is 2,030,000 TEU. To realize the full capacity of the harbor and accommodate the 2050 container cargo projection, the individual terminal yard and berth capacities will need to be balanced. The timing of the construction of the new KCT aligns well with the throughput projections, allowing the overall harbor to continue to adequately handle container cargo until early 2040 without major changes to existing cargo operations. Recommendations for updating existing cargo operations and facility improvements to accommodate projected 2050 container cargo throughput are included in **Chapter 7**. There are also opportunities to optimize the storage needs of other cargoes, particularly with automobiles.

Berth utilization analysis conducted for the HHMP determined that Honolulu Harbor will require an additional 1,921 linear feet (LF) of layberth by 2050 to meet projected demand and maintain targeted maximum utilization rates of 30 percent at Piers 9, 10, 11, 19, 20, 29, 31, 32, 33, and 34,

[2] A TEU is one of the standard units for counting containers of various capacities. Forty-foot Equivalent Unit (FEU) is another standard unit for counting containers of various capacities. A 40-FT containerized cargo is equivalent to 1 FEU.

and 50 percent at Piers 1, 2 and 51. The findings of the layberth analysis are presented in **Chapter 5**. A description of proposed new layberth locations is provide in **Section 7.9.1**.

1.6 Adaptation to Climate Change and Sea Level Rise and Port Resiliency

A central objective of the HHMP is to ensure that Honolulu Harbor is able to adapt to meet the challenges posed by climate change and sea level rise (SLR) and to improve port resiliency so that the State's primary port is able to remain operational following a natural or human-made disaster. To guide these planning efforts, the HHMP references the recommendations in the *Hawai'i Sea Level Rise Vulnerability and Adaptation Report* (Hawai'i Climate Change Mitigation and Adaptation Commission, 2017) to plan for projected 3.2 FT of SLR by 2060 for critical infrastructure.

Key recommendations related to adaptation and resiliency include raising pier facilities to adapt to SLR and meet future operational requirements, and reconstructing and strengthening pier facilities to withstand more frequent and intense storm events. The HHMP also designates Piers 1 and 2 as a priority resiliency pier and recommends additional improvements, including heavy lift pads and hardened utility conduit, to support emergency relief efforts following a disaster. See **Section 7.1**.

Additional recommendations related to adaptation and resiliency include conducting a feasibility study, in coordination with the U. S. Army Corps of Engineers (USACE), for the reopening of a second harbor entrance at Kalihi Channel and widening the Main Entrance and Kapālama Transit Channels. The HHMP further recommends establishing a Strategic Committee for Climate Change and SLR, led by DOTH and consisting of representatives from the maritime community, government agencies, academia and the private sector, with the purpose of developing and coordinating climate change and SLR adaptation solutions for the State's commercial harbors system.

1.7 Land Use Recommendations

The HHMP recommends preserving as-is the existing, established land uses in Honolulu Harbor associated with cargo operations, maritime support services, passenger services, commercial fishing, and public waterfront, with minor changes to harbor administration/district operations. The recommended changes include the interim use of approximately 3.5 acres of the Pier 19 yard, warehouse, Superferry building and backland areas for DOTH O'ahu District Baseyard operations, and designating the historic Department of Health building at Pier 2 for Administrative Use. See **Chapter 6** for a complete discussion regarding land use recommendations.

1.8 Summary of Development Plan Recommendations

HHMP recommendations for harbor facility improvements are summarized in the following tables, organized by maritime use categories of cargo operations, maritime support services, commercial fishing operations, passenger services, and public waterfront. See **Chapter 7** for complete discussion of development plan recommendations.

1.8.1 Cargo Facilities

Cargo terminals include multi-purpose cargo terminals at Piers 1 and 2, 19 and 20, 29, and 31 to 34 and non-exclusive dedicated-use terminals at Piers 39 to 40 (Interisland Terminal), 41 to 43 (KCT), 51 to 53 (Sand Island Terminal), and 60 (bulk-cargo / aggregate terminal). The HHMP recommends major improvements and/or reconstruction at all these piers over the 30-year planning horizon. In addition to proposed harbor-wide adaptations to climate change and SLR, recommended cargo terminal improvements are focused on creating multi-purpose, open-yard facilities that accommodate a variety of cargo operations and that are adaptable for other maritime uses to allow DOTH the greatest flexibility and efficiency in managing vessel movements and operations in the harbor. **Table 1.2** provides a summary of major improvements recommended for the Cargo Terminals.

Table 1.2 – Summary of Cargo Terminal Improvements

Pier No.	Facilities and Operations	Major Improvements
1 to 2A	Fort Armstrong Terminal: General Cargo, Containers, Automobiles	• Modernize and strengthen the terminal for use as a multi-purpose cargo terminal and primary resiliency pier. • Reconstruct and raise pier and yard to adapt to 3.2-feet (FT) SLR by 2060. • Cut back the pier face to fast land (approx. 75 FT) and reconstruct with sheet pile/bulkhead pier. Shift the Pier 2A knuckle *mauka*. • Improve fendering and replace bollards with 100-ton bollards. • Repave yard with concrete and construct heavy lift pads. • Install reinforced utility conduit. • Reallocate a portion of Pier 2A cargo yard to the cruise terminal for ground transportation staging and circulation. • Negotiate to acquire use of the 5-acre Office of Hawaiian Affairs (OHA) parcel and Hawaiʻi Community Development Authority (HCDA) remnant strip to expand terminal area.
19	General Cargo, RO/RO, Maritime Support Services, Warehouse Sheds, Ferry Building	• Modernize the terminal for use as a multi-purpose cargo terminal. • Reconstruct and raise pier, apron, and yard to adapt to 3.2-FT SLR by 2060. • Improve fendering and replace bollards with 100-ton bollards. • Strengthen yard pavement. • (Near Term) Relocate DOTH Oʻahu District Base Yard to interim location at Pier 19. Renovate shed and ferry building for Oʻahu District use. • (Long Term) Demolish shed and ferry building to create an open yard. • Integrate cargo terminal with proposed Pier 23 maritime center structure.
20	General Cargo, RO/RO	• Modernize the terminal for use as a multi-purpose cargo terminal. • Reconstruct and raise pier, apron, and yard to adapt to 3.2-FT SLR by 2060. • Improve fendering and replace bollards with 100-ton bollards. • Strengthen yard pavement.
29	General Cargo / RO/RO, Layberth	• Modernize the terminal for use as a multi-purpose cargo terminal. • Reconstruct Pier 29 pier and apron, including infilling pier "notch".

Pier No.	Facilities and Operations	Major Improvements
		• Construct 100-FT wide raised apron to adapt to 3.2-FT SLR by 2060. • Improve fendering and replace bollards with 100-ton bollards. • Improve truck access to/from cargo pier.
31 to 34	General Cargo / RO/RO, Layberth	• Modernize the terminal for use as a multi-purpose cargo terminal. • Cut back the pier face to fast land (minimum 30 FT) and reconstruct with sheet pile/bulkhead pier. • Construct 100-FT wide raised apron to adapt to 3.2-FT SLR by 2060. • Improve fendering and replace bollards with 100-ton bollards. • Strengthen yard pavement. • Improve vehicle access and circulation. • Acquire DOT Airports Division (DOTA) parcel Honolulu Freight Services (HFS) to expand terminal.
39 to 40	Interisland Terminal: Containers, RO/RO, Automobiles, Break-Bulk	• Modernize Interisland Terminal for tug-and-barge cargo operations. • Balance berth and yard (yard-constrained) by expanding yard area and improving efficiency of yard operations. • Reconstruct and strengthen piers using sheet pile/bulkhead construction. • Fill in 0.75-acres of the Piers 39 and 40 slipway. • Raise piers and adjacent yard area to adapt to 3.2-FT SLR by 2060. Keep backland yard areas at existing elevation. • Improve fendering and replace bollards with 100-ton bollards. • Strengthen and repave yard with concrete. • Raise and strengthen revetment by Kapālama Canal outlet. • Upgrade infrastructure (power for refrigerated containers and lighting). • Relocate buildings toward the perimeter of the yard or off-site. • Improve traffic circulation (e.g., new Libby Street Driveway entrance and internalize truck queueing).

Pier No.	Facilities and Operations	Major Improvements
41 to 43	KCT	• Complete terminal modernization for use as a dedicated, non-exclusive container cargo terminal and fuel manifold terminal • Balance berth and yard (yard-constrained) by densifying container storage and improving efficiency of yard operations. • Monitor rate of SLR and, if necessary consider raising pier apron / gantry track corridor to adapt to 3.2 FT SLR by 2060.
51 to 53	Sand Island Container Terminal: Containers, RO/RO, Automobiles, Fuel Manifold	• Modernize the terminal for use as a dedicated, non-exclusive container cargo terminal and fuel manifold terminal • Balance berth and yard (berth-constrained) by improving efficiency of movements across the berth or by adding gantry crane(s). • Construct 120-FT wide raised apron (gantry track corridor) to adapt to 3.2-FT SLR by 2060. Keep backland yard areas at their current elevation. • Improve fendering and replace bollards with 100-ton bollards. • Strengthen and repave yard. Use concrete pavement for grounded container operations. • Install hydro-dynamic separators to treat drainage from the yard. • Improve truck gates to internalize truck queuing within the terminal. • Relocate buildings toward the perimeter of the yard or off-site.
60	Bulk Aggregate	• Modernize the terminal for use as a bulk cargo aggregate terminal. • Reconstruct the pier, apron and yard area. • Improve fendering and bollards. • Repave aggregate storage yard with concrete (HC&D lease area). • Raise the pier, apron and yard to adapt to 3.2-FT SLR by 2060. • Raise and pave backland areas to adapt to 3.2-FT SLR by 2060. • Redevelop backland areas for storage and/or industrial use. Consider public-private partnership (PPP) agreement for redevelopment. • Create new, direct street access from Pahounui Drive to the pier and backland areas.

1.8.2 Maritime Support Services

Maritime support services are located at Piers 12 to 15, 21 and 22, 23 to 29A, backland areas of Piers 31 to 33, and backland areas of Pier 38 adjacent to Kapālama Canal. The HHMP recommends major improvements and/or reconstruction at most of these piers over the 30-year planning horizon to support harbor-wide adaptations to climate change and SLR. Recommended improvements and policy initiatives for maritime support services focus on incentivizing PPP agreements to invest in harbor facility improvements and on consolidating these operations where possible to improve operational efficiencies and to benefit from economies of scale. A summary of recommended improvements at maritime support services piers is provided in **Table 1.3**.

Table 1.3 – Summary of Maritime Support Services Pier Improvements

Pier No.	Facilities and Operations	Major Improvements
12	Maritime Support Services, Layberth	• Reconstruct Diamond Head side pier and yard. • Replace segmented pier on ʻ*Ewa* side with a continuous pier • Consider extending the continuous pier approximately 100 LF from the end of existing pier.
13 and 14	Maritime Support Services, Layberth	• Preserve and reuse the historic shed structure if feasible. • Redevelop piers only if needs of harbor dictate or if PPP investment opportunity exists.
15	Harbor Police Station / Spill Response	• If necessary, raise pier deck heights to adapt to 3.2-FT SLR by 2060.
21 and 22	Tugboats	• Modernize terminal. Reconstruct and raise pier, apron, and yard to adapt to 3.2-FT SLR by 2060, improve fendering and bollards, and repave with concrete. • Demolish existing buildings and develop new shared-use facilities. • Provide shoreside power and upgrade shoreside water utilities to tugboats. • Cut back pier face of Pier 22 by 20 to 40 FT. • Clear out subsurface coral and rocks. • Dredge Pier 22 to 26 slipway to 35-FT depth.
23	Work Boats, Layberth, Warehouses	• Modernize terminal. Reconstruct and raise pier, apron, and yard to adapt to 3.2-FT SLR by 2060, and improve fendering and bollards. • Cut back pier face by 20 to 40 FT. • Clear out subsurface coral and rocks. • Dredge Piers 22 to 26 slipway to 35-FT depth.

Pier No.	Facilities and Operations	Major Improvements
19 to 23 Maritime Center		• Demolish warehouses 6 & 8, grain silos and misc. sheds at Pier 23. • Develop a new maritime center to house offices, parking, automobile storage, and high-cube ground level for cargo operations. • Improve access and circulation.
24 to 29A	Maritime Support, Layberth	• Provide dedicated pier locations to consolidate maritime support operations. • Construct raised apron to adapt to 3.2-FT SLR by 2060. • Use long-term leases and PPPs to incentivize investment.
38	Maritime Operations	• Pave 1.39-acre lot adjacent to the Kapālama Canal outlet for maritime support operations. • Develop approximately 360 LF of new pier adjacent to maritime support area. • Reconstruct existing fuel barge pier for misc. vessel use.

1.8.3 Commercial Fishing Fleet Piers

The HHMP recommends improvements to the existing commercial fishing fleet piers at Piers 16 to 18 and at the Fishing Village, Piers 36 to 38. Recommended improvements are intended to maintain the existing function of the piers for fishing vessel berthing, provisioning, and servicing operations, and to expand capacity for long-term and short-term berthing. A summary of recommended improvements at the commercial fishing fleet piers is provided in **Table 1.4**.

Table 1.4 - Summary of Recommended Improvements at the Commercial Fishing Fleet Piers

Pier No.	Facilities and Operations	Major Improvements
16 to 18	Commercial Fishing Operations	• Develop respite center with office and storage space for commercial fishermen. • Elevate piers to adapt to 3.2-FT SLR by 2060. • Widen Pier 16. • Upgrade electrical service to Piers 17 and 18.

Pier No.	Facilities and Operations	Major Improvements
36 to 38	Commercial Fishing Operations	• Extend Pier 36 by approximately 160 LF to the Federal Project Line. Construct deck height to adapt to 3.2-FT SLR by 2060. • Reconstruct and elevate Pier 36 deck height to adapt to 3.2-FT SLR by 2060. • Replace Pier 37 with a floating dock to adapt to 3.2-FT SLR by 2060. • Replace revetment and extend Pier 38 bulkhead. • Construct raised apron at Pier 38 to adapt to 3.2-FT SLR by 2060.

1.8.4 Passenger Operations

Passenger operations include international, domestic and interisland cruise ships, as well as local day excursion, dinner cruise, whale watching and other seasonal short-term commercial ship passenger services. Cruise operations are conducted at the Pier 2 Cruise Terminal and at Piers 10 and 11. Piers 19 and 20 serve as a contingency berth for smaller (650 LF) cruise vessels. Day excursion operations are conducted at Piers 5 through 8 at the Aloha Tower complex. The HHMP recommends major improvements and/or reconstruction at most of these piers over the 30-year planning horizon to support harbor-wide adaptations to climate change and SLR. Recommended improvements for passenger operations also focus on operational efficiency, including improving shore-to-ship utilities that benefit the environment. A summary of recommended improvements at passenger piers is provided in **Table 1.5.**

Table 1.5 – Summary of Cruise and Day Excursion Pier Improvements

Pier No.	Facilities and Operations	Major Improvements
2A-C	Cruise Terminal	• Modernize terminal. • Construct raised apron to adapt to 3.2-FT SLR by 2060. • Improve fendering and replace bollards with 100-ton bollards. • Improve shore-to-ship utility connections for sewer, water, and power.

Pier No.	Facilities and Operations	Major Improvements
		• Allocate portions of the Pier 2A cargo yard for use by ground transportation and cruise ship service vehicle circulation/staging. • Negotiate to acquire/gain use of GSA lot. • Renovate Cruise Terminal building. • Develop pedestrian facilities/connectivity with adjacent land uses.
5 and 6	Day Excursions	• Replace revetments/dolphins with continuous pier. • Develop pedestrian facilities/connectivity, street improvements, and parking. • Develop mixed-use structure (maritime operators, businesses, hotel space, passenger orientation, parking etc.) through a PPP.
7	Day Excursions, Layberth	• Develop pedestrian facilities/connectivity, street improvements, and parking. • Upgrade sewer line for shore-to-ship service.
8	Day Excursions, Layberth	• Develop pedestrian facilities/connectivity, street improvements, and parking. • Upgrade infrastructure (e.g., waterline, wastewater pump out, improved lighting). • Construct apron to adapt to 3.2-FT SLR by 2060.
9	Day Excursions, Layberth	• Develop pedestrian facilities/connectivity, street improvements, and parking. • Construct apron to adapt to 3.2-FT SLR by 2060.
10 and 11	Cruise Terminal, Layberth	• Develop pedestrian facilities/connectivity, street improvements, and parking. • Construct apron to adapt to 3.2-FT SLR by 2060. • Upgrade infrastructure (e.g., sewer, water, power/communication, and drainage).
19	Contingency Cruise Terminal	• No improvements recommended.

1.8.5 Public Waterfront

Honolulu Harbor offers two locations where the public can access and experience the harbor waterfront: the Aloha Tower complex, which extends from Pier 5 to Pier 11, and the Pier 38 Commercial Fishing Village, which extends from Piers 36 to 38. The HHMP recommends the continuation of land uses and public open spaces within the Aloha Tower complex and Pier 38 Commercial Fishing Village. These include retail/commercial, dining, fishing, and open space and promenade areas that encourage personal gathering and socialization, which are otherwise restricted and unavailable elsewhere in Honolulu Harbor.

Due to its waterfront location; public shoreline access; historical significance; and proximity to Downtown, Chinatown, and Kaka'ako; the Aloha Tower complex provides unique public waterfront development and re-development opportunities. The HHMP envisions a re-energized Aloha Tower complex and the return of the community to the waterfront. General themes proposed to support this vision include:

- Celebrating the past, present, and future of Honolulu Harbor.
- Strengthening and reconnecting the community to the shoreline.
- Reinvigorating the harbor with annual celebrations, such as Polynesian Voyaging Society (PVS) educational events, canoe regattas, and Boat Days.

A summary of conceptual improvements at the Aloha Tower complex for consideration by Aloha Tower Development Corporation (ATDC) and a private developer is provided in **Table 1.6.**

Table 1.6 – Summary of Conceptual Improvements at Aloha Tower Complex

Pier No.	Facilities and Uses	Major Improvements
5 to 11	Mauka-Makai Connectivity	• Increase pedestrian connectivity to Downtown, Chinatown and Kaka'ako. • Coordinate with DOT-HWY, Hawaiian Electric Company (HECO) and property owners on the mauka side of Ala Moana Boulevard and Nimitz Highway to develop pedestrian facilities (cross walks, signage). • Incorporate maritime design motifs in signage and pavements at mauka-makai crossings. • Establish transportation services (shuttles, jitneys) between mauka areas and Aloha Tower complex.
5 to 11	Pedestrian Promenade	• Develop a continuous pedestrian path (25-ft wide) and landscaping along the waterfront between Piers 5 to 8. • Plant new trees and maintain existing shower trees along Ala Moana Boulevard. • Construct Pa hula (grassed mound used for hula performance) • Maintain the existing minipark with naturalized shoreline at the makai end of Piers 5 and 6.

Pier No.	Facilities and Uses	Major Improvements
		• Create a viewing platform with educational displays for the coral outplanting area offshore of the Piers 5 and 6 minipark. • Re-use the existing ramp support structures in the water between Piers 6 and 7 to support a point of interest feature, such as pedestrian bridge spanning the slipway. • Enhance wayfinding with better signage, technology-based tools/apps, and coordination with the CCH's wayfinding efforts. • Coordinate pedestrian improvements with the HART rail station and TheBus public transit system, including providing a bus stop and pull-out along Aloha Tower Drive.
5 to 11	Transportation Circulation and Parking	• Maintain two-way traffic patterns on all streets within the complex • Add roundabouts at the termini of Bishop and Richard Streets at Aloha Tower Drive to allow vehicles looking for parking to circulate within the Aloha Tower complex and not have to exit the complex and circle back to the area. • Convert Richards Street to two-way traffic and signalizing the mauka-bound Richards Street exit with a no right-turn-on-red. • Create reverse-in angled street parking where possible on Aloha Tower Drive. • Consider pedestrian-friendly street concepts such as Woonerfs (shared streets). • Create bicycle lanes throughout the area to connect to the bicycle lanes on Nimitz Highway and Bishop Street and proposed facilities on Ala Moana Boulevard and Richards and Halekauwila Streets.
5 and 6	Multi-Level, Mixed-Use Structure	• Develop Piers 5 and 6 through a public-private-partnership among ATDC, DOTH and private developer. • Consolidate landside areas of Piers 5 and 6 with the Ala Moana minipark just mauka of the existing at-grade parking lot to maximize the redevelopment footprint.

Pier No.	Facilities and Uses	Major Improvements
		• Develop multi-level, mixed-use structure that could include: o Retail/commercial/office o Cultural heritage/education center to possibly include a museum, permanent exhibits, and cultural activities o Special event space o Offices for maritime operators, day excursion/tour retail front o Boutique hotel o Maritime museum o NOAA Science Center o Structured or mechanized parking • Integrate Improvements with maritime operations at Piers 5 and 6.
7	Mixed-Use Redevelopment	• Redevelop Pier 7 building to accommodate various potential uses: officer/retail space, exhibit area, or cultural educational center. • Reestablish the Polynesian voyaging Society berth at the southern end of the pier to complement potential educational programs
10 and 11	Historic Shed Redevelopment	• Redevelop the historic Piers 10 and 11 sheds through a public-private-partnership among ATDC, DOTH and private developer/cruise industry to a shared use facility accommodating both cruise operations and retail/commercial or fully converted to retail/commercial/office use. • Consider expanding the interior mezzanine level for an additional usable space. • Consider modifying interior vehicle space to remove structural obstructions. • Ensure modifications to the structures comply with HRS Chapter 6E, historic preservation review requirements.
5 to 11	Design Guidelines	• Involve those who have lineal ties and kuleana (responsibility) to provide input and contribute in meaningful ways to the development of the Aloha Tower complex and other public waterfront improvements.

Pier No.	Facilities and Uses	Major Improvements
		• Create interpretive and educational signage with information about harbor history, native Hawaiian cultural practices throughout Honolulu Harbor. • Manage iconic historic architectural resources within the Aloha Tower complex to preserve the historic character and setting. Incorporate more and better signage. • Consider and integrate all modes of transportation at the Aloha Tower complex and as a means of connecting Pier 2, the Aloha Tower complex and the Pier 38 Fishing Village. • Enhance public waterfront streetscapes with unified and creative design treatments for street hardscape features and landscaping. Select materials, plants and design motifs that relate to Native Hawaiian culture and Honolulu Harbor history.

1.8.6 Development Constraints

The HHMP identifies several development constraints in Honolulu Harbor that influence the planning and design recommendations included in the HHMP. These development constraints include land management (long-term leases and land agreements), environmental constraints (wetlands, corals, and sea grass), hazardous materials, cultural and historic resources, HNL Airport noise corridor, and airspace restrictions (see **Section 7.10**).

1.8.7 Additional Recommendations

- **USACE Feasibility Study** – DOTH is partnering with the USACE to conduct a feasibility study for various improvements to navigation and port resiliency at Honolulu Harbor. The project is being initiated in the latter half of 2022. The scope of the feasibility study may include:
  - Main Entrance Channel Widening
  - Kapālama Transit Channel Widening
  - Second Harbor Entrance – Kalihi Channel Reopening
  - Breakwater Protection for the Main Entrance Channel
  - Lock and Dam System
- **Security Fencing and Boundary Treatments** – The HHMP recommends boundary edge treatments and signage to provide aesthetic continuity of the harbor facilities from public vantage points, while ensuring the security of these facilities. The HHMP recommends that chain link fence with rubber coating and barbed wire on top be used as standard utility fencing for

industrial areas of the harbor. The HHMP recommends decorative fencing for use in high-visibility areas and at special facilities such as the Aloha Tower complex, future maritime center at Piers 19 to 23, and the Piers 36 to 38 Fishing Village. Decorative fencing should be constructed of anodized, marine-grade aluminum picket fence material with or without concrete footing.

- **Fire Projection Systems** – Maritime operators that participated in the HHMP planning process recommended that DOTH work with other government agencies, including the U. S. Coast Guard (USCG) and City and County of Honolulu (CCH), Honolulu Fire Department (HFD), to improve marine firefighting capabilities in Honolulu Harbor, including staffing firefighters with specialty training and equipment for fighting marine and shipboard fires. The HHMP also recommends improvements to fire protection water systems at various piers and for all new development and redevelopment.
- **Regional Drainage Master Plan –** The HHMP recommends that DOTH participate with other city, state and federal agencies in the preparation of a regional drainage master plan. DOTH would not be the lead agency in this undertaking due in part to the limits of its jurisdictional boundaries. The regional drainage master plan should identify strategies to address the drainage tributaries that discharge into Honolulu Harbor, and identify improvements and modifications to the storm water drainage system to address climate change and SLR.
- **Utility Improvements –** The HHMP recommends pier-specific improvements to sewer, water, and power utilities to support shore-to-ship utility connections and to ensure that harbor utilities comply with building codes, engineering standards and regulatory requirements.
- **Strategic Committee for Climate Change and SLR** – The HHMP recommends that the DOTH establish and facilitate a Strategic Committee for Climate Change and SLR (Strategic Committee) with representatives from the maritime industry, government agencies, academia, and the private sector to develop design solutions to address pier and yard adaptation to SLR.
- **Land Acquisition –** The HHMP identifies the following properties for possible future acquisition for their ability to improve harbor operations, subject to mutually agreeable arrangement with the current property owners:
  - 5-acre parcel contiguous with the Pier 1 cargo yard (TMK 2-1-015: 051) owned by the Office of Hawaiian Affairs.
  - 0.8-acre parcel contiguous with the Pier 1 entry gate (TMK 2-1-015: 052) owned by the Hawaiʻi Community Development Authority.
  - 1.5-acre parcel located in front of the Pier 2 Cruise Terminal (TMK 2-1-015: 020) owned by the federal government.
  - 2.4-acre triangular parcel (TMK 1-5-035-006) on Nimitz Highway contiguous with the Piers 31 to 34 cargo yard owned by HECO.
  - 3.7-acre parcel contiguous with Piers 31 to 34 (TMK 1-5-035: 010) leased by Honolulu Freight Service from DOTA.
  - Portion of TMK 1-5-041: 334 located on Sand Island and leased to CCH for operations of the Hale Mauliola Temporary Housing Facility.

- Pier 4, owned by the USCG and used for the USCG Regional Exam Center.
- Waterside portions of the "TYCO Pier" facility located on Sand Island adjacent to the entrance to the Sand Island State Recreation Area.

- **Continued Cultural Outreach and Recognition** – In the interest of honoring the land occupied by Honolulu Harbor and the Hawaiian families that have lived there, the HHMP recommends that DOTH continue to conduct cultural outreach to build relationships with the Hawaiian families and community members with *kuleana* (responsibility) in the land on which Honolulu Harbor lies. The purpose is to help guide the stewardship and management of DOTH's land, to fulfill requirements of the laws and regulatory process governing the protection of cultural resources and practices, to support opportunities to reconnect the community to the Harbor, and to honor the historical and cultural activities and practices at the harbor and the individuals who have *kuleana* to perpetuate those practices.
- **Historic Preservation Programmatic Agreement** – The HHMP recommends that DOTH coordinate with the State Historic Preservation Division (SHPD) to develop a programmatic agreement for selected DOTH owned properties, identified through consultation with SHPD, in order to streamline project planning and delivery, and develop appropriate mitigation treatments for historical and cultural resources, under the HRS Chapter 6E historic review process.

1.9 Implementation Plan

The HHMP is not a decision-making document; it provides a range of alternatives to address existing and future facility and operational needs at Honolulu Harbor, and considerations and criteria for prioritizing projects. Project prioritization and phasing will ultimately be decided by DOTH and undertaken through one of the existing project programs.

1.9.1 Prioritization Criteria

The HHMP offers the following prioritization criteria for consideration by DOTH decision-makers when programming projects and financing. Aside from projects required to ensure the safety of the public and maritime operators, no single criterion outweighs the others; each project is prioritized based on a rational balance of the following criteria.

- Logical Sequence
- Conditions Assessment / End of Asset Design Life
- Synergy with Other Projects
- PPP Opportunities
- Affordability
- Climate Change and SLR Adaptation
- DOTH Capital Improvement Project (CIP) Criteria - DOT's Departmental Service Manual (DSM), Section 05.05.01 *Policy Statement,* says that CIP, Special Maintenance and special projects

should be authorized and prioritized in an efficient and cost-effective manner using the following criteria:

- Public Safety
- Existing Systems Preservation
- State and Federal Compliance
- Major Replacements
- Revenue Enhancements
- Energy Efficiency
- Functional Improvements and System Modernizations
- Capacity Expansion and Congestion Mitigation

1.9.2 Rough Order of Magnitude Cost Estimates

The HHMP developed ROM cost estimates for recommended facility improvements. ROM costs provide a high-level measurement of the scale of an improvement project as a means to compare projects and strategize priorities based on funding availability and financing time frames. The ROM costs prepared for the HHMP are provided in **Appendix M** and summarized in **Table 1.7** based on FY 2023 costs and escalated costs for years 2030, 2040 and 2050. These costs will be refined as projects concepts are developed and specific uses and needs are identified.

Table 1.7 - Rough Order of Magnitude Cost Estimate Summary

Proposed Improvement [1]	FY 2023 [3]	FY 2030 [2,3]	FY 2040 [2,3]	FY 2050 [2,3]
Harbor-Wide Improvements	$81,500,000	$114,683,000	$186,795,000	$304,290,000
Layberth Improvements	$3,845,000	$5,411,000	$8,814,000	$14,359,000
Piers 1A, 1B, and 2A - Multi-Use Pier Reconstruction	$435,212,000	$612,408,000	$997,482,000	$1,624,902,000
Pier 2 Cruise Terminal Pier Upgrades	$296,368,000	$417,034,000	$679,260,000	$1,106,517,000
Pier 2 DOH Building Renovation	$10,000,000	$14,072,000	$22,921,000	$37,339,000
Piers 5 and 6 and Mini Park - Maritime Upgrades	$512,344,000	$720,944,000	$1,174,264,000	$1,912,881,000
Piers 7 to 11 Aloha Tower Area Improvements	$171,071,000	$240,723,000	$392,087,000	$638,712,000
Piers 12-15 Modernization	$29,742,000	$41,852,000	$68,168,000	$111,046,000
Piers 16-18 Fishing Pier Improvements	$75,653,000	$106,455,000	$173,393,000	$282,458,000
Piers 19 and 20 Multi-purpose Cargo Terminal	$188,184,000	$264,803,000	$431,308,000	$702,603,000
Piers 21 and 22 "Tug Row" Improvements	$114,397,000	$160,974,000	$262,193,000	$427,114,000
Piers 22 and 23 Maritime Support Pier Improvements	$173,474,000	$244,104,000	$397,594,000	$647,682,000
Piers 19 and 23 Maritime Center	$409,788,000	$576,633,000	$939,212,000	$1,529,980,000
Piers 24 to 29A Maritime Support Pier Improvements	$510,499,000	$718,348,000	$1,170,036,000	$1,905,993,000
Pier 29 Multi-purpose Cargo Pier Improvements	$91,400,000	$128,614,000	$209,485,000	$341,252,000
Piers 31 to 34 Multi-purpose Cargo Terminal Improvements	$363,729,000	$511,821,000	$833,647,000	$1,358,014,000
Pier 35 UH Research Pier	$135,604,000	$190,815,000	$310,797,000	$506,290,000
Pier 36 Fishing Village Pier Extension	$74,896,000	$105,390,000	$171,658,000	$279,632,000
Pier 38 Fishing Village Pier Improvements and Expansion	$70,892,000	$99,756,000	$162,482,000	$264,684,000
Pier 38 Maritime Support Area Improvements	$17,462,000	$24,572,000	$40,023,000	$65,198,000
Piers 39 to 41 Interisland Terminal Modernization	$898,384,000	$1,264,159,000	$2,059,045,000	$3,354,192,000
Piers 51-53 Sand Island Terminal Improvements	$1,124,275,000	$1,582,021,000	$2,576,774,000	$4,197,574,000
Pier 60 Aggregate and Cargo Pier Improvements	$146,037,000	$205,496,000	$334,709,000	$545,243,000
Total	**$5,934,756,000**	**$8,351,088,000**	**$13,602,147,000**	**$22,157,955,000**
Piers 1 & 2 Consolidated Cruise Terminal Options and Alternatives				
Passenger Access Option 1 - Mobile Staging Equipment	$750,000	$1,056,000	$1,720,000	$2,802,000
Passenger Access Option 2 - Elevated Retractable Walkway	$14,850,000	$20,897,000	$34,037,000	$55,447,000
Terminal Building Option 1 - Renovate Existing Building	$40,000,000	$56,286,000	$91,678,000	$149,344,000
Terminal Building Option 2 - New Semi-Permanent Structure	$12,500,000	$17,590,000	$28,651,000	$46,673,000
Terminal Building Option 3 - New Permanent Structure	$50,000,000	$70,358,000	$114,599,000	$186,683,000
Alt 1 - Semi-Permanent Structure / Mobile Staging Equip.	$13,250,000	$18,645,000	$30,369,000	$49,472,000
Alt 2a - Renovate Existing Terminal Bldg. / Mobile Staging Equip.	$40,750,000	$57,342,000	$93,398,000	$152,146,000

Proposed Improvement [1]	FY 2023 [3]	FY 2030 [2,3]	FY 2040 [2,3]	FY 2050 [2,3]
Alt 2b - Renovate Existing Terminal Bldg. / Elevated Walkway	$54,850,000	$77,183,000	$125,715,000	$204,791,000
Alt 3a - New Permanent Terminal Bldg. / Mobile Staging Equip.	$50,750,000	$71,413,000	$116,317,000	$189,481,000
Alt 3b - New Permanent Terminal Bldg. / Elevated Walkway	$64,850,000	$91,254,000	$148,634,000	$242,126,000

1. ROM cost estimates represent a broad approximation of a project's cost. Costs attributes for the Kapalama Container Terminal were used as the baseline to derive ROM cost estimates for selected HHMP projects. These costs will be refined as projects concepts are developed and specific uses and needs are identified.
2. 5 percent annual cost escalation.
3. Cost estimate values for recommended improvement items are rounded up to the nearest thousandths. See Appendix M for ROM cost estimate worksheets.

1.9.3 Project Prioritization

The HHMP groups major projects as high-, medium- and low-priority as well as "opportunistic", as presented in **Table 1.8**. HHMP project priorities, serve as suggestions for DOTH decision-makers to consider when programming financing and improvements to Honolulu Harbor facilities. DOTH is not obligated to implement projects according to HHMP priorities as priorities may change based on evolving conditions, unexpected occurrences, and availability of financing.

Table 1.8 – HHMP Recommended Project Prioritization

Priority	Projects
High	High priority projects include improvements to build harbor resiliency and adapt to climate change and SLR, to take advantage of near-term project sequencing opportunities, and to address essential harbor facilities that are in poor condition. • Piers 1-2 Multi-purpose Cargo Terminal Modernization • Piers 39-40 Interisland Terminal Modernization • Piers 19-20 Multi-purpose Cargo Terminal Modernization • Piers 21-22 "Tug Row" Improvements • Pier 29 Multi-purpose Cargo Terminal Modernization • Piers 51-53 Sand Island Container Terminal Modernization • Initiate USACE Feasibility Study • Establish the SLR Strategic Committee
Medium	Medium priority improvements are less urgent or involve facilities that are prioritized as less critical to harbor resiliency and function than high priority projects but are still important for medium and long-term improvement of harbor capacity and function. • Demolish Grain Silos at Pier 23 • Piers 22-23 Reconstruction and Slipway Widening • Pier 23 Maritime Center • Piers 5-6 Reconstruction • Pier 60 Improvements • "Tyco Pier" – Layberth Dolphins • Pier 31-34 Multi-purposed Cargo Terminal Modernization

Low	Low priority projects include non-urgent projects that may be undertaken in the future upon end of facility design life or when capacity demand or operational conditions change. • Pier 16 Widening • Pier 36 Extension • Pier 38 New Berth Construction
Opportunistic	Opportunistic projects include non-urgent projects that may be initiated through agreements among private partners, DOTH and/or ATDC. • Aloha Tower Complex Redevelopment • Piers 1 and 2 Cruise Terminal Consolidation • Pier 23 Maritime Center

2.0 INTRODUCTION

2.1 Overview

The Hawaiʻi Department of Transportation (DOT) was established in 1959 to provide efficient transportation facilities and systems that support the State's commerce and economy. It is comprised of three modal divisions: Airports, Harbors, and Highways. DOTH is the port authority for Honolulu Harbor.

DOTH seeks to provide an efficient, accessible, and safe inter-modal system to ensure the mobility of goods thereby enhancing Hawaiʻi's quality of life and economic prosperity. To meet those mission purpose mandates, DOTH is responsible for planning and designing, building and maintaining, and operating the State's maritime transportation facilities and infrastructure and for coordinating with other agencies in these activities. DOTH is also responsible for efficient utilization of commercial harbor facilities and lands, and for facilitating the conduct of maritime business with harbor stakeholders and the public. DOTH's responsibilities are mandated by HRS Chapter 266, *Harbors* and implemented through HAR Title 19, Subtitle 3, Chapters 41 through 44.

As a geographically remote multi-island community, Hawaiʻi remains essentially dependent on maritime transport for the movement of materials and goods between the islands and between Hawaiʻi and the rest of the world. Honolulu Harbor is the principal seaport on Oʻahu and for the State of Hawaiʻi and is the critical hub of the State's commercial harbors system. Honolulu Harbor annually handles over 12 million tons of cargo, including daily essentials such as food and commercial goods that stock our store shelves, as well as less obvious necessities such as bulk aggregate and other construction materials; jet fuel for private, commercial and military aircraft; automobiles; and equipment and machinery for local industry. The vast majority of all foreign imports arrive at Honolulu Harbor before being distributed to the neighbor islands,[3] and most cargo transported between the United States (U.S.) Mainland, U.S. Pacific Islands and the Hawaiian Islands passes through Honolulu Harbor before moving on to its final destination (see **Figure 2.1**).

[3] Special cargos (e.g. wind turbine components, generators, etc.) on chartered vessels are delivered directly to the neighbor islands and regular chartered tankship deliveries of LPG are imported directly to the ports of Hilo, Kahului, and Nāwiliwili for Hawaiʻi Gas.

Figure 2.1 - Hawai'i Commercial Harbor System

The maritime services that the harbor provides are crucial to the State's population as about 85 percent of goods we use in Hawai'i is imported, and 91 percent[4] of those imports comes through the State's commercial harbors system. See **Appendix L.**

The KCT, which is currently under construction and anticipated to be operational in 2024, will add 86 acres to Honolulu Harbor, increasing the harbor's cargo capacity and relieving congested cargo conditions. The development of KCT was initially conceived in the 1980s; the 1989 *Honolulu Waterfront Master Plan* recommended that the State purchase the former Kapālama Military Reservation, a portion of which was indicated for long-term redevelopment into a modern container

[4] Source: SMS, 2022. Excluded from this calculation is crude oil which enters Hawaii through an offshore mooring and not through the commercial harbors system.

cargo terminal. This recommendation was fully conceptualized in the *Oahu Commercial Harbors 2020 Master Plan*, completed in 1997. The 2020 plan noted that in 1995 Honolulu Harbor was ranked as the tenth busiest of all 75 North American container ports; however, the Harbor's acreage dedicated to cargo was in the lower 31 percent of ports studied, which suggested that cargo handling efficiencies were constrained by lack of space. Furthermore, projected future cargo volumes and related operator facility requirements indicated that the space required by year 2020 was considerably greater than the amount of land currently available for port operations. KCT was the cornerstone project to address those anticipated needs and its completion will satisfy the harbor's needed cargo capacity for the immediate future and allows for the reconsideration of long-term land use and redevelopment of certain areas of Honolulu Harbor.

To ensure that the State's primary port-of-entry is prepared to continually meet the future needs of our island communities and of the maritime industry, DOTH prepared the HHMP, which updates the previous, *Oahu Commercial Harbors 2020 Master Plan*. The HHMP will serve as a critical tool for the strategic development of Honolulu Harbor after the completion of KCT, in terms of its use, infrastructure improvements, and optimization of the port and its facilities to best serve the future cargo handling, storage and distribution requirements for foreign and domestic waterborne cargo and interisland maritime transportation, as well as non-cargo maritime operations such as commercial fishing, passenger and maritime support services. The HHMP considers current requirements and challenges within Honolulu Harbor, as well as anticipated user needs and cargo projections to guide new development and harbor usage over its planning horizon.

2.2 Purpose

DOTH's master plans are long-range strategic guides that provide a framework for the orderly development of the commercial harbors. Master plans include analysis of existing conditions, identification of opportunities and constraints, projection of future needs, and recommendations and proposals for the development of essential facilities, typically over a 20 to 30-year period.

The purpose of the HHMP is to ensure that Honolulu Harbor is prepared to meet the future needs of the maritime industry and our community.

The purpose of the HHMP is to:

- Organize and plan for harbor usage to optimize efficiency while maintaining flexibility to preserve future opportunities and foster healthy competition among harbor users that will benefit the people of Hawaiʻi;
- Answer critical questions about the harbor's capacity to handle cargo throughput in 2050 and determine if harbor expansion is required;

- Identify near-, mid- and long-term projects to ensure that the State has the necessary port facilities and funding mechanisms to support maritime operations in 2050 and beyond; and,
- Develop considerations and criteria to help DOTH prioritize harbor improvement projects.

2.3 Mission, Vision, and Strategy

The mission of DOTH is:

> *To effectively improve and manage a commercial harbors system that facilitates safe and efficient operations of commercial cargo, passenger, fishing, and other commercial maritime-related services and support activities within the State of Hawai'i and which serves to sustain and enhance the State's economic prosperity and quality of life.*

The vision for Honolulu Harbor is of a highly functioning, efficient, and economically prosperous harbor with the capacity to accommodate future needs and support the operations of all harbor users, both water- and non-water-dependent, and support the State's economic growth and vitality.

With a wide variety of competing interests for the future of Honolulu Harbor, the HHMP's comprehensive approach to identifying and evaluating alternative development options utilized the following strategy:

1. Identify future needs and opportunities.
2. Anticipate outside influences on harbor facilities and operations.
3. Establish defensible basis for making decisions and allocating funds.

2.4 Goals

The goals of the HHMP serve as compass points to guide the master planning work, to keep the focus on what is important, and to ensure the outcomes align with DOTH's mission. The goals of the HHMP are:

- ***Identify current and meet future maritime needs.***
- ***Optimize use of the Harbor's finite land resources.***
- ***Balance stakeholders' competing needs and interests.***
- ***Ensure resiliency in the face of natural and human-made disasters and climate change.***
- ***Consider emerging technologies and trends.***
- ***Consider public access and waterfront development opportunities in select locations.***

2.5 Planning Process

The HHMP was developed through a public outreach program involving a wide array of stakeholders including harbor users, adjacent landowners, government agencies, civic organizations, and the public. The planning process followed three general phases of work (see **Figure 2.2**):

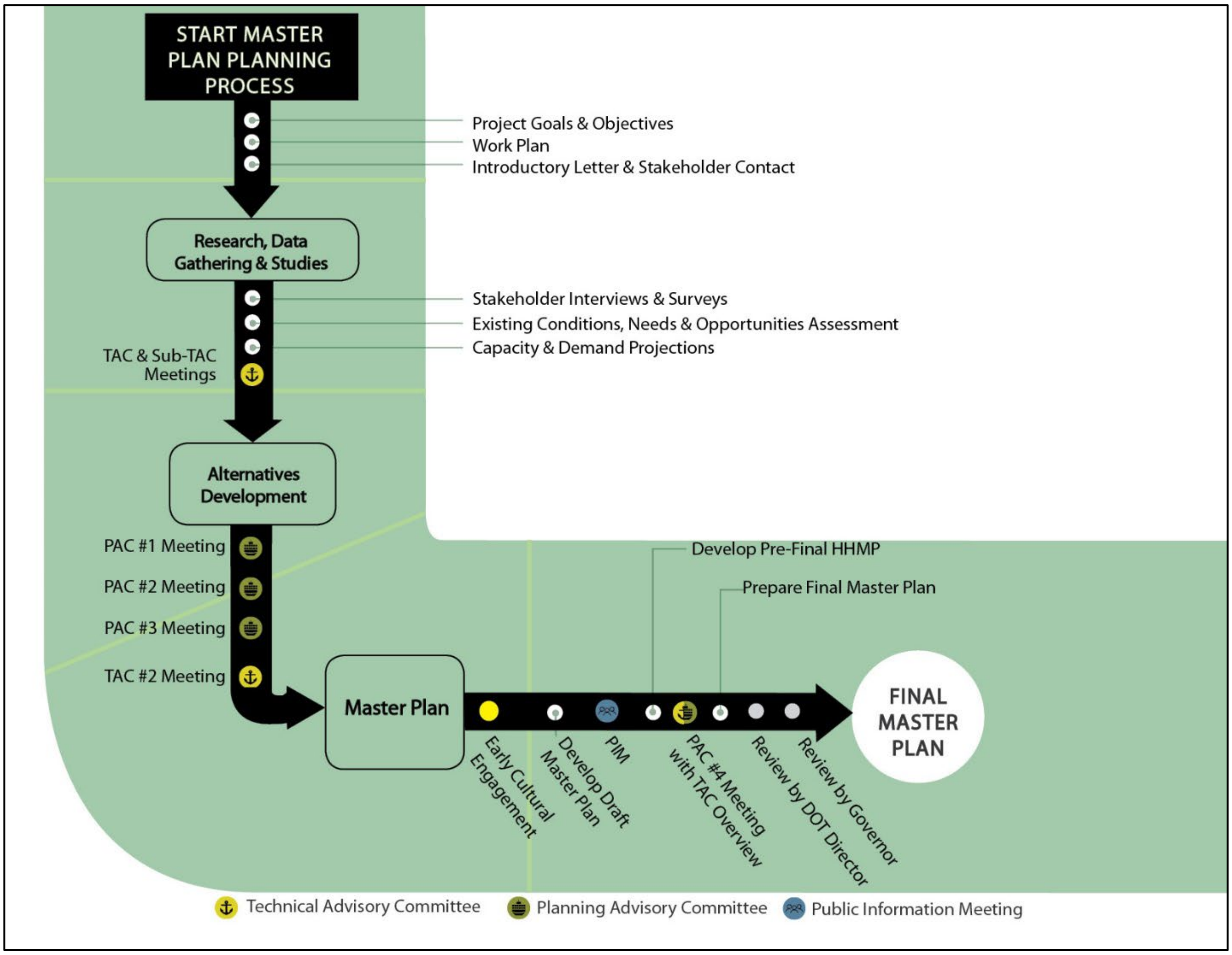

Figure 2.2 - Planning Process

- ***Phase 1: Research, Data Gathering, and Studies.*** Phase 1 included collecting information about the harbor from research, field visits, user surveys and questionnaires, consultation with stakeholders, and input from industry professionals. The Project Team analyzed existing conditions, harbor operations, and cargo capacity; forecasted future market conditions and cargo capacity demand over the HHMP's time horizon through 2050; and conducted other studies necessary to determine the harbor's future needs, constraints, and opportunities.

- ***Phase 2: Alternatives Development.*** The alternatives that were developed consider improvements that will benefit maritime uses (e.g., cargo operations, commercial fishing, passenger vessels, and maritime support services) in accordance with DOTH's mission. In addition, within lands under DOTH jurisdiction, opportunities for public waterfront development that are compatible with the harbor's primary function and that serves to diversify and enhance revenue, which supports harbor improvements, maintenance, and operations, were identified. Proposed public waterfront development is limited to marginal harbor lands that are not well-suited for pure industrial maritime activities, such as areas lacking back land for cargo yard operations.
- ***Phase 3: Draft and Final Master Plan.*** During Phase 3, alternatives were vetted and refined with input from the Planning Advisory Committee (PAC) and Technical Advisory Committee (TAC)[5] and with additional input from the public. The recommended preferred alternatives identified during this process are included in the HHMP.

The planning process was guided by the following principles:

- ***Transparent.*** The planning analysis, alternatives development, criteria used for decision-making, and the decision-making process was documented and open to public review throughout the planning process. This ensured that DOTH remained accountable to the public for the process and outcomes and that stakeholders and public participants in the planning process were able to track and understand the basis for decision-making.
- ***Equitable.*** The project information and opportunities to participate in the planning process were accessible to all interested stakeholders and members of the community regardless of race, color, national origin, gender, language, income level, or physical ability. DOTH conducted the planning process in accordance with a Public Participation Plan that outlined outreach strategies and resources to ensure that the planning process complied with Title VI of the Civil Rights Act and the State's Limited English Proficiency (LEP) Policy and other Environmental Justice principles.
- ***Data-Driven.*** The alternatives development and recommendations relied on unbiased, quantifiable, outcomes-based data derived from a systematic assessment involving cargo capacity analyses, market forecasts, demand projections, and a technical assessment of harbor needs.
- ***Supports DOTH's Mission.*** The preferred alternatives identified in the HHMP support DOTH's mission.

[5] See Section 2.5.1 for description of the PAC and TAC and their roles in the planning process.

2.5.1 Outreach Process

Preparation of the HHMP involved an extensive, iterative outreach process with numerous key stakeholders and the public at-large. Input received during the outreach process informed the development of concepts and alternatives. Stakeholders included harbor users, harbor-support users, policy- and decision-makers at the federal, state, and county levels, key community and business organizations, landowners surrounding the harbor, and Native Hawaiian families and organizations with lineal and cultural ties to the three *ahupua'a* (a land division usually extending from the uplands to the sea) within which Honolulu Harbor is located.

The process included opportunities to provide input through multiple forums as follows:

- ***Surveys and interviews.*** Specific expertise and experience-based input from harbor and harbor-support users were gathered through surveys and interviews. Survey instruments were developed and distributed to harbor users to gather data on their operations, which were then followed-up with one-on-one interviews. In total, 84 interviews were conducted with harbor users and other stakeholders.
- ***Technical Advisory Committee (TAC)*** *and* ***Sub-Committees (Sub-TACs).*** The TAC was an invitation-based advisory group composed of approximately 150 representatives from all sectors of the maritime industry, government agencies with jurisdiction in the harbor, landowners adjacent to the harbor, and subject matter specialists from academia and the private sector. The TAC collectively possessed broad and deep expertise in harbor operations and issues and provided technical and focused input on various aspects of the harbor, such as cargo handling, navigation, emergency preparedness and resilience, climate change adaptation, biosecurity, revenue diversification, and other issues. The TAC's experience-based guidance was essential to the planning process. TAC participants were invited to serve on Sub-TAC(s), which were comprised of eight specialized groups that possessed subject-matter expertise on the following topics: (1) Cargo Operations, (2) Vessel Operations, (3) Maritime Support, (4) Cruise/Excursion Operations, (5) Fishing Industry, (6) Adaptation/Resiliency, (7) Public Access Waterfront Development Opportunities, and (8) the Environment. Each Sub-TAC met several times to identify planning issues and resources and to recommend alternatives related to their subject area for consideration by DOTH.
- ***Planning Advisory Committee (PAC).*** The PAC provided general review and feedback of the proposed alternatives. To ensure equitable subject-matter expertise and representation, the PAC was comprised of two representatives from each specialty Sub-TAC, as well as selected government agencies, DOTH's Oahu District Manager and Commercial Harbors Manager, and other at-large participants as determined by DOTH. Four meetings were conducted with the PAC. The PAC served as an advisory, not a decision-making body, which assisted the Project Team to vet and refine concepts and alternatives. Under advisement of the PAC, the

Project Team provided recommendations to DOTH Administration for acceptance. Decisions about HHMP alternatives and improvements will ultimately be made by DOTH.

- ***Early Cultural Engagement (ECE).*** ECE meetings provided input from Native Hawaiian descendants and organizations with *kuleana* (responsibility) in the three *ahupuaʻa*—Kalihi, Kapālama, and Honolulu—within which Honolulu Harbor is located. The meetings offered an informal forum for information exchange and dialogue to familiarize *ʻohana* and organizations about the HHMP and to request their early input.
- ***Public Informational Meeting (PIM).*** The PIM provided the opportunity to familiarize and solicit input from the public at-large. The PIM was conducted virtually due to restrictions stemming from the COVID-19 pandemic. 'Ōlelo hosted the live and post-streaming of the meeting.

2.5.1.1 Chronology of Outreach

- **TAC Meeting #1 – July 18, 2018**
  TAC 1 meeting was held on July 18, 2018, at the Homer Maxey Conference Center. Approximately 90 out of 182 invited stakeholders and agencies attended the first TAC meeting. The purpose of the meeting was to provide an overview of the HHMP, review preliminary analysis by the Project Team, and establish the Sub-TAC working groups.

- **Sub-TAC Meetings – September 6 to November 16, 2018**
  Sub-TAC meetings were held at various locations, including the Marine Education and Training Center, Homer Maxey Conference Center, POP Fishing & Marine, and Pier 19 Ferry Terminal. Each Sub-TAC working group met one to three times depending on the amount and complexity of issues to be discussed. In total, 16 Sub-TAC meetings were conducted.

  The Sub-TACs participants identified existing and future conditions, issues and opportunities regarding infrastructure, operations and other aspects of Honolulu Harbor and evaluated various conceptual ideas for harbor improvements. The Project Team used the input provided by the Sub-TACs to formulate preliminary alternatives and concepts for the HHMP. Each Sub-TAC group also elected two individuals to represent that group on the PAC.

- **PAC Meeting #1 – September 25, 2019**
  PAC 1 occurred on September 25, 2019, at the Homer Maxey Conference Center with 29 participants. At the PAC 1 meeting, the Project Team shared analysis of cargo terminal capacity, projected cargo throughput, and berth utilization, and presented an array of master plan concepts gathered from the Sub-TAC meetings and stakeholder interviews for review and discussion with the PAC members.

- **PAC Meeting #2 – February 28, 2020**
  PAC 2 convened on February 28, 2020, at the Homer Maxey Conference Center with 26 participants. The purpose of PAC 2 was to present an array of refined maritime alternatives and public waterfront development concepts, gather input on those alternatives and concepts, and initiate discussion on phasing.

- **PAC Meeting #3 – October 1, 2020**
  Due to the COVID-19 pandemic, PAC 3 was conducted on October 1, 2020, as a virtual meeting using the Zoom platform. Forty-one participants attended PAC 3. In PAC 3, the Project Team presented the draft master plan and the preliminary project prioritization, gathered input and identified the PAC's preferred maritime alternatives and public waterfront development concepts.

- **TAC Meeting #2 – December 18, 2020**
  TAC 2 was conducted on December 18, 2020, as a virtual meeting using the Zoom platform. Ninety-five stakeholders and representatives from the city, state, federal agencies, and private and public organizations attended the meeting. The purpose of the meeting was to reconvene the TAC to present the preferred alternatives and preliminary project prioritization that was developed through the series of PAC meetings. The Project Team used TAC member input received at this meeting to further refine the alternatives and project prioritization.

- **ECE Meetings – July 8, 9, and 10, 2021**
  A series of three ECE meetings were held virtually via Zoom on July 8, 9, and 10, 2021. The meetings were intended as informal *kūkākūkā* (discussion) sessions to introduce participants to DOTH and Project Team, familiarize them with the HHMP project, and request early input through their *manaʻo* (wisdom) and perspectives on the plan. The meetings were <u>not</u> part of any formal consultation process pursuant to Section 106 of the National Historic Preservation Act (NHPA) HRS 6E, or other regulatory requirement, as currently there are no such triggers.

- **PIM 1 – August 4, 2021**
  The PIM was broadcast on Wednesday, August 4, 2021, through ʻŌlelo cable channel 53, ʻŌlelo online stream, and Zoom. The total attendance could not be determined from the cable broadcast; however, 98 online Zoom participants joined the meeting. The purpose of the meeting was to collect public input on the HHMP preferred maritime alternatives, public waterfront development concepts, and preliminary project prioritization.

  Prior to the PIM, a Public Participation Plan was prepared to ensure compliance with Title VI of the Civil Rights Act of 1964, Environmental Justice in Minority and Low-Income Populations (Executive Order 12898), Improving Access to Services for Persons with LEP (Executive Order 13166), and the Americans with Disabilities Act (ADA) of 1990. The Public

Participation Plan included a demographic analysis of the project area to identify demographic groups that have LEP.

Notifications were prepared with instructions for how people could request language interpretation, an auxiliary aid, or special services (e.g., sign language interpreter) at the PIM. Notifications were translated for the LEP demographic groups identified in the Public Participation Plan and distributed to newspapers, radio stations and other media outlets; community organizations; businesses; churches; and homeless programs within the project area by mail, email, and in-person. Notifications were also posted on the DOT and project website. PIM invitations were extended to the PAC, TAC, and ECE invitees.

- **PAC Meeting #4 – November 3, 2022**
  Subsequent to the PIM, the Project Team developed the pre-final Master Plan for presentation to the PAC. The final PAC meeting (PAC 4) was on November 3, 2022 at the Homer Maxey Conference Center with 26 in-person and 2 online PAC participants. TAC members were invited as virtual spectators via Zoom. During PAC 4, the PAC members provided feedback on the pre-final HHMP to consider in preparing the final document, and provided position statements on the preferred HHMP maritime alternatives and public waterfront development concepts.

Outcomes from the meetings are reflected in the HHMP. See **Appendices A to F** for complete meeting documentation.

2.6 Evaluation Criteria

The following criteria were created to assist DOTH in evaluating proposed alternatives identified during the development of the HHMP. The criteria tie back to DOTH's Mission Statement and HHMP goals.

- ***To what extent does it align with the master plan goals?*** Does the improvement:
  - Respond to the best available information about future conditions and evolving practices?
  - Support cargo and terminal capacity and throughput projections?
  - Support commercial maritime use (e.g., cargo, passenger, fishing, maritime support services)?
- ***To what extent does it improve the function of the harbor, and by extension, the community's economic security and quality of life?*** Does the improvement:
  - Address an existing or future deficiency or need (e.g., lack of layberth space, congested berths or cargo yards)?
  - Enhance safety and security for harbor users and maritime operations?
  - Make the harbor more resilient in response to disasters and climate change and SLR?

- ***To what extent is the improvement reasonable and feasible (economically, operationally, and politically) and beneficial to Honolulu Harbor and the State?***
    - To what extent can the State finance the improvement?
    - Will the improvement make maritime operations more efficient and minimize cost increases to the community?
    - Is it within DOTH jurisdiction or control?
    - Does it recognize existing long-term leases and other land agreements?
- ***To what extent does it benefit or adversely impact the environment?***
    - Does the improvement balance marine resource conservation objectives with the needs of a commercial harbor?
    - Does the improvement strengthen the State's biosecurity?

The evaluation criteria are practical and common sense and were intended to provide DOTH with a basic due diligence standard during the development of HHMP recommendations.

2.7 Idea Vetting Process

The vetting process identified ideas and concepts gathered through stakeholder input; TAC, Sub-TAC and PAC meetings; and from DOTH, O'ahu District, and DOTH Administration. A screening process was then applied to filter out the ideas and concepts that were considered for the HHMP (see **Appendix H** and **Figure 2.3**).

Concepts and ideas were divided into two groups: (1) Short-term/non-master plan ideas and (2) master plan ideas. Non-master plan ideas included projects that could be undertaken through one of DOTH's existing programs, including routine maintenance and operational initiatives by the Oahu District, Special Maintenance Projects (SMP), near-term Capital Improvement Program (CIP) Projects, and administrative initiatives. Physical improvement projects (i.e., not operational nor administrative initiatives) generally fall into one of three buckets.

- Typical ***District Projects*** include routine maintenance and repair such as painting, light bulb replacement, window repair, and plumbing
- Typical ***SMP*** include more substantial repairs that require engineering such as pier repairs, repaving yards, roof repairs, LED lighting retrofit, maintenance dredging, and utility repairs
- Typical **CIP** Projects involve development of new facilities or expanding/adding capacity to existing facilities, which include land acquisition, major upgrades to pier facilities, new buildings and structures, and utility expansion among others

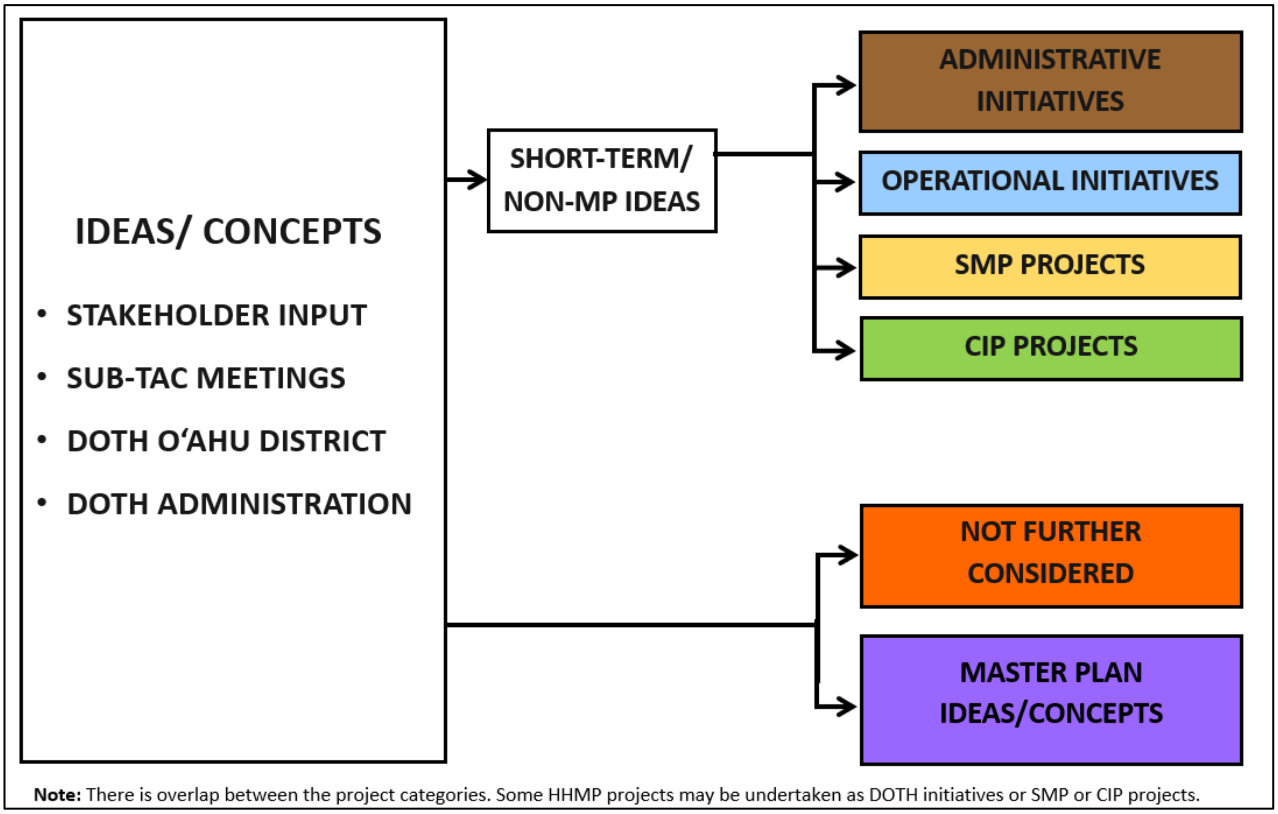

Figure 2.3 – Master Plan Idea Vetting Process

Concepts and ideas that were not filtered out as short-term/non-master plan ideas were then evaluated through an iterative process against the HHMP Evaluation Criteria (see **Section 2.6**) to determine which ideas would be included in the HHMP. The disposition of concepts and ideas raised during the planning process is presented in **Appendix H – Master Plan Idea Vetting Process.**

It is important to note that there is frequent overlap between the HHMP alternatives and projects that are typically undertaken through one of DOTH's existing project programs. While the HHMP generally guides long-range, large-scope projects, many of these projects, such as partial reconstruction of a pier or utility upgrades, might also be found on a CIP project list. Moreover, these large-scale projects include improvements that independently might be part of a CIP or SMP project list, such as a bollard or fender replacement/upgrade. The HHMP planning process directed the short-term, smaller-scale projects that were identified in the stakeholder meetings to the O'ahu District and DOTH Administration for assessment through one of the existing project programs so that the facility needs of the harbor would receive timely attention and not distract from the long-term planning function of the HHMP.

2.8 Literature Review

The HHMP benefits from information and ideas in earlier studies and reports that were prepared for Honolulu Harbor or that pertain to special subject matter which were reviewed as part of the planning process. Key documents that influenced/supported development of the HHMP include the following:

- *2010 Master Plan for Honolulu Harbor* (DOTH, 1986)
- *Honolulu Waterfront Master Plan* (OSP, 1989)
- *O'ahu Commercial Harbors 2020 Master Plan* (DOTH, 1997)
- *Statewide Cruise Facilities Study* (DOTH, 1999)
- *Ship Navigation Study, Kalihi Channel Reopening*, Honolulu Harbor, O'ahu, Hawai'i (USACE, 2001)
- Hawai'i Harbor Users Group Report on Port Facilities & Development Priorities (Mercator Transport Group, 2005)
- *Sand Island Tunnel Reconnaissance Study* (USACE, 2006)
- *Hawai'i 2050 Sustainability Plan*: Charting a Course for Hawai'i's Sustainable Future (Hawai'i 2020 Sustainability Task Force, 2008)
- *Hawai'i Cruise Industry Stud*y: Modules 1-9 (Hawai'i Tourism Authority, 2008)
- *A Framework for Climate Change Adaptation in Hawai'i* (Hawai'i State Ocean Resources Management Plan Working Group, 2009)
- *Statewide Fuel Facilities Development Plan* (DOTH, 2009)
- *Transportation Asset Climate Change Risk Assessment Project* (Oahu Metropolitan Planning Organization, 2011)
- *Hawai'i Statewide Transportation Plan* (HDOT, 2011)
- *Hawai'i Ocean Resource Management Plan* (Hawai'i Office of Planning, 2013)
- Vessel Biofouling in Hawai'i: Current Patterns of a Potent Marine Bioinvasion Vector and Potential Management Solutions (Davidson et al., 2014)
- *Vulnerability of Hawai'i Commercial Port and Harbor Facilities to Tsunamis and Hurricane Storm Surge and Wave Protection* (UHM/CEE, 2015)
- *Hawai'i Interagency Biosecurity Plan* 2017-2027 (DOA and DLNR, 2016)
- In-Water Vessel Cleaning: Current and Emerging Technologies, Associated Risks, and Management Options for Hawai'i (Zabin et al., 2016)
- *Hawai'i Sea Level Rise Vulnerability and Adaptation Report* (Hawai'i Climate Change Mitigation and Adaptation Commission, 2017)
- *Honolulu Port Analyses for the Hawai'i Tsunami Scenarios* (Martin and Chock, Inc., 2017)
- *Hawai'i Statewide Freight Plan* (DOT, Highways Division; 2018)
- *Hawaiian Islands National Shoreline Management Study* (USACE-IWR, 2018)

- *Infrastructure Trends, Primary Urban Center Development Plan* (Wilson Okamoto Corporation, 2018)
- *Learning to Build Resilience into Transportation Systems* (Kim et al., 2018)
- *Sea Level Rise and Climate Change, Primary Urban Center Development Plan* (University of Hawaiʻi Sea Grant College Program, 2018)

Literature review summaries are provided in **Appendix G**.

3.0 BACKGROUND AND CONTEXT

Since pre-contact times, when Honolulu Harbor was known as "*Ke ʻAwa O Kou*" (the harbor of Kou) and seafaring Hawaiians preferred Waikīkī's oceanfront to the deep-water harbor for landing their shallow-draft outrigger canoes, waterborne transportation has been central to Hawaiʻi's way of life, economic well-being, and identity. In the present day, ocean cargo transport remains Hawaiʻi's lifeline and only viable means to serve and support every facet of the local economy, including tourism, construction, national defense, agriculture, and other industries.

3.1 Regional and Site Overview

Honolulu Harbor is located on the south shore of the island of Oʻahu, the State's most populated and densely developed island and home to the seat of the Hawaiʻi state government. It is the largest container port in Hawaiʻi and serves as the primary entry point into the state for incoming cargo from the continental U.S. and foreign countries. The harbor is a base for regularly scheduled liner service to and from San Diego, Long Beach, San Francisco, Seattle, Alaska, Vancouver British Columbia, Guam, Japan, Korea, and China, as well as routine cargo shipments to and from other Pacific ports and international vessels via the Panama Canal. Honolulu Harbor is the center of the State's commercial harbors system hub-and-spoke cargo distribution model as it receives inbound goods destined to neighbor islands and assembles outbound cargo from the neighbor islands for shipping to destinations around the world. Located strategically in the middle of the Pacific Ocean, Honolulu Harbor also serves as a transshipment center for inbound domestic and foreign cargo destined for out-of-state ports, and as an emergency port for trans-Pacific vessels in distress.

Honolulu Harbor is situated between Keʻehi Lagoon and the Daniel K. Inouye International (HNL) Airport on the *ʻEwa* (west) side and Kakaʻako Makai on the Diamond Head (east) side within the Primary Urban Center Development Area of Oʻahu. Nimitz Highway and Ala Moana Boulevard form the *mauka* (toward the mountain) boundary of Honolulu Harbor. Neighborhoods and districts surrounding the *mauka* side of the harbor, from west to east, include Kalihi, Iwilei, Chinatown, Downtown, Capitol District and Kakaʻako Mauka. The *makai* (toward the ocean) side of Honolulu Harbor is formed by Sand Island, a man-made island separated from Honolulu by the harbor's Main Entrance Channel on the Diamond Head end and Kalihi Channel on the ʻ*Ewa* end. Sand Island connects to Honolulu by means of a fixed bridge across Kalihi Channel. The harbor and surrounding region are shown in **Figure 3.1**.

Figure 3.1 – Honolulu Harbor Regional Map

- ***Kalihi Kai and Kalihi.*** The mixed-use neighborhood of Kalihi Kai is located on the *makai* side of Nimitz Highway and separated from the Interisland Terminal (Piers 39 to 41) by Libby Street and from KCT (Piers 41 to 43) by Auiki Street. Kalihi Kai includes Sand Island Access Road and adjacent land out to Ke'ehi Lagoon, including Pier 60. The Kalihi neighborhood extends *mauka* of Nimitz Highway, bounded by Kapālama Transit Canal on the east and Interstate H-1 Highway on the west. In proximity to the harbor, both areas consist of a high-density mix of primarily light industrial combined with commercial/retail and residential uses. These uses are generally compatible with the industrial maritime uses in Honolulu Harbor. Kalihi Kai and Kalihi mixed-use areas provide an opportunity for off-site location of non-waterfront-dependent maritime support operations, such as storage, shipping services, cargo consolidators, and administration functions.

- ***Iwilei-Kapālama***. The Iwilei-Kapālama area is located along the *mauka* side of Nimitz Highway across from Piers 18 to 38. It is generally bounded by Nimitz Highway on the south side, Dillingham Boulevard on the north side, Kapālama Canal on the west side and King Street on the east. Alakawa Street runs *mauka-makai* (mountain-to-sea) and bisects the area with an intersection on Nimitz Highway adjacent to Pier 35. The Iwilei area predominantly consists of light industrial and commercial retail uses on large lots. *Makai* and *mauka* of Dillingham Boulevard are warehouse uses, including trucking, import, and woodworking businesses, as well as hardware stores and contractors' supplies, generally housed in one- to three-story buildings. The Iwilei area is also home to big box retailers Costco, Best Buy, Lowe's, and Home Depot, as well as many smaller retail and service businesses. Residential uses are limited and generally *mauka* of King Street, with the notable exception of the Senior Residences at Iwilei at the eastern end of Iwilei, between Nimitz Highway and King Street. Like the Kalihi area, Iwilei provides opportunity for non-waterfront-dependent maritime support uses.

The City and County of Honolulu (CCH) has designated the Iwilei-Kapālama area for major population growth anchored around two future rail transit stations, the Kapālama Station at the west end near Kapālama Canal, and the Iwilei Station at the center of the area. The CCH conducted the *Iwilei/Kapālama Transit-Oriented Development (TOD) Infrastructure Needs Assessment* to identify improvements needed to support new development around the future stations. The assessment concluded that nearly all infrastructure systems need to be upgraded to allow for the anticipated growth and the effects of climate change and SLR. Infrastructure improvements in Iwilei, particularly drainage improvements and climate change adaptation and resiliency improvements, will directly affect Honolulu Harbor which lies downstream and receives drainage and discharge from the Iwilei area. The proximity of a future expanded resident population in proximity to the existing working, industrial harbor facilities, with the attendant noise, visual impacts and cargo truck traffic, has potential for future conflict.

- ***Chinatown and the Honolulu Arts District.*** The Chinatown area is located northeast of the Main Harbor Basin across Nimitz Highway from Piers 12 to 15. It is generally bounded by Nimitz Highway on the west side, Beretania Street on the east side, Nuʻuanu Stream and River Street on the north side and Nuʻuanu Avenue on the south side. Chinatown is a densely developed mixed-use area with a vibrant combination of residential uses, restaurants, commercial/retail establishments, bars, galleries and open-air markets. Chinatown is also known for an eclectic arts and nightlife scene. The Hawaiʻi Theatre is located on the eastern edge of Chinatown. Surrounding the theatre is the Honolulu Arts District, which includes galleries and monthly Art Walk evenings.

  Chinatown is a designated Historic District, registered on both the National and Hawaiʻi Registers of Historic Places. Chinatown's origins and development are closely associated with the development of Honolulu Harbor. The area at the mouth of Nuʻuanu Stream now occupied by Chinatown, is the site of the longest continuous native and immigrant settlement in Hawaiʻi.[6] Its location in relationship to Honolulu Harbor and the neighboring land areas made it a natural center for the growth of trade and commerce in Hawaiʻi, and an attractive location for settlement by one of Hawaiʻi's earliest and largest immigrant groups. Today, the architecture, businesses, residents and patrons of Chinatown represent the diverse cultures and histories that contribute to Hawaiʻi's unique sense of place, and serve as an attraction to locals and visitors.

Chinatown's historic ties to the harbor's development and proximity to publicly accessible waterfront in the Aloha Tower area create opportunities to strengthen *mauka-makai* connections and reestablish a relationship between Chinatown and Honolulu Harbor with the potential to strengthen economic activity across Nimitz Highway.

- ***Downtown and the Capitol District.*** Downtown Honolulu is located on the *mauka* side of Nimitz Highway / Ala Moana Boulevard directly across from the Aloha Tower complex, comprising Piers 5 through 11. Downtown Honolulu and the contiguous Capitol District are Oʻahu's historic center for government and business. Some of Oʻahu's most historic places are located in this area, within reasonable walking distance of Aloha Tower. Downtown Honolulu comprises a dense mix of professional office, commercial, retail, restaurant, and residential uses, small parks and outdoor gathering spaces. The architecture is a combination of historic low-rise buildings, some dating from the 1800s, to modern high-rise buildings. The Capitol District is contiguous with the east side of the downtown area and is the historic and contemporary seat of Hawaiʻi's government. It is home to ʻIolani Palace, the King Kamehameha I statue and Aliʻiōlani Hale (the former Kingdom and Territorial Government Building), Kawaiahaʻo Church, the Hawaiʻi State Capitol, Washington Place (the Governor's Mansion), Honolulu Hale (Honolulu's City Hall), and other civic buildings.

  As with Chinatown, the historic relationship and proximity of Honolulu Harbor to the Downtown area and Capitol District invites greater *mauka-makai* connection and social and economic synergies. During the Hawaiian Kingdom period, prior to the development of mid-rise and high-rise buildings downtown, Honolulu Harbor and Iolani Palace were visually connected via the current Mililani Street corridor, and palace residents could keep a watchful eye on the comings and goings of ships in the harbor from the palace's second story *lanai* (balcony). While this direct visual relationship is now blocked by buildings, numerous landmarks from this era remain in the built environment as points of orientation toward the harbor. In contemporary times, the *mauka-makai* relationship is challenged primarily by the busy Nimitz Highway and Ala Moana Boulevard traffic corridor which creates a barrier to pedestrian access

[6] 1972 Chinatown Historical District NRHP Nomination Form.

to and from the harbor. Future redevelopment of the Aloha Tower complex, particularly at Piers 5 and 6, along with the planned construction of the transit rail system with stations on Nimitz Highway at Chinatown (adjacent to Pier 15) and Downtown (the "Kuloloia Station" at Bishop Street), have potential to overcome the *mauka-makai* divide and reinvigorate commercial prospects in the Aloha Tower complex.

- ***Kakaʻako.*** Kakaʻako is located east of Honolulu Harbor and includes areas *mauka* and *makai* of Ala Moana Boulevard. The area is a special development district under the jurisdiction of the HCDA. Kakaʻako has a rich history of Native Hawaiian values, entrepreneurship, industry, and cultural diversity. The area was once composed of fishing villages, fishponds, and salt ponds. In the 1800s, residential construction began, and diverse immigrant camps emerged. Kakaʻako continued to grow and became a community built on a strong blue-collar work ethic, social activism, and a sense of *ʻohana* (family). In the mid-1900s, the zoning laws for Kakaʻako changed from residential to commercial. Currently, the Kakaʻako Mauka neighborhood is transforming from a warehouse-filled commercial/light industrial hub to a mixed-use district that includes mid- and high-rise residential buildings and a wide range of restaurants, shops, boutiques and street art. It is within walking distance from the Pier 2 Cruise Terminal and the Aloha Tower complex and is an area of attraction for visitors and residents.

  Kakaʻako Makai is immediately adjacent and contiguous with the Piers 1 and 2 terminals. Uses abutting the terminal yards include surface parking lots, the Entrepreneurs' Sandbox collaboration and event facility, and a 5-acre commercial use warehouse parcel abutting the Pier 1 Yard. The 5-acre parcel is under OHA jurisdiction and currently houses a homeless shelter, recycle center and other businesses. Kakaʻako Makai is also the location of the University of Hawaiʻi (UH) Cancer Research Center and the John A. Burns School of Medicine, Kakaʻako Waterfront Park and Amphitheater, Children's Discovery Center, Kakaʻako Farmers' Market, Gold Bond office building, several automobile dealerships, and other commercial enterprises. Residential uses are currently not permitted in Kakaʻako Makai. Kewalo Basin Harbor is at the east end of Kakaʻako Makai.

  The Kakaʻako area on both sides of Ala Moana Boulevard offers attractions for cruise passengers within reasonable walking distance from the Pier 2 Cruise Terminal. Areas immediately adjacent to Piers 1 and 2 could present opportunities for expanding the terminal facilities in the future.

- ***Sand Island.*** Sand Island is a largely man-made island constructed over time of fill material dredged during different phases of Honolulu Harbor's development. At the time of western contact, it was called *Kamoku`ākulikuli* or *`ākulikuli* island and consisted of two small, naturally occurring islands that rose above the long reef flat (referred to as *Kaholaloa* or *Koholaloa*). It was gradually filled in by dredging and by the late 19th century was referred to as Quarantine Island when it served that function for arriving ship crew suspected of harboring disease. Its continued expansion followed the history of the two world wars and the increased military presence in the islands in the first half of the 20th century. Its creation is intrinsically linked to the history of Honolulu Harbor.

Sand Island forms the *makai* boundary of the Honolulu Harbor interior and the two harbor entrance channels: the Main Entrance Channel (also known as The Fort Armstrong Channel) adjacent to Piers 1 and 2, and the Kalihi Channel which is now blocked to ship traffic by a fixed bridge that carries Sand Island Access Road and connects Sand Island to O‘ahu. From 1963 to 1984, a two-lane bascule bridge allowed cargo ships to transit in and out of the harbor through the Kalihi Channel. In the mid-1980s, the bascule bridge was fixed in place and a second two-lane fixed bridge was constructed to meet the demands of growing truck traffic from the Sand Island Container Terminal.

Piers 51 to 53, the Sand Island Container Terminal, is the largest container cargo yard in the harbor and occupies the *mauka* side of the island, facing inland. Adjacent to Pier 53 is the U.S. Coast Guard (USCG) Base Honolulu and extending eastward the Hawai‘i Department of Land and Natural Resources (DLNR), Division of Aquatic Resources (DAR) Ānuenue Fisheries Research Center and a small pier and yard operated as a marine cable-laying ship berth and staging area. The center of the island contains the Sand Island Industrial Park and the CCH Sand Island Wastewater Treatment Facility. At the east end of Sand Island adjacent to the Main Entrance Channel is the Sand Island State Recreation Area (SISRA), which extends along the *makai* side of the island. At the west, *makai* end of the island is the Marine Education Training Center, home of the Polynesian Voyaging Society. Undeveloped state-owned land on the *makai* side of Sand Island Parkway across from Piers 51 and 52, has been used as annex staging and storage space by the container terminal operators and offers potential expansion area for Honolulu Harbor in the future.

3.2 Economic Impact of Hawai‘i's Commercial Harbors System

As noted in **Chapter 2**, Honolulu Harbor serves as the hub of the State's commercial harbors system. Cargo bound for the Neighbor Islands are transshipped from Honolulu Harbor on interisland barges, linking the harbor to the rest of the State's economy. This vital link between the port's activity and the State's overall economy can be understood and evaluated using three separate but related measurements: Economic Value; Economic Activity; and Practical Value. The descriptions below are summarized from *The Value of Hawai‘i's Commercial Harbors System*, a study completed in support of the HHMP (**Appendix L**).

Economic value is the measurement of the benefit derived from a good or service to the State, its economy and the community. Economic value represents the value that is derived from using the assets—the cargo and goods that are transported to Hawai‘i by water. Economic value also looks at the willingness of the community to pay for the associated activity and the net benefits to the community. Economic value was determined by looking at the dollar value (price paid by consumers) and volume of cargo being imported, transshipped, and exported.

The economic value of all cargo passing through Hawaiʻi's commercial harbors system[7] was measured in terms of both tonnage and dollar value. The dollar value of cargo, however, provides a more meaningful and accurate measure of the economic activity associated with the State's commercial harbors system. Air cargo, by contrast, tends to be higher value items, but shipped to Hawaiʻi at much smaller volumes. Using the "Freight Analysis Framework 5", a database comprised of multiple national sources that contains volumes and values of major commodity groups broken down by transportation mode, of the total economic value of all cargo moving through and within Hawaiʻi, $26.13 billion (48 percent) is attributable to marine cargo. This value, which excludes crude oil imported through offshore moorings, is 2.8 times greater value than all cargo transported by air, and more the 1.5 times greater than the value of all cargo transported by truck.

Economic Activity is any action that involves producing, distributing, or consuming products or services. The Gross State Product (GSP), which is the sum of all economic activity in the state, is one way this activity can be measured. Other ways economic activity is measured are sales and revenue, jobs, employment, wages, and tax revenue. An economic impact analysis of the commercial harbors system looked at actual expenditures, how those expenditures cycle through the state's economy, and how that contributes to Hawaiʻi's economy.

The economic impact of the commercial harbors system spending is measured in terms of its effect on jobs, earnings, and taxes. The commercial harbors system contributes to the local and state economies by providing employment and income to individuals, tax revenues to local and state governments, and revenue to businesses engaged in handling, shipping, and receiving cargo via the port. In 2017, the economic activity associated with the commercial harbors system accounted for $2.03 billion and funded 4,648 jobs. Using an input-output model, this level of revenue generated an estimated total of $1.17 billion in household income and earnings, supported 20,519 jobs and resulted in $324 million in state government revenue.

The **Practical Value** of the harbor is an assessment of how impactful harbor activities are in the day-to-day lives of Hawaiʻi's residents. Although it is a qualitative measure, determining the practical value of the harbor is an important factor in assessing its overall value. Interviews with food store

[7] This includes only cargo moving through the harbors, not the entirety of all waterborne cargo, which would include crude oil and other commodities that are transported by sea but don't pass through one of the State's commercial harbors.

managers were used to understand the practical value of the commercial harbors system and to assess how much of the products they sell arrive by way of ocean transportation.

The practical value of Honolulu Harbor can be expressed by comparing the amount and value of goods that come through the harbor by ocean transport to the total amount of goods consumed. On average about 70 percent of all food items and 79 percent of non-food items sold through these markets are brought in through at least one harbor. If Honolulu Harbor were to shut down and/or food deliveries were to stop for some reason, food supplies at grocery stores and supermarkets would start running out in a week and a half and two weeks for non-food items.

The lasting conclusion is that Hawaiʻi's commercial harbors system is critically important to the state economy and well-being of Hawaiʻi's residents far beyond the value of the freight it accommodates. Our dependency on maritime cargo and our port facilities is effectively illustrated in the statistic that about 85 percent of all goods used here in Hawaiʻi is imported, and 91 percent of that comes through Hawai'i's commercial harbors system[8]. The purpose of the HHMP is to ensure that Honolulu Harbor, as the critical hub of Hawaiʻi's commercial harbors system continues to function efficiently to support this economic lifeline. Further discussion can be found in A**ppendix L, Economic Valuation of the Commercial Harbors System**.

3.3 Background of Honolulu Harbor

Honolulu Harbor was originally a small, reefed basin created by the natural flow of freshwater from the streams of the Nuʻuanu Valley. This flow of freshwater eroded coral and created a long, narrow channel cutting through the reef into the deeper salt water. The main channel, which was the deepest, was flanked to the west by shallower outlets. Between these outflows rose occasional spots of earth and coral, which were the beginnings of Sand Island.

Hawaiians preferred Waikīkī's oceanfront for seafaring because their shallow-draft outrigger canoes did not require deep-water harbors or completely protected anchorages. However, foreigners, with their deep-draft vessels, preferred the naturally-deep channel created by Nuʻuanu Stream. The harbor increased in popularity because it was a convenient port-of-call for ships participating in the Pacific Trade. Hawaiians referred to the harbor as *Ke ʻAwa O Kou*, or "the Harbor of Kou" and as *ke kai o Kuloloi'a* or the Sea of *Kuloloi'a* for the waters off of *Kuloloi'a* beach (from Pākākā Point

[8] This statistic is based on the results of literature review, expert interviews and data analysis and represents a reasonable interpretation of these sources. (SMS, 2022)

near the present-day location of Pier 11 to Kakaʻako) (CSH 2021). In 1796, a British captain renamed the harbor "Fair Haven," which was translated to Hawaiian as "Honolulu."

The islands were a popular and convenient port-of-call for fur, sandalwood, and whaling vessels. These maritime industries spurred rapid development of the harbor and surrounding community. In 1825, the first wharf was created by floating a sunken ship's hull in place near Nuʻuanu Avenue. This wharf was the harbor's only terminal for eight years. Other modifications to the harbor included developing a shipyard and wharf and deepening the harbor by dredging. The dredged material was used to fill in the surrounding tidelands. The community surrounding the harbor also continued to grow, with life centered around supporting the harbor by providing all the goods and services to support vessels calling in port.

The 1848 gold rush in California spurred another surge in commercial growth and activity. The harbor was a port-of-call for miners, goods, and food headed to California. The growing prosperity of the harbor led King Kamehameha III to declare Honolulu to be the city and capitol of his Kingdom on August 31, 1850.

During the Civil War, the supply of sugar from the southern states was cut off, creating a significant increase in demand for Hawaiian sugar. Hawaiian sugar exports spurred another surge in the local economy and development of the port. The harbor and waterfront were further developed with important infrastructure improvements including widening the harbor entrance; deepening the channels; and constructing wharves, warehouses, harbor lights, and seawalls. The dredge sediment from deepening the channels was deposited on and around *Kamoku`ākulikuli* or *`ākulikuli* island, two small islands rising above the shallow off-shore reef, expanding them into what eventually came to be called Quarantine Island by western new comers, and is now known as Sand Island. Quarantine Island was used to isolate ships with contagious diseases on-board.

On August 12, 1898, Hawaiʻi was annexed by the United States and became an American port. By 1900, most of the eastern portion of the harbor was developed with wharves, piers, and other maritime support facilities. Private companies developed the western portion of the harbor.

During World War I (1914-1918), harbor activity greatly decreased as most shipping vessels were conscripted into service on the Atlantic Ocean. Decreased maritime shipments led to shortages of food and other necessities, which significantly raised the cost of living (see **Figure 3.2**).

During the 1920s, Hawaiʻi became a popular tourist destination. Visitors arrived and departed on passenger cruise liners. Aloha Tower was completed in 1926 and became a landmark for the Honolulu waterfront, serving as a welcoming beacon for passenger cruise liners and as a vantage point for harbor control.

After Pearl Harbor was bombed in 1941, Hawaiʻi become a major participant in the Pacific Front campaigns during World War II. Pearl Harbor was the primary location for waterfront military activities, while Honolulu Harbor served a secondary role. The U.S. Military improved harbor infrastructure, including dredging Keʻehi Lagoon for seaplanes; widening, dredging and lengthening Kapālama Basin; and constructing new piers.

After World War II ended in 1945, the U.S. Military transferred ownership of the harbor back to the Territory of Hawaiʻi. During the post-war period the local economy prospered, which spurred harbor improvements, including construction of Nimitz Highway, a second entrance to the harbor, seawalls, and continued landfilling along the shoreline.

Figure 3.2 – Waterfront Esplanade in 1900
(Source: Historic Hawaiʻi Foundation)

Hawaiʻi became a state on August 21, 1959. During this period, maritime commerce grew rapidly. Harbor construction, dredging, and landfilling activities continued to accommodate increasing demand for goods and other essential materials.

Honolulu Harbor continues to function as the port hub of Hawaiʻi by receiving, consolidating, and distributing practically all international and domestic waterborne cargo shipments, as well as catering to passenger and commercial fishing operations. These maritime operations provide most of Hawaiʻi's necessities including food, clothing, construction materials, fuel, and other essential supplies. A timeline of major Honolulu Harbor facility improvements is provided in **Table 3.1**.

Table 3.1 – Timeline of major Honolulu Harbor facility improvements:

1825	The first Honolulu Harbor Wharf was developed.
1840	Start of harbor deepening and fill in the surrounding tidelands.
1968-1869	Two lighthouses constructed to aid navigation into the harbor.
1874	A long seawall lined with wharves and warehouses was constructed.
1885	Kamoku\`ākulikuli or \`ākulikuli island renamed "Quarantine Ground", and three years later renamed "Quarantine Island".
1898	The Kingdom of Hawaiʻi annexed by the United States.
1901	Piers 17 and 18 constructed.
1911-1916	A shed and marine railway were in place at Pier 3. The front of what is now Piers 18, 19 and 20 were developed for berthing with the addition of three small sheds.
1912	Pier 1 was constructed; the first pier in Honolulu Harbor to use reinforced concrete piles and a concrete deck.
1917-1918	Piers 24 to 27 were constructed.
1921-1928	Aloha Tower was constructed along with Piers 8 to 11.
1928-1929	Pier 30's concrete apron constructed to accommodate tanker operations, Pier 35 was constructed, and Pier 4 reconstruction completed.
1931	Pier 36 was constructed, and Piers 13 and 14 were reconstructed.
1938	Piers 27, 28, 29, 31, 31A and 32 were constructed.
1940 – 1945	USACE dredged seaplane runways in Keʻehi Lagoon. The spoils were used to expand Sand Island to its present size and to construct a dirt causeway to connect Sand Island to the Kapālama area.
1943	Kapālama Basin dredged, Piers 39 and 40 were constructed as concrete sheet pile/bulkhead wharves and portions of the apron on piles.
1944	Piers 51 to 53 were constructed as a 4,000-FT marginal wharf on Sand Island.
1954	Pier 38 was constructed to provide a direct loading area for refined petroleum products, Pier 39's slipway dredged, and the berth at Pier 34 was reconstructed to accommodate oil tankers and bulk cement shipments.
1959	HC&D Company wharf in Keʻehi Lagoon was built for inter-island barge shipping of aggregates.
1965	Kalihi Channel was completed and a bascule bridge was constructed to provide accessibility to Sand Island.

1967	Sand Island commercial ship facility was completed to accommodate another container shipping service and to provide more expeditious handling of cargo.
1969	The Sand Island Wharf was demolished, the basin dredged, and the wharf reconstructed to accommodate container vessels.
1972	Fort Armstrong's container yard was improved and expanded, Pier 34 was reconstructed, Piers 22 and 23 upgraded with new dolphins, bulkhead and pavement, and the final phase of Harbors Division's Baseyard facilities completed.
1977-1978	A commercial fishing area known as the Kewalo Basin Annex was established at the newly constructed Piers 17 and 18 in Honolulu Harbor, additional finger piers at Pier 21 were provided, Piers 31 to 33 refaced, and the Piers 22 and 23 bulkhead was repaired.
1980	Honolulu Harbor's depth was increased by five feet through dredging, and container-handling facilities were constructed to consolidate Matson Navigation and United States Lines freight operations on Sand Island.
1988	The Hawai'i Maritime Museum was established at Pier 7.
1998	New shed, pier apron strengthening and yard improvements undertaken at Pier 40 for the storage and handling of cargo.
2017	The KCT Harbor Modernization project breaks ground.

3.4 Honolulu Harbor Environs

3.4.1 Historic and Cultural Resources

Among the first descriptions of the harbor area are by Hawaiians through testimonies recorded during the 1840s in documents associated with Land Commission Awards (LCAs) and awardees of the Māhele.[9] LCAs usually include information on land use and thus are useful sources of information on the presence of residences, agricultural practices, and other activities that can help identify the locations and characterize the types of cultural materials that might be encountered in and around the harbor. This information can be used during project planning and design of harbor improvements to evaluate the cultural and archaeological sensitivity of site locations for further study and appropriate consultation and regulatory review. Location maps of LCA awards in the vicinity of Honolulu Harbor (the Kaka'ako, downtown Honolulu, and Kapālama areas) are included in **Appendix J**. Only three LCAs extend into the harbor boundary—LCA 784, LCA 9971:2, and LCA

[9] The Organic Acts of 1845 and 1846 initiated the process of the Māhele—the division of Hawaiian lands—which introduced private property into Hawaiian society. In 1848, the crown, the Hawaiian government, and the *ali'i* (nobility) received their land titles. The *maka'āinana* (common people) received their *kuleana* (individual parcels) and LCA parcels in 1850.

4882—near Pier 11. Outside the harbor boundaries, LCA density varies. There are several awards in the Kakaʻako area, the nearest approximately 100 yards northwest of Honolulu Harbor. A heavy concentration of LCA parcels spans through downtown Honolulu, the closest only several yards away from the harbor boundary. The Iwilei and Kapālama areas include nine and five LCAs, respectively.

Cultural Surveys Hawaiʻi (CSH) conducted a Literature Review/Field Inspection (LRFI) to support the HHMP. Nine previously identified historic properties were encountered during the pedestrian inspection. These historic properties included: (1) State Inventory of Historic Places (SIHP) # 50-80-14-7575, Pier 12; (2) SIHP # -7576, Pier 15; (3) SIHP # -9042, the Chinatown Historic District, which includes Piers 13, 14, and 15; (4) SIHP # -9700, Falls of Clyde; (5) SIHP # -9829, Irwin Memorial Park; (6) SIHP # -9929, Aloha Tower; (7) SIHP # -9964, U.S. Immigration Complex; (8) Piers 8-11 (no SIHP designation); and (9) a fishhook memorial/burial reinterment area (no SIHP designation). Descriptions and maps of the historic properties are included in **Appendix J**.

Additionally, seven potential historic properties were identified and designated CSH 1 through 7, which consist of the following: (1) historic curb/road alignments near Piers 5 through 8; (2) railroad track and warehouse door track remnants at Piers 24 and 28; (3) structural remnants at Pier 32; (4) basalt and mortar wall and drainage ditch at Pier 32; (5) railroad track remnants at Pier 36; (6) railroad track remnants at Piers 41 through 43; and (7) former pier structural remnants at Piers 42 through 45. Descriptions and maps of the additional potential historic properties are included in **Appendix J**.

In addition to observed surface historic properties, several areas of Honolulu Harbor have potential for subsurface historic properties. There may be subsurface remnants of Fort Armstrong at Piers 1 and 2, remnants of the internment camp at Sand Island, and remnants of Pākākā Point or Honolulu Fort at Pier 11. Additionally, subsurface fishpond deposits may be intact at Piers 17 and 18, 41 through 43, and 60. A historic account of burial grounds in the area of Piers 39 and 40 suggests the possibility of encountering additional human remains in the area, and at least one burial has been identified on the property by a previous study (SIHP # -5581). Furthermore, human remains uncovered during the Piers 12 and 15 Improvement Project were reinterred on the Pier 15 property (SHIP # -8985).

Recommendations regarding Historic and Cultural Resources are included in **Chapter 8**. A detailed list of the SIHP sites and maps of the site locations is provided in **Appendix J**.

3.4.2 Historic Architecture Resources

An architectural reconnaissance level survey (RLS) was completed in October 2021 to determine the historical significance of buildings and structures within Honolulu Harbor.[10] The survey included piers, structures, and buildings that were at least 50 years old, as well as those that may be deemed eligible for listing on a historic register by the year 2030 or thereafter. The study's findings are summarized below; details from the study are included in **Appendix K**.

One-Hundred ninety-four (194) total properties within Honolulu Harbor were surveyed, of which sixty-one (61) properties were considered to be eligible and appeared to meet the historic significance Criteria A and/or C for listing on the Hawaiʻi State and/or National Register of Historic Places (NRHP). To be considered for listing under Criterion A, a property must "be associated with one or more events important in the defined historic context." Specifically, a structure must be linked to a qualifying event significant to Hawaiʻi and local historic or national trends. To be considered for listing under Criterion C, a structure must, "embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction."

Of the 61 eligible properties within the harbor boundary, 27 were deemed high preservation value (HPV) (see **Table 3.2**). Under Criterion A, HPV properties would be associated with the development of Honolulu Harbor and retain a high level of integrity. Under Criterion C, HPV properties would be architecturally exceptional through their character-defining features such as the employment of concrete as a structural and decorative feature, massing, and unique use of building materials.

Table 3.2 - High Preservation Value Historic Properties

Property	Criterion	Year Constructed	Condition
Ala Moana Health Center	Listed	1934	Good
Aloha Tower	Listed	1923	Excellent
Pier 10 Shed	Listed	1921	Good
Pier 11 Shed	Listed	1927	Good
Hale Awa Ku Moku	Listed	1950	Good
Piers 13-14 Shed	A and C	1930	Good
Pier 15 Shed	A and C	1946	Good

[10] While the RLS focused predominately on properties under DOTH jurisdiction, it did include a handful of facilities that were outside of, but immediately adjacent to the Harbor's boundary. These properties were included due to their proximity to the harbor and potential interest as future acquisition areas by DOTH.

Property	Criterion	Year Constructed	Condition
Pier 15 Fire Station	A and C	1950	Good
Pier 23 Flour Mill Warehouse	A and C	1960	Fair
Pier 23 Flour Mill Towers	A and C	1959-1964	Good
Pier 23 Flour Mill	A and C	1964	Fair
Pier 24 Flour Mill Feed Shop	A and C	1958	Fair
Matson Sand Island Terminal			
Matson Gate 1 Guard House	A	1980	Good
Container Freight Station	A	1980	Good
Facilities Maintenance Building	A	1980	Fair
MTI Operations Tower	A and C	1980	Good
Gate Lane 3 Inspection Area	A	1980	Fair
Gate Lane 2 Inspection Area	A	1980	Good
Gate Lane 1 Inspection Area	A	1980	Fair
Gate Lane 3 Clerk Office	A	1980	Good
Gate Lane 2 Clerk Office	A	1980	Good
Gate Lane 1 Clerk Office	A	1980	Good
Oahu District Baseyard			
Shop Building	A and C	1971	Good
Dock Building	A and C	1971	Good
Baseyard Carport	A and C	1971	Good
Baseyard Office Building	A and C	1970	Good
Material Warehouse	A and C	1968	Good

Further, six of the 61 eligible properties within the harbor boundary were recommended eligible under a different historic context; that is, they are not associated with the development of Honolulu Harbor. The remaining properties surveyed were either determined to be not eligible for listing, were outside of the harbor boundary, or did not fall within the date range within which they would come of historic age (50 years) by year 2030.

Recommendations based on the results of the RLS are included in **Chapter 8**. A detailed list of the eligible properties and maps of their locations are provided in **Appendix K**.

3.4.3 Environmental Conditions

3.4.3.1 Aquatic Flora and Fauna

Potential fauna that can or have occurred in the Honolulu Harbor includes *honu* or green sea turtles (*Chelonia mydas*), hawksbill sea turtles (*Eretmochelys imbricate*), *īlio-holoi-ka-uaua* or Hawaiian monk seals (*Monachus schauinslandi*), *koholā* or humpback whales (*Megaptera novaeangliae*), *aʻeo* or Hawaiian stilt (*Himantopus mexicanus knudseni*), *kōloa maoli* or Hawaiian duck (*Anas wyvilliana*), *ʻalae keʻo keʻo* or Hawaiian coot (*Fulica Americana alai*), *ʻalae ʻula* or Hawaiian moorhen (*Gallinula chloropus sandvicensis*), *ʻaʻo* or Newell's shearwater (*Puffinus auricularis newelli*), *ʻuaʻu* or Hawaiian petrel (*Pterodroma phaeopygia sandwichensis*), *manu o kū* or white fairy tern (*Gygis alba*), *wana* or spiny urchins (*Diadema paucispinum* or *Echinothrix diadema*), herbivorous urchins, rock boring urchins, sponges, *loli* or sea cucumbers (*Holthuria spp.*), invasive coral-eating crown-of-thorns starfish (*Acanthaster planci*), *ʻula* or lobster (*Panulirus spp.*), *pā* or black lipped pearl oysters (*Pinctada margaritifera*), *uhu* or parrotfish (*Scarus perspicillatus*), *āholehole* or Hawaiian flagtail (*Kuhlia sandvicensis), aku* or *ʻahi* or tuna *(Thunnus spp.), anae* or mullets (*Mugil spp.*), *pāpaʻi* or crab, *ʻōpae* or shrimp (*Atyoida bisculcata*), *olepe* or mussels/oysters (*Arca ventricosa*), and *heʻe* or octopus (*Octopus hawaiiensis*). *Honu* (green sea turtles and hawksbill sea turtles), *Īlio-holo-i-ka-uaua, Koholā, ʻAlae ʻula, ʻAlae keʻo keʻo, Koloa Maoli, Aeʻo, ʻAʻo, and ʻUaʻu* are protected species under the Endangered Species Act (ESA) of 1973. *Moʻolelo* associated with Honolulu Harbor specifically mention *Kahololoakeāhole*, or the running of the *āhole* or *āholehole* fish, which are prized for eating and as bait for larger game fish. In addition, a land section along the waterfront is called *Honoka`upu*, or the albatross bay for the *Ka`upu*, or the Black-footed albatross, *Phoebastria nigripes*.

Various stony corals, soft corals, *Kaholaloa* or long reefs, zoanthids, *limu* or sea grass, and frondose algae exist within the Honolulu Harbor. Seagrass has been mapped in several areas of the harbor, including the Main Entrance Channel, along the Diamond Head end of Sand Island, and off the Piers 4 to 8 area. Corals exist throughout Honolulu Harbor and in adjoining off-shore areas. A transplantation site is designated off the end of the Piers 5 and 6 peninsula for corals relocated due to the construction of KCT. A coral transplantation site is also located at Pier 12. Corals are known to be present in the slipways of Piers 6 to 9 area and elsewhere among the piers in the harbor. Any in-water work resulting from HHMP recommendations will require Department of the Army (DA) permits, which require benthic surveys, consultation with relevant resource agencies and appropriate mitigation.

3.4.3.2 Climate and Prevailing Winds

Climate on Oʻahu is characterized as semi-tropical with two seasons: Summer (May through September) and Winter (October through April). Based on the National Oceanic and Atmospheric Administration (NOAA), National Weather Service weather station at the HNL Airport, the average annual temperature recorded at the HNL from 2000 to 2021 is 78.1-degree Fahrenheit. Typical temperature on Oʻahu ranges from 70 degrees in the winter to 84 degrees Fahrenheit in the summer. The average annual precipitation ranges between 25 to 30 inches a year, with rainfall occurring mostly between October and April.

Northeasterly trade winds prevail throughout the year due to the North Pacific high-pressure system located northeast of Hawaiʻi. The northeasterly trade winds are dominant in the summer season and less prevalent in the winter. Winds from the southwest, known as *Kona* winds, usually occur when a low-pressure center is within 500 miles northwest of the Hawaiian Islands and typically occur during the winter season. *Kona* winds are usually associated with cyclones, strong winds, and heavy rain.

Winds generate force against vessels with a high profile, such as cruise vessels, cargo ships, roll-on/roll-off (RO/RO) vessels and auto-carriers, which affects navigation within the close confines of the harbor. This is a particular concern for vessels navigating the Main Entrance Channel and Kapālama Transit Channel. The Pacific Islands Ocean Observing System (PacIOOS) operates an automatic weather station at Pier 1 near the entrance to Honolulu Harbor to aid navigation. The station records measurements of air temperature, wind speed and direction, precipitation, relative humidity, and air pressure. Although the weather station at Pier 1 can aid in navigation to a certain extent, the alignment and restricted width of these channels orients the broad side of the transiting vessel against the prevailing trade winds coming from the northeast or *Kona* winds from the south and causes the ship to “crab,” that is, to move forward with the ship center line at a slight angle to the direction of travel. This increases the effective transit width required for safe navigation through the channels and can restrict vessel berthing and uses on adjacent piers to avoid encroachments into the navigation corridor. In addition, strong trade wind conditions place tremendous force on cruise vessels berthed at the Pier 2, which can exceed the strength of the bollards and moorings to hold the ship, thus necessitating the use of tugboats and/or the cruise vessel’s own thrusters to maintain position against the berth.

3.4.3.3 Tides, Waves and Currents

Honolulu Harbor experiences a mixed tidal cycle, in which the tides occur twice daily, where the two high tides and two low tides are unequal in height. Annual tide levels typically range from a low of -1.24 FT to a high of +02.13 FT above Mean Sea Level (MSL), with extreme tides ranging from a low of -1.65 FT to +2.62 FT.[11] Tidal variation affects navigable draft depths in the harbor, which can place restrictions on large, heavily laden vessels transiting within the harbor and the amount of freeboard between the water level and pier deck height, which can impact vessel operations across the berth, vessel loads and ballasting. NOAA maintains a tide measuring station in the harbor at the end of Pier 4 (Station ID: 1612340). The station was installed in 1905 and has provided over 115 years of historic tide data. The station can be used to monitor future SLR in the Harbor.

Honolulu Harbor is sheltered from the predominant northeast trade wind-generated waves as well as the winter North Pacific swells. Wave activity affecting the harbor is relatively mild, except during the summer months when southern swells generated by storms in the southern hemisphere can produce high surf conditions along the South Shore of O'ahu, which impact navigability in the south-facing Main Entrance Channel, and berthing operations at Piers 1 and 2. Wave energy from southern swells can also reflect off structures near the harbor entrance and affect deeper regions of the harbor. The south shore is also exposed to infrequent Kona storms and hurricane waves approaching from the southeast through southwest directions.

Currents generated by the wind and tides are variable at the harbor entrance and within the harbor. Strong cross-currents, particularly during high surf and extreme tides, are experienced outside of the approach to the Main Entrance Channel. However, currents have much less impact on navigation than wind in the harbor. There are no ocean current monitoring stations in Honolulu Harbor.

[11] Source: Exceedance Probability Levels and Tidal Datums - Honolulu, HI - NOAA Tides & Currents

3.4.3.4 Streams

Kapālama and Nuʻuanu streams discharge into the Honolulu Harbor. Kapālama Stream is an intermittent stream approximately 5.6 miles long that starts at Kapālama Heights and ends at the Kapālama Canal and basin near Pier 38. Nuʻuanu Stream is a perennial stream which extends approximately 18.6 miles, from the Koʻolau Range and discharges near Piers 15 and 16.

Streams and drainage channels that flow into the harbor affect its water quality and result in sediment accumulation, which reduces draft depths near Piers 15 through 17 and Piers 38 and 39. This results in the need for maintenance dredging to facilitate sufficient draft depths in these areas.

3.4.3.5 Water Quality

Hawaiʻi's water quality is regulated by the Hawaiʻi Department of Health (DOH), Clean Water Branch, which implements surface water pollution control programs delegated from the United States Environmental Protection Agency (EPA) in support of the Clean Water Act (CWA). DOH categorizes water quality in Honolulu Harbor as "impaired" under the CWA Section 303(d), List of Impaired Waters. A water body is considered impaired if (a) water quality does not meet established water quality standards, or (b) the designated use described in Chapter 11-54, HAR, is not being achieved. Honolulu Harbor receives surface runoff via sheet flow and drainage outlets and from Kapālama and Nuʻuanu streams. Both streams are also included on the CWA Section 303(d) list as impaired.

Currently, DOTH has no control over the discharge that enters the harbor through Kapālama and Nuʻuanu streams; however, it can manage discharge through its Small Municipal Separate Storm Sewer Systems (MS4). Any discharge from storm water runoff, industrial activities, and other pollutants from point sources at the harbor is regulated and monitored through a National Pollutant Discharge Elimination System (NPDES) permit from DOH under the water quality standards and water pollution rules, HAR Chapters 11-54 and 11-55. Honolulu Harbor has a NPDES Notice of General Permit Coverages under HAR 11-55, Appendix K, for its MS4. The permit authorizes stormwater discharges and certain non-stormwater discharges into harbor waters. DOTH maintains a Stormwater Management Plan to ensure that applicable environmental protection requirements are met and includes measures and BMPs to manage illicit discharges, construction site runoff, post-construction stormwater, and pollution prevention and good housekeeping. For new and redevelopment projects, the SWMP encourages Low Impact Development site design strategies, source control and treatment control BMPs.

3.5 Land Ownership and Jurisdiction, Land Use and Zoning, and Maritime Jurisdiction

3.5.1 Land Ownership and Jurisdiction

3.5.1.1 Department of Transportation Harbors Division (DOTH)

The majority of waterfront facilities in Honolulu Harbor is owned by the State of Hawaiʻi, under DOTH jurisdiction as authorized by HRS 266. DOTH is responsible for the control, management, use and regulation of the State-owned harbor facilities used by commercial cargo, passenger, fishing and maritime support operators. DOTH manages harbor traffic, berthing, landside usage and facility development within Honolulu Harbor. DOTH commercial harbor operations and facility improvements are funded through the Harbor Special Revenue Fund (HRS 266-19), which relies solely on revenues derived from the harbor through wharfage fees, demurrage, rental of land and wharf space, permit and license fees; no state or local taxes are used by DOTH. Exceptions to DOTH jurisdiction of Honolulu Harbor lands include Pier 30, a privately-owned fuel supply pier; the USCG's Regional Exam Center at Pier 4 and Base Honolulu on Sand Island; the DLNR Division of State Parks (DSP) SISRA; and DLNR-DAR Ānuenue Fisheries Research Center. See **Section 3.5.1.4. Adjacent Landowners** below for additional information on these adjacent land owners and uses.

3.5.1.2 Aloha Tower Development Corporation (ATDC)

ATDC was established in 1981 to oversee the redevelopment of State-owned properties located along the Downtown Honolulu waterfront. ATDC has jurisdiction over all landside areas within the Aloha Tower complex, which includes Piers 5 through 11 from the pier face to the *makai* edge of Nimitz Highway / Ala Moana Boulevard, with the exception of Pier 7, which is entirely under DOTH jurisdiction, and the HECO power plant. DOTH also retains jurisdiction over all waterside uses adjacent to Piers 5 through 11 and maritime uses within the Aloha Tower complex. See **Section 7.5.2**. ATDC is statutorily mandated under HRS 206J, to redevelop, renovate, and/or improve the Aloha Tower complex in order to:

> *…strengthen the international economic base of the community in trade activities, to enhance the beautification of the waterfront, and in conjunction with the department of transportation, to better serve modern maritime uses, and to provide for public access and use of the waterfront property. Properly developed, the Aloha Tower complex will further serve as a stimulant to the commercial activities of the downtown business community and help transform the waterfront into a "people place."* (HRS §206J-1)

ATDC administratively is housed within DOT but operates as an independent agency of the State. In 1993, DOTH granted ATDC a ground lease for most of the landside areas from Piers 5 to 11 for the purpose of redeveloping the area. Revenues derived from the ATDC ground lease contribute to the Harbors Special Fund. While Pier 7 is under the jurisdiction of DOTH, not ATDC, for the purposes of the HHMP the Aloha Tower complex is construed to mean all state land between Pier 5 and Pier 11. ATDC is responsible for establishing rules for the areas of the Aloha Tower complex under its jurisdiction, including zoning and development standards. It has authority to prepare development plans, undertake development projects and enter into development agreements, leases and subleases with qualified private entities for the redevelopment and operations of facilities in the areas under its jurisdiction.

- **Aloha Tower Marketplace and Hawaiʻi Pacific University (HPU) –** In 2014, Hawaiʻi Lifestyle Retail Properties, LLC, a wholly-owned subsidiary of HPU, entered into a long-term lease agreement with ATDC for use of the Aloha Tower Marketplace buildings located on Piers 8 and 9, and portions of the Pier 10 shed, as a campus facility. The upper levels of the Marketplace are used for student housing. The lower levels are a mixture of classrooms, meeting spaces, school activity centers, restaurants, and retail merchants. The Pier 10 shed area is used for storage. HPU manages all retail spaces within the Marketplace, which includes securing tenants, executing lease agreements, maintenance, and security. HPU's lease requires ATDC to provide 840 parking stalls within the Aloha Tower complex, including the use of existing ground-level parking on Aloha Tower Drive.

3.5.1.3 Fishing Village Association of Owners

The Commercial Fishing Village at Piers 36, 37, and 38 was established in 2006 as a condominium project in accordance with HRS 514A, *Condominium Property Regimes* (CPR). The landside areas are managed by the Domestic Commercial Fishing Village Tenants Association of Apartment Owners (AOAO) which is governed by a Board of Directors elected by the owners of the condominium. DOTH is a party to the AOAO and member of the Board of Directors. The Board conducts its business pursuant to its by-laws. The Board manages all utilities and roadway infrastructure for the Fishing Village. The AOAO has a ground lease from DOTH, which includes a Limited Use Clause that limits the type of development and business to maritime-related businesses (retail, restaurants) that serve the general population. Other tenants within the AOAO have individual leases with DOTH.

3.5.1.4 Adjacent Landowners

Major Landowners adjacent to Honolulu Harbor include the following (see **Figure 3.3**):

- **Office of Hawaiian Affairs (OHA)** – OHA has jurisdiction over a 5-acre parcel contiguous with the Pier 1 cargo yard (TMK 2-1-015: 051). The parcel contains a warehouse building currently occupied by a homeless shelter and various businesses. OHA also has jurisdiction over a 3-acre undeveloped parcel located adjacent to Forrest Street across from the Piers 1 and 2 yard and access driveways (TMK 2-1-015: 061).

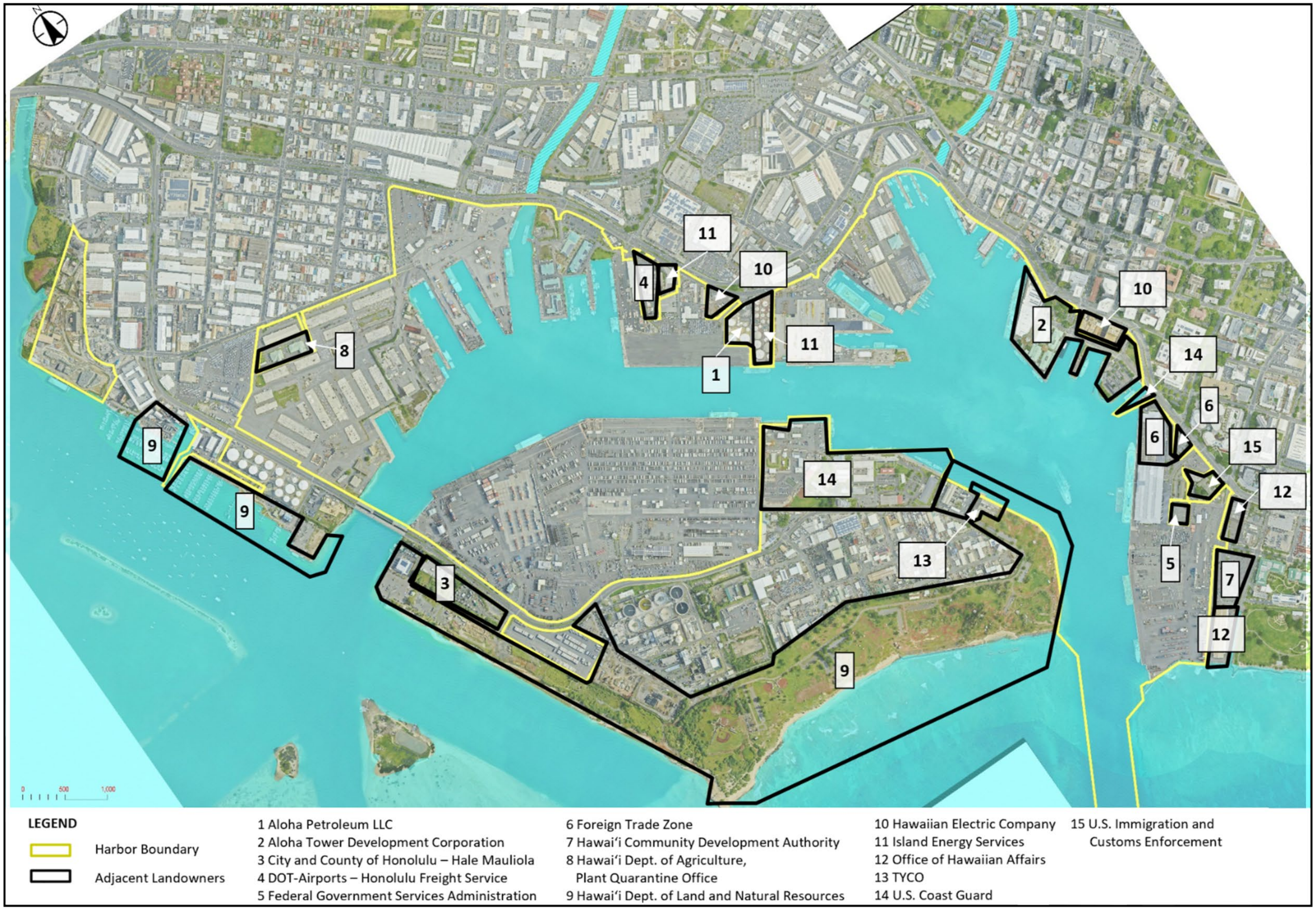

Figure 3.3 - Adjacent Landowners

- **Hawaiʻi Community Development Authority (HCDA)** – HCDA has jurisdiction over lands in Kakaʻako Makai, including a parcel contiguous with the Pier 1 entry gate (TMK 2-1-015: 052) that is used for at-grade parking. Acquisition of a vacant portion of this parcel, a narrow strip aligned with the Pier 1 entry gate lanes, could enhance gate operations.

- **U.S. Coast Guard (USCG)** – The USCG operates their Regional Exam Center in the building on Pier 4. The Pier 4 berths are used by small USCG patrol vessels and work boats and may be used as a layberth by USCG-approved maritime operators. The USCG also operates the USCG Base Honolulu on Sand Island, adjacent to the Pier 53 cargo terminal.

- **Federal Government Services Administration (GSA)** – The "GSA Lot" is an approximately 1.5-acre parcel (TMK 2-1-015: 020) owned by the federal government. It is located east of the Pier 2 Cruise Terminal building and is used for at-grade parking. Acquisition of this parcel by DOTH could enhance ground transportation staging and circulation at the Pier 2 Cruise Terminal.

- **U. S. Immigration and Customs Enforcement (ICE)** – ICE occupies the majority of the historic U.S. Immigration Complex (TMK 2-1-015: 018) adjacent to Forrest Street across from the Pier 2 Cruise Terminal and Foreign Trade Zone (FTZ) building. The complex consists of four structures—the main administration building, the detention building, the lounging shed and the garage. The detention building, more recently known as the DOH Ala Moana Health Services building, is under DOTH jurisdiction with the other three structures occupied by ICE.

- **Foreign Trade Zone (FTZ)** - FTZ No. 9 has occupied the *mauka* half of the Pier 2 building since 1982. The FTZ program was started in 1934 to assist business owners and manufacturers by providing a cost offset for tariffs and taxes on incoming goods. It is a federal program that is run by the individual states. In 1966, Hawaiʻi's FTZ was activated and became the 9th FTZ created in the U.S. It is currently managed by the Hawaiʻi Department of Business, Economic Development and Tourism (DBEDT). The FTZ operates completely independently from DOTH's operations; however, DOTH maintains jurisdiction over the pier and apron adjacent to the FTZ facility.

  The FTZ's Pier 2 headquarters provide space for warehousing, manufacturing, and offices for importers, exporters, customs brokers, import/export support services, shipping agents and logistics agents, and the U.S. Commercial Service. The FTZ has approximately 75 offices and 392 clients between the administrative and Homer A. Maxey International Trade Resource Center wings of the facility. Its proximity to the cargo piers at Honolulu Harbor is convenient for the FTZ's tenants and clients. A Federal grant was used to construct the Homer A. Maxey International Trade Resource Center wing of the FTZ Pier 2 facility which requires that the facility must remain in use for the grant's stated purpose for the projected life of the facility.

- **Hawaiian Electric Company (HECO)** – HECO owns and operates the electric power station (TMK 2-1-014-006) located adjacent to the Aloha Tower complex. The power plant is deactivated, but not decommissioned, and could be brought back online within 3 months, if required. In addition, HECO is planning to install synchronous condensers in one of the power plant buildings to help stabilize the electrical grid. HECO is exploring long-range plans to decommission the power plant and is entertaining uses for the parcel that are more compatible with the public waterfront setting. An electrical power substation is located on the Diamond Head end of the parcel. The substation is an essential facility which HECO plans to continue to operate. The property is under the jurisdiction of the HCDA[12] and subject to HCDA's land use rules and regulations; DOTH and ATDC have no authority over the use of the HECO parcel.

  HECO also owns an approximately 2-acre parcel (TMK 1-5-035-006) on Nimitz Highway contiguous with the Piers 31 to 34 cargo yard and adjacent back land areas owned by DOTH. The parcel is largely undeveloped and primarily used for vehicle storage.

- **Island Energy Services (IES) -** IES owns and operates the marine fuel terminal facilities at Pier 30 (TMK 1-5-037: 001). Refined fuel products are transported to the Pier 30 terminal by pipeline from Campbell Industrial Park. At Pier 30, IES operates a tank farm for storage and fuel mixing and a manifold rack for fueling ships and barges. A pipeline spur also transports jet fuel from the tank farm directly to the airport. IES relies on the adjacent DOTH parcels to service the marine terminal and to accommodate overhanging vessel berthing for ships and barges taking on bunker fuel.

  IES also owns a parcel (TMK 1-5-035-008) adjacent to Nimitz Highway and the Piers 31 to 34 cargo terminal driveway. The parcel houses offices and a truck load rack used for filling tanker trucks that deliver gas and diesel projects to their retail stations. The load rack facility is supplied by a pipeline that runs through the Piers 31-32 yard from the IES Pier 30 fuel terminal.

[12] In 1987, the HECO property, as well as surrounding lands at Piers 5 through 7, were brought under HCDA's jurisdiction through expansion of the Kaka'ako Community Development District Boundaries. However, in 1991, the Piers 5 through 7 areas were reassigned to ATDC, thus leaving only the HECO property with HCDA. In 1992 HCDA promulgated the Aloha Tower Special District Design Guidelines, which pertain only to the HECO parcel.

- **Aloha Petroleum LLC** – Aloha Petroleum owns a 3-acre parcel (TMK 1-5-037-002) located *mauka* from and contiguous with the Pier 31 yard, and adjacent to the IES Pier 30 fuel facility. The parcel is used for fuel storage, conveyance and discharge.

- **Honolulu Freight Service (HFS)** – HFS operates a break-bulk freight-handling service on a 3.7-acre parcel (TMK 1-5-035: 010) under long-term lease from DOTA. The parcel is located contiguous with the Piers 31 to 34 cargo terminal and adjacent to the UH Research Facility on Pier 35. The State is in the process of conveying jurisdiction of the parcel from DOTA to DOTH.

- **Hawaiʻi Department of Agriculture (DOA) Plant Quarantine Office** – The DOA operates the Plant Quarantine Office, located at 1849 Auiki Street, adjacent to the KCT. The office is used as a base of operations for conducting cargo inspections at the point of entry (harbor and airport terminals). The facility is also used to conduct inspections and treatment of quarantined cargo.

- **CCH Hale Mauliola Temporary Housing Facility** – The CCH leases from the State a portion of TMK parcel 1-5-041: 334 located on Sand Island for use as the Hale Mauliola temporary housing facility. The Institute of Human Services operates the facility, which services approximately 100 individuals, in partnership with CCH.

- **Hawaiʻi Department of Land and Natural Resources (DLNR)** – DLNR administers several properties adjacent to the harbor:

    - Sand Island State Recreation Area (SISRA) – DLNR-DSP manages the SISRA, a public park located on the east and *makai* sides of Sand Island. The SISRA forms the west edge of the harbor's Main Entrance Channel (Fort Armstrong Channel). The SISRA is developed with active and passive recreation facilities, including picnic areas, covered pavilions, campgrounds, play apparatus, softball and baseball diamonds, beaches, walking paths, comfort stations and showers. A portion of the SISRA, near its entry gate at the end of Sand Island Parkway, is adjacent to the 3.4.2 cable pier. Portions of the SISRA were developed using federal Land and Water Conservation Fund Act, Section 6f funding. DLNR-DSP also manages the Off Highway Vehicle (OHV) day use riding area, which contains tracks and trails for motorized OHV's and non-motorized BMX bikes, contiguous with the SISRA.

    - Ānuenue Fisheries Research Center – DLNR-DAR operates a fish and coral research center on a 4.25-acre parcel (TMK 1-5-041: 003) on Sand Island. The facility includes a base yard, fish and coral hatchery, culture center, chemical laboratory, workshop, storage areas for equipment and boats, boat ramp, offices as well as a residence for the Chief Biologist and a quarantine facility for aquatic animal disease studies.

- Tyco Pier - This 1.6-acre parcel (TMK 1-5-041:333) on Sand Island sits between the Ānuenue Fisheries Research Center and the SISRA. On the waterside, the parcel is serviced by a small pier and two dolphins. DLNR currently leases the property to SubCom, LLC, which installs and maintains undersea cables for international communication networks. The yard is used primarily for storage of spooled cables and the on-site warehouse provides storage for equipment and supplies. The lease is set to expire in late 2022, after which the landside portion will transfer to DLNR-DAR to expand the Ānuenue Fisheries Research Center and the pier and dolphins will transfer to DOTH to provide for additional berthing in Honolulu Harbor.

- Keʻehi Small Boat Harbor (SBH) – DLNR, Division of Boating and Ocean Resources (DOBOR) manages the Keʻehi SBH located on the east edge of Keʻehi Lagoon adjacent to Pier 60. The SBH is comprised of floating docks, 389 boat slips, and 202 off-shore mooring buoys for recreational watercraft, as well as a boat ramp and recreational maritime support facilities. A navigation transit channel between the boat slips and off-shore moorings provides access for tug-and-barge operations at Pier 60. During *Kona* wind conditions, moored vessels adjacent to the channel frequently swing on their anchor lines into the transit channel and create an impediment to navigation.

- Keʻehi Industrial Park Association (KIPA) – A portion of the KIPA area, located adjacent to the Keʻehi SBH, is also managed by DLNR-DOBOR. The area is leased to maritime operators for various commercial maritime support uses.

3.5.2 State Land Use and CCH Zoning

Honolulu Harbor and surrounding areas are located within the State Land Use Urban District. The Urban District includes lands characterized by large concentrations of people, structures, and services. The State Land Use Law, HRS Chapter 205, grants jurisdiction over the Urban District on Oʻahu to the CCH through its zoning regulations, codified in the Revised Ordinances of Honolulu 1990 (ROH), Chapter 21, Land Use Ordinance (LUO). However, pursuant to HRS 266-2(b), DOTH is not subject to CCH zoning or land use regulations or CCH agency approvals in the use and operations of its lands and commercial harbor facilities.

Although lands within the Honolulu Harbor boundary are not subject to CCH zoning controls, the vast majority of the land under DOTH jurisdiction is zoned I-3, Waterfront Industrial under the CCH LUO. The Waterfront Industrial district designates areas for facilities necessary for successful and efficient performance of port functions. Piers 15 through 53 are in the I-3 district. Piers 1 and 2 are situated in the Waterfront Industrial Precinct of the Kakaʻako Special Design District and Pier 60 is zoned I-2. DOTH's industrial commercial harbor use is consistent with these zoning designations.

The landside of the Aloha Tower complex (Piers 5 through 11) is under the jurisdiction of the ATDC and subject to zoning rules set by ATDC. **Section 3.5.2.1** below discusses ATDC's zoning regulations. HRS 206J-7 provides that ATDC's development rules supersede all other inconsistent ordinances and rules relating to the use, zoning, planning and development within the Aloha Tower complex.

In addition to zoning, portions of Honolulu Harbor fall within the boundaries of two CCH special districts. The Aloha Tower complex comprises the Waterfront Precinct of the Hawaiʻi Capital Special District and Piers 12 through 15 are within the *makai* Precinct of the Chinatown Special District. The CCH designates special districts to protect and/or enhance the physical and visual aspects of those areas for community benefit. Although the areas under DOTH and ATDC jurisdiction are not subject to the CCH Special District regulations and design controls, these regulations provide guidance for perpetuating the characteristics of the built environment and landscape that make these areas unique.

CCH zoning districts are shown on **Figure 3.4**. Adjacent lands, outside of DOTH jurisdiction, are a mix of industrial (I-2, IMX-1), business (B-2) and business mixed-use zoning (BMX-3 and BMX-4) that includes residential uses in Chinatown and Downtown. The Kalihi Kai area, which is zoned I-2, Intensive Industrial, also contains residential uses that are grandfathered. In addition, the CCH long-range plans for Iwilei include transitioning from IMX-1 to TOD high-density mixed-use zoning, including residential uses, around the future Rail transit stations, two of which are planned for the Iwilei area (the Niuhelewai Station at Honolulu Community College and the Kūwili Station on Kaaʻahi Street). See **Section 3.1** for additional discussion about plans for Iwilei. Increased residential uses adjacent to the industrial activities at the commercial harbor increases the potential for conflict around issues of noise, traffic, nighttime lighting and other characteristics of industrial maritime use.

To the east, the Kakaʻako area is designated the Kakaʻako Community Development District, which is administered by the HCDA. The HCDA serves as an infrastructure developer, landowner, city planner, regulator, and property manager to implement Kakaʻako's Master Plan. The Kakaʻako Master Plan designates Piers 1 and 2 as part of the Waterfront Industrial Precinct (WI). The purpose of the Waterfront Industrial Precinct of the Kakaʻako Special Design District is to reserve the area for port-related activities only and to exclude uses that are inappropriate to this precinct and which can be appropriately located elsewhere. See **Section 3.5.1.4** for additional discussion regarding HCDA land areas.

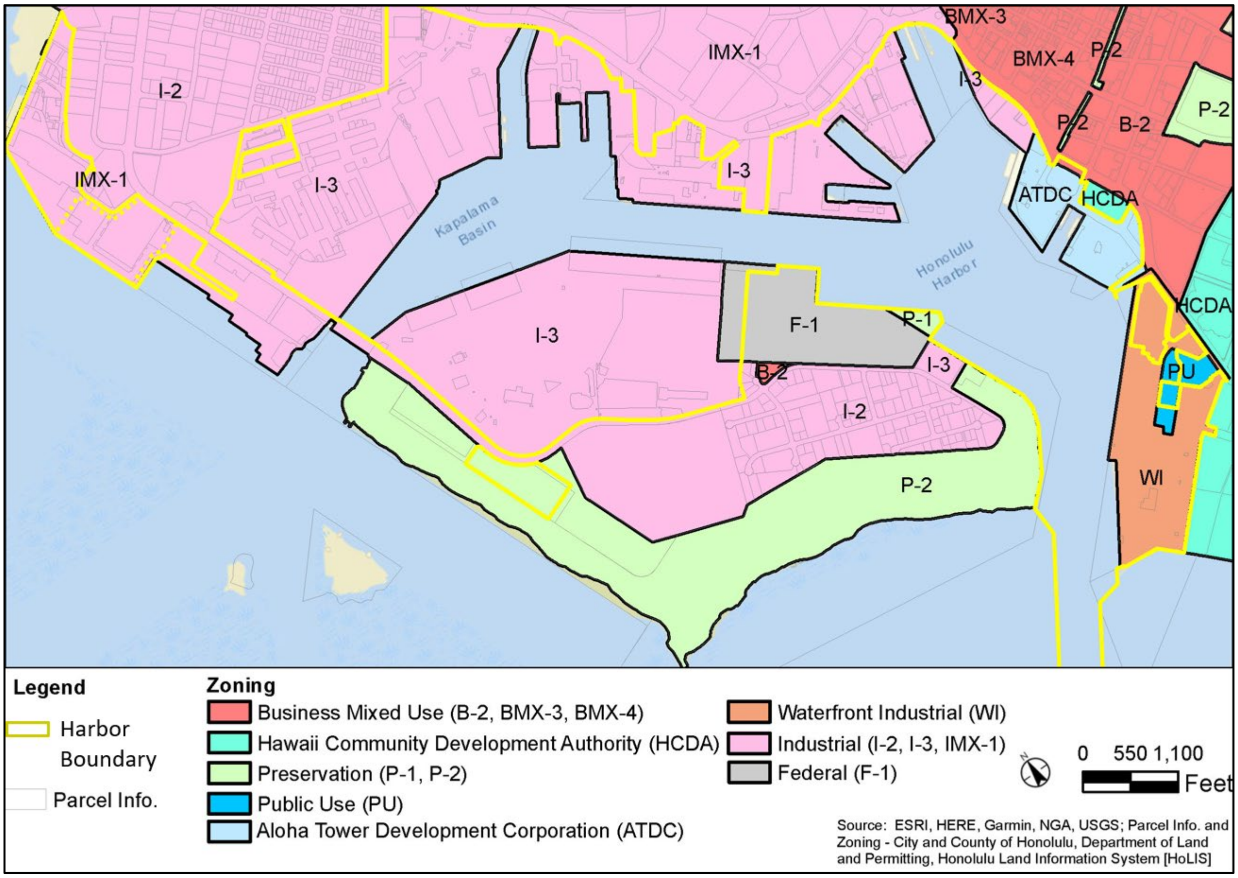

Figure 3.4 - CCH and HCDA Zoning Districts

3.5.2.1 ATDC

The Aloha Tower complex, including landside areas adjacent to Piers 5 to 11, Aloha Tower Marketplace, and Irwin Park, but excluding Pier 7 which is entirely under DOTH jurisdiction, are in an area zoned Aloha Tower Project, which is under the jurisdiction of the ATDC. ATDC is charged with defining, protecting and maximizing the public interest during the redevelopment of the Aloha Tower complex. ATDC is also charged with the enhancement of the commercial feasibility and financial attractiveness of the project to enlist the participation of private enterprise. Under HRS 206J, ATDC issued administrative rules and established development objectives for selecting a developer and administering the development of the Aloha Tower complex. In HAR 19-170, Subchapter 7, ATDC established the following land use zones for the Aloha Tower complex. See **Figure 3.5** and refer to **Chapter 7** for specific uses allowable within each zone.

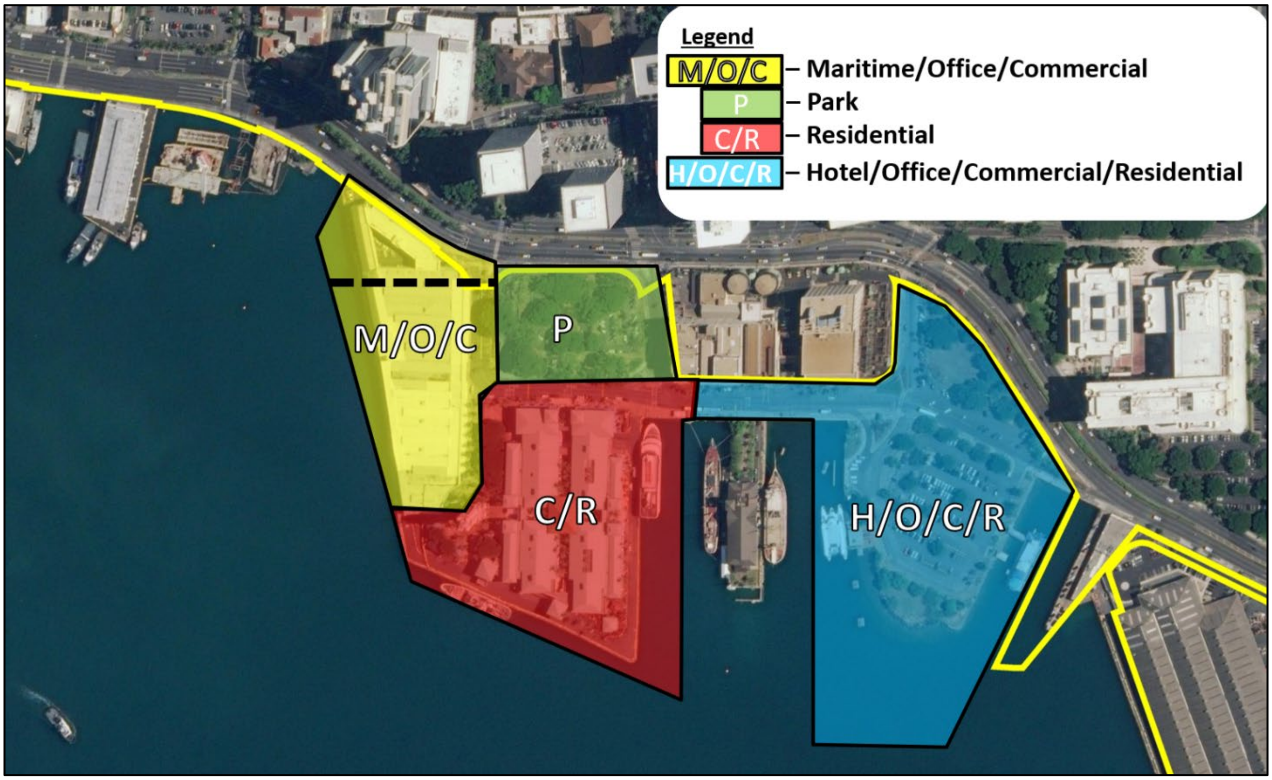

Figure 3.5 – ATDC Zoning Districts

- **Maritime/Office/Commercial (M/O/C) zone** – Established to meet the needs of the state's maritime industry, and to serve as a center for cruise ship operations on O'ahu, in addition to Pier 2 and, in particular, to serve the terminal needs for larger international cruise ships. It is also designated to help meet the need for office space in downtown Honolulu with emphasis on maritime related office uses and to provide a multipurpose venue for performing arts, sports and entertainment events.
- **Commercial/Residential (C/R) zone** – Established to promote an environment where retail commercial and residential uses will coexist compatibly alongside maritime uses; to create a vibrant, attractive retail commercial and residential "people place" which will attract downtown workers, local residents and island visitors during daytime and evening hours; to protect, enhance and restore the historic Aloha Tower structure as the dominant feature in the zone; to provide housing in close proximity to downtown thus reducing dependence on vehicular transportation; and to help meet the need for high quality office space in downtown.
- **Hotel/Office/Commercial/Residential (H/O/C/R) zone** – Established to provide overnight accommodations and services for neighbor island and out-of-state visitors in close proximity to the downtown business and civic center; to help meet the need for high quality office space in downtown Honolulu; to provide housing in close proximity to the downtown thus reducing dependence on vehicular transportation; and to provide revenues in excess of those

required to develop the uses in this zone in order to provide the maritime and public uses within the Aloha Tower project at no financial cost to the general public.

- **Park (P) zone** – Established to provide much needed improved public open space for passive recreational activities in the downtown and waterfront areas and to protect, enhance and restore the historically significant features in the zone which are important links to past eras in the waterfront area.

3.5.3 Maritime Jurisdiction

3.5.3.1 U.S. Army Corps of Engineers (USACE)

The USACE plays a vital role in sustaining Honolulu Harbor. One of the USACE's core responsibilities is to maintain a safe, reliable, efficient, and environmentally sustainable waterborne transportation system for the United States. This is accomplished by partnering with local project sponsors (in this case DOTH) to conduct feasibility studies and develop necessary harbor facility improvements that relate to navigation and harbor protection, such as channel widening and breakwater features. Within Honolulu Harbor, the USACE also maintains the authorized depths in the entrance channel, turning basins and inner harbor transit channels within the federal project area, which is delineated by a line (the federal project line) that generally begins 50 FT away from the pier face. The most recent maintenance dredging was initiated in 2021 and is currently ongoing.

The USACE's other major responsibility involves regulatory oversight of projects that have the potential to affect Waters of the United States (WUS)[13] and Navigable Waters of the United States (NWUS),[14] through the DA permit process. The USACE rules and regulations establish permit requirements to prevent unauthorized obstruction or alteration of any WUS and NWUS. The USACE issues DA permits under three authorizations—Section 10 of the Rivers and Harbors Act (RHA) of 1899 (33 U.S.C 403), Section 404 of the CWA of 1972 (33 U.S.C. 1344), and Section 103 of the Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972 (33 U.S.C. 1413). The most frequently exercised authority is contained in Section 10 RHA, which covers all work (e.g., construction, demolition, dredging, etc.) in, over, or under NWUS, or affects the course, location, condition, or capacity of those waters. Under Section 404 CWA, the USACE regulates the discharge

[13] Waters of the U.S. include Navigable Waters of the U.S., plus all interstate and intrastate waters such as lakes, rivers, streams, wetlands, etc. the use, degradation or destruction of which could affect interstate or foreign commerce.

[14] Navigable Waters of the U.S. are those subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. This includes oceans and navigable coastal and inland waters. USACE jurisdiction extends shoreward to the mean high-water line.

of dredged or fill material in WUS, and under Section 103 MPRSA, the transportation of dredged material for ocean disposal at ocean disposal sites designated by the EPA.

3.5.3.2 U.S. Coast Guard (USCG) Jurisdiction

The USCG has multiple roles in Honolulu Harbor. In addition to its responsibilities related to port and Homeland security (see **Section 3.5.3**), the USCG approves, installs and maintains aids to navigation in the harbor, approves off-shore anchorages, and is responsible for coordinating among local, state and federal partner agencies responding to natural disasters and emergencies. After a disaster warning is issued, USCG determines whether a mandatory harbor evacuation is necessary and when it is safe to return to the port. Fishing vessels, dry-docks, barge vessels, and other ships should evacuate the harbor area to deep water after the warning is issued. Moored vessels may be damaged due to grounding or impact from other structures, boats, or debris. During the warning, the port authorities will be stationed at the Emergency Operations Center and at the Harbor Control Office in Aloha Tower to maintain communication with the Hawaiʻi Emergency Management Agency.

There is continuous work from the USCG, the U.S. Navy, and the U.S. Department of Defense to provide safety and assist in the event of disasters. The USCG develops and maintains the *Marine Transportation System Recovery Plan* (USCG, 2019), which addresses all hazards and marine transportation system recovery processes and procedures for commercial ports. The USCG also established the Hawaiʻi Marine Transportation Systems Recovery Unit to work with stakeholders and identify recovery priorities for the incident commander and decision-makers.

3.5.3.3 Keʻehi Lagoon Joint Jurisdiction

Jurisdiction of Keʻehi Lagoon, including the submerged lands in the sea plane runway area, is split between DOTH; DOTA; and DLNR-DOBOR. Joint jurisdiction can complicate management activities in this area because the agencies have different mandates and priorities and can only enforce the law in areas under their own jurisdiction. For example, DLNR's proposed SISRA Renaissance Plan includes development of a marina in the *makai*, Diamond Head leg of the sea plane runway triangle, which is under DOTA jurisdiction. DOTA receives federal funding from the Federal Aviation Administration (FAA) for the submerged seaplane runway areas; a condition of the federal funds requires the area to remain designated as a seaplane runway.

3.6 Natural and Man-Made Hazards

3.6.1 Climate Change and Sea Level Rise

Climate change and SLR will exacerbate risks and hazards to Hawaiʻi's coastal communities and to Honolulu Harbor's operations. As the hub of the Hawaiʻi's commercial harbors system, adapting

Honolulu Harbor's infrastructure to accommodate climate change and SLR is imperative for the State. Planning and adaptive design strategies for Honolulu Harbor's infrastructure will be based on the latest scientific recommendations for climate change and SLR projections. As scientific projections for climate change and SLR evolve, planning and design assumptions will be revised to reflect the most current scientific recommendations to ensure infrastructure is adaptive to rapidly changing conditions.

Hawaiʻi is particularly vulnerable to climate change effects due to its geographic location and limited potable water and food resources (UH Sea Grant College Program, 2018). Climate change will continue to affect Hawaiʻi through increasing floods and inundation, rising sea surface levels and air temperatures, decreasing frequency but increasing intensity of rainfall events, and increasing frequency of extreme storm events (Gregg, 2018). Rising sea levels will further increase the risks of flooding and erosion, which will create stress to ecosystems and infrastructure. Floods, rising groundwater, and tidal surges due to storm events can cause outfalls and upstream drainage to become inundated; the inundation creates debris and pushes contaminants to the surface or into local aquifers (Rotzoll and Fletcher, 2013). In Honolulu Harbor, the debris caused by storm events could damage equipment and piers' functionality (Robertson, 2015; Martin and Chock, Inc., 2017). With increasing concerns for climate change and SLR, the State of Hawaiʻi and CCH are responding to address climate change and SLR impacts on infrastructures and the community.

According to the Intergovernmental Panel on Climate Change's (IPCC) 2019 *Special Report on Ocean and Cryosphere in a Changing Climate*, global mean sea level (GMSL) is projected to rise between 0.95 to 3.61 FT (0.29 to 1.1 meters) by the year 2100 for the lower and upper scenarios. These SLR projections are uncertain due to a range of factors (e.g., glaciers melting and vertical land movements). Accelerating SLR could make 6.56 to 8.2 FT (2 to 2.5 meters) by 2100 more plausible (IPCC, 2019; Sweet et al., 2017). SLR will also vary by region and specific location. The NOAA found that the relative sea level (RSL) for most of the U.S. coast outside of Alaska is projected to be higher than the average GMSL under Intermediate to Extreme scenarios. In Hawaiʻi, the RSL could rise from 1 to 1.6 FT (0.3 to 0.5 meters) higher than the GMSL (Sweet et al., 2017). The *Hawaiʻi Sea Level Rise Vulnerability and Adaptation Report* (Hawaiʻi Climate Change Mitigation and Adaptation Commission, 2017) notes that 3.2 FT of global sea level rise could occur as early as 2060 under a high-end scenario. Thus, the HHMP took the more conservative approach and plans for the projected 3.2 FT of SLR by 2060 for planning of essential harbor facilities.

At present, certain areas of Honolulu Harbor are more vulnerable to SLR. Based on the 3.2-FT SLR scenario data from the PacIOOS 2017 data of Sea Level Rise Exposure Area[15] (SLR-XA), significant inundation may occur at Piers 1, 18, the backland areas of Piers 31 to 33, 38, 60, the Sand Island Bridge, and the areas around the Kapālama Stream and Nuʻuanu Stream (see **Figure 3.6**). Several piers at Honolulu Harbor currently allow minimal clearance for inspection or maintenance under the pier deck due to current sea level and high tide conditions. Future SLR could potentially leave no access underneath the pier deck for inspections and maintenance and would create poor drainage conditions.

Figure 3.6 – Honolulu Harbor Sea Level Rise Exposure Area, 3.2 FT
(Source: PacIOOS, State of Hawaiʻi Sea Level Rise Viewer)

[15] The SLR-XA reflects flood exposure to multiple coastal hazards resulting from sea level rise and includes passive flooding, annual high wave flooding, and coastal erosion.

3.6.2 Natural Hazards

3.6.2.1 Hurricanes, Storms, and Waves

The Hawaiian Islands are seasonally affected by tropical storms and hurricanes during the late summer to early winter months. Tropical storms and hurricanes have historically had a relatively low probability of making landfall on the Hawaiian Islands. The primary impacts of tropical storms and hurricanes on Honolulu Harbor are expected to include possible inundation from storm surge and high waves. According to the *Vulnerability of Hawaiʻi Commercial Port and Harbor Facilities to Tsunamis and Hurricane Storm Surge and Wave Action* report (Robertson, 2015), the USACE's hurricane simulations at Honolulu Harbor predict the worst storm surge scenario to reach 7 to 8 FT and wave height to reach 10 FT at the harbor entrance and over 35 FT immediately outside the harbor.

Hurricane strength winds occasionally reach the Hawaiian Islands, though sea surface temperatures are typically not warm enough to sustain hurricane formation and growth. Predicted winds for such events are between 75 and 115 miles per hour (mph). Sustained hurricane winds can cause damage to on-shore buildings, structures, and vessels within the harbor. The USGS identifies the storm hazard in the vicinity of Honolulu as 4 on a scale of 1 to 4, with 4 being "high" (Fletcher et al., 2002). DOTH Oahu District and the USCG authorities require all ships to vacate the harbor prior to the estimated time of hurricane arrival when possible and if able to safely get underway. The International Building Code and ASCE 7 Standard, Chapter 6 (Martin and Chock, Inc., 2017) includes design criteria to allow buildings to withstand prescribed minimum wind loads.

3.6.2.2 Tsunami

Honolulu Harbor is located within the Tsunami Evacuation Zone. In addition, the interior of Sand Island Terminal, the *mauka* portion of KCT and the *mauka-ʻEwa* corner of the Interisland Terminal are within the Extreme Tsunami Evacuation Zone (see **Figure 3.7**). It is projected that an extreme tsunami would likely inundate most of the current piers, uplift pier decks, displace shipping containers, and damage equipment from debris (Robertson, 2015; Martin and Chock, Inc., 2017). Based on the Great Aleutian Tsunami simulation in *Vulnerability of Hawaiʻi Commercial Port and Harbor Facilities to Tsunamis and Hurricane Storm Surge and Wave Action* (Robertson, 2015), all of the piers in Honolulu Harbor were inundated with flow depths of 3 to 10 FT, which can cause shipping containers to be displaced. The report also noted inundation damage to gantry cranes, sensitive equipment, and older pier yards. In the simulation, inundation also restricted access to containers on Sand Island by impacting transit across Sand Island Bridge, and the storm surge caused shipping containers and contaminants to sink to the bottom of the harbor which would create a navigational hazard for relief vessels. The simulation also showed that the inundation could disrupt nearby critical infrastructure at the Sand Island Sewage Treatment Plant. Another modeling exercise indicated a significant tsunami event could cause major to complete damage to the pier functionality at Piers 20, 24, 26, 30, 35, 39F, 40A, 40B, 51B, and 52 (Martin and Chock, Inc., 2017) (see **Figure 3.8**). Facility siting and design measures can be implemented to minimize damage due to tsunami wave action.

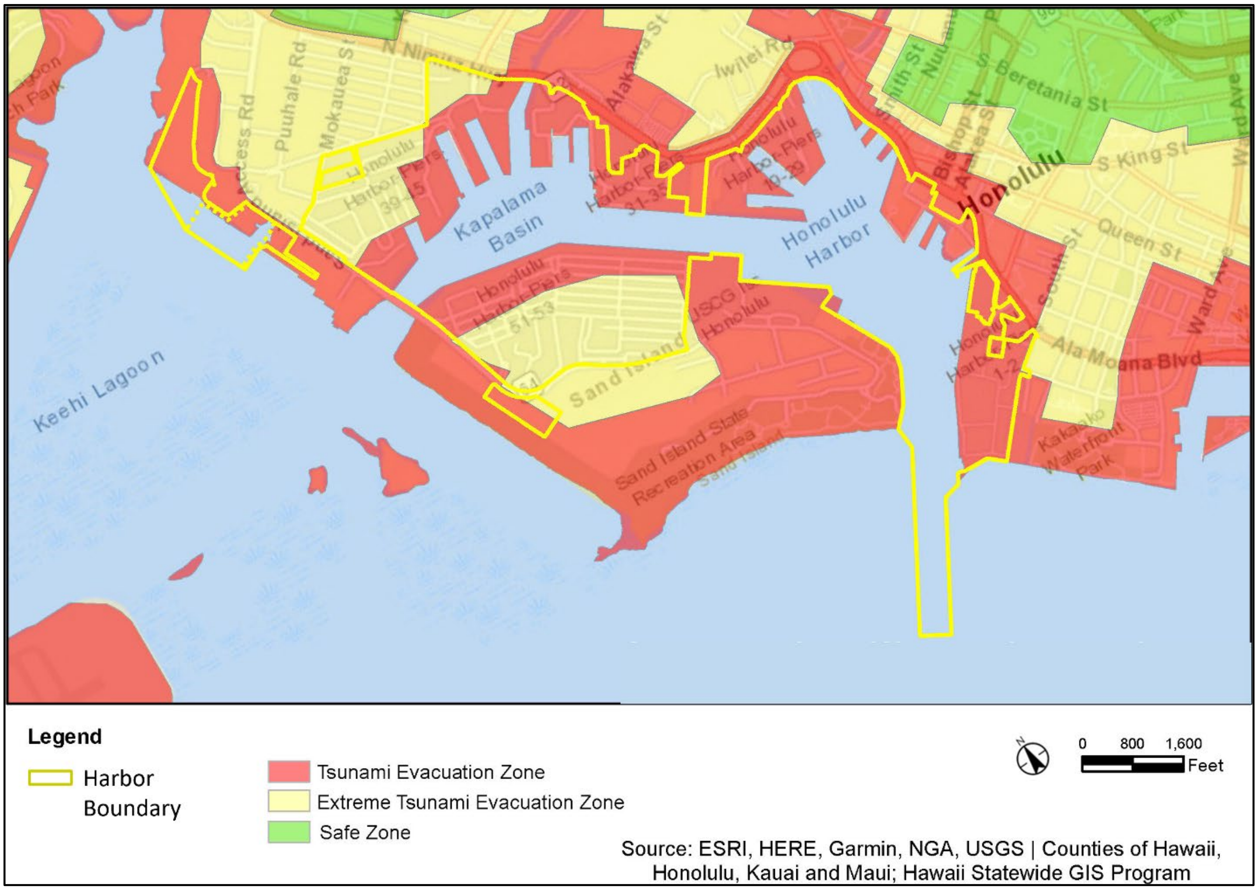

Figure 3.7 - Tsunami Evacuation Zones

DOTH Oahu District and USCG authorities require all ships to vacate the harbor prior to the estimated time of arrival of a generated tsunami sea wave when possible and if able to safely get underway. Telephone, electronic messaging (text-email) notifications are given by the USCG Captain of the Port (COTP) to vessel owners-operators and vessel agents who must in turn, notify their respective ships. Messengers are employed to the extent available to supplement the telephone and/or electronic messaging. Vessels that are unable to move in time are required to take adequate precautions against damage to the vessel and harbor facilities during the tsunami due to expected rise and fall of harbor's sea level.

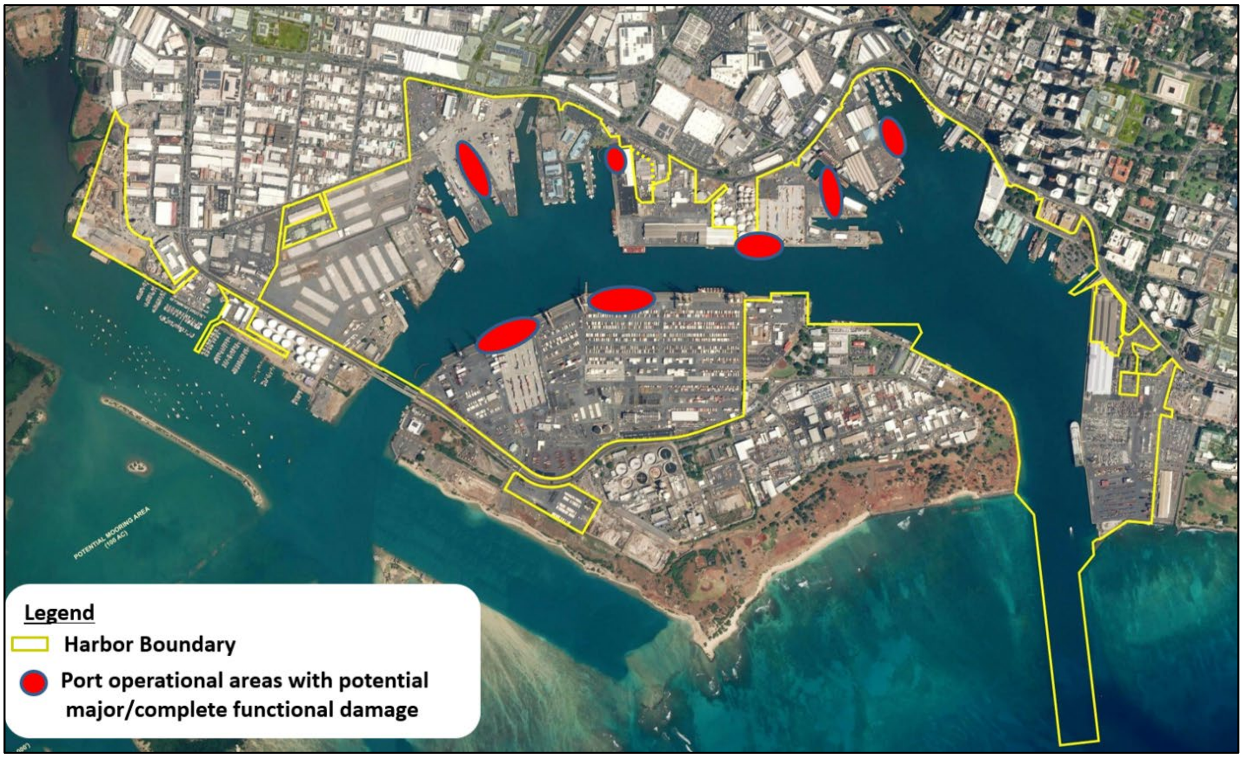

Figure 3.8 - Honolulu Harbor Tsunami Vulnerable Piers
(Source: Martin and Chock, Inc., 2017)

3.6.2.1 Seismic Activity

As a series of islands formed by volcanoes, the Hawaiian Islands and surrounding areas are seismically active. Most of the earthquakes in Hawai'i occur on or near Hawai'i Island and are associated with volcanic activity. However, other earthquakes are caused by the weight of the Hawaiian archipelago on the Pacific lithosphere. Although difficult to predict, an earthquake of sufficient magnitude causing structural or other property damage may occur in the future. See **Section 8.2** for structural recommendations.

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4.0 EXISTING FACILITIES AND OPERATIONS

4.1 Physical Facilities

4.1.1 Harbor Channels and Basins

Honolulu Harbor consists of the following channels and basins (see **Figure 4.1**):

- ***Main Entrance Channel.*** The Main Entrance Channel is 4,000 FT long, 500 FT wide, and 45 FT deep. It is the only access to the harbor for ship transit.
- ***Kapālama Transit Channel.*** The Kapālama Transit Channel connects the Main Harbor Basin with the Kapālama Basin and is 400 FT wide and 40 FT deep.
- ***Kalihi Channel.*** Kalihi Channel is 400 FT wide and 23 FT deep. The channel is blocked to ship transit by a fixed, 4-lane bridge that conveys motor vehicle traffic to and from Sand Island.
- ***Main Harbor Basin.*** The Main Harbor Basin is 3,300 FT long, 1,520 FT wide, and 40 FT deep.
- ***Kapālama Basin.*** Kapālama Basin is 3,400 FT long, 1,000 FT wide, and 40 FT deep.

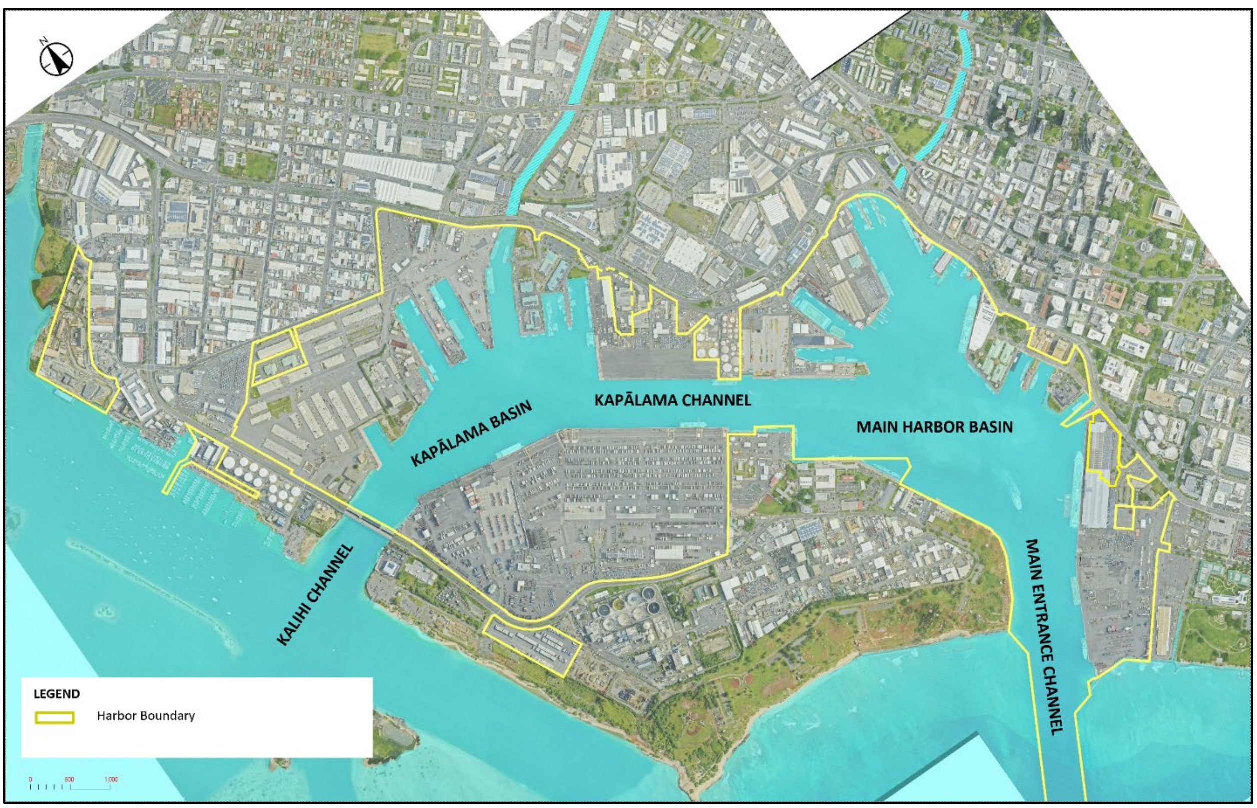

Figure 4.1 – Harbor Channels and Basins

4.1.2 Wharves/Piers and Yards

Honolulu Harbor is comprised of numerous piers, cargo yards and other operating areas. Pier numbers start at Pier 1 within the Fort Armstrong Terminal, at the Diamond Head end of the harbor, through Pier 60 at the extreme *'Ewa* end of DOTH's jurisdiction, in Ke'ehi Lagoon. Development of the harbor, as it appears today, occurred over several decades, beginning in the early 20th century. Some of the piers were developed as private enterprises and eventually came under DOTH's possession. The following sections provide a brief physical description of the piers and supporting backland areas. Pier structural conditions were obtained from the 2021 *Conditions Assessment Study of Harbor Waterfront Structures, Hawai'i Department of Transportation, HDOT Job No. H.C. 90045* (MKE Associates, LLC, 2021). Piers that are leased/maintained by tenants, condemned, or in the process of being reconstructed were not included in the 2021 study.

4.1.2.1 Pier 1

The Fort Armstrong Terminal encompasses Piers 1A and 1B (referred to as Pier 1), and Piers 2A and 2B. Pier 1 is the primary cargo operations berth; however, depending on availability, Pier 2A also is used for cargo operations. The primary function of Pier 2B is as a Cruise Passenger Terminal, as described in **Sections 4.1.2.2** and **4.3.4**. On the landside, the terminal consists of Yard 1 and Yard 2.

Pier 1 was constructed in 1963 and 1969 and is a pile-supported wharf. The pier is 1,175 FT long and its width varies from 50 FT to 115.5 FT before reaching fast land retained by a concrete bulkhead (see **Figure 4.2**). The pier deck is constructed with rectangular blow-out plates that are designed as sacrificial deck panels that pop out to relieve structural stress and prevent more substantial damage to the pier from wave surge energy. Blow-out plates are displaced and must be repaired several times in a typical year. Thirty- to 60-ton cast iron bollards are installed along the edge of the pier and a few 100-ton bollards are installed in landside areas of the pier. Maritime operators recommended that bollards be upgraded to 100-ton capacity along the pier edge. Fendering consists of thick-walled rubber cylindrical fenders suspended on chains.

The Pier 1 yard area consists of Yard 1 adjacent to Pier 1A, and Yard 2 adjacent to Piers 1B and 2A, with a combined yard area of approximately 32 acres (see **Figure 4.3**). The yard area is paved with asphalt and has an estimated design load of 500 pounds per square foot (PSF). Maritime operators recommended a minimum design load of 1,000 to 2,000 PSF for stacked container and heavy equipment operations. Typical use of the yard area includes approximately 11.1 acres used for container storage, approximately 8.4 acres used for automobile storage with lane striping to accommodate 1,340 standard sized automobiles, and an additional 1.1 acres used for break-bulk and specialty cargo storage. The remaining area is used for access and maneuvering space. Lighting is provided by fixed light poles and mobile lighting stands that are maneuvered as necessary for nighttime operations.

Within the Piers 1 and 2 yards are several small structures, most of which support the terminal's cargo operations. Of note is the weather station/aid to navigation structure (1967) located at the extreme southwestern point of the terminal, near the breakwater (see **Figure 4.47**), and the building currently occupied by the U.S. Department of Homeland Security (1967). Both structures were evaluated as eligible for listing on a historic register.

The Pier 1 Entry Gate is accessed from Forrest Avenue and comprises 0.8 acres. The Pier 1 Gate consists of two in-bound lanes and two out-bound lanes with one lane in each direction dedicated for container traffic. The Gate processing is manual, and no pre-gates are used.

The 2021 DOTH Conditions Assessment rated Pier 1A as 'Satisfactory' and Pier 1B as 'Poor'. Collectively, Pier 1 was given an overall assessment rating of 'Fair'; with a recommendation that Pier 1B be repaired with moderate urgency.

Figure 4.2 – Pier 1 Concrete Pile-Supported Deck With "Bull Rails" and Bollards at Edge

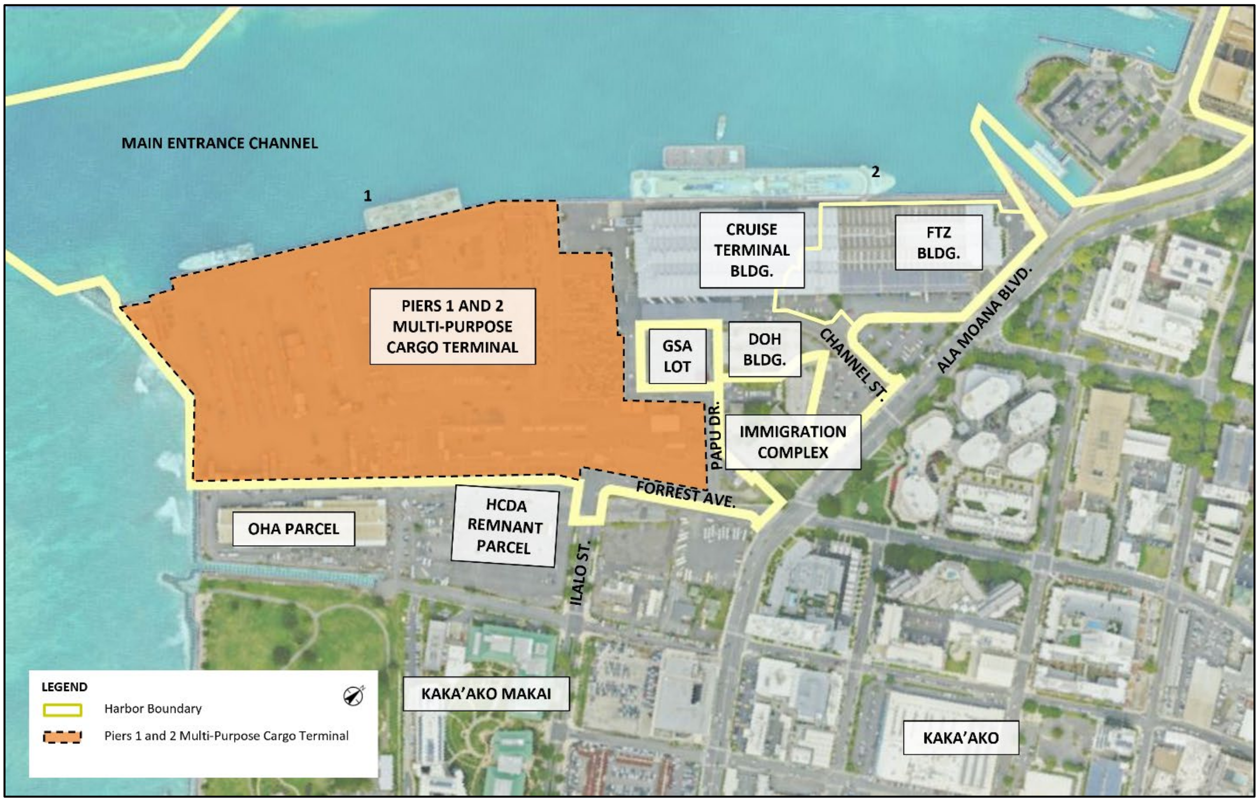

Figure 4.3 – Piers 1 and 2 Multi-Purpose Cargo Terminal

4.1.2.2 Pier 2

Pier 2 was originally constructed in multiple phases during 1950, 1952, and 1960 for cargo use. It has served as Honolulu Harbor's primary, dedicated cruise ship terminal since it was redeveloped for this purpose in 2006. The Pier 2 facility includes Pier 2A adjacent to an open yard area, portions of which are used for cargo and portions for cruise ship staging, and Piers 2B and 2C, which are set off from a concrete warehouse structure, constructed in 1955, by a 40-FT wide apron (see **Figure 4.4**). Approximately half of the warehouse, adjacent to Pier 2B, contains the Pier 2 Cruise Terminal passenger processing facility. The other half of the warehouse structure, adjacent to Pier 2C, contains DBEDT's FTZ No. 9's warehouse and offices. The FTZ portion of the warehouse was evaluated as being eligible for inclusion on a historic register.

Pier 2 is a pile-supported wharf that is approximately 1,850 FT long with a width that varies from approximately 45 FT to 56 FT before reaching fast land retained by a bulkhead structure. The design load of the deck is estimated at 500 PSF. The 2021 Conditions Assessment assigned Pier 2 an overall structural rating of 'Poor' with a recommendation that it be repaired with moderate urgency. Other nonstructural issues that affect cruise operations include the bollards, fendering and the gangway. There are a few 100-ton bollards; however, currently a majority of the bollards are rated at 40- to 60-tons, which is undersized and insufficient for securing large cruise ships in the harbor. Maritime operators recommended that bollards be upgraded to 100-ton capacity for cruise ship berthing. Fendering consists of thick-walled, black rubber cylinders suspended on chains. Cruise ship operators noted that the fendering is insufficient for cruise ship berthing and recommended the use of light colored fendering to prevent marring the sides of cruise vessels which are typically painted white. In 2019, a new mobile gangway was introduced at Pier 2. The gangway provides a vertical elevation range of 22 FT to adapt to different cruise vessels and adjust for tidal variation, while maintaining required ADA accessibility standards. An undersized shoreside water system is available. There is no shoreside power or sewer connection to serve cruise ships at berth.

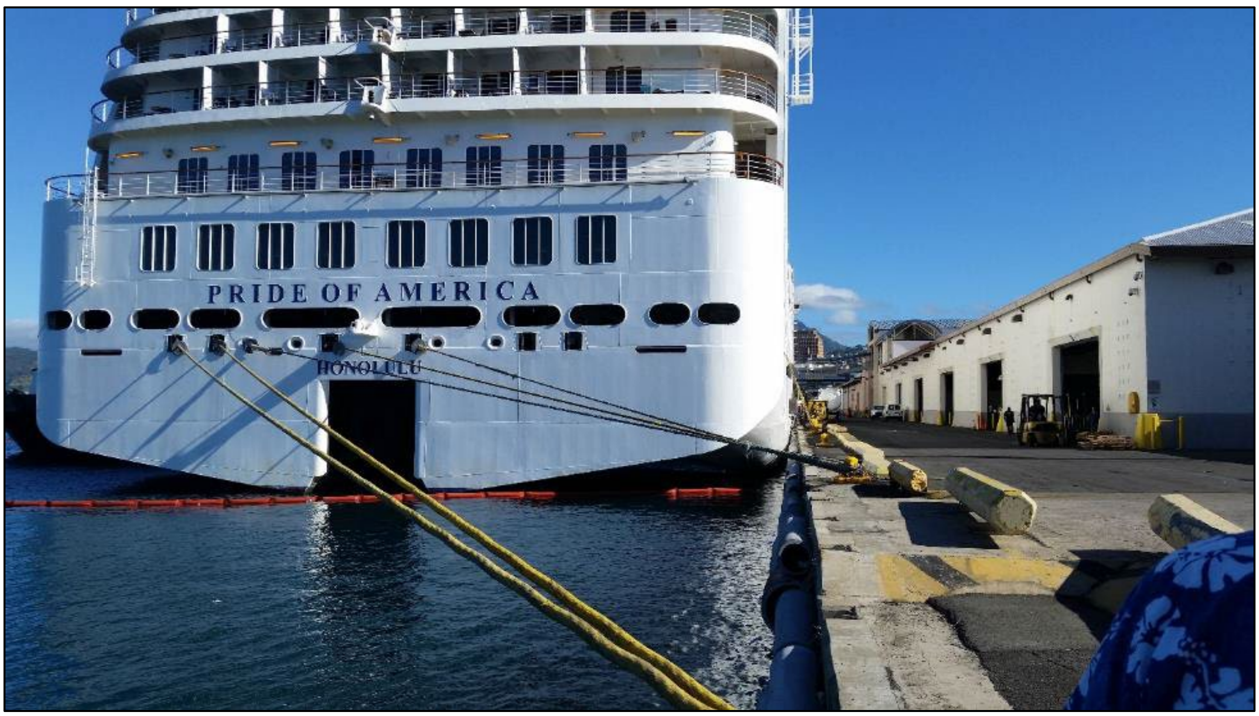

Figure 4.4 – Pier 2 Cruise Terminal Berth, Apron and Building

On the landside, access to the Pier 2 Cruise Terminal is via Channel Street which connects to Ala Moana Boulevard at a signal-controlled intersection. Access to the terminal building is secured with an entry gate located at the end of Channel Street. The terminal building has an area of approximately 185,800 square foot (SF). The interior space includes the ground-level for passenger screening, processing and orientation, and baggage handling, and a 2nd-story mezzanine level for passenger access to the ship gangway. The *makai* end of the terminal building, along with an adjacent 1-acre yard area and 40-FT wide pier apron, serve as the staging area for ship provisioning and servicing. The area is space-constrained for efficient maneuvering of delivery vehicles and supplies to support typical cruise ship passenger turnover operations.

The front of the terminal building has limited area for passenger and ground transportation staging (see **Figure 4.5**). A solar panel canopy covers a bus access lane and three taxi queuing lanes at the front of the terminal. The ground transportation queuing lanes merge onto a one-way, two-lane driveway that follows the *mauka* boundary of the Pier 1 Terminal, exiting onto Forrest Avenue (see **Figure 4.6**). At the *makai* end of the terminal there is pedestrian access to a ride-share waiting area with five covered passenger waiting shelters. A 6-FT wide sidewalk on the Diamond Head side of Channel Street provides pedestrian access to Ala Moana Boulevard. DOTH recently completed a project to remove barriers on this sidewalk as required to comply with Americans with Disabilities Act (ADA) accessibility standards. There are no pedestrian wayfinding signs or informational kiosks, nor any shade features (trees or awnings) on the sidewalk for pedestrian orientation and comfort.

The former DOH building, now under DOTH jurisdiction, is located across the queuing lanes, opposite from the terminal building entrance. The historic, 2-story building was constructed in 1946 and has a building footprint of approximately 15,325 SF. The building is listed on both the National and Hawaiʻi Registers of Historic Places as part of the U.S. Immigration Complex and is currently vacant.

Figure 4.5 – Pier 2 Cruise Terminal Ground Transportation Staging Area

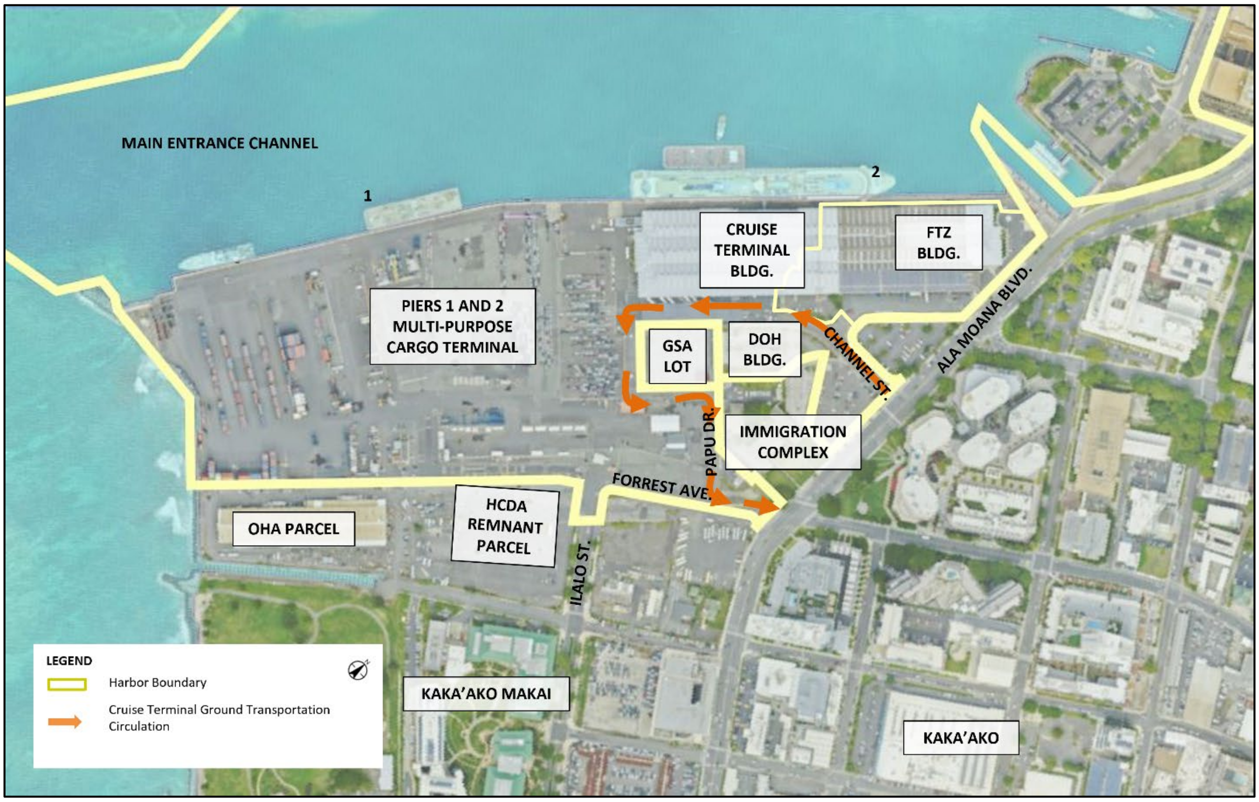

Figure 4.6 – Pier 2 Ground Transportation Circulation

4.1.2.3 Pier 4

Pier 4 is under the jurisdiction of the USCG and is not included in the DOTH facility inventory. The pier is used by small USCG patrol vessels and work boats, and for berthing by maritime operators subject to USCG approval. The pier is a pile-supported wharf, 325 FT in length and extends from a concrete retaining wall with solid fill. The landside of Pier 4 accommodates the USCG's Regional Exam Center, Gage Station, and parking areas. The historic building was constructed in 1938. It is a two-story triangular-shaped concrete structure with an approximately 9,380-SF footprint (see **Figure 4.7**).

Figure 4.7 – Pier 4 USCG Exam Center

4.1.2.4 Piers 5 and 6

Piers 5 and 6 are primarily used for day excursion operations that operate evening and nightly dinner cruises. Pier 5 is constructed as a rip rap revetment with two pile-supported dolphins that provide a berth length of 200 LF. A pile-supported concrete gangway extends from the revetment to provide access to berthed vessels. Pier 6 is constructed as a combination of concrete bulkhead with 2 breasting dolphins and rip rap revetment with 2 mooring dolphins to provide a total berth length of approximately 345 LF. Three old concrete support columns, remnants of a demolished elevated driveway that led to the former terminal at Piers 8-10, are exposed above the water surface within the Pier 6 slipway. The remnant columns prevent berthing by large vessels within approximately 150 LF of the head of the slipway. Piers 5 and 6 were not included in the 2021 Conditions Assessments.

The landside of the piers is developed as a ground-level, fee-based parking lot with 303 parking stalls, and the Ala Moana Mini Park which includes a pocket parking area with 46 parking stalls. The *makai* end of the Piers 5 and 6 area is among the few naturalized shorelines in Honolulu Harbor. The nearshore area at the end of Piers 5 and 6 is designated as a coral outplanting site. The landside area is approximately 5 acres (see **Figure 4.8**).

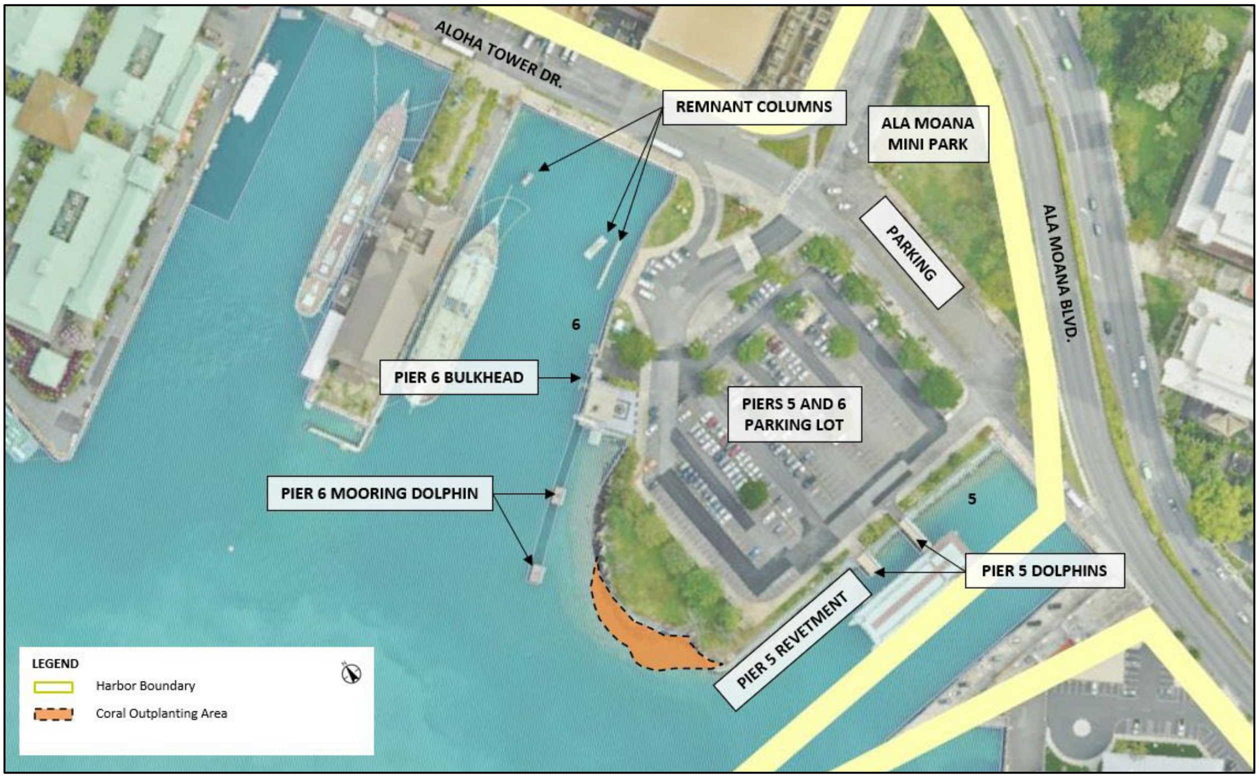

Figure 4.8 – Piers 5 and 6

4.1.2.5 Pier 7

Pier 7 is currently utilized for layberth and long-term berthing of the historic Falls of Clyde, a 4-masted ship, on the *ʻEwa* side of the pier. The landside of the pier is 0.85 acres on which sits the former Hawaiʻi Maritime Center building that is currently vacant and in deteriorated condition. Pier 7 was originally constructed in 1908 and has been heavily modified and rebuilt over the years. It is constructed as a concrete bulkhead pier and provides a total berth length of 725 LF. The *ʻEwa* side of the pier is augmented by a concrete breasting platform supported by concrete piles where the Falls of Clyde is currently berthed (see **Figure 4.9**). The historic vessel is planned to be removed from the harbor for safety reasons. At the *makai* end of Pier 7 is a concrete slipway designed as a berth for the Hōkūleʻa Hawaiian sailing canoe, but currently vacant. The front navigational range (dayboard and light) for the Main Entrance Channel is located at the *makai* end of the main pier structure; the rear range is located at the *mauka* end of Pier 8. The pier has water, sewer and power utilities, though they are undersized for use by day excursion vessels at berth. The pier was not included in the 2021 Conditions Assessments.

Figure 4.9 – Pier 7, Falls of Clyde Vessel and Vacant Maritime Center Building

4.1.2.6 Piers 8, 9, 10, and 11

Piers 8, 9, 10, and 11 were originally constructed in multiple phases during 1915 (Piers 8, 9, and 10) and 1925 (Pier 11), and are primarily used for cruise, day excursion, and layberth. The piers are constructed as pile-supported concrete wharves topped with asphalt. The distance that the piers extend from the concrete bulkhead varies from approximately 35 FT to 85 FT.

Pier 8 is used for day excursion vessels that operate seasonal whale watching and nightly dinner cruises. Pier 8 is separated from the Aloha Tower Marketplace buildings by a 25-FT apron, which is used for passenger embark/debark and ship staging. Pier 9 is used for layberth by miscellaneous vessels and is separated from the Aloha Tower Marketplace buildings by a 50-FT apron. Piers 10 and 11 serve as Honolulu Harbor's secondary cruise ship terminal. The pier has customized fendering to accommodate passenger cruise vessels (see **Figure 4.10**).

The landside of Piers 8 through 11 includes the cruise ship terminals within the Piers 10 and 11 sheds; DOTH administration and Oahu District offices within the Hale Awa Ku Moku Building fronting Nimitz Highway and the Pier 11 2nd level gallery, respectively; the Aloha Tower Marketplace, which houses HPU facilities plus restaurants and commercial operations; Irwin Park; and HECO's downtown power plant. Approximately 2,500 students attend classes or live at the

Aloha Tower Marketplace. HPU has a long-term lease with ATDC and balances commercial and educational uses of the Aloha Tower Marketplace by subleasing to commercial entities. Parking for the Aloha Tower Marketplace is provided by the open parking lots at Irwin Park and Piers 5 and 6, and covered parking within the Piers 10 and 11 sheds. There are plans to convert Irwin Park from a landscaped parking lot to a passive park to align with the park's original vision.

As a cruise terminal, the Piers 10 and 11 location is attractive due to its proximity to Aloha Tower, downtown Honolulu and Chinatown; however, in its current configuration is deficient for cruise operations. The sheds are too small and cramped to accommodate passenger handling from the larger, modern cruise ships, and the new cruise industry post-COVID-19 health distancing and screening requirement standards. In addition, structural columns inside the shed make maneuvering trucks to provision and service the cruise ships difficult. Operators note that the area outside of the terminals available for ground transportation is too small, inefficient, and unsafe for cruise passengers to negotiate. Further, it doesn't provide adequate staging area for taxis, ride-shares and buses.

Aloha Tower, Irwin Park, Hale Awa Ku Moku and the Piers 10 and 11 sheds are all listed on the State Register of Historic Places. Aloha Tower is also listed on the NRHP. The RLS identified all the buildings as having HPV (see **Figures 4.10** and **4.11**).

Figure 4.10 – Pier 8 Aloha Tower Market Place

Figure 4.11 – Pier 9 and Aloha Tower

4.1.2.7 Pier 12

Pier 12 was constructed in phases over various periods dating back to the earliest history of the harbor's development. Hand-cut and stacked coral blocks dating from the 1820's and possibly sourced from the original Honolulu Fort are still visible submerged along the *makai* edge of pier (see **Figure 4.12**). Pier 12 is included in the State Inventory of Historic Places and assigned SIHP No. 50-80-14-7575. The pier structural system consists of an asphalt topped deck and reinforced concrete bulkhead wall. A 112-LF segmented pier constructed in 2016 is located along the *'Ewa* side of the pier and consists of pile-supported mooring dolphins connected to a loading platform by metal walkways. The segmented pier was purpose-built but no longer has a dedicated user; it's currently used for layberth or temporary assignment. The Diamond Head side of Pier 12 is in a state of disrepair and is not in use. The landside of the pier includes a parking lot with 22 stalls, including 14 located within a secured and fenced area and 8 located outside of the fence line. The fence is a 12-FT high marine-grade aluminum picket fence mounted within a low concrete wall (see **Figure 4.13**).

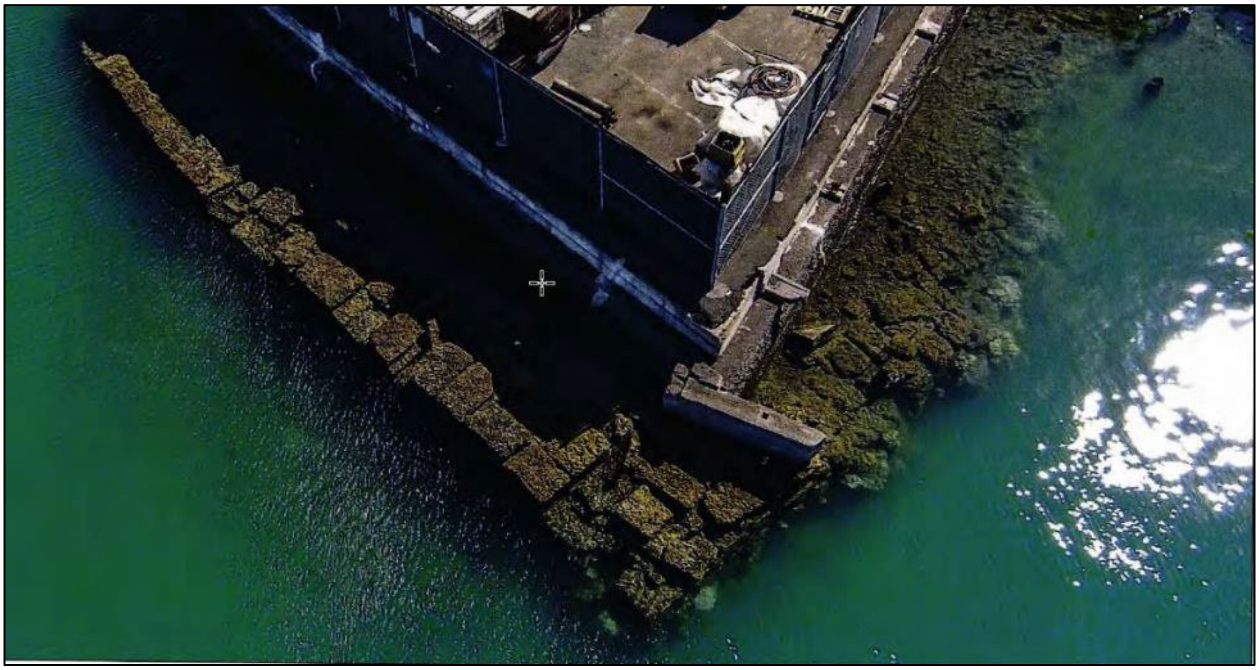

Figure 4.12 – Pier 12 Historic Hand-Cut Coral Blocks
(Source: CSH, 2021)

Figure 4.13 – Pier 12 Gated Parking Lot and Segmented Pier (on left side)
(Source: CSH, 2021)

4.1.2.8 Piers 13 and 14

Piers 13 and 14 accommodate tugboats and work barges. On the landside of the piers is an approximately 28,000-SF reinforced concrete shed that is used primarily for tenant parking and storage, with some administrative space. The shed is a historic structure evaluated as eligible for listing on a historic register and identified as having HPV. It is also situated within the boundaries of the Chinatown Historic District. Piers 13 and 14 were constructed in 1930. The structural system consists of pile-supported deck constructed of concrete topped with asphalt that extends from a concrete bulkhead backed with solid fill. Pier 13 has a berth length of 335 LF and Pier 14 is 420 LF. The 2021 Conditions Assessment assigned Piers 13 and 14 an overall rating of 'Fair' (see **Figure 4.14**).

Figure 4.14 – Piers 13 and 14

4.1.2.9 Pier 15

Pier 15 accommodates the Harbor Police Station and the Marine Spill Response Corporation (MSRC) oil spill response vessel and barge. The police station is a one-story concrete building with a tower (a remnant from the building's previous use as a fire station), a shed and three parking bays. Both the former fire station (1951) and the adjacent shed (1955) were evaluated as eligible for listing on a historic register and were identified in the RLS as having HPV. It is also situated within the boundaries of the Chinatown Historic District.

The Pier 15 land area includes a reinterment site for a human ulna that was found in the highway median during construction of the Piers 12 and 15 Improvement Project. The ulna has been designated by the DLNR, State Historic Preservation Division (SHPD) as SIHP No. 50-80-14-08985. Protective mitigation measures, including buffer areas and landscaping restrictions, as well as protocols for accessing the site are documented in the *Burial Site Component of an Archaeological Data Recovery Plan for SIHP 50-80-14-08985, Piers 12 and 15, Honolulu Ahupuaʻa, Honolulu District, Island of Oʻahu.*

Pier 15 was constructed in 1951 along with the waterfront fire station. A recent improvement project, completed in 2016, added a new segmented pier at the *makai* face of the existing reinforced concrete bulkhead. The purpose-built segmented pier consists of two staging piers composed of pile-supported deck constructed of concrete together with five pile-supported concrete mooring platforms connected by metal walkways. It has a berthing length of 485 LF. At the Diamond Head end of the pier is an existing concrete deck supported by concrete piles. A floating dock was recently installed at this pier to berth Harbor Police patrol boats (see **Figures 4.15** and **4.16**).

Figure 4.15 – Pier 15

Figure 4.16 – Pier 15 Marine Spill Response Vessel and Barge

4.1.2.10 Piers 16, 17 and 18

Piers 16, 17, and 18 support fishing operations and provide berthing for commercial longline fishing vessels. Approximately half of the fishing fleet operating in Honolulu Harbor berth at Piers 16 to 18 and the other half at Piers 36 to 38 (Commercial Fishing Village). For a description of fishing operations at Piers 36 to 38 (see **Section 4.1.2.21**). Berth utilization at Piers 16 to 18 is an ad hoc combination of single-moored vessels and rafted vessels (2 to 4 vessels across). Fishing vessels typically go between Pier 38 to offload fish at the Honolulu Fish Auction and resupply provisions (e.g., ice, fuel etc.), and berth at Piers 16 to 18 before heading back out to the fishing grounds. Users noted the overall lack of pier-side berthing, which drives the need to raft vessels. Typically, vessels need to be berthed pier side for provisioning and to take on fuel from a fuel truck, so current conditions hamper operational efficiency. There is also a critical need for a comfort station for fishing vessel crews, as these piers are currently serviced by portable toilets only. Users also expressed a need for a small recreational space and laundry facilities.

Pier 16 was constructed in 1984, it is approximately 18 FT wide and has a berth length of 930 LF. The structural system consists of prestressed concrete piles supporting a concrete deck. Pier 17 was constructed in 1976 and is a pile-supported deck approximately 34 FT wide and provides a berth length of 965 LF. Because of its narrow width, Pier 16 is not able to accommodate fuel trucks which exacerbates the inefficiencies with fueling operations. Pier 18, constructed in 1990, is a wooden wharf with berth length of 210 LF. It was not included in the 2021 Conditions Assessment; however, DOTH has plans to replace Pier 18's timber deck with concrete (see **Figures 4.17** and **4.18**).

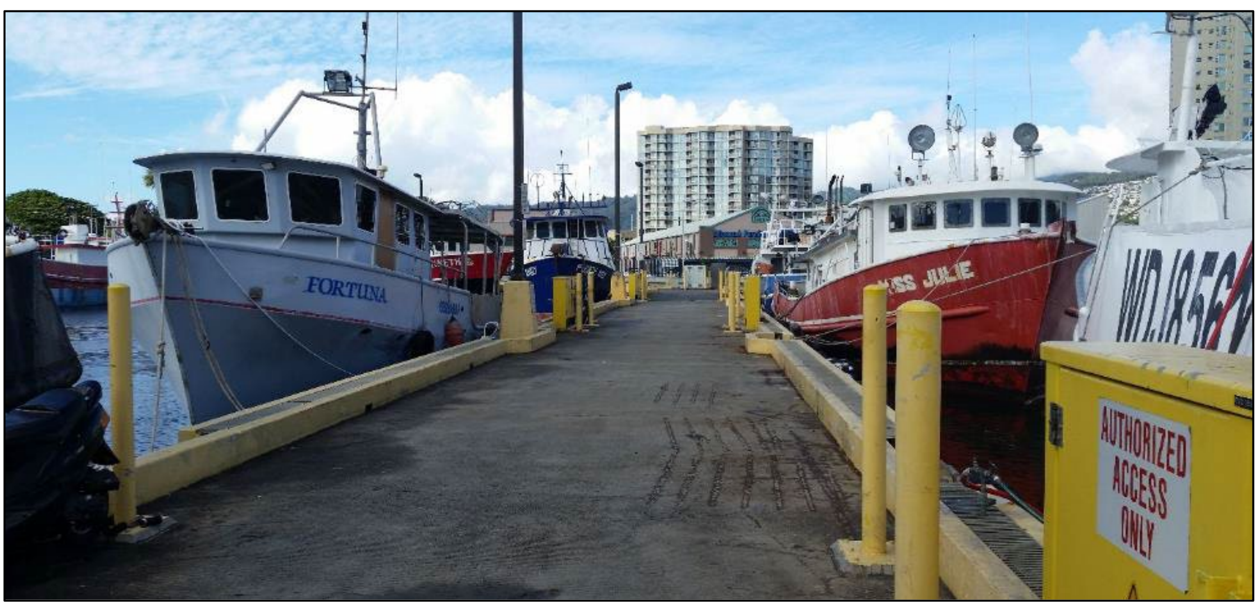

Figure 4.17 – Pier 16

Figure 4.18 – Pier 17

4.1.2.11 Piers 19 and 20

Piers 19 and 20 were constructed in 1914. The pier's structural system is a pile-supported wharf extending approximately 40 FT from a reinforced concrete bulkhead wall. Together, Piers 19 and 20 provide nearly 1,000 LF of berthing space. The 2021 Conditions Assessment assigned Pier 19 an overall rating of 'Poor' and Pier 20 as 'Fair' and recommended that Pier 19 be repaired with moderate urgency. Piers 19 and 20 accommodate tugboats, barges, automobile carriers, general cargo ships, and an occasional small cruise ship (see **Figure 4.19**).

The landside of Pier 19 includes the Pier 19 shed and the ferry terminal building, which is currently vacant. The shed consists of six connected metal warehouse sections and is partially occupied by harbor tenants. The shed was constructed in 1924 and was evaluated as eligible for listing on a historic register. The ferry terminal building is a concrete structure constructed in 2001. At the *mauka* end of Pier 19 is a small facility for the harbor pilots, which include a small office building, adjacent maintenance shop, storage, parking and berthing of pilot boats.

Pier 20 is an open yard used for both discharge or loading of vessels and automobile storage (see **Figure 4.20**). Pier 20 consists of 3.2 acres of landside area, 2.3 acres of which are used for automobile storage, providing 373 sustainable slots. There are no buildings or sheds at Pier 20.

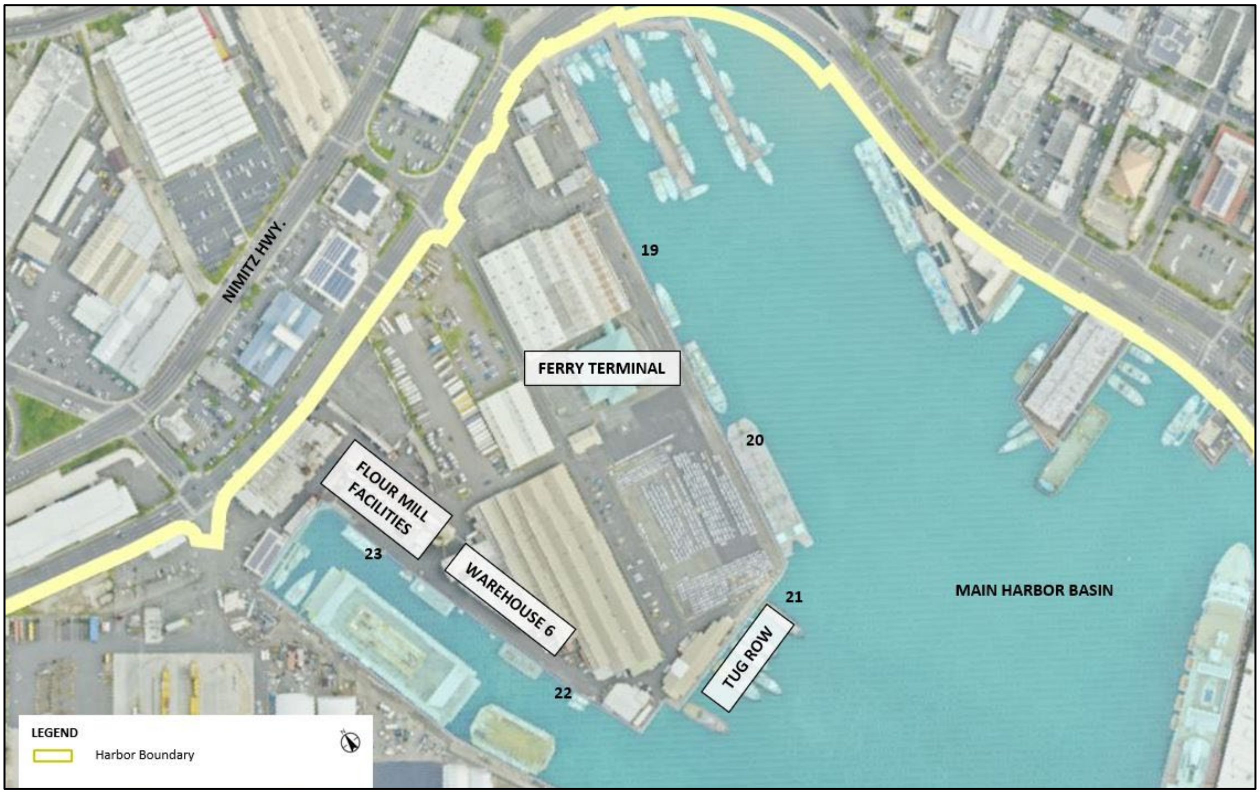

Figure 4.19 – Piers 19 to 23

Figure 4.20 – Pier 20

4.1.2.12 Pier 21 and 22

Piers 21 and 22, also known as "Tug Row," is home to most of the harbor's tugboats and some small workboats (see **Figure 4.21**). The landside of Pier 21 includes a two-story, metal-framed structure with corrugated metal siding (aka Machine Shop). Another metal-framed structure with corrugated metal siding (aka Carpenter Shop) is located at Pier 22. The structures were constructed in 1951 and 1946, respectively, and accommodate offices, storage, and workspace for tug operators. Both structures were evaluated as eligible for listing on a historic register. The structure at Pier 22 is occupied by Young Brothers / FOSS; however, it cannot be fully utilized as portions of it have been condemned due to hazardous materials. Some parking is available adjacent to these structures with other stalls located along the road leading to Pier 21.

Pier 21 was constructed in multiple phases during 1968, 1975, 1985, and 1987 and provides 494 LF of berthing space. It is a pile-supported wharf extending approximately 20 FT from the reinforced concrete bulkhead. Users noted that the apron, which is currently rated as 150 PSF, needs a higher load capacity as it is not strong enough to support the trucks and cranes used for spooling operations. Other concerns noted include bollards that are not ideally located for tug operations and the need for dedicated shore-to-ship power connections (i.e., cold ironing). Pier 22 was constructed in 1975 and is also a pile-supported wharf extending from a reinforced concrete bulkhead. Pier 22 has a berth length of 410 LF. The 2021 Conditions Assessment assigns both piers an overall structural rating as 'Satisfactory.'

Figure 4.21– Pier 21

4.1.2.13 Pier 23

Currently, Pier 23 is primarily used for layberth as the pier is essentially unusable due to a coral/rock outcropping at the edge of the pier face, and adjacent dry dock operations, which limit vessel movements in the slipway (see **Figure 4.22**). Pier 23 was constructed in 1957 and consists of reinforced concrete piles supporting an asphalt-topped deck with a reinforced concrete bulkhead wall. Four pile-supported dolphins front the pier face. Pier 23 has a berth length of 425 FT, and along with Pier 22 form the Diamond Head side of the slipway, with Piers 24 and 25 on the opposite side. The 2021 Conditions Assessment assigned Pier 23 and overall structural rating of 'Satisfactory.'

Figure 4.22 – Piers 23-24 Slipway with PSI Floating Dock in Submerged Condition

The landside of Pier 23 includes Warehouses 6 and 8, a concrete shed, and the Flour Mill facilities (see **Figure 4.23**). Warehouse 6 is a one to three-story, trapezoid-shaped warehouse with part concrete masonry unit (CMU) and part steel frame walls. It is located directly south of the grain silos with direct waterfront access. Warehouse 8 consists of two connected metal warehouse sections. It is located to east of the grain silos and to the west of the Pier 19 ferry terminal building. The Pier shed is a one-story, trapezoid-shaped, hardened concrete structure, with rooftop parking, that is located adjacent to Nimitz Highway and is currently occupied by McCabe Hamilton & Renny. Constructed in 1928, 1928, and 1958, respectively, all three structures were evaluated as eligible for listing on a historic register.

Figure 4.23 – Flour Mill Complex of Buildings
(Source: Fung Associates, Inc., 2021)

The Flour Mill facilities were constructed between 1958 and 1964 and consist of the warehouse, the towers and silos, the mill, and the feed shop (see **Figure 4.23**). The warehouse is a corrugated metal structure that is connected to the west side of the silo structure. The silo structure is comprised of ten connected-in-a-row concrete silos with a tower at each end that contained the grain elevator and other infrastructure. The grain silos are approximately 11 to 14-stories in height and 26 FT in diameter. The mill is a six-story concrete structure that is connected to Warehouse 6. The feed shop is a two-story metal-framed and corrugated metal structure that is located at the end of the slipway between Piers 23 and 24. The Flour Mill facilities were evaluated as eligible for listing as recommended historic district and identified as having HPV.

4.1.2.14 Piers 24 and 25

Piers 24 and 25 accommodate maritime-support operations, specifically ship building and repair (see **Figure 4.24**). The current tenant, Pacific Shipyards International, has a long-term lease for the area, which includes the submerged lands adjacent to the piers. There are two dry docks located in-line along the piers – one large dry dock (approximately 450 FT x 150 FT) and one small dry dock (200 FT x 80 FT) (see **Figure 4.25**). Landside of the piers includes a two-story concrete building, located at the *mauka* end of the slipway that is used as office space, and several tension-fabric structures that house the shipyard operations. All shipbuilding and repair operations are powered by off-grid utilities including one acre of photovoltaic solar panels and a battery storage bank that distributes power to the shops. The concrete office building was constructed sometime between 1949 and 1961 and was evaluated as eligible for listing on a historic register.

Piers 24 and 25 were constructed in 1920 and consist of a pile-supported wharf extending roughly 25 to 30 FT from a reinforced concrete bulkhead and together provide approximately 945 FT of berthing space. Along the pier apron, and parallel to the pier face is a set of railroad tracks embedded in the pier deck. The tracks, which could date as early as the 1920s, are remnants of the pier's historic usage and possibly may be considered a historic property. The piers were not included in the 2021 Conditions Assessment.

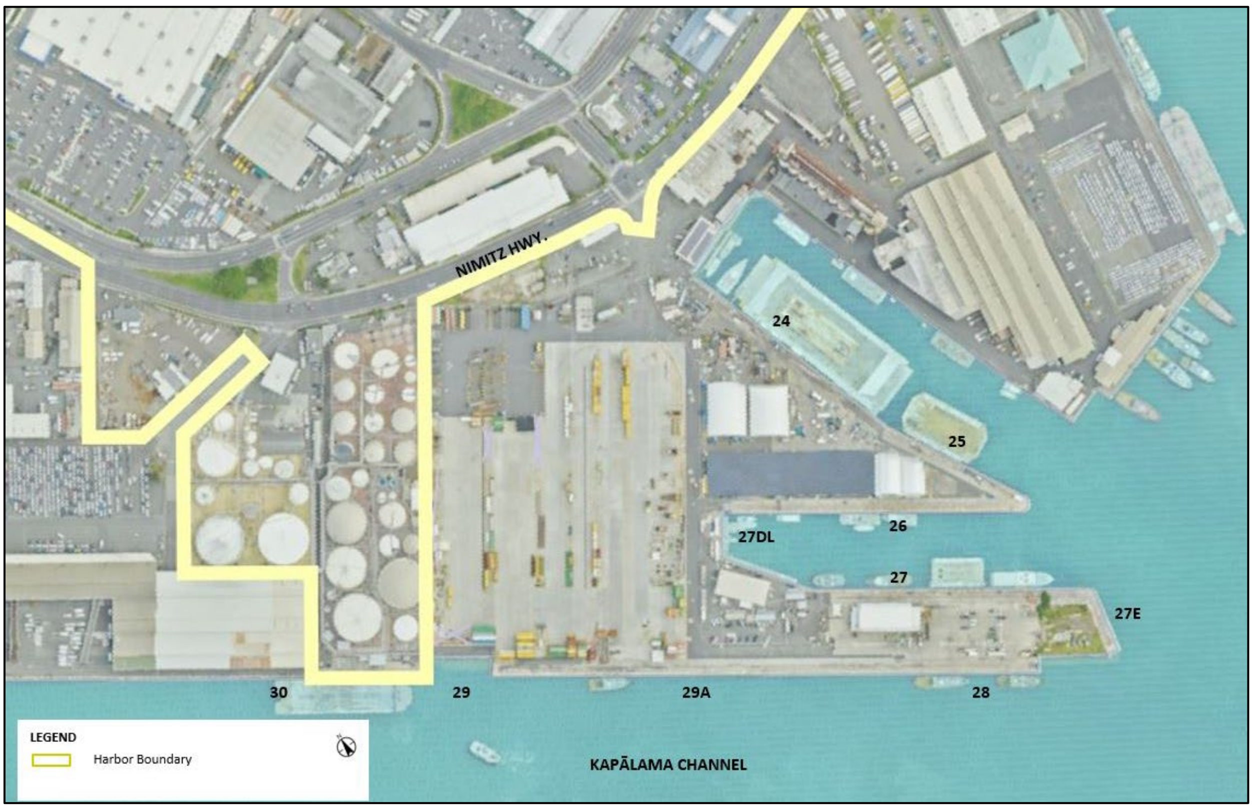

Figure 4.24 – Piers 24 to 30

Figure 4.25 – Drydocks at Piers 24 and 25

4.1.2.15 Pier 26

Pier 26 was constructed during the first half of the 20th century and modified in 1977 to accommodate RO/RO operations, which no longer occur at this pier. Currently, Pier 26 provides berthing for tugboats and barges (see **Figure 4.26**).

The structural system consists of a pile-supported wharf extending roughly 30 FT from the reinforced concrete bulkhead wall. Pier 26 has a berth length of 685 FT and was assigned an overall structural rating of 'Satisfactory' by the 2021 Conditions Assessment.

Figure 4.26 – Corner of Piers 25 and 26

4.1.2.16 Piers 27 and 28

Pier 27 is used to berth tugboats, barges, and a small drydock. Pier 27 DL, located at the *'Ewa* end of the slipway, is occupied by Atlantis, a day excursion operator, where they maintain and berth their vessels, and charge their battery-operated submarines. Other uses occurring at Pier 27 landside are Sause Bros' operations including maintenance yards and storage areas.

Pier 27 was constructed in 1938 and is a pile-supported wharf extending approximately 35 FT from the reinforced concrete bulkhead wall and provides 660 LF of berth. Pier 27DL is a bulkhead pier providing 250 LF of berth length. The 2021 Conditions Assessment assigned Pier 27 an overall structural rating of 'Poor' and recommended it be repaired with moderate urgency. The Diamond Head end of Pier 27, 27E, is a pile-supported structure but was not assessed in the 2021 report; however, it is in an obviously deteriorated condition and is condemned by DOTH (see **Figure 4.27**).

Figure 4.27 – Pier 27E

Pier 28 is situated opposite of Pier 27, at the Diamond Head end of the Kapālama Transit Channel. It is generally used to berth tugs and barges and shares the same landside uses as Pier 27. Pier 28 was likely constructed contemporaneous with Pier 27, around 1940. It is a pile-supported wharf extending approximately 30 FT from the reinforced concrete bulkhead wall and provides 490 FT of berth length. The 2021 Conditions Assessment assigned Pier 28 an overall rating of 'Poor' with a recommendation to repair with moderate urgency. Remnant rail tracks from the pier's historic use are embedded in the pier deck and possibly may be deemed historic properties. One set of linear tracks is oriented northwest / southeast parallel to the pier face. A second set diverges from the first set and extends toward the *makai* edge of Pier 28. Finally, a third set of tracks diverges from the first set towards the *mauka* portion of Pier 29.

4.1.2.17 Pier 29

Pier 29 was constructed in 1938 and is situated along the *mauka* side of the Kapālama Transit Channel. It is a pile-supported wharf that extends roughly 30 FT from the reinforced concrete bulkhead wall and fastland. Pier 29 is a flexible-use cargo terminal that currently has no dedicated user but has been used in the past to accommodate tugboats, RO/RO barges and general cargo ships. The Pier 29 truck gate consists of four in-bound lanes and two out-bound lanes. The truck gate processing is manual, and no pre-gates are used.

Pier 29 provides 800 FT of berthing space and about 11 acres of cargo yard. It can support a combination of wheeled storage and grounded containers as well as break-bulk/neo-bulk cargo and project cargo. The yard was recently improved (up to 30 FT from the pier face) and is in good condition. The pier itself was assigned an overall rating of 'Poor' in the 2021 Conditions Assessment, which recommended that it be repaired with moderate urgency. A small segment at the *'Ewa* end of Pier 29 is unimproved, creating a "notch" between Pier 29 and Pier 30 (see **Figure 4.28**).

Located in the Pier 29 backlands, fronting Nimitz Highway, is a two-story CMU building surrounded by a small parking lot. It is occupied by at DOTH tenant and is currently identified as the Oceantronics building. It was constructed in 1959 and was evaluated as eligible for listing on a historic register.

Figure 4.28 – Pier 29

4.1.2.18 Pier 30

Pier 30 is privately-owned fuel terminal that is outside of DOTH's jurisdiction. IES conducts liquid-bulk cargo operations at the Pier 30 terminal, which handles several fuel types including jet fuel, gasoline, diesel, naphtha, and ethanol (see **Figures 4.29** and **4.30**). The landside tank farm has a total storage capacity 356,500 barrels (Bbls). At the pier, there are about a dozen above-gound manifolds and risers that discharge fuel to vessels berthed at the pier. IES maintains a small boat and spill response boom at the pier, which they deploy during a spill event using the unimproved "notch" between Piers 29 and 30.

Pier 30 is a pile-supported wharf that extends approximately 30 FT from the bulkhead and fastland and provides 270 FT of berthing space. It was not included in the 2021 Conditions Assessment. IES noted that the 30-FT draft at the pier face is fine for barges but does pose a constraint for larger tank ships. Ideally pier-side draft should be 36 FT.

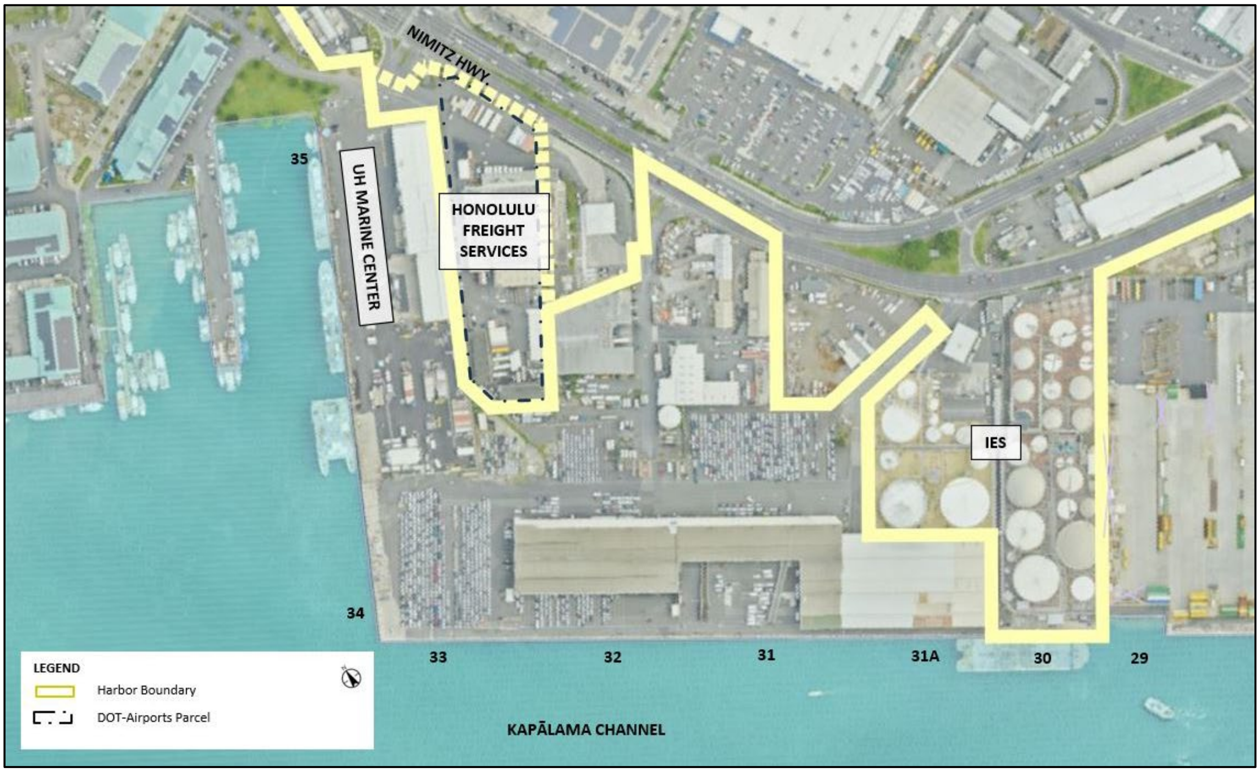

Figure 4.29 – Piers 30 to 35

Figure 4.30 – Pier 30 – Island Energy Service Fuel Pier

4.1.2.19 Piers 31 to 34

Piers 31 and 33 were constructed in multiple phases beginning in 1938. It is a pile-supported wharf that extends approximately 30 FT from the reinforced concrete bulkhead wall and fastland. Together, these piers provide 1,125 FT of berthing space along the Kapālama Transit Channel. Pier 34, located around the corner from Pier 33, was constructed in 1954 by replacing an older wooden wharf with a new concrete one using the existing pilings; the pier was updated in 1994. The pier has a berth length of 545 FT and its extent from the bulkhead and fastland varies from approximately 35 FT to 50 FT. The 2021 Conditions Assessment assigned Pier 31 an overall rating of 'Poor' with a recommendation to repair with moderate urgency. Piers 32 and 33 were rated as 'Fair' and Pier 34 as 'Satisfactory' (see **Figure 4.31**).

These piers have no dedicated user and accommodate primarily RO/RO automobile operations. A large, covered shed occupied the yard until recently; it was demolished in 2020. These piers now have a combined open, flexible-use yard of approximately 14 acres.

In the backland area of these piers are located several buildings and sheds occupied by DOTH tenants that engage in maritime-related activities, such as commodity warehousing/distribution and marine construction/salvaging operations and include their administrative offices and storage yards. Some of these structures—the multiple tenant building (1946), Sea Engineering (1954) and Aala Ship Service (1977)—were evaluated as eligible for listing on a historic register.

Also, within the backland area are four non-DOTH properties. HECO owns an approximately 2-acre parcel *mauka* of Pier 31 used for storage; Aloha Petroleum has 3.3-acres *mauka* of Pier 31A used as a tank farm and load rack, and IES has a 2.1-acre parcel *mauka* of Pier 32 with an administrative office and load rack that is fed from the tank farm at Pier 30. HFS occupies a 3.7-acre parcel, which is under the jurisdiction of DOTA. Located at the boundary between DOTH property and IES's *makai* property line is a cut basalt rock and mortar lined drainage ditch which the LRFI identified as a potential historic property.

Figure 4.31 – Piers 31 to 34

4.1.2.20 Pier 35

Constructed in 1927, Pier 35 is a pile-supported wharf that extends approximately 60 FT from the bulkhead wall. Pier 35 was not included in the 2021 Conditions Assessment. Pier 35 is under a long-term lease and occupied by the UH Marine Center. They also occupy a portion of Pier 34. Pier 35 has a berth length of 705 FT and together with their portion of Pier 34, UH Marine Center has approximately 850 FT of berthing for two research vessels (see **Figure 4.32**).

Figure 4.32 – Pier 35

4.1.2.21 Piers 36 to 38 Commercial Fishing Village

Piers 36, 37, and 38 are known as the Commercial Fishing Village and support the longline fishing fleet operations (see **Figure 4.33**). Constructed in 1931, Pier 36 is a pile-supported finger pier with a berth length of 546 FT on the Diamond Head side and 430 FT on the *'Ewa* side. Pier 37 was constructed in 1984. It is a pile-supported concrete pier, set off approximately 40 FT from the shoreline and is accessed by a concrete pedestrian walkway; there is no vehicle access to Pier 37, which has a berth length of 408 FT. Pier 38 was constructed in phases, beginning in 1954 and was improved in the late 1990s for development of the Commercial Fishing Village. It is a bulkhead pier with a berth length of 645 FT. The 2021 Conditions Assessment assigned Pier 36 an overall rating of 'Fair' and Piers 37 and 38 as 'Satisfactory.' *Mauka* of the improved *'Ewa* portion of Pier 38, a rock revetment forms the shoreline of the Commercial Fishing Village (see **Figures 4.34** and **4.35**).

The fishing fleet is split, with approximately half of the fleet berthed at Piers 16 to 18 and the other half at Piers 36 to 38. Berth utilization at the piers is an ad hoc combination of single-moored vessels and rafted vessels (2 to 4 vessels across). Berthing along Pier 37 is reduced due to its distance from the shoreline and revetment which largely limits berthing for standard fishing vessels to one side of the pier.

The landside of the Commercial Fishing Village is managed by the AOAO (see **Section 3.5.1.3**). Landside operations include the United Fishing Agency (Honolulu Fish Auction), POP Fishing & Marine, Fresh Island Fish, Hawaiian Ice Company, other restaurants and maritime-related operations, and parking.

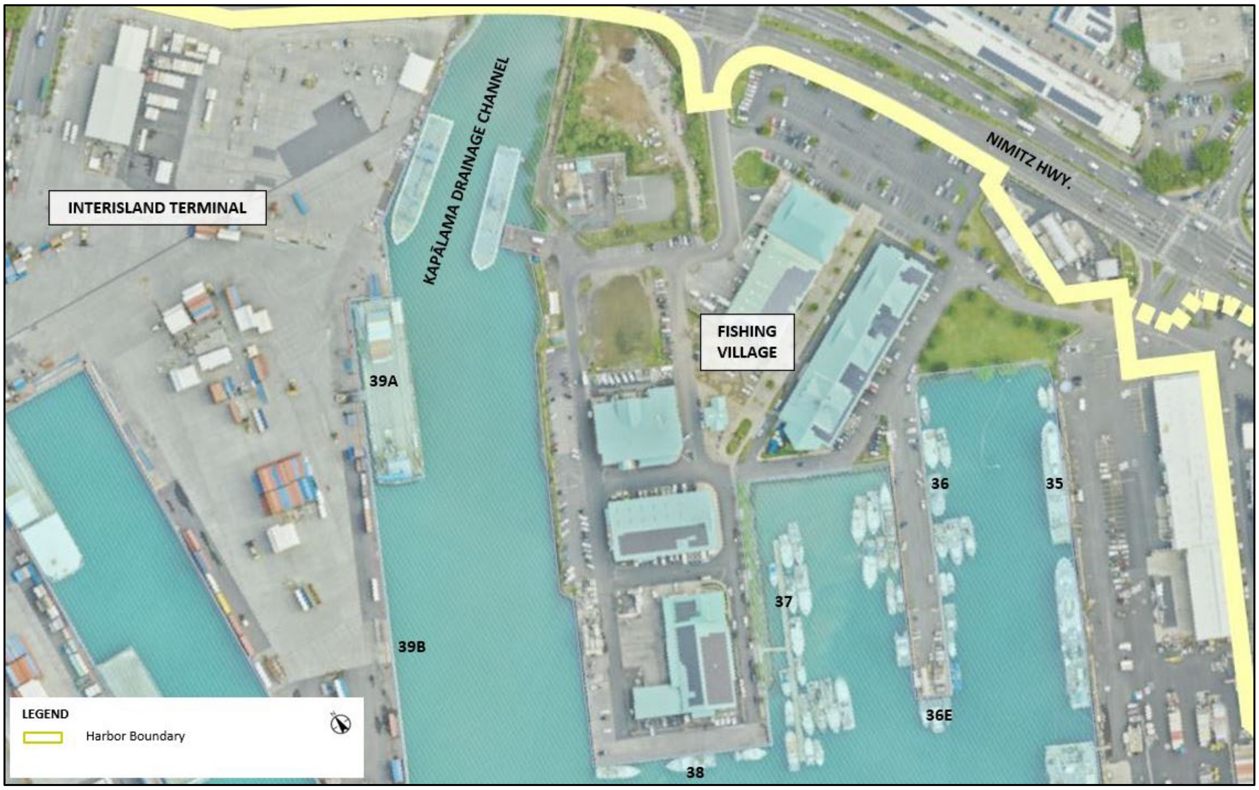

Figure 4.33 – Honolulu Harbor Fishing Village

The Honolulu Fish Auction is located at the end of Pier 38 and is the primary pier where fishing vessels offload their catch, refuel and restock provisions (see **Figure 4.35**). Users noted a need for more berthing space as limited availability causes delays in offloading catch, fuel delivery, other provisioning operations, and vessel maintenance. A need for a respite center in the Commercial Fishing Village for the fishing vessel crews was also indicated.

In addition to fishing operations, Pier 36 also accommodates maritime support operations by P&R Water Taxi. Approximately 150 FT at the *makai* end of Pier 36 provides berthing for approximately seven to eight P&R work boats (without rafting and using stern-to mooring for three vessels at the end of the pier). There is also a dedicated fuel tank at the end of the pier to service their work boats. There are four sets of railroad tracks embedded in the Pier 36 concrete deck. The tracks are a remnant of the pier's historical usage and are only visible near the southwest end but may extend the length of the pier underneath the pavement. These tracks potentially may be historic properties.

Figure 4.34 – Piers 36 (right) and 37 (left)

Figure 4.35 – Pier 38

Located in the northern corner of the Pier 38 area, Hawai'i Gas maintains a mixing facility that serves as a backup to their Kapolei plant. Gas is brought to this site by truck where it is vaporized and distributed by pipeline. Adjacent to this facility is a small pier where Hawai'i Gas layberth their barges. Adjacent and to the north of Hawai'i Gas's site, at the mouth of the Kapālama Drainage Canal, is an empty parcel with an unimproved shoreline.

4.1.2.22 Piers 39 to 40 Interisland Terminal

Piers 39 and 40 comprise the Interisland Cargo Terminal currently operated by Young Brothers. Berths 39A, 39B, 39D, 39E, 40A, and 40B are actively used for cargo operations, which utilize barges for transport of RO/RO, containers, less-than-container-load (LCL), and break-bulk/neo-bulk cargo (see **Figures 4.36, 4.37, 4.38,** and **4.39**).

Pier 39 was constructed in 1944 and Pier 40 in 1941; both have been modified over the years. The piers are pile-supported wharves that extend roughly 30 FT from the reinforced concrete bulkhead wall. Concrete sheetpiles are located on the outboard end of the piers. The 2021 Conditions Assessment assigned these piers an overall rating of 'Fair.' However, the users noted that Pier 40 is in deteriorated condition and needs rebuilding. It was also indicated that the piers need strengthening and the yard hardened to better handle cargo operations. Pier 39 1A, located at the mouth of the Kapālama Drainage Canal, is a bulkhead pier and is not used for active loading/unloading of cargo. Reconstruction of Piers 39 and 40 will result in disruption to Young Brothers' interisland cargo operations at these piers. The adjacent Pier 41 offers suitable pier facilities and yard area for temporary relocation of Young Brothers' operations during phased reconstruction of the interisland terminal. With temporary use of Pier 41, Young Brothers could avoid conducting split operations for interisland service. Split operations are typically undesirable due to increased logistical complexity and higher operational costs.

The Interisland Terminal consists of 37.6 acres with 6.9 acres of container storage yard, 2.0 acres of automobile storage, and 2.8 acres of break-bulk/neo-bulk storage. The container yard is all grounded containers with 388 TGS. The Interisland Terminal has two gates: the West Gate, accessed via Auiki Street for container cargo, and the North Gate (the public gate) accessed via Nimitz Highway for mixed cargo. The West Gate consists of two in-bound lanes and two out-bound lanes. The truck gate processing is manual, and no pre-gates are used.

Located within the terminal are several structures, including a large maintenance shed, a refrigerated cargo shed, the Administration Building, the Annex, and the Customer Service Building. Three of the structures – the Administration Building, the Annex, and the Customer Services Building – are located in the middle of the cargo yard, hampering efficient use of the yard. The Administration Building and Annex were constructed in 1964; both were evaluated as eligible for listing on a historic register.

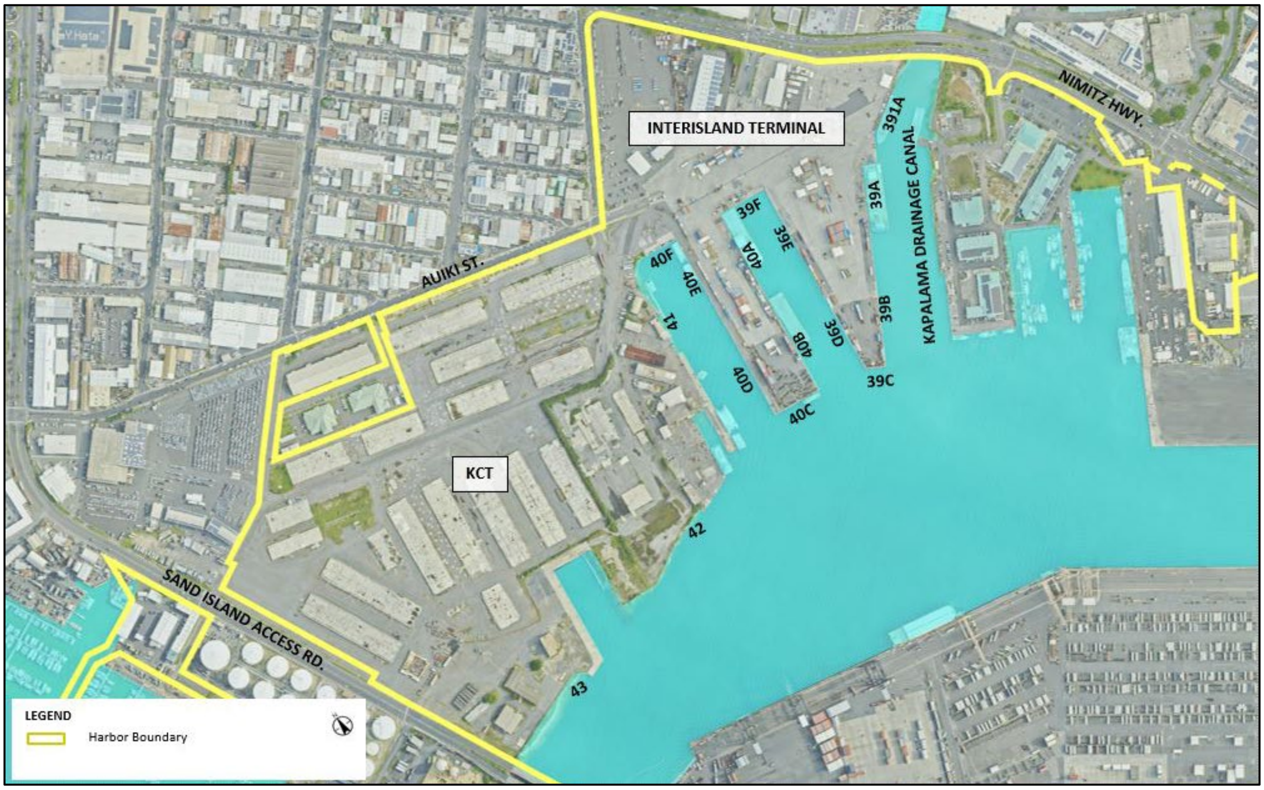

Figure 4.36 – Interisland and KCT Terminal

Figure 4.37 – Pier 39

Figure 4.38 – Piers 39-40 Slipway

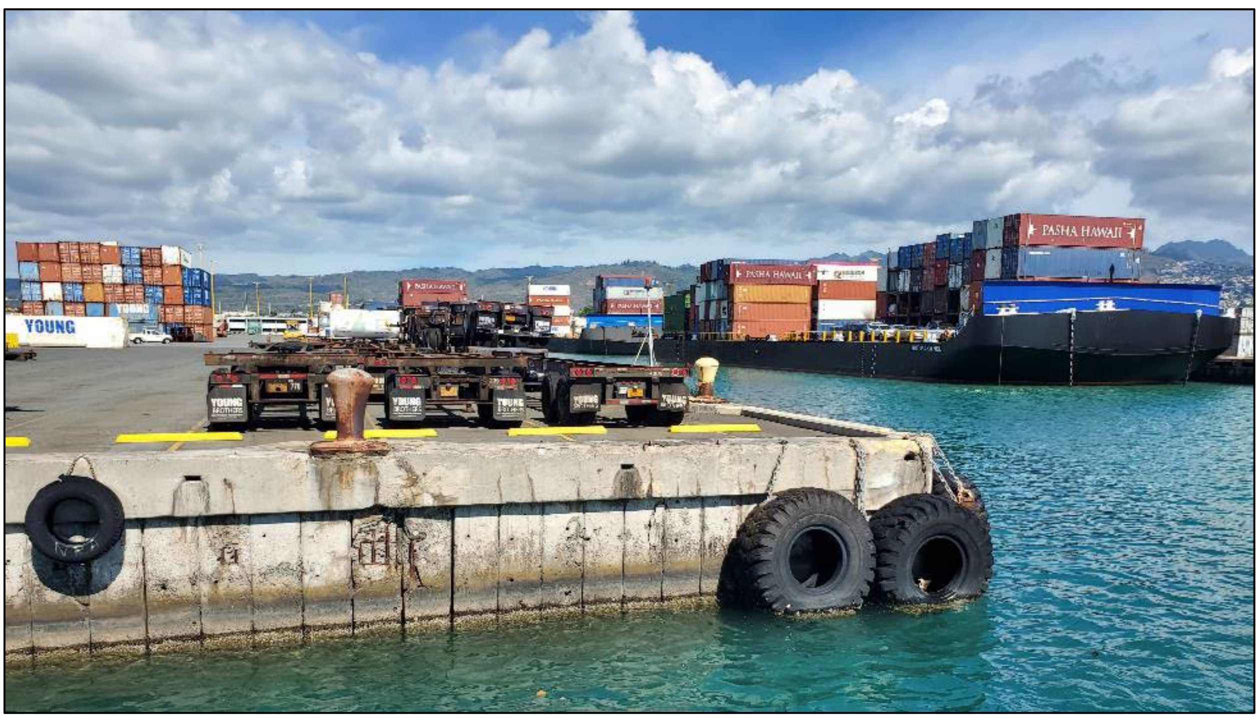

Figure 4.39 – Pier 40C with Pier 39D in Background

4.1.2.23 Piers 41 to 43 KCT

The KCT is currently under development and scheduled for completion in 2024. KCT consists of approximately 85 acres at Piers 41, 42 and 43 (see **Figure 4.36**). Once completed, Pasha's Sand Island operations will relocate to Piers 42 and 43, which will be operated by Hawaiʻi Stevedores. Pier 43 will also include a fuel manifold to import and export jet fuel from the tank farm located across Sand Island Access Road.

Pasha has begun procurement for five ship-to-shore gantry cranes. It is expected the container yard will be a combination of wheeled storage and grounded storage. Truck access to KCT will be via Sand Island Access Road. The KCT Gate will consist of six in-bound lanes and two out-bound lanes.

4.1.2.24 Piers 51 to 53 Sand Island Container Terminal

Piers 51 through 53 comprise the Sand Island Container Terminal (see **Figure 4.40**). The approximately 140-acre terminal is shared by two operators, Matson Terminals, Inc. / Matson Navigation (Matson) and Hawaiʻi Stevedores (HSI) / Pasha Hawaiʻi (Pasha). Pier 51 (51A, 51B and 51C) provides a total of 1,356 FT of continuous berthing. Pier 51 was constructed in multiple phases beginning in 1969. Pier 52 (52A and 52B) is 800 FT and Pier 53 (53A, 53B, and 53C) is 1,250 FT. Pier 52 was constructed in multiple phases in 1978 and 1982 (Pier 52 extension). Pier 53 was constructed in multiple phases in 1978 and 1992 (Pier 53 extension). All three piers are pile-supported wharves that extend roughly 50 FT from the bulkhead wall and fastland. The 2021 Conditions Assessment assigned all three piers an overall rating of 'Satisfactory.'

Pasha utilizes Piers 51A and 51B and associated yard area. The berth has a total of three usable ship-to-shore gantry cranes (see **Figure 4.41**). Pasha's terminal consists of 44.0 acres with 31.7 acres of container storage yard. The container yard is a combination of wheeled storage with 535 40-FT ground slots and grounded container storage with 1,910 TGS. Several structures are within the terminal, including Pasha's Administration Building, an Operations Building, and a Maintenance Shed, among others. The Maintenance Shed (1975), which is a metal-framed, one-story standing seam metal structure was evaluated as eligible for listing on a historic register.

Also, at Pier 51A is a fuel manifold used for unloading fuel for Hawaiʻi Fueling Facilities Corporation (HFFC) and Par Hawaiʻi. Imported jet fuel is transferred via pipeline to off-site storage tanks located on the *mauka* side of the Sand Island Bridge.

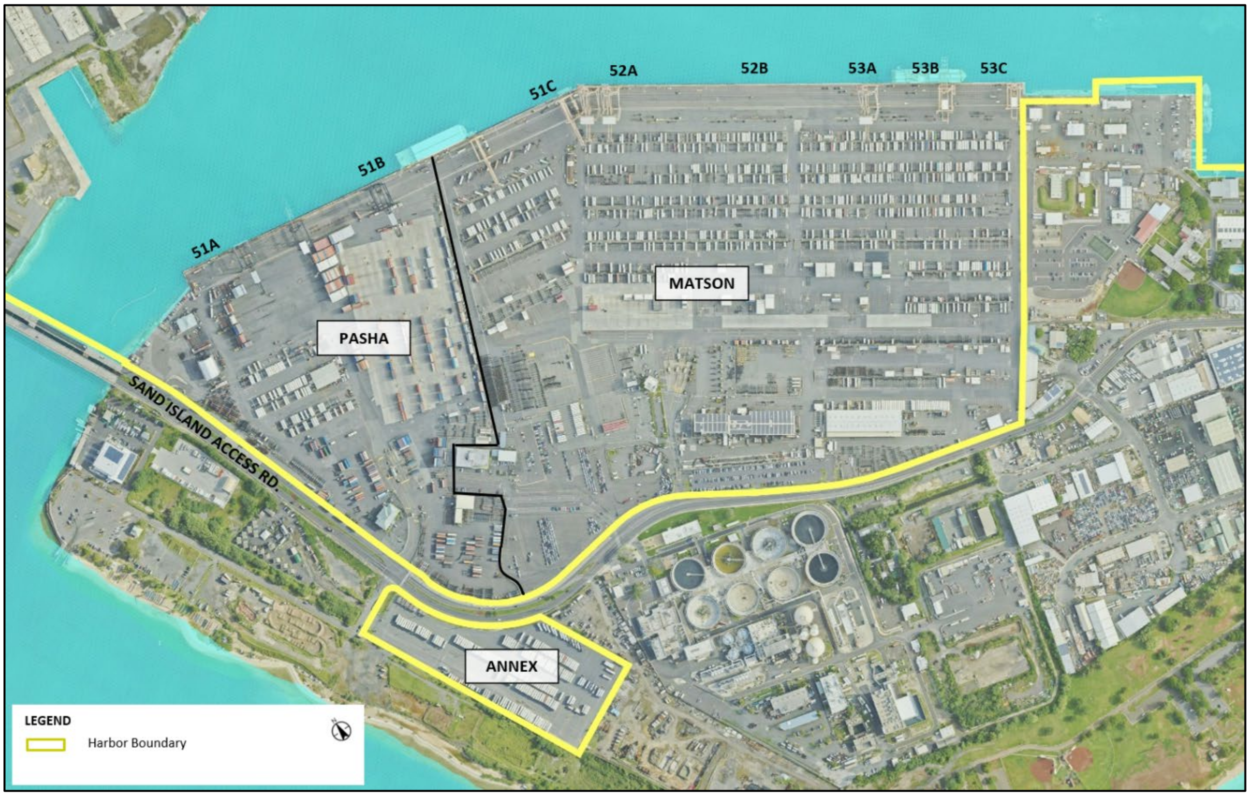

Figure 4.40 – Piers 51 to 53

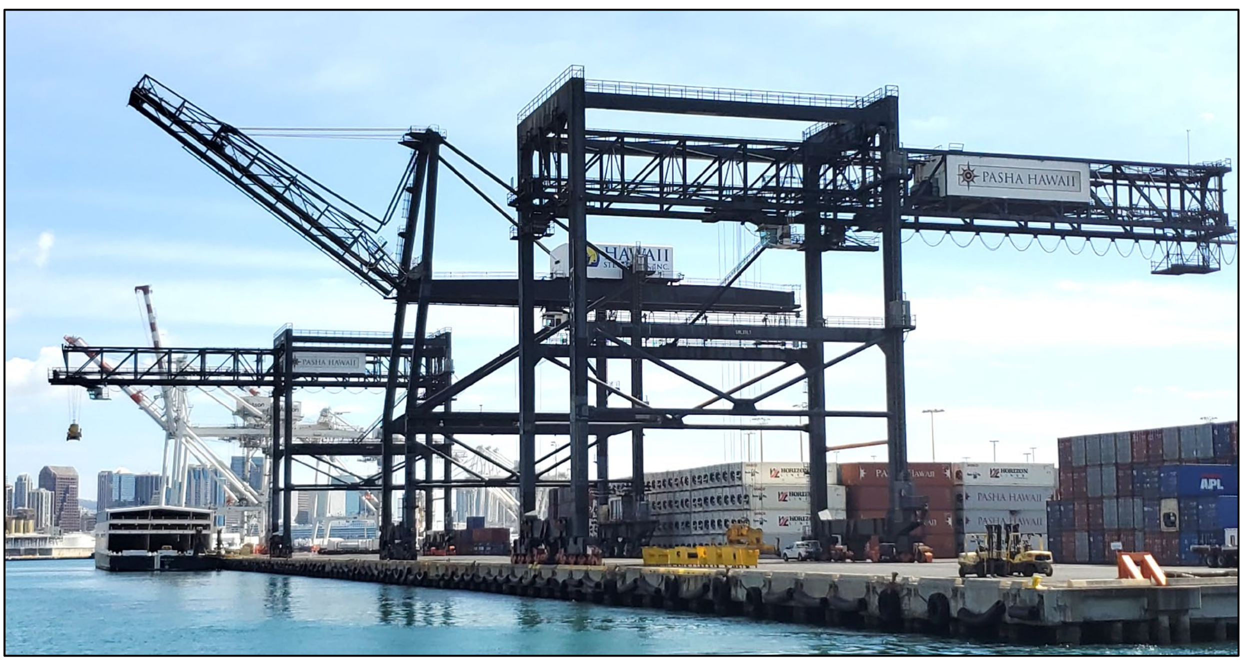

Figure 4.41 – Pasha Berth and Gantry Cranes at Sand Island Terminal

Matson utilizes Piers 51C through 53C which are outfitted with five ship-to-shore gantry cranes. Additionally, some vessels are unloaded by top lifters via RO/RO barge ramp at Pier 51C. Matson's terminal consists of 107.6 acres, of which 60.4 acres are used for container storage, 3.4 acres for automobile storage, and 0.5 acres for break-bulk/neo-bulk storage. The container yard is a combination of wheeled storage and grounded storage (see **Figure 4.42**). The wheeled storage includes 2,246 40-FT wheeled slots near the terminal berths and 313 40-FT wheeled slots in the Sand Island Annex Yard on the other side of Sand Island Parkway. Additionally, 1,152 TGS are located within the terminal where both laden and empty containers are stacked. The automobile storage yard has 547 sustainable slots (see **Figure 4.43**).

Figure 4.42 – Matson Sand Island Container Yard and Berth


Figure 4.43 – Matson Automobile Storage at Sand Island Terminal

Matson's terminal gate consists of 3 in-bound lanes and 3 out-bound lanes. The truck gate processing is manual, and no pre-gates are used. The gate includes a guard house, small structures for clerk offices and inspection areas.

Other structures within the terminal that support Matson's operations include the MTI Operations Tower, the Container Freight Station, the Facilities and Maintenance Building, and the Matson Navigation Administration Building, among others. The Taxi Waiting Area (1980) and the Reefer Shop Office (1980) were evaluated as eligible for listing on a historic register. In addition, the Guard House, the MTI Operations Tower, the Gate Lanes 1, 2, and 3 Clerk Offices and Inspection Areas, the Container Freight Station and the Facilities Maintenance Building, all constructed in 1980, were evaluated as eligible for listing on a historic register as a potential historic district and are considered HPV. The MTI Operations Tower is individually eligible.

4.1.2.25 Pier 60

Pier 60 is operated by HC&D, LLC and is used for the import/export and storage of sand and aggregate products. Pier 60 is comprised of 7.85 acres with 5.8 acres of aggregate storage (see **Figures 4.44** and **4.45**). Pier 60 is a bulkhead wharf and provides 452 FT of berth length. It was not included in the 2021 Conditions Assessment.

The backland area of Pier 60 includes several warehouse and shed structures, some of which are leased to tenants. Among these, the Nānākuli Neighborhood Housing Services Building, which is two stories high with sections of corrugated metal, brick, and concrete block siding, was evaluated as eligible for listing on a historic register. Portions of the backland area are prone to stormwater and tidal flooding due to its low elevation and the poor drainage system in the area.

The Ke'ehi Lagoon Channel, which provides access to Pier 60, is difficult for tug and barge operations to navigate due to its narrow width, relatively shallow draft, and the presence of private recreational vessels moored in the channel.

Figure 4.44 – Pier 60

Figure 4.45 – Pier 60 Aggregate Storage

Table 4.1– Summary of Pier Conditions

Pier No.	Facilities and Operations	Yard Area (AC) [1, 2]	Length (FT) [1]	Pier Apron Load Capacity (PSF) [1]	Structural System[1]
1	Fort Armstrong Terminal: General Cargo, Containers, Automobiles	13.24 (Yard 1)	1A: 500 1B: 675	500	Pile-supported wharf
2	Cruise Terminal, General Cargo, Automobiles	18.46 (Yard 2)	2A: 500 2B: 700 2C: 650	500	Pile-supported wharf
4	USCG Exam Facility	--	325	--	Pile-supported wharf
5	Day Excursions	--	200	500	Pile-supported dolphins
6	Day Excursions	--	345	500	Bulkhead and pile-supported dolphins
7	Layberth	--	Pier 7DH: 450 Pier 7EWA: 275	500	Pier 7DH: Bulkhead Pier 7E: Pile supported wharf
8	Day Excursions, Layberth	--	615	500	Pile-supported wharf
9	Day Excursions, Layberth	--	624	500	Pile-supported wharf
10	Cruise Terminal, Layberth	--	502	500	Pile-supported wharf
11	Cruise Terminal, Layberth	--	435	500	Pile-supported wharf
12	Layberth	--	112	--	Pile-supported dolphins
13	Tugboats/Work Barges, Layberth	--	345	500	Pile-supported pier
14	Tugboats/Work Barges, Layberth	--	14: 280 14E: 150	500	Pile-supported pier
15	Harbor Police Station / Spill Response	--	485	--	Pile-supported dolphins
16	Fishing Operations	--	930	500	Pile-supported pier
17	Fishing Operations	--	965	1,000	Pile-supported pier
18	Condemned	--	210	1,000	Pile-supported wharf with timber beams and decking
19	General Cargo, RO/RO, Maritime Support, Warehouses, Ferry Building	--	580	500	Pile-supported wharf
20	General Cargo, RO/RO	2.79 (Yard 20)	400	500	Pile-supported wharf
21	Tugboats	--	494	150	Pile-supported wharf
22	Tugboats	--	410	500	Bulkhead wharf
23	Work Boats, Layberth, Warehouses	--	425	500	Pile-supported dolphins
24	Maritime Support	--	580	500	Pile-supported wharf
25	Maritime Support	--	365	500	Pile-supported wharf
26	Maritime Support, Layberth	--	685	500	Pile-supported wharf

Table 4.1– Summary of Pier Conditions

Pier No.	Facilities and Operations	Yard Area (AC) [1, 2]	Length (FT) [1]	Pier Apron Load Capacity (PSF) [1]	Structural System[1]
27	Maritime Support, Layberth	--	Pier 27: 660 Pier 27DL: 250 27E: 0 (condemned)	500	27: Pile-supported wharf 27DL: Bulkhead wharf 27E: Pile- Supported wharf
28	Maritime Support, Layberth	--	490	--	Pile-supported wharf
29	General Cargo / RO/RO, Layberth	10.78 (Yard 29)	29: 400 29A: 400	750	Pile-supported wharf
30 [4]	Fuel Terminal	--	270	500	Pile-supported wharf
31	General Cargo / RO/RO, Layberth	14.5 (Yard 31-34)	Pier 31: 400 Pier 31A: 375	1,000	Pile-supported wharf
32	General Cargo / RO/RO, Layberth		400	1,000	Pile-supported wharf
33	General Cargo / RO/RO, Layberth		325	1,000	Pile-supported wharf
34	General Cargo / RO/RO, Layberth		545	1,000	Pile-supported wharf
35	UH Research Vessels	--	705	500	Pile-supported wharf
36	Fishing Operations	--	Pier 36DH: 546 Pier 36EWA: 430	1,000	Pile-supported pier
37	Fishing Operations	--	408	500	Pile-supported pier
38	Fishing Operations	--	645	500	Bulkhead wharf
39	Interisland Terminal: Containers, RO/RO, Automobiles, Break-Bulk	4.60 (Yard 39)	Pier 39-1A: 320 Pier 39A: 500 Pier 39B: 526 Pier 39C: 100 Pier 39D: 495 Pier 39E: 530 Pier 39F : 250	Pier 391A: 500 Pier 39A-39F: 1,000	Pier 39-1A: Bulkhead wharf Pier 39A-39F: Pile-supported wharf
40	Interisland Terminal: Containers, RO/RO, Automobiles, Break-Bulk	22.84 (Yard 39-40)	Pier 40A: 500 Pier 40B: 505 Pier 40C: 250 Pier 40D: 505 Pier 40E: 500 Pier 40F: 170	500	Pier 40A- 40E: Pile-supported wharf Pier 40F: Bulkhead wharf
41, 42. 43	KCT: Containers, RO/RO, Automobiles, Fuel Manifold	81.11	Pier 41: 250 Pier 42: 963 Pier 43: 900	500	--Piers 41, 42, and 43: Bulkhead wharf

Table 4.1– Summary of Pier Conditions

Pier No.	Facilities and Operations	Yard Area (AC) [1, 2]	Length (FT) [1]	Pier Apron Load Capacity (PSF) [1]	Structural System[1]
51, 52, 53	Sand Island Container Terminal: Containers, RO/RO, Automobiles, Fuel Manifold	38.9 (Yard 51) [3] 89.4 (Yard 52) [3] 8.45 (Matson Annex)	Pier 51A: 680 Pier 51B: 585 Pier 51C: 770 Pier 52A: 400 Pier 52B: 400 Pier 53A: 490 Pier 53B: 400 Pier 53C: 360	1,000	Pile-supported wharf
60	Bulk Aggregate	--	452	--	Bulkhead wharf

[1] Data is sourced from the DOTH ArcGIS Database.
[2] The yard areas are delineated in the DOTH ArcGIS Database and do not strictly align with the adjacent pier numbering.
[3] Includes respective automobile operations areas.
[4] Privately owned pier.

4.1.3 Layberth and Anchorages

A layberth is a berth used to accommodate inactive or idle vessels where no loading or unloading takes place. Dedicated berthing space is either leased (usually long-term) or used for the storage of impounded vessels. Currently, the only piers exclusively used for layberth are Pier 23 and a portion of Pier 38. All of the piers in the harbor may be used for short-term and intermittent layberth, except for piers dedicated to a single use or occupied under permit or lease, such as the spill response vessel at Pier 15, the fishing fleet piers at Piers 16 and 17 and 36 to 38, “Tug Row” at Piers 21 and 22, Pacific Shipyard International’s (PSI) dry-dock operations at Piers 24 and 25, and the UH Research operations at Pier 35. See **Section 5.6** for additional discussion.

Anchorages are designated areas offshore for vessels to anchor. Anchorages are established by the USCG and locations are established in 33 Code of Federal Regulations 110. The USCG has been delegated authority to establish, administer, and enforce anchorage areas, pursuant to 49 CFR 1.46. The authority to establish special and general anchorages pursuant to 33 United States Code (USC) 471, 474, 2030, 2035, and 2071 has been redelegated to District Commanders. The Commandant or District Commander may designate certain areas as special anchorage areas in which vessels not more than 65-foot-long may anchor without being required to show anchor lights.

There are four Honolulu Harbor offshore general anchorages for commercial vessels: A, B, C, and D (see **Figure 4.46**).

- ***Anchorage A.*** Located between Honolulu Harbor’s main entrance and Kalihi Channel. Anchorage A should only be used when anchorages B, C, and D are utilized by other vessels.
- ***Anchorage B.*** Used by small to medium sized vessels.
- ***Anchorages C and D.*** Primary anchorages for larger ocean-going commercial vessels.

The anchorages are located in Māmala Bay between the seaward ends of two deepwater channels and have depths from about 20 to 30 fathoms with sand and coral bottoms. Use of the anchorages is controlled by the DOTH Harbor Master, and any vessel that wishes to use an assigned anchorage is required to obtain permission from the Harbor Master’s office. Vessels entering the anchorage areas are required to seek traffic clearance from Aloha Tower traffic control and are also required to advise Aloha Tower traffic control of their departure. All vessels must monitor VHF-FM channels 12 and 16 while in anchorage. Anchorage is not practical in the harbor basins because of limited swinging room.

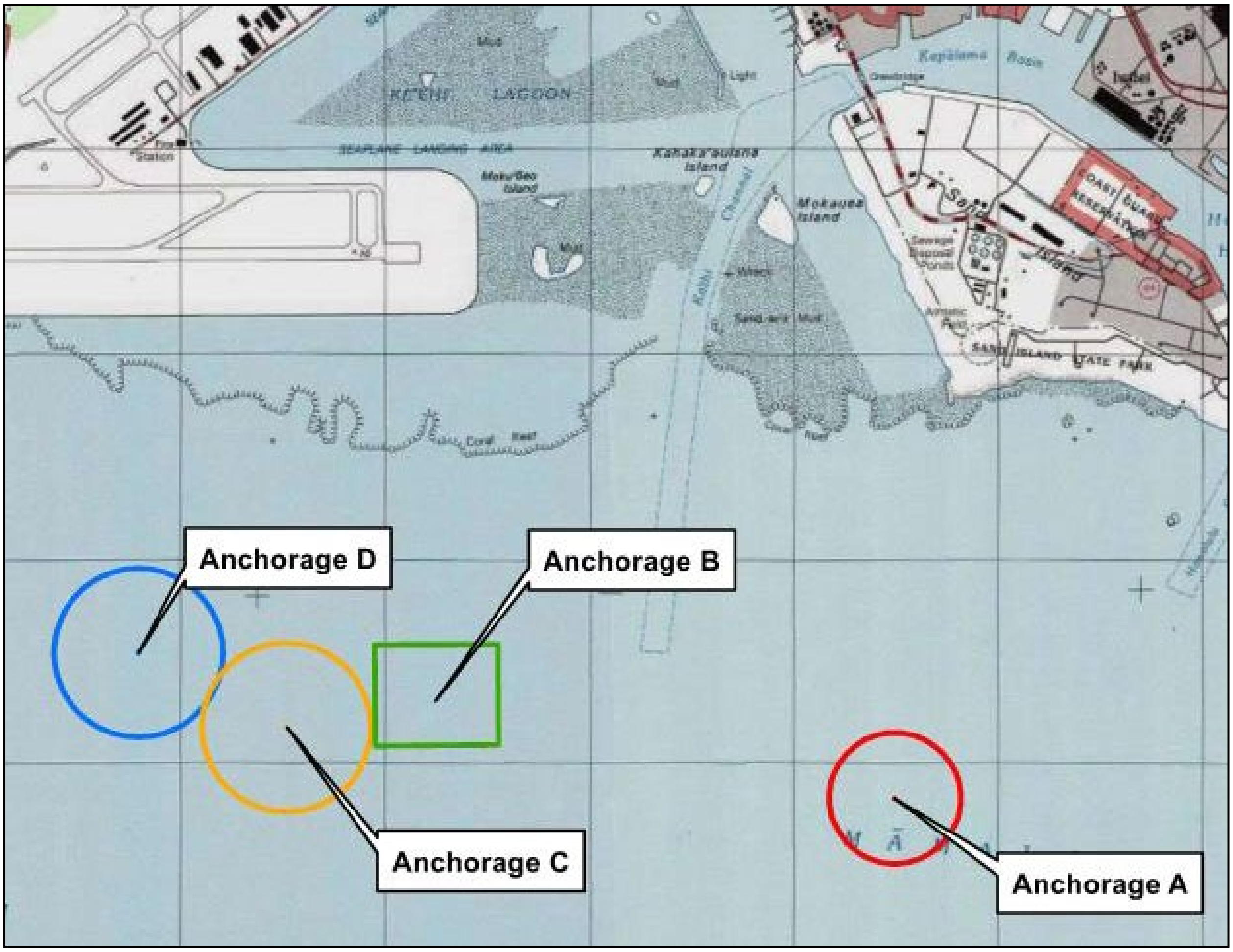

Figure 4.46 - Honolulu Harbor Anchorages

4.1.4 Navigational Aids and Weather and Ocean Condition Gauges

Navigational aids and weather/ocean condition gauges are located at different areas in the harbor to capture accurate, real-time environmental information (wind speed and direction, tides) to aid the safe navigation of vessels within the harbor. These navigational tools help ensure the right size and type of tugboats are used to move ships through the harbor under varying environmental conditions, particularly against prevailing trade winds. Ocean condition gauges include a navigation/weather station at Pier 1 and gage station at Pier 4.[16] The Pier 1 navigation/weather station is maintained by DOTH and used by NOAA and the USCG. The Pier 4 gage station has been in operation since 1905 and is maintained and operated by NOAA (see **Figure 4.47**).

[16] NOAA Tides & Currents, https://tidesandcurrents.noaa.gov/stationhome.html?id=1612340.

Figure 4.47 – Pier 1 navigation/weather station and Pier 4 gage station
(Source: Fung Associates, Inc., 2021)

4.1.4.1 Day Ranges

Day ranges consist of a pair of large, pole-mounted panels, often incorporating signal lights, that are used as visual references by ship pilots and crew to line up a ship's course through the confines of the harbor. There is one pair of day ranges in Honolulu Harbor; the forward day range panel is positioned at the *makai* end of Pier 7, and the rear panel is located at the *mauka* end of Pier 8. The existing day ranges are used by mariners to identify the navigation alignment through the Main Entrance Channel. There is a need to identify suitable locations at the east and west ends of the harbor for the installation of range markers (dayboards/night range lights) to denote the mid-channel navigational alignment of the Kapālama Transit Channel as an aid to navigation for vessels transiting the inner harbor channel. This simple technology will enhance safety while navigating through the Kapālama Transit Channel (see **Figure 4.48)**.

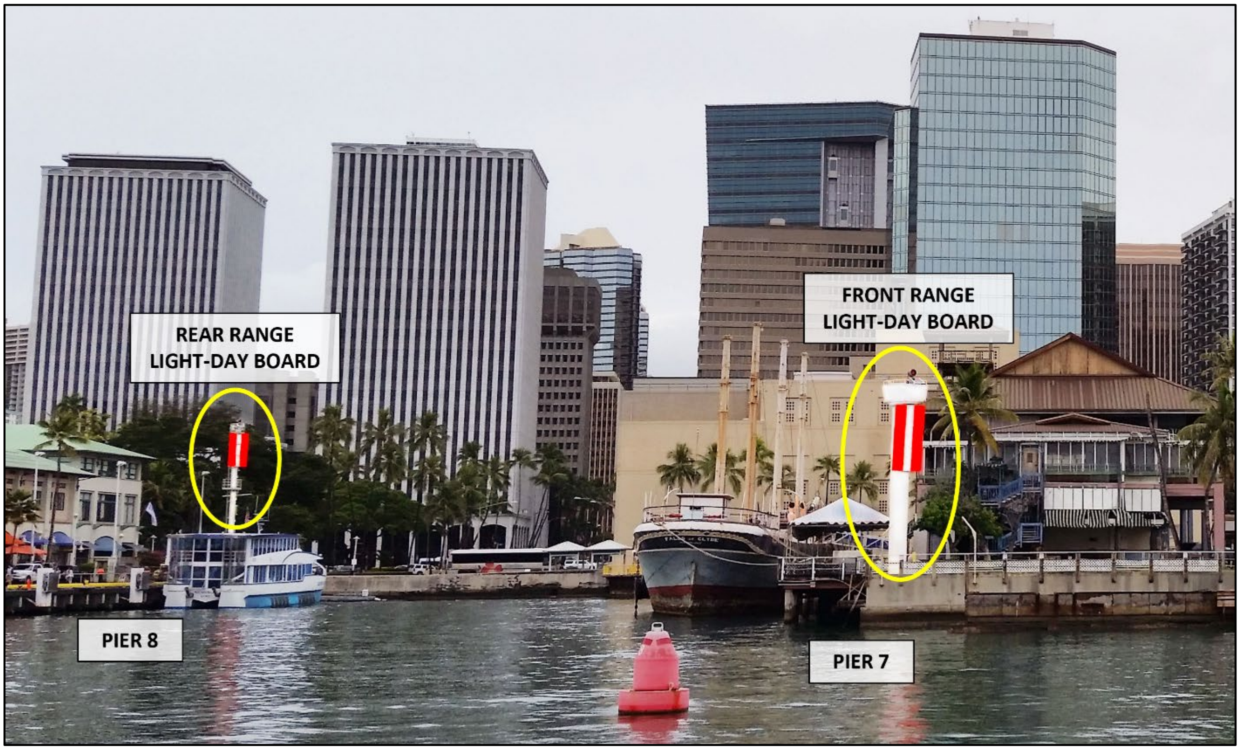

Figure 4.48 – Front and Rear Range Light-Day boards at Piers 7 and 8

4.1.4.2 UH Pacific Islands Ocean Observing System (PacIOOS)

The UH PacIOOS maintains and operates wave buoys that collect and transmit real time data on wave conditions. There is one wave buoy located in the vicinity of the harbor, approximately 1 mile offshore from the HNL. The wave buoy is moored approximately 115 FT deep and can measure north/south, east/west, and vertical displacement, which provides data on both wave direction and energy.

4.2 Infrastructure

4.2.1 Electrical and Lighting

4.2.1.1 Electrical Service

Electrical service to customers within Honolulu Harbor is provided by HECO. The HECO electrical distribution system consists of a series of overhead 46 kilovolt (kV) lines that feed a combination of overhead and underground 12 kV lines into the individual facilities. These lines are located in roadway rights-of-way (ROW).

Electrical service to the various facilities is generally extended underground from HECO's distribution system to pad-mounted transformers located within each facility. A few facilities are served by overhead poles with electrical line extension and pole-mounted transformers. HECO is responsible to provide the necessary equipment to support its distribution systems to the end user, including the joint utility poles, guy wires, sub-transmission and distribution conductors, pole-mounted transformers, and pad-mounted transformers. HECO's existing sub-transmission and distribution system within Honolulu Harbor is assumed adequate to support the existing landside facilities.

At the Sand Island Terminal, Matson's six ship-to-shore gantry cranes under standard operational conditions are powered by HECO. Matson's facilities at Piers 52 and 53 are also equipped with a dedicated emergency diesel-powered generation system that can provide full electrical power to support the terminal power requirements, including gantry crane operations, refrigerated plugs, yard lights, and buildings, so long as the diesel generators are refueled. Pasha's current three ship-to-shore gantry cranes at Pier 51 are self-sustainable with diesel generators providing electrified power to the cranes. When KCT opens for cargo operations, the five new container gantry cranes at KCT will be powered by HECO and connected to on-site battery storage to capture regenerative power from the crane operations to provide electrical power to the terminal for 24-36 hours. In the future, power at the terminal might be provided by on-site, renewable energy sources linked in a microgrid electrical system.

Honolulu Harbor does not have electrical power distribution and connection infrastructure to provide shore-to-ship power,[17] which would allow vessels to shut down their main engines while at berth thereby reducing exhaust emissions and improving air quality. One exception is shore-to-ship connections installed by Foss Maritime Company for its tugboats at Piers 21 and 22.

Honolulu Harbor currently lacks electrical vehicle (EV) charging stations. EV use will continue to increase in the future through personal and business ownership and government fleet vehicle inventories. Promoting EV use is a key component of the State's commitment to 100 percent clean

[17] Shore-to-Ship electrical power, also known as "cold ironing" is the process of providing shoreside electrical power to a ship at berth while its main and auxiliary engines are turned off. Cold ironing permits emergency equipment, refrigeration, cooling, heating, lighting and other equipment to receive continuous electrical power while the ship loads or unloads its cargo and/or passengers.

energy by 2045.[18] The CCH has also codified EV charging station requirements for new commercial construction in ROH Chapter 32, the CCH Energy Code.

Planned upgrades or redevelopment of existing facilities and proposed new development within Honolulu Harbor will require HECO engineering assessment(s) to determine the adequacy of their existing sub-transmission and distribution circuits and the extent of any upgrades to existing HECO equipment.

HECO's downtown power plant is located outside of DOTH property boundaries but is contiguous with the Aloha Tower complex. The power plant is currently deactivated, but not decommissioned. If needed, the downtown power plant can be reactivated within three months. An active substation is located on the east side of the power plant adjacent to Richards Street.

4.2.1.2 Lighting

Exterior and interior lighting is provided at the harbor facilities as needed for specific nighttime operations. Cargo piers use tall, fixed, pole-mounted lights with shielded, downward focused fixtures as well as mobile light stands to illuminate yard areas. Existing exterior lighting is adequate but may be modified or augmented from time to time based on operational needs. Most of the exterior lighting systems at Honolulu Harbor have recently been retrofitted with energy efficient LED luminaries and a networked, wireless lighting control system as part of an Energy Savings Performance Contract between DOTH and Johnson Controls. Modifications to, or replacement of, existing exterior lighting systems will need to be compatible with or similar to the current exterior lighting system and designed to meet illumination standards for safe operations and security, to be energy efficient, and to minimize light pollution.

4.2.2 Telecommunications

Telecommunication services (e.g., voice, internet, and other communications services) to customers within Honolulu Harbor are provided by Hawaiian Telcom and Spectrum. Hawaiian Telcom's and

[18] The 2021 Hawaiʻi State Legislature passed three bills, which Governor Ige signed into law, that promote EV use as part of the State's transition to clean transportation. These include: House Bill (HB) 424, which requires all state agencies to "adopt a preference for renting electric vehicles or hybrid vehicles" for state employees; HB552 which establishes clean ground transportation goals for state agencies to transition 100 percent of light-duty motor vehicles to a zero-emission fleet by December 31, 2035; and HB1142 which allocates a portion of barrel tax revenue and establishes dedicated funds to support and finance electric vehicle charging systems. The stated goal of these bills is to reduce Hawaiʻi's contribution to emissions that cause climate change and to reduce reliance on imported fossil fuels.

Spectrum's telecommunication distribution systems consist of a combination of overhead and underground optical fiber and/or copper cables that generally follow the alignment of the HECO distribution system located in roadway ROWs. Telecommunication services to the various Honolulu Harbor facilities are generally extended underground from the Hawaiian Telcom and Spectrum distribution systems to each facility. A few facilities are served by overhead cables extended from the overhead pole lines.

The existing Hawaiian Telcom and Spectrum distribution systems within Honolulu Harbor are assumed to be adequate to support the existing facilities. Planned upgrades or redevelopment of existing facilities and proposed new development within Honolulu Harbor will require Hawaiian Telcom and Spectrum to conduct engineering assessment(s) to determine the adequacy of their existing distribution systems and the extent of any upgrades to existing facilities.

4.2.3 Roadways and Traffic

Honolulu Harbor is confined along the south shore of O'ahu by densely developed urban Honolulu. On the landside, the piers are mostly discontinuous and rely primarily on public roadways for access between terminals. There are two locations with internal connecting roadways in the harbor: Aloha Tower Drive, which provides connection between Piers 5 through 11, and an internal driveway that connects Piers 19 and 20 to Pier 29. The two major public roadway systems that service Honolulu Harbor are the Nimitz Highway / Ala Moana Boulevard corridor, which runs along the *mauka* side of the harbor, and Sand Island Access Road / Sand Island Parkway, which runs on the *makai* side of the harbor (see **Figure 4.49**). Feeder roadways and driveways that provide access to and from the various harbor terminals are listed in **Table 4.2**.

Figure 4.49 – Turning Movements for Piers 19 through 33 Access

Table 4.2– Honolulu Harbor Access Roadways and Driveways

Main Roadway Intersecting Streets / Driveways	Provides Access to/from (Pier No.)	Owner
Ala Moana Boulevard	1 to 11	DOT-Highways Division (DOT-HWY)
Forrest Avenue	1 and 2	DOTH
Channel Street	1 and 2	CCH
Papu Road	Channel St. & Forrest Ave.	DOT-HWY
Aloha Tower Drive (Exit)	Ala Moana Boulevard	DOTH / ATDC
Richards Street	Aloha Tower complex	CCH
Bishop Street	Aloha Tower complex	CCH
Nimitz Highway		DOT-HWY
Aloha Tower Drive at Fort Street	Aloha Tower complex	DOTH / ATDC
Kukahi Street	19 to 23	DOT-HWY
Pacific Street	23 to 29	DOT-HWY
Pier 31 to 34 Driveway	31 to 34	DOTH
Pier 32 Backland Driveway	31 to 34	DOTH
Alakawa Street	35 to 38	DOT-HWY
Piers 36 to 38 Driveway	36 to 38	DOT-HWY
Waiakamilo Road	39 to 41	DOT-HWY

Libby Street	39 to 41	CCH
Sand Island Access Road	39 to 41 and KCT	DOT-HWY
Auiki Street	39 to 41 and KCT	CCH
Pahounui Drive	60	CCH
KCT Driveway	KCT	DOTH
Sand Island Parkway	51 to 53	DOT-HWY
Pier 51 Driveway (Sealand Drive)	51	DOT-HWY
Pier 52 to 53 Driveway (Matson Drive)	52 to 53	DOTH

Nimitz Highway, Ala Moana Boulevard, Sand Island Access Road and Sand Island Parkway are federally designated highways in the National Highway System (NHS) and the Primary Highway Freight System (PHFS). Sand Island Access Road / Parkway, Kukahi Street (from Nimitz Highway to the Piers 19/20 gate), Forrest Avenue (from Ala Moana Boulevard to the Pier 1 gate), and Matson Drive (from Sand Island Parkway to the Piers 52/53 gate) and Sealand Drive (from Sand Island Parkway to the Pier 51 gate) are also designated NHS Intermodal connectors. These designations indicate roadways that are essential to the movement of goods, services and people, to the economy and to national defense. These and the other roadways that serve Honolulu Harbor are critical components of the State's and O'ahu's larger intermodal freight network that supports the supply chain to the State's population. Poor performance of these roadway systems can lead to congestion and delays at Honolulu Harbor that affect the overall supply chain (DOT-HWY, 2018).

There are two maritime activities that produce distinctive traffic impacts. First is traffic created by the cargo terminals, which tends to produce truck traffic along the roadways at the terminals' entry gates during cargo operations. Due to the high volumes of cargo and the limited capacity of the roadway system, congested traffic conditions are experienced regularly. During the morning peak hours of 7:00 AM to 9:30 AM, on days when ships are off-loading, roadway systems surrounding Honolulu Harbor experience traffic slow-downs and delays at intersections. During the time when ships are not off-loading, queuing is minimal and roadway systems around Honolulu Harbor generally operate with free-flowing traffic and minimal delays, except during peak AM and PM periods of commuter traffic.[19] Second is the traffic produced from cruise ship terminals, which tends to produce high volumes of bus, shuttle and vehicular traffic within a short period of time, particularly during full or partial turns and to a lesser extent during cruise ship port calls.

Limited truck storage capacity in the cargo terminals and on the adjacent public roadways creates queuing in both the outbound and inbound lanes near cargo terminal entrances. This queuing adversely impacts traffic conditions at the following locations:

[19] Source: DOTH Administration [20] DOTH 2021 Stormwater Management Plan (Honolulu Harbor HI03KB482).

- Forrest Avenue at the Piers 1 and 2 gate area, Fort Armstrong Terminal. Forrest Avenue provides two inbound travel lanes to the Piers 1 and 2 gate, plus a third lane used for left turns onto Ilalo Street. Truck queuing into the terminal often backs up onto Forrest Avenue and occupies the two travel lanes, causing congestion on these public roadways. Exiting the terminal, Forrest Avenue provides two travel lanes to Ala Moana Boulevard. The outer lane is used for parking and occasionally for informal container-on-chassis storage, which encumbers its function for vehicle movement. Traffic on Forrest Avenue and Ilalo Street is expected to increase as Kakaʻako Makai develops.
- At the multi-purpose cargo terminals at Piers 19 and 20 (Kukahi Street), Pier 29 (Pacific Street) and Piers 31 to 33, the absence of a deceleration lane on Nimitz Highway forces east-bound trucks to slow down in the outside travel lane before making a right turn into the DOTH facilities, thereby contributing to congestion on the highway. This is particularly the case at the Pacific Street / Nimitz Highway intersection at the Piers 24 to 29 gate, which has a tighter turning radius than the other gates. A project is currently underway to provide truck storage off of Nimitz Highway at Piers 24 to 28 to alleviate traffic near Nimitz Highway and Pacific Street during peak hours.
- Trucks exiting the multi-purpose cargo terminals at Piers 19 and 20 (Kukahi Street), Pier 29 (Pacific Street) and Piers 31 to 33 must turn right-out only onto east-bound Nimitz Highway. Only the Piers 24 to 29 driveway has a signalized intersection that allows a left turn onto Nimitz Highway west-bound, via Pacific Street. However, the short segment of Pacific Street between east-bound and west-bound Nimitz Highway has very limited storage capacity, which can cause trucks to become stuck between signal changes and block traffic on Nimitz Highway. To mitigate this condition, DOTH proposes to restrict trucks exiting Piers 24 to 29 to right-turn out only onto Nimitz Highway. Trucks exiting from all of these cargo terminals are typically destined for the west-bound direction; however, they must first travel east-bound on Nimitz Highway and execute a U-turn at Sumner Street or Pacific Street onto west-bound Nimitz Highway. This traffic pattern contributes to congestion on Nimitz Highway.
- The Waiakamilo Road and Nimitz Highway intersection is signalized with full turning movements in all directions, including into and out of the Interisland Terminal main gate. This gate provides two inbound gate lanes with less than 300 LF each. Inbound lanes at the Interisland Cargo Terminal are frequently congested by container truck traffic during barge arrivals, with trucks backing up on Nimitz Highway, in both the east-bound travel lane and west-bound left turn lane, and on Waiakamilo Road (see **Figure 4.50**). Use of the recently created off-street truck queuing lanes adjacent to Auiki Street at KCT and related changes to Interisland Terminal container truck operations may mitigate some of the congestion on public roadways (see **Figure 4.51**).

Figure 4.50 – Entrance to Interisland Terminal, Piers 39 and 40 (view from Waiakamilo Road and Nimitz Highway intersection looking into terminal)

- A second gate, at the Auiki and Libby Streets intersection, also provides access to Interisland Terminal. In 2020, an internal multi-lane truck storage roadway was constructed along the *mauka* edge of KCT as part of the KCT harbor modernization project. The storage roadway is located parallel to Auiki Street within KCT, but outside of the secure yard area. The storage roadway is designed with access off Auiki Street for the purpose of reducing truck queuing on the public roadways. It is used primarily by container trucks conveying transshipped cargo between the Sand Island Terminal and Interisland Terminal (see **Figure 4.51**).
- The KCT entrance gate is located off Sand Island Access Road, approximately 550 LF *'Ewa* from the Sand Island Bridge. The terminal is being developed with internal truck storage lanes with adequate capacity to eliminate queuing and congestion on the public roadway.
- On Sand Island Parkway, at the Piers 52-53 (Matson) Gate and at Pier 51B (Pasha/Sealand) Gate of the Sand Island Terminal, truck queuing lanes within the terminal yard and on Sand Island Parkway lack capacity during peak hours which results in truck queuing and congestion on the public roadway.

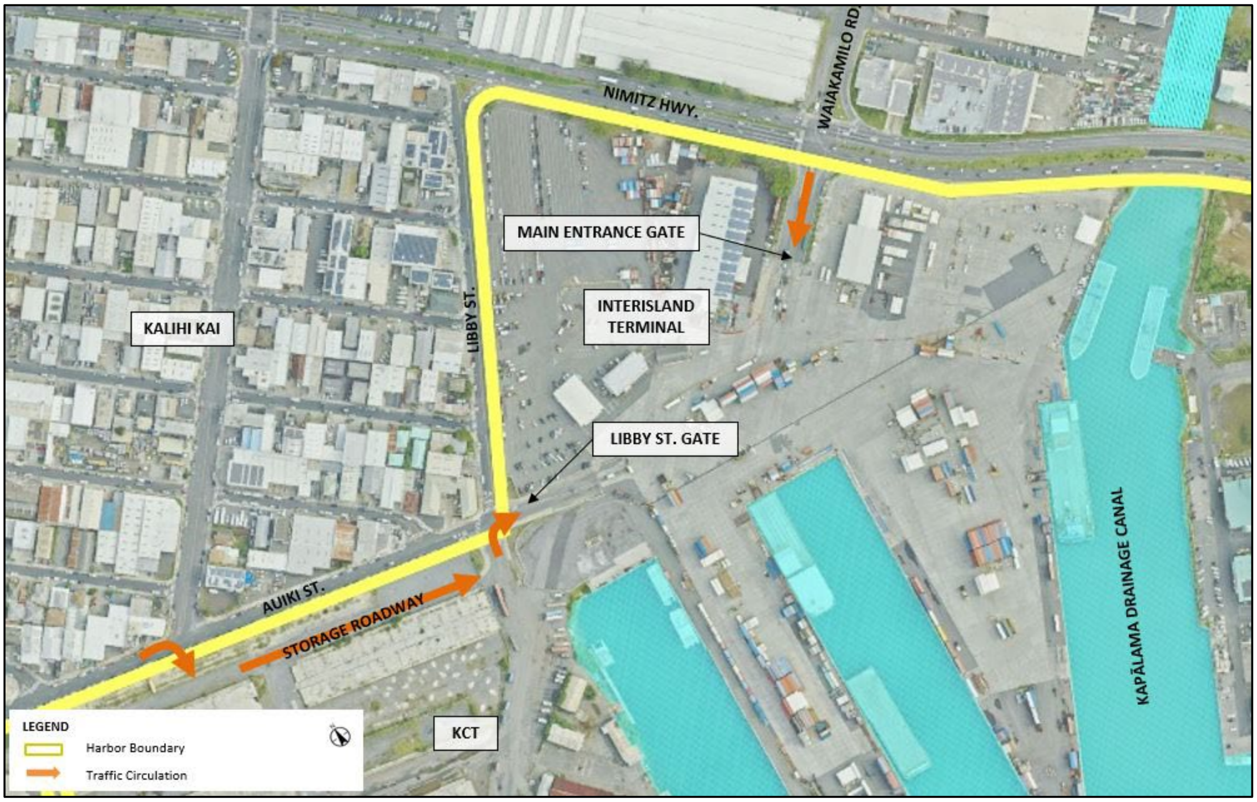

Figure 4.51 – Interisland Terminal Adjacent Roadways

Channel Street, which serves as the entrance roadway into the Pier 2 Cruise Terminal, is a four-lane, two-way public street where it intersects with Ala Moana Boulevard, but tapers to one lane in each direction as it approaches the Pier 2 Terminal entry gate. The roadway does not provide a convenient vehicle turn-around space before entering the secure terminal area; vehicles that aren't permitted to access the Cruise Terminal typically execute 3-point turns across both travel lanes or maneuver through the FTZ public parking lot to turn around. Both maneuvers contribute to vehicle congestion. On cruise ship days, Channel Street is congested by ground transportation vehicles including buses, taxis, ride-share vehicles and personal vehicles, as well as by service and provisioning vehicles. The Pier 2 terminal lacks sufficient vehicle queuing space, which frequently results in congestion on Channel Street from ground transportation vehicles, particularly taxis. Traffic moving through the Pier 2 Cruise Terminal follows a meandering route around a federally owned parking lot (the GSA Lot, see **Section 3.5.1.4**) and exits via Papu Road onto Forrest Avenue. See **Figure 4.52** and **Section 4.1.2.2** for additional discussion.

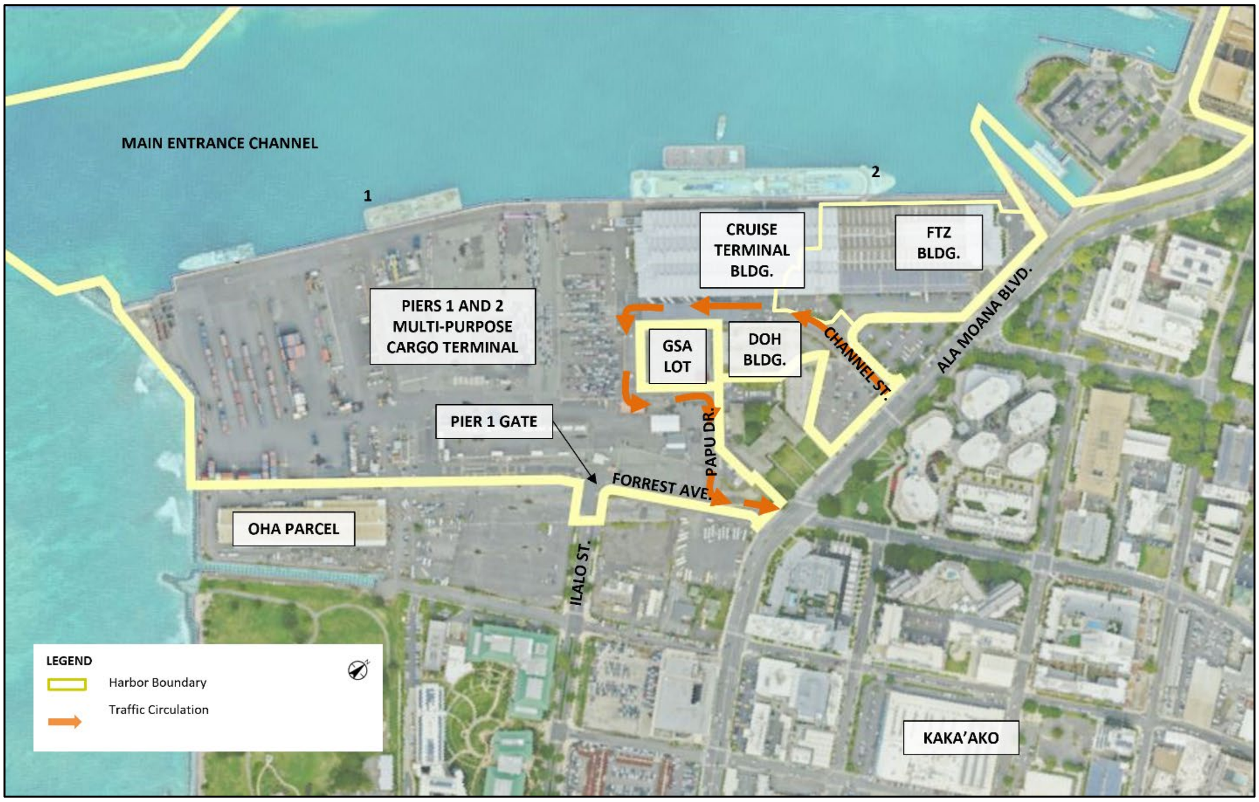

Figure 4.52 – Piers 1 and 2 Roadways and Cruise Terminal Traffic Circulation

Aloha Tower Drive provides access to the Aloha Tower complex at Piers 5 to 11 (see **Figure 4.53**). It is a four-lane, two-way roadway that intersects Nimitz Highway at Fort Street (inbound and outbound) and travels southwesterly until merging with Ala Moana Boulevard near Pier 4. Other streets that provide ingress/egress to the Aloha Tower complex are Bishop Street (two inbound lanes and two outbound lanes) and Richards Street (one lane inbound only). Aloha Tower Drive transitions to a two-lane, two-way road after it crosses Bishop Street and then becomes a one-lane, one-way outbound road after it crosses Richards Street. Traffic on Aloha Tower Drive generally experiences minimal delay, even during peak traffic hours (ATA, 2017). However, traffic congestion is created on Aloha Tower Drive and on the intersecting roadways by drivers circulating in search of parking. In addition, Aloha Tower Drive does not accommodate legal U-turns, which results in awkward and illegal vehicle maneuvering that contributes to congestion. On cruise ship days, passenger ground transportation and ship provisioning and servicing vehicles, which include large container trucks and buses, contribute significantly to congestion on Aloha Tower Drive and the intersecting streets.

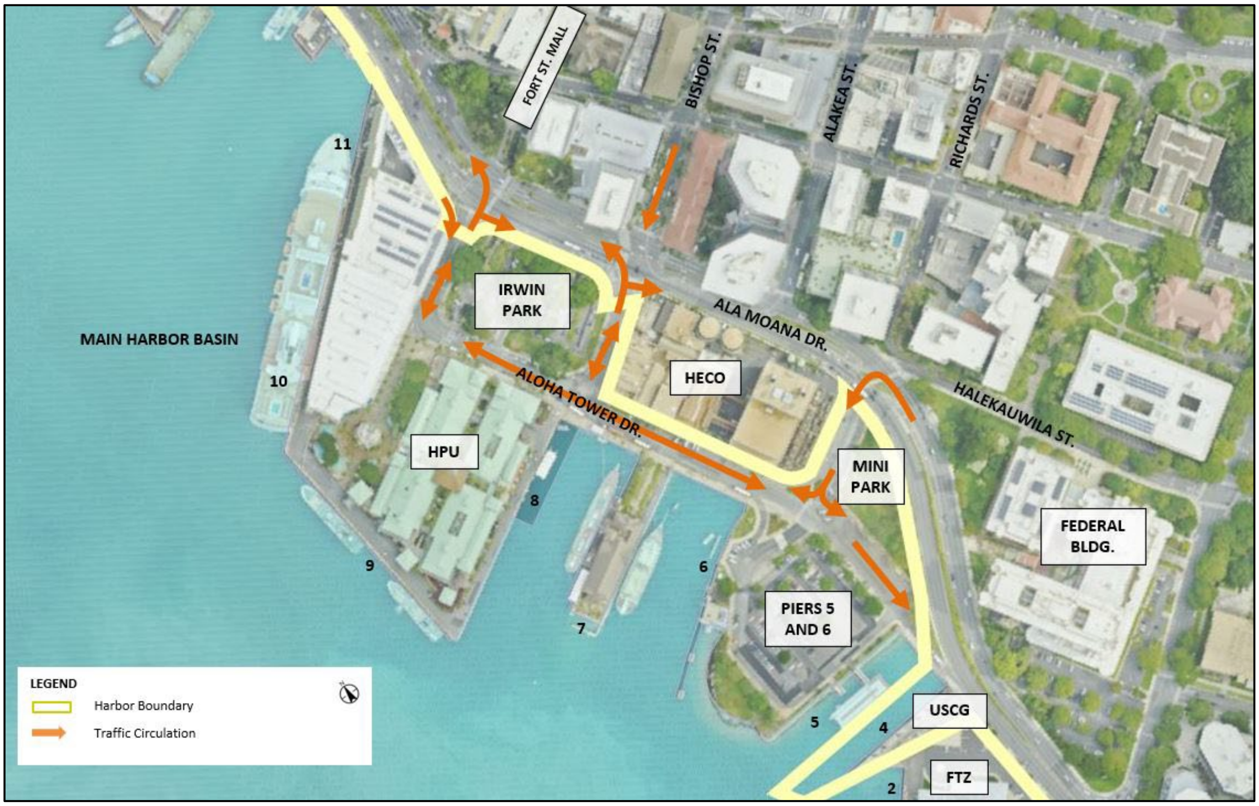

Figure 4.53 – Existing Aloha Tower Complex Traffic Configuration

Access to Pier 60 and the Ke'ehi Industrial Park is from a paved driveway that is located at the end of a road that extends from Sand Island Access Road; the road also provides access to the La Mariana Sailing Club and the Ke'ehi Marine Center (see **Figure 4.54**). In addition, Pahounui Drive, with an intersection on Sand Island Access Road, provides access to the HC&D batch plant located on a private parcel adjacent to Pier 60. HC&D integrates the batch plan operations with their use of their Pier 60 lease area, which is separated by the Pier 60 internal roadway. Currently, there is no public access connection to Pier 60 from Pahounui Drive. The Pier 60 and the Ke'ehi Industrial Park internal roadway conditions are poor with surface cracks and potholes. The roadway shoulders, a combination of partial pavement and gravel, are used for parking and storage. The roadway near the *makai* edge of Pier 60 is subject to flooding during king tides and wind and storm swells. Pahounui Drive is developed as a standard city street with curb, gutters and sidewalks.

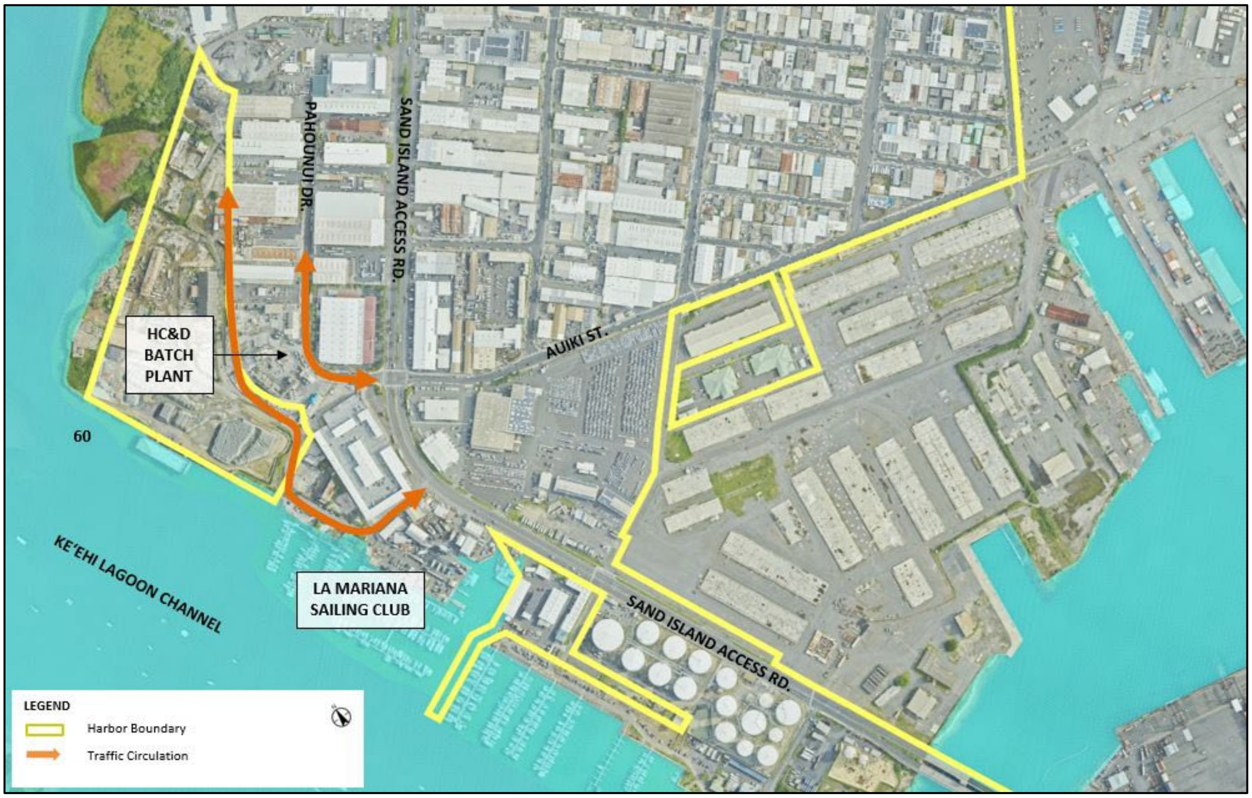

Figure 4.54 – Pier 60 Roadway Access

Heavy vehicle traffic around Honolulu Harbor, particularly container truck traffic, results in wear and tear on the roadway system that serves the harbor. Nimitz Highway has the second highest truck volumes in the state, after H-1, with an estimated 4,500 to 5,000 daily truck trips. Sand Island Access Road and Sand Island Parkway have the highest concentration of locations with high-volume truck traffic. (DOT-HWY, 2018). The wear and tear from truck traffic extends to the driveway entrances to harbor facilities. Based on visual inspection, the entrance driveways to most Honolulu Harbor facilities appear to need repair. Pavement conditions at the entrance to Piers 24 to 29, shown in **Figure 4.55**, is indicative of the condition at many of the driveway entrances. These driveway entrances are managed by DOT-HWY.

Figure 4.55 – Poor pavement conditions at Pier 24-29 entrance (DOT-HWY Jurisdiction)

Circulation within the individual terminals consists of internal roads that can withstand the weight of loaded trucks transporting cargo, in accordance with state and federal highway standards and best practices. Development and maintenance of the internal roads is the responsibility of DOTH as part of yard pavement improvements; however, the configuration of internal roads at non-exclusive, dedicated use cargo terminals is determined by the preferred terminal operators according to their operational needs. Terminals should be configured to accommodate adequate container truck queuing storage to prevent queuing and related congestion on adjacent public roadways.

4.2.4 Fencing and Security

Most of Honolulu Harbor facilities are used for industrial maritime activities that, for reasons of safety and security, are secured from public access by fencing and access protocols in compliance with Maritime Transportation Security Act (MTSA) regulations. Personnel accessing secure areas of the port are required to have both a Transportation Worker's Identification Credential (TWIC) and a Maritime Security Card (MARSEC). TWIC is an identification credential issued by the Department of Homeland Security for all personnel accessing a MTSA regulated area. MARSEC is a security training course that provides the tools to recognize and detect potential security threats as well as other security protocols. Security fencing surrounds the backland areas of Piers 1 and 2, Piers 11 through 14, Piers 16 through 35, portions of Pier 38, Piers 39 and 40, Pier 41, and Piers 51 through 53A.

Entry gates that control access are located along various locations of the fence lines. In addition, the Pier 36 to 38 Fishing Village is fenced, but publicly accessible.

The majority of security fencing used in the harbor is 6-FT high chain link fence topped with barbed wire strands. This fencing material is economical to procure, install and maintain and appropriate for the required level of security. It can be easily screened with vegetation where improved aesthetics are a consideration. In areas of the harbor with high public visibility and use, and that have a greater need for aesthetic consideration in facility design, DOTH maintains a more visually appealing 8-FT high picket security fence fabricated from marine-grade powder coated black aluminum. This fence type is installed at Piers 11 through 18 adjacent to Nimitz Highway. This segment of the harbor offers public views of the harbor waterfront and coincides with the approach to the Aloha Tower complex, Chinatown, and Downtown, all of which are major public destinations with high visible interest. In addition, this fence type is installed at the Piers 36 to 38 Fishing Village, which is also a public destination. From Piers 11 to 17, where the fence is immediately adjacent to the water, it is mounted on a 2-FT high foundation wall designed with scuppers, with a total height of 8 FT. Where it aligns inland from the water at Pier 18 and at the Fishing Village, there is no foundation wall and the fence pickets extend to the ground. This type of fence is much costlier to procure, install and maintain. It is best suited for locations at the harbor with high public visibility and use.

4.2.5 Potable Water and Fire Protection

The existing source, storage, and transmission of water to Honolulu Harbor is via a Honolulu Board of Water Supply (BWS) system. The water system within Honolulu Harbor is owned and maintained by DOTH or its users. Typically, DOTH provides water lateral stubs that individual harbor tenants can tap into to provide water service to their use area.

The existing points of connection to the BWS water system are a 12-inch diameter water main within the DOT-HWY Nimitz Highway / Ala Moana Boulevard ROW and a 16-inch diameter water main within the Pacific Street and Sand Island Access Road ROW. Potable water service is provided to individual terminals through a series of various diameter water laterals connected to the water mains.

The BWS potable water system also supplies Honolulu Harbor's fire protection system through water laterals connected to the water mains. The fire protection system consists of wells, storage tanks, distribution mains, meters, fire hydrants, and fire distribution lines. Based on discussion with BWS, the existing water system is generally adequate to provide the existing on-site facilities within Honolulu Harbor with potable water and fire protection. All future improvements will be designed in compliance with BWS standards and coordinated with the Fire Prevention Bureau of the CCH Honolulu Fire Department (HFD) and will conform to existing fire codes.

Chapter 7 identifies required upgrades to potable water and fire protection utilities for specific areas of the harbor where major development/redevelopment is proposed. Existing water and fire protection utilities at these locations are noted below.

- ***Pier 2 Cruise Terminal.*** The domestic water system that serves Pier 2 consists of 6-inch cast-iron pipe, valves, boxes, and meters. The 6-inch line connects to a 12-inch BWS water main located within Ala Moana Boulevard. The water system does not meet BWS Water System Standards (WSS) for potable water systems or fire needs. In addition, exterior fire protection is provided by means of a 12-inch BWS waterline located along Channel Street that provides water to existing fire hydrants spaced approximately 200 LF apart on the Diamond Head side of the street, including three hydrants located within the secure terminal area across the ground transportation staging area from the terminal building. Pier 2 currently has shore-to-ship water connection, however cruise ship operators noted that the existing water system lacks flow and pressure to adequately service cruise vessels at berth and to replenish on-board potable water storage within the 12-hour period that cruise vessels are typically in port.
- ***Piers 5 and 6***. The domestic water system that serves Piers 5 and 6 consists of 2- and 3-inch pipes, valves, meters, and boxes. The water lines connect to a 12-inch BWS water line located within Ala Moana Boulevard. The 12-inch water line also provides water to fire hydrants installed along the street. The BWS domestic water system is in acceptable condition for potable and fire protection service. However, the existing system downstream from the water meter is aged and in poor condition.
- ***Piers 7 and 8.*** The water system that serves Piers 7 and 8 is supplied by a 12-inch BWS main water line within Aloha Tower Drive that connects to a 16-inch main that extends north on Nimitz Highway from the Aloha Tower Drive/Fort Street intersection. The 12-inch water line also supplies the fire protection system, which consists of a 6-inch water line, detector check meter, fire hydrants, and valves. A fire hydrant is located at the entrance to Pier 7 on Ala Moana Boulevard. The fire system components are in aged condition. Pier 7 potable water is provided by 2- and 3-inch water laterals, meters and valves connected to the 12-inch water main. A 6-inch lateral runs along the face of Piers 8 and 9 to serve the maritime uses. In addition, an 8-inch looped water lateral circles the Aloha Tower Market Place and provides water to those buildings. Maritime operators noted that the existing water utility does not provide a dedicated shore-to-ship water connection at these piers, and that the existing water system does not have adequate pressure and flow for day excursion operations.
- ***Piers 10 and 11.*** The potable water system that currently serves Piers 10 and 11 consists of a 6-inch water line along the face of the piers, which is an extension of an 8-inch water line along the Aloha Tower Drive side of the pier sheds. These lines connect to the 12-inch BWS water main in Aloha Tower Drive. In addition, a 4-inch water line connects to the 16-inch BWS water main in Nimitz Highway to serve the DOTH offices at Pier 11. The 12-inch water

line also provides water to fire hydrants on both sides of Aloha Tower Drive. The existing water system, including pipes, valves and fittings, are in aged condition and inadequate to support redevelopment of the Piers 10 and 11 landside areas. Cruise ship operators also noted that the existing shore-to-ship water connection does not provide adequate pressure and flow to meet the needs of modern cruise ship operators while at berth.

- ***Piers 19 to 23***. The domestic water system at Piers 19 to 23 consists of 2-, 3-, and 4-inch water lines, valves, and meters that connect to a 12-inch BWS water line on Nimitz Highway. The 12-inch water line also supplies water to the fire water system comprising 6-, 8- and 12-inch water lines, valves, and meters that run the length of the driveway that serves Piers 19 to 21 and provides water to fire hydrants spaced approximately 200 LF apart. The existing water system, including pipes, valves and meters, is aged and inadequate to support redevelopment or densification of the landside areas of these piers. A separate waterline transitions from a 9-inch to a 6-inch line along the face of Piers 18 to 21, with connection to a 16-inch BWS waterline in Nimitz Highway. This waterline is sufficiently sized to serve the planned maritime uses at these piers, including redevelopment of "Tug Row" facilities at the end of Piers 21 to 22. Tugboat operators noted that shore-to-ship water system connections are insufficient to support tug operations at Piers 21 to 22 due, in part, to low water pressure. In addition, the pipes, fittings and valves of this system will require incremental replacement over the HHMP planning period due to their age and condition.

4.2.6 Stormwater

Stormwater runoff originating upland discharges at multiple locations into Honolulu Harbor. Stormwater outfalls include Nuʻuanu Stream (Pier 16) and Kapālama Drainage Canal (Piers 38 to 39), and through the 124 drainage outlets owned by the CCH and DOT (DOTH, 2021). These systems convey storm and urban runoff water, sediment, trash, debris and hazardous materials from *mauka* areas outside of DOTH jurisdiction into the harbor where the discharged materials create maintenance issues by contributing to sedimentation that accelerates dredging intervals. These systems also deposit floating and sunken debris that creates navigational hazards, damages vessels, discharge pollutants that impact water quality, and generally adversely affect port function. In addition, deficiencies in the drainage systems can result in backups in the system and upstream flooding through manholes and storm drain inlets. These conditions are expected to be exacerbated by climate change and SLR due to both higher water levels that will submerge drain outlets thereby blocking outflows, and to expected intensification of rainfall events that will generate greater, episodic drainage flows. Maintenance of drainage ways and adjacent lands is challenging due to unclear or disputed jurisdictions among county, state, federal and private entities. Because the drainage systems fall under several jurisdictions, including CCH, DOTH, DOT-HWY and private systems, addressing the drainage system deficiencies and ongoing maintenance requires a regional perspective and multi-agency coordination.

4.2.6.1 Off-site Drainage

Drainage systems from three off-site tributary drainage areas discharge through Honolulu Harbor facilities and into the harbor waters. The Kapālama Drainage Canal and Nuʻuanu Stream carry the majority of stormwater runoff that discharges into Honolulu Harbor between Piers 38 and 39, and between Piers 15 and 16, respectively. In addition, lesser off-site tributaries discharge runoff into inlet boxes, drain manholes, box culverts, and pipes, which eventually flow into Honolulu Harbor. The three drainage tributary systems of concern are shown in **Figure 4.56** and described below:

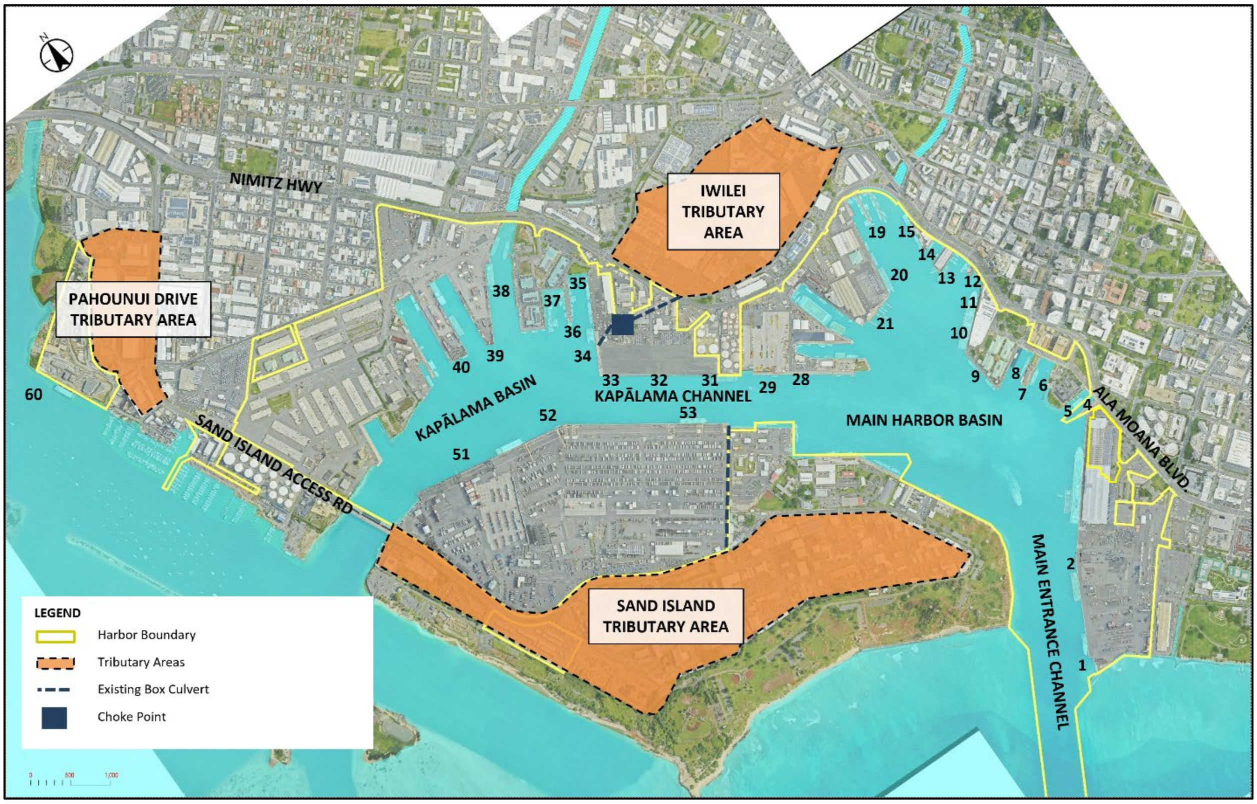

Figure 4.56 – Off-Site Drainage Tributary Areas of Concern

- ***Iwilei Tributary Area.*** Runoff flows through a collection of pipes, catch basins, inlets, and box culverts that cross Nimitz Highway near Alakawa Street and the Piers 34 and 35 backlands area. Once runoff crosses *makai* of Nimitz Highway, it flows into an undersized 4-foot-wide by 3-foot-deep box culvert and causes a backwater condition upstream (i.e., a "choke point"). Partial provisions after the choke point were constructed as part of the Piers 34 and 35 improvements project in 2016. A 12-foot-wide by 4-foot-deep box culvert was designed to CCH Storm Drainage Standards to accommodate a 50-year, 1-hour storm event. However, the new box culvert segment ends at the perimeter of Piers 34 and 35 and the upstream choke point remains.

- ***Sand Island Tributary Area.*** This tributary system collects stormwater runoff along Sand Island and the Piers 52 and 53 backlands area and discharges the runoff through an 8-foot-wide by 6-foot-deep box culvert into Honolulu Harbor. The existing box culvert is located along the boundary between Pier 53 and the USCG Base Honolulu and is owned and maintained by the CCH. The box culvert is in poor condition. Failure to maintain the culvert may cause collapse of the pavement above the culvert and create a safety risk for terminal operations.
- ***Pahounui Drive Tributary Area.*** The area located from Sand Island Access Road to Pahounui Drive adjacent to the Pier 60 backland area is continuously settling and collects stormwater runoff via overland sheet flow that discharges into Keʻehi Lagoon. The drainage system is deficient in this area and needs to be upgraded to meet CCH standards. The drainage overflow condition beyond the drainage system design flow needs to be addressed to ensure that flooding does not occur in the area during rainfall events that overwhelm the drainage system.

4.2.6.2 On-site Drainage

Honolulu Harbor's on-site drainage system consists of reinforced concrete catch basins, inlets, pipes, trench drains, box culverts and manholes located in all the piers and associated backland areas. The existing drainage system improvements throughout the harbor are generally old and in deteriorated condition. Portions of the drainage system that only serve harbor facilities are owned and maintained by DOTH; most of the drainage systems that serve the piers and backland areas connect to drainage main lines owned by the CCH and DOT-HWY that also convey off-site drainage. Approximately 125 drainage outfalls discharge into Honolulu Harbor through these systems.[20] Many of these drainage outfalls are partially or nearly completely submerged during high- and king tides, which causes backups in the drain system and can cause flooding in upstream areas. Projected SLR is expected to submerge more drainage outfalls in Honolulu Harbor and further exacerbate these conditions. Stakeholders noted that a regional approach and multi-agency, multi-jurisdictional response is required to address existing drainage system deficiencies and projected SLR impacts to drainage system infrastructure.

In addition to the general need for ongoing maintenance and opportunistic replacement of the existing aging drainage system components as part of programmed harbor facility improvement projects, drainage system deficiencies identified during the master planning process include:

[20] DOTH 2021 Stormwater Management Plan (Honolulu Harbor HI03KB482).

- ***Piers 1 and 2.*** Piers 1 and 2 Multi-Purpose Cargo Terminal is prone to ponding and flooding due to subsiding topography in adjacent land areas in Kakaʻako Makai and undersized drain lines.
- ***Pier 22.*** Pier 22 has a collapsed drain line with a drainage outfall into the slipway. The collapsed drain line is contributing to erosion underneath the Pier 22 apron and yard area and weakening the pavements above. A project is currently underway to repair this drain line.
- ***Piers 31 to 33.*** The Piers 31 through 33 backland area is subject to ponding and flooding during storm events due to subsiding topography and a choke point in the undersized box culvert that conveys drainage from Iwilei through the Piers 34 and 35 backland areas.

4.2.7 Wastewater

The wastewater system within Honolulu Harbor is owned by DOTH and CCH. Wastewater is collected from the DOTH properties and flows through the wastewater system owned and operated by the CCH for treatment at the CCH's Sand Island Wastewater Treatment Plant (SIWWTP) located *makai* from the Sand Island Terminal. There are no treatment facilities within Honolulu Harbor.

There are three sewer force mains (one 42-inch and two 34-inch) that traverse Kapālama Transit Channel from the Piers 33 and 34 backland area to Pier 52 and on to the SIWWTP. Additionally, there are two sewer force mains (one 54-inch and one 60-inch) that cross the Main Entrance Channel from the Pier 1 backland area to Sand Island. Gravity sewer lines and sewer force mains within the harbor vary in size from 4-inches to 8-inches. The existing wastewater system is generally adequate to serve existing DOTH properties and maritime operations. Existing sewer collection utilities at specific locations in the harbor recommended for HHMP improvements are as follows:

- ***Pier 2 Cruise Terminal.*** The wastewater system that serves Pier 2 is a gravity system that consists of a 6-inch clay pipe and concrete sewer manholes. The 6-inch line connects to a 34-inch gravity sewer line located within Ala Moana Boulevard. The gravity sewer system at Pier 2 is in poor condition and does not meet CCH Wastewater System Standards. Cruise ship operators also noted that there is no shore-to-ship sewer connection to allow cruise ships to pump out sewage while at berth. The inability to discharge sewer while in port shortens the amount of time that a cruise ship can remain at berth due to limited on-board sewage storage and treatment capacity.
- ***Piers 5 and 6.*** The wastewater system that serves Piers 5 and 6 is a gravity sewer system that consists of 8-inch vitrified clay pipe and concrete sewer manholes built in 1988. The 8-inch line connects to a 32-inch gravity sewer line located within Ala Moana Boulevard. The gravity sewer system is in acceptable condition and meets CCH Wastewater System Standards. However, the system does not currently provide shoreside sewer pump-out connection for day excursion vessels. Currently, depending on the fixture unit count/sewer

discharge load of any future development within the landside areas of Piers 5 and 6, there is adequate sewer capacity to allow for discharge into the municipal system.

- ***Piers 7 and 8.*** The wastewater system, that serves Piers 7 and 8 is a gravity sewer system that consists of two 8-inch sewer laterals; one system built in 1990 and the other built in 1993. Both lines gravity flow to a 28-inch gravity sewer line in Ala Moana Boulevard / Nimitz Highway that was built in 1912. The existing gravity sewer lines are adequately sized for the expansion of day excursion operations or ferry service; however, the system lacks adequate shoreside vessel sewer connections to allow vessel sewer pump-out while at berth.
- ***Piers 10 and 11.*** The wastewater system that serves Piers 10 and 11 is a gravity sewer system that consists of 8-inch vitrified clay pipes and concrete sewer manholes built in 1900 and 1993. The sewer in this area flows to a 28-inch sewer line in Ala Moana Boulevard/Nimitz Highway. The existing sewer system does not include pier-side sewer connection for cruise vessels. Cruise vessels that dock at Piers 10 and 11 have in the past run a temporary sewer line from the ship to a CCH sewer manhole located in the driveway to the DOTH office at Pier 11. Cruise ships pay the CCH each time they discharge into the municipal sewer system. Although the temporary sewer line has been serviceable, the exposed temporary line creates an obstacle along its alignment when deployed and increases the risk of damage and related spills. For these reasons, a dedicated pier-side sewer connection for cruise ships is preferable. Currently, it is assumed that there is adequate capacity in the municipal sewer collection and treatment system to accommodate proposed landside uses and off-peak cruise vessel discharge into the municipal system.
- ***Piers 19 to 23.*** The wastewater system that serves Piers 19 to 23 was built in the early 1950s. The system consists of an 8-inch gravity sewer line and concrete sewer manholes. The sewer flow in this area travels to a 54-inch sewer line within Nimitz Highway. There is no shore-to-ship sewer connection at Piers 21 and 22 to support tugboat operations. The existing sewer infrastructure is adequately sized for current uses at Piers 19 through 23, however the system might not be adequate to support redevelopment and densification of uses in the landside areas.

4.2.8 Solid Waste

Solid waste produced by harbor users is collected in dumpsters and hauled away by a private contractor. Demolition and construction debris is similarly collected by private contractors and disposed at the PVT Landfill. DOTH Grounds Maintenance picks up and disposes of solid waste and potential pollutants (i.e., chemical and petroleum waste products) left in designated drop-off areas or discarded illegally on DOTH property by the public to minimize pollution impacts on the environment. A regular sweeping schedule is maintained by DOTH to prevent pollutants from reaching the storm drain system, and sweeper debris is removed from Honolulu Harbor grounds for proper disposal.

4.2.9 Fuel Pipelines

The existing fuel system in Honolulu Harbor is privately-owned by Par Hawaiʻi (a subsidiary of Par Pacific Holding, Inc.), IES, and HFFC. Par Hawaiʻi owns an existing 12-inch fuel line that crosses Honolulu Harbor to connect the Pier 30 fuel tank farm to the jet fuel tanks on Sand Island Access Road. IES owns an existing 8-inch fuel line that crosses harbor property to serve their marine fuel terminal facilities at Pier 30 and commercial fuel truck load rack operations adjacent to Piers 31 to 34 backland area and Nimitz Highway. Monitoring wells are located along various points of the fuel lines.

Pier 51A is the State's main terminal for jet fuel imports. Imported jet fuel is discharged at the existing Pier 51A manifold and piped to the fuel storage tanks located on Sand Island Access Road south of DOTH's Honolulu Baseyard. In addition, a second manifold for jet fuel is planned at Pier 43 and will be designed for jet fuel import and export.

4.3 Harbor Operations and Users

Maritime operations in Honolulu Harbor include cargo commodities, maritime support services, commercial fishing, and cruise vessel/day excursion vessels. The following sections describe the maritime operations and users who maintain the critical functions in Honolulu Harbor.

4.3.1 Cargo Commodities and Operations

The types of cargo commodities that pass through Honolulu Harbor include containers, automobiles (RO/RO), break-bulk/neo-bulk, dry-bulk, and liquid-bulk. The following is a summary of the types of cargo commodities.

- ***Containers.*** Container cargo includes any commodity that is shipped within a standardized, enclosed shipping container or flat rack. Standard lengths include 20-FT, 40-FT, 45-FT and, less common, 53-FT long containers. Standardized containers facilitate efficient movement across vessels, harbor terminals, and land transportation modes (top-picks, container-on-chassis trucks, and trains). Most containers are moved across the berth by ship-to-shore gantry cranes, which currently are located only at the Sand Island Terminal. The future KCT will also have ship-to-shore gantry cranes. A mobile "stick" crane moves containers across the berth at Pier 1. Containers also are moved across the berth as RO/RO cargo at all the cargo piers when mounted on wheeled chassis or moved by top-pick equipment on ramped vessels. Container operations occur at Piers 1 and 2, 19 and 20, 29, 31 to 33, 39 and 40 Interisland Terminal, and the gantry-crane supported Sand Island Terminal.
- ***RO/RO (Automobiles, Rolling-Stock).*** RO/RO (roll-on/roll-off) cargo refers to wheeled vehicles (automobiles, construction vehicles and equipment, aircraft) that are transported on ships and driven or rolled across the berth. RO/RO cargo is typically carried on specially

designed RO/RO vessels with access ramps that secure to the pier apron for discharging and taking on vehicles. Some RO/RO vessels, also referred to as “car carriers”, are purpose-built for efficient transport of automobiles cars, trucks, buses, tractors, and other four-wheeled vehicles. Combination container and RO/RO (CON/RO) vessels are hybrid vessels with wheeled cargo ramps and protected automobile storage as well as storage for container cargo. RO/RO automobile operations occur at Piers 1 and 2, 19 and 20, 29, 31 to 33, 39 and 40 Interisland Terminal, and Sand Island Terminal. Automobiles offloaded at these piers are allowed 5-day free-time storage by which time they must be removed from the yard or incur demurrage fees. Piers 19 and 20 are used primarily as an automobile yard to temporarily store automobiles drayed (moved) from other piers within the harbor. Automobiles drayed from Pier 29 to Piers 19 and 20 take a circuitous route through the sheds and structures on Pier 23, which has in the past resulted in accidents and damage to the automobiles. In general, draying operations increase the risk of damage to automobiles and it is preferable to store automobiles on the first receiving pier until they are transported off harbor property to the intended recipient (owner, dealership, or rental company).

- ***Break-Bulk / Neo-Bulk.*** Break-bulk and neo-bulk commodities are non-containerized general cargo including lumber, steel, construction materials and equipment, and newsprint, typically mounted on palettes or shipping racks. These commodities can be efficiently handled without containerization. Break-bulk cargo is handled at all the cargo piers in Honolulu Harbor.
- ***Liquid-Bulk.*** Liquid-bulk cargo refers to jet fuel, gasoline, diesel, fuel oil, ethanol, liquified petroleum gas (LPG), chemicals, molasses and other liquids. Liquid-bulk cargo may be conveyed across the berth by pipeline connection to/from a tanker vessel to a receiving manifold on the pier. There is a fuel manifold at Pier 51 that is part of the DOTH facilities, and a privately owned and operated fuel manifold at Pier 30. A future jet fuel manifold is planned at Pier 43. In addition, liquid-bulk cargo is commonly moved across the berth in specialized containers, such as intermediate bulk containers designed to contain industrial-scale liquids or LPG tanks, that can be moved on truck chassis. Liquid-bulk handled in containerized form occurs at all the cargo piers in Honolulu Harbor.
- ***Dry-Bulk.*** Dry-bulk refers to unpacked, homogenous materials that are typically transported in ship cargo holds without an intermediate form of containment. Dry-bulk includes grains, fertilizer, sand, gypsum, cement, scrap metal, coal, aggregate materials (sand, gravel, and crushed rock) and other materials. Pier 60 is the only pier dedicated for dry-bulk cargo (aggregate materials). Dry-bulk material is infrequently moved across the berth at the other cargo piers in the harbor by means of conveyor belts or chutes into receiving vehicles on the pier; however, most of the dry-bulk cargo operations are now directed to Kalaeloa Barbers Point Harbor (KBPH).

4.3.1.1 Multi-Purpose and Non-Exclusive Dedicated-Use Piers

Cargo operators prefer to use piers that are designed to accommodate their operational requirements for vessel size, heavy equipment use, yard area, degree of automation, environmental conditions and other variables that impact the efficiency of their operations. To support cargo operators' requirements, DOTH designates cargo piers in Honolulu Harbor as either multi-purpose cargo piers or non-exclusive dedicated-use piers. Multi-purpose cargo piers are designed with standard berthing features and open yard areas which can accommodate a variety of vessel and cargo types for cargo operators that do not operate fixed-schedule service. Multi-purpose cargo piers include Piers 1 and 2, Piers 19 and 20, Pier 29, and Piers 31 to 34. For further discussion on multi-purpose cargo piers (see **Section 6.2.1**).

Non-exclusive dedicated-use piers refer to piers that are improved and used by a preferred cargo operator that maintains regular scheduled cargo service. These piers remain non-exclusive, public-use piers under the control of the DOTH Harbor Master, but priority use is given to the preferred operator. Preferred users develop these piers with infrastructure and facilities, including gantry cranes, office buildings, maintenance shops, storage buildings and specialized utilities, to meet their operational requirements. Non-exclusive dedicated-use piers include the Interisland Terminal (Piers 39 to 40), the future KCT (Piers 41 to 43), Sand Island Terminal (Piers 51 to 53), and Pier 60. For further discussion on Non-Exclusive Dedicated-Use Piers (see **Section 6.2.2**).

4.3.1.2 Cargo Operators

The following is a summary of the main users associated with cargo transport.

- ***Matson, Inc* (Matson).** Matson has operated a 10-ship fleet that call at Honolulu Harbor (5 ships on the Guam/Asia route and 5 ships on the North America West Coast route), but could add another ship during busier periods, for a total of 11 ships. With the introduction of the new post-Panamax Aloha class vessels, Matson will transition to a 9-ship fleet. The fleet includes containerships, CON/RO, and custom-designed barges. The operation schedule cycles every two weeks, with three ships arriving one week, then four ships arriving the next week, and so on, with additional interisland barges arriving during these cycles to transship containers and cargo destined for the neighbor island ports of Hilo, Kawaihae, Kahului and Nāwiliwili.

  Matson currently operates gantry crane-supported container cargo and RO/RO operations at Sand Island Terminal, Piers 51C, 52, and 53, and conducts RO/RO automobile operations at Piers 31 to 33. Up to six ship-to-shore gantry cranes are used at a time to load and unload containers across the berth. Containers are stored in the terminal yard with a majority of the containers mounted on wheeled chassis. All empty containers are stacked. For transshipments, containers are pre-positioned in the yard and then loaded onto the barge.

Matson has two CON/RO vessels that transport automobiles, which arrive primarily at Piers 32 and 33 as RO/RO cargo, as well as at Sand Island either as RO/RO cargo or in automobile racks that are handled similarly to container cargo. Other operations provided by Matson includes container maintenance, stevedoring, and other terminal services supporting Matson's ocean shipping operations.

Matson's operations also include an approximately 8.45-acre parcel located on the *makai* side of Sand Island Parkway and referred to as the "annex." Matson uses the property for chassis storage and for after-hours container pick-up and drop-off. In the near future, Matson plans to cease operations at the annex and move all container and chassis operations to the Sand Island Terminal.

- ***Pasha Hawaiʻi* (Pasha).** Pasha provides specialized container, vehicle, and oversize cargo ocean transport between the U.S. mainland and Hawaiʻi. Pasha currently operates a split operation with Piers 1A-B and 2A used for RO/RO automobile and rolling stock cargo operations and Piers 51A and 51B used for container cargo operations.

  At Piers 1A-B and 2A Pasha uses Hawaiʻi Stevedores to handle RO/RO automobile and rolling stock cargo and special project cargo (using a mobile stick crane). Pasha's RO/RO vessels include fully enclosed and ventilated decks to protect vehicles and oversized cargo from harsh ocean elements.

  Pasha uses Hawaiʻi Stevedores to conduct gantry-supported container cargo operations at Piers 51A and 51B, where they are the preferred operator. Due to size constraints of the yard, Pasha runs a stacked operation at Piers 51A and 51B. Cargo that is designated for neighbor islands is trucked from the Sand Island Terminal to the Interisland Terminal.

  Hawaiʻi Stevedores conducts separate operations at Piers 1 and 2 for various international carriers; see discussion below.

- ***Young Brothers, LLC.*** Young Brothers operates as the preferred operator at the Piers 39 to 40 Interisland Terminal. Their operations, including shipping rates and routes, are governed by the Public Utilities Commission (PUC) to ensure regular cargo service is provided to smaller Neighbor Island ports that might otherwise not be reliably served. Young Brothers provides interisland barge transport for all categories of cargo handled in Honolulu Harbor, including container goods, food and refrigerated cargo, building materials, construction equipment, automobiles, liquid-bulk, and livestock. Young Brothers operates a tug and barge fleet consisting of six towing tugs and seven flat-deck barges. As part of their obligation under PUC rules, Young Brothers also provides interisland transport of LCL cargo by aggregating individual customers' smaller items in a shared container.

Due to size constraints of their cargo yard, Young Brothers runs a completely stacked operation. Laden containers are stacked four high and empties are stacked five high. Pier 39-40 slipway can accommodate four barges simultaneously using side or stern loading of barges.

Young Brothers' operation consists of 12 regularly scheduled sailings per week to six neighbor island ports. Their service system is designed to go to neighbor islands, offload within 12 hours, and return to Honolulu Harbor the following day. All containers are treated as RO/RO; top-pick and side-lift equipment are used to move and stack containers in the yards and on the barges. Barges are equipped with side-, stern- and/or quarter-stern ramps that accommodate top-pick and side-lift and other vehicle movement across the berth.

- ***Hawai'i Stevedores Inc* (HSI).** Hawai'i Stevedores provides stevedoring and marine terminal services. Services include supplying ship and barge lines with personnel and equipment for the handling of marine cargo and the processing of documents. HSI handle domestic and foreign containers cargo, break-bulk/neo-bulk cargo, automobiles, RO/RO cargo, dry-bulk cargo, and passenger liners. At Pier 1, HSI handles international container operations and RO/RO automobile deliveries, serving shipping lines Ocean Network Express and CMA CGM with a mobile harbor crane. See **Figure 4.57**. HSI also provides stevedoring services for Pasha's operations at Piers 1A-B, 2A and 51. A small volume of break-bulk/neo-bulk cargo is also handled at Pier 1 by HSI.

Figure 4.57 - Pier 1 Berth and Mobile Harbor Crane

- ***McCabe, Hamilton & Renny Co. Ltd.*** McCabe, Hamilton & Renny provides stevedoring and marine terminal services. They are the sole independent stevedore service with no attachment to a specific shipper. They provide services to Matson at Piers 31 to 33 and Piers 52 and 53, to HC&D at Pier 60, to the military and to various shipping agents (Norton Lilly, NHK, Transmarine Navigation and Inchcape) operating at all of the multi-purpose piers. Their cargo handling services include container, break-bulk, dry-bulk, LCL, RO/RO and cruise ship operations. Their offices are located at Pier 2 in the Homer A. Maxey International Trade Resource Center; they also operate a shop at Pier 23 for cargo handling equipment.

4.3.1.3 Relationship to KBPH

KBPH is located approximately 25 miles to the northwest of Honolulu Harbor and serves as the second commercial port on O‘ahu and as the primary harbor for liquid-bulk (e.g., petroleum products, liquified-gases, ethanol and asphalt) and dry-bulk (e.g., coal, cement, sand, aggregates, and neo-bulk) cargos. KBPH has specialized cargo handling facilities including a coal bulk unloader system and pneumatic cement pump system. KBPH handles more liquid-bulk cargo volume than Honolulu Harbor and serves as the hub for Hawai‘i’s fuel and liquid asphalt supply system. KBPH is located adjacent to multiple industrial facilities including two oil refineries, a gas production plant, and several large fuel-storage tank facilities. KBPH also handles a small amount of containerized cargo transported by barge from the Pacific Northwest by Aloha Marine Lines (AML).

Most dry bulk operations have been relocated from Honolulu Harbor to KBPH, with the exception of HC&D’s aggregate operations at Pier 60. In addition to barge deliveries, Pier 60 receives aggregate material that is first delivered to KBPH then trucked to Pier 60 for processing in HC&D’s batch plant or for barge delivery to neighbor islands. Similarly, liquid asphalt is imported directly to the asphalt terminal at KBPH, which is operated under long-term lease by Asphalt Hawai‘i, and is transferred to Honolulu Harbor by truck for shipment by barge to the Neighbor Islands. KBPH has been suggested as an alternative RO/RO automobile carrier berth due to ample landside storage, however berth constraints and swell conditions in the harbor make KBPH less desirable for RO/RO automobile operations than Honolulu Harbor.

4.3.2 Maritime Support Service Industries and Operations

Maritime support service industries and operations include a variety of private businesses that are essential to support efficient functioning of the commercial harbor. Within Honolulu Harbor, maritime support services are located primarily between Piers 12 and 38. They include operations that are dependent on waterfront access for working vessels, such as harbor pilots and tugboats, as well as services that may be located in backland areas, such as ship provisioners, but require proximity to the harbor to efficiently support maritime operations. Key maritime support services include the following:

- ***Pilots*** – Pilot services are required for large vessels, including cargo, tanker and cruise ships that enter and exit one of Hawai'i's commercial harbors, including Honolulu Harbor. Pilots are experienced mariners who possess in-depth knowledge about navigational conditions in and surrounding the port and are responsible for assisting ship captains to safely navigate their vessels between the harbor berth and open ocean. Pilot services are essential to minimize navigational risks and ensure safe, unimpeded operations in the busy harbor environment. The Hawai'i Pilots operate out of Pier 19.
- ***Tug operations*** – Tugboats perform a variety of essential roles to support safe and efficient harbor operations and maritime commerce. Tug assist vessels are highly maneuverable tugboats used to safely guide large vessels with limited mobility in and out of the harbor. Tugs are used to tow barges for cargo transport, as is typical for neighbor island cargo operations, and barges used for construction, dredging, fueling, and research purposes. They are also used to tow "dead" vessels or specialized equipment, such as the floating single-point mooring fuel manifold, that are unable to operate under their own power. Tug operations require dedicated berthing within the harbor and direct access to the waterfront for landside operations. Piers 21 and 22 "Tug Row" serves as the primary tugboat pier in Honolulu Harbor. Tugs boats also operate from Piers 13 and 14, Piers 26 and 27, and Piers 39 to 40.
- ***Ship Construction, Repair and Maintenance*** – Ship construction, repair and maintenance services are essential to keep vessels based in the harbor operational and to service visiting vessels in need of maintenance or emergency repairs. Honolulu Harbor has two floating dry-dock operators with three dry docks between them, located at Piers 24 to 26. The existing dry docks are large enough to accommodate all the working vessels in the harbor, up to approximately 450 LF.
- ***Ship Suppliers / Provisioners (Ship Chandlers)*** – Ship chandlers coordinate and/or provide the supplies that a crew needs to maintain and operate a vessel, including food, ice, materials, tools and equipment, as well as services such as fueling, waste disposal and inspections. These operations do not require direct waterfront access, but ideally are located near the harbor for efficient operations. In Honolulu Harbor, ship provisioners are located primarily in the backland areas between Piers 29 to 34, as well as at the Pier 38 Fishing Village.
- ***Marine Engineering, Construction, Salvage and Dredging*** – Marine engineering, construction, salvage and dredging services are necessary to support the maintenance, repair and development of existing and new harbor infrastructure. These services are especially important for timely restoration of port function in the event of an emergency involving damage to pier facilities that impact harbor operations or a sunken vessel that poses a navigational or environmental hazard. These operations require waterfront access for workboats and marine construction vessels, as well as to facilitate efficient response to events in the harbor. Administrative, office functions and storage may be located in backland areas away from the waterfront. In Honolulu Harbor, these operations are generally located on the

waterfront from Piers 12 to 14, Piers 26 to 29 and Pier 36, and backland areas from Piers 19 to 38.

- ***Water Taxi Service*** – Water taxi services in Honolulu Harbor include water-borne passenger transport within the harbor, between the piers and vessels stationed off-shore, and throughout the islands, as well as launch boats and tender boat services, vessel towing, offshore supply vessels, and workboat and research vessel services. These operations are essential to harbor function and are required to be located on the waterfront. Water taxi services are currently located at the end of Pier 36.
- ***Ship Agents*** – Ship agents provide local representation for ship owners to ensure that port calls are successfully executed according to the owner's needs. They assist in pre-arrival planning and scheduling; coordinate ship arrival, berthing, and discharge of business (cargo, cruise operations or other purpose); ensure that vessel operations while in port are conducted according to required regulations and procedures; and help coordinate any necessary provisioning or repairs prior to departure. Ship agents typically operate out of an office, ideally located near the harbor for convenience and efficiency, but do not need a waterfront location. In Honolulu Harbor, ship agents occupy office space at the FTZ at Pier 2.
- ***Spill Response*** – The USCG Base Honolulu and the MSRC respond to spills of petroleum or other materials that could adversely impact the marine environment in the Hawaiian Islands or operation of Hawai'i's commercial harbors system. The USCG Jupiter-class cutter stationed in Honolulu Harbor (the *Kukui*) is equipped with spilled-oil recovery system. In addition, the MSRC maintains a spill response vessel and barge at Pier 15. Spill response operations require direct waterfront berthing.

Key maritime support services operators in Honolulu Harbor are summarized below:

- ***Hawai'i Pilots Association (HPA)***. HPA is the sole provider of pilotage services in Hawai'i and operates at all of the State's deep-draft commercial harbors. Their office building, maintenance/workshop, and storage area, from which they conduct state-wide operations, are located on Pier 19. HPA maintains a fleet of seven vessels throughout the Hawaiian Islands, including two pilot boats at Honolulu Harbor.
- ***P&R Water Taxi.*** P&R Water Taxi provides launch boats, marine salvage, tug, offshore supply vessels, research vessels, and charter services. Their shoreside facilities include office and storage at Pier 26 and a two-story office trailer, container storage, portable parts trailer, and a dedicated fuel tank at Pier 36. Their Honolulu Harbor based fleet consists of two assist tugs and six launches-workboats. Their tugs provide ship-barge assists at Honolulu Harbor, and a stern tug used to service the PAR Hawai'i Single-Point Mooring offshore Barbers Point. In addition to regular operations, water taxis provide a critical emergency and disaster response service for Honolulu Harbor. If a natural disaster damages the roadways, water taxis have been identified by the Maritime Transportation System Recovery Unit as a critical service to transport emergency personnel around the island. Water taxis are also available

to transport people to and from Sand Island in the event of damage to the Sand Island Bridge. Water taxis also provide emergency sealift services.

- ***Honolulu Marine, LLC (HML).*** HML operates tug and dry dock services from Pier 26. Their dry dock services tugboats and the Atlantis submarines. Landside facilities include an office and storage area.
- ***P&M Marine Services.*** P&M Marine Services provide tractor tug services. They share facilities with P&R Water Taxi at Pier 36.
- ***FOSS Maritime (Foss)***. Foss provides tug towing and harbor vessel assist services. The Foss fleet at Honolulu Harbor consists of five tow-and-tug vessels: one on rotation for maintenance and repair, one for charter service, and three to support Young Brothers' interisland barge service. These vessels are typically berthed at Piers 21 and 22. Foss provides tug and assist service for eight Young Brothers operated barges berthed at Piers 39 and 40. Foss also conducts 12 regularly scheduled sailings per week to six neighbor island ports for Young Brothers' cargo barge operations. Their harbor assist operations utilize a fleet of three harbor assist tugs that are berthed at Piers 21 and 22, to include providing services at the IES Offshore Moorings at Barbers Point. Foss has eight tug berths at Piers 21 and 22: four slots on the Diamond Head side of Pier 21 and four slots on the *'Ewa* side of Pier 22. Their office buildings, maintenance ship, and locker room are located on Pier 21 and the *'Ewa* corner of Pier 22/23.
- ***Kirby Offshore Marine (Kirby).*** Kirby previously provided tug and double-hulled fuel barge services. These vessels included three tugs and matched-up fuel barges, one additional double-hulled fuel barge engaged in ship refueling service, two additional tugs, a stern tug and four small work boats used to service the Single-Point Mooring offshore Barbers Point. The work boats were also used for other contract work. Their facilities including office space, workshop, storage areas, and pier space to stern-berth up to five tugs were located on Pier 13-14. Pier 26 was occasionally used for berthing. Sause Bros. and P& R Water Taxi took over Kirby's vessel and barge operations in 2022.
- ***Sause Bros (SBI).*** SBI provides tug towing, barge services and harbor vessel assist services. The fleet includes six tugs and four barges. Three of the tugs provide towage services for Matson's three interisland barges, one provides service for their double-hulled petroleum barge under time charter contract with IES, and two provide services for their two LPG barges under time charter to Hawai'i Gas. Sause Bros. vessels and offices are at Pier 27
- ***Pacific Shipyards International (PSI)***. PSI provides ship design and construction services, and shipyard and drydock services for ship maintenance and repairs. They operate two, floating dry docks (450 LF and 200 LF) at Piers 24 and 25 under a long-term lease that includes submerged lands adjacent to the piers. Landside facilities include offices, repair shops, and storage areas.
- ***American Marine Corp (AMC) / Pacific Environmental Corporation (PENCO)***. AMC provides marine construction and salvage, commercial diving, and vessel support and repair services. PENCO provides oil and chemical spill response for marine and landside

environments, tank cleaning, and hazardous waste processing services. AMC and PENCO are sister companies under American Marine Services Group. Their operations are located on Piers 13 and 14. PENCO operates an oil processing facility on Pier 32 and a spill cleanup facility at Pier 33. They also have a storage yard on Pier 60.

- ***Sea Engineering, Inc. (SEI).*** SEI provides maritime and coastal engineering, emergency response and salvage, commercial diving, oceanographic/marine environmental and waterfront construction services. Their boats are located at Pier 26. Their office is located within the Pier 31 backland area adjacent to Nimitz Highway. They operate storage yards at their office location and at Piers 27DL and 27E.
- ***Marine Spill Response Corporation (MSRC).*** MSRC is a non-profit spill response service that operates two vessels from Pier 15, the *Hawaiʻi Responder*, a responder-class oil spill response vessel, and the MSRC 400, an oil spill response barge.

4.3.3 Commercial Fishing Operations

Commercial fishing operations center around two locations in Honolulu Harbor—the Commercial Fishing Village at Piers 36-38 and the fishing vessel berths at Piers 16-18. The landside of the Commercial Fishing Village is managed by the AOAO (see **Section 3.5.1.3**), while the waterside remains under the control of DOTH. Commercial fishing operations are regulated by NOAA's Pacific Island Regional Office, which administers Hawaiʻi Longline Permits that allow fishing with longline gear in Guam, Northern Mariana Islands, and the Pacific Remote Island Areas. There are 164 Hawaiʻi longline permits available with approximately 150 active permits held by various private commercial fishing operators. Of the 150 fishing vessels, approximately one-third are in port and two-thirds are at sea at any given time. The fishing fleet is split, with approximately half of the fleet berthed at Piers 16 to 18 and half at Piers 36 to 38. Berth utilization at the piers is an ad hoc combination of single-moored vessels and rafted vessels (2 to 4 vessels across). Rafting 3 and 4 vessels together is a common practice, but not recommended due to operational inefficiency and safety concerns. Fishing vessels offload their catch at the Honolulu Fish Auction and restock their provisions (e.g., ice, bait, food, materials and equipment) at Pier 38. Fueling is by primarily by fuel trucks on Piers 17 or 38. Fishing vessels sometimes need to transit back and forth between Piers 38 and 16-18 to provision or engage in other activities at the Commercial Fishing Village, which adds to vessel traffic along the Kapālama Transit Channel.

There are special security requirements for the foreign fishing crew members, which is enforced by the U.S. Customs and Border Protection (CBP). Technically, foreign crew members are required to remain onboard fishing vessels because they are not eligible for the C1/D visas for transit and crewmembers. However, for basic humanitarian reasons, CBP allows crew members to leave their vessel and be within a five-minute walking distance from the vessel within the gated area of the Fishing Village.

4.3.4 Cruise Vessel Operations

Cruise operations in Honolulu Harbor are conducted primarily at the dedicated Pier 2 Cruise Terminal and, to a lesser extent, at the Piers 10 and 11 shed which is configured for cruise terminal and multi-purpose use. In addition, the Piers 19 and 20 multi-purpose cargo terminal is designated as a contingency cruise terminal for smaller cruise vessels; however, it is very rarely used for this purpose.

Cruise ships call year-round at Honolulu Harbor; however, the primary cruise season is from October through April when cruise vessels that operate in Alaska during the spring and summer months re-position to Hawaiʻi for the winter. Cruise operations in Hawaiʻi have not yet returned to pre-COVID-19 pandemic levels, but the HHMP anticipates that cruise ship activity will return to pre-pandemic levels and continue to grow in the coming years (see **Section 5.2.2**). Prior to the pandemic, cruise ships were at berth in Honolulu Harbor approximately 150 days per year, including approximately 121 days at the Pier 2 terminal and 29 days at Piers 10 and 11.[21] Cruise ships are typically at berth for a 12-hour period, arriving in the early morning and departing in the evening. There are exceptions when cruise vessels, particularly round-the-world cruises and cruise ships executing a full passenger turn-over, schedule their time at berth in Honolulu Harbor for 24 to 60 hours to give their passengers more time to experience the island of Oʻahu and their operations crew time to turn-over and reprovision the ship. Cruise ship capacity is typically between 2,300 to 3,600 passengers. The largest cruise ship to call at Honolulu Harbor is the Ovation-class vessel with 4,900 passenger capacity. The majority of cruise ships that call at Honolulu Harbor undertake at least a partial turn-over of passengers. Full passenger turn-overs are less common, but occur weekly with the home-ported *Pride of America* and intermittently with some international cruise ships that conduct back-to-back Hawaiian Island cruises that originate on the West Coast.[22] Passenger turn-over operations will always be in Honolulu Harbor because the airport, ground transportation, and hotel facilities can accommodate the high passenger counts compared to the neighbor islands.

Most cruise vessels calling at Honolulu Harbor, particularly those making full or partial passenger turnovers, are directed to the Pier 2 Cruise Terminal. The terminal is purpose-built for handling a full turnover of ship passengers with dedicated facilities for passenger processing, security and health screening, baggage handling, ground transportation and ship provisioning. Cruise operators noted

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[21] 2019 Port Call Data

[22] A typical cruise ship route for back-to-back Hawaiian Island cruises might originate in Seattle or San Diego with a stop in a foreign port of Vancouver, B.C. or Ensenada, Mexico, respectively, before crossing the Pacific Ocean to Hawaiʻi for a week-long cruise through the Neighbor Islands and a last stop in Honolulu Harbor for a full turn-over of passengers and ship reprovisioning. The ship then retraces the route with a week visiting the Neighbor Islands before visiting a foreign port on the West Coast then back to a U.S. port to complete the voyage.

that despite adequate space in the terminal building, the layout is inefficient and problematic for handling simultaneous embark and debark operations. There is inadequate space to stage arriving passengers' baggage prior to security screening, which causes congestion at the terminal entrance. Baggage security screening operations have a single screening station, which creates a choke point in processing, and screening operations are handled at the opposite end of the terminal from the area where bags are staged before being loaded on board. This slows down overall embarkation operations and results in passenger and baggage congestion at the terminal entrance.

Buses, shuttles, taxis, ride share vehicles and private vehicles are used to transport passengers in and out of the Pier 2 Cruise terminal. Traffic circulation is generally one-way, with vehicles entering the terminal area through Channel Street and exiting on Forrest Avenue onto Ala Moana Boulevard. Significant congestion can occur during cruise days when the number of taxis exceeds the designated taxi queue area and taxis back up into the FTZ driveway and parking area and along Channel Street. Vehicles that are not authorized to enter the terminal area maneuver in and out on Channel Street and further contribute to ground transportation congestion. Additional area for ground transportation would improve these conditions. Similarly, space for ship servicing and provisioning vehicles is limited at Pier 2. In order to handle 24-25 containers, delivery and space is coordinated by queuing truck deliveries based on a sequencing plan for provisioning food and frozen goods, removing trash and providing other goods and services. See **Sections 4.1.2.2** and **7.5.1**. Cruise operators also noted that lack of wayfinding signage to orient passengers who leave the ship by foot to points of interest in Chinatown, Downtown, the Capitol District, Kakaʻako, Ala Moana and Waikīkī.

The Pier 2 Cruise Terminal also serves as the berth for Hawaiʻi's sole home-ported cruise ship, the Norwegian Cruise Lines (NCL) *Pride of America* which has capacity for 2,300 passengers. The *Pride of America* makes weekly cruises around the Hawaiian Islands starting each Saturday from Honolulu Harbor. The ship is typically at berth in Honolulu Harbor for a 12-hour period, during which operations include a full turnover of passengers, ship reprovisioning, servicing and bunker fueling. For logistical reasons, NCL conducts the ship's crew change at the *Pride of America's* first port-call at Kahului, Maui. NCL has considered introducing a second and possibly third home-ported ship.

The cruise terminal at Piers 10 and 11 is typically used only when two cruise ships call at Honolulu Harbor on the same day, or for cruise vessels making a port-call and request the Piers 10 and 11 berth adjacent to the picturesque and historic Aloha Tower location as a preference. Piers 10 and 11 also offer a contingency berth for cruise ships that are forced to abort an anchorage call at a Neighbor Island port due to unfavorable weather conditions. Due to spatial constraints in the Piers 10 and 11 shed and adjacent roadways, the existing terminal configuration is poorly suited to handle passenger processing, ground transportation and ship provisioning operations required for a full or partial turnover; however, partial turns are routinely handled at this terminal and full-turns, though inefficient, have been successfully executed with careful planning. See **Sections 4.1.2.6** and **7.5.1.3**.

The spatial constraints and existing public access areas nearby, make it difficult to meet security requirements when a cruise ship is at berth. Ground transportation is particularly challenging due to limited vehicle staging and queuing areas near the terminal. Buses and ship provisioning trucks adapt by staging and queuing in off-site locations and along Aloha Tower Drive. Buses for day excursions pick up passengers in front of Pier 11. Taxis stage around Irwin Park, which unlike Pier 2 is a public area and does not require a permit to access. These adaptations contribute to vehicle congestion in the Aloha Tower complex on cruise ship days.

All cruise vessels that call at Honolulu Harbor undertake bunker refueling. Bunker refueling is not available at the neighbor island ports. Refueling operations involve the use of a bunker barge positioned adjacent to the cruise ship with tug assist and surrounded by a floating boom as a precaution to contain spills. It takes approximately eight hours to complete bunker refueling operations.

4.3.5 Day Excursion Operations

Day excursion operations are currently conducted at Piers 5, 6 and 8. They include daytime scenic cruises and seasonal whale watching (January to April), and nighttime dinner cruises. Day excursion operators noted that on an annual basis, prior to the COVID-19 pandemic, day excursion vessels operating out of Honolulu Harbor handled more passengers than cruise ships do in Hawai‘i.

Daytime whale watching and scenic cruises are generally scheduled twice daily with morning cruises from approximately 8:45 a.m. to 10:45 a.m., and afternoon cruises from 12:30 p.m. to 2:30 p.m., with staggered passenger boarding and offloading occurring approximately 45 minutes before and after each sailing.

Sunset dinner cruises typically sail from 5:30 p.m. to 7:30 p.m. with staggered passenger boarding and offloading occurring approximately 45 minutes before and after the sailing. Currently, two dinner cruise operators sail from Honolulu Harbor, the Atlantis' *Majestic* out of Pier 6 and the *Star of Honolulu* out of Pier 8. Roberts Hawai‘i's *Ali‘i Kai* is currently berthed at Pier 5, but is not in operation at present.

The majority of passengers on these vessels are visitors staying in Waikīkī.[23] Ground transportation for day excursion operations is carefully coordinated to minimize traffic impacts and congestion in the Aloha Tower complex. Approximately 15 buses (50-60 passenger capacity) arranged by the cruise operators are used to transport passengers for each cruise, plus an additional 10 to 12

[23] The Star of Honolulu reported that approximately 85 percent of its passengers are visitors staying in hotels in Waikiki and approximately 15 percent are local residents.

commercial ground transportation vehicles (tour vans, charter buses, limousines, and taxis) that may be hired independently by individuals and groups of passengers. With two, day excursion or dinner cruise vessels operating at the same time, as many as 40 to 50 vehicles may be circulating within the Aloha Tower complex during the passenger boarding and offloading periods. To reduce the impact, day excursion operators stagger arrivals to minimize the number of buses at any given time. *Star of Honolulu* positions four buses at a time on the *makai* side of Aloha Tower Drive, between Piers 6 and 7 for active passenger loading and offloading and stages an additional four buses at a time on Bishop Street (*makai*) during offload/departure operations to quickly arrive as full buses depart. The *Majestic* similarly operates three buses at a time along the *makai* side of Aloha Tower Drive for active passenger loading and offloading.

After offloading from ground transportation, passengers assemble on the pier adjacent to the vessels prior to boarding. Day excursion operators noted that there are no developed facilities for passenger assembly and pre-sail orientation and entertainment. Such facilities would enhance passenger experience as well as improve operational efficiency and passenger safety. In addition, day excursion operators noted that nighttime lighting is limited in the areas used for passenger debark and departure.

Piers 5 through 8 currently lack sewer connections to allow day excursion vessels to pump out sewage. As a result, day excursion vessels must sail beyond the 3-mile limit to discharge untreated sewage generated onboard or maintain onboard sewage treatment systems that comply with USCG requirements which would allow them to discharge treated sewage closer to shore. Day excursion operators indicated that they would prefer to have sewer pump-out facilities at the berth for both environmental and operational benefits.

Between sailings, day excursion vessels require trucks to access the berth for delivery of provisions and for fueling and ship servicing.

Day excursion operators in Honolulu Harbor include.

- **Star of Honolulu.** *Star of Honolulu* provides day excursion operations including dinner, seasonal whale watching, and specialty holiday cruises from their berth at Pier 8. Their operations are sometimes augmented by the *Dolphin Star*, which ordinarily operates out of Waiʻanae Harbor, but operates from Pier 8 during periods of high demand.
- **Atlantis Adventures – *Majestic* (ship) and *Atlantis* (submarine).** Atlantis Adventures provides day excursion services, including dinner, seasonal whale watching, and specialty holiday cruises. Their day excursion vessel, the *Majestic*, operates passenger service out of Pier 6. Atlantis Adventures also operates *Atlantis* Submarine tours off Waikīkī; the submarine berths at Pier 26 for maintenance and when not in service.
- **Roberts Hawaiʻi/Aliʻi Kai**. Roberts Hawaiʻi operated day excursion and dinner cruise service on their vessel, Aliʻi Kai, out of Pier 5. Their operations are currently on hold.

4.4 Safety and Security Services and Facilities

4.4.1 Security

Port security is a complex, multi-faceted operation focused on preventing and responding to various types of threats and accidents that put harbor personnel and operations at risk. DOTH has oversight of port operations and security measures within the boundaries of Honolulu Harbor, which are undertaken in accordance with a series of security plans approved by the USCG. DOTH security plans cover the appointment and duties of the port's Facility Security Officer, fencing, access control, lighting, harbor user identification, communications, and surveillance. All vessels, operators, tenants, users and visitors at Honolulu Harbor are required to comply with the security plans.

Terminal-facility security is dependent upon the interaction and communication between all concerned parties. Port authorities, local law enforcement, emergency response personnel, ship crews, and ship operators communicate with each other as needed to respond to the posted security level and to ensure that the actions taken during an incident are adequate. DOTH and USCG participate in the local Area Maritime Security Committee (AMSC) which addresses security concerns within the harbor and identifies networks to support security measures.

The USCG is the lead federal agency for the Maritime Homeland Security mission. In this capacity, the COTP, as the Coast Guard's lead entity in the port, is responsible, through the AMSC, for developing a Port Security Plan (PSP). The purpose of the PSP is to enhance awareness for the detection of terrorist threats, to deter attacks, and reduce vulnerabilities through coordinated security procedures and port improvements. The PSP defines the government's (local, state and federal) obligation and the other port stakeholders' contributions to the Maritime Homeland Security mission. In the port, the USCG is also the designated authority for setting security levels. MARSEC Levels are based upon national threats and are passed down to the ports from the National Command Authority. MARSEC Levels trigger certain procedures in the PSP to deter criminal activities and respond to security threats or breaches of security while including provisions for maintaining critical operations in the port.

A key security measure in the harbor is access control. Most of the maritime industrial areas are fenced off from general public access, both for reasons of port security and public safety. Access procedures at the various entrance gates to the harbor and individual terminal facilities are set by the PSP and various Facility Security Plans (FSPs) which are tailored to the specific operations at individual terminals. In accordance with the MTSA, DOTH's access control procedures include the use of TWIC cards, administered by the Transportation Security Administration (TSA), for workers who need access to secured harbor facilities.

4.4.2 Harbor Police

DOTH Harbor Police are authorized by HRS 266-24 to conduct patrol and enforcement at all the State's commercial harbors. The Harbor Police facilities are located at Pier 15, from which they patrol the harbor by motor vehicle and patrol boat, including a 27-FT, aluminum-hull vessel christened *Kia`iawa*, meaning "harbor guardian," which is used to patrol both Honolulu and KBPH, and a 21-FT Boston Whaler christened *Moku Makai*, maintained as a supplemental patrol craft. The Harbor Police participate in the AMSC.

4.4.3 Fire Protection

Port facilities, including piers, yards and backland areas, have a system of strategically placed fire hydrants along with sprinklers systems in many of the harbor structures, which are directly connected to the main water supply network. There are no fire hoses staged adjacent to the hydrants. There are no supplemental pumps or storage tanks supporting the fire protection system. The current water pressure from the main water supply system is adequate to serve the use and current requirements.

There is no direct link between the port fire alarm systems and the local fire station. A fire alarm raised in the port would need to be reported to HFD by telephone. The port fire protection coverage is serviced by the HFD's three fire stations (HFD's Headquarters - Fire Station # 9 Kaka'ako, Fire Station # 1 Central, Fire Station # 31 Kalihi Kai) which are between 5 and 10 minutes away from the Port. Harbor tenants and users are required to keep access roadways and waterfront fire lanes clear to facilitate land-based responses to incidents. The HFD lacks specialized training required for fighting shipboard fires. Shipboard fires present a unique environment of confined and shifting spaces; metal construction that has unique heat characteristics and requires specialized cutting tools to penetrate; stored flammable materials and chemicals; floating ignited materials; and potential for the need to effect rescues from submerged spaces among other challenges.

DOTH does not maintain dedicated marine firefighting personnel, equipment or facilities. In 2014, the State fireboat *Moku Aki* was taken out of service and there are no current plans to replace it. In recent decades, the marine industry has seen advances in fire protection and salvage response planning onboard many commercial ships, driven by new laws, insurance requirements and regulations at the national level. Many vessels in the harbor, such as tugboats, have firefighting equipment onboard, including water hoses and personal protective gear; and crew trained in basic fire response. In the event of a fire aboard a vessel or at a pier terminal, emergency response will be coordinated among the USCG, DOTH, CCH fire fighters, and maritime operators.

4.4.4 Spill Response

The USCG is also responsible for overseeing plans and procedures to prevent and respond to oil, fuel or chemical spills in the harbor, including preparation of an Area Contingency Plan, inspections of vessels and port facilities for compliance with hazardous and pollutant material handling and disposal, and initial response notification in the event of a spill. Spill response is coordinated among the USCG, DOTH and the MSRC. MSRC is a non-profit spill response service that operates two vessels from Pier 15, the Hawaiʻi Responder, a responder-class oil spill response vessel, and the MSRC 400, an oil spill response barge.

4.4.5 Biosecurity

Biosecurity refers to efforts to prevent harmful pest plants, animals, diseases and other hazardous biological material from entering the State through Honolulu Harbor. Biosecurity involves the work of multiple state, federal, and county[24] agencies and partners each with specific and overlapping roles. The key regulatory agencies in Hawaiʻi's biosecurity are DOA; DLNR; DOH; U.S. Department of Agriculture's (USDA), Animal and Plant Health Inspection Services (APHIS); CBP; and U.S. Fish and Wildlife Service (USFWS). The Coordinating Group on Alien Pest Species is a partnership of agencies and non-government organizations that work together to protect Hawaiʻi from invasive species.

The DOA and APHIS screen domestic and international agricultural cargo primarily through visual inspection of incoming agricultural items, including plants, plant parts, non-domestic animals, microorganism cultures, microbial products, arthropods, and soil. Inspections occur aboard cargo vessels, in cargo terminal yards and at the DOA plant quarantine building adjacent to KCT, where contaminated cargo is also treated.

The CBP is responsible for regulating international trade and enforcement of U.S. regulations including customs, agriculture, and immigration, as well as regulations overseen by more than 40 sister agencies (USFWS, NOAA, USDA and others), including pest identification and treatment. Foreign cargo is subject to different regulatory compliance requirements before it can be released and has higher risk for biological and radiological contamination; therefore, it is handled separately from domestic cargo. CBP screens 100 percent of international cargo through a combination of

[24] The CCH is not directly responsible for biosecurity; however, the BWS is a member of the Oahu Invasive Species Committees (OISC), which is an Oahu-based coalition of government and NGOs organized under UH's Pacific Cooperative Studies Unit (PCSU). The OISC focuses primarily on land-based measures to prevent the establishment of new alien pests, controls incipient pests on public and private land, and educates the community about the threats of invasive species.

vessel manifest screening, vessel inspection, and X-ray and radiation detection equipment. CBP currently operates from a 900-SF space at Pier 1 where they store a mobile X-ray device that can be deployed throughout the harbor. They also operate a fixed-in-place gamma and neutron detector at Pier 1, which is used to detect radioactive material. The CBP has a free space agreement with DOTH for its Pier 1 facilities. CBP also oversees a container exam station at Lagoon Drive to conduct inspections of de-vanned cargo. The facility is operated by a private contractor, not by CBP personnel.

The USFWS coordinates with CBP to inspect livestock from international sources to protect Hawaiʻi's local agricultural industry and natural environment, and inspect cargo for illegal wildlife. USFWS does not occupy a space in Honolulu Harbor; USFWS inspectors conduct mobile inspections on vessels at berth and in the terminal yards. International cargo must clear USFWS inspection before the CBP can conduct their own inspections.

In addition to transport via cargo, biofouling and ballast water are two other biosecurity concerns. Biofouling, or biological fouling, sometimes referred to as 'hull fouling,' is the accumulation of microorganisms, plants, algae, or animals on the surface of a shipping vessel. Ballast is water taken up or released by a ship to provide stability and is the leading pathway for the spread of invasive marine species. The spread of invasive aquatic species carried in ships' ballast water or on the hulls can outcompete native species and disrupt the local ecosystem. This in turn can cause a significant economic impact for industries depending on the marine environment such as fisheries. In Hawaiʻi, some invasive coral species such as the snowflake coral (*Carijoa riisea),* a coral native to the Atlantic, smothers Hawaiʻi's black coral (*Antipatharia*). Black corals provide a habitat for coral fishery and are harvested for manufacturing jewelry, thus are of ecological and economic importance.

Hull cleaning to remove biological growth on a vessel is currently not permitted in Honolulu Harbor. Vessels that require hull cleaning must use one of the floating dry docks or go to a port where hull cleaning can be performed. Biological material removed from the hull must be treated and disposed of to avoid the spread of invasive species harbored in the material.

In Honolulu Harbor, most vessels arrive laden with cargo and do not need to discharge water ballast to float higher in the water to maintain operational drafts and stability. As cargo is offloaded and the vessels rise, vessel operators take on ballast water in the harbor as necessary to maintain safe operational drafts, vessel stability, proper balance and effective trim. The most common vessels that discharge water ballast in Honolulu Harbor are cruise ships which discharge some of their water ballast to counter the bunker fuel they are receiving. Cruise ships maintain onboard water ballast treatment systems and treat all ballast water prior to discharge. Other vessels that might discharge ballast water in the harbor are special project shipments where a vessel arrives in a ballasted or partial ballasted condition in preparation to load a specific cargo. These water ballasting transfers are required to be undertaken in compliance with USCG and DLNR-DAR requirements for pre-treatment and appliable procedures.

DLNR is the lead state agency, mandated under HRS 187A-32, to regulate biofouling and ballast water, two major vectors for introducing non-indigenous marine species to Hawai'i. Biofouling and ballast water are regulated separately:

- To address vessel biofouling in Hawai'i's harbors, the 2018 State Legislature adopted House Concurrent Resolution No. 130, S.D. 1. This resolution is an agreement to support coordination and collaboration among specific industry and government agencies on developing in-water cleaning (IWC) conditions and biofouling regulations. IWC of vessels currently is not allowed in Hawai'i due to the potential biosecurity risks and release of vessel antifouling paint that may degrade water quality. DLNR is currently coordinating efforts among various government agencies to develop conditions for (1) allowing IWC of vessels that pose minimal biosecurity and hull paint release risks, and (2) supporting data collection and testing of IWC debris capture technology in Hawai'i. As a result, IWC might be permitted in Honolulu Harbor in the future.
- DLNR-DAR's Hawai'i Ballast Water and Hull Fouling Program regulates ballast water management techniques, approved by the USCG and adheres to HAR 13-76, pertaining to ballast water discharge compliance. DAR conducts on-board vessel inspections of required ballast water documentation and takes samples of sediment and ballast water to ensure compliance. To analyze time-sensitive ballast water samples, DAR requires a container-sized laboratory space near the harbor.

The USCG also has a lead role in managing, inspecting and enforcing regulations concerning ballast water and biofouling discharges. In accordance with the National Invasive Species Act of 1996, the USCG established rules for controlling discharge of ballast water in U.S. waters through the publication of 33 CFR Part 151 and 46 CFR Part 162. These rules have been in effect since June 2012. The rules require commercial vessels with onboard ballast tanks to maintain an approved Ballast Water Management Plan and prohibit the discharge of untreated ballast water into U.S. waters. The rules include additional requirements related to onboard ballast treatment systems, ballast exchange procedures, cleaning and maintenance of ballast tank and treatment equipment, and record keeping. In addition, under 33 CFR §151.2050 (g), the USCG requires commercial vessels to maintain a Biofouling Management Plan (BFMP) in accordance with guidelines established in Marine Environment Protection Committee Resolution 207(62). Under these regulations, the BFMP does not require USCG approval, but must adequately address biofouling management in the specific vessel's operational procedures.

In 2018, the Vessel Incidental Discharge Act (VIDA) was passed into law to establish a framework for the regulation of discharges incidental to the normal operation of a vessel, including ballast water discharges, under a new CWA Section 312(p). The VIDA streamlines the patchwork of federal, state and local requirements for the commercial vessel community. The VIDA applies to commercial vessels greater than 79 FT in length; other non-recreational, non-Armed Forces vessels, such as research and emergency rescue vessels; and ballast water only from small vessels (vessels less than

79 FT in length) and fishing vessels of all sizes. As required by the VIDA, the EPA developed preliminary national standards of performance for incidental discharges at the end of 2020. The EPA is currently working with the USCG to prepare final Vessel Incidental Discharge National Standards of Performance, and corresponding implementation, compliance, and enforcement regulations for those standards. The USCG will be responsible for enforcing requirements governing the design, construction, testing, approval, installation, and use of devices necessary to achieve the EPA standards.

Until the USCG regulations are final, effective, and enforceable, non-recreational and non-Armed Forces vessels 79 FT in length and greater are subject to the existing discharge requirements established in EPA's 2013 Vessel General Permit (VGP) and the USCG's ballast water regulations, as well as any other applicable state and local government requirements. Non-recreational, non-Armed Forces vessels less than 79 FT in length and fishing vessels of any size continue to be subject to existing ballast water discharge requirements only as established through the EPA 2013 VGP, the USCG ballast water regulations, and any other applicable state and local government requirements.

5.0 FUTURE FACILITY DEMAND ASSESSMENT

5.1 Overview of Demand Assessment Methodology

Honolulu Harbor is the principal seaport for the State of Hawaiʻi and central hub of the State's commercial harbors system. It cannot be overstated that the harbor is the crucial lifeline upon which the State depends for virtually all its cargo. Central to the HHMP is to determine the future demand on harbor facilities and the adequacy of the land area within the harbor to accommodate this demand through 2050. To address this, cargo projections were prepared, and the terminal cargo capacity was calculated which provided the basis for a terminal cargo capacity assessment and cargo needs assessment. Additionally, layberth requirements for the harbor were also evaluated.

5.1.1 Existing Cargo Operations

An overview of the existing cargo terminals located within Honolulu Harbor is shown in **Figure 5.1**. KCT, depicted in the figure below, is currently under construction and scheduled to commence operations in 2024.

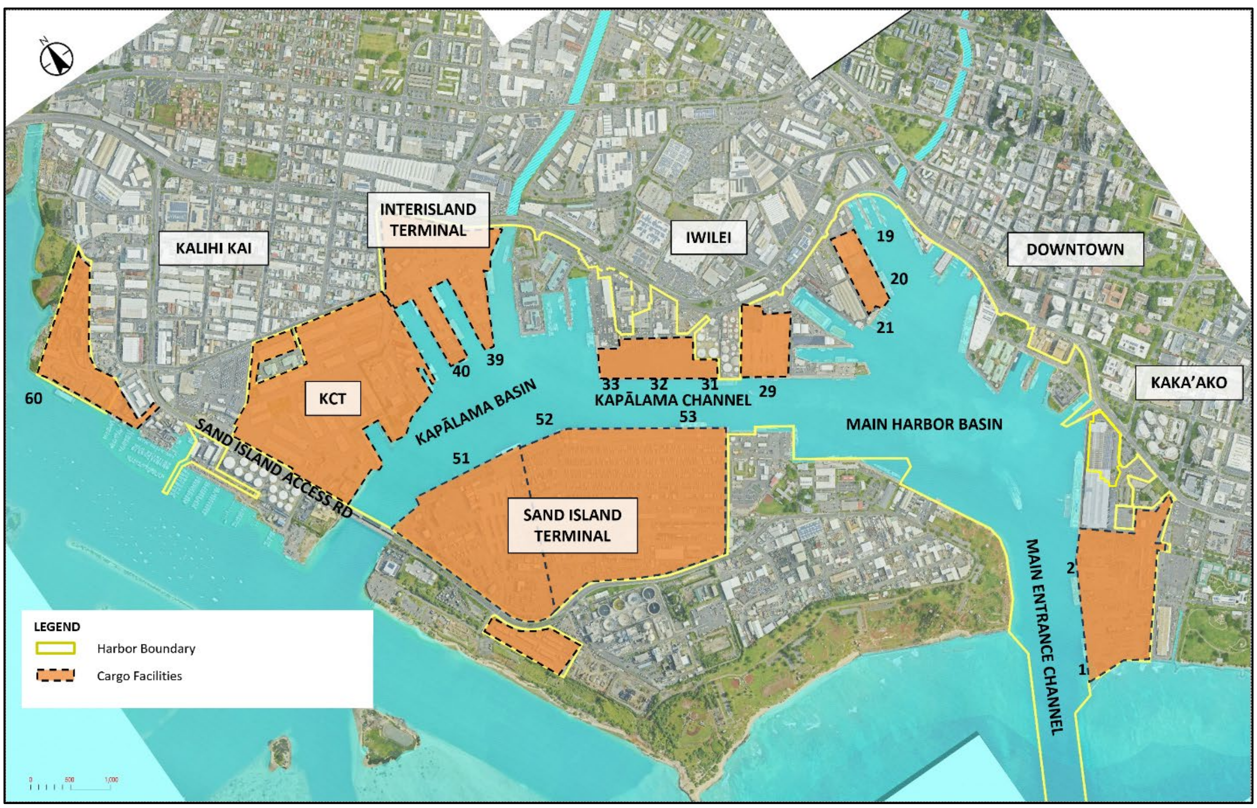

Figure 5.1 - Honolulu Harbor Cargo Facilities

Honolulu Harbor encompasses approximately 360 acres dedicated to handling cargo (see **Figure 5.1**). This includes container storage yards, automobile storage yards, break-bulk/neo-bulk storage yards, dry-bulk storage yards, liquid-bulk storage tanks, truck gates, and buildings and sheds (see **Table 5.1**).

Table 5.1 – Overall Harbor Spatial Characteristics

	Honolulu Harbor Cargo Terminals
Terminal Area (acres)	359.4
Container Yard Area (acres)	176.8
Automobile Storage Area (acres)	26.6
Break-Bulk/Neo-Bulk Cargo Storage Area (acres)	5.8
Dry-Bulk Cargo (Aggregates) Storage Area (acres)	5.8
Truck Gate Area (acres)	11.1
Building and Sheds (acres)	7.3
Tank Volume (barrels [Bbls]) [1]	1,356,500

[1] Fuel storage tanks are not located on DOTH property and are not managed by DOTH. Only the fuel manifold at Pier 51 and planned manifold at KCT are located on DOTH land.

Since completion of this analysis, AML (which operates at Pier 29) has relocated to KBPH, however this terminal is still designated for cargo operations.

5.2 Cargo and Passenger Throughput Projections

5.2.1 Methodology

Cargo projections were based on throughput, which is defined as the total activity or number of cargo or passengers passing through the harbor, which includes incoming and outgoing cargo (interisland and overseas), empty containers, and passenger movements. Throughput was recorded for individual cargo categories through piers, yards, cranes, and gates. Throughput represents cargo and passenger movements, whether overseas or interisland, export or import, and encompasses the total harbor activity for a given period.

The throughput projections focused on six cargo categories: 1) Containerized Cargo; 2) Automobiles; 3) Liquid-Bulk Cargo; 4) Break-Bulk and Neo-Bulk; 5) Sand and Aggregate; and 6) Passengers. The cargo projections were then analyzed for low, medium, and high case scenarios every five years from 2020 to 2050. The high and low projections were based on the variance of the historical data combined with what we know about the quality of the data and the likelihood of future events. They serve as outer boundaries of a channel in which cargo and passenger measurements are predicted to fall, with the medium projection as the baseline representing the Project Team's most probable scenario for the Needs Assessment.

The primary source of historical data used for the assessment included the Harbors Division Annual Cargo Statistics (HDACS), a comprehensive dataset describing cargo movements within Hawaiʻi's commercial harbors. The HDACS Data File contained transactional data gathered by DOTH in the process of collecting and managing wharfage fees. The annual throughput volumes for each major cargo type are likely to be influenced by varying levels of demand and economic factors that do not have uniform impacts across the different cargo types. Therefore, the projection process for each major cargo type varied slightly to better fit the nature of the cargo types and future expectations. In parallel with the throughput projections by cargo type, projections were also extended to the terminal level, allowing the Project Team to better allocate the space at Honolulu Harbor for future sustainability.

In addition, data used to understand the existing operations was derived from maritime user surveys and interviews. Maritime operators were also provided opportunities to review and provide refinements to the data inputs and conclusions. Ancillary data sources were also used to analyze and support cargo projections and passenger trends.[25] These ancillary data sources provided not only cargo related statistics, such as number of new automobiles sold or annual visitor counts, they also included correlates of cargo throughput including population counts from the U.S. Census Bureau and GSP from DBEDT.

The projection analyses were primarily conducted in 2018 and completed in November 2019, prior to the global COVID-19 pandemic. The projection methodology accounts for economic variability over time, including economic bubbles and recessions, world events such as wars and political crises, and other trends that together are experienced as cyclical economic activity. As a result, the COVID-19 pandemic is not expected to have an impact on the long-term cargo projections and capacity analyses over the 2050 planning horizon.

5.2.2 Future Cargo and Passenger Throughput

Containerized cargo includes commodities shipped in standardized, rectangular-shaped metal containers, and used to store and transport cargo intermodally (i.e., by ship, rail, and/or truck) from the origin to the destination. Shipping containers are a standard width and height. They are typically in lengths of 20, 40 and 45 FT, and can be as long as 53 FT, although containers of this size are

[25] American Community Survey; DBEDT, READ, Population and Economic Projections for the State of Hawaiʻi to 2045; DBEDT, Data Warehouse and State Data Book 2017; DBEDT, Annual Visitor Research Report 1999 to 2017; U.S. Energy Information Administration State Energy Consumption Estimates 1960 through 2016; Rhodium Group, Transcending Oil Hawaiʻi's Path to a Clean Energy Economy, Future distribution of electricity generated by oil and renewable energy from 2008 to 2030; The Hawaiʻi Auto Dealer Association (HADA) Projection; DOTH, Breakdown of incoming overseas cargo to Hawaiʻi by sea vs. air (internal draft report).

rarely used in Hawai'i because they require special use permits for transporting them on the local roadway system.

Container throughput is measured in 20-foot-equivalent units or TEUs. According to the Organization for Economic Co-operation and Development, a TEU is one of the standard units for counting containers of various capacities.[26] The TEU converts containers of different sizes into 20-FT equivalent units to produce a single standard for measuring containerized cargo. For example, a 40-FT and a 20-FT container are equivalent to 2 TEUs and 1 TEU, respectively.

Figure 5.2 presents the 2050 projection for containerized cargo throughput at Honolulu Harbor. Throughput is the total number of cargo movements, overseas and interisland, incoming and outgoing at the harbor for a 12-month fiscal year, ending in 2050. It is not the total number of containers arriving at the harbor.

From 2020 to 2050, containerized cargo throughput is projected to grow year over year, except in the low case scenario where there is a small decrease in 2020 (see **Figure 5.2**). The overall growth rate in the low scenario is 37 percent, in the medium scenario is 69 percent, and in the high scenario is 101 percent. Container cargo throughput projections strongly correlate with *de facto* population growth and GSP projections. The average annual rate of growth of GSP is projected to be 1.7 percent between 2016 and 2045 (DBEDT, 2018) and 1.6 percent between 2046 and 2050 (SMS, 2022). The growth slowdown is expected due to an aging population, a slowdown in construction activities and slower tourism growth.

[26] FEU is another standard unit for counting containers of various capacities. A 40-FT containerized cargo is equivalent to 1 FEU.

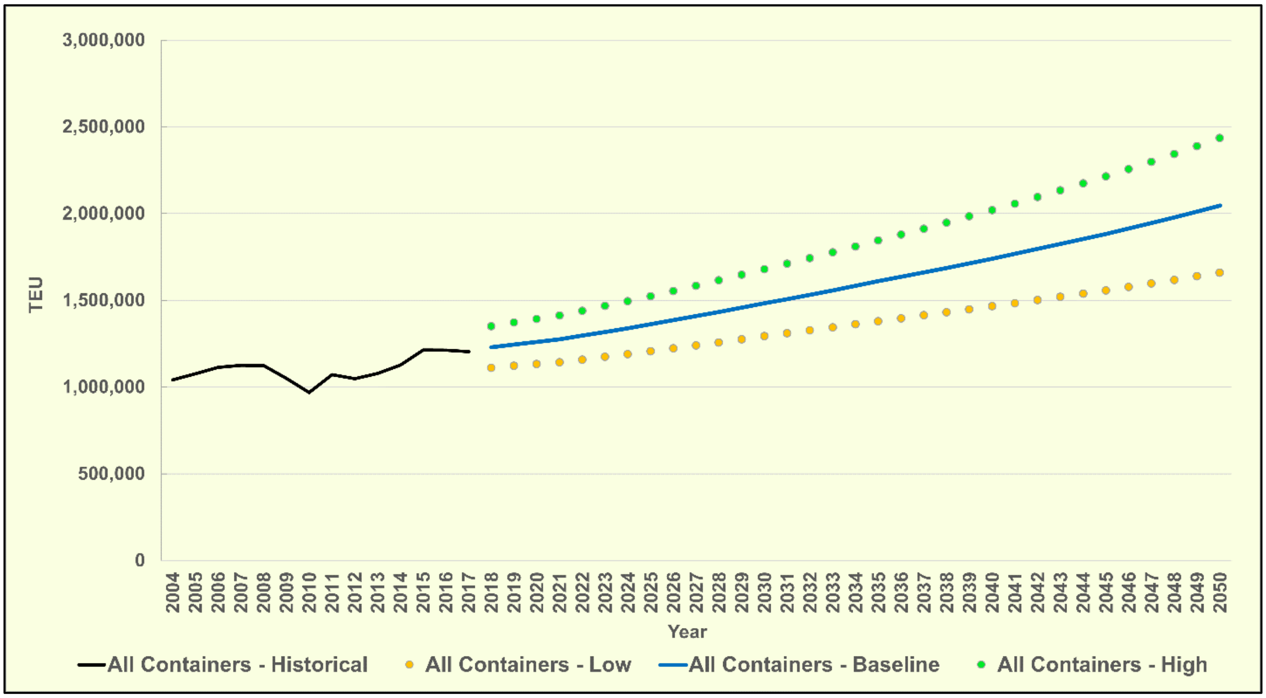

Figure 5.2 - Projected Container Throughput

The annual automobiles throughput from 2020 to 2050 is projected to increase 16 percent in the low scenario and grow by 29 percent in the medium scenario and 41 percent for the high scenario (see **Figure 5.3**). Hawai'i's automobile market was saturated by 2018 and not expected by industry experts interviewed by the Project Team to show strong upward growth until the mid-2020s. Projected RO/RO automobile growth is based on a logarithmic trend of the historical data adjusted to reflect the expected slow growth due to market saturation, higher prices for new vehicles, lower used vehicle values (which disincentivizes "selling-up" and trade-ins), and decline in pent-up demand. The effect of as yet unknown impacts of continued roadway congestion, increases in ride-sharing, fully electric and self-driving cars, are not factored into the RO/RO automobile projections.

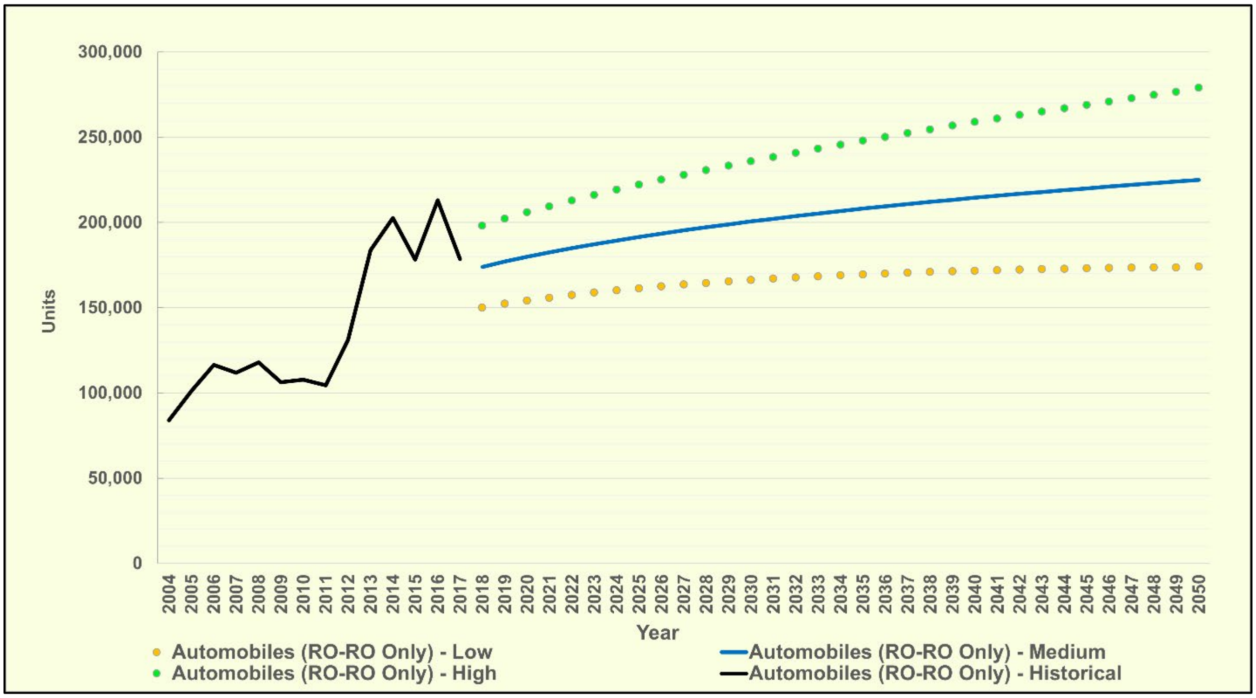

Figure 5.3 - Projected Automobiles Throughput

Differing from the other cargo trends, the annual break-bulk/neo-bulk cargo is expected to decrease from 2020 to 2050 for all three scenarios (see **Figure 5.4**). The growth rate is minus 55 percent in the low scenario, minus 29 percent in the medium scenario, and minus 18 percent in the high scenario. The historical data and projection for neo-bulk and break-bulk throughput at Honolulu Harbor through 2050 has as its defining characteristic a sharply decreasing trend after 2007. It is reasonable to assume that The Great Recession (2007 to 2009) contributed to the first three or four years of decline, but the recovery period shows continued decline. It is known that this period witnessed increasing containerization of all cargoes – a trend that is expected to continue. The impact of new projections for population and GSP could change this projection. Even if the state population continues to decline, the percentage of the population living on the Neighbor Islands will continue to climb. In Honolulu Harbor, most break-bulk and neo-bulk handling involves breaking incoming cargo into barge loads destined for Neighbor Islands. Increasing demand on the Neighbor Islands would increase the net throughput of break-bulk and neo-bulk at Honolulu.

The annual liquid-bulk cargo throughput, harbor wide, from 2020 to 2050 is projected to decrease five percent in the low scenario and grow by 32 percent in the medium scenario and 69 percent for the high scenario (see **Figure 5.5**). The 2013 peak in the historic data was in part the result of a fire at one of Hawaiʻi's refineries that caused a shutdown at the end of 2013. That resulted in a significant reduction in petroleum products refined in-State, which in turn caused a sharp increase in imports of refined products through Honolulu Harbor. The overall trend for liquid-bulk cargo throughput since 2009 appears to be increasing at a decreasing rate. The trend is not highly correlated with either population or economic growth. Population growth and GSP may well predict the use of liquid-bulk products in Hawaiʻi, but not necessarily their flow through Honolulu Harbor. The upward trend reflects a moderate increase in consumption and a steady state increase in visitor arrivals – the primary drivers of jet fuel and other liquid-bulk commodities.

The annual aggregate throughput in Honolulu Harbor is projected to decrease from 2020 to 2050 between 100 percent, 99 percent, and 80 percent in the low, medium, and high scenarios, respectively (see **Figure 5.6**). The downward trend in aggregate operations in Honolulu Harbor is due to relocation of most barge deliveries of aggregate materials to KBPH. Although Pier 60 is planned to continue to serve primarily as an aggregate pier, its use is integrated with the contiguous HC&D concrete batch plant operations which increasingly receives aggregate materials by truck. Thus, barge deliveries of aggregate to Pier 60 are projected to continue, but on a decreasing basis.

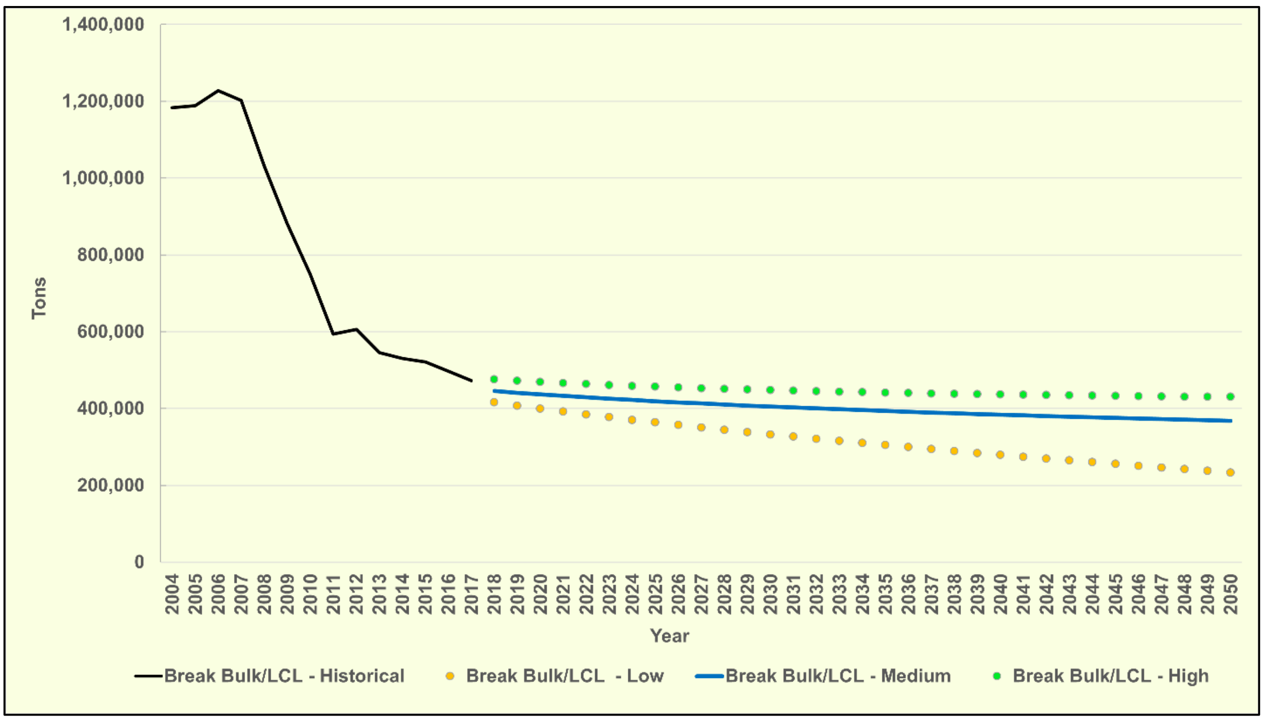

Figure 5.4 - Projected Break-Bulk/Neo-Bulk Cargo Throughput

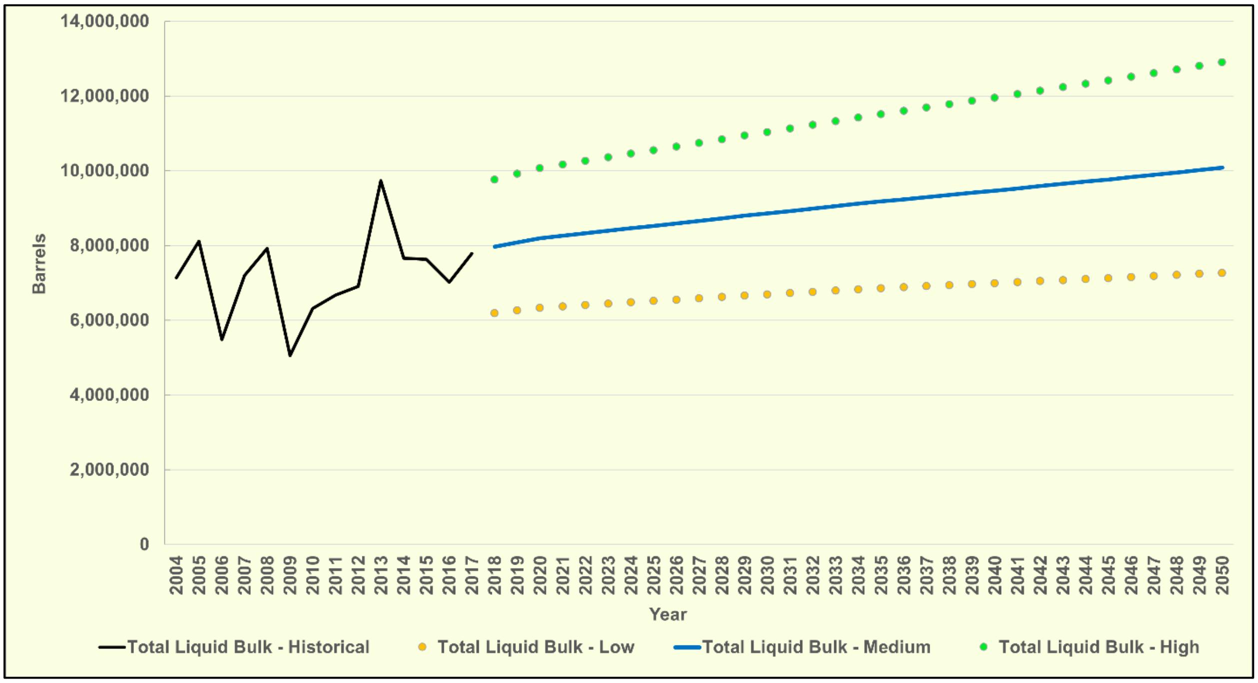

Figure 5.5 - Projected Liquid-Bulk Cargo Throughput

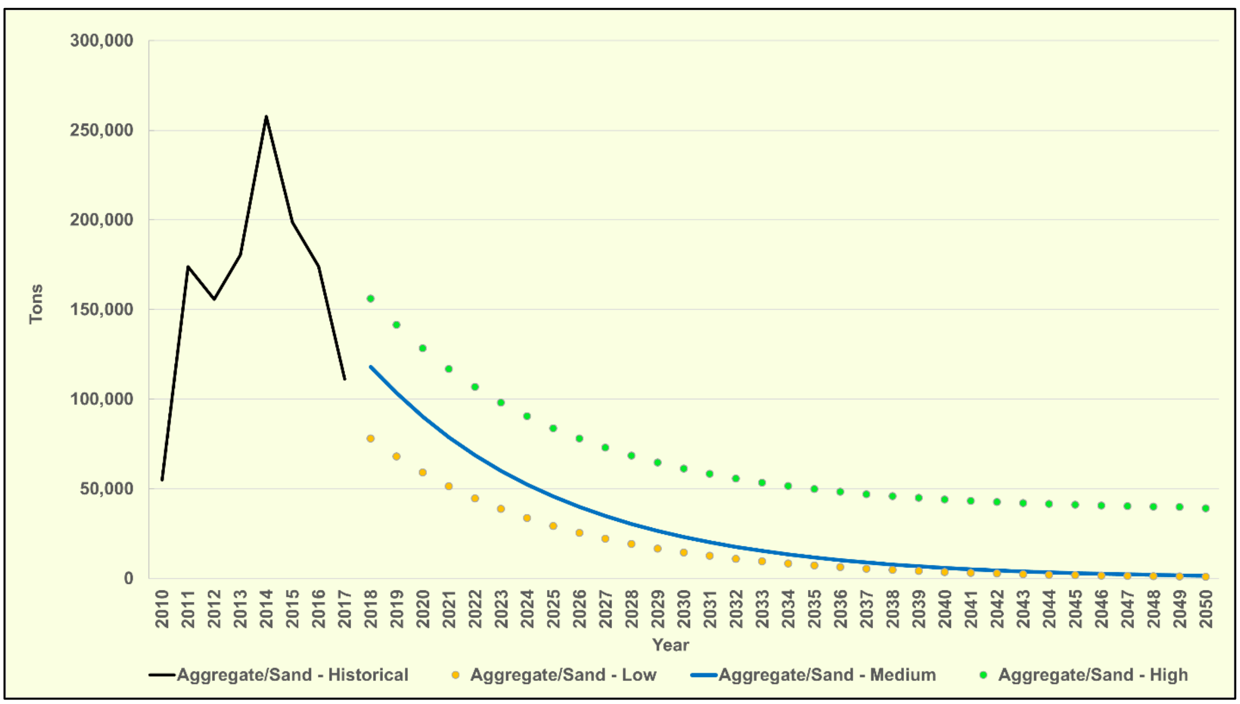

Figure 5.6 - Projected Dry-Bulk Cargo (Aggregate) Throughput

Figure 5.7 presents the historical and projected data on total cruise passenger movements through Honolulu Harbor, including overseas and interisland passengers, from 2004 to 2050. The total cruise passenger movements through Honolulu Harbor included passengers who were arriving or departing to/from the state on cruise ships as well as passengers embarking or debarking from interisland cruise vessels. Excursion passenger traffic was excluded.

The historic data were relatively stable at 450,000 to 500,000 passenger movements per year. The medium annual passenger throughput projection is nearly flat with a six percent increase by 2050. The low projection illustrates a relatively small chance that cruise passenger activity in Honolulu Harbor will decrease by about five percent over the planning horizon. The high scenario indicates a 70 percent increase in passenger throughput in 2050, reflecting the strong potential of increasing capacity in the interisland cruise market.

The COVID-19 pandemic resulted in a complete halt of cruise operations in Honolulu Harbor from first quarter 2020 until first quarter 2022. The expectation is that cruise activity in Hawaiʻi will return to pre-pandemic levels within a few years and may even increase as U.S. vacationers seek alternatives to international travel. Unlike cargo projections, which are largely driven by population growth and related demand for essential commodities, cruise passenger throughput trends are largely driven by cruise industry investment and promotion in Hawaiʻi cruise routes, and by the level of policy and infrastructure support provided by the state government. The outcome of these negotiated exchanges will ultimately determine future passenger throughput.

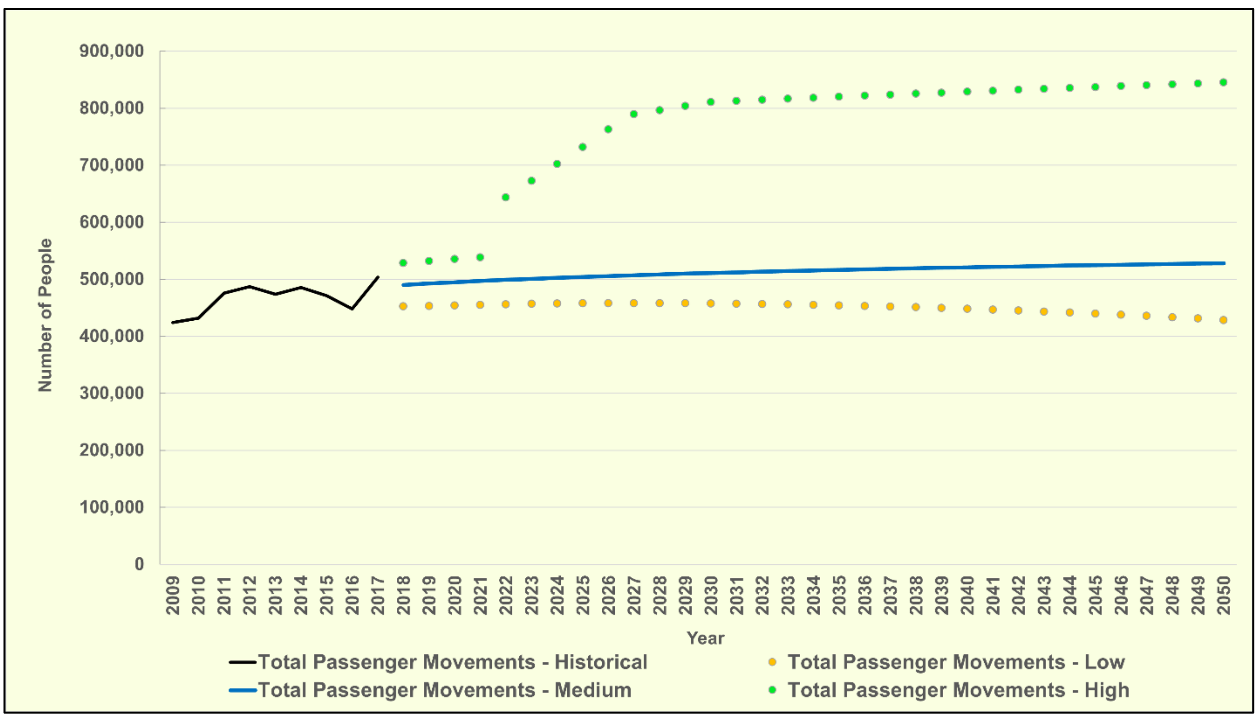

Figure 5.7 - Total Passenger Throughput

5.3 Capacity and Existing Conditions

5.3.1 Methodology

An assessment of the existing conditions of Honolulu Harbor relevant to the current capacity of cargo activities was completed for the HHMP. The existing condition assessment included the collection of data from terminal operators and users,[27] an analysis of current throughput capacity of the major cargo activities in the port, and a comparison with recent throughput data to determine utilization.

The initial step in the existing condition assessment was to collect data from terminal operators and users on current harbor operations and throughput capacity. A data request form was prepared for the operators/users to complete for each cargo activity. Several in-person and phone meetings were also conducted to further understand terminal operations and to clarify and refine information provided in the data requests. Along with the data request, site visits to each of the facilities occurred along with discussions with terminal operators, DOTH, and maritime experts familiar with operations in the harbor.

Static simulation modeling was conducted to estimate the annual throughput capacity for each terminal and for each cargo activity based on the physical, productivity, and market attributes of the terminal. The throughput capacity of a terminal is a function of its major components, which in Honolulu Harbor include the berth, storage yard, and truck gate.

Various factors influence the volume of cargo that can be handled on a daily, weekly, monthly, and yearly basis by a terminal. These factors can be divided into three primary categories: physical parameters, productivity measures, and market conditions.

- ***Physical parameters.*** The physical infrastructure and equipment of the facility including the available yard space; length of wharf; and the number of trucking gate lanes, ship-to-shore cranes, and yard handling equipment.
- ***Productivity measures.*** Generally relates to the capabilities of equipment and labor, such as number of containers moved by crane per hour and the rate at which incoming trucks can

[27] Industries represented by the terminal operators and users included: (1) International, U.S. and interisland cargo; (2) containerized, bulk and RO/RO cargo; (3) petroleum cargo; and (4) aggregate and sand bulk cargo; (5) break-bulk consolidators; and (6) cruise and day excursion operations. Interviews were conducted with terminal operators, shipping service providers, stevedore services, shipping agents, and energy companies who operate in Honolulu Harbor.

be processed. The productivity of a terminal is influenced by many factors including equipment capabilities plus labor rules, training, and skill.

- ***Market conditions.*** Impact the terminal's throughput and are generally beyond the control of the port or terminal operator. Market condition variables include ship stow, the mix of imports and exports, the volume of empty containers, and the destination of the cargo.

Models are used to simulate operations that in turn can estimate throughput capacities. The use of modeling allows for the estimation of capacity based on select variables. A static numerical representation was used for the HHMP to simulate the physical conditions of the harbor under one set of variables at a single point in time. The more variables entered, and the more reflective they are of actual conditions, the more accurate the results.

The estimated capacities are considered sustainable capacities. The sustainable capacity of a terminal can be defined as the upper, sustainable limit of throughput that maintains levels of service that meets customer requirements. A terminal's maximum capacity can exceed the sustainable capacities by an estimated 15 to 20 percent, but as volumes exceed sustainable capacity congestion will increase as throughput increases.

Sustainable capacities are reported as "berth equivalent capacities" for a fair comparison in which the reported capacity of a component reflects the level of overall berth throughput in which the component may begin to be constrained, and thus is not the actual capacity of the component. For example, if the truck gate has an actual capacity of 100,000 TEUs per year and it handles 50 percent of the berth throughput (the other 50 percent is transshipped), then the truck gate has a berth equivalent capacity of 200,000 TEUs per year.

This capacity analysis focused on the sustainable capacity of the berth, cargo storage area, and truck gate.

- ***Berth capacity.*** The amount of cargo that can be transferred between ship and shore in any given period of time. It is a function of the number of available berths based on vessel size and wharf length, maximum sustainable berth occupancy, operating hours, cargo discharge and load rates, and seasonal fluctuations/peaks.
- ***Cargo storage area capacity.*** Evaluated in terms of "static" and "throughput" capacity. Static capacity is the volume of cargo that can be stored at any single time and is a function of total yard area and how densely the yard area is utilized. Throughput capacity is the volume of cargo that can be moved through the yard in any given period and is a function of the static capacity of the yard and dwell time (i.e., how long cargo is stored in the yard).
- ***Truck gate capacity.*** The amount of cargo that can be moved by truck through the perimeter gate (both in-bound and out-bound), which serves as a process and security interface. The amount of cargo moved is a function of gate opening hours; number of process/truck lanes;

process rate per truck; amount of cargo per truck; staging capacity; and seasonal, daily, and hourly peaks and arrivals.

Following the existing conditions assessment, a needs assessment was completed. The needs assessment identified where there are shortfalls within Honolulu Harbor's overall capacity to accommodate projected throughput looking forward to 2050. The needs assessment focused on the needs of the harbor as a whole.

5.3.2 Existing Capacity

Berth and storage capacity were modeled, and the governing capacity was used to determine the terminal's overall capacity. Most of the terminals in the harbor are limited by their berth capacity; however, the Interisland Terminal is limited by its yard capacity. KCT is also constrained by the container yard capacity; however, discussions with the future terminal operator indicate that densification of the yard is planned as throughput at the terminal increases.

5.3.2.1 Containers

Containers contribute the largest portion of the cargo throughput at Honolulu Harbor and traffic is handled through several terminals and operators including Sand Island, the Interisland Terminal, Pier 1 and the soon to be completed KCT. Pier 29 was included in the analysis however, the operator at this pier terminal has relocated to KBPH.

The overall sustainable capacity of Honolulu Harbor is currently 1.43 million TEUs per year and will increase to 1.86 million TEUs per year once KCT is completed and operational (see **Table 5.2**).

Table 5.2 – Summary of Estimated Container Terminal Sustainable Capacities

Terminal	Sustainable Capacity (TEUs/year)		
	Berth	Container Yard	Overall
Pier 1	70,000	90,000	70,000
Pier 29	70,000	100,000	70,000
Interisland Terminal Piers 39/40	290,000	180,000	180,000
Sand Island Piers 51C-53	780,000	900,000	780,000
Sand Island Pier 51A-51B	340,000	330,000	330,000
TOTAL W/O KCT	**1,550,000**	**1,600,000**	**1,430,000**
KCT	770,000	430,000	430,000
TOTAL W/ KCT	**2,320,000**	**2,030,000**	**1,860,000**

5.3.2.2 Automobiles (RO/RO)

Automobiles, or RO/RO, are handled at several terminals around the harbor. The existing automobile storage yard capacity is 367,000 units per year, whereas the berth capacity for vehicles is 655,000 units per year (see **Table 5.3**). The throughput capacity of the automobile terminals is governed by the capacity of the automobile storage area; thus, the total throughput capacity in Honolulu Harbor is 367,000 units per year.

Table 5.3 – Summary of Sustainable Capacities for RO/RO Automobiles by Terminal

Terminal	Sustainable Capacity (Autos/year)		
	Berth	Auto Storage Yard	Overall
Pier 1	140,000	89,000	89,000
Pier 20	175,000	35,000	35,000
Pier 32	175,000	162,000	162,000
Interisland Terminal Piers 39/40	78,000	30,000	30,000
Sand Island Piers 51C-53	87,000	51,000	51,000
TOTAL	**655,000**	**367,000**	**367,000**

5.3.2.3 Break-Bulk/Neo-Bulk Cargo

Break-bulk cargo typically is not transported by container. LCL cargo is a sub-set of break-bulk cargo. Neo-bulk cargo, also referred to as project cargo, includes larger items that typically would not fit in a container, such as steel girders or wind turbine components. The annual throughput capacity for break-bulk/neo-bulk cargo facilities is 763,000 tons (see **Table 5.4**). It is noted that this value is the most difficult to quantify due to the large range of cargo with varying sizes and weights.

Table 5.4 – Summary of Sustainable Capacities for Break-Bulk/Neo-Bulk Cargo by Terminal

Terminal	Sustainable Capacity (Tons/year)		
	Berth	Storage Yard	Overall
Pier 1	120,000	230,000	120,000
Pier 29	297,000	137,000	137,000
Interisland Terminal Piers 39/40	436,000	431,000	431,000
Sand Island Piers 51C-53	120,000	75,000	75,000
TOTAL	**973,000**	**873,000**	**763,000**

5.3.2.4 Liquid-Bulk Cargo

The annual throughput capacity for liquid-bulk cargo, with KCT, is 20,630,000 Bbls (see **Table 5.5**), which is governed by the berth capacity. The existing manifold at Pier 51A is the primary berth for jet fuel imports at Honolulu Harbor. A second manifold will be added at KCT Pier 43 to reduce congestion currently experienced at Pier 51A, as this berth is shared with container ships. The second manifold will provide an alternative berth for unloading jet fuel and will connect with the same storage tanks as the Pier 51A manifold. As Pier 51A and the future Pier 43 at KCT will utilize the same storage tanks, no storage capacity is listed for KCT.

Unlike the other terminals in the harbor that are under the control of DOTH, Pier 30, which includes the berth itself, the pier-side manifolds and the land-side storage tanks for liquid-bulk cargo are outside of DOTH's property and responsibility. However, as the terminal is located within the immediate harbor area, it was included in the analysis.

Table 5.5 – Summary of Sustainable Capacities for Liquid-Bulk Cargo by Terminal

Terminal	Sustainable Capacity (Bbls/year)		
	Berth	Tank Storage	Overall
Pier 30	8,350,000	35,630,000	8,350,000
KCT	6,140,000	--	6,140,000
Pier 51	6,140,000	12,170,000	6,140,000
TOTAL	**20,630,000**	**47,800,000**	**20,630,000**

5.3.2.5 Dry-Bulk Cargo (Aggregates)

The only dry-bulk cargo (aggregates) terminal in Honolulu Harbor is at Pier 60, which has an overall throughput capacity of 500,000 tons per year (see **Table 5.6**).

Table 5.6 – Summary of Sustainable Capacities for Dry-Bulk (Aggregates)

Terminal	Sustainable Capacity (Tons/year)		
	Berth	Storage Yard	Overall
Pier 60	500,000	810,000	500,000

5.3.2.6 Truck Gate Capacity

Truck gates are only used for container and break-bulk/neo-bulk cargo and not for RO/RO automobiles or liquid-bulk cargo. An analysis of the truck gate capacity was completed for the container terminals. Due to the extensive variability of cargo and vehicles transporting the break-bulk/neo-bulk cargo, the capacities of the gates for this cargo were not evaluated. However, if the terminal gate is shared between cargo types, an allowance was included in the container gate capacity analysis to account for the additional traffic.

- ***Interisland Cargo Terminal.*** Break-bulk/neo-bulk cargo and containers are handled at separate gates, with all containers moving through the west gate and break-bulk/neo-bulk cargo moving through the north gate. Only the west gate was considered in the analysis.

- ***Pier 29.*** It was assumed that the gate will handle additional volume to compensate for the traffic from the break-bulk/neo-bulk cargo.
- ***Pier 1.*** The truck gate has two inbound and two outbound lanes; however, only one lane in each direction is dedicated to container traffic.

Typically, when analyzing the sustainable capacity of a truck gate, an hourly peaking factor is included. This peaking factor allows for adequate capacity to handle the truck traffic during periods that are above average volumes. At a truck gate, it is common to have a peak of truck traffic in the morning when the gates open and then again in the afternoon if the gates close at lunch. A typical hourly peaking factor for a manual truck gate is 1.5 to 1.8; thus, 1.5 was used in the analysis. When there is not an allowance for hourly peaking of the truck traffic, queues can form during peak traffic flows. [28]

Truck gate capacities at several of the terminals do not balance with overall terminal capacities when a peaking factor was included. When no peaking factor is included, queuing and congestion will occur at the truck gates during peak truck traffic flows (see **Table 5.7**).

Table 5.7 – Estimated Container Truck Gate Capacity

Terminal	Sustainable Throughput Capacity (TEUs/year)		
	Hourly Peaking = 1.0	**Hourly Peaking = 1.5**	**Overall Terminal Capacity [1]**
Pier 1	140,000	90,000	70,000
Pier 29	100,000	70,000	70,000
Interisland Piers 39/40	180,000	100,000	180,000
Sand Island Piers 51A-51B	290,000	190,000	330,000
Sand Island Piers 51C-53	610,000	400,000	780,000
TOTAL W/O KCT	**1,320,000**	**850,000**	**1,430,000**
KCT	600,000	400,000	430,000
TOTAL W/ KCT	**1,920,000**	**1,250,000**	**1,860,000**

[1] From Table 5.2.

[28] An hourly "peaking factor" is a correction factor / multiplier that is applied to the calculation used to determine truck gate throughput capacity to ensure that the calculation captures the increased throughput demand created during peak traffic periods. Without a "peaking factor" the truck gate capacity calculation would not account for the increased number of trucks that the gate accommodates during peak traffic periods and thus would underrepresent the capacity of a gate.

For Pier 1, Pier 29, and KCT, the truck gate capacities with an allowance for peak traffic approximately matched that of the overall terminal's berth and yard capacity. When no allowance was included for peaking, the Interisland and Pier 51 truck gate capacities were approximately balanced with their overall berth and yard capacities; therefore, congestion will occur during peak traffic periods.

It is noted that no allowance was included for the proposed pass-pass operation between KCT and Interisland Terminal, which will reduce the truck gate traffic at both terminals once KCT is operational and the pass-pass operation is in use.

The Sand Island Piers 52/53 truck gate capacity was less than the overall terminal capacity. Long lineups often occur during peak traffic to both enter and exit the facility with up to 50 trucks lining up on a Monday morning when the terminal is at its busiest.

5.3.3 Existing Throughput and Utilization

The estimated sustainable capacities were compared to actual 2017 and 2020 throughputs to determine current harbor wide utilization by cargo (see **Table 5.8**).

The results demonstrate that Honolulu Harbor container handling facilities without KCT are reaching their sustainable capacity with 84 percent utilization for both years. Automobile throughput in 2017 was approximately 48 percent of capacity. The utilization dropped to 34 percent in 2020, however this is likely due to short-term changes from the pandemic such as reduced movement of rental cars. Break-bulk/neo-bulk cargo throughput was 62 percent of the harbor capacity in 2017 and 53 percent of the harbor capacity in 2020. Liquid-bulk cargo throughput in both 2017 and 2020 was approximately one-third of the harbor's capacity. The 2017 utilization of Pier 60 for dry-bulk cargo (i.e., aggregate) handling was only 17 percent.

Table 5.8 – Overview of Existing Capacity

Cargo Type	Unit	Sustainable Capacity	FY 2017	2017 Percent Utilization	FY 2020	2020 Percent Utilization
Containers	TEUs	1,430,000	1,204,000	84 percent	1,197,000	84 percent
Autos (RO/RO)	Unit	367,000	178,000	48 percent	126,000	34 percent
Break-Bulk/Neo-Bulk Cargo	Tons	763,000	471,000	62 percent	408,000	53 percent
Liquid-Bulk Cargo	Bbls	14,490,000	7,072,000	34 percent	7,255,000	35 percent
Dry-Bulk Aggregate	Tons	500,000	83,000	17 percent	11,000	2 percent

5.4 Future Harbor Capacity Needs

5.4.1 Cargo

The annual projected throughputs in 2050, outlined in **Section 5.2**, were compared with the harbor's sustainable capacities to determine where any shortfalls may occur. The sustainable capacities reflect the inclusion of KCT, which is expected to become operational in 2024. In 2050, the medium and high annual throughput projections for containerized cargo will exceed the harbor's capacity. However, the harbor's overall capacity to handle automobiles, break-bulk/neo-bulk cargo, liquid-bulk cargo, and dry-bulk cargo (aggregate) is adequate to meet the projected annual throughputs in 2050 (see **Table 5.9**).

Table 5.9 – 2050 Cargo Throughput

Cargo	Unit	Annual Sustainable Capacity	Projected Annual Throughput in 2050	Difference
Containers	TEUs	1,860,000[1]	1,658,100 (low) 2,046,000 (medium) 2,435,000 (high)	+201,900 (low) -186,000 (medium) -575,000 (high)
Automobiles (RO/RO)	Units	367,000[2]	174,000 (low) 225,000 (medium) 279,000 (high)	+193,000 (low) +142,000 (medium) +88,000 (high)
Break-Bulk/Neo-Bulk Cargo	Tons	763,000	233,000 (low) 368,000 (medium) 430,000 (high)	+530,000 (low) +395,000 (medium) +333,000 (high)
Liquid-Bulk Cargo	Bbls	20,630,000	7,265,000 (low) 10,080,000 (medium) 12,895,000 (high)	+13,365,000 (low) +10,550,000 (medium) +7,735,000 (high)
Dry-Bulk Cargo (Aggregate)	Tons	500,000	800 (low) 1,500 (medium) 39,000 (high)	+499,200 (low) +498,500 (medium) +461,000 (high)

[1] With KCT.

[2] With Piers 19/20.

As containers are the only cargo expected to exceed the harbor's capacity to accommodate them, a timeline of the projected throughput was plotted along with capacity to determine when container capacity will be reached (see **Figure 5.8**). In the high scenario, the projected container throughput will exceed harbor capacity between 2035 and 2040. In the medium scenario, projected throughput will exceed harbor capacity between 2040 and 2045. In the low scenario, the throughput will not exceed harbor capacity by 2050. The change in harbor capacity reflects KCT becoming operational in 2024 which will provide the additional container capacity to meet the future container throughput demand.

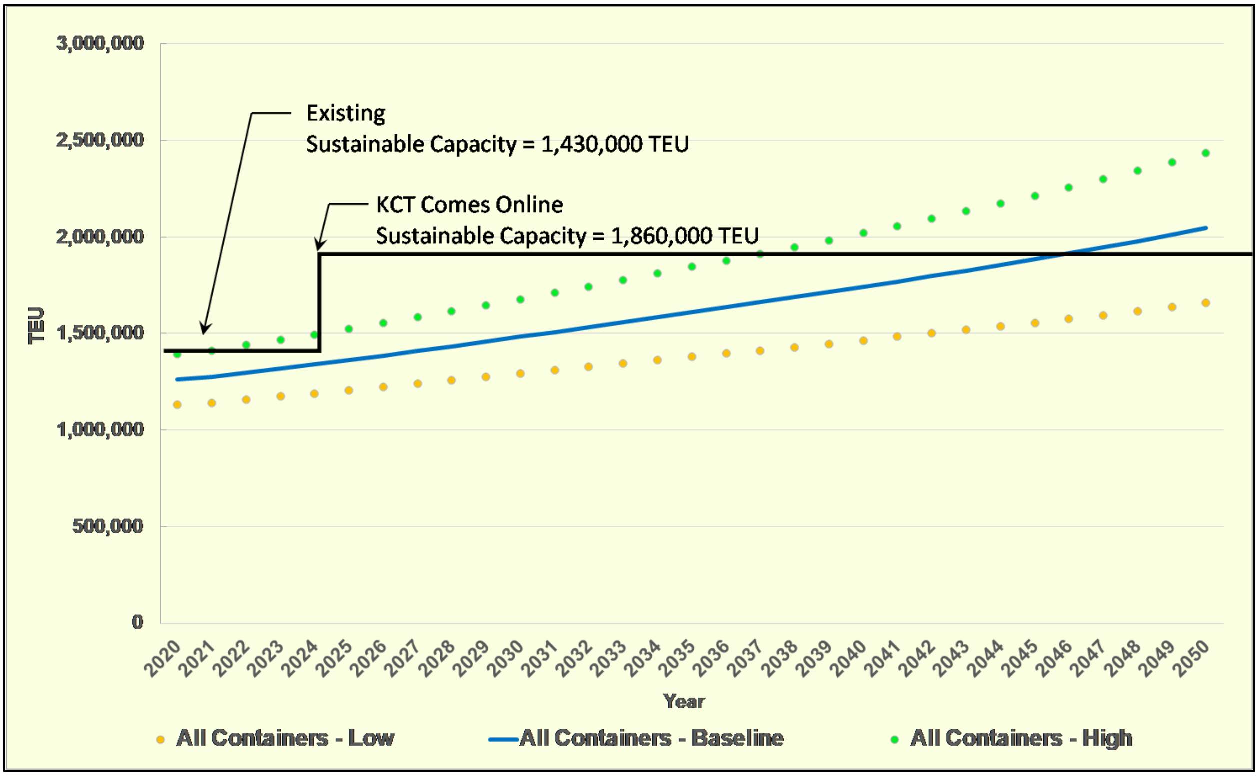

Figure 5.8 – Projected Container Throughput and Capacity

5.4.2 Cruise Passengers

Two cruise ship terminals are sufficient to accommodate the anticipated return to pre-pandemic levels of cruise operations in Honolulu Harbor with some additional capacity for growth, such as the introduction of a second or even third homeported ship. These operations can be accommodated at the existing terminals at Pier 2 and Piers 10 and 11, or at a consolidated Pier 2 Cruise Terminal with Pier 1 serving as an additional cruise ship berth for port calls and partial turns. In either scenario, cruise terminal capacity will rely on efficient cruise ship scheduling to maximize berth utilization. To accommodate the maximum passenger throughput projection of a 70 percent increase in passengers by 2050, expanded terminal facilities, particularly on the landside, will be required for passenger processing and ground transportation. This level of growth will also require analysis of the sustainable capacity of the State, and in particular the Neighbor Island communities' and the environment's threshold for absorbing the impacts of cruise activities, and the cruise industry's ability to mitigate those impacts.

5.5 Future Harbor Spatial Needs

The overall harbor storage requirements were evaluated to determine how much space is required for each cargo type looking ahead to 2050, assuming there is no change to the current storage throughput density. Storage throughput density is the overall throughput capacity of a storage area per unit of storage (example acre or tank volume) assuming no change to market and productivity parameters including dwell time.

5.5.1 Containers

In general, the overall berth capacity in the harbor is adequate to meet the medium projected growth; however, Honolulu Harbor's container storage yard capacity is insufficient to accommodate the projected 2050 throughput for the medium case scenario. Honolulu Harbor's container storage yard capacity is 2,030,000 TEUs per year (see **Table 5.2**), which is 16,000 TEUs per year short of the projected 2050 medium case throughput of 2,046,000 TEUs/year.

The total container yard area across the entire harbor is 176.8 acres (see **Table 5.10**). Using the container storage yard capacity and container yard area as a baseline, the area required to meet the medium case projected 2050 throughput of 2,046,000 TEUs per year is 178.2 acres, which is the equivalent of an additional 1.4 acres.

Table 5.10 – Summary of Container Storage Needs (Medium Scenario)

Year	Throughput Medium Scenario (TEUs/year)	Required Container Yard Area (Acres)
Storage Throughput Capacity	**2,030,000**	**176.8**
2025	1,362,000	118.6
2030	1,483,000	129.2
2035	1,610,000	140.2
2040	1,741,000	151.6
2045	1,883,000	164.0
2050	2,046,000	178.2

While the overall harbor berth and yard capacities are adequate or close to the projected TEU throughput in 2050, there are several terminals where either the berth or yard capacities are substantially different and therefore governed by the lower capacity. <u>To realize the full capacity of the harbor, the individual terminal yard and berth capacities will need to be balanced</u>. In the case of Pier 1, Pier 29, and the Sand Island Terminal, the yard capacity is higher than the berth capacity; therefore, the full yard capacity is not realized. The opposite is in effect at KCT and the Interisland Terminal where the berth capacity is higher than the yard capacity and therefore the full berth capacity is not realized. At Pier 1, Pier 29 and Sand Island Terminal, additional berth capacity can be achieved by improving the efficiency of cargo movement across the berth, which reduces the duration a vessel must remain at berth and thereby expands berth capacity. Increasing movement across the berth could involve adding gantry cranes at the terminal or improving operational efficiencies in cargo handling. At KCT and the Interisland Terminal, additional yard capacity can be achieved by grounding and densifying container storage (stacking containers), improving yard layout and operational efficiency by relocating buildings to the yard perimeter, and in the case of the Interisland Terminal, by filling in portions of the slipway to create more yard area. The berth and yard capacities of the individual terminals are taken into consideration in the recommendations in **Section 7.2**.

5.5.2 Automobiles (RO/RO)

The existing automobile storage yard capacity is 367,000 units per year, whereas the berth capacity is 655,000 units per year. The total automobile storage yard area across the entire harbor is 26.6 acres (see **Table 5.11**).

Table 5.11 – Summary of Automobile Storage Needs (Medium Scenario)

Year	Throughput Medium Scenario (Autos/year)	Required Storage Yard Area (Acres)
Storage Throughput Capacity	**367,000**	**26.6**
2020	180,000	13.0
2025	191,000	13.9
2030	201,000	14.5
2035	208,000	15.1
2040	214,000	15.5
2045	220,000	15.9
2050	225,000	16.3

The projected medium case scenario throughput for automobiles in 2050 is 225,000 units, which is 142,000 units less than the overall existing capacity for automobiles in the harbor. To meet the projected throughput, a total of 16.3 acres is needed in 2050. Therefore, the 26.6 acres of existing auto storage yard capacity exceeds the projected 16.3 acres required in 2050 by 10.3 acres.

5.5.3 Break-Bulk/Neo-Bulk Cargo

The total storage yard area across the entire harbor for break-bulk/neo-bulk cargo is 5.8 acres. Using the storage yard capacity of 873,000 tons per year and area as a baseline, the overall storage yard area required in 2050 is 2.5 acres (see **Table 5.12**).

Table 5.12 – Summary of Break-Bulk/Neo-Bulk Cargo Storage Needs (Medium Scenario)

Year	Throughput Medium Scenario (Tons/year)	Required Storage Yard Area (Acres)
Storage Throughput Capacity	**873,000**	**5.8**
2020	437,000	2.9
2025	419,000	2.8
2030	405,000	2.7
2035	394,000	2.6
2040	384,000	2.6
2045	376,000	2.5
2050	368,000	2.5

The projected medium case scenario throughput for break-bulk/neo-bulk cargo in 2050 is 368,000 tons, which is 505,000 tons less than the existing overall capacity for bulk storage in the harbor. A storage area of 2.5 acres is needed to meet the medium case scenario throughput projections in 2050. Therefore, the existing 5.8 acres of storage yard exceeds the 2050 requirement by 3.3 acres.

5.5.4 Liquid-Bulk Cargo

Using the existing tank capacity of 47,800,000 Bbls per year and static tank storage of 1,356,500 Bbls as a baseline, the harbor's overall liquid-bulk tank storage required to meet the medium case scenario throughput projections, assuming there is no change in the storage throughput density, was determined (see **Table 5.13**).

The throughput projection in the medium case scenario for liquid-bulk cargo in 2050 is 10,080,000 Bbls, which is less than a quarter of the harbor's storage throughput capacity. To meet the projected throughput in 2050, total tank capacity of approximately 290,000 Bbls is needed.

Table 5.13 – Summary of Liquid-Bulk Cargo Storage Needs (Medium Scenario)

Year	Throughput Medium Scenario (Bbls/year)	Required Tank Capacity (Bbls)
Storage Throughput Capacity	**47,800,000**	**1,356,500**
2020	8,198,000	232,652
2025	8,527,000	241,979
2030	8,860,000	251,422
2035	9,179,000	260,492
2040	9,469,000	268,731
2045	9,768,000	277,189
2050	10,080,000	286,057

5.5.5 Dry-Bulk Cargo (Aggregates)

Using the existing storage yard capacity at Pier 60 of 810,000 tons per year and a static stockpile storage area of 5.8 acres as a baseline, it was determined that the average storage throughput density is 139,655 tons per acre. The harbor's overall aggregate storage area required to meet the medium case scenario in 2050, assuming no change in the storage throughput density of which the most significant factor is the stockpile height and dwell time, is less than 0.1 acre (see **Table 5.14**).

The recorded throughput is the cargo that crosses the berth. At Pier 60, the yard is also used for storage of aggregate that is trucked to and from the site. It is anticipated that the site will continue to be used for aggregate storage in the future even through the throughput crossing the berth is expected to decrease.

Table 5.14 – Summary of Dry-Bulk (Aggregate) Storage Needs (Medium Scenario)

Year	Throughput Medium Scenario (Tons/year)	Storage Yard Area (Acres)
Storage Throughput Capacity	**810,000**	**5.8**
2020	90,215	0.6
2025	45,704	0.3
2030	23,155	0.2
2035	11,730	0.1
2040	5,943	<0.1
2045	3,011	<0.1
2050	1,500	<0.1

5.5.6 Summary

Based on this assessment and the results of the existing conditions assessment, the overall harbor is well positioned to handle the projected cargo throughputs to 2050, with some changes to balance the yard and berth capacities and create additional storage capacity for containers. While the overall harbor berth and yard capacities are adequate or close to the projected throughput in 2050, there are several terminals where either the berth or yard capacities are substantially different and therefore governed by the lower capacity. As shown in **Table 5.2**, the overall harbor capacity for containers is 1,860,000 TEU based on the governing capacity of each terminal, while the overall harbor berth capacity is 2,320,000 TEU and the overall harbor yard capacity is 2,030,000 TEU. To realize the full capacity of the harbor, the individual terminal yard and berth capacities will need to be balanced. In the case of the Pier 1, Pier 29 and Sand Island terminal Piers 51C to 53, the yard capacity is higher than the berth capacity and therefore the full yard capacity is not realized. At Sand Island Piers 51A-51B, the berth and yard are nearly balanced, but slightly constrained by the yard. When Matson takes over the entire Sand Island Terminal (Piers 51 to 53), the combined yard capacity will be greater than berth capacity; therefore, measures will be required to increase capacity at the berth to balance the berth and yard. The opposite is the case at KCT and the Interisland Terminal where the berth capacity is higher than the yard capacity and therefore the full berth capacity is not realized. The timing of the construction of the new KCT aligns well with the throughput projections, allowing the overall harbor to continue to adequately handle container cargo until 2040 without major changes to existing cargo operations. There are also opportunities to optimize the storage needs of other cargoes, particularly with automobiles. These opportunities are addressed in the recommendations in **Section 7.2**.

5.6 Berth Utilization and Layberth Analysis

Berth utilization refers to the amount of pier space that is used by active, inactive and idle ships as a percentage of overall available pier length. Existing berth capacity and future berth demand are determined by analyzing overall berth utilization in the harbor, as measured in annual berth foot days (BFD). BFD utilization is a function of a vessel's length and its duration of stay at a specific berth as a percentage of the berth length multiplied by 365 days per year. For example, a 1000-FT long pier has 365,000 BFD capacity available per year (1,000 LF x 365 days). If a vessel occupies 500 LF of that pier (350-LF vessel length plus 150 LF of the pier to allow for mooring lines) for half the year, that pier has a BFD utilization rate of rate of 25 percent; half of the pier is occupied half of the year.

For Honolulu Harbor, total BFD capacity is the total berth length of 30,890 LF[29] x 365 days = 11,274,850 BFD available for use by all active and inactive/idle vessels that call at the harbor. The current overall berth utilization for Honolulu Harbor based on the refined eCIDS data is calculated to be 58 percent, which supports what the HHMP Project Team heard from nearly all the operators, that there is an overall need for additional berthing in the harbor. Note that the aggregate utilization rate does not differentiate utilization based on the type of operations at a specific pier, nor between active berth and layberth.

Layberth refers to the amount of pier space in the harbor that is available for inactive and idle ships to berth. Nearly all 30,890 LF of existing pier space conceptually could be used for layberth when it is not otherwise in use by active vessels; piers where there are no shoreside facilities may be dedicated to layberth use, while other piers that are more actively used, such as cargo, day excursion, fishing, tugboat and dry-dock piers, have limited or no layberth capacity. For this analysis, the terms "pier" and "berth" are synonymous.

5.6.1 Definitions

The following definitions are used for the berthing and layberth analysis:

- "Berthing"
    - "Active Berth": When the vessel is engaged in its primary function, such as loading/unloading cargo. Tugboats are always active unless they are removed from service for repair.
    - "Lay Berth": For the purpose of the berth utilization analysis, "layberth" includes Idle and Inactive Berthing.
        - "Idle Berth": When a vessel is not engaged in its primary function / is not active but is waiting for external conditions to allow it to move out of the berth (e.g., waiting for approval from harbor control, waiting for provisions, or being repaired). A fuel barge that is not actively taking on or discharging fuel is "idle."
        - "Inactive Berth": When a vessel is not engaged in its primary function and/or is incapable or movement (e.g., in need of repair, out of service).
- "Berth Foot Days" or "Berth Foot Demand" (BFD): A measurement of the availability of pier space (berth length in LF) in the harbor to accommodate vessel calls determined by multiplying existing or future projected port call durations with the length of the vessel plus a mooring allowance.

[29] This figure includes the combined length of all piers within Honolulu Harbor including the "Tyco Pier" and mooring dolphins on Sand Island and Pier 60, but not including Piers 4 and 30, which are owned by others, and Piers 42 and 43 and "Snug Harbor", which are under construction as part of the KCT.

  - BFD Capacity = Berth length x available days (365/year, or 365.25/year over 4 years to account for leap years) = annual available berth foot days
  - BFD Utilization = [(vessel length (SF) + mooring allowance length (SF)] x duration at berth (days)
- "Berth Length": Berth lengths are measurements in LF of the existing piers taken from DOTH's ArcGIS high-resolution aerial image.
- "eCIDS": Database maintained by DOTH of all vessel calls to the State's ports for the purposes of accounting and collecting wharfage revenue. eCIDS data includes vessel type, arrival and departure dates and times, origin, destination, the harbor and pier number where the vessel berthed, vessel length, agent name, and other information.
- "Full Capacity": A berth is considered to be at full capacity if it has a utilization rate of 50 percent for unscheduled calls and 60 percent for scheduled calls. Beyond these percentages, operators will experience increasing congestion, reduced operating efficiency and impacts to vessel scheduling.
- "Scheduled Berth": Refers to a berth that has scheduled liner service, such as container cargo piers that are regularly utilized by a cargo or automobile-carrier operator according to a set schedule. This results in more predictable and less flexible utilization.
- "Unscheduled Berth": Refers to a berth that has no scheduled liner service and is available for use by any vessel calling at Honolulu Harbor, as determined by the Harbor Master. Utilization of these piers is more flexible and less predictable.

5.6.2 Methodology

Layberth utilization was derived from an overall berth utilization analysis using DOTH eCIDS data from FY 2017 and FY 2018 based on annual BFD. The eCIDS data was refined to correct for data input errors, to more accurately reflect vessel types and designations, and to make other adjustments to improve the accuracy of the analyses.

Through the Sub-TAC meetings and individual interviews, harbor users assisted with refining the eCIDS data and analysis by providing input on existing berth and layberth operations, identification of piers used for layberth, mooring allowances and targeted BFD utilization rates.

Assumptions

- Mooring allowances were added by vessel type to represent the total berth space occupied by a vessel and more accurately calculate BFD. Mooring allowances are shown in **Table 5.15**.

Table 5.15 – Mooring Allowances by Vessel Category

Vessel Category	Total Mooring Allowance Total (LF) [4]
Tug/Workboats and Fishing (<100′)	30
Tug/Workboats and Fishing (>100′)	50
Barge	100
Small Vessel [1] (<100′)	30
Mid-size Vessel (100′to 200′)	50
Mid-size Vessel (200′ to 300′)	100
Large Vessel (300′ to 500′)	150
Largest Vessel (>500′)	200
Cruise/Passenger (<100′)	50
Cruise/Passenger (100′ to 300′) [2]	80
Cruise / Passenger (>300′) [3]	200
Container, Bulk Carrier, Tanker and RO/RO/Automobile	200
All others	120

Notes:
1 Includes "Government", and "Other" vessels <100 LF.
2 Includes the excursion vessels "Star of Honolulu", "Majestic", and all other Cruise/Passenger vessels 100 LF to 300 LF.
3 200-LF mooring allowance includes allowance for security perimeter.
4 Total mooring allowance is the combined length of required fore and aft mooring, e.g., a total mooring allowance of 100 LF indicates a 50-FT mooring allowance fore and 50-FT mooring allowance aft.

- Existing and projected berth utilization rates do not account for future improvements to the piers that would increase capacity, or changes in future berth operations, e.g., when KCT becomes operational and related adjustments to vessel operations and berth assignments in the harbor.
- BFD utilization rates over 50 percent for unscheduled berths, and 60 percent for scheduled berths, are considered at capacity based on industry standards. Beyond that percentage, the berth is experiencing congestion and the need for additional berth capacity is indicated. This standard is due to variability in vessel length and available berth length at any given time. For example, a 250-LF vessel with a 100-LF mooring allowance (350 LF total) at a 600-FT berth prevents other vessels from berthing, so the berth should be counted as 100 percent utilized while that vessel is at the berth.
- For the layberth analysis, the following piers were considered to be 100 percent active, therefore unavailable for layberth use and excluded from the calculations:
  - Dedicated cargo terminals, including Piers 39/40 and Piers 52-53.
  - Commercial Fishing piers, including Piers 16 to 18 and Piers 36 to 38.
  - Day excursion piers, including Piers 5 through 8.

  - Vacant Pier 12 due to FSP restrictions at the Piers 10/11 cruise terminal.
  - Tugboat piers, including Piers 13/14 and 21/22.
  - Spill response vessel pier at Pier 15.
  - Dedicated maritime operations at Piers 23 through 28.
  - Fuel Terminal at Pier 30.
  - The UH research pier at Pier 35.
- Snug Harbor, which was customarily used for layberth in Honolulu Harbor, was demolished to make way for construction of KCT, thereby eliminating 650 LF of layberth that previously lowered berth utilization rates at other piers in the harbor. Therefore, 650 LF was added to the final layberth demand calculation.
- For the layberth analysis, the desired BFD utilization rate was set at a maximum 30 percent for unscheduled berths and 50 percent for scheduled berths to accommodate sufficient berthing for active vessels and layberth for inactive and idle vessels. Piers identified as available for layberth and used in the analysis are identified as follows:
  - Unscheduled utilization at Piers 9, 10, 11, 19, 20, 29, 31, 32, 33, and 34.
  - Scheduled utilization at Piers 1, 2 and 51.
- Berth utilization forecasts were based on DBEDT average annual GSP growth projections of 1.7 percent to 2050.

Based on these assumptions, the existing BFD utilization rate was determined for years 2025, 2035 and 2050 for each of the included piers. Where utilization was higher than the targeted maximum rates of 30 percent unscheduled and 50 percent scheduled, the length of additional berth required to meet those targets, in LF, was calculated to determine the unmet layberth demand for the master planning period.

5.6.3 Findings

In 2050, Honolulu Harbor will require an additional 1,921 LF of layberth to meet projected demand and maintain targeted maximum utilization rates of 30 percent at Piers 9, 10, 11, 19, 20, 29, 31, 32, 33, and 34, and 50 percent at Piers 1, 2 and 51. The findings of the layberth analysis are presented in **Table 5.16**. A description of proposed new layberth locations is provide in **Section 7.9.1**.

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Table 5.16 – Layberth Utilization Analyses - FY 2017 and FY 2018 DOTH eCIDS Data

FY 2017 AND FY 2018 LAYBERTH UTILIZATION AT HONOLULU HARBOR BY PIER							DBEDT Est. 1.7 percent Avg Growth Rate		
Pier Number	Pier Length	Port Calls	Total BFD (Days)	Average BFD (Days)	Average Port Call (Days)	% Utilization (FY 2017)	Forecasted % Utilization (FY 2025)	Forecasted % Utilization (FY 2035)	Forecasted % Utilization (FY 2050)
01A	500	119	133,621	1,123	2.05	37 %	42 %	49 %	63 %
01B	675	144	122,037	847	2.20	25 %	28 %	33 %	43 %
Total 01A-01B	1,175	263	255,657	972	--	30 %	34 %	40 %	51 %
Layberth Need (LF) 50 % Utilization						**-237**	**-190**	**-115**	**15**
02A	505	64	56,288	879	2.22	15 %	17 %	21 %	26 %
02B	705	390	228,965	587	1.18	44 %	51 %	60 %	77 %
02C	650	52	52,478	1,009	1.40	11 %	13 %	15 %	19 %
Total 02A-02C	1,860	506	337,730	2,476	--	25 %	28 %	34 %	43 %
Layberth Need (LF) 50 % Utilization						**-467**	**-402**	**-302**	**-129**
9	624	73	78,710	1,078	3.79	17 %	20 %	23 %	30 %
Layberth Need (LF) 30 % Utilization						**-79**	**-65**	**-42**	**-2**
10	502	69	88,258	1,279	3.73	24 %	27 %	33 %	41 %
Layberth Need (LF) 30 % Utilization						**121**	**137**	**163**	**208**
11	435	84	135,951	1,618	3.40	43 %	49 %	58 %	74 %
Total 10-11	937	153	224,208	1,465	--	33 %	37 %	45 %	57 %
Layberth Need (LF) 30 % Utilization						**26**	**70**	**136**	**251**
19	580	57	92,803	1,628	5.70	22 %	25 %	30 %	38 %
20	510	78	187,418	2,403	7.71	50 %	57 %	68 %	87 %
Total 19-20	890	135	280,222	2,076	--	43 %	49 %	58 %	74 %
Layberth Need (LF) 30 % Utilization						**117**	**169**	**251**	**394**
23	425	4	37	9	0.11	0 %	0 %	0 %	0 %
Layberth Need (LF) 30 % Utilization						**-127**	**-127**	**-127**	**-127**

FY 2017 AND FY 2018 LAYBERTH UTILIZATION AT HONOLULU HARBOR BY PIER							DBEDT Est. 1.7 percent Avg Growth Rate		
Pier Number	**Pier Length**	**Port Calls**	**Total BFD (Days)**	**Average BFD (Days)**	**Average Port Call (Days)**	**% Utilization (FY 2017)**	**Forecasted % Utilization (FY 2025)**	**Forecasted % Utilization (FY 2035)**	**Forecasted % Utilization (FY 2050)**
29-	390	69	46,256	670	2.31	16 %	18 %	22 %	28 %
29 A	410	165	117,047	709	2.06	39 %	44 %	53 %	67 %
Total 29-29A	800	234	163,303	698	--	28 %	32 %	38 %	48 %
Layberth Need (LF) 30 % Utilization						**-16**	**14**	**62**	**146**
31 A	400	111	93,294	840	2.54	32 %	36 %	43 %	55 %
31-	375	91	56,969	626	1.46	21 %	24 %	28 %	36 %
Total 31A-31	775	202	150,263	744	--	27 %	30 %	36 %	46 %
Layberth Need (LF) 30 percent Utilization						**-27**	**1**	**45**	**122**
32	395	163	101,617	623	1.33	35 %	40 %	48 %	61 %
33	330	54	41,043	760	2.89	17 %	19 %	23 %	29 %
34	545	27	59,920	2,219	9.31	15 %	17 %	20 %	26 %
Total 32-34	1,270	244	202,579	830	--	22 %	25 %	30 %	38 %
Layberth Need (LF) 30 percent Utilization						**-103**	**-66**	**-6**	**97**
51A	680	302	381,957	1,265	1.39	77 %	87 %	104 %	132 %
51B	585	574	132,927	232	0.75	31 %	35 %	42 %	54 %
51C	770	588	192,147	327	1.02	34 %	39 %	46 %	59 %
51A-51C	2,035	1,464	707,031	483	--	48 %	54 %	64 %	82 %
Layberth Need (LF) 50 percent Utilization						**-49**	**82**	**290**	**650**
						2017	**2025**	**2035**	**2050**
Layberth Need (LF) =	**30 percent**	**Unscheduled utilization at Piers 9, 10, 11, 19, 20, 29, 31, 32, 33, and 34**				**-194**	**-18**	**258**	**735**
Layberth Need (LF) =	**50 percent**	**Scheduled utilization at Piers 1, 2 and 51**				**-754**	**-510**	**-126**	**536**
	Snug Harbor					**650**	**650**	**650**	**650**
LAYBERTH NEED TOTAL =						**-298**	**122**	**782**	**1,921**

6.0 LAND USE PLAN

This chapter presents the preferred land use alternatives based on the Capacity and Needs Assessment in **Chapter 5.0**. This chapter is meant to be a guide for decision makers when determining the placement of uses and future tenants. The following sections will present the improvement projects proposed for Honolulu Harbor to support the preferred land use plan, as well as a phasing plan and estimated development costs.

The land use plan for Honolulu Harbor is generally fixed according to existing established uses and practices. However, changing conditions in the harbor and surrounding area as well as changing industry practices and trends indicate that some land use adjustments are appropriate and recommended. As a further consideration, Honolulu Harbor's land inventory of approximately 497 acres is finite. The harbor is surrounded by dense, urban development that in many locations is not compatible with the heavy industrial uses of the commercial harbor. Opportunities for future expansion are limited. Primary among the HHMP land use considerations is the completion of the KCT Harbor Modernization project in 2024, which will result in spatial reorganization of cargo operations and will increase the flexibility of land uses elsewhere in the harbor. In addition, new technologies for container cargo operations that enhance cargo handling efficiency and allow for container yard densification will relieve demand for land area expansion. The increasing size and passenger capacity of cruise vessels, as well as new requirements for passenger processing and health screening place new spatial demands on cruise terminal facilities. The development of The Rail public transit stations adjacent to the Aloha Tower complex and long-range development plans for Iwilei and Kakaʻako create additional land use opportunities and challenges that are reflected in the land use plan for the harbor.

With these considerations in mind, the land use plan recommendations follow these objectives:

- Meet the existing and future needs of Honolulu Harbor's maritime users and the harbor's function as the state's primary commercial, industrial port.
- Reorganize and improve land use flexibility created by the opening of KCT to support efficient harbor operations and encourage healthy economic competition that will benefit Hawaiʻi's residents.
- Promote port resiliency and adaptation strategies in land use decisions.
- Consolidate similar land uses to encourage private investment in shared-use facilities and infrastructure, reduce costs and improve operational efficiency.
- Accommodate waterfront development to enhance public access and revenue generation.
- Identify land for possible future acquisition to improve harbor operations and increase facility capacity.

6.1 Land Use Overview

As the hub of the State's commercial harbors system, Honolulu Harbor facilities must support a variety of maritime operations, broadly categorized in the DOTH mission statement as cargo, passenger services, commercial fishing and other commercial maritime-related support services. Most of these operations, particularly cargo, fishing and maritime support services, involve land use activities that are industrial in nature and the majority of the land area in the harbor is designated for this purpose. Land uses also include activities that are non-industrial in nature, such as passenger services (cruise, day excursion, water taxi and ferry service), educational and research functions, and administrative functions (maritime offices, ship agents, regulatory functions, and inspections). The land use plan provides guidance on these various land uses to achieve the highest and best use of Honolulu Harbor's finite land resources.

The HHMP identifies the following maritime land use areas in Honolulu Harbor. See **Figures 6.1** and **6.2** for existing and proposed land uses.

- Cargo (containers, RO/RO, dry- and liquid-bulk, neo-bulk/break-bulk, etc.)[30]
- Maritime Support (tugs, harbor pilots, ship repair, ship suppliers, and other services)
- Commercial Fishing
- Passenger (cruise, day excursion, water taxi, ferry)
- Public Waterfront
- Administration and Harbor Operations
- Education/Research

A variety of specialized uses occur within each of these general land use designations and are summarized in the following sections.

[30] See Glossary for definitions of cargo terminology.

Figure 6.1 – Land Use Plan - Existing

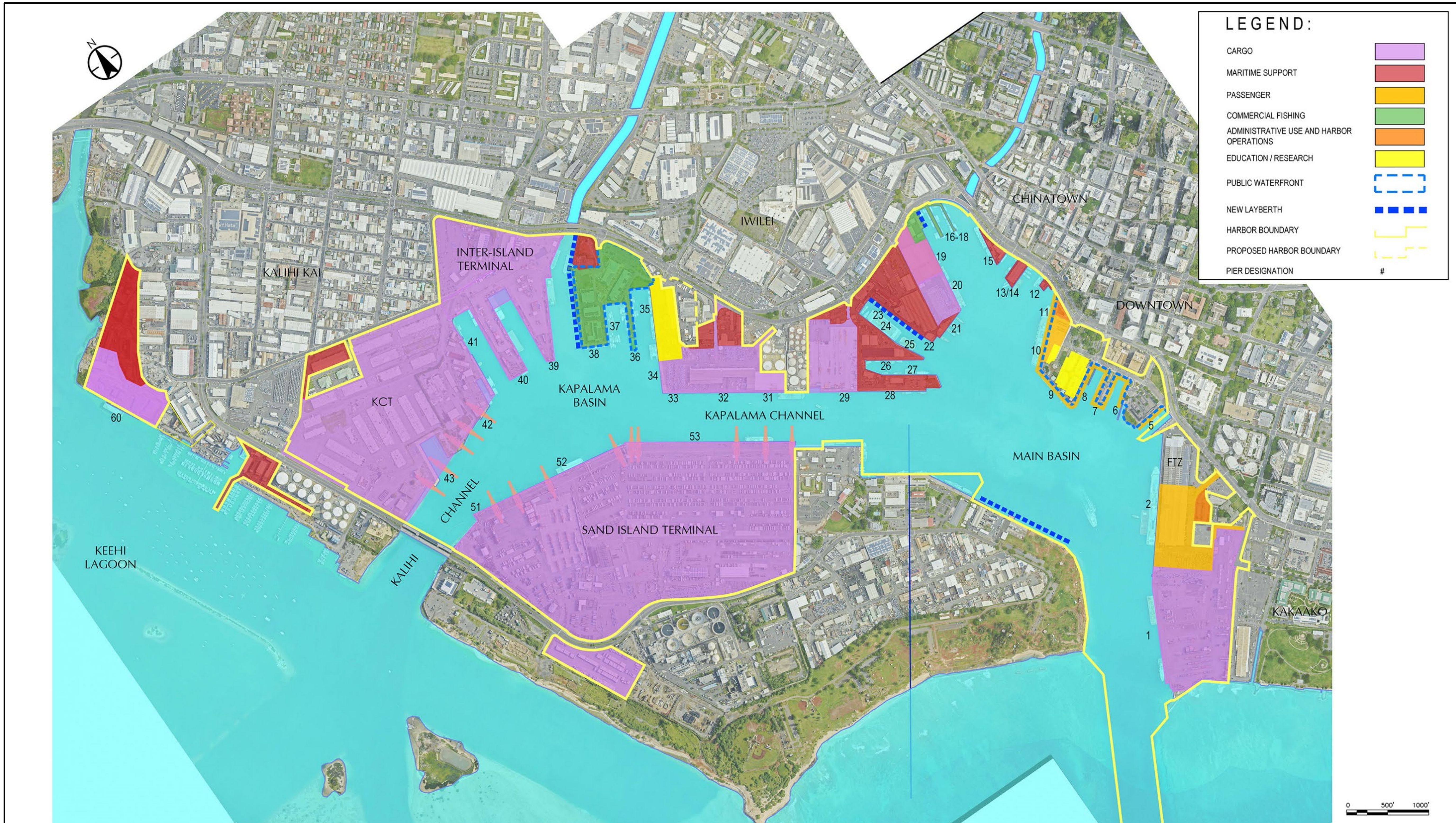

Figure 6.2 – Land Use Plan - Proposed

6.1.1 Cargo

Cargo land uses include dedicated-user and non-dedicated terminals that utilize gantry cranes, stick cranes, RO/RO and "top-pick" container handling equipment for the movement of a variety of cargo types. These are very active areas with the movement, handling and inspection of large volumes of containers, bulk and special cargos, automobiles and other specialized vehicles. These terminals also serve as staging and maintenance areas for the heavy equipment used for cargo movement and transport. Cargo terminals are also used for transfer of petroleum products, liquid natural gas ISO-containers and other hazardous industrial materials. Cargo terminals in Honolulu Harbor includePiers 1 to 2A, Piers 19 to 20, Pier 29, Piers 31 to 33, Piers 39 to 40 (Interisland Cargo Terminal), Piers 41 to 43 (KCT), Piers 51 to 53 (Sand Island Terminal) and Pier 60. Detailed descriptions of these terminals are provided in **Section 6.2**.

6.1.2 Maritime Support

Maritime support areas are reserved for a variety of light and heavy industrial businesses that are essential to maintain a functioning harbor. These include tug operators; harbor pilots; ship manufacturing, repair, and servicing; ship provisioning services (ship chandlers); dry dock operations; marine construction and salvage services; spill response operations; ship fueling; and waste treatment and disposal. These operations may involve activities that are industrial in nature. Maritime support areas in Honolulu Harbor are largely consolidated within Piers 12 to 15, 19 to 28, and the backland area of 31 to 35.

6.1.3 Commercial Fishing

Commercial fishing piers include areas used for berthing, servicing and provisioning long-line commercial fishing vessels, and offloading catch for transport to market. The fishing piers are active with service vehicles, fuel trucks, maintenance and repair activities, and movement of provisions, ice, and fish. Areas designated for commercial fishing include Piers 16 to 18 and Piers 36 to 38, which is also known as the Commercial Fishing Village.

6.1.4 Passenger

Passenger operations are defined by two distinct sub-uses each with different functional characteristics and needs; the first is cruise ship operations and the second includes day excursion, ferry and water taxi operations.

Cruise ship terminals include dedicated-use and multi-purpose piers that are used to berth and service cruise ships and process passengers. Currently, Pier 2B serves as the harbor's primary, dedicated cruise ship terminal, with Piers 10 and 11 serving as the secondary cruise terminal. The HHMP includes an option to eliminate cruise operations at Piers 10 and 11 and consolidate all cruise operations at Piers 1B to 2B, which is discussed in **Section 6.2.4**. Piers 19 and 20 are designated as a contingency cruise ship berth for small (no longer than 650 FT) cruise ships. Cruise ship terminals are active with vehicle traffic from service trucks (solid and liquid waste handling, fuel, trades, and maintenance), container trucks for ship provisions, other delivery service vehicles, and crew and passenger ground transportation (buses, taxis, shuttles, and ride share services). Pedestrian foot-traffic is also active into and out of cruise terminal facilities on days when cruise ships are in port. The areas surrounding Honolulu Harbor include a wide variety of points of interest and many cruise ship passengers choose to explore Honolulu on foot. **See Section 3.1**. Passenger processing includes areas for baggage handling, passenger health and security screening, CBP screening, and for passenger concierge services for transportation, tours, accommodations, and other needs. Cruise ship terminals are subject to facility security plans that place restrictions on public access.

Day excursion, ferry and water taxi piers are used to berth and service vessels for single-day passenger service, as well as supporting landside functions. These piers have generally light vehicle traffic from service trucks, ship provision delivery vehicles, fuel trucks, and crew and passenger ground transportation. Passenger processing includes areas for ticket purchase, health and security screening, and miscellaneous passenger orientation and concierge services. Piers used for day excursion vessels, ferry and water taxi service are typically open to public access. Piers 5 through 9 have been identified for this use.

6.1.5 Public Waterfront

Public waterfront areas are used for commercial, retail, restaurant, office, public gathering, and other uses that are compatible with the maritime environment and recommended for public patronage. Uses in these areas may relate directly to the maritime function of Honolulu Harbor, such as at the Fishing Village where restaurants serve fresh fish caught by the long-line fishing fleet and retail stores sell fishing and boat supplies to maritime operators and the public. Other areas are underutilized and ripe for development opportunities to increase public activity and access to the waterfront and which can generate “highest and best use” revenue. Public access waterfront uses are designated for Piers 5 to 11 (Aloha Tower complex) and Pier 38 (Commercial Fishing Village).

6.1.6 Administration and Harbor Operations

Administration and Harbor Operation areas are used to accommodate facilities necessary for maritime administrative and back-office functions, including the management of Honolulu Harbor. It includes DOTH’s services and as well as those provided by harbor users. Harbor operations include DOTH Administration offices, I District offices, and the I District Baseyard. Areas designated for Administration and Harbor Operation uses include Pier 2 landside of the cruise terminal, the Hale ‘I I Moku building at Pier 11, and Aloha Tower.

Administrative uses by private maritime operators are typically incorporated into the operators' land use area, be it a cargo terminal or maritime support area. These uses may be located away from the waterfront and active maritime industrial-use areas and outside of the secured perimeters and restricted access areas. Activity in these areas is typically limited to employee and customer vehicle traffic and parking, public customer access, and other office-related tasks. The HHMP recommends that these uses be located at the landward perimeter of the harbor terminals or in off-site locations in order to preserve yard area for cargo and industrial maritime operations that are waterfront-dependent.

6.1.7 Education/Research

Areas that accommodate facilities and operations with a primary focus on higher education. This includes specialized maritime research facilities that may prohibit public access. Education/Research uses may include water-dependent functions that require pier access or may only be tangentially related to the harbor function, such as HPU. However, they serve the maritime community by educating the public about Hawai'i's maritime history and the importance of Honolulu Harbor to the State. Education/Research land use in the harbor is identified for Piers 8 to 9 (HPU) and Pier 35 (UH School of Ocean and Earth Science and Technology's [UH SOEST] Marine Center).

6.2 Land Use Alternatives

6.2.1 Cargo

Honolulu Harbor's cargo terminals are defined by two distinct sub-types — non-exclusive multi-purpose terminals and non-exclusive dedicated use terminals. Land use alternatives for these two terminal types and their respective locations are described below.

6.2.1.1 Multi-Purpose Cargo Terminals

The HHMP recommends Piers 1 and 2, 19 and 20, 29, and 31 to 34 be designated as multi-purpose cargo terminals for general use by scheduled and unscheduled cargo operators (see **Figure 6.3**). These piers can be used interchangeably for all categories of cargo that pass-through Honolulu Harbor; however, each terminal has characteristics that may make it more suitable for specific cargo operations and multi-use purposes.

Piers 1A, 1B and 2B

With the anticipated completion of KCT in 2024, the majority of scheduled international container cargo and automobile RO/RO operations at Piers 1 and 2 are expected to relocate to the new, gantry-crane supported KCT at Piers 41 to 43. Piers 1 and 2 contain the largest yard area (approximately 34 acres) among the planned multi-purpose piers and its 1,675 LF of berth can accommodate multiple vessels simultaneously. These characteristics allow for accommodating more than one cargo operator at a time at the terminal and other maritime uses, such as cruise vessels (see **Section 6.2.4.1**), to share use of the pier.

Operators at the Piers 1 and 2 Cargo Terminal typically allocate about one quarter of the yard area for automobile storage. In fair weather conditions, it is a preferred automobile RO/RO berth due to its easy access at the harbor entrance and generous storage area. However, the terminal's proximity to the harbor entrance also makes it susceptible to ocean swells that can adversely affect berthing and RO/RO operations, particularly during summer months (see **Section 3.4.3.3)**. As such, the HHMP recommends that multi-purpose cargo piers located deeper inside the harbor be prioritized for automobile RO/RO operations.

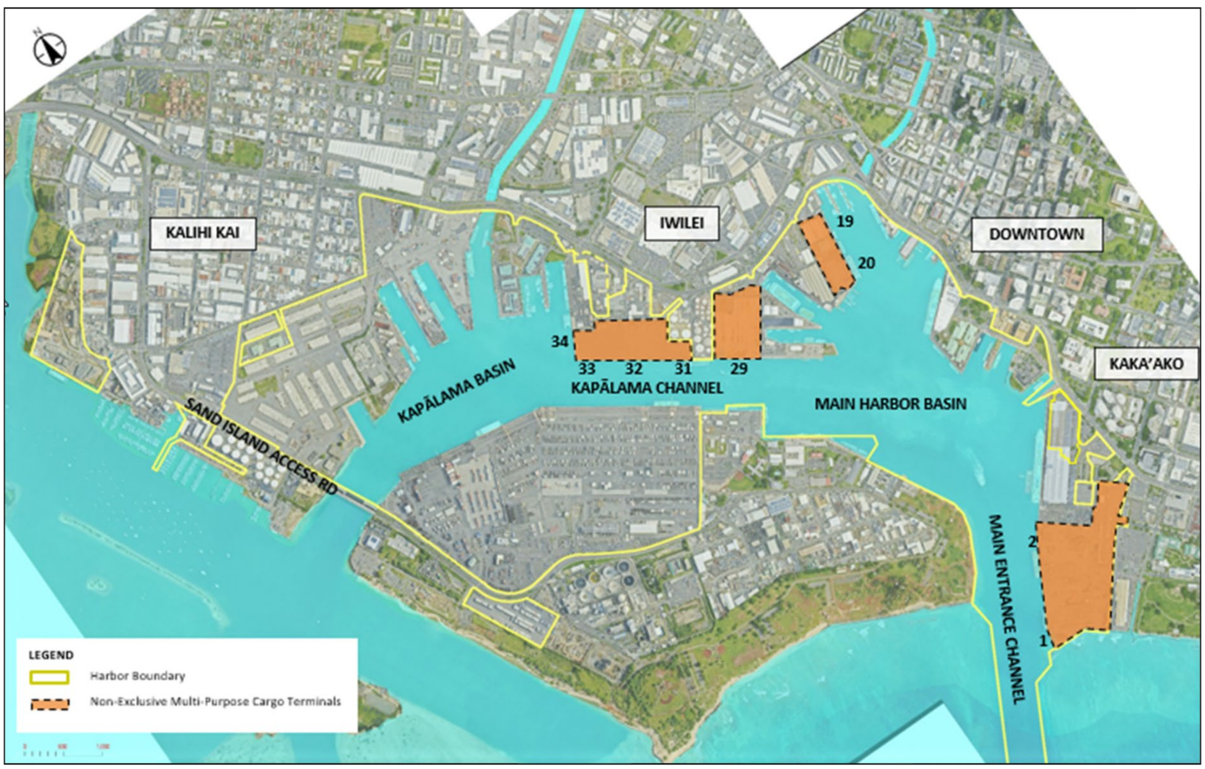

Figure 6.3 – Non-Exclusive Multi-Purpose Cargo Terminals

Piers 19 and 20

The HHMP recommends Piers 19 and 20 continue to be used for multi-purpose cargo, particularly for RO/RO operations, and that future improvements expand the capacity and function of these piers for this purpose. Piers 19 and 20 provide the smallest amount of cargo yard area (approximately 3.2 acres in its current configuration) of the planned multi-purpose piers but is otherwise well-suited for automobile RO/RO operations, including loading, discharge and storage. It is a preferred terminal by some RO/RO operators due to being relatively sheltered from wave energy and easier to navigate for berthing and departure compared to other multi-purpose piers. Piers 19 and 20 are used primarily by international automobile RO/RO vessels and as a layberth.

Although DOTH has been gradually improving Piers 31 to 33 to serve as a primary automobile RO/RO terminal, the Piers 19 and 20 terminal is expected to continue to be an important berthing option for automobile carriers. The availability of the pier for automobile carriers reduces offshore delays, and related cost and operational issues, while vessels wait for yard space or berthing space to open, which was happening frequently prior to reopening of the terminal following maintenance dredging at Pier 19 in 2019. The availability of Piers 19 and 20 for automobile operations and storage will reduce the instances where carriers are compelled to remove stored vehicles prior to the free-time allowance on the pier in order to accommodate an incoming vessel. Improving Piers 19 and 20 for automobile RO/RO operations will also help to eliminate many of the safety issues, operational hurdles and costs faced when draying automobiles between Pier 19 and 29.

The maximum number of automobiles that can be stored at the terminal under its current configuration is approximately 600 to 650 depending on the type of vehicle. This is approximately half the capacity of a fully loaded automobile carrier vessel. Automobile and special cargo storage occurs entirely in the Pier 20 yard, while the Pier 19 yard is almost entirely occupied by the existing Pier 19 shed and the former SuperFerry Terminal (see **Figure 6.4**).

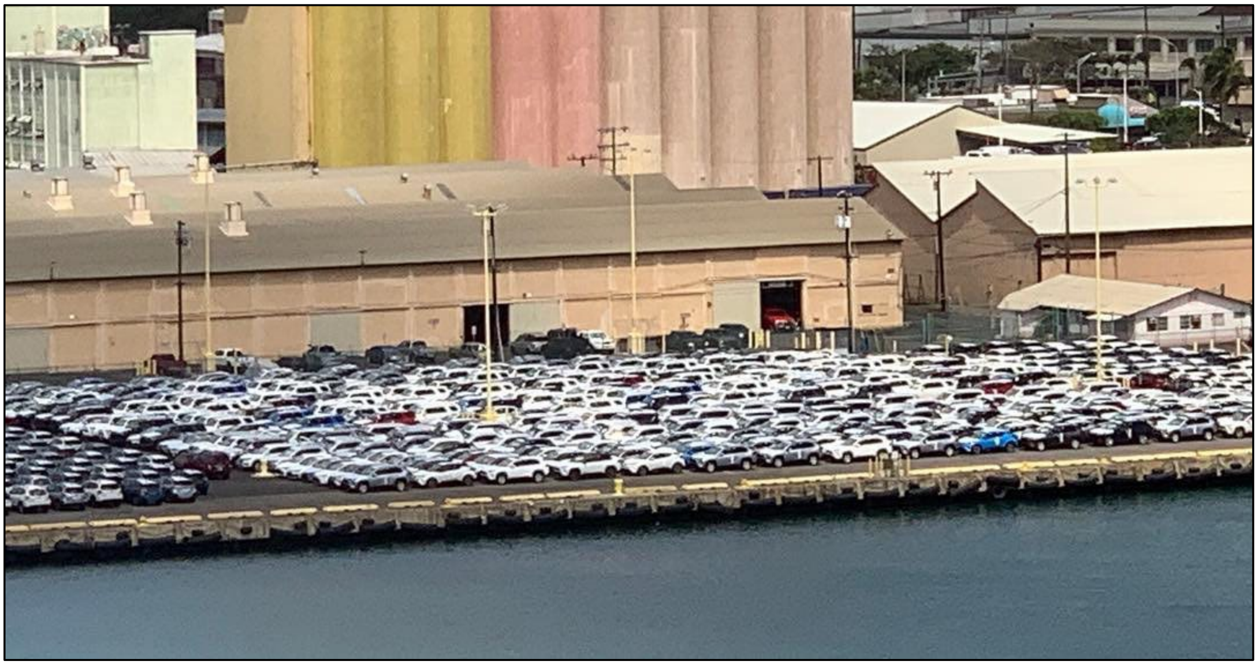

Figure 6.4 – Automobile Storage at Piers 19 and 20

In the long-term, the HHMP recommends that the multi-purpose cargo function and automobile storage capacity at Piers 19 and 20 be expanded through a combination of removing the existing structures in the Pier 19 yard and/or integrating the cargo terminal facilities with the planned development of a multi-story maritime center structure at Pier 23. See **Sections 6.2.4.1** and **7.3.6.**

In the short-term, the HHMP recommends that DOTH renovate the Pier 19 shed and SuperFerry Terminal to serve as the DOTH Oʻahu District Operations Baseyard. The existing baseyard located on Sand Island Access Road near the Keʻehi Small Boat Harbor is currently subject to frequent flooding during high tide and king tide events, and is highly vulnerable to storm surge, all of which adversely impact present-day baseyard operations. These conditions will be exacerbated in the coming years by climate change and SLR. The baseyard is essential to maintain harbor functions and must be located within the harbor and outside of known hazard areas. Renovating the Pier 19 warehouse and SuperFerry Terminal for this purpose offers a low-cost alternative to acquiring and developing a new baseyard site. However, when such time as the cargo demand dictates and the Pier 19 area is needed to increase the harbor's cargo capacity, the baseyard should be relocated and the Pier 19 shed and SuperFerry Terminal cleared to allow for expanding the terminal.

Pier 29

The HHMP recommends that Pier 29 continue to be used for multi-purpose cargo and RO/RO vessels and barge operations. The approximately 11-acre open yard area accommodates container cargo, bulk and break-bulk cargo, rolling-stock, and specialty cargo, including the use of heavy cargo-moving equipment. It has sufficient area for RO/RO automobile storage, however, constraints at the security gate and related queuing bottlenecks at the Pacific Street intersection, as well as a circuitous drayage route to additional vehicle storage at Piers 19 and 20, make other piers more suitable for this purpose. The Pier 29 multi-purpose cargo terminal next to the maritime support services area provides an open, flexible-use area that could be adapted and used interchangeably for cargo or maritime support service use depending on the operational needs of the harbor.

Piers 31 to 34

The HHMP recommends that Piers 31 to 34 continue to be improved and used for multi-purpose cargo, and as a priority terminal for RO/RO automobile-carrier operations. The terminal is well-suited for this use with a large, unobstructed yard of 16 acres and direct access to Nimitz Highway. The improved multi-purpose cargo terminal relates well to the adjacent non-secured maritime support service area between the terminal and Nimitz Highway. These areas provide space for tenants that can complement operations at the pier, such as freight forwarding operations, automobile preparation services, and other services that involve public interface. Alternately, these backland areas may be cleared to expand the yard area as necessitated by demand. DOTH's planned acquisition of the adjacent HFS parcel (TMK parcel 1-5-035: 010) from DOTA could allow DOTH to redevelop the parcel in the future, if the current tenant vacates the building or when the building reaches the end of its useful life cycle. Redevelopment could include internal driveway improvements to connect the Pier 31 to 34 terminal to the signalized intersection at Nimitz Highway and Alakawa Street and thereby enhance the function of this terminal for the designated use (see **Figure 6.5**).

Berthing at the terminal is subject to scheduling and conditional navigation procedures to accommodate vessel transit when ships are berthed simultaneously on each side of the Kapālama Transit Channel. The relatively narrow width of the channel allows conditional passage of a standard cargo vessel (115-FT beam) when an automobile-carrier or cargo vessel is berthed at Piers 31 to 33 and at Piers 52 to 53 at the same time. Vessel arrival and departure maneuvers at these piers are more complex compared to Piers 1 and 2 or 19 and 20, which has made the terminal a less convenient berth for operators. However, berthing and loading/unloading operations are less susceptible to impacts from waves at this location, and the large, open yard supports improved efficiencies for cargo and automobile storage and handling. Future pier reconstruction might include widening the transit channel, pending study by the USACE, which would improve navigability and berthing operations. These recommendations support the planned land use at this terminal.

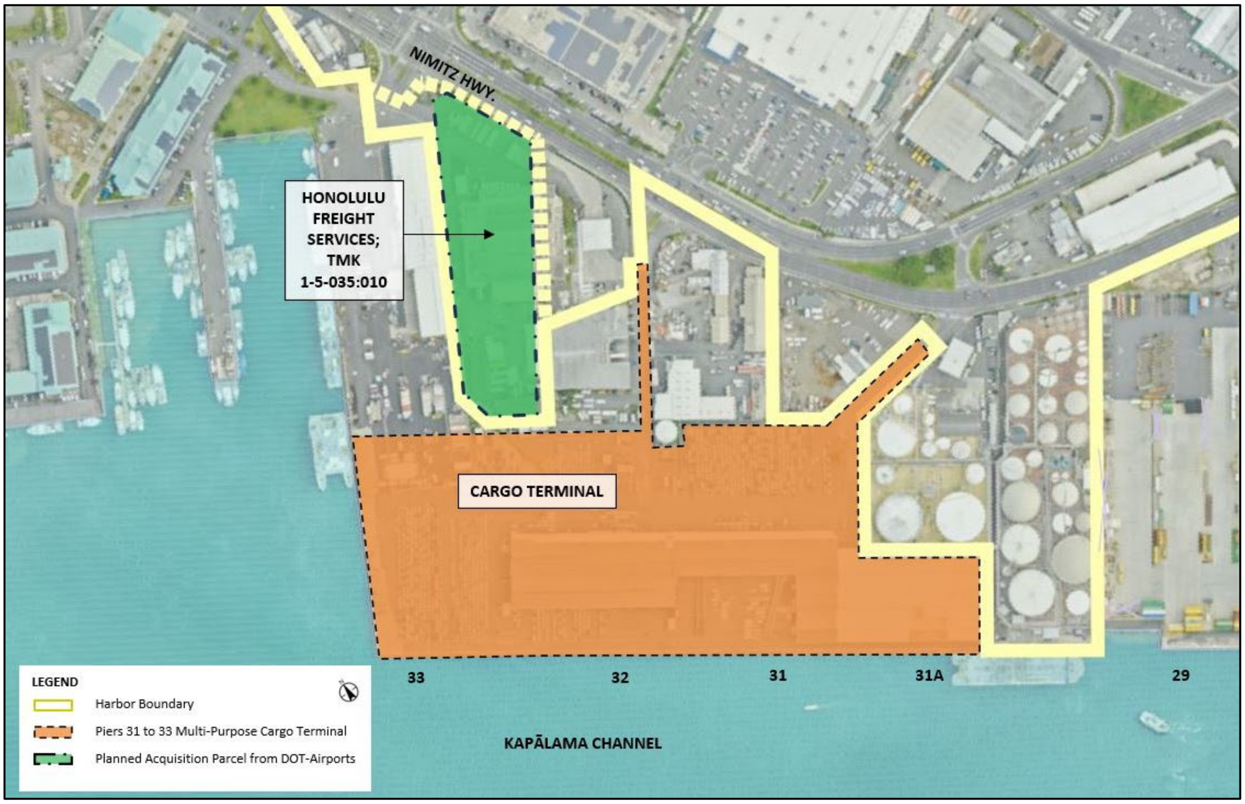

Figure 6.5 – Piers 31 to 33 Multi-Purpose Cargo Terminal and Backland Area

6.2.1.2 Non-Exclusive Dedicated-Use Terminals

The HHMP recommends that Piers 39 to 40 (Interisland Terminal), 41 to 43 (KCT), 51 to 53 (Sand Island Terminal), and 60 (Ke'ehi Lagoon) be improved and continue to be used as non-exclusive, dedicated-use piers for scheduled cargo service (see **Figure 6.6**). These piers are designated for preferential use by specific cargo terminal operators who maintain scheduled cargo liner service and invest in facility improvements according to lease terms with DOTH. These terminals remain publicly-owned commercial harbor facilities available for use by any maritime operator and/or project cargo use, subject to the direction of the harbor master, as to not impede the cargo operations of the pier's preferential cargo activity and/or user-operator.

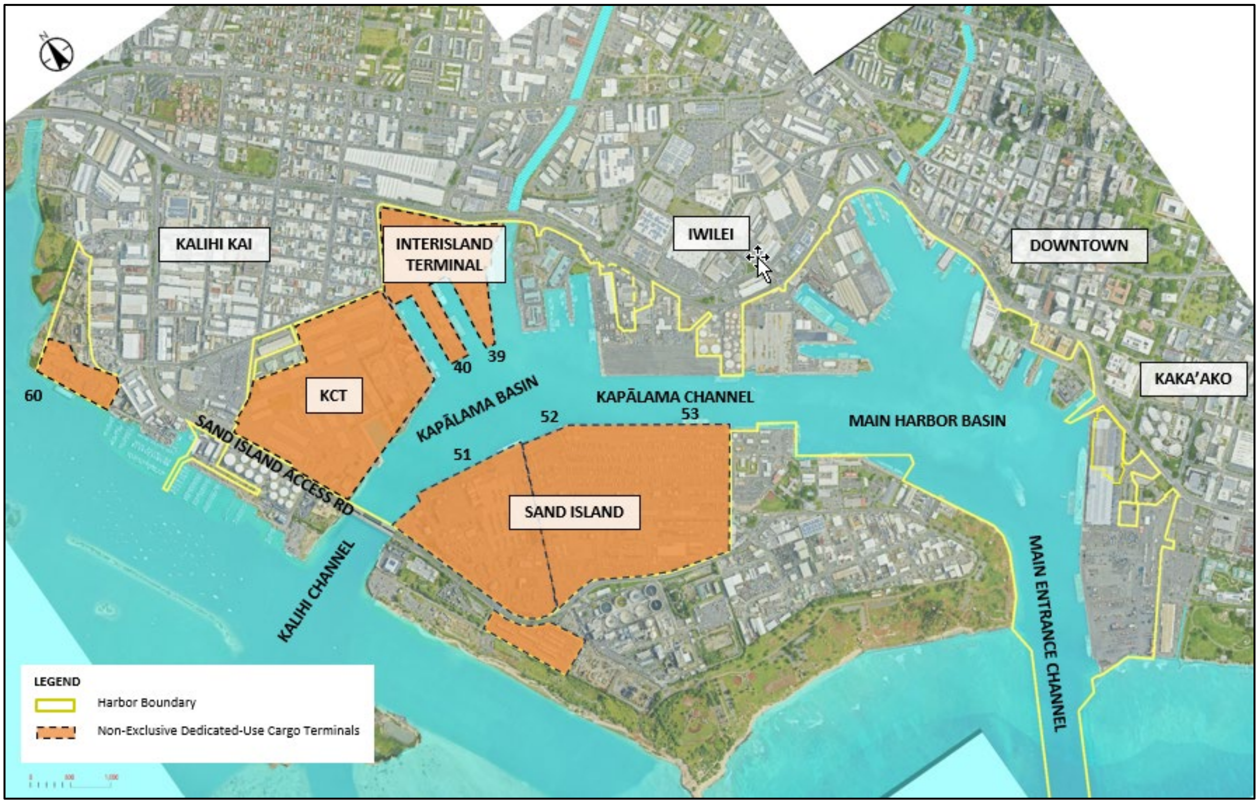

Figure 6.6 – Non-Exclusive Dedicated-Use Terminals Operated by Preferred Users

Pier 39 to 40, Interisland Terminal

The HHMP recommends that Piers 39 to 40 continue to be used for interisland tug-and-barge cargo service by Young Brothers LLC, as the current interisland carrier approved by the PUC. The terminal yard totals approximately 27 acres and accommodates a mixture of cargo types including containers, neo-bulk / break-bulk, freight-all-kind (FAK), LCL, automobiles, equipment, special cargos, and livestock. The HHMP proposes to expand the yard by infilling a portion of the Piers 39-40 slipway to provide approximately 0.5 acres of additional container staging area adjacent to the berths, and to reconstruct and strengthen approximately 5 acres of yard area at the *makai* end of the piers to allow full use of the terminal for heavy equipment and container operations. The landside areas of the terminal are otherwise constrained from expansion by Nimitz Highway and adjacent Kalihi Kai neighborhood. To improve land use efficiency at the terminal, the HHMP recommends that the terminal operator consider relocating livestock and/or LCL handling to a nearby off-site location, such as the Triple-F building adjacent to the DOA Plant Quarantine Building on Auiki Street. Changes to LCL operations may require PUC approval. The HHMP also recommends that the operator relocate public service areas and related structures (cargo and vehicle pick-up and drop-off) to the perimeter of the terminal and outside of fenced security zones to further improve land use efficiency.

The interisland terminal includes a transitional “pass/pass” space at Pier 41 which will be shared with the KCT operator, where incoming containers and other cargo arriving at KCT from domestic or international ports, and outgoing cargo from the neighbor islands will be staged before passing through the appropriate carrier enroute to its destination (see **Figure 6.7**). The size of the pass/pass area fluctuates with the volume of transferred cargo. Continued use of the pass/pass area is consistent with the HHMP land use recommendations for these piers.

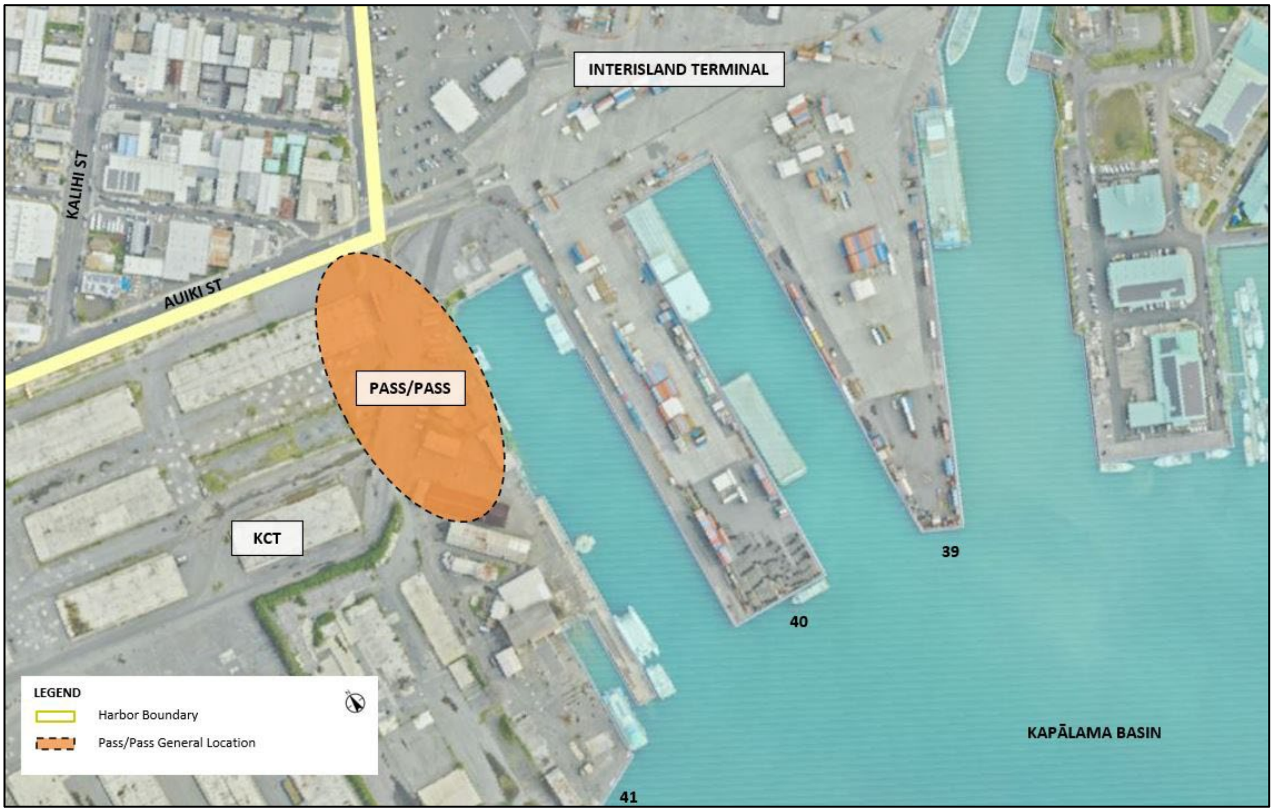

Figure 6.7 – Pass/Pass General Location

Piers 41 to 43, KCT

KCT will be a new, 87.4-acre gantry-crane-supported cargo terminal scheduled to start operations in 2024. It is the key harbor facility investment in DOTH’s Honolulu Harbor Modernization program. The HHMP recommends that KCT be used for container cargo, RO/RO and automobile operations by dedicated cargo operator Pasha Hawaiʻi. The HHMP anticipates that the majority of the international container cargo and automobile RO/RO operations from Piers 1 and 2 and Pasha’s existing operations at Sand Island Terminal Piers 51A and 51B will move to KCT when it opens. Pier 41 at KCT will be used for interisland barge operations. DOTH will assign use of Pier 41 to an operator or operators based on the needs of the harbor and the best interest of the State of Hawaiʻi and its residents. Pier 41 could also serve as a suitable temporary location for Young Brothers to conduct interisland cargo operations during phased reconstruction of Piers 39 and 40.

Piers 51 to 53, Sand Island Container Terminal

The HHMP recommends that the Sand Island Container Terminal, encompassing Piers 51 through 53, be modernized for continued use by dedicated terminal operator, Matson, for its gantry-crane-supported container, bulk cargo, RO/RO, automobile and barge operations. Matson currently operates at Piers 51C through 53C on approximately 107.6 acres of the 151.6-acre terminal. When Pasha Hawaiʻi moves their operations to KCT in 2024, the vacated 44-acre terminal area adjacent to Piers 51A and 51B will become available to Matson. The HHMP recommends that all of Matson's operations be consolidated to the Sand Island Container Terminal.

Pier 60, Bulk Cargo Terminal

The HHMP recommends that Pier 60 terminal be improved and used for heavy-duty bulk (aggregate) cargo and tug-and-barge cargo operations by dedicated operator HC&D, LLC, or similar operator. Backland areas adjacent to the pier and yard can be used for aggregate storage and a concrete batch plant by the dedicated operator under a long-term lease. Pier 60 is suitably located for this use, outside of the main harbor in Keʻehi Lagoon and adjacent to the Sand Island industrial area. The channel width of approximately 50 FT and depth of 18 FT limit vessel operations at the terminal to tug-and-barge and shallow-draft work boats.

The HHMP further recommends that backland areas located *mauka* from the aggregate pier and yard and adjacent to existing industrial development along Sand Island Access Road be developed and used for maritime industrial purposes, such as container, chassis, automobile, aggregate and special cargo storage, or for maritime support services and light industrial uses.

Dedicated Automobile Terminal Alternative

An alternative considered for improving cargo operations was the consolidation of automobile operations at dedicated automobile terminals. This alternative would provide for additional container capacity at KCT and the Sand Island Terminal, as well as provide additional overall capacity at the Interisland Terminal. Based on projected automobile storage needs, Piers 1 and 2A by itself, or a combination of Piers 19 to 20 and 31 to 33 could provide the necessary storage space to accommodate the 2050 automobile projections. Another option would be vertical automobile storage in a multi-story structure, which would reduce the footprint required. However, from the operators' perspective, split operations, with automobile operations going to a dedicated automobile terminal and the rest of the cargo operations at another terminal, were deemed undesirable due to the added cost and logistical complexity. As well, flexible, multi-use terminals were regarded as a better option to accommodate future growth and operational changes. For these reasons, this alternative is not included in the HHMP.

6.2.1.3 Resiliency Terminals

All cargo terminals serve a secondary function for resiliency operations. Should Honolulu Harbor be impacted by a disaster of natural or anthropogenic cause, it is imperative that as the hub of the state's commercial harbors system, operations be restored as quickly as possible. To facilitate the harbor's resiliency and restoration, select locations within the harbor would be used to pre-stage emergency equipment, generators, and fuel when a storm warning is issued, and the resiliency terminals would receive emergency supplies following the disaster event. The resiliency function is an overlay land use, secondary to the primary functions discussed above.

The HHMP recommends that the Piers 1 and 2 Terminal be improved to function as the harbor's primary resiliency pier. Its location at the harbor entrance is well-suited to support emergency operations following a disaster because there is a lower risk that post-event debris (sunken containers and other harbor equipment, and debris deposited by stormwater backwash from *mauka* urban areas) will obstruct safe navigation of vessels delivering relief equipment and supplies compared to piers located further inside the harbor. The terminal's location with easy access to the major transportation corridor of Ala Moana Boulevard and Nimitz Highway also supports its designation as a priority resiliency pier.

For all practical purposes, any terminal that remains accessible and operational after a disaster event would serve as a resiliency terminal. Thus, all other cargo terminals in the harbor are designated as secondary resiliency terminals (see **Figure 6.8**). The following notes the advantages and disadvantages of each terminal with respect to resiliency function and general improvements that would be needed to support that function:

- **Piers 19 and 20.** These piers are located relatively close to the harbor entrance and turning basin and thus may be less at risk of experiencing navigation hazards posed by sunken debris compared to piers located deeper inside the harbor. Proposed construction of a hardened, multi-story maritime center structure at this location can accommodate pre-staged emergency equipment and supplies and enhance the function of these piers as a staging point for post-disaster recovery efforts. Proximity of these piers to the major transportation corridor of Nimitz Highway supports efficient distribution of relief materials and increases their functionality as resiliency piers. On the other hand, the piers' location near the Nu'uanu Stream outfall increases the risk that they will be obstructed or damaged by debris carried in floodwaters during severe storm events or in backwash from hurricane or tsunami wave surge run-up into the city. Finally, the pier apron and yard surfaces do not have heavy-lift pads to handle emergency equipment deliveries. These piers are recommended for reconstruction and strengthening to accommodate modern cargo operations and to improve their resiliency function; the cost to reconstruct the piers would be much higher than upgrading Pier 29 for this purpose.

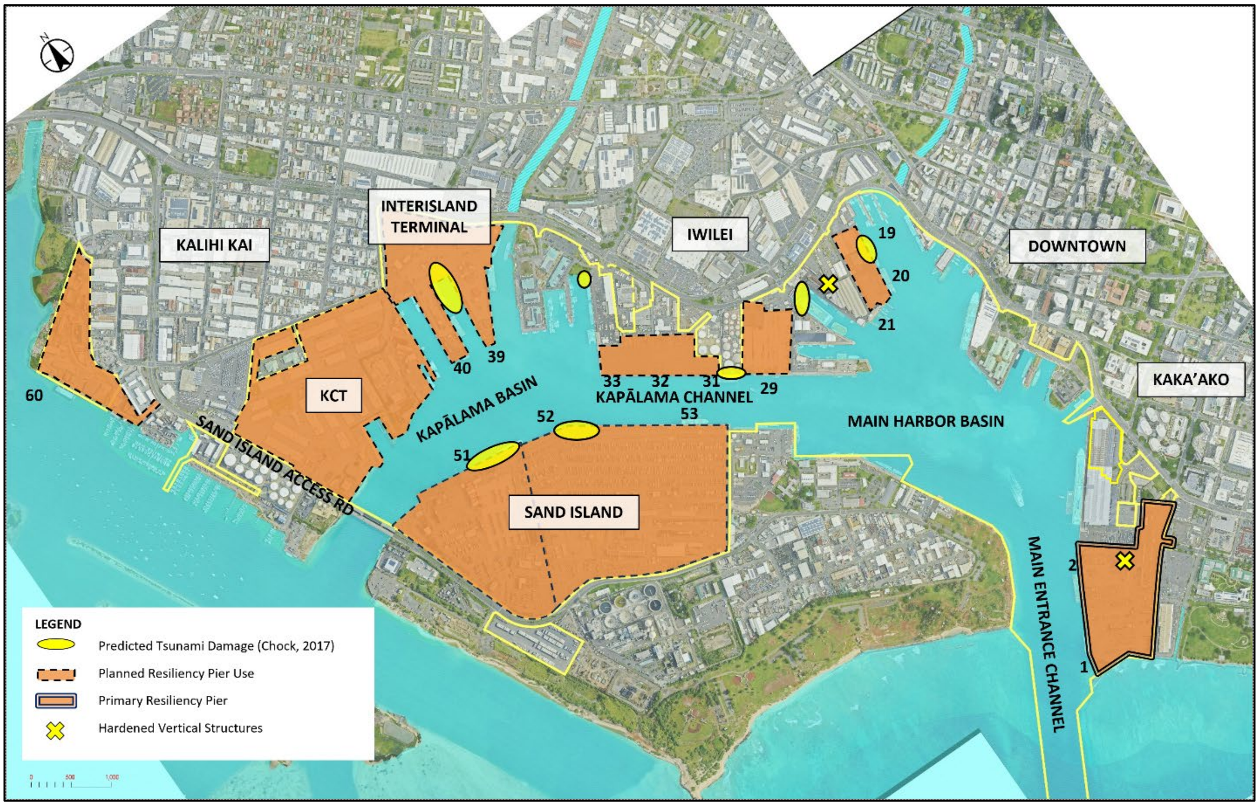

Figure 6.8 – Resiliency Piers

- **Pier 29.** This terminal is located centrally in the harbor where safe navigation may be hindered by sunken storm debris and is identified as at-risk of significant damage from a tsunami (Martin and Chock, Inc., 2017). Though the terminal has a newly constructed concrete yard, it does not have heavy-lift pads. However, the cost to upgrade this terminal to serve as a resiliency pier would be less compared to Piers 19 and 20 where both the yard and apron need to be upgraded.

- Interisland Terminal. The terminal is located deep inside the harbor and thus more likely to be impacted by sunken containers and debris that could pose a navigation hazard following a natural disaster such as a hurricane. The terminal is also identified as being susceptible to significant damage following a tsunami due to its location at the mouth of the Kapālama Canal and impacts from waterborne debris (Martin and Chock, Inc., 2017). However, it is adjacent to the major transportation corridors of Nimitz Highway and Waiakamilo Road, which may facilitate the distribution of relief supplies through partnerships with various government agencies, utilities and non-profit organizations before and after natural disasters. Its function as a resiliency pier would be enhanced by reopening of the second harbor entrance through Kalihi Channel, pending a feasibility study by the USACE. The second entrance would provide an alternate access into the harbor for delivery of emergency supplies, which would be of critical value if the main entrance channel is blocked. Proposed pier reconstruction and strengthening, including installation of heavy lift pads, will accommodate heavy emergency relief equipment such as large generators, and the equipment required to move them.

- **KCT.** Like the Interisland Terminal, KCT is located deep inside the harbor and thus at high risk to be impacted by navigation hazards following a natural disaster, including from toppled gantry cranes adjacent to the berth. However, the terminal is not identified as being particularly at risk of tsunami damage (Martin and Chock, Inc., 2017). The terminal possesses an expansive yard area for handling the large volume of relief material that could be required. In addition, if the Sand Island Bridge becomes impassable for cargo trucks, KCT will be the only gantry-crane terminal with access to Honolulu and the O'ahu mainland for distribution of relief supplies because of its location landside of Sand Island. Similar to the Interisland Terminal, KCT's function as a resiliency terminal would be enhanced by reopening of the second harbor entrance through Kalihi Channel, which would provide an alternate access into the harbor to deliver emergency supplies.

- **Sand Island Terminal.** The terminal location on Sand Island does not offer the best conditions for use as a resiliency pier. It is located deep within the harbor where there is a higher risk of navigation hazard from submerged storm debris and toppled gantry cranes following a disaster. Access to and from the terminal relies on the Sand Island Bridge, which is more vulnerable to storm or tsunami impacts than road systems adjacent to other areas of the harbor. Piers 52 and 53 are also identified as at risk of significant damage in the event of a tsunami due to waterborne debris from Kapālama Canal damaging the wharf structure (Martin and Chock, Inc., 2017). However, the terminal's expansive yard and ability to accommodate RO/RO operations would be a valuable asset for relief activities if, following a disaster, it remains accessible and operable. The resiliency function would also be enhanced by reopening of the second harbor entrance through Kalihi Channel.

- **Pier 60.** The Pier 60 terminal could be used for tug-and-barge delivery of emergency relief supplies. Proposed improvements to strengthen the pier and yard will also serve to improve the resiliency of the pier to withstand major storm events. In the event Honolulu Harbor becomes wholly or partially blocked by storm debris and damage, tug-and-barge delivery of emergency relief supplies through Ke'ehi Lagoon, including at Pier 60, may become necessary.

6.2.2 Maritime Support

The HHMP recommends that Piers 12 to 15, 21 to 28, portions of Pier 38, as well as backland areas located on the *mauka* edge of Piers 31 to 34, be used for maritime support operations (see **Figure 6.9**). The HHMP recommends that DOTH consider long-term leases of at least 30 years in these areas to support private investment in port facility improvements.

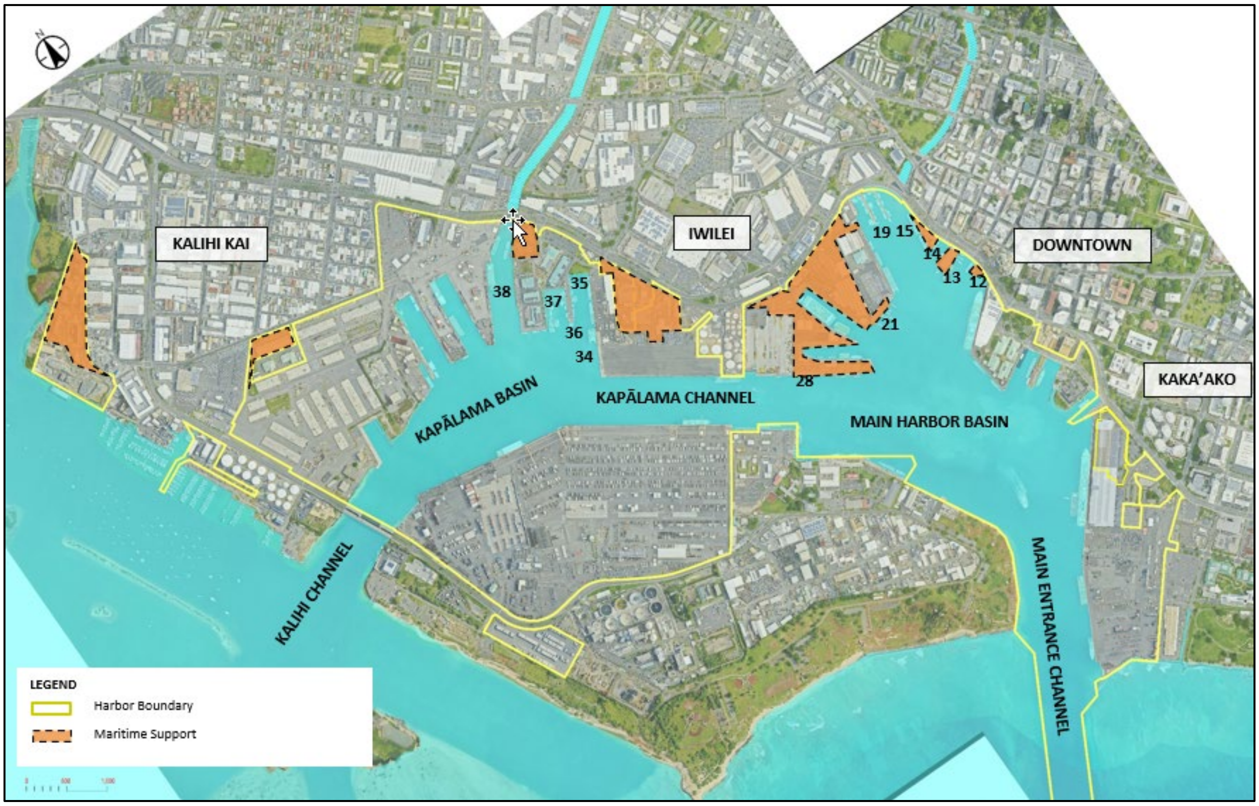

Figure 6.9 – Maritime Support Services Areas

Pier 12

Pier 12 currently does not have a long-term tenant. The pier provides approximately 0.30 acres of yard area and 112 LF of segmented berth suitable for a small-scale maritime support service operator. Pier 12 is located next to the Piers 10 and 11 cruise ship terminal and is subject to use restrictions according to the FSP when a cruise vessel is berthed at Piers 10 and 11. The impact of FSP restrictions will have to be considered by potential tenants. FSP restrictions affecting Pier 12 will be lifted if cruise operations are eliminated at Piers 10 and 11.

Piers 13 and 14

Piers 13 and 14 are currently under long-term lease to AMC with an expiration date of 2034. The pier provides 775 LF of berth and approximately one acre of apron and yard area that includes a two-story, high-cube shed suitable for maritime support service use. The shed was deemed to be a

HPV structure by the RLS and is also located within the boundaries of the Chinatown Historic District (see **Figure 6.10**). Given its historic status, the shed should be retained if feasible. However, if the needs of the harbor dictate and the opportunity arises, redevelopment of the pier and shed structure could be conducted by a private maritime operator under a long-term lease in order to enhance the function of the pier for the intended maritime support services use and overall harbor operations.

Figure 6.10 – Piers 13 and 14
(Source: Fung Associates Inc., 2021)

Pier 15

The HHMP recognizes the use of the Pier 15 land area and renovated buildings as the new, permanent Harbor Police station, and continued use of the Pier 15 segmented pier as the berth for the MSRC marine spill response vessel and barge. These uses are consistent with the designated maritime support services land use.

Piers 21 and 22 – "Tug Row"

The HHMP recommends that Piers 21 and 22 be improved and continue to be used as a dedicated tugboat pier, aka "Tug Row" (see **Section 7.3.4**). Tugboat navigation assistance for large cargo and cruise ship vessels within the harbor, and tug-and-barge operations for interisland and Hawai'i-U.S. Mainland cargo transport are essential harbor functions. Piers 21 and 22 are located strategically at a central location within the harbor; the location offers a good vantage of the harbor entrance channel and main turning basin and facilitates efficient deployment of tugboats. Use of Piers 21 and 22 for dedicated tugboat operations is compatible with the adjacent cargo operations at Piers 19 and 20, and proposed improvement of adjacent areas at Piers 22 and 23 for maritime support service use, including development of a maritime center recommended by the HHMP. The proposed maritime center concept includes parking for tugboat crews and tug operation staff; secure, long-term parking for tugboat crews who are at sea will improve the recommended use.

Piers 22 and 23

The HHMP recommends that the Piers 22 and 23 berth, yard area and adjacent slipway be cleared and improved to enhance its useability for maritime support services that require waterfront access for small vessels, such as water taxi service, or extension of tugboat operations. Piers 22 and 23 are currently underutilized for maritime purposes. The landside areas contain aged warehouse structures that are used for storage by various non-maritime agencies and businesses under DOTH short-term revocable permits. Pier 23 is also the site of a vacant flour mill and grain silo complex (former Hawaiian Flour Mills facility), which was deemed to be a HPV structure by the RLS. Despite its historic status, the HHMP recommends removing the flour mill complex and adjacent warehouse structures as they occupy valuable yard space adjacent to the slipway and berth which constrains use of the area for harbor operations. Subsurface conditions alongside Piers 22 and 23, along with PSI dry dock operations in the slipway, limit use for berthing.

The HHMP recommends that Pier 23 backland areas be considered for development and use as a maritime center, including a multi-story, multi-purpose building integrated with the surrounding maritime support services at Piers 21 and 22, and cargo operations at Piers 19 and 20. Uses at the maritime center may include office space for maritime operators, retail and eating establishments, storage and warehouse space, machine shop and light industrial uses, long-term parking for tugboat crews, vehicle storage for automobile RO/RO operations, and a high-cube ground level to support cargo operations on Piers 19 and 20. Maritime center uses could include both public access areas and secured areas; maritime center design will need to consider these requirements in vehicle and pedestrian access and circulation.

The HHMP recommends that the maritime center building be designed as a reinforced concrete structure to withstand a Category 5 hurricane. This will allow the building to be used for pre-staging of emergency relief equipment, supplies, fuel and generators ahead of a forecasted storm, and to be used as a base of emergency response operations after a natural disaster. The maritime center should consider incorporating the existing reinforced concrete structure on Pier 23 that is currently used by McCabe, Hamilton & Renny stevedore operations for equipment staging, maintenance and storage. See also **Section 7.3.6** for description of the proposed maritime center development plan.

Piers 24 and 25 – Pacific Shipyard, Inc. (PSI) Dry Dock

PSI operates ship design, construction and repair operations on approximately 4.2 acres of dry land and 2 acres of submerged land at Piers 24 and 25 under a long-term (70-year) lease with DOTH. PSI operations include two dry docks which are berthed in-line along the face of Piers 24 and 25 within PSI's submerged land lease area in the slipway. PSI's uses are suitably located within an area of the harbor that the HHMP recommends for maritime support services. The HHMP does not propose any changes in use to PSI's lease area.

Piers 26 to 29A

The HHMP recommends that Piers 26 through 29A continue to be improved and used for maritime support services. These piers are located within a secured access area. Backland areas along these piers are limited however, and therefore not suitable for cargo operations that require open yards with room for storage and maneuvering large volumes of cargo. Instead, the smaller areas adjacent to berthing in the protected slipway and relatively protected Kapālama Transit Channel are suitably located for smaller-scale maritime support service operations that require waterfront access. The HHMP recommends that areas adjacent to these piers remain dedicated to consolidated maritime support operations (e.g., tugboats, pilots, ship repair and ship maintenance). The HHMP also recommends that DOTH use long-term leases and public-private partnership (PPP) agreements to incentivize private investment in maritime facilities, including pier reconstruction, infrastructure and support buildings.

Pier 30 (IES)

The HHMP recognizes IES's ownership and exclusive use of Pier 30 for fuel storage and bunkering service. Fueling service (ship bunkering) is essential for operations in the harbor. While bunkering service could be provided by bunker barge operations originating outside of Honolulu Harbor, the Pier 30 fueling operations are an asset to efficient harbor operations. IES relies on access from the adjacent open-yard cargo piers to conduct maintenance and repairs at the Pier 30 fuel facilities. Therefore, continued use of Pier 29 and Piers 31 to 33 as open-yard multi-purpose cargo yards supports IES's operations. The Pier 30 berth is 270 LF, which is too short for many of the vessels that berth to take on fuel; fueling operations for vessels longer than the pier (including length for mooring lines) require use of Pier 29 and/or Pier 31 for berthing. The HHMP recommends continuing to accommodate use of Piers 29 and 31 for this purpose and coordinated use of Pier 30 for layberth. IES also uses the notch in Pier 29 to deploy a dinghy used to place a surface boom for spill containment. The HHMP recommends filling the notch as part of the Pier 29 improvements (see **Section 7.2.3**), which will require IES to modify their method for deploying the dinghy. Otherwise, the HHMP does not recommend land use changes that would affect operations at Pier 30.

Piers 31 to 33 Backland Areas

The HHMP recommends that the backland area between the Piers 31 to 33 multi-purpose cargo terminal and Nimitz Highway continue to be used for maritime support services and/or for possible future expansion of the cargo terminal yard. The backland area includes approximately 4.4 acres of land under DOTH jurisdiction. The area is subdivided into individual parcels and developed with warehouse and office buildings that are leased to various maritime support services or are vacant. These parcels are located adjacent to Nimitz Highway and outside of the secured areas, and therefore suitable for maritime support services that require a public-access business interface. Many of the buildings are aged and in poor condition. The HHMP recommends that vacant structures be removed when they reach the end of their useful life and that the land area be leased to maritime support service operators for long lease periods that will allow the tenants to obtain financing to invest in facility improvements. Alternatively, the parcels adjacent to the cargo terminal can be cleared and used to expand the cargo yard and gate area to improve the utility and enhance throughput capacity at the terminal.

The HHMP recommends that two additional parcels in this area that are not under DOTH jurisdiction be acquired by DOTH for maritime support service and/or cargo terminal use. These include (1) a contiguous 3.7-acre parcel under DOTA jurisdiction (TMK parcel 1-5-35: 010), and (2) a 2.0-acre parcel owned by HECO (TMK parcel 1-5-35: 006). Acquisition of the DOTA parcel would create opportunities to reconfigure internal driveways to directly connect the multi-purpose cargo terminal and maritime support service area to the signalized intersection at Nimitz Highway and Alakawa Street (see **Section 7.1.1.4**).

Pier 38

The HHMP recommends that the approximately 1.39-acre parcel (currently vacant) adjacent to Nimitz Highway between the Kapālama Canal and Pier 38 Commercial Fishing Village entrance driveway (TMK 1-5-34: 004) be used for maritime support services. The parcel has direct water access for shallow-draft vessels and barges which makes it suitable for a maritime operator that operates these types of vessels.

Pier 60

The HHMP recommends that approximately one acre of backland area at Pier 60 be leased and/or redeveloped through a PPP for use as chassis, container and/or auto storage, freight forwarding/consolidating or other maritime support use.

DOTH Oahu District Baseyard

The HHMP proposes that the existing Oahu District Baseyard, along Sand Island Access Road, near the Ke'ehi Small Boat Harbor, be converted to the Maritime Support Service land use. The site is subject to flooding (see **Section 4.2.6**) and no longer suitable for baseyard operations. The HHMP recommends the site be leased to a maritime support services operator that will benefit from the direct water access.

6.2.3 Commercial Fishing

The HHMP recommends that Piers 16 to 18 and Piers 36 to 38 continue to be used and improved for the commercial long-line fishing fleet (see **Figures 6.11, 6.12** and **6.13**). Due to the restricted immigration status of many of the fishing vessel crew members, these areas are gated for security and to define the area limits that crew members from foreign countries can access when off their vessels. The two commercial fishing fleet areas operate differently and are discussed separately as follows:

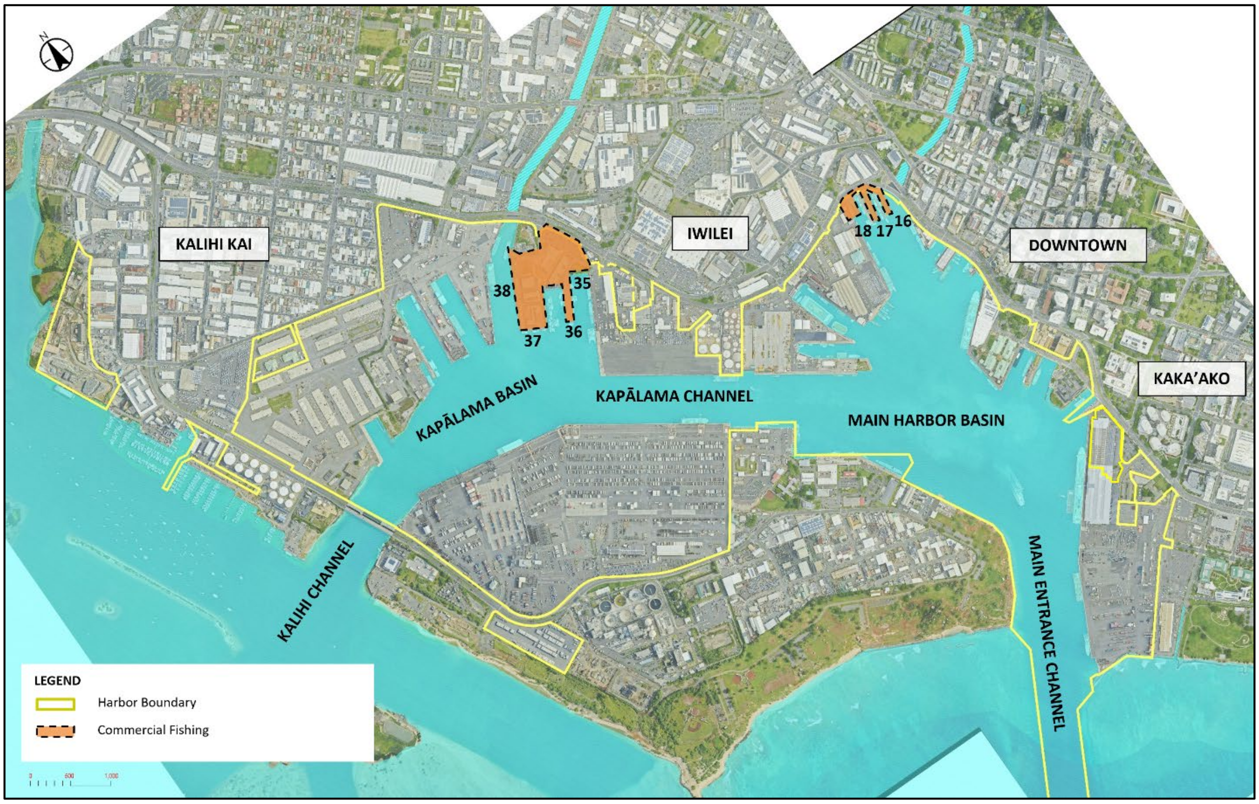

Figure 6.11 – Commercial Fishing Fleet Piers

Piers 16 to 18 are dedicated for commercial long-line fishing fleet berthing and operations. See **Figure 6.12**. The HHMP recommends that the entire gated area around these piers and the adjacent 0.4-acre landside area continue to be used exclusively by the commercial fishing fleet for vessel operations, provisioning, fueling, maintenance and repairs, and that improvements be maintained to support these uses, including storage and temporary disposal facilities for industrial materials used by the vessel operators. Pier 18 is contained within the secured area of the Piers 16 to 18 and the pier is currently unused due to its dilapidated condition. The HHMP recommends that Pier 18 be improved to add capacity as a temporary berth and support pier for provisioning, fueling and servicing commercial long-line fishing vessels.

The HHMP recommends that the landside area of Pier 18 be developed as a respite center to provide relief to long-line fishing vessel crew members from foreign countries who must remain in the secured fishing pier area due to the conditions of their work visas. The remaining landside area of Pier 18 that is located outside of the security fence contains an approximately 0.2-acre yard area and a vacant building. The HHMP recommends that this area and building be integrated into the Piers 16 to 18 fishing fleet facilities and be considered as space for back office and storage use by fishing boat operators displaced from the Pier 19 shed when it is repurposed for use as the interim Oʻahu District maintenance baseyard (see **Section 7.7**).

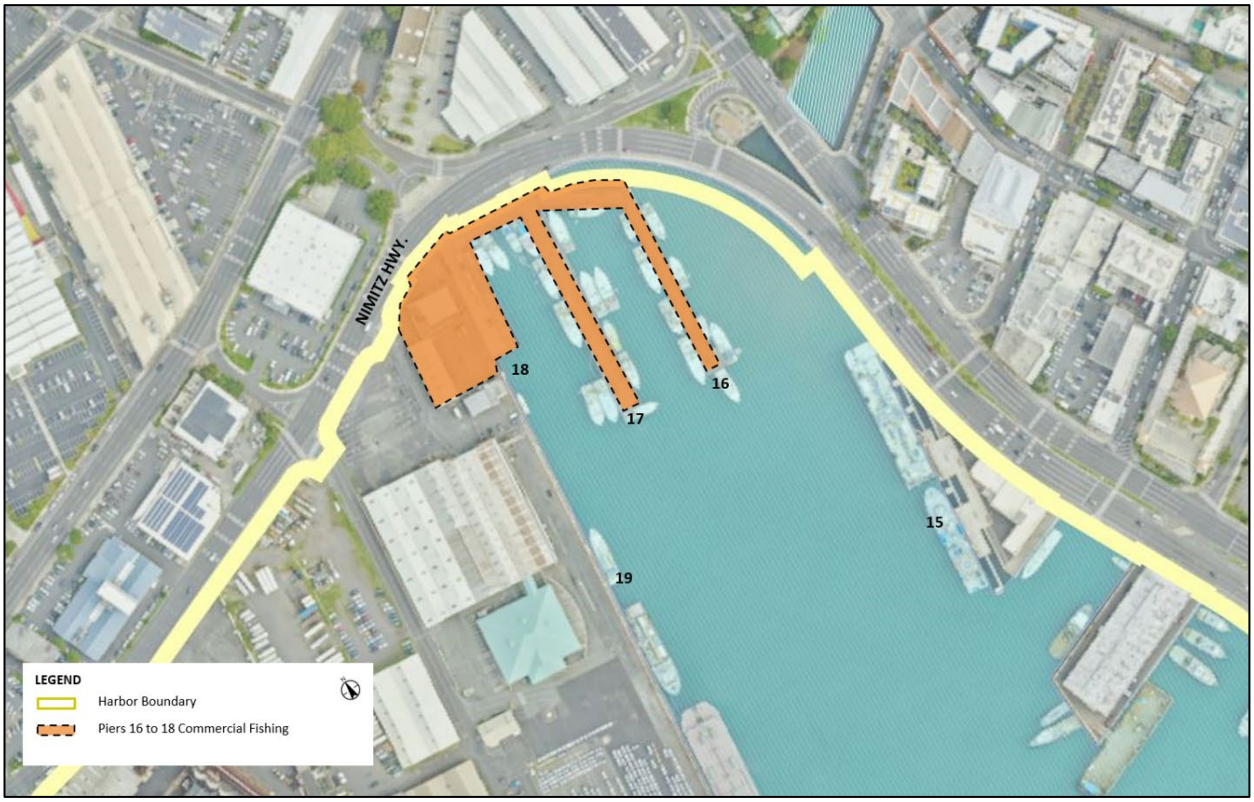

Figure 6.12– Commercial Fishing Fleet Piers 16 to 18

The Piers 36 to 38 Fishing Village is home to approximately half of the commercial long-line fishing fleet in addition to being one of two locations in Honolulu Harbor with public access to the waterfront. See **Figure 6.13**. Most of the landside areas are under a CPR managed by the Domestic Commercial Fishing Village Tenants AOAO which has a ground lease to 2064. Existing land uses at the Fishing Village include the United Fishing Agency (UFA) fish auction, ice factory, retail marine supply, restaurants and warehouse space. The Fishing Village is a popular destination for residents and visitors that offers a unique and direct experience with commercial harbor operations. The HHMP recommends that public access to the Fishing Village be maintained, and land uses continue to provide opportunities for public interface with the commercial waterfront, including patronage of fresh ocean catch from the commercial long-line fishing fleet. The HHMP also recommends that portions of the land area be improved and used for respite by the foreign fishing crews. The HHMP recognizes that the lease arrangements establish the land uses at the Fishing Village beyond the 2050 planning horizon.

Figure 6.13 – Commercial Fishing Fleet Piers 36 to 38

6.2.4 Passenger

Land use for passenger operations accommodate two distinct types of services — cruise passenger services and day excursion and ferry services. Alternatives for the passenger land use are described below.

6.2.4.1 Interisland and Overseas Cruises

The HHMP recognizes that a second cruise vessel berth is necessary to accommodate the number of pre-pandemic cruise vessel calls and the projected growth in cruise industry activity at Honolulu Harbor. It is DOTH's intention to continue accommodating simultaneous berthing of two cruise ships at Honolulu Harbor. However, DOTH will make decisions on cruise terminal improvements and changes to existing cruise vessel operations in Honolulu Harbor based on State policy, operational requirements, and mutual commitments with cruise operators on port facility operations, cruise schedules and investments that will best serve the people of Hawaiʻi and the maritime community. The HHMP also recommends that decisions that would result in decreasing or increasing the number of cruise ship berths in Honolulu Harbor, and the corresponding number of calls by cruise ships, also consider the effects that such a change would have on the neighbor islands.

The HHMP recommends two general land use alternatives for cruise operations. The two alternatives provide flexibility for future decision-making to accommodate changes in industry trends and a variety of development scenarios at the Aloha Tower complex.

Alternative 1 – Consolidated Cruise Terminal at Piers 1 and 2

Under Alternative 1, Piers 1 (1A and 1B) and 2 (2A and 2B) would be improved and used as a consolidated cruise terminal to accommodate cruise vessel berthing, provisioning and passenger processing for two cruise vessels berthed simultaneously at Piers 1 and 2. See **Figure 6.14**. This alternative would allow DOTH to accommodate cruise operations and future passenger growth more efficiently than the current practice of operating cruise terminals at Pier 2 and at Piers 10 and 11. This alternative also responds to constraints to cruise terminal use at Piers 10 and 11.

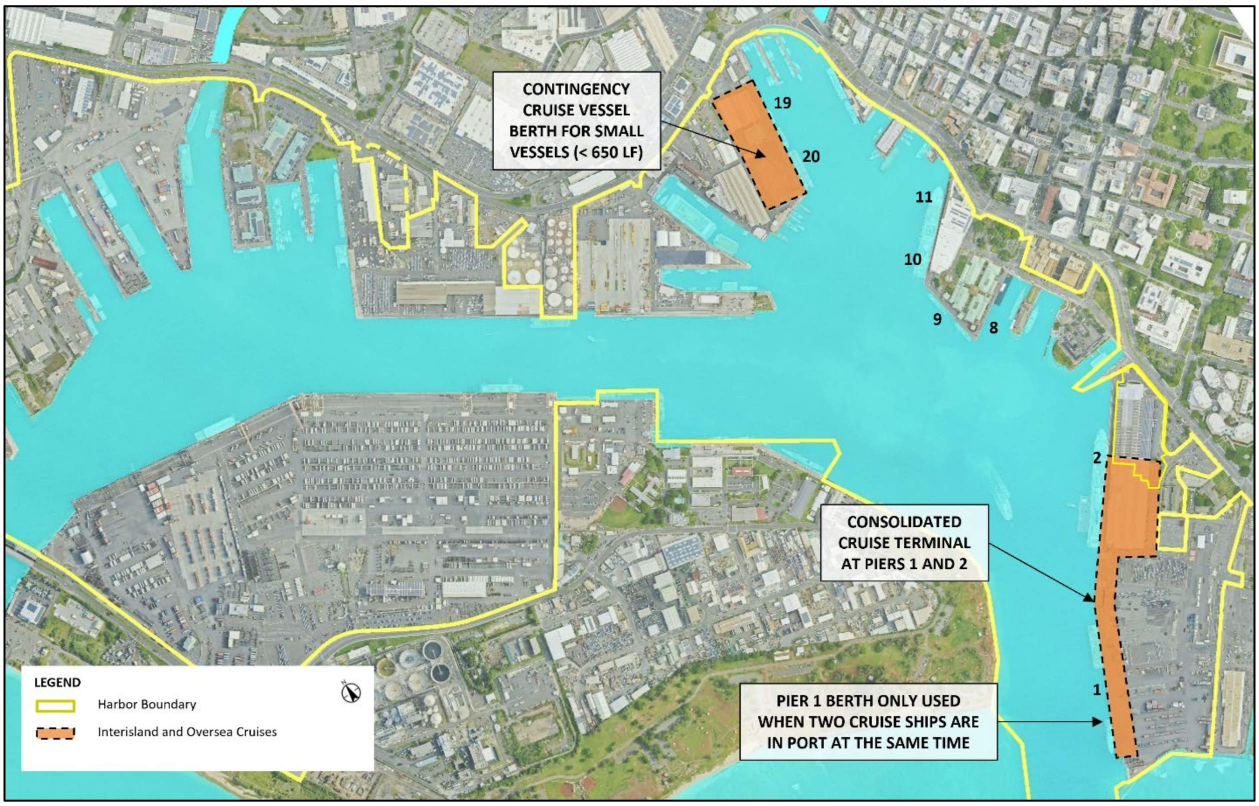

Figure 6.14 – Alternative 1 - Consolidated Cruise Terminal at Piers 1 and 2

Under this alternative, cruise operations will be eliminated from Piers 10 and 11. Cruise industry representatives and the maritime community noted that the existing Piers 10 and 11 sheds provide limited space for passenger operations, particularly when considering the cruise industry trend toward larger vessels carrying an increased number of passengers, as well as new requirements for increased per capita space for passenger processing and health and security screening. Motor vehicle access and circulation on Aloha Tower Drive and through the sheds are similarly constrained. Cruise ships generate pulse demand for transportation, with related peak traffic congestion when ships are in port. In its current configuration, Aloha Tower Drive is not well-suited to handle the high traffic volume from passenger ground transportation (buses, shuttles, taxis and ride share) and from large delivery vehicles and container trucks that are required for cruise ship provisioning and servicing. In addition, the Piers 10 and 11 sheds are supported by numerous columns that create access obstacles for large delivery vehicles that need to operate pier-side. Consolidating cruise operations at the Pier 2 Cruise Terminal and Pier 1 berth addresses the site constraints at Piers 10 and 11.

As a further consideration, the cruise ship season in Hawaiʻi is typically from December through April, when winter temperatures in Alaska redirect the desirable cruise routes to the warmer climes of Hawaiʻi. In the off-season in Hawaiʻi, the cruise terminal facilities in the Piers 10 and 11 sheds are unused or underutilized. Based on 2019 Port Call data, cruise ships berthed in Honolulu Harbor a total of 150 days that year, including 121 berth days at Pier 2 and 29 berth days at Piers 10 and 11. Consolidating all cruise operations at the dedicated Pier 2 Cruise Terminal opens Piers 10 and 11 for alternative development scenarios with a higher and better use that can activate economic activity at the Aloha Tower complex and generate greater revenue. In addition, elimination of cruise operations at Piers 10 and 11 would remove security protocols required by the FSP that currently limit uses at Piers 10 and 11 and surrounding areas when a cruise ship is in port.

Under this Alternative, Pier 1 would continue to be used primarily for multi-purpose cargo operations and as a resiliency pier, and that it be used to berth cruise vessels when two cruise ships are in port at the same time. Prior to the COVID-19 pandemic, there were approximately 30 berth days per year when two cruise ships were in port simultaneously. A berth utilization assessment based on 2017-2018 Port Call data calculated that Piers 1A and 1B combined have a current utilization rate of approximately 30 percent, projected to 51 percent in 2050 (see **Section 5.4.2**). This analysis indicates that these piers have adequate capacity to accommodate intermittent berthing at Pier 1 by cruise vessels. In addition, cargo capacity and throughput analysis conducted for the HHMP determined that with the opening of KCT in 2024, Honolulu Harbor has sufficient capacity to handle projected 2050 cargo throughput with relatively minor densification at the dedicated cargo terminals (Interisland Terminal, KCT and Sand Island Terminal), (See **Chapter 5**). The general use cargo piers, including Piers 1 and 2, Piers 19 and 20, Pier 29 and Piers 31 to 34, provide additional cargo capacity beyond the projected 2050 throughput, as well as flexibility for vessel assignments that will allow Oʻahu District to operate the harbor most efficiently. This might include seasonally shifting some cargo vessel operations from Pier 1 to the other general use piers to accommodate cruise vessels at Piers 1 and 2.

The HHMP recognizes that berthing a cruise ship at Pier 1 creates a navigational constraint for large vessels transiting the adjacent Main Entrance Channel. The entrance channel has a defined navigation width of 500 FT. The available berthing space between the channel boundary and the face of Pier 1 ranges in width from 80 FT to 230 FT. A cruise ship with a 135-FT beam (Ovation-class vessel) berthed at Pier 1 plus a 100-FT wide fuel barge alongside will encroach into the navigation channel. This would prohibit large vessels (i.e., cargo vessels and automobile carriers) from entering or exiting the harbor during the estimated eight hours that fuel bunkering operations typically take to discharge. Note that all cruise vessels that call at Honolulu Harbor require fuel barge service. The HHMP concludes that unless and until the Main Entrance Channel is widened to accommodate cruise vessel fueling operations outside of the navigation channel, the use of Pier 1 as a cruise vessel berth is only feasible through vessel scheduling, with cargo vessels given priority. Oʻahu District and the cruise operators would need to coordinate scheduling to increase utilization of the Pier 2 berth during the cruise season, which could relieve some of the demand on Pier 1.

Figure 6.15 – Pride of America Taking on Bunker Fuel at the Pier 2 Cruise Terminal
(Source: W. F. Anonsen, The Maritime Group)

DOTH will coordinate with cruise ship operators to determine suitable conditions and adequate facilities needed for cruise operations at Pier 1, which would be dependent on the level of cruise ship activity. Operational considerations may include, but are not limited to the following:

- Cruise-related operations at Pier 1 be restricted to vessel berthing and provisioning for cruise ships making a port call or a partial turnover of 500 or fewer passengers. Cruise ships making a full turnover of passengers will be berthed at Pier 2 where there are adequate terminal facilities to handle passenger and baggage processing.

- All passenger processing occur at the Pier 2 Cruise Terminal, not ship-side at Pier 1, with passengers disembarking a vessel at Pier 1 directed along the pier apron to the Pier 2 Terminal building for processing and access to ground transportation.
- Only motor vehicle traffic related to ship provisioning and servicing occur ship-side at Pier 1.
- All passenger ground transportation operations continue to use the Pier 2 Cruise Terminal.
- Only temporary barriers and equipment be used for cruise operations at Pier 1, and only as required when a cruise vessel calls at the pier.
- A second homeported ship can be accommodated at the Pier 2 Cruise Terminal through scheduling.

Alternative 2 – Cruise Terminal at Pier 2 and at Piers 10 and 11

Under Alternative 2, DOTH continues to use and improve Pier 2 as the harbor's primary cruise terminal and Piers 10 and 11 as the secondary cruise terminal. See **Figure 6.16**. The Aloha Tower complex, including Piers 10 and 11, has been receiving ocean liner and cruise ship passengers since the piers were first constructed between 1922 and 1928. Anchored by the iconic Aloha Tower clocktower and with Downtown and Chinatown in easy walking distance, Piers 10 and 11 remain a desirable cruise ship terminal due to the passenger experience it provides. This is particularly true for international cruise vessels on longer voyages. These vessels typically visit Honolulu as a port-call or partial passenger turn-over and tend to cater to older guests who prefer shorter walking distances. Cruise passengers at Piers 10 and 11 create the potential to enhance economic synergies among the cruise terminal operations and retail, commercial, dining, and other enterprise in the area.

This alternative responds to the preference expressed by cruise industry representatives and members of the maritime community for the continued use of Piers 10 and 11 as a secondary cruise terminal as opposed to consolidating all cruise activity at Piers 1 and 2. From a passenger experience perspective, the Aloha Tower complex provides an interesting and hospitable environment for disembarking passengers, particularly when compared to the exposed, industrial character of the Pier 1 cargo terminal. Sheltering buildings and trees, retail and eating establishments, historic features, and access to Downtown and Chinatown are immediately at hand as passengers leave the Piers 10 and 11 terminal. Use of Piers 10 and 11 as a cruise terminal is compatible with other existing and envisioned uses in the Aloha Tower complex, including retail, commercial, office, education, historic/cultural center, day excursion operations and boutique hotel (see **Section 6.2.5**). It is also conveniently located near to the planned HART rail transit downtown station. Shared use of the Piers 10 and 11 shed with cruise, retail, commercial and eating establishments creates opportunities for developing synergistic relationships among the cruise passengers and businesses that benefit from their patronage. During the off-season when cruise ships are not in port, the terminal could support alternate uses such as event space or a vendor market. The HHMP recognizes that shared use of Piers 10 and 11 will require coordination among private developers, cruise operators, ATDC and DOTH (see **Section 6.2.5**).

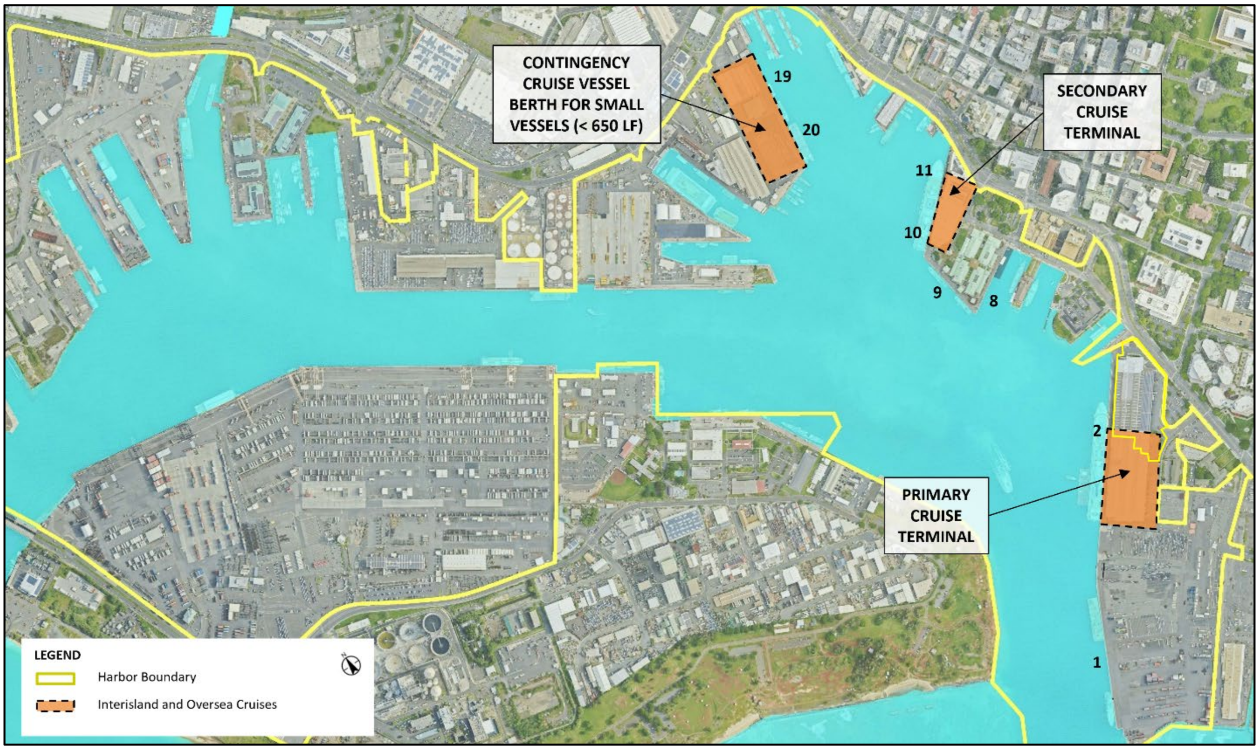

Figure 6.16 – Alternative 2 – Cruise Terminal at Piers 2 and at Piers 10 and 11

The HHMP recognizes that there may be future demand for a second or third homeported cruise ship in Hawaiʻi. Homeported ships historically use Honolulu Harbor as the starting and ending point for week-long cruises around the Hawaiian Islands, with departures on Saturday or Sunday being the most desirable schedule for the operators. Improving and maintaining a cruise terminal at Piers 10 and 11 that can handle full turns, in addition to the Pier 2 Cruise Terminal, can accommodate a second homeported cruise ship without the need to share a single terminal through scheduling, and creates capacity to accommodate a third homeported ship through scheduling as well as accommodate further growth in cruise operations in Hawaiʻi (see **Figure 6.17**).

Piers 19 and 20

The HHMP recommends that Piers 19 and 20 continue to be used as a contingency cruise vessel berth for smaller-sized cruise vessels, up to 650 LF. Piers 19 and 20 are currently covered by a FSP for cruise operations. No physical changes to the existing pier and yard are required. Note that the existing SuperFerry Terminal building at Pier 19 is currently identified in the FSP for use to stage cruise ship operations when a cruise ship is berthed at the pier. Under the plan to relocate the DOTH Oʻahu District maintenance baseyard to Pier 19, cruise operations at these piers, including passenger processing, ship provisioning and servicing and ground transportation, would only be accommodated in the open yard areas of Pier 20 through the use of mobile equipment (see **Section 6.2.6**).

Figure 6.17 – Pacific Princess Cruise Ship Berthed at the Piers 10 and 11 Cruise Terminal
(Source: HawaiiNews, 2020)

6.2.4.2 Day Excursion and Ferry Service

The HHMP recommends that Piers 5 through 9 be designated for use by day excursion operations, future ferry service and water taxi service, as well as layberth piers (see **Figure 6.18**). These piers are contiguous with the Aloha Tower complex, which along with the Pier 38 Fishing Village provide the only public-access waterfront in Honolulu Harbor. As such, these piers are appropriately located for maritime uses that cater to the public. Adjacency to eating establishments, shops, points of interest and pedestrian promenade, as well as envisioned development of the Aloha Tower complex to include more convenient access and parking; office space for day excursion, ferry and water taxi operators; entertainment space; and maritime history and cultural education center also support the recommended use of these piers for publicly accessible maritime passenger services (see **Section 6.2.5**).

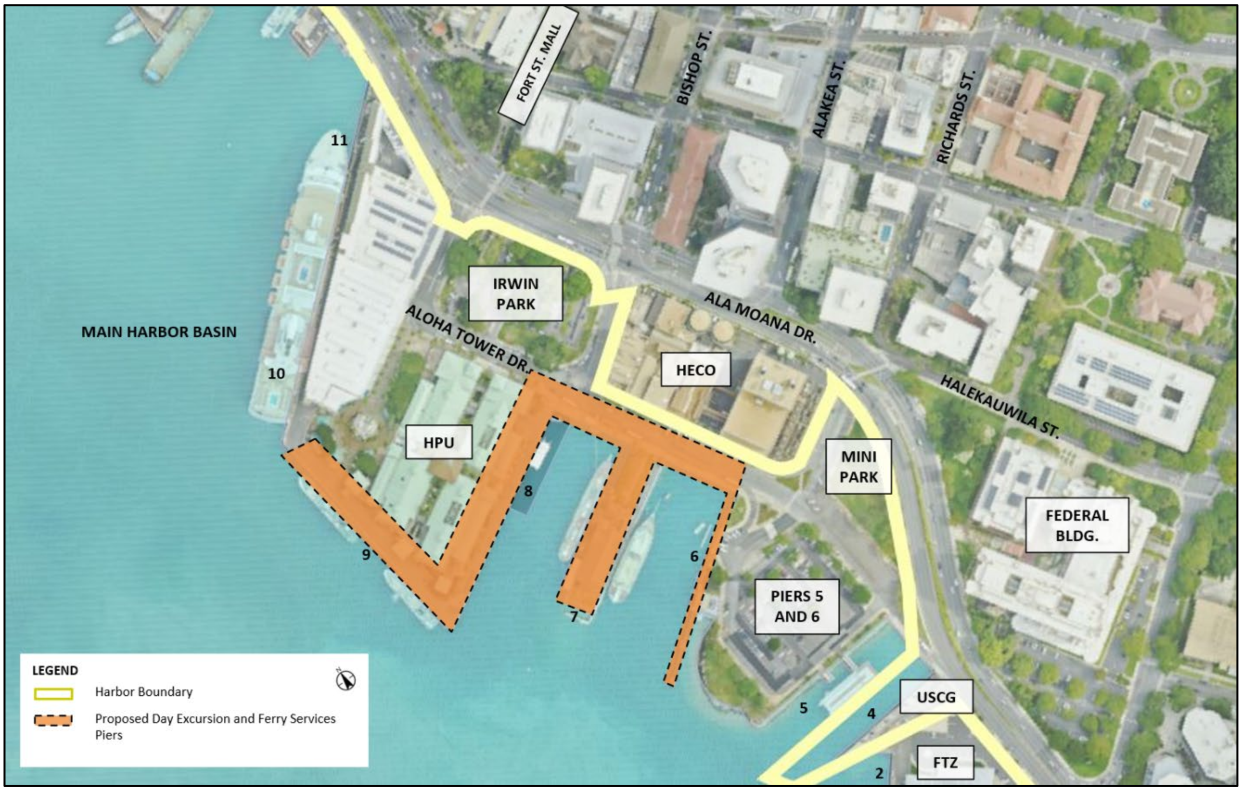

Figure 6.18 – Proposed Day Excursion and Ferry Service Piers

6.2.5 Public Waterfront

The HHMP recognizes that public shorelines provide a valuable resource which should be preserved and made accessible to both residents and visitors. Public access to Honolulu Harbor's waterfront also provides economic benefits, as well as opportunities for public education about the importance of the harbor, both its present-day use and historically. While public access is largely prohibited within the harbor, two areas, including the Aloha Tower complex and the Pier 38 Commercial Fishing Village, allow limited public access (see **Figure 6.19**). The public access areas are generally used for fishing, dining, retail/commercial, and personal gathering and socializing.

Throughout history, *mo'olelo* (stories, legends and traditions) include great appreciation for important *mauka-makai* connections to the harbor, which are interwoven with the Hawaiian cultural identity, values, and customs. In addition, strong connections between Chinatown, Downtown and the harbor waterfront were also established during Honolulu's contemporary history. These connections, however, have increasingly been lost over time. To this end, the HHMP recommends maintaining and enhancing public access to the shoreline within the two areas, to restore and reconnect the community to the shoreline.

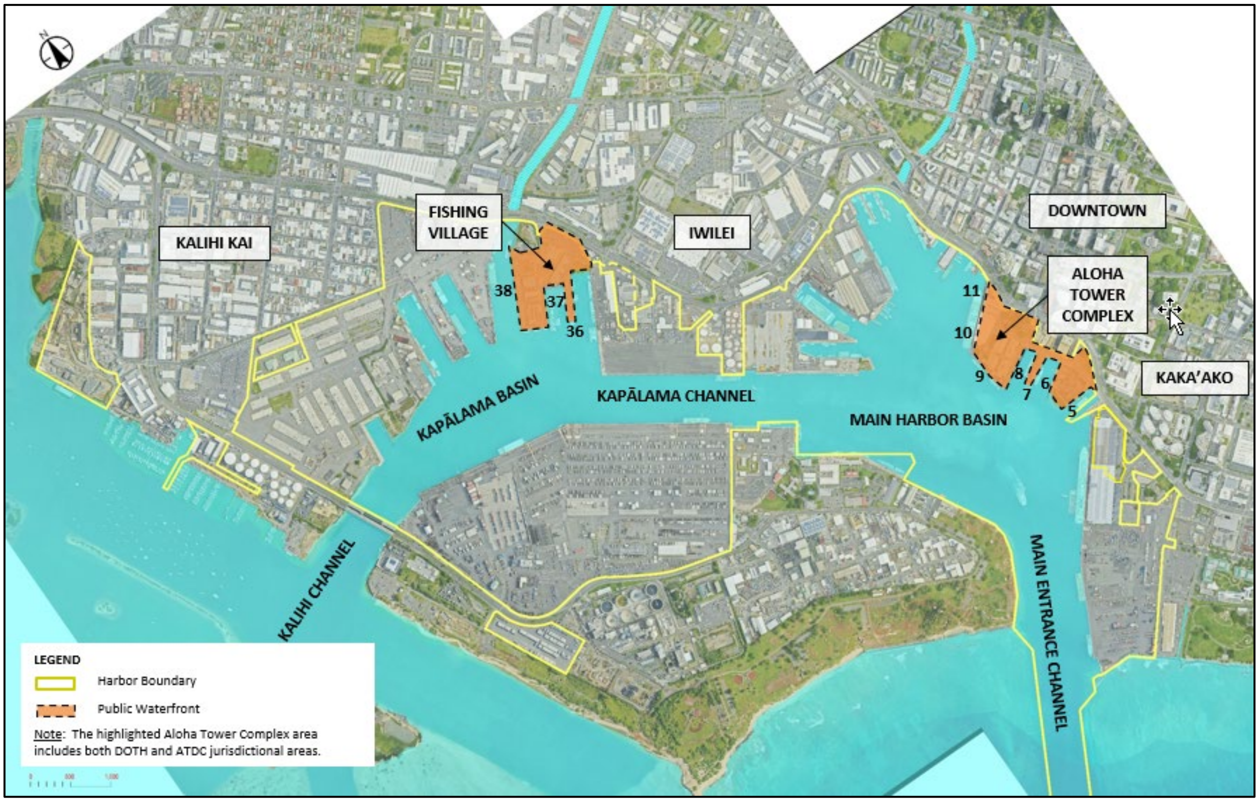

Figure 6.19 – Public Waterfront Areas

The HHMP recommends consideration of numerous plans and initiatives by agencies and community groups, which affirm the public's interest in restoring *mauka-makai* connections and encouraging multi-modal networks along the south shore of Oʻahu. A selection of relevant plans and initiatives includes:

- Honolulu Waterfront Master Plan
- Kapālama Canal Restoration
- Iwilei/Kapālama Infrastructure Master Plan
- Kapālama Canal Catalytic Project, The Resilient Master Plan
- City's TOD Way-Finding Plan
- Oʻahu Bike Plan 2019 Update
- Lei of Parks
- Kakaʻako Master Plan
- South Shore Multi-Use Path
- Neighborhood TOD Plans – Kalihi, Kapālama, Iwilei, Chinatown, Downtown

The HHMP recommends the continuation of land uses and public open spaces within the Aloha Tower complex and Pier 38 Commercial Fishing Village. These include retail/commercial, dining, fishing, and open space and promenade areas that encourage personal gathering and socialization, which are otherwise restricted and unavailable elsewhere in Honolulu Harbor. Towards seeking the highest and best use of the areas and optimizing revenue generation, the HHMP also recommends redevelopment of underutilized portions of these areas. See **Section 7.6** for HHMP development concepts for the Aloha Tower complex.

Further, the HHMP recommends that long-range plans for Iwilei, Chinatown, Downtown, and Kaka'ako, which may include additional residential, and business uses, be considered for any proposed land use plan and redevelopment concept for the Aloha Tower complex. Other recommendations include encouraging uses that will attract public appreciation and education of the waterfront such as restaurants, public exhibits, or cultural events, and pursuing PPP agreements to facilitate redevelopment. The HHMP recommends that improvements and programming focus on attracting local residents to the Aloha Tower complex. By creating a vibrant "local" destination with a variety of uses, interests and enterprises, the Aloha Tower complex will in turn become an attraction for visitors who will further contribute to its economic vitality.

Any proposed improvements to public access or other land uses within the Aloha Tower complex, except Pier 7, will ultimately be determined by ATDC. ATDC has jurisdiction over all landside areas within the Aloha Tower complex, with the exception of Pier 7 which is entirely under DOTH jurisdiction. DOTH also retains jurisdiction over all waterside uses adjacent to Piers 5 through 11. See **Figure 7.33** and **Figure 7.34** for DOTH and ATDC jurisdictional areas. In addition, HPU currently leases areas within the complex under a 40-year lease that will expire in 2055 with the option to extend for an additional 20 years. Thus, any proposed improvements will be contingent on the future status and terms of HPU's lease. Land uses within the Pier 38 Commercial Fishing Village are covered under a long-term leases, which extend beyond 2064.

With regard to the treatment of Irwin Park, the Irwin Family Trust is pursuing plans for restoration to its original intended use as a public park. The HHMP recommends consistency with this direction.

Details of the development plan are provided in **Section 7.6**.

6.2.6 Administrative Uses and Harbor Operations

Pier 2 Historic DOH Building

The HHMP recommends that the existing, historic DOH building located on Channel Street across from the Pier 2 Cruise Terminal building be renovated and used for administrative uses. See **Figure 6.20**. The building provides over 30,000 SF of space and is currently vacant. Its location near the harbor waterfront and close to downtown and the Capitol District make it a good location for the proposed use.

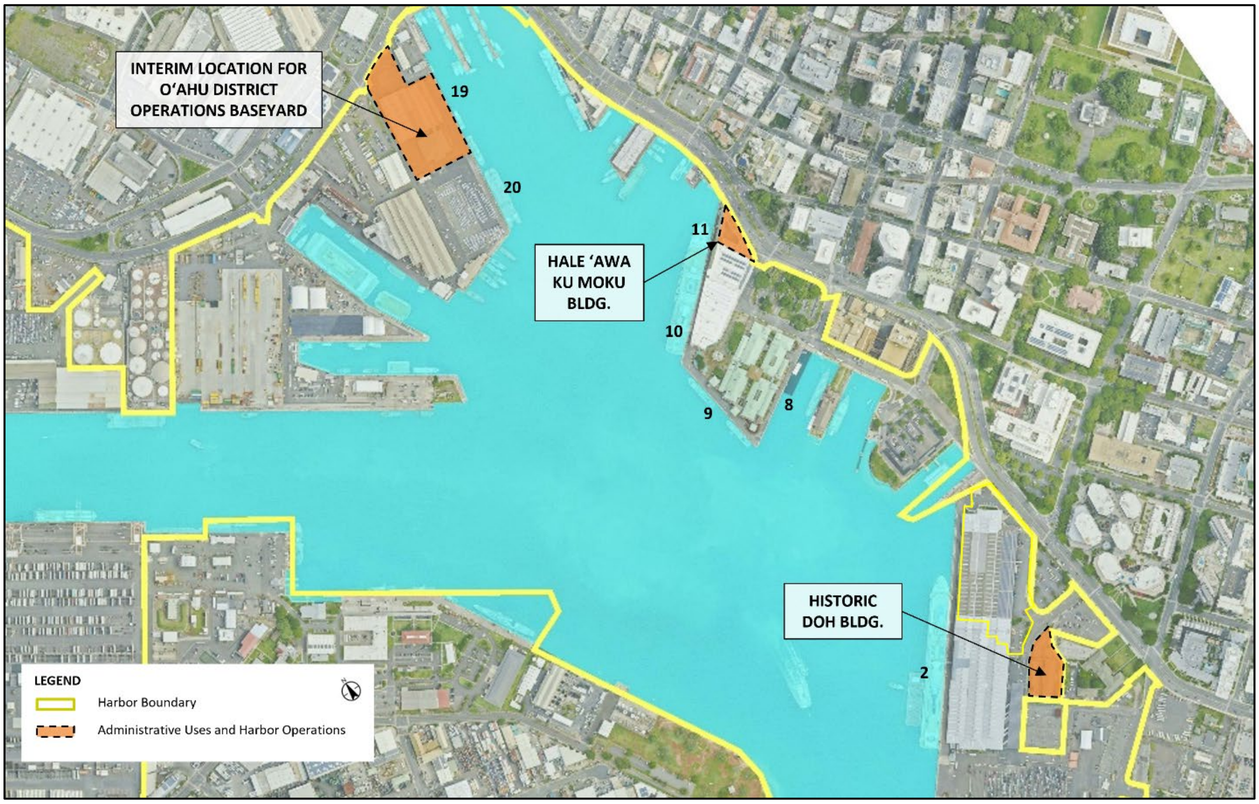

Figure 6.20 – Administrative Uses and Harbor Operations

Pier 11 Hale ʻAwa Kū Moku Building – DOTH Administration

The historic Hale ʻAwa Kū Moku building at Pier 11 is currently used as office space for DOTH Administration and Oʻahu District personnel (see **Figure 6.21**). This use is compatible with other uses and the public waterfront character at the Aloha Tower complex. The central location within the harbor is well-suited for DOTH Administrative functions, providing immediate access to the waterfront and a convenient location for conducting business with maritime operators. The HHMP recommends that the building continue to be used for purposes that complement the existing uses and future redevelopment at the Aloha Tower complex, including as office space for the DOTH Administration or other maritime tenants, as well as for possible future retail and commercial purposes.

Figure 6.21 – Hale ʻAwa Kū Moku Building at Pier 11
(Source: Fung Associates, Inc., 2021)

Pier 19 – Interim Location for Oʻahu District Operations Baseyard

The HHMP recommends that portions of Pier 19, encompassing the existing Pier 19 shed, the former SuperFerry building, and the yard area bounded by the Pier 19 shed, Kukahi Street and Nimitz Highway, be repurposed and used as the interim location for the DOTH Oʻahu District Baseyard. The existing baseyard is located adjacent to Keʻehi Lagoon on Sand Island Access Road. Portions of the existing baseyard are currently subject to intermittent flooding during high and king tide events which render these areas unusable, and the entire site is at risk of damage from storm surge and flooding. A functioning and accessible baseyard is essential to maintaining facilities and operations in Honolulu Harbor. Interim use of the Pier 19 location would continue until a permanent location becomes available and/or cargo demand increases such that Pier 19 is required to meet the demand. See **Section 7.2.2.** The HHMP recommends use of the Pier 19 facility as the interim baseyard location for the following reasons:

- Pier 19 provides a convenient, centralized location in the harbor from which Oʻahu District Operations staff can conduct necessary inspection and maintenance of harbor facilities.
- The existing warehouse and ferry buildings are currently underutilized.
- The proposed interim use will not displace existing cargo operations in the Piers 19 and 20 cargo yard. RO/RO operations at Piers 19 and 20 can continue as currently conducted and can also be directed to the multi-purpose terminals at Pier 29 or Piers 31 to 33, where there is greater yard capacity.
- Renovating the existing buildings and facilities for use as a baseyard can be accomplished for relatively low cost compared to acquiring new land and/or constructing new facilities on a vacant site. The cost savings will help preserve funds for other projects and harbor users.

- The covered storage area provided by the Pier 19 shed building will better protect materials and equipment from weather exposure, and reduce regulatory requirements and costs associated with retaining and treating runoff water compared to the existing open-air baseyard facility.

Other locations around the harbor were evaluated for the relocated baseyard, but eliminated from further consideration for various reasons:

- The Triple-F Building near the DOA Plant Quarantine Inspection facility on the *mauka* side of KCT is suitably located but was determined to be too small for the baseyard operations.
- Various parcels within the maritime support services area of the harbor between Piers 19 and 23 were evaluated due to their desirable location in proximity to the harbor. However, these areas would require evicting existing tenants to assemble a sufficiently sized parcel for the baseyard or would require splitting the baseyard operation. Both conditions were determined to be unacceptable due to the hardship on the tenants and increased costs.
- The HECO-owned parcel located adjacent to Nimitz Highway and the Pier 31 backland area is suitably located and sized to accommodate the baseyard. However, the potential for acquisition is highly uncertain and the cost to acquire and develop baseyard facilities on the vacant parcel high.

6.2.7 Education/Research

Piers 8 to 10 – HPU

The HHMP recognizes HPU's continued use of the Aloha Tower Marketplace buildings at Piers 8 and 9, and portions of the Pier 10 shed, under long-term lease agreement with ATDC, as a campus facility. HPU's lease provides for the use of 840 parking stalls within the Aloha Tower complex, including ground-level stalls within Irwin Park, along Aloha Tower Drive and at Piers 5 and 6. The lease does not include submerged lands. HPU's building use areas are identified in **Figure 6.22**. Continued use and possible expansion of HPU campus facilities within the Aloha Tower complex is compatible with the public waterfront character of the area. Decisions regarding the use and/or redevelopment of landside areas between Piers 5 and 11 are under the jurisdiction of ATDC. The HHMP recommends that if HPU's educational use is expanded to other areas of the Aloha Tower complex, that educational programming and facility improvements include a maritime component that relates to Hawaiʻi's cultural and historic maritime achievements.

Pier 35 – UH Marine Center

The HHMP recognizes UH's exclusive landside use of Pier 35 for its Marine Center and research vessel operations under long-term lease with DOTH. UH's uses include berth, yard and building used for office, labs, workshop, and storage space. However, the submerged lands adjacent to the berth are not included in the lease; DOTH has the right to berth vessels at this pier under certain conditions. The UH Marine Center is contiguous and compatible with the maritime support service uses on the *mauka* areas of Piers 31 to 33. The HHMP does not identify any conditional shared uses nor recommend any changes to land use at Pier 35.

Figure 6.22 – HPU Use Areas at Aloha Tower Marketplace

6.2.8 Access and Circulation

Industrial land uses within Honolulu Harbor are generally secured and gated to prevent unauthorized public access, but there are limited public access areas for transactions such as cargo and vehicle pick-up and drop-off. Access points from public roadways control entry into secured areas of Honolulu Harbor. Restricted and controlled access to the cargo yards and maritime support areas require TWIC and MARSEC training. Areas that do not require this security are accessible by harbor tenants, employees and the public. The HHMP does not recommend changes to existing maritime industrial area access. Access to maritime industrial use areas is described in **Section 4.2.4**.

Honolulu Harbor's spread-out and generally linear configuration requires, for the most part, using public roadways to get from terminal to terminal. An internal roadway system is virtually non-existent, which creates safety and efficiency issues when transshipped cargo and drayed automobiles use public roadways to get from one terminal to another. There is one internal roadway in the harbor that connects two terminals—Piers 19 and 20 to Pier 29. However, this roadway which is mostly used to dray automobiles between the two terminals, winds between several sheds and industrial structures which creates safety, liability and cost concerns. The use of Piers 19 and 20 for RO/RO automobile carriers is expected to continue as an alternative to RO/RO/auto operations at Piers 31 to 33 in order to maintain flexibility in overall harbor operations (see **Section 6.2.1.1**). Development of automobile storage as part of the larger maritime center proposed for the Pier 23 area will eliminate the need to dray automobiles from the Pier 19-20 terminal for overflow storage at Pier 29 when the number of automobiles exceeds the capacity of the Pier 19-20 yard.

Circulation within each terminal will be determined by the terminal operators to best suit their operational needs. The HHMP recommends that cargo terminal operators provide adequate truck queuing capacity inside the terminals to reduce impacts to public roadways. For example, KCT, when completed in 2024, will have sufficient internal truck queuing lane capacity to prevent truck queuing on Sand Island Access Road. Further, KCT will allow for direct transfer of transshipped cargo between KCT and the Interisland Terminal, thus creating operational efficiencies while at the same time increasing safety and reducing congestion on public roadways. In addition, separate truck queuing lanes are being developed adjacent to Auiki Street as part of the KCT improvements. These lanes accommodate trucks accessing the Interisland Terminal from Auiki Street / Libby Street, primarily carrying transshipped cargo between Sand Island Terminal and the Interisland Terminal, thereby relieving those roads of truck congestion.

6.2.9 Layberth

All piers in Honolulu Harbor may be used for layberth purposes when not in active use by another vessel, except Piers 24 and 25. There are limited opportunities for the creation of new layberth in the harbor; however, the following locations provide an opportunity to add sufficient layberth to meet the projected layberth need of approximately 2,000 LF. See **Sections 5.6.3** and **7.9.1**.

- The HHMP recommends that the "Tyco Pier" at Sand Island be improved and used as a dedicated layberth (see **Figure 6.23**). The Tyco Pier landside area is expected to be brought under DLNR jurisdiction in the near future and will be unavailable for commercial maritime use; however, the waterside will come under DOTH jurisdiction when the current user's lease expires. The area is relatively protected by Sand Island and well-suited for dedicated layberth use. The existing 600 LF of berth provided by the pier and two mooring dolphins can be expanded to 1,200 LF with the addition of two more dolphins.

Figure 6.23 – "Tyco Pier" and Mooring Dolphins at *Mauka* Edge of Sand Island

- The HHMP recommends that currently undeveloped segments of Pier 38 near the Kapālama Canal outlet be improved and used for layberth and for temporary berths for commercial fishing vessels while offloading their catch or taking on provisions and fuel. These improvements would add up to 960 LF of new layberth.

In addition, improvements in the following locations will add additional layberth.

- Pier 18 is currently in dilapidated condition and not used for berthing. The HHMP recommends improving Pier 18 for use as a temporary berth for fishing vessel servicing and provisioning, and as layberth. The pier will restore 210 LF of berth for these uses (see **Section 7.4.1**).
- Piers 22 and 23 are currently underutilized as a berth and layberth due to subsurface rock outcroppings that prevent all but smaller, shallow-draft vessels from berthing. The HHMP recommends improving Piers 22 and 23 for use as an active berth by maritime support operators, and for layberth. Improvement of these piers will restore 835 LF of berth for these uses (see **Section 7.3.5**).

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7.0 DEVELOPMENT PLAN

This chapter presents an overview of recommended improvements that meet the planning objectives of the HHMP. These improvements will benefit Honolulu Harbor and support realization of the preferred land use plan presented in **Chapter 6.0**. In addition to recommended improvements, development constraints and maintenance recommendations are also provided.

7.1 Development Plan Overview

The HHMP recommends improvements that will enhance operational efficiencies, meet current and future maritime needs, are adaptive to changing conditions, optimize use of the Harbor's finite land resources, and balance competing needs and interests. Recommendations considered emerging technologies and cargo trends while ensuring resiliency in the face of natural and human-made disasters and climate change. Public access and waterfront development opportunities are also considered in non-secured locations. The HHMP recommends that harbor improvements be designed and developed according to the following guidelines:

- Plan and design all pier facilities to adapt to 3.2 FT of SLR by 2060 based on the *Hawai'i Sea Level Rise Vulnerability and Adaptation Report* (Hawai'i Climate Change Mitigation and Adaptation Commission, 2017). See **Figure 7.1**. For individual pier height SLR elevation calculations see **Appendix M**.
    - Continue to monitor the latest scientific recommendations for climate change and SLR projections. As needed, revise planning and design assumptions to reflect the most current scientific projections for climate change and SLR to ensure harbor infrastructure is adaptive to rapidly changing environmental conditions.

- Consider standardizing pier deck heights based on a minimum and maximum design freeboard according to the operational requirements of various vessel types. See **Figure 7.2** and **Table 7.1.** The maximum pier freeboard is the maximum allowable height of the exposed pier face at low tide (measured as mean lower-low water [MLLW]).[31] For reference, MLLW is the standard used by the USACE and mariners for determining elevations of

[31] MLLW refers to the average height of the lowest tide recorded at a tide station each day during the recording period. For harbor planning purposes, MLLW establishes the average lowest level of the water surface at the berth face to determine the maximum amount of freeboard between the water surface and pier deck height. MLLW differs from MSL, which is a calculated measurement of the sea level halfway between the mean levels of high and low water. MSL is typically used as a basis for calculating the elevation of land-based objects and altitude of aircraft. MHHW refers to the average height of the highest tide recorded at a tide station each day during the recording period. In Honolulu Harbor, MHHW is approximately +1.9 FT above MLLW. For planning purposes, it can be used similarly to MLLW.

maritime facilities and navigational features. Standard pier deck heights may be applied throughout the statewide commercial harbors system; however, standardized pier heights also require standardized vessel design. The minimum pier freeboard is minimum required height of the exposed pier face at high tide (measured as mean higher-high water [MHHW]).

Figure 7.1 – Proposed Minimum Pier Deck Heights to Account for SLR

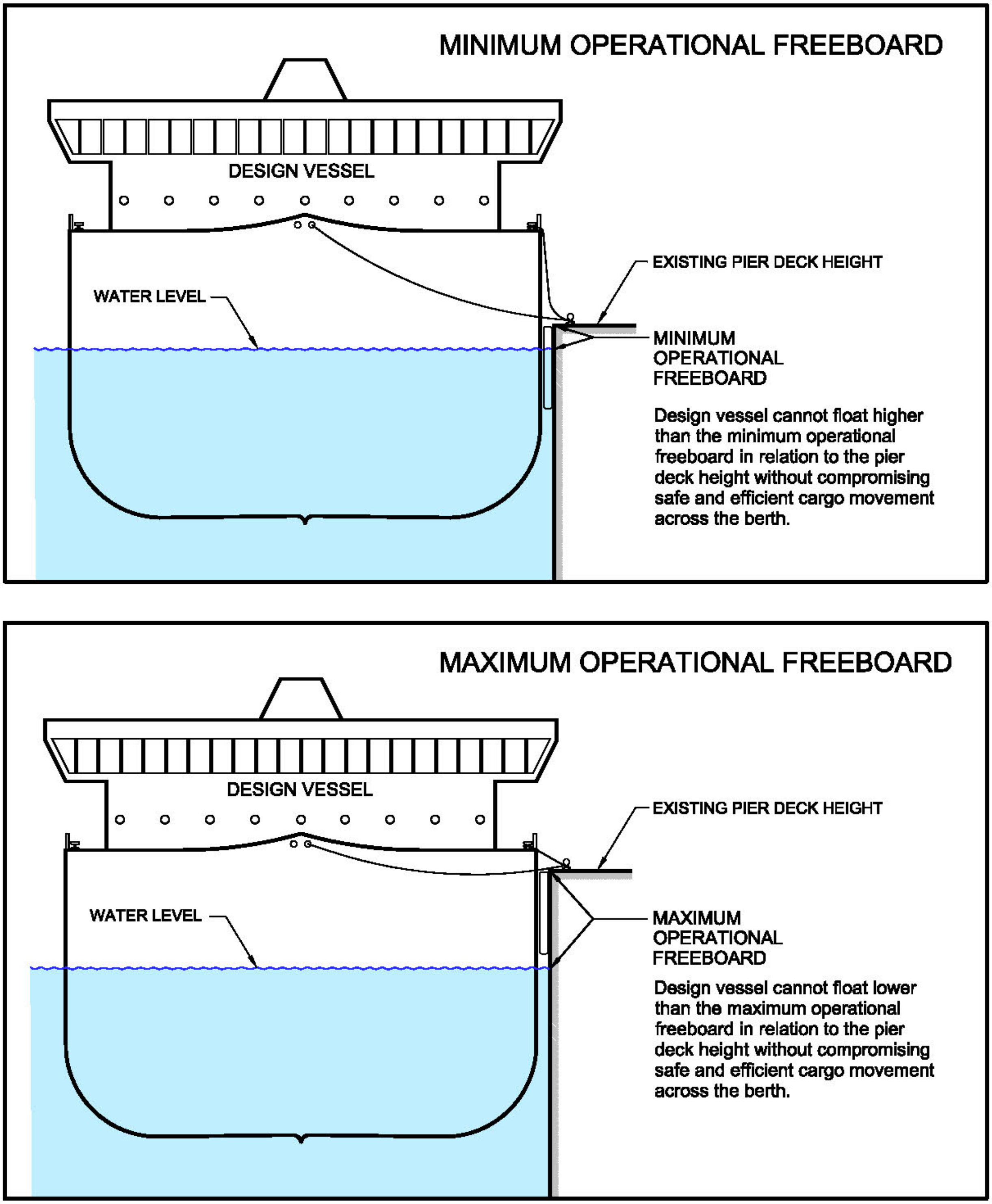

Figure 7.2 –Minimum and Maximum Operational Freeboard

Table 7.1 – Minimum and Maximum Pier Heights by Vessel Type

Type of Vessel / Operations	Minimum Pier Freeboard	Maximum Pier Freeboard
Barge (Roll-On / Roll-Off [RO/RO])	6	10
Barge (Pass-Pass)	6	12
Bulk Carrier	6	15
Container	6	15
Cruise	5	10
Fishing / Workboats	3	8
Tanker	6	15
Tugs	3	9

- Raise the pier deck heights at the various piers as necessary to accommodate 3.2 FT SLR by 2060 while maintaining the minimum operational freeboard based on the design vessels that operate at the particular piers. At various locations around the harbor the HHMP recommends raising the entire pier apron and yard area, while at other piers the HHMP recommends raising just the pier apron only and/or a portion of the yard while leaving the majority of the yard area at its existing elevation. During the design phase, harbor facility planners/designers will properly design SLR modifications to the operational/yard areas to match the pier modifications and/or equipment modifications.
    - At the Piers 1 and 2 multi-purpose cargo terminal, the HHMP recommends raising the entire pier apron and yard to support the terminal's designation as the primary resiliency pier (See **Section 6.2.1.3**). Raising the entire yard area will reduce the risk of flooding following a storm event and thereby improve the piers' function as a post-disaster emergency staging area.
    - At the Piers 39 to 40 Interisland Terminal, the HHMP recommends raising the piers and the adjacent yard area while keeping the majority of the yard and backland areas at their existing elevation. Raising a portion of the yard improves the function of the areas immediately adjacent to the unique finger-pier configuration at this cargo terminal, whereas the other cargo terminals in the harbor have a straight pier configuration and thus can be served by a raised apron only.

Where the HHMP recommends raised aprons, the proposed width of the apron varies based on the pier use and facility characteristics, as listed in **Table 7.2.**

Table 7.2 – Proposed Raised Apron Widths

Pier Number	Use	Raised Apron Width (FT)
2	Cruise Terminal, Layberth	20
8 to 11	Cruise Terminal, Day Excursion Operations, Work Boats, Layberth	16
24 to 29A	Maritime Support Services, Work Boats, Layberth	20
29, 31 to 33	Multi-purpose Cargo Operations, Layberth	100
51 to 53	Multi-purpose Cargo Operations, Layberth	120 [1]

[1] Raised apron width based on width of gantry crane rail corridor.

- As an interim alternative to raising the pier aprons and yards, the installation of raised mooring dolphins at the pier face might be used to allow large cargo vessels to securely berth against the pier when less than the minimum design freeboard is available. The available freeboard at the pier is one variable that works together with other factors, such as vessel loads, trim, ballast and hull design, that affect ship stability at berth. Raised mooring dolphins provide elevated points of contact against which to stabilize a berthed vessel when there is less than the desired pier face freeboard. A raised mooring system could potentially solve one of two major challenges to cargo terminal operations caused by SLR, that is the ability to safely moor a large cargo vessel and conduct operations across the berth. However, it does not resolve the second challenge, which is the inevitable increase in inundation of the pier and yard by wind and wave-driven seawater overtopping the pier deck as SLR reduces the pier face freeboard. In addition, vessel movement at the berth, from the play in the ship's mooring tensioning system, displaces water that increasingly will overtop the pier deck as the pier face freeboard diminishes. Thus, the raised mooring system concept only buys time before pier deck and yard flooding caused by reduced freeboard will need to be addressed by a raised apron or seawater barrier of some sort (raised edge, curb or bull rail at the pier face). Equipment operations across the berth, including the secure placement of ship ramps on the apron, maximum ramp slopes for safe RO/RO operations, gantry crane tolerances, as well as crew gangway configurations, will also factor into the design, and limits, of a raised mooring system.
- Use adaptive design principles and routine hazard assessments to prioritize and program facility upgrades and improvements.
- Design harbor facilities for flexible use to accommodate a variety of operational needs and future adaptation and resiliency upgrades.

- Work with maritime operators to develop design solutions to ensure that pier modifications are compatible with vessel operations and equipment. For example, raising the piers will affect the placement of RO/RO ramps and tolerances for safe RO/RO operations. Raised piers, fendering, bollards, rail systems and aprons will need to be designed in concert with vessel and ramp design and mobile equipment operating parameters. Establishing standard pier heights throughout the State's commercial harbors system can also contribute to more efficient harbor operations and assist in long-range planning for vessel design. Standard pier heights will also help vessel operators plan for loading and ballast requirements and could help minimize the need for ballast water exchange within the harbors.
- Upgrade and modernize harbor facility structures and infrastructure, including replace pile-supported deck structures with sheet pile/bulkhead construction that is more resilient against damage from waves, storms and scouring from vessel propulsion systems. With rising sea levels, the underside of pile-supported decks and associated infrastructure is more difficult to access and maintain as well as being more vulnerable to damage from storms and wave surge. Also, improve fendering systems, strengthen bollards, improve lighting systems, and provide necessary utilities according to the particular pier use.

7.2 Cargo Terminals

Cargo terminals include multi-purpose cargo terminals at Piers 1 and 2, 19 and 20, 29, and 31 to 34 and non-exclusive dedicated-use terminals at Piers 39 to 40 (Interisland Terminal), 41 to 43 (KCT), 51 to 53 (Sand Island Terminal), and 60 (bulk-cargo / aggregate terminal). The HHMP recommends major improvements and/or reconstruction at all these piers over the 30-year planning horizon. In addition to proposed harbor-wide adaptations to climate change and SLR, recommended cargo terminal improvements are focused on creating multi-purpose, open-yard facilities that accommodate a variety of cargo operations and that are adaptable for other maritime uses to allow DOTH the greatest flexibility and efficiency in managing vessel movements and operations in the harbor. **Table 7.3** provides a summary of major improvements recommended for the Cargo Terminals. See also **Appendix I** for a detailed description of recommended improvements.

Table 7.3 – Summary of Cargo Terminal Improvements

Pier No.	Facilities and Operations	Major Improvements
1 to 2A	Fort Armstrong Terminal: General Cargo, Containers, Automobiles	• Modernize and strengthen the terminal for use as a multi-purpose cargo terminal and primary resiliency pier. • Reconstruct and raise pier and yard to adapt to 3.2-FT SLR by 2060. • Cut back the pier face to fast land (approx. 75 FT) and reconstruct with sheet pile/bulkhead pier. Shift the Pier 2A knuckle *mauka*. • Improve fendering and replace bollards with 100-ton bollards. • Repave yard with concrete and construct heavy lift pads. • Install reinforced utility conduit. • Reallocate a portion of Pier 2A cargo yard to the cruise terminal for ground transportation staging and circulation. • Negotiate to acquire use of the 5-acre OHA parcel and HCDA remnant strip to expand terminal area.
19	General Cargo, RO/RO, Maritime Support Services, Warehouse Sheds, Ferry Building	• Modernize the terminal for use as a multi-purpose cargo terminal. • Reconstruct and raise pier, apron, and yard to adapt to 3.2-FT SLR by 2060. • Improve fendering and replace bollards with 100-ton bollards. • Strengthen yard pavement. • (Near Term) Relocate DOTH Oʻahu District Base Yard to interim location at Pier 19. Renovate shed and ferry building for Oʻahu District use. • (Long Term) Demolish shed and ferry building to create an open yard. • Integrate cargo terminal with proposed Pier 23 maritime center structure.
20	General Cargo, RO/RO	• Modernize the terminal for use as a multi-purpose cargo terminal. • Reconstruct and raise pier, apron, and yard to adapt to 3.2-FT SLR by 2060. • Improve fendering and replace bollards with 100-ton bollards. • Strengthen yard pavement.
29	General Cargo / RO/RO, Layberth	• Modernize the terminal for use as a multi-purpose cargo terminal.

Pier No.	Facilities and Operations	Major Improvements
		• Reconstruct Pier 29 pier and apron, including infilling pier "notch". • Construct 100-FT wide raised apron to adapt to 3.2-FT SLR by 2060. • Improve fendering and replace bollards with 100-ton bollards. • Improve truck access to/from cargo pier.
31 to 34	General Cargo / RO/RO, Layberth	• Modernize the terminal for use as a multi-purpose cargo terminal. • Cut back the pier face to fast land (minimum 30 FT) and reconstruct with sheet pile/bulkhead pier. • Construct 100-FT wide raised apron to adapt to 3.2-FT SLR by 2060. • Improve fendering and replace bollards with 100-ton bollards. • Strengthen yard pavement. • Improve vehicle access and circulation. • Acquire DOTA parcel (HFS) to expand terminal.
39 to 40	Interisland Terminal: Containers, RO/RO, Automobiles, Break-Bulk	• Modernize Interisland Terminal for tug-and-barge cargo operations. • Balance berth and yard (yard-constrained) by expanding yard area and improving efficiency of yard operations. • Reconstruct and strengthen piers using sheet pile/bulkhead construction. • Fill in 0.75-acres of the Piers 39 and 40 slipway. • Raise piers and adjacent yard area to adapt to 3.2-FT SLR by 2060. Keep backland yard areas at existing elevation. • Improve fendering and replace bollards with 100-ton bollards. • Strengthen and repave yard with concrete. • Raise and strengthen revetment by Kapālama Canal outlet. • Upgrade infrastructure (power for refrigerated containers and lighting). • Relocate buildings toward the perimeter of the yard or off-site. • Improve traffic circulation (e.g., new Libby Street Driveway entrance and internalize truck queueing).

Pier No.	Facilities and Operations	Major Improvements
41 to 43	KCT	• Complete terminal modernization for use as a dedicated, non-exclusive container cargo terminal and fuel manifold terminal • Balance berth and yard (yard-constrained) by densifying container storage and improving efficiency of yard operations. • Monitor rate of SLR and, if necessary consider raising pier apron / gantry track corridor to adapt to 3.2 FT SLR by 2060.
51 to 53	Sand Island Container Terminal: Containers, RO/RO, Automobiles, Fuel Manifold	• Modernize the terminal for use as a dedicated, non-exclusive container cargo terminal and fuel manifold terminal • Balance berth and yard (berth-constrained) by improving efficiency of movements across the berth or by adding gantry crane(s). • Construct 120-FT wide raised apron (gantry track corridor) to adapt to 3.2-FT SLR by 2060. Keep backland yard areas at their current elevation. • Improve fendering and replace bollards with 100-ton bollards. • Strengthen and repave yard. Use concrete pavement for grounded container operations. • Install hydro-dynamic separators to treat drainage from the yard. • Improve truck gates to internalize truck queuing within the terminal. • Relocate buildings toward the perimeter of the yard or off-site.
60	Bulk Aggregate	• Modernize the terminal for use as a bulk cargo aggregate terminal. • Reconstruct the pier, apron and yard area. • Improve fendering and bollards. • Repave aggregate storage yard with concrete (HC&D lease area). • Raise the pier, apron and yard to adapt to 3.2-FT SLR by 2060. • Raise and pave backland areas to adapt to 3.2-FT SLR by 2060. • Redevelop backland areas for storage and/or industrial use. Consider PPP agreement for redevelopment. • Create new, direct street access from Pahounui Drive to the pier and backland areas.

7.2.1 Piers 1A, 1B and 2A Multi-Purpose Cargo Terminal (Fort Armstrong Terminal)

The HHMP recommends the Piers 1A, 1B and 2A cargo terminal be reconstructed to continue to serve as a multi-purpose cargo terminal and as a priority resiliency / emergency staging pier. Associated pier improvements would make the terminal more resilient to impacts from natural and man-made disasters and equipped to support emergency relief operations. The terminal is exposed to southern swells, which can affect routine vessel operations at the berth, primarily during the summer months, and which over time impact the condition of the pier; the pier routinely requires repairs to blow-out plates in the deck that are designed to release wave energy pressure and minimize damage to the pier and deck structure. In 2021, DOTH assessed Pier 1 as 'Fair' and Pier 2 as 'Poor',[32] with a recommendation that Piers 1B and 2 be repaired with moderate urgency. This assessment supports the HHMP recommendation for reconstruction of these piers over the 30-year HHMP planning horizon using more durable sheet pile/bulkhead construction with wave energy dampening design. When KCT operations begin in 2024, Piers 1 and 2 will serve primarily as a non-exclusive multi-purpose cargo pier. Cargo operations that are not relocated to KCT can be directed to Piers 19 and 20, Pier 29 or Piers 31 to 33, thus providing an opportunity to take Piers 1 and 2 out of service to undertake phased reconstruction without constraining cargo operations in Honolulu Harbor.

The HHMP recommends that planning and design for the pier reconstruction consider cutting back the pier face to the existing fast land. This would serve two purposes: 1) it would effectively widen the Main Entrance Channel adjacent to the terminal and reduce encroachment into the entrance channel navigation corridor by cargo and/or cruise vessels berthed at Pier 1 that are being serviced by a fuel barge; and 2) it would reduce the quantity and associated costs of fill material that would be required to backfill behind a new, solid pier face. See **Section 7.5.1.2** for additional discussion on the use of the Pier 1 for cruise vessel operations. The HHMP further recommends that improvements to Piers 1 and 2 be designed and undertaken to accommodate a possible additional dedicated cargo terminal operator in Honolulu Harbor. Dedicated, non-exclusive use of the Piers 1 and 2 terminal by a new cargo carrier creates opportunity for PPPs in harbor facilities and fosters market competition among maritime operators that would benefit the residents of Hawaiʻi.

The HHMP recommends the following improvements to Piers 1A, 1B and 2A (see **Figure 7.3**).

- Raise the pier deck and yard height as necessary to account for SLR of 3.2 FT by 2060 while maintaining a minimum operational freeboard of 6 FT to accommodate a full range of cargo vessels, barges and RO/RO vessel:

[32] Conditions Assessment Study of Harbor Waterfront Structures, DOTH, October 2021.

- Alternative 1 - Raise the entire pier, yard and interior land areas as necessary.
- Alternative 2 – Construct a 100-FT wide raised apron at the edge of the pier to form a "sea wall" at the pier face to adapt to projected SLR. Keep the landside areas at their current height behind the sea wall to minimize the costs of filling and raising the yards. Install motor vehicle access ramps onto the raised apron.

- As an interim measure to address SLR, consider installing a mooring structure, fendering pylon or other mooring system along the full length of Piers 1 and 2 to raise the mooring height freeboard to allow vessels to safely berth and conduct cargo operations with SLR and during extreme high tides. See discussion on elevated mooring systems in **Section 7.1**.

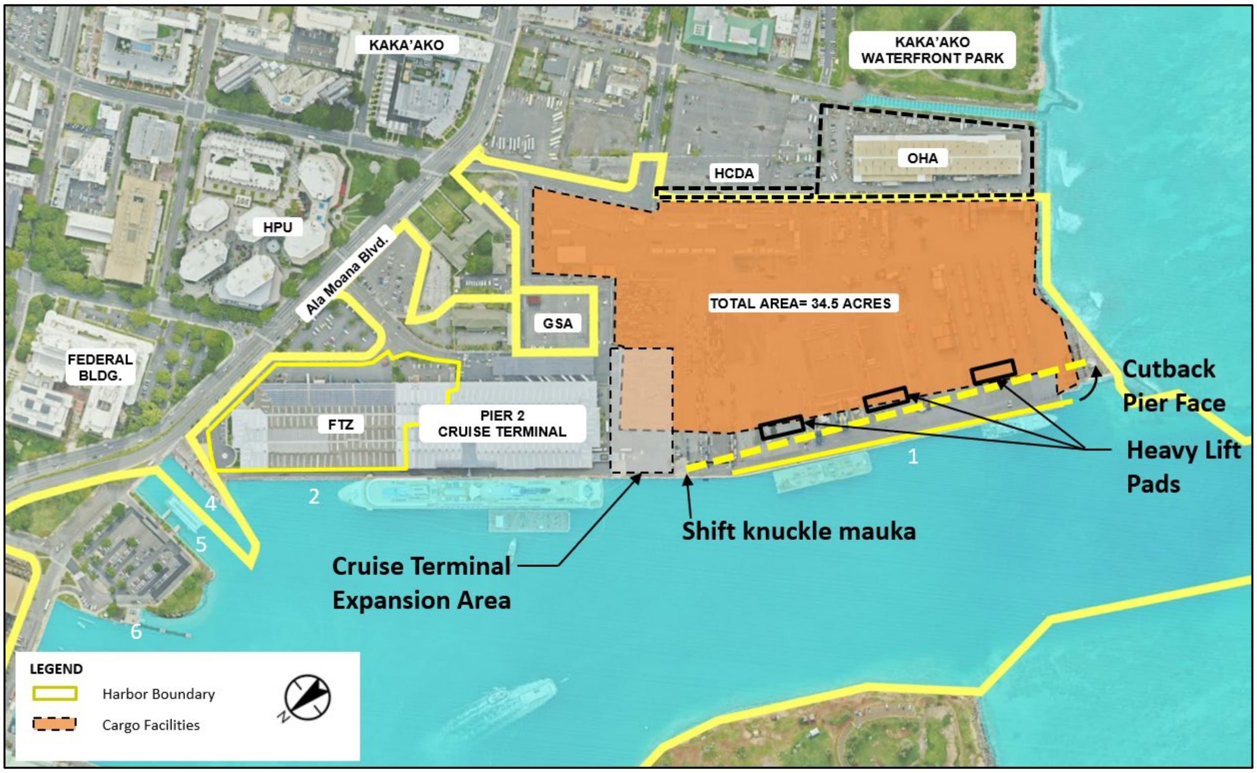

Figure 7.3 – Piers 1 and 2 Multi-Purpose Cargo Terminal Improvements

- Reconstruct and strengthen Piers 1 and 2 using sheet pile/bulkhead design. Consider incorporating wave dampening measures such as textured or perforated pier-wall surfaces to diffuse wave energy from south wells and storm surge. **Figure 7.4** illustrates a design concept for diffusing wave energy using a typical bulkhead pier constructed with baffles that create friction designed to reduce wave velocity. **Figure 7.5** illustrates a Jarlan-type[33] sea wall that uses a perforated face wall with openings that let wave energy and water pass through, behind which is a void/energy dampening space with circulating water followed by the solid wall of the bulkhead.

- Consider cutting back the face of Piers 1A and 1B to fast land (approximately 75 LF in from existing pier face) and shift the knuckle between Piers 1B and 2A *mauka* to create more pier side berthing space outside of the Main Entrance Channel navigation corridor.
- Reconstruct Piers 1A, 1B and 2A yards, which are paved with asphaltic concrete and are in poor condition. Replace the yard surface with concrete to accommodate heavy-lift operations.
- Modify yard grades and upsize the existing drain lines to address ponding and flooding in the cargo terminal yard.
- Install heavy-lift pads for mobile cranes and RO/RO ramps to support cargo operations and emergency relief efforts in the terminal's role as the designated primary resiliency pier. Consider 2,000 PSF concrete mixture for heavy-lift pads.
- Install reinforced utility conduit systems that can withstand the design storm (Category 5 hurricane) and allow for rapid restoration of power, communications, and water to support the pier's function as a resiliency pier.
- Negotiate with the OHA for mutually agreeable use of the 5-acre parcel, located just Diamond Head of Pier 1 (currently used by Re-Use Hawaiʻi and as a homeless shelter), to expand the Pier 1 yard area.
- Acquire from HCDA the vacant, remnant strip of land adjacent to the Piers 1 and 2 terminal entry gate. Acquisition of this parcel will allow DOTH to expand the Piers 1 and 2 gate facilities to add an additional lane and/or provide better utility access, buffer and security from adjacent lands in Kakaʻako that are outside of the secured area.

[33] The Jarlan-type sea wall was invented by Gerard Eugene Jarlan in 1964 and is the basis for a variety of sea wall designs used throughout the world that feature a perforated wall.

Figure 7.4 – Wave Dampening Design Concept
(Source: EngineeringCivil.org, 2018)

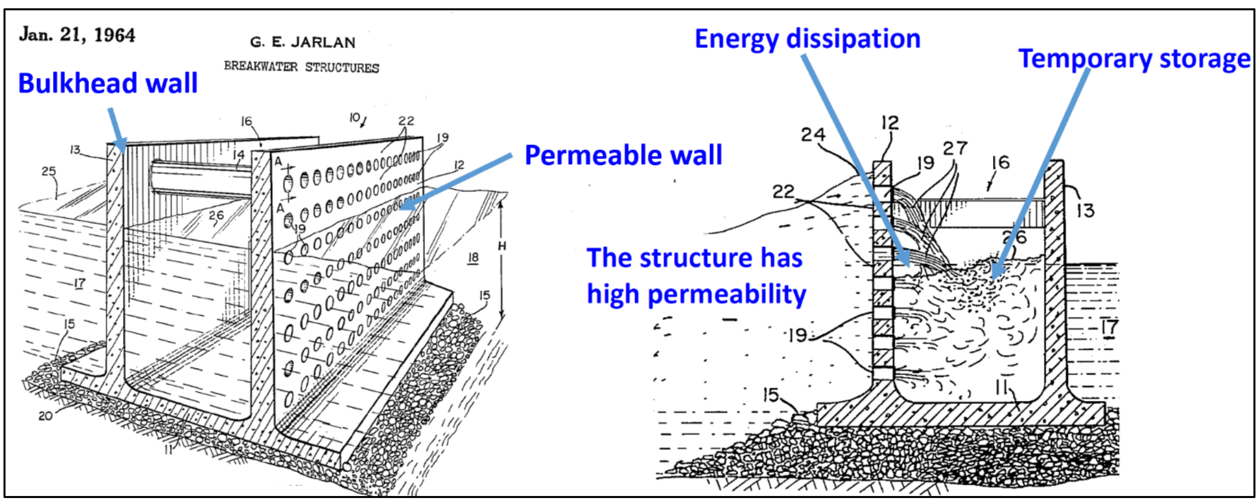

Figure 7.5 – Jarlan-Type Perforated Breakwater Structures

7.2.2 Piers 19 and 20 Multi-Purpose Cargo Terminal Modernization

The HHMP recommends modernizing and strengthening Piers 19 and 20 to serve as a flexible, multi-purpose cargo terminal able to accommodate automobile RO/RO and specialized project cargo operations, and to serve as a secondary resiliency pier, layberth and contingency pier for cruise vessels (see **Figure 7.6**). In the near-term, the HHMP recommends that the existing Pier 19 shed and former SuperFerry Terminal be repurposed to house the DOTH Oahu District Baseyard (see **Section 6.2.6**). In the long-term, as demand for cargo terminal space increases, the HHMP recommends that these buildings be removed to create an open yard integrated with a future, multi-story maritime center (see **Section 7.3.6** for description of proposed maritime center).

Figure 7.6 – Piers 19 and 20 Multi-Purpose Cargo Terminal Improvements

The Piers 19 and 20 berth is susceptible to sediment build-up from the nearby outfall of Nuʻuanu Stream, which in the past has periodically reduced the operational water depth and required automobile carrier vessels to berth and discharge vehicles elsewhere in the harbor. Routine hydrographic survey and dredging by DOTH will ensure that the pier remains available to the full range of RO/RO vessels at the full controlling water depth of the pier.

The HHMP recommends the following specific improvements to Piers 19 and 20:

- Reconstruct and strengthen the pier, apron and yard using sheet pile/bulkhead construction. Pave the yard with concrete where heavy equipment and special cargos will be staged. Pave the yard with asphalt where it will be used for automobile storage.
- Raise the pier deck and yard height as necessary to account for SLR of 3.2 FT by 2060 while maintaining a minimum operational freeboard of 6 FT to accommodate a full range of cargo vessels, barges and RO/RO vessels. Raise the entire yard area rather than constructing a raised apron due to the relatively small size and lack of yard depth at this terminal.
    - If, at the time that DOTH undertakes reconstruction of Piers 19 and 20, the Pier 19 shed, Superferry building and backland area are being used by the Oʻahu District for baseyard operations, consider raising the Pier 19 apron and Pier 20 apron and yard concurrently and postponing work on the Pier 19 yard and backland areas. Alternately, consider raising Piers 19 and 20 in separate phases. See **Section 6.2.1.1**.
- Improve fendering and bollards.
- Relocate DOTH Oʻahu District Baseyard when a permanent location becomes available and/or cargo demand increases such that Pier 19 is required to meet the demand.
- Demolish the Pier 19 shed and SuperFerry Terminal to create an open yard for multi-purpose cargo operations and resiliency pier use.
- Phase demolition as existing buildings lose their utility to support maritime needs.
- Improve newly-opened yard for cargo operations.

7.2.3 Pier 29 Multi-Purpose Cargo Terminal Improvements

The HHMP recommends modernizing Pier 29 to serve as a flexible, multi-purpose cargo terminal, layberth and secondary resiliency pier. The existing Pier 29 yard was reconstructed and strengthened with concrete in 2012 and provides approximately 11 acres of open space suitable for flexible cargo operations (container, RO/RO, special cargo, neo-bulk). However, the apron was not improved at that time. The apron also has an unimproved notch with dimensions of approximately 150 FT long by 50 FT wide that diminishes the function of the pier. In 2021, DOTH assessed the Pier 29 apron condition as ‘Poor’ with a recommendation that the pier be repaired with moderate urgency. This assessment supports the HHMP recommendation for reconstruction of the apron, including filling the unimproved notch and using more durable sheet pile/bulkhead construction. See **Figure 7.7**.

The HHMP recommends the following specific improvements to Pier 29:

- Reconstruct and strengthen the pier face and apron up to the recently reconstructed yard (2012). Reconstructed apron should be able to accommodate heavy lift equipment to increase the utility of the pier and serve its function as a resiliency pier.
- Fill the notch in the apron as part of the pier reconstruction.

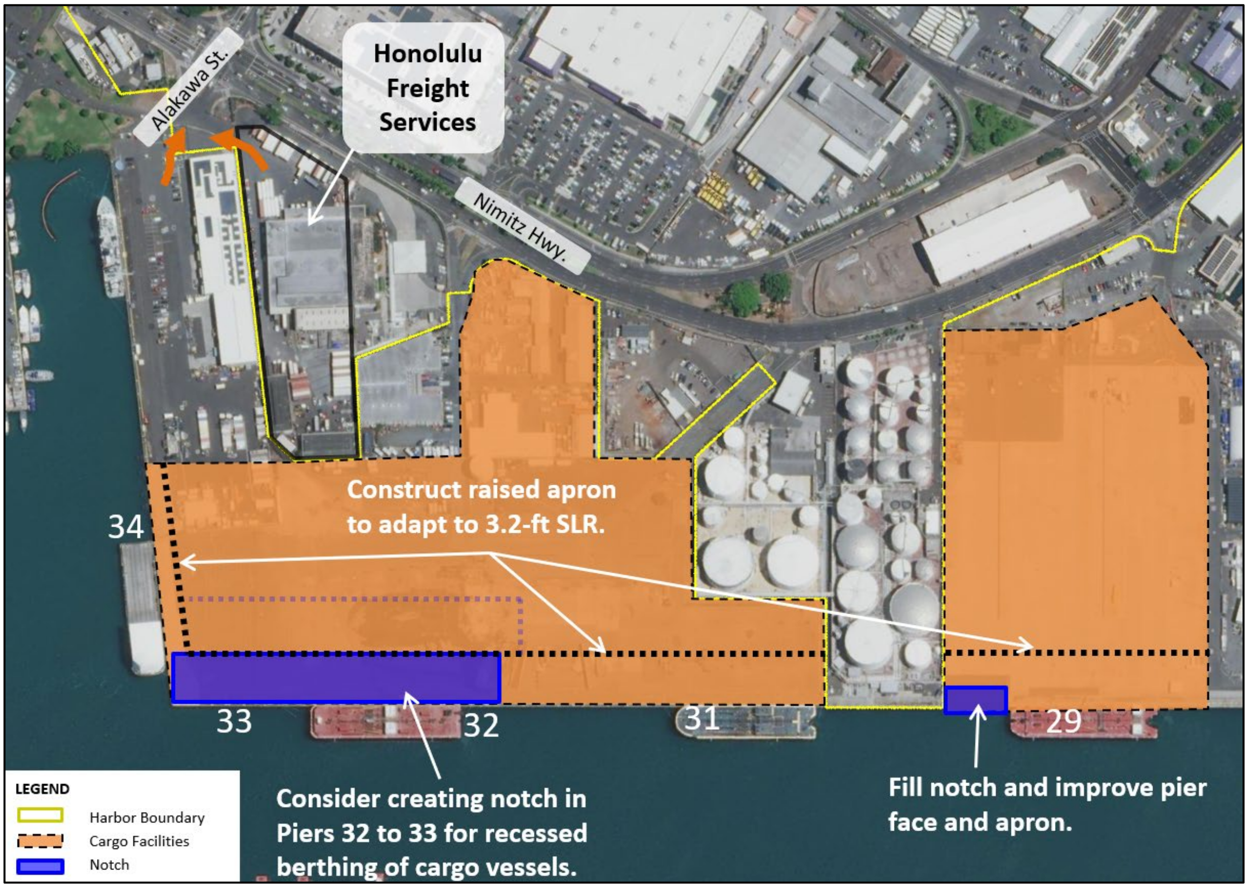

Figure 7.7 – Piers 29 and 31 to 34 Multi-Purpose Cargo Terminal Improvements

- Construct a 100-FT wide raised apron at the edge of the pier to form a "sea wall" at the pier face to adapt to projected SLR. Keep the landside areas at their current height behind the sea wall to minimize the costs of filling and raising the yards. Install motor vehicle access ramps onto the raised apron.
- Re-authorize and reconstruct the east-bound Nimitz Highway exit lane with connection to the Pacific Street intersection and access to Piers 27 to 29. Note: This project is currently in progress.
- At the Pacific Street exit, restrict container trucks leaving Pier 29 to right-out only to avoid causing congestion at the Pacific Street intersections and on the short segment of Pacific Street between east-bound and west-bound Nimitz Highway.

7.2.4 Piers 31 to 34 Multi-Purpose Cargo Terminal Modernization

The HHMP recommends modernizing Piers 31 to 33 to serve as an open, multi-purpose cargo terminal, layberth and secondary resiliency pier. DOTH has been enhancing this utility in recent years by making gradual improvements to the terminal, including demolishing and clearing the shed and repaving portions of the yard with asphalt. Construction of new comfort stations are also planned.

The removal of the Piers 31 and 32 sheds in 2020 created a largely unobstructed open yard of approximately 16 acres, which is capable of storing automobiles from approximately three auto-carrier vessels (up to 1,200 automobiles per vessel). This allows automobile-carriers to discharge their full manifest at one terminal, if desired, and take advantage of the full duration of free-time storage without having to remove their inventory to make room for a subsequent vessel.

Future improvements may expand the yard area by removing aging warehouse structures in the adjacent maritime support service areas and improve internal driveway access to the signalized intersection at Alakawa Street, which would facilitate direct, west-bound left-turn movements out of the terminal.

In the long-term, SLR is diminishing clearance and reducing access under the piers required for inspection, maintenance and repair work, which might compel DOTH to reconstruct Piers 31 to 33 and cut the piers back to fast land. This presents an opportunity to widen the channel and improve navigation. See **Figure 7.7** and **Section 8.1.2.**

The HHMP recommends the following specific improvements to Piers 31 to 34:

- Reconstruct the pier, apron and yard:
    - Create a notch for vessel berthing to reduce encroachment into the Kapālama Transit Channel, thus increasing navigational safety. Create notch by cutting back the pier face, at a minimum to existing fast land (approximately 30 FT inland from existing pier face) and replace pile-supported deck with sheet pile/bulkhead. The dimensions of the cut back area will be determined during design.
    - Improve fendering and bollards.
    - Strengthen the pier and yard surfaces to accommodate heavy-lift equipment.
- Raise the pier deck and yard height as necessary to account for SLR of 3.2 FT by 2060 while maintaining a minimum operational freeboard of 6 FT to accommodate a full range of cargo vessels, barges and RO/RO vessels:
    - Alternative 1 - Raise the entire pier, yard and interior land areas as necessary.
    - Alternative 2 – Construct a 100-FT wide raised apron at the edge of the pier to form a “sea wall” at the pier face to adapt to projected SLR. Keep the landside areas at their

current height behind the sea wall to minimize the costs of filling and raising the yards. Install motor vehicle access ramps onto the raised apron.

- Replace and upsize the existing 4-FT wide by 3-FT deep box culvert located between Nimitz Highway and the 12-FT wide by 4-FT deep box culvert beneath Pier 35 to eliminate the drainage "choke point" at this location.
- As an interim measure, consider installing a mooring structure, fendering pylon or other mooring system along the full length of Piers 31 to 34 to raise the mooring height freeboard to allow vessels to safely berth and conduct cargo operations with SLR and during extreme high tides. See discussion regarding raised mooring systems in **Section 7.1**.
- Acquire the DOTA parcel (HFS) *mauka* of Pier 33 for eventual expansion of the Pier 33 yard area, and to improve internal circulation and create direct access to the Alakawa Street and Nimitz Highway intersection. A new internal access driveway from Piers 31 to 33 to the signalized intersection will allow for full, signalized turning movements onto Nimitz Highway.

7.2.5 Piers 39 to 40 Interisland Terminal Modernization

The HHMP recommends reconstructing, strengthening and modernizing the Interisland Terminal to serve as a dedicated cargo terminal for exclusive use by the interisland cargo operator, Young Brothers. The terminal will also serve as layberth for interisland cargo tugboats and barges.

The Interisland Terminal yard area is constrained and requires Young Brothers to conduct a 100 percent grounded container operation. The HHMP recommends expanding the area available for cargo operations through a combination of pier strengthening, operational changes, terminal reconfiguration, and yard expansion by infilling a portion of the Pier 39 and 40 slipway.

In 2021, DOTH assessed the Piers 39 and 40 condition as 'Fair' with a recommendation that the piers be improved after those rated as 'Serious' or 'Poor'. However, the terminal operator cannot fully utilize the extent of the existing piers because only portions of the piers are strengthened to support the heavy top-pick equipment used to move and stack containers. Strengthening the full extent of the pier will expand the terminal capacity and enhance operational efficiency by allowing heavy equipment to work the full length of the berthed barges. The HHMP therefore recommends prioritizing reconstruction of Piers 39 and 40 in the near-term. See **Chapter 9** for additional discussion.

The HHMP recommends the following specific improvements to the Interisland Terminal (see **Figure 7.8**):

- Reconstruct, raise and strengthen Piers 39 to 41 to the full extent of the pier using sheet pile bulkhead construction to accommodate modern barge operations and to adapt to 3.2 FT SLR by 2060 while maintaining a minimum design freeboard of 6 FT for tugboats and barges.

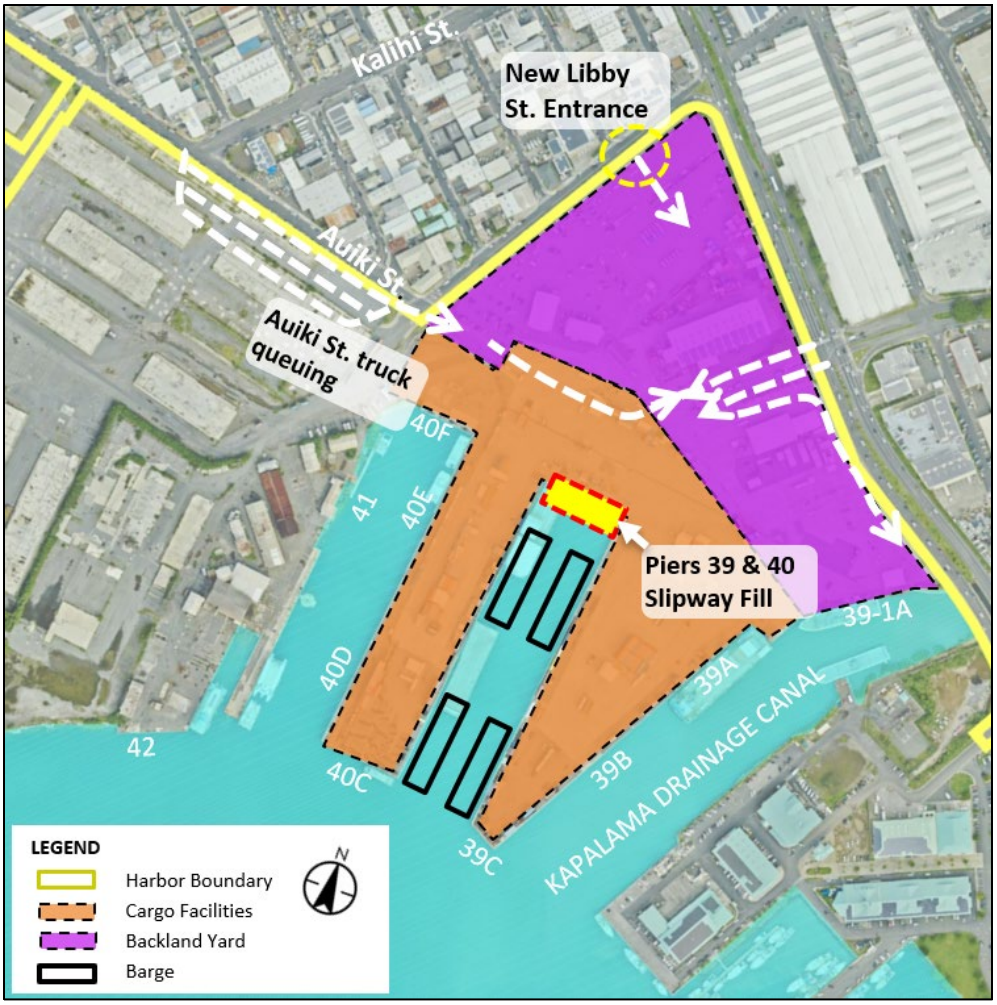

Figure 7.8 – Proposed Interisland Terminal Improvements

- Replace pavement with concrete to accommodate heavy-lift operations.
- Provide power for refrigerated containers.
- Provide lighting.
- Improve fendering and bollards.

- Fill in approximately 0.75 acres of the Piers 39 and 40 slipway to expand the yard area. Retain sufficient berthing within the slipway to accommodate two barges on each side.
- Reconstruct, raise and strengthen the revetment at the Kapālama Canal outlet near Pier 39-1A for SLR, resiliency and terminal function.

The HHMP recognizes that Young Brothers' interisland cargo operations will be significantly impacted during redevelopment of Piers 39 and 40 and recommends that DOTH assign Pier 41 and contiguous yard areas for Young Brothers' use during interisland terminal reconstruction. This will benefit interisland cargo service by minimizing disruptions to Young Brothers' cargo operations and avoiding costs of conducting split operations which could affect neighbor island consumers. In the long term, Pier 41 will continue to be used for interisland barge operations; however, DOTH will assign use of Pier 41 to an operator(s) based on the needs of the harbor and the best interest of the State of Hawaiʻi and its residents.

The HHMP recommends the following backland yard improvements:

- Raise the yard height as necessary. Consider two alternatives:
    - Alternative 1 – Raise the entire yard to match the pier height.
    - Alternative 2 – Raise the portion of the yard adjacent to the piers to match the pier height and leave the *mauka* areas of the terminal (maintenance building, office buildings and public interface areas) at existing grade.
- Relocate existing buildings located at the center of the Interisland Terminal yard to the perimeter of the yard or off-site location to increase yard capacity and improve operations.
- Balance the berth and yard by increasing yard capacity. Yard capacity could be increased by increasing yard density (stacking containers higher); relocating buildings and structures, administrative operations and public interface activities to the perimeter of the terminal or an offsite location to improve yard utilization and operational efficiency; and infilling portions of the slipway to create more yard area.

The HHMP recommends the following operational improvements be considered by Young Brothers:

- Relocate LCL and/or livestock operations to an offsite location to open up yard area for container cargo. LCL and livestock operations involve public interface that might be more efficiently handled in a less congested, offsite location.
- Create a new driveway entrance on Libby Street to non-secured areas of the terminal for staff and customer traffic.
- Internalize truck queuing to mitigate traffic impacts on public roadways, including the Nimitz Highway and Waiakamilo Road intersection. Utilize roadway storage lanes parallel to Auiki Street as part of the KCT improvements. These lanes are located outside of the KCT secure area and are used primarily by trucks moving transshipped cargos between the Interisland Terminal and the Piers 1 and 2 Cargo Terminal and Sand Island Terminal. Transshipped cargo moving between KCT and the Interisland Terminal will use the pass/pass area internal to KCT and adjacent to Pier 41.
- Consider one-way in and one-way out vehicle circulation through the terminal to reduce congestion and queuing.

7.2.6 Piers 41-43 KCT SLR Adaptation

The KCT is designated as a dedicated, non-exclusive containerized cargo terminal and fuel manifold terminal. The terminal is designed with pier deck and yard heights that account for projected SLR based on current State SLR guidelines. Although the KCT improvements are designed to meet operational requirements beyond the HHMP 2050 planning period, including adaptation to projected SLR, the HHMP recommends that routine hazard assessments be conducted, including periodic reassessment of SLR measurements and forecasts, to guide decisions on future SLR adaptation improvements at KCT, if necessary, to maintain a minimum operational design freeboard of 6 FT for cargo vessel operations.

In addition, the HHMP recommends balancing the berth and yard by increasing yard capacity. Yard capacity can be increased by increasing yard density through grounding and stacking a greater proportion of container operations. Decisions regarding container handling and yard operations are the responsibility of the preferred terminal operator.

7.2.7 Piers 51-53 Sand Island Container Terminal Modernization

The HHMP recommends modernizing the Sand Island Terminal to serve as a dedicated, non-exclusive container cargo terminal and fuel manifold terminal for scheduled and unscheduled cargo vessel service. The Sand Island Terminal will also serve as layberth and as a secondary resiliency pier. When KCT opens for service in 2024, Pasha Hawaiʻi will relocate their existing gantry crane supported container operations from Piers 51A and 51B to the new terminal and Matson will expand their operations to occupy the entire Sand Island Container Terminal. As the terminal operator, Matson will determine any configuration changes to the gates and yards. Improvements to the terminal facilities and apportioning of costs will be determined and programmed through discussions and negotiated agreements between DOTH and the terminal operator.

The HHMP recommends the following specific improvements to the Sand Island Terminal. See **Figure 7.9.**

<u>Modernize Piers 51A to 53C</u>

- Raise the height of the pier, apron and 120-FT wide gantry track corridor as necessary to account for SLR of 3.2 FT by 2060 while maintaining a minimum operational freeboard of 6 FT for cargo vessel operations. Install ramps to provide motor vehicle access to the raised gantry track corridor for container handling/moving equipment and vehicles.
    - As an interim measure, consider installing a mooring structure, fendering pylon or other mooring system along the full length of Piers 51A through 53C to raise the mooring height freeboard to allow vessels to safely berth and conduct cargo operations with SLR

and during extreme high tides. See **Section 7.1** for additional discussion about the raised mooring system concept.

- Reconstruct the pier and yard using sheet pile/bulkhead construction. Use concrete in all areas to be used for container storage and heavy-lift (top pick) operations.
- Install hydro-dynamic separators as necessary to treat stormwater drainage from the yard prior to discharge into the storm drainage system.
- Improve truck gates and internalize truck queuing to eliminate congestion on Sand Island Parkway.

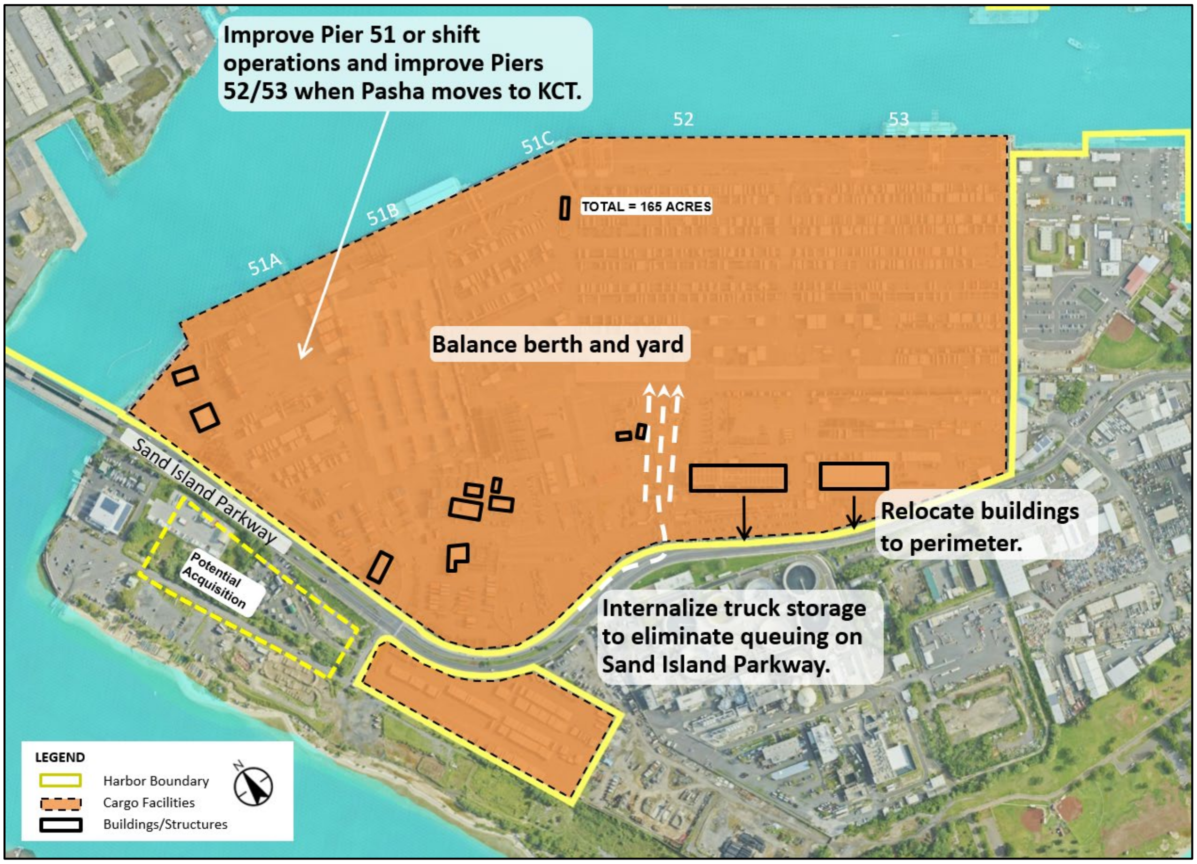

Figure 7.9 – Proposed Sand Island Terminal Improvements

- As buildings and structures located at the center of the terminal yard reach the end of their useful life, relocate them to the perimeter of the yard or offsite location to increase yard capacity and improve operations.
- Undertake additional cargo terminal modernization improvements as required by the terminal operator to support efficient cargo movement and increased capacity to accommodate projected cargo throughput.
- Balance the berth and yard capacity by improving cargo movement efficiency across the berth. Improving berth capacity is the terminal operator's responsibility. Berth capacity could be

increased by adding gantry cranes and/or by improving efficiencies in container movements (RO/RO operations) across the berth.

- Coordinate with the CCH (owner) to repair or replace the existing 8-FT wide by 6-FT deep concrete box culvert and discharge outfall located beneath the cargo yard. The box culvert is in poor condition and further deterioration could affect the yard foundation.

7.2.8 Pier 60 Modernization

The HHMP recommends modernizing Pier 60 to continue serving as a bulk cargo terminal for tug-and-barge operations loading and offloading aggregate materials. The pier can also serve as layberth for barges and shallow-draft vessels. The HHMP also recommends that backland areas be improved either as paved areas for vehicle and chassis storage or developed with improved access roads and light-industrial buildings or other industrial uses through a PPP agreement supported by a long-term lease agreement. Development of the backland area would generate revenues for the Harbor Special Fund through lease rents.

Pier 60 comprises two distinct areas: (1) the pier and yard area that is under a lease[34] and used for aggregate storage, and (2) the minimally developed backland adjacent to the Sand Island industrial area that is used by various short-term tenants for storage and light-industrial use. The entire area is located on low-elevation ground, much of which is susceptible to soil subsidence, groundwater saturation and periodic tidal flooding. Development in the backland will require substantial investment to fill, surcharge and raise the land above the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Zone AE Base Flood Elevation (BFE) of 10 FT[35].

The HHMP recommends the following specific improvements at Pier 60 (see **Figure 7.10**).

- Reconstruct and strengthen the Pier 60 pier and yard to create a heavy-duty pier for barge (RO/RO) operations:
- Raise the height of the pier, apron and yard as necessary to account for SLR of 3.2 FT by 2060 while maintaining a minimum operational freeboard of 6 FT for tug and barge operations.
- Pave the entire yard (HC&D lease areas) with concrete to prevent comingling of bulk aggregate material with natural soil and to contain industrial discharges.
- Maintain the width and depth of the channel used by tug and barge operators to access Pier 60.

[34] HC&D's current lease of these areas expires in 2046.
[35] FEMA Firm Map No. 15003C0353G; Effective date 1/19/2011.

The HHMP recommends the following backland area improvements:

- Fill, surcharge and raise the existing backland area above the FEMA FIRM Zone AE BFE of 10 FT.
- Develop backland areas with a paved surface for automobile or container/chassis storage or other maritime uses.
- Develop existing *mauka* perimeter driveway into a new industrial street to create new business frontage for the backland areas. Acquire right-of-way through HC&D's batch plant parcel on Pahounui Drive to improve the street layout and circulation with a direct street connection between Pahounui Drive and Pier 60. Development of a new roadway connection from Pahounui Street to Pier 60 will improve access and operational efficiency at the pier by shortening the driveway distance and eliminating potential vehicle conflicts with users of the roadway serving the Keʻehi Marine Center and La Mariana.
- Consider a PPP and long-term lease agreement for development of the Pier 60 backlands.

Figure 7.10 – Pier 60 Improvements

7.3 Maritime Support Services

Maritime support services are located at Piers 12 to 15, 21 and 22, 23 to 29A, backland areas of Piers 31 to 33, and backland areas of Pier 38 adjacent to Kapālama Canal. The HHMP recommends major improvements and/or reconstruction at most of these piers over the 30-year planning horizon to support harbor-wide adaptations to climate change and SLR. Recommended improvements and policy initiatives for maritime support services focus on incentivizing PPP to invest in harbor facility improvements and on consolidating these operations where possible to improve operational efficiencies and to benefit from economies of scale. A summary of recommended improvements at maritime support services piers is provided in **Table 7.4**. A detailed discussion is provided in the following sections.

Table 7.4 – Summary of Maritime Support Services Pier Improvements

Pier No.	Facilities and Operations	Major Improvements
12	Maritime Support Services, Layberth	• Reconstruct Diamond Head side pier and yard. • Replace segmented pier on ʻ*Ewa* side with a continuous pier • Consider extending the continuous pier approximately 100 LF from the end of existing pier.
13 and 14	Maritime Support Services, Layberth	• Preserve and reuse the historic shed structure if feasible. • Redevelop piers only if needs of harbor dictate or if PPP investment opportunity exists.
15	Harbor Police Station / Spill Response	• If necessary, raise pier deck heights to adapt to 3.2-FT SLR by 2060.
21 and 22	Tugboats	• Modernize terminal. Reconstruct and raise pier, apron, and yard to adapt to 3.2-FT SLR by 2060, improve fendering and bollards, and repave with concrete. • Demolish existing buildings and develop new shared-use facilities. • Provide shoreside power and upgrade shoreside water utilities to tugboats. • Cut back pier face of Pier 22 by 20 to 40 FT. • Clear out subsurface coral and rocks. • Dredge Pier 22 to 26 slipway to 35-FT depth.
23	Work Boats, Layberth, Warehouses	• Modernize terminal. Reconstruct and raise pier, apron, and yard to adapt to 3.2-FT SLR by 2060, and improve fendering and bollards. • Cut back pier face by 20 to 40 FT. • Clear out subsurface coral and rocks. • Dredge Piers 22 to 26 slipway to 35-FT depth.

Pier No.	Facilities and Operations	Major Improvements
19 to 23 Maritime Center		• Demolish warehouses 6 & 8, grain silos and misc. sheds at Pier 23. • Develop a new maritime center to house offices, parking, automobile storage, and high-cube ground level for cargo operations. • Improve access and circulation.
24 to 29A	Maritime Support, Layberth	• Provide dedicated pier locations to consolidate maritime support operations. • Construct raised apron to adapt to 3.2-FT SLR by 2060. • Use long-term leases and PPPs to incentivize investment.
38	Maritime Operations	• Pave 1.39-acre lot adjacent to the Kapālama Canal outlet for maritime support operations. • Develop approximately 360 LF of new pier adjacent to maritime support area. • Reconstruct existing fuel barge pier for misc. vessel use.

7.3.1 Pier 12

The HHMP recommends that Piers 12 to 15 continue to be maintained and improved for maritime support uses. Improvements at Piers 12 through 14 could be undertaken through a PPP under long-term lease agreements that will incentivize an operator to invest in pier improvements.

The HHMP recommends Pier 12 improvements to support a smaller scale maritime operator that requires direct water access for work boats and can work with the limited landside area and restrictions related to preservation of the historic coral blocks and cruise ship security protocols at the adjacent Piers 10 and 11. The HHMP recommends that existing segmented pier be replaced by a continuous pier in order to increase the amount of berth space and improve the utility of the pier for multiple vessel types. The HHMP recommends reconstruction of the pier and yard on the Diamond Head side of Pier 12 to maximize the overall utility of the pier. Specific recommendations at Pier 12 are as follows (see **Figure 7.11**).

- Preserve in place the existing historic coral blocks and coral transplantation site located in the water *makai* of Pier 12.
- Replace the segmented pier on *'Ewa* side of Pier 12 with a continuous pier to accommodate a greater array of vessel types.
- Consider extending a new continuous pier (segmented pier replacement) approximately 100 LF from the end of the existing pier to increase the amount of berthing. Extending the pier in this location avoids direct disturbance of the historic coral blocks. However, submerged areas off Pier 12 contain corals that could be directly affected by construction of new pier piles and

indirectly affected by increased shading from the pier structure. The area is already subject to active boat traffic that can disturb bottom sediments and cause intermittent turbidity; use of the pier would not significantly change that condition. Impacts to corals would require appropriate mitigation determined through the environmental review and DA permit process.

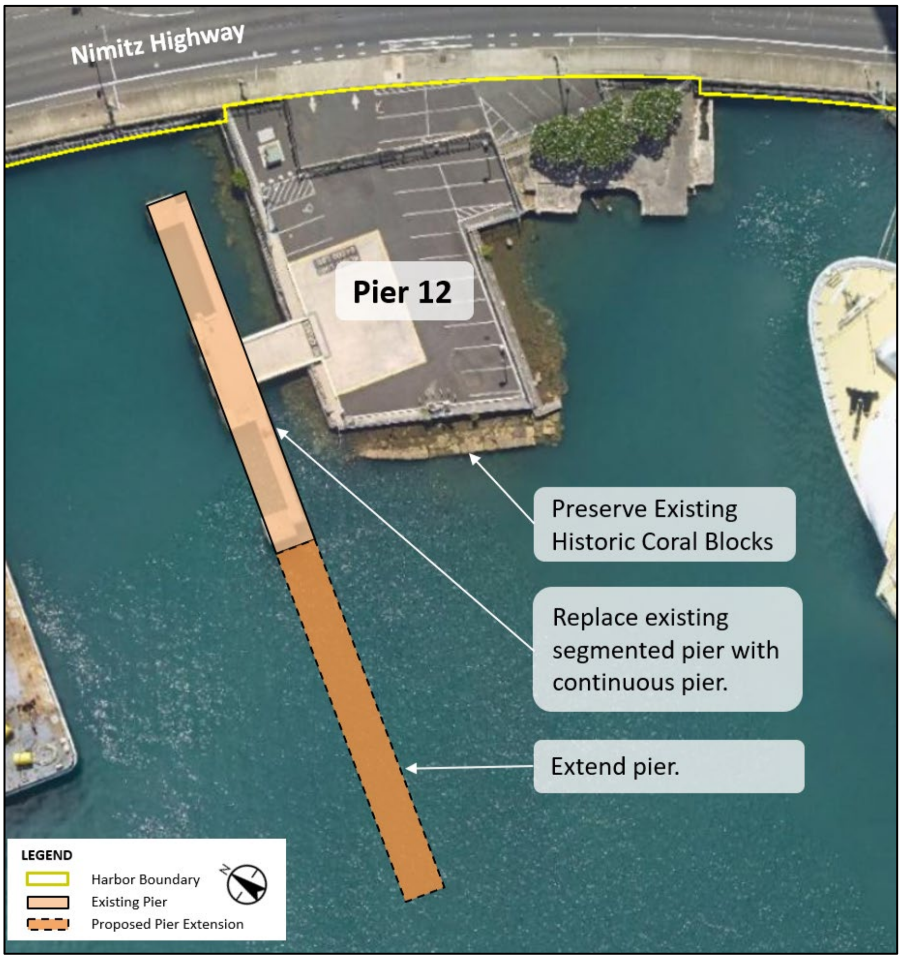

Figure 7.11 – Pier 12 Proposed Improvements

7.3.2 Piers 13 and 14

The HHMP recommends that improvements to Piers 13 and 14 be based on the needs of the existing tenant or a future maritime operator and that they be undertaken as the existing facilities come to the end of their useful life and require renovation or reconstruction. Piers 13 and 14 are located within the Chinatown Historic District and the existing shed, constructed in 1930, is determined to have high historic preservation value (see **Sections 3.4.2** and **4.1.2.8**). The existing shed offers limited space for office, storage and employee parking to support modern maritime business operations. Parking in particular occupies a large portion of the ground level space in the shed that might otherwise be used for operations. A new or renovated structure could be designed to maximize the operational area at the pier deck level, while providing second or third story space for offices, storage and parking. The HHMP recommends that DOTH endeavor to the preserve the historic attributes and character of the building when renovation or redevelopment work is undertaken. Alternately, the pier facility could be redeveloped as an open yard for maximum utility, with administrative functions and employee parking relocated to an offsite location. Renovation, redevelopment and/or demolition of the historic shed will require historic preservation review by SHPD in accordance with HRS Chapter 6E. The pier deck heights are 7 FT above MLLW. Berthing operations will be affected within the HHMP planning period if the projected SLR of 3.2 FT by 2060 is realized. Specific recommendations at Piers 13 to 14 are as follows:

- Alternative 1 – Redevelop the Piers 13 and 14 pier and shed through a PPP agreement with a maritime operator under a long-term lease. Given the historic status of the shed, retain and preserve the historic attributes and character of the building when renovation or redevelopment work is undertaken.
- Alternative 2 – Redevelop Piers 13 and 14 through a PPP agreement with a maritime operator. Renovate, reconstruct or remove the shed as necessary to enhance the function of the pier for the intended maritime support services use and to support overall harbor operations. For example, a new shed could be developed to accommodate high-cube container movement at the ground level with upper-level space for parking, office and storage. The existing warehouse does not have the minimum interior clear height of 24 FT that is typical for a modern, high-cube warehouse and the existing bay doors do not have adequate clearance for movement of high-cube container on wheeled chassis. See **Figures 7.12** and **7.13.**
- Reconstruct and elevate the pier deck height as necessary to account for SLR of 3.2 FT by 2060 while maintaining a minimum operational freeboard of 3 FT for workboats, tugboat operations and layberth. Use sheet pile/bulkhead construction.
- Consider long-term leases and PPP agreements to incentivize operator to invest in redevelopment of the piers.

Figure 7.12 – Piers 13 and 14 Shed Showing Bay Doors Along Pier 14 Side
(Source: Fung Associates Inc., 2021)

Figure 7.13 – Example of a High-Cube Container on Chassis
(Source: Rabin Worldwide, n.d.)

7.3.3 Pier 15

Pier 15 landside facilities were recently redeveloped to serve as the home of the Harbor Police. On the waterside, the MSRC loading platform and mooring structure located along the west side of Pier 15 is specifically designed as a berth for the MSRC Hawaiʻi Responder and MSRC spill-response barge. This MSRC pier structure was constructed in 2015, before the State issued its 2017 climate change resiliency and adaptation guidelines and SLR projection of 3.2 FT by 2060. The pier deck heights are 7 FT above MLLW. Berthing operations will be affected within the HHMP 2050 planning period if the projected SLR of 3.2 FT by 2060 is realized. The HHMP recommends continued maintenance of these piers to support the existing uses. Specific recommendations related to SLR adaptation at Pier 15 are as follows:

- Routinely monitor increases in SLR and reassess projections over time. Based on current projections and State SLR guidelines, raise the pier deck heights as necessary to account for SLR of 3.2 FT by 2060 while maintaining a minimum operational freeboard of 3 FT for dedicated Harbor Police patrol boats and spill response vessels.
- Selection of an alternative to maintain operational freeboard as sea levels rise depends on the actual rate of SLR and the structural condition at the time of reconstruction and may include:
    - Alternative 1 – Replace and reconstruct the entire pier using sheet pile/bulkhead construction. This option is the costliest and might be considered only if the pier condition is deteriorated and warrants complete reconstruction.
    - Alternative 2 – Reconstruct the exiting pile and deck pier structure.
        - Raise the pier deck using the existing piles with the addition of structural spacers.
        - Install mooring dolphins with a floating dock system.

7.3.4 Piers 21 and 22 "Tug Row"

The HHMP recommends that Piers 21 and 22 be redeveloped and dedicated for continued use as a consolidated tugboat pier (see **Figure 7.14**). Although the existing condition of these piers was determined to be 'Satisfactory' in the 2021 Conditions Assessment, the HHMP recommends modernization of the Piers 21 and 22 piers, aprons and adjacent land area to serve the special needs of the tugboat operations. Specific improvements address the need for pier structure and pavement strengthening to accommodate the heavy, truck-mounted cable spools and crane used to replace towing cables on the tug vessels. The HHMP recommends pier reconstruction, including subsurface pier structures, designed to withstand the forces from tugboat propulsion systems, and bollards and fendering to accommodate Tahitian mooring configuration (stern-in / bow-out) used at the pier. In addition, tugboats currently must rely on on-board, combustion power generation when at berth, which results in increased exhaust emissions. The HHMP recommends that shoreside electric utility connections be installed to power tugboats while at berth, thereby improving energy use and air quality.

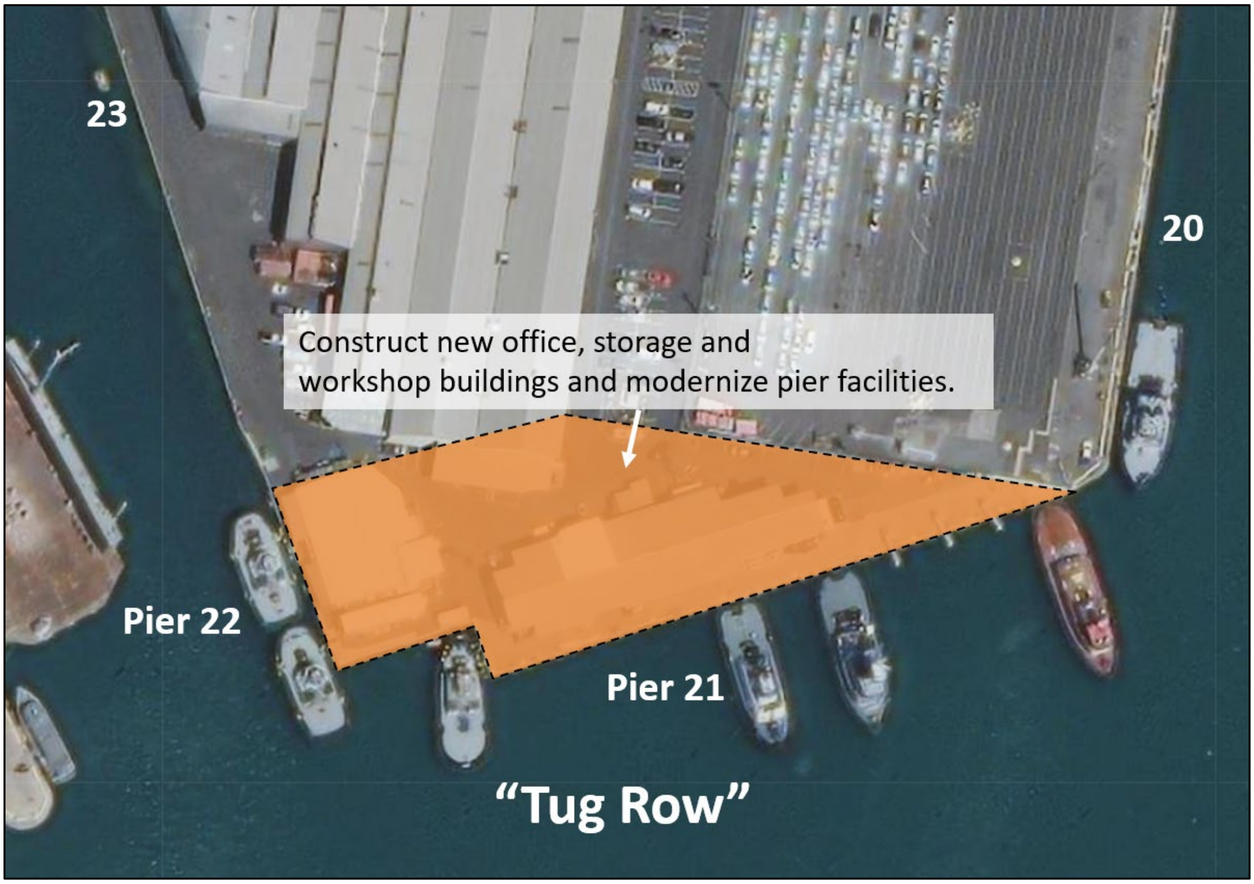

Figure 7.14 – "Tug Row"

The existing buildings at Piers 21 and 22 that house offices, storage and workshop space, are well past their useful life and in immediate need of replacement. Due to the limited land area at the end of the pier, the HHMP recommends redevelopment with a new, two- or three-story shared-use building to be occupied by multiple tugboat operators. The HHMP also recommends that building improvements be undertaken through a PPP under long-term lease agreements that will incentivize tug operators to invest in harbor improvements. Finally, the pier deck heights are 6 FT above MLLW. Berthing operations will be affected within the HHMP planning period if the projected SLR of 3.2 FT by 2060 is realized. Specific recommended improvements at Piers 21 and 22 include the following:

- Demolish the existing buildings at Piers 21 and 22 which are past their useful lifecycle.
- Develop new shared-use facilities to consolidate tug operators. Facilities should accommodate office, warehouse and maintenance spaces, and parking.
- Raise the pier deck height as necessary to account for SLR of 3.2 FT by 2060 while maintaining a minimum operational freeboard of 3 FT for tug operations.

- Reconstruct pier and apron using sheet pile/bulkhead construction. Construct the submerged pier face to withstand undermining by the forces from vessel propulsion systems.
- Strengthen the yard and entire apron to accommodate spooling operations that include a heavy crane and spool trucks. Replace asphalt pavement with concrete.
- Improve fendering and bollards to accommodate the specific needs of tugboats and mooring practices at Piers 21 and 22.
- Provide shore-to-ship power and upgrade shoreside water utilities to support berthed tugboats.
- Upgrade the existing old and undersized six- and nine-inch water pipes with new water pipes, valves, boxes and meters to supply adequate flow and water pressure to support shore-to-ship water for tugboat operations.
- Phase improvements so as not to disrupt existing tugboat operations which are essential to harbor operations and cargo transport.
- Consider opportunities to use long-term leases to encourage private investment by the existing tugboat operators.

7.3.5 Piers 22 and 23 Modernization

The HHMP recommends modernization of Piers 22 and 23 to accommodate a variety of waterfront-dependent and non-waterfront-dependent maritime support operations, including small vessel berthing and layberth. The existing landside areas of Pier 23 and portions of Pier 22 are occupied by old and dilapidated structures, historically used for cargo warehousing and grain storage, that obstruct efficient use of this valuable waterfront pier area for modern maritime operations. Subsurface rock and coral outcroppings along the face of Pier 23 prevent all but small, shallow draft vessels from berthing against the pier face. Four concrete mooring dolphins and Yokohama fenders are infrequently used to breast larger vessels off of the pier face to avoid the subsurface outcroppings. The dolphins are used primarily to secure mooring lines by PSI to maneuver their large, floating dry dock staged at Piers 24 and 25. The subsurface outcroppings and the mooring dolphins effectively narrow the width, and thus the utility, of the slipway and restrict the use of Piers 22 and 23 from a wider variety of maritime operations. See **Figure 7.15**.

Access to Piers 22 and 23 is via the Pacific Street / Pier 29 driveway intersection, or via the Kukahi Street / Piers 21-23 driveway intersection on Nimitz Highway. Both access points require driving a circuitous route around existing structures and through active industrial space to reach Piers 22 and 23. A direct driveway entrance to Pier 23 on Nimitz Highway is currently closed to traffic. Opening this access point to inbound-only traffic would provide more convenient and efficient access to these piers and to "Tug Row" at Piers 21 and 22. Exiting traffic would use the Kukahi Street driveway. See **Section 7.3.6** for description of proposed Kukahi Street intersection improvements. Finally, the pier deck heights are 6 FT above MLLW. Berthing operations will be affected within the HHMP planning period if the projected SLR of 3.2 FT by 2060 is realized.

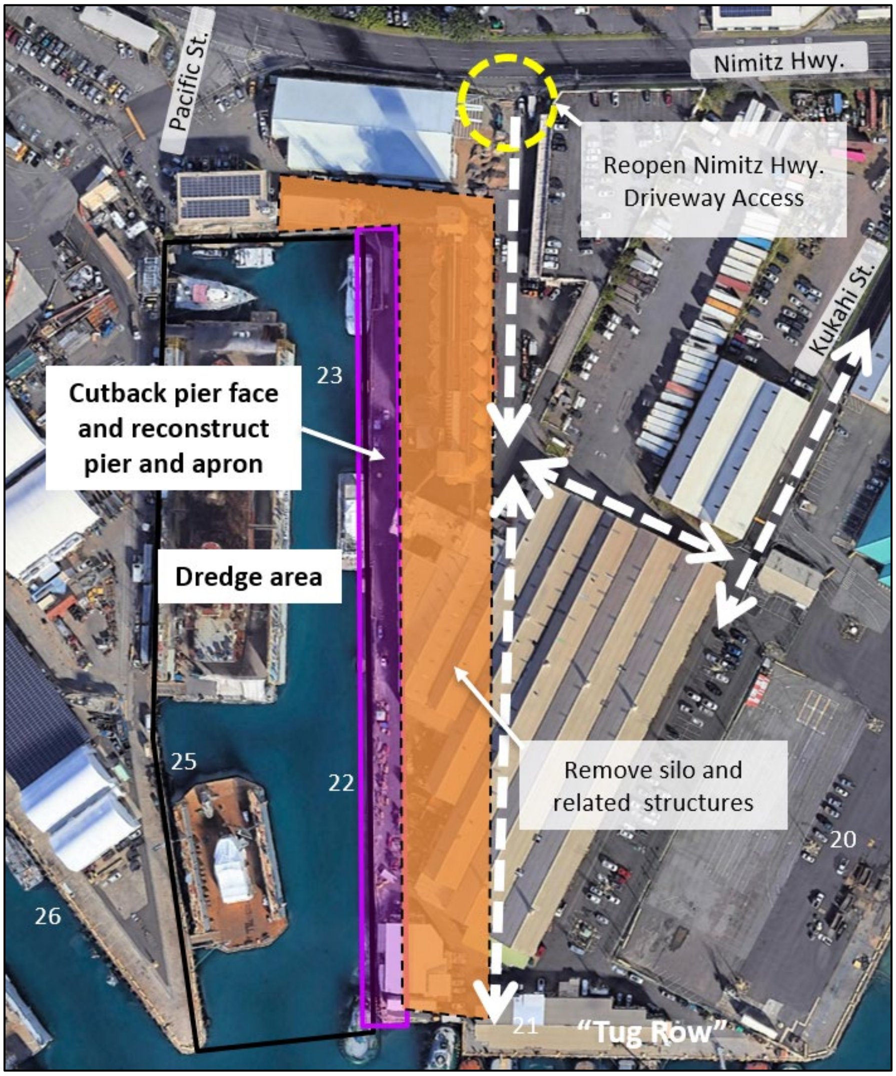

Figure 7.15 – Piers 22 and 23 Improvements

The HHMP recommends the following specific improvements to Piers 22 and 23 to create an accessible, multi-purpose pier and open yard that can accommodate a wide variety of maritime support operations and vessel types:

- Demolish the existing grain silos, warehouses and miscellaneous buildings to accommodate driveway access improvements and efficient layout of the yard area for maritime uses.
- Remediate contaminated soil, groundwater, lead and asbestos, as needed.
- Cut back the face of Piers 22 and 23 by 20 to 40 FT to widen the slipway.
- Reconstruct the pier, apron and yard using sheet pile/bulkhead construction.
- Replace the existing collapsed drain line and drainage outfall.

- Raise the pier deck height as necessary to account for SLR of 3.2 FT by 2060 while maintaining a minimum operational freeboard of 3 FT for work boat and tug operations.
- Improve fendering and bollards.
- Clear out subsurface coral and rocks to remove navigation and berthing obstructions.
- Dredge the full extent of Piers 22 to 25 slipway to the 35-FT depth.

7.3.6 Piers 19 to 23 Maritime Center

The HHMP recommends development of a new, multi-story maritime center at Pier 23 to accommodate non-waterfront-dependent maritime tenants, automobile storage and emergency equipment staging. As noted in **Section 7.3.5**, the existing warehouses that occupy the Piers 22 and 23 landside areas are old, dilapidated and do not meet the needs of modern maritime operations. Maritime operators commented on the need for additional maritime office, storage and short- and long-term employee parking space, as well as services that support day-to-day work at the harbor, including food service and other commercial services, located near the waterfront. The maritime center building will function similarly to the Airport Industrial Complex, with ramp access to upper floors designed with flat floor plates that could be converted to a variety of uses based on demand: office, commercial/retail, industrial, material storage, vehicle storage, and emergency equipment pre-staging. The HHMP recommends that the building design be integrated with operations at the Piers 19 and 20 multi-purpose cargo terminal to accommodate ground-level cargo operations and access to secure upper-level automobile storage. See **Section 6.2.2** for description of the Pier 23 land use plan.

Development of a multi-story structure at this location will require evaluation of subsurface conditions and coordination with recommended reconstruction of the adjacent piers 19 and 20, “Tug Row” and Piers 22 and 23 (see **Sections 7.2.2, 7.3.4** and **7.3.5**) for building foundation improvements. In addition, site redevelopment, including demolition and excavation work, may require mitigation of contaminated materials and soils, which may include petroleum, PCBs, lead, asbestos and other chemical pollutants. See **Section 7.10.3** for additional discussion.

The proposed maritime center is expected to generate increased traffic that will affect Kukahi Street and Nimitz Highway. The HHMP recommends that the Kukahi Street / Nimitz Highway intersection be signalized to serve as the primary ingress and egress to the proposed maritime center[36] with a

[36] Signalization of the Kukahi Street intersection will require an analysis of traffic movements and volumes generated by the proposed maritime center to meet traffic signal warrants guidelines published in the Manual on Uniform Traffic Control Devices (MUTCD) by the Federal Highways Administration, U. S. Department of Transportation.

secondary ingress-only access provided by reauthorizing the Pier 23 driveway entrance on Nimitz Highway. In addition, the maritime center is expected to generate pedestrian traffic across Nimitz Highway to bus stops on *'Ewa*-bound Nimitz Highway and to commercial uses located in *mauka* areas of Iwilei. A signal at the Kukahi Street intersection will provide safer pedestrian access across the highway. In addition, the HHMP recommends constructing a channelizing island on the *makai*-*'Ewa* corner of the Kukahi Street / Nimitz Highway intersection to improve pedestrian safety by improving pedestrian sight-lines to approaching traffic and shortening the distance pedestrians must walk across the intersection. See **Appendix O – Traffic Analysis Memorandum**.

The HHMP recommends the following specific maritime center improvements (see **Figure 7.16).**

- Demolish Warehouses 6 and 8.
- Develop a multi-level, mixed-use structure to accommodate offices, parking, automobile storage, and ground-level cargo operations. Consider incorporating the existing McCabe building. The parking structure component should be designed for automobile storage and parking space for maritime employees and public visitors to the maritime center and with high-cube ground level integrated with Piers 19 and 20 cargo yard. Examples of the type of structure contemplated for the maritime center include the Airport industrial Center on Paia Street and Walmart on Ke'eaumoku Street (see **Figure 7.17**).
- When Piers 19 to 23 are redeveloped with a new maritime center, replace and upsize the existing water system, including the existing water meter and two-, three- and four-inch water pipes, with new water pipes, valves, boxes and meters based on water demand calculated for the designed building program. A fire sprinkler system which meets National Fire Protection Association (NFPA) 13 standards will need to be constructed within any new, proposed structures. In addition, exterior fire protection consisting of 8- and 12-inch fire lines, fire hydrants, and meters will need to be constructed to BWS standards.
- Upgrade the existing sewer system based on the design service demand. Currently, depending on the size and demand from the proposed maritime center, it is anticipated that there is adequate sewer capacity to allow for discharge into the municipal system.
- Provide storage area for large/heavy maritime cargo handling and servicing equipment, emergency equipment and pre-staged generators and fuel during hurricane and tsunami events.
- Develop new commercial / retail space along the Nimitz Highway frontage as part of the maritime center structure or as stand-alone structures.

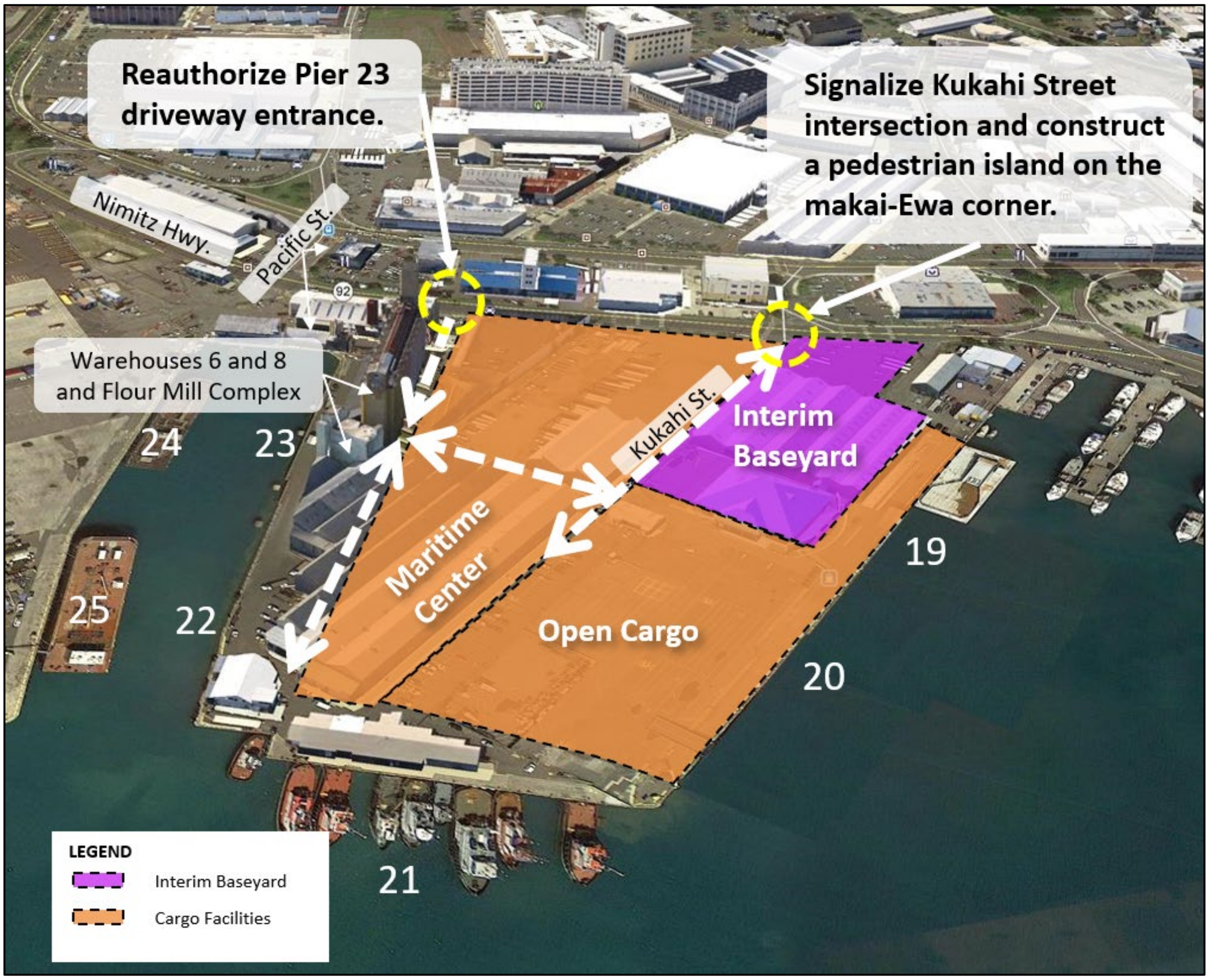

Figure 7.16 – Proposed Pier 23 Maritime Center

The HHMP recommends the following access improvements to serve the maritime center:

- Develop the Kukahi Street intersection on Nimitz Highway as a primary access to the new maritime center and Piers 19 and 20 cargo terminal. Signalize the intersection. Coordinate with DOT-HWY for a signalization warrant study.
- Reauthorize the driveway entrance at Pier 23 to provide right-turn-in only access to Piers 21 and 22, "Tug Row," and to maritime uses and the proposed maritime center at Piers 22 to 23 (see **Figure 7.16**).
- Design the driveway to provide public access to portions of the maritime center and with TWIC-secured access to secure portions of the maritime center, "Tug Row" and the Piers 19 and 20 cargo terminal.

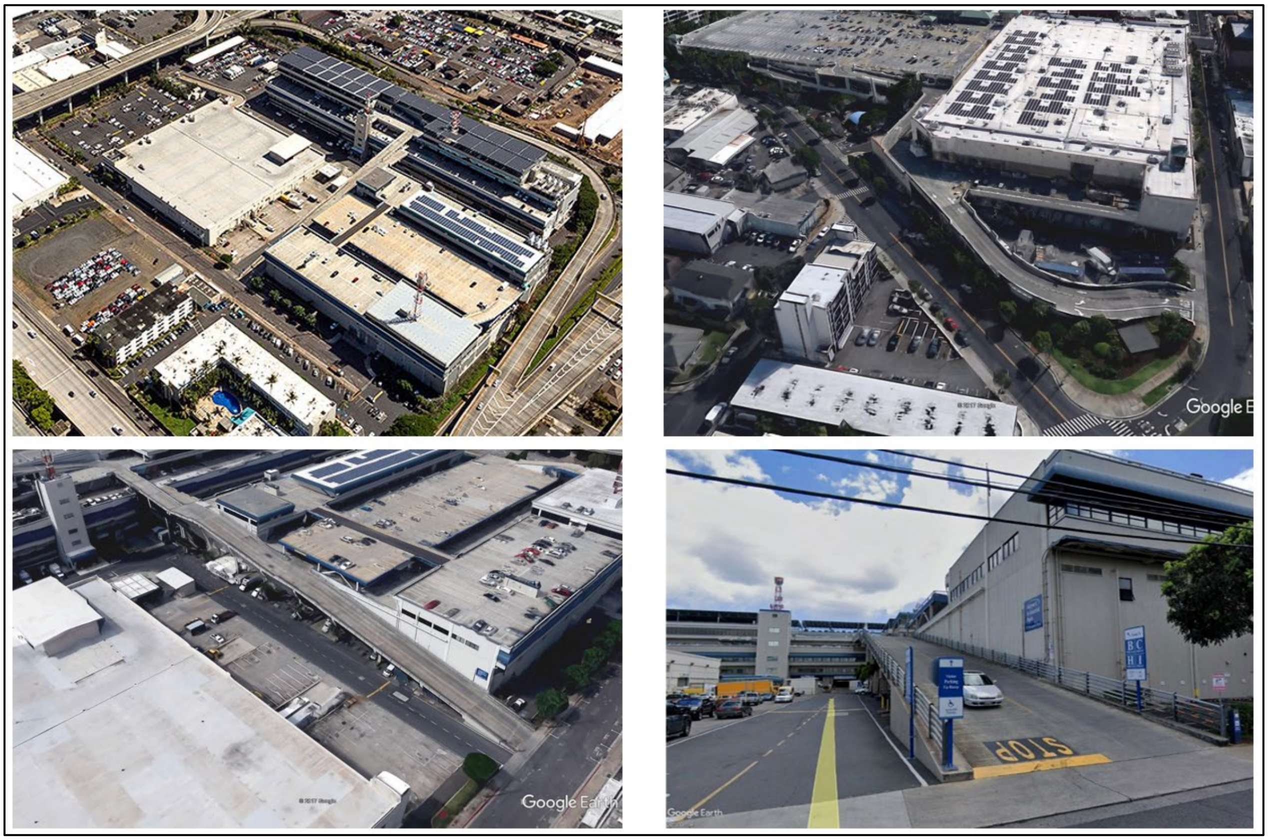

Figure 7.17 – Maritime Center Concept: Airport Industrial Complex (top left and bottom), Keʻeaumoku Street Sam's Club / Walmart (top right)
(Source: Google Earth, n.d.)

7.3.7 Piers 24 to 29A Consolidated Maritime Support

The HHMP recommends that Piers 24 to 28 be designated for continued consolidated maritime support operations, including ship repair, ship maintenance, dry docks, tugboats, pilots, marine engineering, and other support and specialty operations. See **Section 6.2.2** for a description of land use plans for the maritime support areas. Piers 24 through 26 are determined to be in 'Satisfactory' condition; however, Piers 27 through 29A are rated as 'Poor' condition in DOTH's 2021 Conditions Assessment report, along with a recommendation to undertake repairs to these piers with "some urgency." Pier 27E is currently not useable due to its deteriorated condition. The HHMP recommends that improvements to these piers be undertaken through PPPs under long-term lease agreements that will incentivize an operator to invest in pier improvements and landside facilities. The HHMP recommends that any PPP pier improvement projects be coordinated with DOTH plans for SLR adaptation. The pier deck heights are 6 FT (Piers 24 through 26) and 7 FT (Piers 27 through 29A) above MLLW. Based on maintaining a minimum design freeboard of 3 FT for work boats, berthing operations will be affected at Pier 26 within the HHMP planning period if the projected SLR of 3.2 FT by 2060 is realized, and Piers 27 through 29A will have a pier deck height (freeboard) of 3.8 FT above MLLW and only 1.9 FT above MHHW, which is below the minimum design freeboard and therefore could affect operational efficiencies of vessels at these piers.

The HHMP recommends the following specific improvements for Piers 24 to 29A:

- Based on periodic risk assessments, including reassessment of SLR projections and rate of SLR increase, construct a minimum 20-FT wide raised apron to form a sea wall at the pier face to adapt to projected SLR of 3.2 FT by 2060. Keep the landside areas at their current height behind the sea wall to avoid associated redevelopment costs and disruption to existing land uses. Install motor vehicle access ramps onto the raised apron. Maintain minimum design freeboard of 3 FT for drydocks, work boats, tugs and layberth.
- As an alternative, consider installing a mooring structure, fendering pylon or other mooring system along the pier face to raise the mooring height freeboard to allow vessels to safely berth and conduct operations with SLR and during extreme high tides. In addition, consider installing permanent or moveable low curbing or sea walls along the pier face to deflect waves from overtopping the pier under strong wind, large swell, and/or king tide conditions.
- Relocate HML drydock from Pier 27 to Pier 26 with storage area at end of Piers 25 and 26.
- Improve fendering and bollards.
- Use long-term leases and PPP agreements to incentivize investment in maritime facilities, including pier reconstruction and support buildings.

7.3.8 Pier 38 Maritime Support Area

The HHMP recommends that the 1.39-AC parcel located adjacent to Nimitz Highway and the Kapālama Canal outfall at Pier 38 be improved and used for maritime support service operator(s), preferably those requiring direct water access for shallow-draft work boats and barges, and for layberth use. The site is currently not developed with pier facilities. The location at the Kapālama Canal outfall is susceptible to high water flows and debris from storm drainage runoff during rainfall events. Design of pier improvements at this location should consider floating piers that can adjust to variation in water levels and that are suitable for smaller, shallow-draft vessels. In addition, design should consider debris deflection or catchment alternatives. On the landside, the majority of the site was previously used for petroleum storage and the entire site is located within the IDPP Operating Unit #OU1A (see **Section 7.10.3**). New construction involving ground disturbing activities and dewatering could require contaminated soil and groundwater containment, treatment and disposal measures. The HHMP recommends that improvements at the Pier 38 maritime support area be undertaken through a PPP under a long-term lease agreement that will incentivize an operator to invest in pier improvements and landside facilities.

The HHMP recommends the following, specific improvements (see **Figure 7.18):**

- Clear and pave the 1.39-AC lot adjacent to the Kapālama Canal outlet for maritime support uses and possible future facility development through a PPP agreement.
- Develop approximately 360 LF of new pier adjacent to maritime support area for work boats and layberth. Consider use of floating dock design. Include a debris deflection or catchment in the design to reduce the risk of damage to the dock from debris discharged from Kapālama Canal.
- Reconstruct the existing fuel barge pier for miscellaneous vessel use. This alternative could be undertaken as an individual improvement if Pier 38 dock improvements are not implemented. If the Pier 38 improvements are implemented, reconstructing the fuel barge pier could be incorporated into the overall Pier 38 improvements.
- Construct an access ramp for emergency vessels (jet skis, outboard boat). This location could supplement the existing ramp on Sand Island.

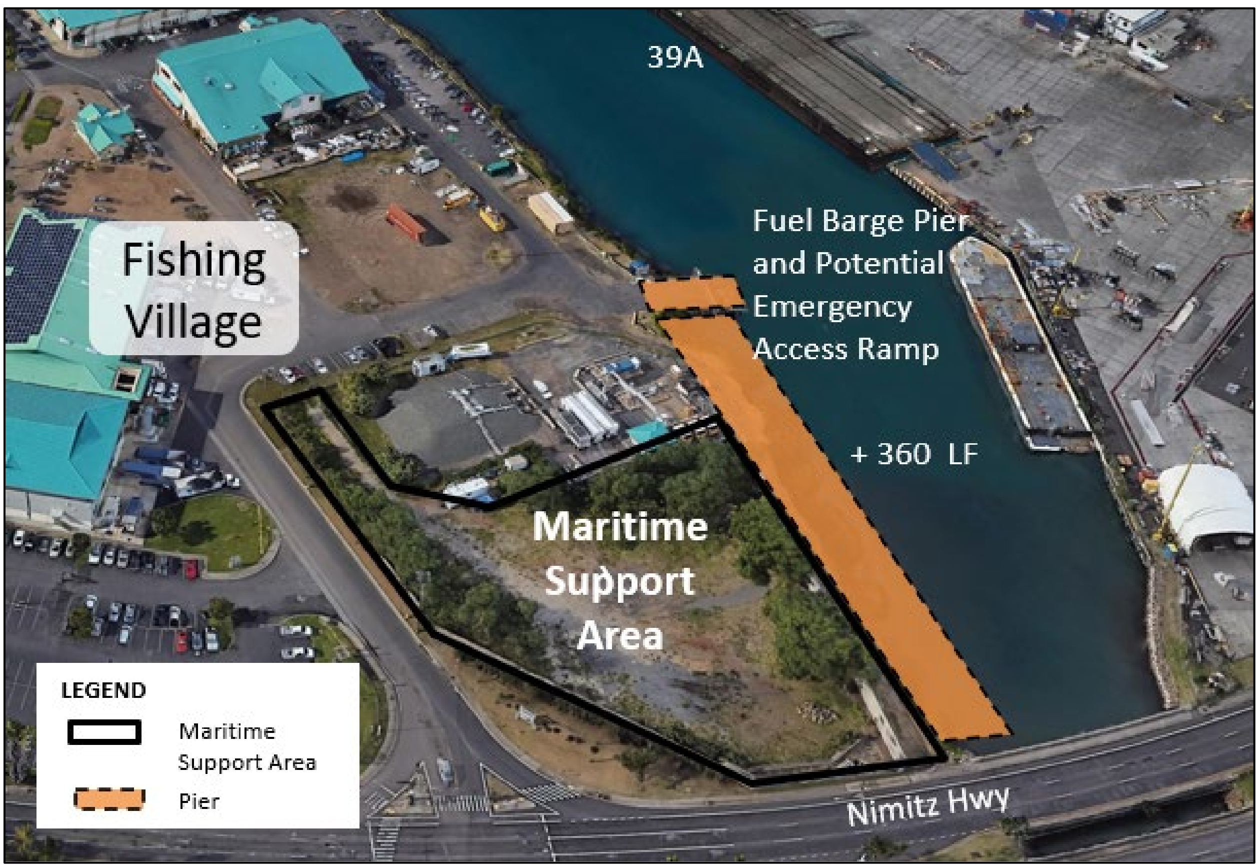

Figure 7.18 – Recommended Maritime Improvements at Pier 38

7.4 Commercial Fishing

The HHMP recommends improvements to the existing commercial fishing fleet piers at Piers 16 to 18 and at the Fishing Village, Piers 36 to 38. Recommended improvements are intended to maintain the existing function of the piers for fishing vessel berthing, provisioning, and servicing operations, and to expand capacity for long-term and short-term berthing. A summary of recommended improvements at the commercial fishing fleet piers is provided in **Table 7.5**. A detailed discussion is provided in the following sections.

Table 7.5 - Summary of Recommended Improvements at the Commercial Fishing Fleet Piers

Pier No.	Facilities and Operations	Major Improvements
16 to 18	Commercial Fishing Operations	• Develop respite center with office and storage space for commercial fishermen. • Elevate piers to adapt to 3.2-FT SLR by 2060. • Widen Pier 16. • Upgrade electrical service to Piers 17 and 18.
36 to 38	Commercial Fishing Operations	• Extend Pier 36 by approximately 160 LF to the Federal Project Line. Construct deck height to adapt to 3.2-FT SLR by 2060. • Reconstruct and elevate Pier 36 deck height to adapt to 3.2-FT SLR by 2060. • Replace Pier 37 with a floating dock to adapt to 3.2-FT SLR by 2060. • Replace revetment and extend Pier 38 bulkhead. • Construct raised apron at Pier 38 to adapt to 3.2-FT SLR by 2060.

7.4.1 Piers 16 to 18 Commercial Fishing Fleet Piers

The HHMP recommends improvements at Piers 16 to 18 to better serve commercial long-line fishing fleet operations. Commercial fishing vessel operators at Piers 16 to 18 noted that the existing piers are serviceable; however, berthing is congested, and fishing boats must double- or triple-raft (2 or 3 vessels moored side-by-side against the pier) to accommodate the fishing boats that are assigned to these piers. The existing piers can accommodate approximately 40 double-rafted fishing vessels. The HHMP does not recommend extending Piers 16 or 17 to increase berthing capacity due to the impact this would have on navigation adjacent to Piers 19 and 20. Opportunity to increase fishing fleet berthing capacity exists at Piers 36 to 38 (see **Section 7.4.2**).

Fishing vessel operators conduct provisioning, servicing, and fueling operations from the piers. Pier 17 can accommodate motor vehicles for these operations, including fuel tank trucks. Pier 16 does not have sufficient width to safely accommodate fuel tank trucks, which requires fishing boats berthed at Pier 16 to relocate and find room at Pier 17 or at the Pier 38 Fishing Village to take on fuel from a fuel tank truck. The Pier 18 apron is constructed with wood and is in unusable condition; improving the pier will restore 200 FT of berth that can be used for vessel fueling, servicing, and provisioning or for layberth.

Commercial fishing crew members who do not have U.S. Citizenship or a Permanent Resident Card must remain on their vessel or within the gated area of Piers 16 to 18. Fishing boat operators recommend that crew respite facilities be provided within the gated area to allow crew members to take a break from their vessels, do laundry, shower, cook, rest and recreate. The respite facility would also replace the portable toilets with permanent restroom facilities. Fishing vessel operators also noted the need for office and meeting space and the lack of adequate, secure on-site storage for materials and equipment required to maintain their boats, which would help improve the efficiency of the fishing fleet operations.

As a final consideration, projected SLR of 3.2 FT by 2060 will reduce the pier face freeboard to less than the minimum 3-FT design freeboard required for fishing vessels at Piers 16 to 18. Based on these considerations, the HHMP recommends the following specific improvements at Piers 16 to 18 (see **Figure 7.19**):

- Develop a crew respite center and office/storage building for commercial fishing crews.
- Reconstruct, and elevate Piers 16 and 17 pier deck height as necessary to account for SLR of 3.2 FT by 2060 while maintaining a minimum operational freeboard of 3 FT for fishing vessel operations. Alternatives depend on the structural condition at the time of reconstruction and may include:
  - Alternative 1 – Reconstruct the entire pier and deck structure.
  - Alternative 2 – Raise the pier deck using the existing piles with the addition of structural spacers.
- Widen Pier 16 to accommodate motor vehicles to facilitate ship provisioning and fuel truck operations.
- Upgrade electrical service to Piers 17 and 18.
- Replace the Pier 18 wooden structure with a concrete deck.
- Elevate the Pier 18 pier deck height as necessary to account for SLR of 3.2 FT by 2060 while maintaining a minimum operational freeboard of 3 FT for cargo vessel operations and layberth.

Figure 7.19 – Piers 16 to 18

7.4.2 Piers 36 to 38 Fishing Village Improvements

The HHMP recommends improvements to Piers 36 to 38 to better serve commercial long-line fishing fleet operations. Recommended improvements are for pier and apron areas under DOTH jurisdiction only. No improvements are recommended for the landside areas that are under the Commercial Fishing Village Tenants AOAO control. See **Section 3.5.1.3**.

As with Piers 16 to 18, Piers 36 to 38 are congested and typically require vessels to double- and triple-raft to accommodate the number of fishing vessels assigned to these piers. Pier 36 ends approximately 160 LF short of the Federal Project Line that defines the boundaries of the Kapālama turning basin. Fishing boat operators and members of the maritime community identified this condition as an opportunity to create additional fishing vessel berthing by extending Pier 36 to the Federal Project Line. Fishing vessel operators also noted that short-term berthing at Pier 38 adjacent the fish auction and ice factory is limited. These segments of pier are used for short-term berthing while off-loading fish, taking on ice and other provisions, fueling and ship servicing; they are not intended to be used as long-term fishing vessel berths. Congestion at the short-term berth can delay fishing vessels from offloading their catch on their day of return to port and can cause friction among vessel operators. Approximately 645 LF of Pier 38 adjacent to the Kapālama Canal outflow is rock revetment and is not improved for pier use. Development of this segment for use by fishing vessels will help relieve short-term berth congestion at Pier 38. Berthing at a new Pier 38 extension should be managed for compatibility with tug-and-barge operations at Pier 39A RO/RO berth. Pier 39A is currently used for Kahului, Maui barge operations which typically involves six maneuvers per week (three inbound / three outbound). Impacts from the propulsion backwash during vessel maneuvers can generate significant force on vessels berthed at Pier 38 across Kapālama Channel from the Pier 39A RO/RO berth. See **Figure 7.20**. As a final consideration, projected SLR of 3.2 FT by 2060 will reduce the pier face freeboard to less than the minimum 3-FT design freeboard required for fishing vessels at Piers 36 through 38.

Figure 7.20 – Pier 39A Tugboat Propulsion Wash Near Proposed Pier 38 Pier Improvements

The HHMP recommends the following specific improvements to Piers 36 to 38 Fishing Village. See **Figure 7.21**.

- Extend Pier 36 by approximately 160 LF to the Federal Project Line to create additional berthing for fishing vessels.
- Reconstruct and elevate the Pier 36 pier deck height as necessary to account for SLR of 3.2 FT by 2060 while maintaining a minimum operational freeboard of 3 FT for fishing vessel operations. Alternatives depend on the structural condition at the time of reconstruction and may include:
    - Alternative 1 – Reconstruct the entire pile and deck pier structure.
    - Alternative 2 – Raise the pier deck using the existing piles with the addition of structural spacers.
- At Pier 37, when it reaches the end of its designed life, replace the existing dock with a floating dock to accommodate SLR. Consider extending the dock further away from the revetment far enough to accommodate additional fishing vessels between the Pier 37 dock and the revetment but avoid encroaching too far into the slipway between Piers 36 and 37.

Figure 7.21 – Piers 36 to 38 Fishing Village Improvements

- At Pier 38, replace the existing revetment and extend the Pier 38 bulkhead pier improvements by approximately 645 LF towards Nimitz Highway for short-term berthing for shore-side vessel services, provisioning, fueling, off-loading fish for the auction, and for layberth use. Consider installing floating docks for fishing vessel and work boat berthing. Floating docks provide flexibility to adapt to SLR.
- Construct a minimum 16-FT wide raised apron at the edge of Piers 37 and 38 to form a sea wall at the pier face to adapt to projected SLR of 3.2 FT by 2060 and maintain minimum design freeboard of 3 FT for fishing vessels and layberth. Keep the landside areas at their current height behind the seawall to avoid redevelopment costs and disruption to existing land uses. Install motor vehicle access ramps onto the raised apron.
- Consider installing more EV charging stations at the Fishing Village to support public patronage and help meet State and CCH goals for conversion to clean energy.

7.5 Passenger

Passenger operations include international, domestic and interisland cruise ships, as well as local day excursion, dinner cruise, whale watching and other seasonal short-term commercial ship passenger services. Cruise operations are conducted at the Pier 2 Cruise Terminal and at Piers 10 and 11. Piers 19 and 20 serve as a contingency berth for smaller (650 LF) cruise vessels. Day excursion operations are conducted at Piers 5 through 8 at the Aloha Tower complex. The HHMP recommends major improvements and/or reconstruction at most of these piers over the 30-year planning horizon to support harbor-wide adaptations to climate change and SLR. Recommended improvements for passenger operations also focus on operational efficiency, including improving shore-to-ship utilities that benefit the environment. A summary of recommended improvements at passenger piers is provided in **Table 7.6.** A detailed discussion is provided in the following sections.

Table 7.6 – Summary of Cruise and Day Excursion Pier Improvements

Pier No.	Facilities and Operations	Major Improvements
2A-C	Cruise Terminal	• Modernize terminal. • Construct raised apron to adapt to 3.2-FT SLR by 2060. • Improve fendering and replace bollards with 100-ton bollards. • Improve shore-to-ship utility connections for sewer, water, and power. • Allocate portions of the Pier 2A cargo yard for use by ground transportation and cruise ship service vehicle circulation/staging. • Negotiate to acquire/gain use of GSA lot. • Renovate Cruise Terminal building. • Develop pedestrian facilities/connectivity with adjacent land uses.
5 and 6	Day Excursions	• Replace revetments/dolphins with continous pier. • Develop pedestrian facilities/connectivity, street improvements, and parking. • Develop mixed-use structure (maritime operators, businesses, hotel space, passenger orientation, parking etc.) through a PPP.
7	Day Excursions, Layberth	• Develop pedestrian facilities/connectivity, street improvements, and parking. • Upgrade sewer line for shore-to-ship service.
8	Day Excursions, Layberth	• Develop pedestrian facilities/connectivity, street improvements, and parking.

Pier No.	Facilities and Operations	Major Improvements
		• Upgrade infrastructure (e.g., waterline, wastewater pump out, improved lighting). • Construct apron to adapt to 3.2-FT SLR by 2060.
9	Day Excursions, Layberth	• Develop pedestrian facilities/connectivity, street improvements, and parking. • Construct apron to adapt to 3.2-FT SLR by 2060.
10 and 11	Cruise Terminal, Layberth	• Develop pedestrian facilities/connectivity, street improvements, and parking. • Construct apron to adapt to 3.2-FT SLR by 2060. • Upgrade infrastructure (e.g., sewer, water, power/communication, and drainage).
19	Contingency Cruise Terminal	• No improvements recommended.

7.5.1 Cruise Terminals

The HHMP recommends that plans for cruise terminal improvements in Honolulu Harbor remain flexible to accommodate a variety of future development scenarios. HHMP recommendations include general improvements to the existing Pier 2 cruise facility, as well as specific improvements under the two future cruise terminal alternatives—Alternative 1: Piers 1 and 2 Consolidated Cruise Terminal, and Alternative 2: Continued Operation of the Pier 2 as the primary cruise terminal, and Piers 10 and 11 as a secondary cruise terminal.

7.5.1.1 Existing Pier 2 Cruise Terminal Improvements

The HHMP recommends improvements to the Pier 2 Cruise Terminal to improve service for existing and projected increases in cruise vessel activity in Honolulu Harbor. The Pier 2 Cruise Terminal is acknowledged by cruise ship operators as a world-class facility, well-suited to accommodate modern cruise ship berthing and landside passenger operations. However, representatives from the cruise industry and maritime community identified several areas where improvements to the existing Pier 2 building and berth would facilitate more efficient cruise terminal operations and improve cruise passengers' experience in Honolulu. One example is the luggage drop-off and pre-security area which becomes congested during embark operations. Cruise operators noted that there is adequate space in the terminal building to more efficiently process passengers and relieve congestion, but the existing interior layout is not well-designed.

The existing cruise terminal building is configured for one-way passenger flow; debarkation must be completed before embarkation begins for the ensuing cruise. This limits capacity at the terminal by extending the time a ship must remain at berth to complete a full or partial passenger turnover. It also limits passenger processing capacity and logistics to accommodate only one ship at a time. As a further consideration, the COVID-19 pandemic brought the cruise industry to a world-wide halt in 2020 and 2021 while the cruise industry, health agencies and government organizations worked together to establish new standards of practice to allow the safe resumption of cruise operations. New post-COVID-19 requirements for physical distancing, health screening, and other terminal operations (HVAC systems, waste management, cleaning and disinfecting) may necessitate modifications to the cruise terminal building.

The area available pier-side for staging ship provisioning and servicing operations is limited for the scope of activity and quantity of materials required by a cruise vessel undertaking a full passenger turnover. A typical, large cruise vessel (2,500 to 3,500 passengers) undertaking a partial or full turnover (500 to 3,500 passengers) might require delivery of eight to fifteen 40-FT trucked containers for resupply, in addition to service vehicles required for miscellaneous ship maintenance activities and waste removal. The less-than-one acre of uncovered yard area currently available at the Pier 2 Cruise Terminal experiences congestion and access conflicts when conducting partial- and full-turnover operations. The cruise terminal building likewise has limited covered warehouse space to handle ship provisions, which is particularly important for perishable food products that must be kept out of the sun. These spatial needs are projected to increase with cruise industry trends to increase ship size (4,000 to 5,000 passengers).

Passenger ground transportation facilities at Pier 2 are likewise constrained. The area available on Channel Street and in front of the Pier 2 terminal building for passenger ground transportation queuing lanes and circulation is limited. The area is also constrained by the presence of the federal government-owned GSA lot (TMK 2-1-015: 020), located directly in front of the terminal building passenger entrance/exit. Buses, vans, taxis, and ride share vehicles generate pulse traffic congestion on Channel Street and Forrest Avenue when cruise ships are in port, which impacts surrounding properties. Traffic congestion also contributes to an increase in exhaust emissions that adversely affects conditions at the terminal building entrance and overall air quality. Expanding vehicle staging areas and improving the configuration of vehicle queuing and circulation lanes and passenger access points will help to alleviate congestion and enhance visitor orientation and experience. In addition, there are limited pedestrian and bicycle facilities and wayfinding signage to encourage and guide cruise passengers to visit nearby points of interest (e.g., Kakaʻako, Downtown, or Chinatown) by walking, biking, or taking the bus; which would further help to minimize traffic congestion within and surrounding the Pier 2 terminal building. Improvements to facilitate active modes of transportation include clear/designated pedestrian and bicycle access ways between the terminal building and Ala Moana Boulevard, shade trees or structures, and other amenities to encourage safe and comfortable transportation by walking or biking. Improvements for wayfinding signage include information kiosks and signage with distances to nearby points of interest and multimodal transportation nodes such as bus stops or bike share stations. These pedestrian/bicycle and wayfinding improvements will help cruise passengers get oriented to points of interest, amenities, and their intended destinations.

Pier 2 lacks utilities to support cruise ships at berth. Water connection is available for cruise ships, but the existing system lacks adequate pressure and flow rate to replenish on-board water storage and meet the operational needs of modern cruise vessels at berth. Instead, cruise ships must rely on their on-board water reclamation and storage systems while in port. Connection to the municipal sewer system is not available at Pier 2; the nearest sewer main is located off Channel Street adjacent to the FTZ building. The inability to pump out sewage generated while in port limits the amount of time a vessel can stay at berth before it must put out to sea where the crew can discharge treated wastewater from its onboard system. Connection to the municipal collection and treatment system improves ship scheduling flexibility by removing this constraint. The sewer connection will require approval of a Sewer Connection Application (SCA) by the CCH. Because cruise ship sewer discharges occur as high-volume in a short period of time, the CCH may condition approval by restricting discharges to non-peak sewer flow periods. Lastly, Pier 2 lacks shoreside power connection that would allow cruise ships to shut down their auxiliary engines and reduce exhaust emissions while in port (referred to as "cold ironing"). Cruise operators also noted that cruise ships will be required to switch to shoreside power to meet 2045 air emissions standards. Cruise industry representatives and maritime operators also noted that existing fendering at Pier 2 is outdated and bollards are not properly sized or spaced to securely moor large cruise vessels, especially during high wind and surge conditions. Cruise vessels berthed at Pier 2 often require the use of the ship's side-thrusters and/or tugboat assistance to counter the force of strong, prevailing north-east trade winds against the side of the ship. As a final consideration, projected SLR of 3.2 FT by 2060 will reduce the pier face freeboard to less than the minimum 5-FT design freeboard required for cruise vessels.

To address these facility considerations, the HHMP recommends the following specific improvements:

- Construct a 20-FT wide raised apron at the pier edge to accommodate SLR of 3.2 FT by 2060 and maintain minimum design freeboard of 5 FT for cruise vessels and layberth use. Due to the presence of the Cruise Terminal / FTZ building at Piers 2B-2C, it is impractical to raise the entire terminal area. A raised apron adapts the pier facility to SLR while preserving backland areas. A width of 20 FT is recommended to accommodate ship service vehicles and equipment while preserving existing-elevation operational space between the raised apron and terminal building.
- Provide shoreside sewer connection to allow cruise vessels to discharge to the municipal collection system while at berth.
- Upgrade the existing six-inch gravity sewer pipe to meet CCH Wastewater System Standards and to provide shore-to-ship sewer connection for cruise ships at berth and to serve proposed expansion of cruise terminal facilities.

- Improve the existing shoreside water connection for cruise vessels to take on potable water while at berth. Upgrade the existing six-inch water pipe, valves, boxes and meters that provide shore-to-ship potable water to supply adequate water pressure and flow rate to support cruise vessels at berth and to meet potable water demand and fire protection requirements of proposed expansion of cruise terminal facilities. If an additional terminal building is developed at Pier 2A, a fire sprinkler system which meets NFPA 13 standards will need to be constructed within the proposed Cruise Terminal Building.
- Provide shoreside power to allow vessels at berth to shut down auxiliary engines and thereby reduce carbon emissions. Shoreside power should be provided prior to 2045 when new air quality emissions standards for cruise operations take effect.
- Modernize the bollards and fendering system. Replace bollards with 100-ton bollards (approximately 10 bollards in total). Consider fendering systems using materials other than black in color. Black material can mar the painted sides of cruise vessels which are typically light in color.
- At Pier 2 improve ground transportation circulation and staging and develop more parking to improve cruise terminal functionality and reduce impacts to FTZ operations and traffic flow on Channel Street, Forrest Avenue and Ala Moana Boulevard.
    - Utilize approximately 0.5 to 1 acre of land area from the Pier 2 yard to increase the staging area at the *makai* side of the existing cruise terminal building to expand and improve circulation for containers and service trucks that service cruise vessels berthed at the Pier 2 Cruise Terminal. See **Figure 7.22**.
    - Modify fencing and pavement markings to create additional vehicle circulation, staging and parking area (without acquisition or use of the GSA lot). See **Figure 7.22**.
    - Expand the harbor property in front of the Pier 2 Cruise Terminal to improve ground transportation queuing and circulation by acquiring or gaining use of the GSA lot at Pier 2. Consider negotiating with the federal government to exchange the Ballpark Parking Lot at the intersection of Channel Street and Ala Moana Boulevard and/or the historic DOH Building parcel for the GSA lot at Pier 2. See **Figure 7.23.**
- Reconfigure the interior of the terminal to accommodate two-way flow for simultaneous embark/debark operations. Expand the mezzanine level to create additional passenger processing area.
- Widen sidewalks along Channel Street to better accommodate cruise passengers with luggage walking to/from Ala Moana Boulevard.
- Install directional and informational kiosks, signage, and sidewalk stenciling, imprints or other special surface treatment to help orient pedestrians to points of interest (e.g., Kakaʻako, Downtown, and Chinatown), amenities, multimodal transportation nodes (e.g., bus stops and bike share stations), and their intended destinations. Consider design motifs that evoke Honolulu Harbor's history. See **Figure 7.24.**

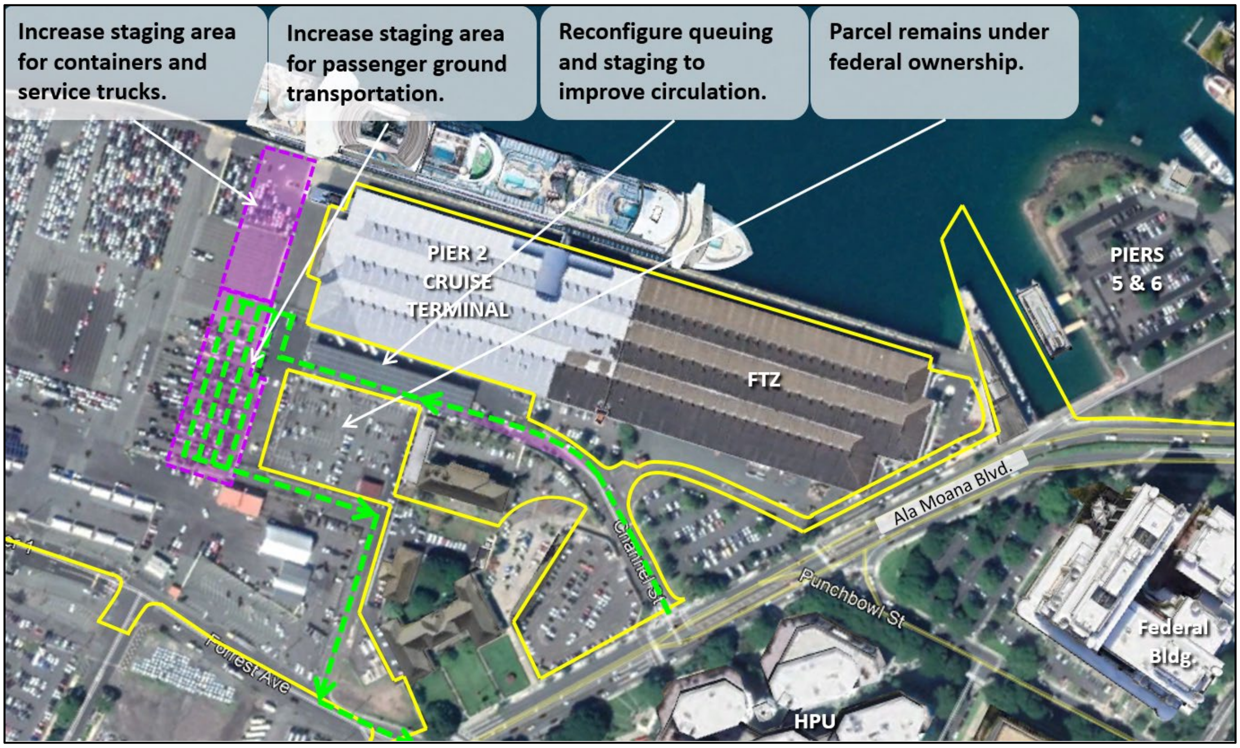

Figure 7.22 – Pier 2 Cruise Terminal Access and Circulation Improvements without GSA Lot

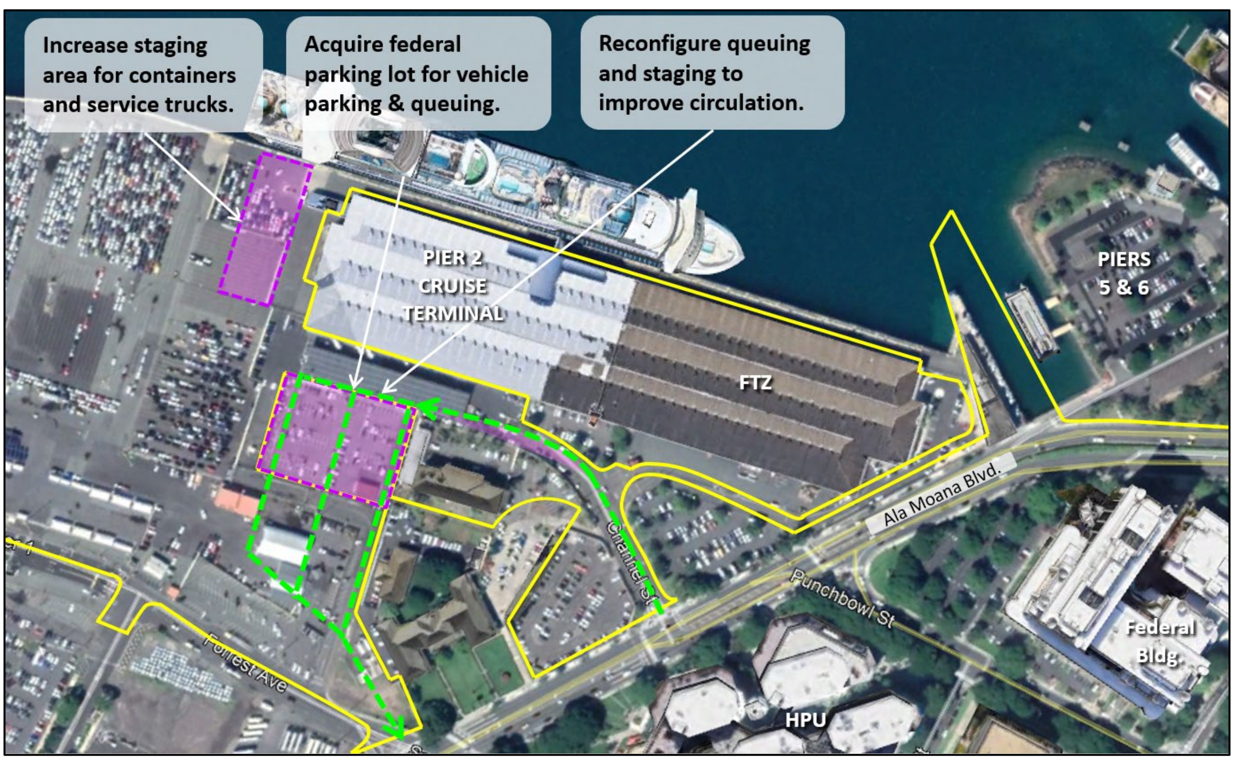

Figure 7.23 – Pier 2 Cruise Terminal Access and Circulation Improvements with GSA Lot

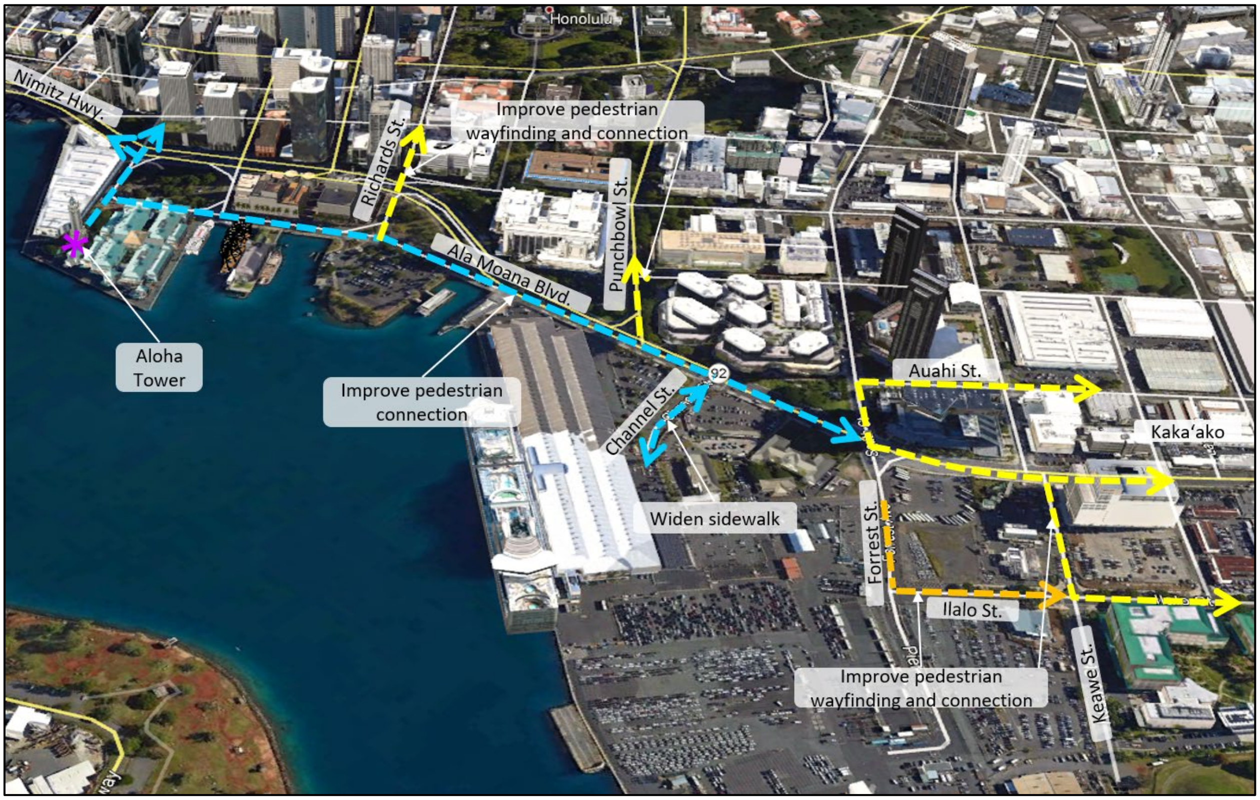

Figure 7.24 – Pedestrian Wayfinding and Connectivity between Pier 2 Cruise Terminal and Aloha Tower Complex

7.5.1.2 Piers 1 and 2 Consolidated Cruise Terminal

In discussions and surveys with cruise industry representatives and the maritime community, the Piers 10 and 11 Cruise Terminal was identified as being constrained for cruise operations, including ground transportation, passenger processing and cruise vessel provisioning/servicing. Spatial constraints will be further exacerbated by post-COVID-19 requirements for passenger screening and social-distancing. To accommodate modern cruise operations and future passenger growth more efficiently, the HHMP recommends as an alternative, consolidating cruise terminal facilities at Piers 1 and 2 to accommodate two cruise vessels simultaneously.

The Pier 2 Cruise Terminal was designed to accommodate two 685-FT ships; however, in its current condition it cannot reasonably handle two simultaneous passenger turnovers due to the spatial constraints described in **Section 7.5.1.1**. The existing operational constraints would be further exacerbated by a second cruise ship, as well by the industry trend toward larger cruise vessels with more passengers. Cruise ship operators further noted the potential for confusion and conflicts with ground transportation, baggage handling, passenger processing and passenger orientation with two, simultaneous vessel operations at Piers 1 and 2. Accommodating a two-ship operation at the Pier 2 Cruise Terminal will require expansion of staging areas for ground transportation and ship provisioning vehicles, as well as added capacity within the existing terminal building or a new facility for passenger processing.

The existing Pier 1 generally is adequate to accommodate berthing a second cruise ship (see **Section 6.2.4.1)**; it is an open, multi-purpose terminal lacking shade or shelter. The existing bollard size and spacing and the fendering are serviceable, but not ideal for mooring a cruise ship. Large south swells, particularly during the summer months, make berthing at Pier 1 difficult and routinely displace sacrificial "blow-out plates" in the pier apron and deck where cruise ship passenger access would be staged. However, similar industrial pier facilities are used in ports throughout the world for intermittent cruise operations; cruise ship provisioning, passenger and baggage processing, and passenger ground transportation operations are accommodated using temporary, mobile shelters and barriers. The HHMP makes various recommendations to improve cruise ship berthing operations and pier-side passenger access, while minimizing impacts to the primary function of Pier 1 for cargo operations. Recommended improvements at Pier 1 for its primary function as a multi-purpose cargo pier and resiliency pier (see **Section 6.2.1 and 7.2.1**) will also benefit its use for cruise ship operations.

DOTH will coordinate with cruise ship operators to determine suitable conditions and adequate facilities needed for cruise operations at Pier 1, which would be dependent on the level of cruise ship activity. Operational considerations may include, but are not limited to the following (see **Figure 7.25**):

- The primary use of Piers 1A, 1B and 2A be for multi-purpose cargo operations. Outside of scheduled calls, cargo vessels and operations be given priority at the Pier 1 Cargo Terminal.
- Cruise facilities be constructed *mauka* of the knuckle between Piers 1B and 2A.
- Only motor vehicle traffic related to ship provisioning and servicing occur shipside at Pier 1.
- All passenger staging occur within the pier apron.
- All passenger processing occur at the Pier 2 Cruise Terminal or a new terminal facility, not ship-side at Pier 1.
- Cruise ship calls at Pier 1 be limited to port calls (no passenger turnover) or partial turnovers of no more than 500 passengers. Cruise ships scheduled for a partial turnover larger than 500 passengers, or a full turnover be directed to the berth at Pier 2.

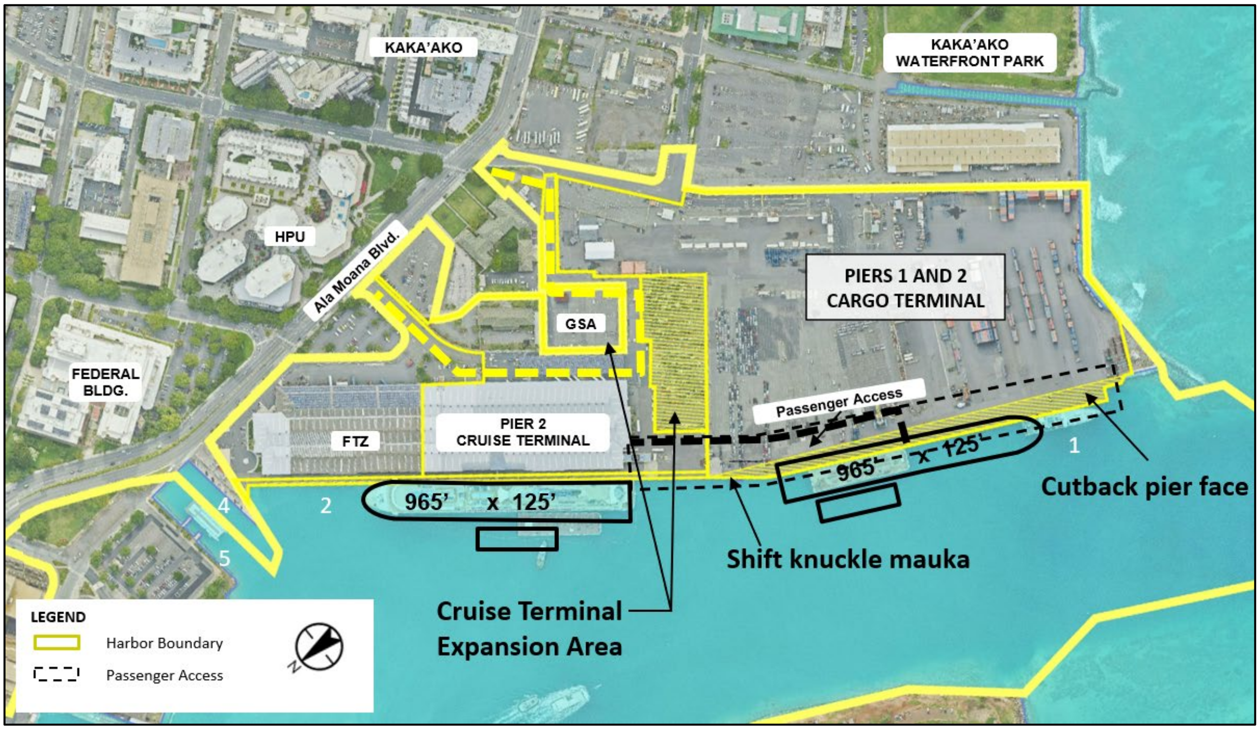

Figure 7.25 – Piers 1 and 2 Consolidated Cruise Terminal Concept

The HHMP offers the following options and alternatives for terminal facility and passenger access improvements for consolidated cruise operations at Piers 1 and 2. For Options 2 and 3, below, the recommended improvements to the existing Pier 2 Terminal described in **Section 7.5.1.1** should also be undertaken to improve existing operations.

- Terminal Building Option 1: Existing Terminal Building
  - Renovate the existing Pier 2B Cruise Terminal to accommodate simultaneous passenger processing from two cruise vessels berthed at Piers 1 and 2.
  - Expand the mezzanine level to increase the terminal building capacity.
  - Reconfigure the terminal for two-way passenger processing.
- Terminal Building Option 2: New Temporary/Semi-Permanent Pier 2A Cruise Terminal
  - Install a temporary tension-fabric structure at Pier 2A to accommodate passenger operations (security and health screening, baggage handling, passenger orientation) for cruise vessels berthed at Pier 1. A tension-fabric structure provides a large, enclosed, open space that can be climate-controlled and internally configured to meet flexible operational needs.
  - A temporary tension-fabric structure may be set up during the cruise season and taken down in the off-season, or it may be maintained year-round as a semi-permanent structure. The size of the structure would be determined during design based on the

cruise operations. See **Figure 7.26** for an example of a temporary tension-fabric structure at the Port of Los Angeles.
  - o The temporary structure could also be repurposed for other uses should cruise operations decline and curtail the need for the additional space.
- Terminal Building Option 3: New Permanent Pier 2A Cruise Terminal Facility
  - o Construct a new cruise terminal building in the Pier 2A yard *makai* of the existing Pier 2B Cruise Terminal to accommodate passenger operations for cruise vessels berthed at Pier 1.
  - o Integrate into the new terminal building hardened, high-cube facilities capable of withstanding a Category 5 hurricane for pre-staging emergency equipment (e.g., generators and fuel tanks) for disaster events, to serve as a relief operations center following a disaster, and for storage of large/heavy maritime cargo handling and servicing equipment that will be required to remove debris and clear the harbor for relief activities.

Figure 7.26 – Temporary Tension-Fabric Structure, Port of Los Angeles
(Source: W.F. Anonsen, The Maritime Group)

Passenger access options include:

- Passenger Access Option 1: Temporary, Mobile Staging
    - Use temporary, mobile equipment (gangway, water barriers, moveable barricades, covered awnings) to direct and secure passenger access between cruise vessels berthed at Pier 1 and the Pier 2B Cruise Terminal, or the new semi-permanent or permanent terminal at Pier 2A. Temporary, mobile staging may be used to facilitate passenger access for port calls or partial-turnover passenger, not for full passenger turnovers. See **Figure 7.27.**
- Passenger Access Option 2 - Elevated, Retractable Walkway
    - Create an elevated, retractable walkway from the existing terminal at Pier 2B or new permanent Pier 2A terminal building to the knuckle between Piers 1B and 2A. The walkway would be extended to the gangway of a cruise ship berthed at Pier 1 for safe and comfortable passenger access to the terminal. This alternative is not contemplated for Terminal Building Option 2 – Temporary/Semi-Permanent Tension-Fabric Structure. **Figure 7.28** shows an example of an elevated walkway from Port of Saint John, New Brunswick, Canada.

Figure 7.27 – Temporary Barriers Used to Demark Cruise Passenger Access
(Source: W.F. Anonsen, The Maritime Group)

Figure 7.28 – Elevated Cruise Passenger Walkway, Port of Saint John, NB, Canada
(Source: W.F. Anonsen, The Maritime Group)

The terminal building and passenger access options produce the following three alternatives for a consolidated cruise terminal at Pier 2:

1) Consolidated Terminal Alternative 1: Semi-permanent building with mobile staging.
2) Consolidated Terminal Alternative 2: Reconfigure existing cruise terminal building
    a. With mobile staging
    b. With a retractable walkway
3) Consolidated Terminal Alternative 3: New permanent cruise terminal building
    a. With mobile staging
    b. With retractable walkway

7.5.1.3 Piers 10 and 11 Cruise Terminal

DOTH has jurisdiction over the waterside uses and improvements at Piers 10 and 11, including the pier and apron; ATDC is the authority for land use and development decisions regarding the landside areas of Piers 10 and 11, including use of the existing terminal buildings. The ultimate use of Piers 10 and 11 will be determined by DOTH and ATDC based on the best interest of the State and public. Engagement among DOTH, ATDC, the cruise industry and interested private developers is a necessary part of the decision-making process. The HHMP recommends that plans for the Piers 10 and 11 terminal remain flexible to accommodate a variety of future development scenarios. Recommendations include:

- Renovation Alternative 1 – Modernize the Piers 10 and 11 Cruise Terminal for cruise operations only. Redevelop the terminal into a modern facility with improved circulation for pedestrians, passenger ground transportation and ship provisioning and service vehicles.
- Renovation Alternative 2 – Redevelop Piers 10 and 11 as a shared-use facility, combining cruise terminal operations and retail/commercial uses. Improve circulation for pedestrians, passenger ground transportation and ship provisioning and service vehicles.
- Renovation Alternative 3 – Redevelop Piers 10 and 11 for retail, commercial and/or office use only. Relocate all cruise operations to the consolidated Pier 2 Cruise Terminal. See **Section 7.5.1.2** for additional discussion about the consolidated cruise terminal alternative.

Regardless of which development scenario is undertaken, infrastructure upgrades to sewer, water, power/communication and drainage should be undertaken as necessary to support redevelopment of Piers 10 and 11 sheds for exclusive or shared cruise terminal use.

Cruise ship operators indicated that Piers 10 and 11 are suitable for port calls and partial passenger turnovers, and for smaller cruise vessels. They noted that the existing facilities can accommodate a turnover of approximately 1,000 passengers (500 on and 500 off). Although the terminal has handled full turnover of passengers under special circumstances, cruise operators prefer berthing at the Pier 2 Cruise Terminal for full turnovers due to the larger, dedicated facilities for passenger processing and ground transportation. Cruise operators noted that they would consider using Piers 10 and 11 more if the terminal is improved for passenger flow and ground transportation circulation. See **Figure 7.29.**

Figure 7.29 – Piers 10 and 11 Cruise Terminal – Vessel Berthing and Apron Service Area

Floor area for turnover operations within the Piers 10 and 11 sheds could be doubled if a mezzanine level is added and if the Pier 10 Cruise Terminal building area, currently under lease to HPU, is opened for cruise terminal use. Within the Pier 10 shed, there is an estimated interior renovation footprint of 46,700 SF with a roughly 6,000 SF exterior upper-level pier-side gallery space and potential to expand the interior mezzanine level for an additional 40,000 SF of usable space. The Pier 11 shed structure has a similar interior ground-level renovation potential of roughly 46,700 SF and upper-level exterior gallery space of 6,000 SF. The interior upper-level mezzanine could be expanded to provide an additional 21,400 SF of usable space. The Piers 10 and 11 shed was listed on the Hawaiʻi Register of Historic Places in 2021, therefore modifications to the structures must comply with HRS Chapter 6E, historic preservation review requirements. See **Figures 7.30** and **7.31**.

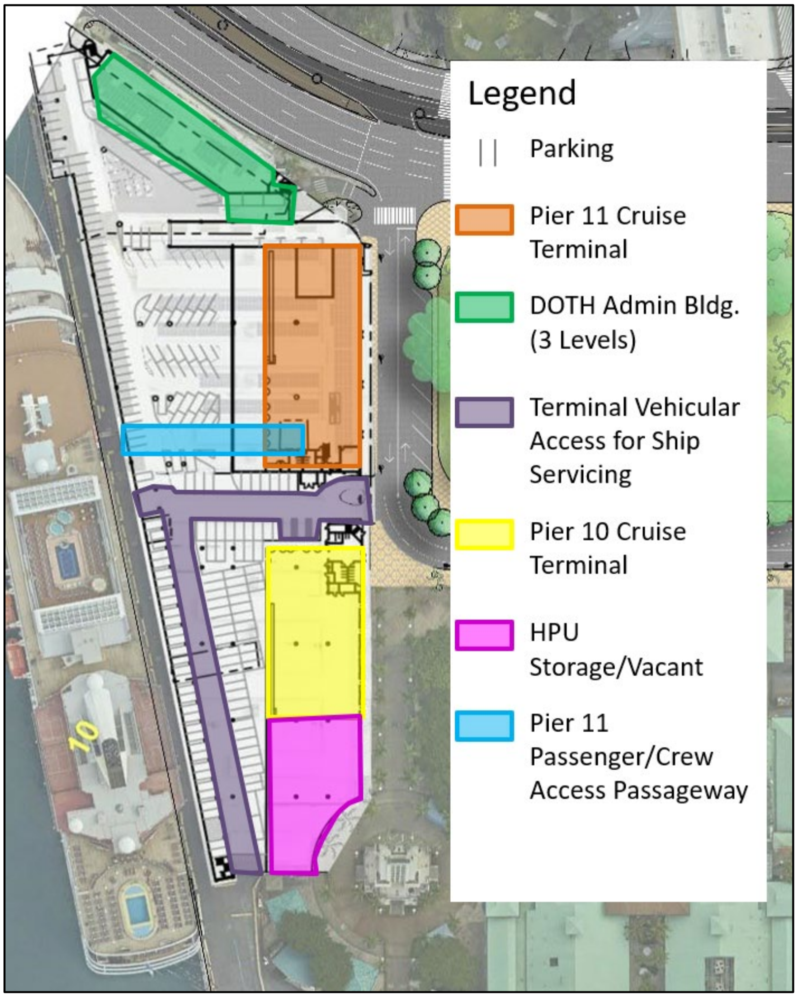

Figure 7.30 – Piers 10 and 11 Existing Configuration – Ground Level

Access and circulation for ground transportation and ship provisioning vehicles at Piers 10 and 11 are difficult due to space constraints within the shed and at the apron, and due to traffic congestion on Aloha Tower Drive. For safe and efficient operations and passenger convenience, passenger queuing and ground transportation need to be staged curbside or within a few hundred yards of the cruise terminal and require overhead cover for protection from sun and rain. The existing walkway fronting the Pier 11 Cruise Terminal becomes quickly congested by the surge in activity from exiting passengers and staging for ground transportation. According to the cruise operators, the vehicle staging area should accommodate ten standard 50- to 55-FT buses and six 25- to 35-FT buses for a typical call. The available lanes fronting the terminal provide storage for only two to three standard 55-FT buses. Currently, buses stage on Aloha Tower Drive and Bishop Street adjacent to the HECO power plant or at Piers 19 and 20 until they are called to pick up passengers in front of the Piers 10 and 11 Cruise Terminal.

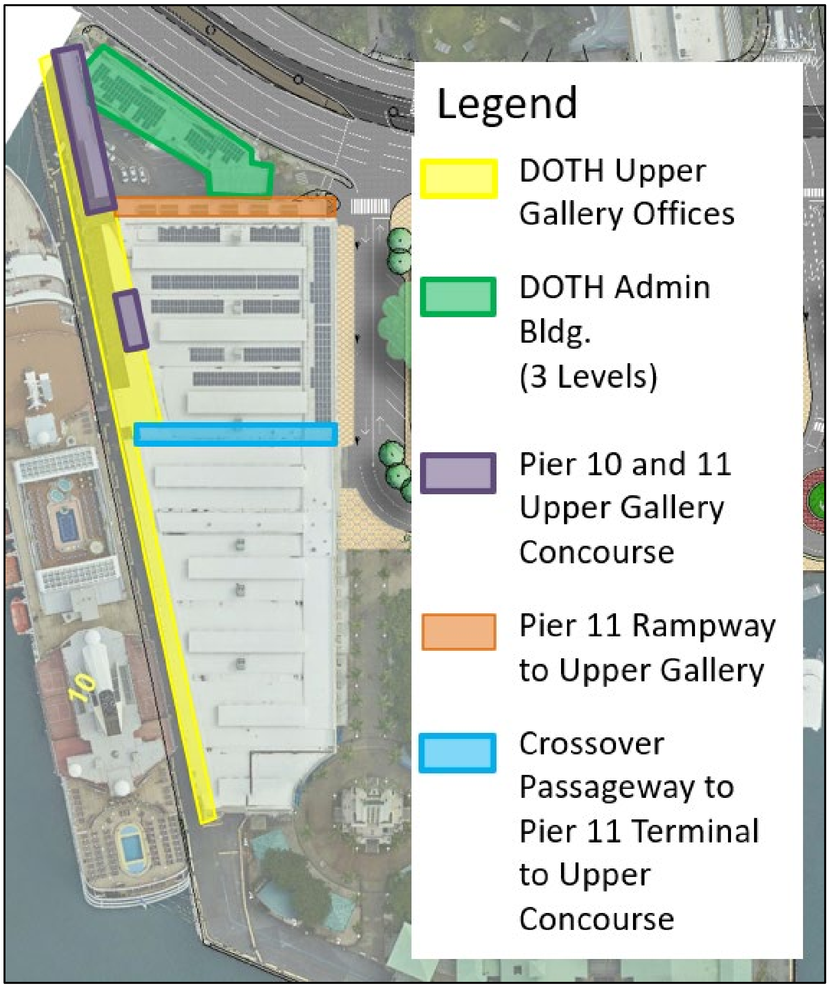

Figure 7.31 – Piers 10 and 11 Existing Conditions – Upper Gallery Level

Ideally, circulation and staging of buses for passenger transport and shore excursions should place the bus with its doors facing the terminal so passengers are shielded from active traffic lanes when boarding, which means buses need to enter Aloha Tower Drive/Fort Street from Nimitz Highway. The Nimitz intersection at Aloha Tower Drive/Fort Street does not accommodate west-bound left-turn-in movements into Aloha Tower Drive, only right-turn-in movements from the east-bound direction. This is inconvenient for a majority of buses that serve the cruise terminal, which are largely bringing passengers to/from Waikīkī or are queuing near the HECO power plant and must return to the terminal building via circuitous routes through downtown streets. The existing circulation works for buses staged at Piers 19 and 20, which upon arrival make a right-turn from Nimitz Highway into Aloha Tower Drive/Fort Street. Cruise passenger ground transportation activity typically occurs during the morning when passengers are heading out for shore excursions. This timing is compatible with the ground transportation that serves nighttime dinner cruises and opens possibilities for shared staging facilities.

Typical ship provisioning requires approximately twelve 40-FT container trucks, garbage trucks and miscellaneous service vehicles. These vehicles must access the pier-side apron area by circulating on Aloha Tower Drive and maneuvering through the Piers 10 and 11 shed building which contains numerous structural support columns. Provisioning vehicles typically access the terminal building via Aloha Tower Drive from Bishop Street as they are unable to make a right-turn into the terminal building coming down Aloha Tower Drive/Fort Street from Nimitz Highway. See **Figure 7.32**.

Figure 7.32 – Piers 10 and 11 Cruise Terminal Transportation Constraints

The HHMP recommends the following improvements to better accommodate cruise terminal facility operations at Piers 10 and 11 under Alternatives 1 and 2. See **Sections 7.6.2.3** and **7.6.2.4** for additional discussion about public waterfront maritime development concepts for Piers 10 and 11.

- Renovate the Piers 10 and 11 Cruise Terminal building to expand the upper-level pier-side gallery and interior mezzanine space to improve passenger processing and baggage operations, as well as for retail, commercial, eating establishments and office use.
- Maintain the historic integrity of the existing terminal building and the overall setting of the Aloha Tower area by limiting major building renovations to interior spaces.
- Consider modifying the Nimitz Highway Pier 11 shed entrance for use by ship service and provisioning vehicles to access the pier apron. Eliminating this in-bound truck and service vehicle traffic from Aloha Tower Drive would address some traffic flow issues when cruise ships are in port. In this configuration, the provisioning vehicles would enter the terminal from Nimitz Highway at *mauka* end of Pier 11 and exit the terminal building onto Aloha Tower Drive east bound. This modification would displace existing parking stalls at the DOTH Administration building which would need to be replaced in an offsite location, such as a new parking structure at Piers 5 and 6.
- Renovate the Piers 10 and 11 sheds interior spaces to eliminate support column obstructions and improve motor vehicle access to pier side for ship provisioning and servicing.
- Create a new bus staging area adjacent to Pier 7 for joint use by cruise passengers and day excursion and dinner cruise passengers. Provide covered bus shelters and orientation signage for passenger comfort. This area would supplement the staging area in front of the Piers 10 and 11 Cruise Terminal building. This area is located approximately 750 FT from the Cruise Terminal building.
- Extend the existing eight-inch gravity sewer line to the Piers 10 and 11 bulkhead to provide shore-to-ship sewer connection for cruise ships at berth. The existing sewer system is generally adequate for renovation of Piers 10 and 11; however, older components of the system will need to be replaced. Sewer system upgrades are subject to CCH approval of a SCA to confirm adequate capacity in the municipal sewer system.
- Upgrade the existing old and deteriorated water system, including the existing four-, six- and eight-inch water pipes up to the 12-inch and 16-inch water mains in Nimitz Highway, with new water pipes, valves and boxes and meters sized to supply adequate flow and water pressure to support shore-to-ship water for cruise ship operations while at berth and to supply potable water for redevelopment of the Piers 10 and 11 sheds based on water demand calculated for the designed building program. Water system upgrades will also need to meet BWS and NFPA requirements for fire protection.
- For additional circulation and access recommendations, see **Section 7.6.2.4.**

7.5.2 Day Excursion, Ferry and Water Taxi Operations – Piers 5 to 11

The HHMP recommends that Piers 5 through 11 be improved for continued day excursion and water taxi operations, potential future ferry service, and for layberth. This section summarizes facility deficiencies at Piers 5 through 11 followed by specific recommended improvements for each pier. See **Figure 7.33**.

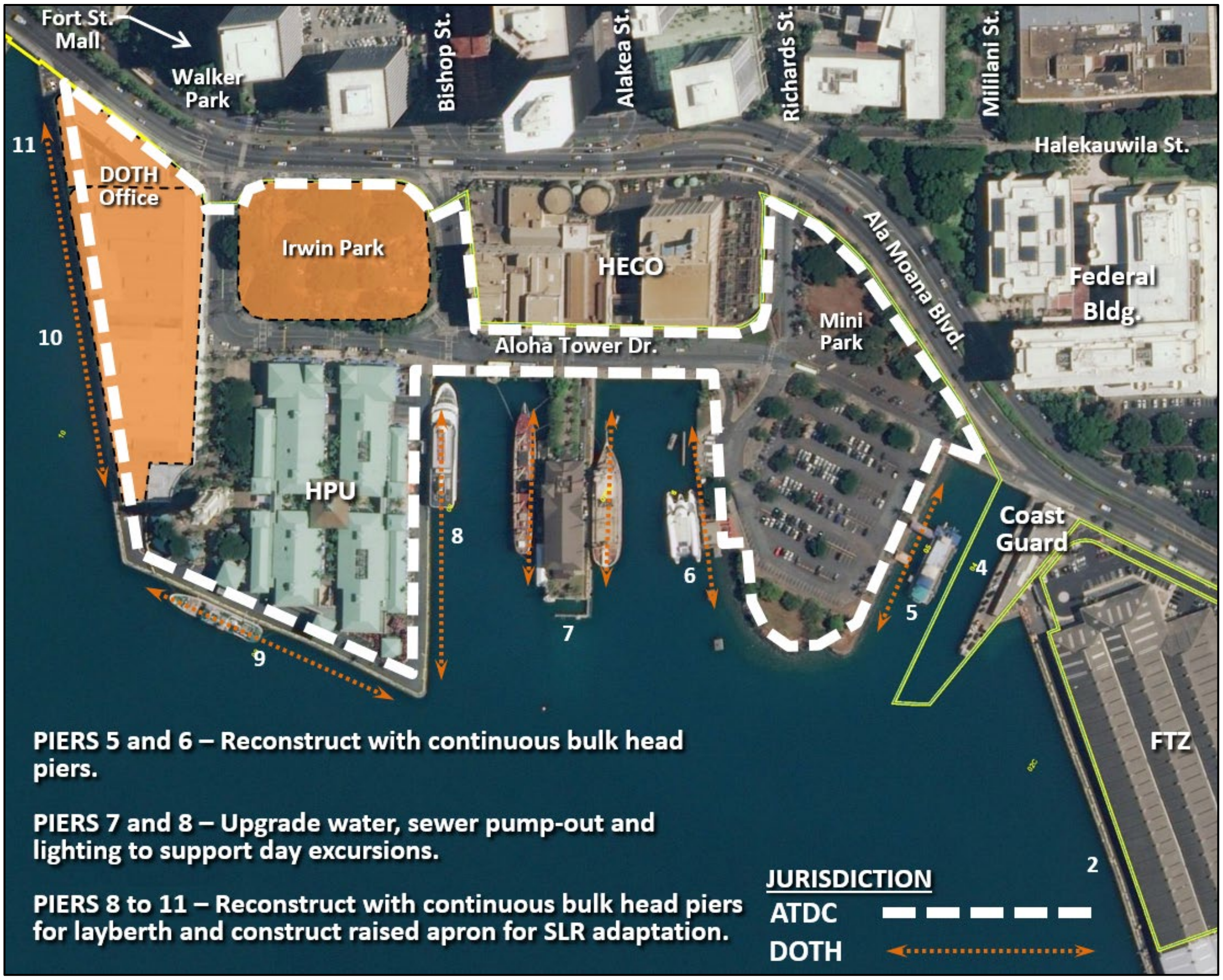

Figure 7.33 – Piers 5 to 11 Proposed Improvements

Piers 5 and 6 – The existing Piers 5 and 6 currently utilize mooring dolphins for berthing, which place berthed vessels away from the land edge and take up additional space in the slipway. Dolphin location also limits the use of the pier to specific vessel configurations and points of access and requires use of extended over-water gangways for passenger embark and debark. Continuous piers, of bulkhead construction, would accommodate a wider range of vessels and allow for more flexible use, would be more resilient, create more navigational space within the slipways and support safer vessel and passenger operations by allowing vessels to berth closer to land. The HHMP recommends the following specific improvements to Piers 5 and 6.

- Replace revetments and dolphins with continuous piers using sheet pile/bulkhead construction to improve berthing for day excursion vessels, ferry service and layberth.
- Consider installing floating docks off the bulkhead pier for smaller passenger vessel operations.
- Integrate pier improvements and vessel operations with landside, public waterfront maritime redevelopment. See **Section 7.6.2.1** for additional information about Piers 5 and 6 landside redevelopment concepts.
- Replace the existing water meter, which is aged and in poor condition, with a new water meter and upgrade the downstream water pipe, valves, boxes and meters to supply shore-to-ship water for day excursion vessel operations at the Piers 5 and 6 berths.[37]
- Extend the existing 8-inch sewer collection system to provide shore-to-ship sewer connection for day excursion vessels at berth. The existing sewer infrastructure is adequately sized for proposed redevelopment of landside areas of Piers 5 and 6, subject to CCH approval of a SCA to confirm adequate capacity in the municipal sewer collection and treatment system.

Pier 7 – In recent years, Pier 7 has been used for long-term layberth by the idle, semi-derelict vessel: the Falls of Clyde. Removal of this vessel opens the pier for use by active, day excursion, ferry or water taxi vessels. Pier 7 has an existing sewer line that can be used to pump out wastewater from passenger vessels. The sewer line is not sized to handle demand from landside uses combined with passenger-excursion vessel pump-out and should be upsized if Pier 7 is actively used for passenger vessels. The HHMP recommends the following specific improvements to Pier 7.

- Replace and upsize the existing old and undersized water pipes with new water pipes, valves, boxes and meters to supply adequate flow and water pressure to support shore-to-ship water for day excursion vessel operations and to supply potable water for redevelopment of the Pier 7 landside area based on water demand calculated for the designed building program.
- Extend the existing 8-inch sewer collection system to provide shore-to-ship sewer connection for day excursion vessels at berth. The existing sewer system is adequately sized for day excursion operations and proposed redevelopment of landside areas of Pier 7, subject to CCH approval of a SCA to confirm adequate capacity in the municipal sewer system.

[37] Shore-to-ship water improvements in the Aloha Tower area are the responsibility of DOTH unless they are constructed as part of redevelopment of adjacent landside areas under negotiated agreements with ATDC and a private developer.

Pier 8 – Pier 8 is currently used for day excursion and dinner cruise operations. The berth does not provide adequate utility connections (wastewater, water and power) to service this use. Lacking connection to the sanitary sewer system while at the berth, the day excursion vessel must routinely put out to sea to discharge wastewater. In addition, Pier 8 lacks a dedicated area for pre-voyage passenger staging, orientation and entertainment, and the pier side area lacks adequate lighting which impacts operational efficiency, safety, and detracts from the passenger experience. The HHMP recommends the following specific improvements to Pier 8.

- Replace and upsize the existing old and undersized water pipes with new water pipes, valves, boxes and meters to supply adequate flow and water pressure to support shore-to-ship water for day excursion vessel operations.
- Extend the existing 8-inch sewer collection system to provide shore-to-ship sewer connection for day excursion vessels at berth. The existing sewer system is adequately sized for day excursion operations, subject to CCH approval of a SCA to confirm adequate capacity in the municipal sewer system.
- Improve nighttime lighting to support day excursion / dinner cruise operations.

Piers 9 and 11 – Piers 9 and 11 are assessed as 'Poor' condition and Pier 10 is assessed as 'Serious' condition, which indicates these piers should be repaired or reconstructed with moderate urgency. In addition, at Piers 8 through 11 the projected SLR of 3.2 FT by 2060 will reduce the pier face freeboard to less than the minimum 5-FT freeboard required for day-passenger vessels, cruise vessels and layberth. The HHMP recommends the following specific improvements to Piers 8 through 11.

- At Piers 8 through 11, construct a minimum 16-FT wide raised apron at the pier edge using sheet pile/bulkhead construction to form a sea wall at the pier face to adapt to projected 3.2 FT SLR by 2060 and maintain minimum design freeboard of 5 FT for day excursion vessels and layberth. Keep the landside areas at their current height behind the sea wall to avoid redevelopment costs and disruption to existing land uses. Install motor vehicle access ramps onto the raised apron.
- See **Section 7.5.1.3** for Piers 10 and 11 utility and access recommendations, and **Section 7.6.2.3** for Piers 10 and 11 waterfront development concepts.
- No utility improvements are recommended for Pier 9.

7.6 Public Waterfront Development

The Aloha Tower complex and Pier 38 Fishing Village comprise the public waterfront component of the HHMP and offer opportunities for public shoreline access, commercial/retail and restaurant uses, and community enjoyment, which are otherwise unpermitted in Honolulu Harbor. One of the goals of the HHMP regarding public waterfront development is to promote the highest and best use of these areas, which in addition to the economic considerations include strengthening community connection to the waterfront and recognizing the historic and cultural importance of the harbor.

As aforementioned, however, while the public waterfront is comprised of both areas, the Fishing Village is under a long-term lease, which extends beyond the HHMP horizon. The HHMP supports the continuation of existing uses within the Pier 38 Fishing Village area that encourage public access and focuses on recommendations to the Aloha Tower complex, most of which is subject to ATDC authority and HPU lease conditions.

DOTH has jurisdiction over the waterside uses and maritime improvements at the Aloha Tower complex, from Piers 5 through 11, including the pier and apron areas, as well as jurisdiction over the entire Pier 7. ATDC is the authority over land use and development decisions for most of the landside areas of the Aloha Tower complex (see **Sections 3.5.1.2, 3,5.2.1 and 6.2.4,** and **Figure 7.34**). Decisions about development and uses in the area will be determined by DOTH and the ATDC based on the best interest of the State and public. Engagement among DOTH, ATDC, interested private developers, the maritime community and other interested parties is a necessary part of the decision-making process.

It is important to recognize that under HRS 206J, ATDC was given jurisdiction over land use decisions at Aloha Tower by the Hawaiʻi Legislature for the purpose of *"redevelopment of the Aloha Tower complex to strengthen the international economic base of the community in trade activities, to enhance the beautification of the waterfront, and in conjunction with the department of transportation, to better serve modern maritime uses, and to provide for public access and use of the waterfront property."* While modern maritime uses are a consideration in ATDC's mandate, they do not have the same priority as in DOTH's mission statement. ATDC must look at development alternatives that make the highest and best use of the landside areas, potentially to the exclusion of maritime uses, such as the cruise operations at Piers 10 and 11 which make only part-time use of the facilities. Expanding retail and commercial development at Aloha Tower is one foundational component of an approach to revitalize economic activity in the area, strengthen *mauka-makai* and Downtown connections, and reengage Hawaiʻi's residents with the Aloha Tower complex and the Honolulu Harbor waterfront.

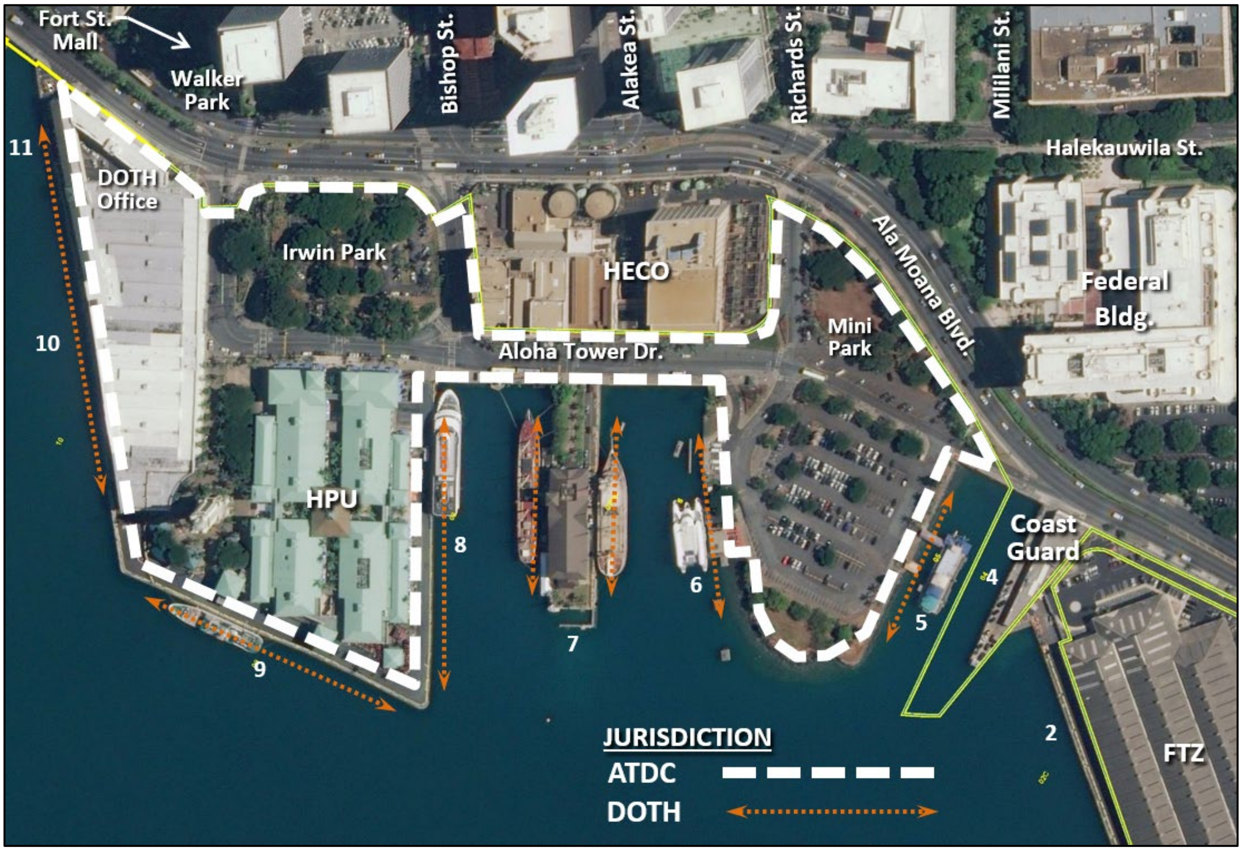

Figure 7.34 – Aloha Tower Complex Jurisdiction

7.6.1 Aloha Tower Complex 2050 Vision

Due to its waterfront location; public shoreline access; historical significance; and proximity to Downtown, Chinatown, and Kakaʻako; the Aloha Tower complex provides unique development and re-development opportunities within the HHMP. The complex stretches from the at-grade parking lot at Piers 5 and 6 to the Aloha Tower Marketplace and Pier 11.

In the past, the Aloha Tower Marketplace was an active area with commercial/retail establishments enjoyed by residents and visitors alike. When Piers 10 and 11 were Honolulu Harbor's primary destination for port calls, averaging more than 100 annually during the height of cruise operations in Hawaiʻi, it made for bustling activity at the Marketplace. However, with the development of the dedicated cruise terminal at Pier 2, cruise operations at Piers 10 and 11 decreased to about 30 ships annually. The reduction in cruise passenger activity, among other things, contributed to the decline of the retail/commercial establishments at the Aloha Tower Marketplace, which was exacerbated by the lack of adequate parking that created challenges in attracting residents to the area. The relocation of HPU's operations to Aloha Tower Marketplace in 2015 introduced university students and personnel to the area. Despite the addition of HPU's presence though, the complex continues to be underutilized.

The HHMP envisions a re-energized Aloha Tower complex and the return of the community to the waterfront. General themes proposed during the outreach process to support this vision include:

- Celebrating the past, present, and future of Honolulu Harbor.
- Strengthening and reconnecting the community to the shoreline.
- Reinvigorating the harbor with annual celebrations, such as Polynesian Voyaging Society (PVS) educational events, canoe regattas, and Boat Days (see **Figure 7.35**).

Figure 7.35 – Celebrating Hawai'i's Maritime Culture and History

7.6.2 Aloha Tower Complex Development Concepts

In support of these three major themes, the HHMP recommends the following development concepts for consideration by DOTH, ATDC and potential developers. The development concepts provide a high-level vision and broad framework for ATDC and potential developers. Ultimately, ATDC and potential developers will determine which development concepts are economically viable for the location. See **Figure 7.36**.

The concepts presented in the following sections represent a multi-pronged approach to fulfill the vision for the Aloha Tower complex and include aspects of cultural recognition and celebration; transit and pedestrian orientation; and circulation and connectivity.

Figure 7.36 – Aloha Tower Complex Development Concept

7.6.2.1 Piers 5 and 6 Development Concepts

The redevelopment concept for the landside areas of Piers 5 and 6 envisions consolidation with the Ala Moana minipark just *mauka* of the existing at-grade parking lot to maximize the redevelopment footprint of the area. For conceptual planning purposes, it is assumed a redevelopment footprint of 143,200 SF is achievable at this site. A multi-story development with structured parking wrapped by a mix of uses to activate ground-level pedestrian spaces could be designed for the area. The mix of uses could include:

- Retail/commercial/office
- Cultural heritage/education center to possibly include space for a museum, permanent exhibits, and cultural activities
- Special event space
- Offices for maritime operators, day excursion/tour retail front
- Boutique hotel
- Maritime museum
- NOAA Science Center
- Structured or mechanized parking

The waterfront could be improved with a continuous pedestrian path and landscaping. The existing open/park space along the perimeter of Piers 5 and 6 and the potential 143,200 SF redevelopment area should be maintained and enhanced with generous landscaped areas and tree-lined sidewalks, to include preserving and maintaining the existing shower trees along Ala Moana Boulevard. *Pa hula* (grassed mound used for hula performance) and other community amenities should be provided to invite the community to the area and support opportunities for gatherings and celebrations, both formal and informal, along the waterfront. The existing minipark with naturalized shoreline at the *makai* end of Piers 5 and 6 should also be maintained with an extension of Pier 6 to create a potential viewing platform with educational displays for the coral outplanting offshore of the minipark. The existing ramp support structures remaining in the water between Piers 6 and 7 could be reused to support a point of interest feature, such as pedestrian bridge spanning the slipway.

The area is envisioned to house most of the Aloha Tower complex's parking needs including the parking required under HPU's lease. The parking structure could be designed with flat decks rather than double helixes to allow the structure to be repurposed and redesigned into useable space should future parking demand decrease. As an alternative to a traditional parking structure, a mechanical parking system could be used to maximize the number of cars that can be stored within a smaller footprint.

Access to Ala Moana Boulevard from the Waikīkī end of the Aloha Tower complex would be maintained as an exit-only from the interior parking areas. Improved sidewalks with safe crossings should be provided to enhance the connection to the Pier 2 Cruise Terminal. A potential gateway feature or sculpture could also be installed in the landscaped area fronting the existing flagpoles to visually connect pedestrians with wayfinding cues to the Aloha Tower complex. This corner also aligns with Mililani Street, which leads directly to ʻIolani Palace, and provides an opportunity to recall the historic connection between the palace and the harbor and the prominence of the aliʻi complex along the waterfront.

Preliminary massing studies of a potential four-story and ten-story structure are provided in the 3-D renderings shown in **Figures 7.37** and **7.38**. A ten-story structure was used as the basis for the massing study as it approximates the height of the adjacent HECO structures and thus provides continuity of scale for the area. The first four stories are envisioned as the building pedestal containing parking in the interior spaces with retail and commercial space around the outer perimeter. Considerations for the design of the structure should include:

- Wrapping mixed uses around the ground floor to activate pedestrian spaces.
- Elevating the lowest inhabitable floors to be above the anticipated 3.2 FT SLR with additional freeboard or plan for the lowest floors to adapt to potential flood conditions over time, if not.

Figure 7.37 – Massing Concept, Rendering 1

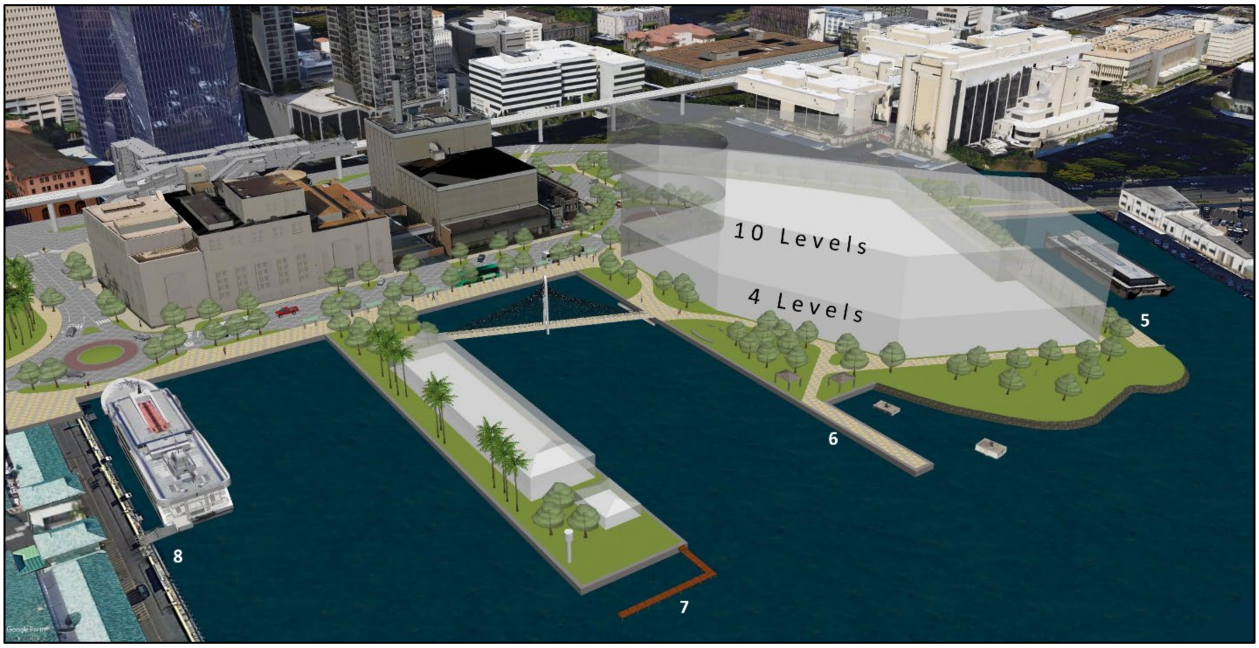

Figure 7.38 **– Massing Concept, Rendering 2**

Regardless of the final development plan, the water meter and downstream distribution system will require upgrading based on water demand calculated for the designed building and land use program. The fire water system is in acceptable condition. However, a fire sprinkler system which meets NFPA 13 standards will need to be constructed within the proposed multi-story building. In addition, exterior fire protection consisting of 6-, 8- and 12-inch fire lines, fire hydrants, and meter will need to be constructed to BWS standards to support redevelopment of the landside area.

7.6.2.2 Pier 7 Development Concepts

The former Maritime Museum structure at Pier 7 has extensive termite damage and is recommended to be examined for any reuse potential via a structural condition assessment. Should the structure be deemed unsalvageable, a new structure with a potential redevelopment footprint of 18,000 SF could be built on the pier. Future uses may include, office or retail space, exhibit area, or cultural educational center. In addition, the PVS berth at the southern end of the pier could be reestablished and a support shed built to complement potential educational programs PVS could host at the pier. Any new structures built on Pier 7 would have to ensure the view of the navigational day boards at the end of Pier 7 and near Pier 8 at the Aloha Tower Marketplace are not impacted or blocked.

7.6.2.3 Piers 10 and 11 Development Concepts

The existing sheds at Piers 10 and 11 are part of the historic Aloha Tower Cruise Terminals built in the 1920s and are therefore recommended to be preserved. The high interior spaces and exterior gallery along the upper mezzanine provide an opportunity for a variety of adaptive reuse options for the historic structures. As discussed in **Section 7.5.1.3.**, the Piers 10 and 11 sheds currently accommodate cruise passenger terminals, parking, and some storage space. The sheds could be redeveloped by ATDC to a shared use facility accommodating both cruise operations and retail/commercial or fully converted to retail/commercial/office use.

Within the Pier 10 shed, there is an estimated interior renovation footprint of 46,700 SF with a roughly 6,000 SF exterior upper-level pier-side gallery space and potential to expand the interior mezzanine level for an additional 40,000 SF of usable space. The Pier 11 shed structure has a similar interior ground-level renovation potential of roughly 46,700 SF and upper-level exterior gallery space of 6,000 SF. The interior upper-level mezzanine could be expanded to provide an additional 21,400 SF of usable space. The Piers 10 and 11 sheds are listed on the State Register of Historic Places, therefore modifications to the structures must comply with HRS Chapter 6E, historic preservation review requirements.

Redevelopment of the Piers 10 and 11 sheds will require upgrades to sewer, water and fire protection systems. Recommended improvements to Piers 10 and 11 utilities and access are described in **Section 7.5.1.3**.

7.6.2.4 Aloha Tower Complex Access and Circulation

In developing the access and circulation concepts for the Aloha Tower complex, several scenarios were analyzed by Randy Okaneku of The Traffic Management Consultant (TMC) in 2020 and 2021 including one-way, two-way, and a mix of both traffic circulation patterns. Based on the limited access to and from the area, TMC recommended maintaining two-way traffic patterns on all streets within the complex and adding roundabouts at the termini of Bishop and Richard Streets at Aloha Tower Drive to allow vehicles looking for parking to circulate within the Aloha Tower complex and not have to exit the complex and circle back to the area. While eastbound vehicles will be allowed to exit the complex from Aloha Tower Drive onto Ala Moana Boulevard, TMC also recommended converting Richards Street to two-way traffic and signalizing the *mauka*-bound Richards Street exit with a no right-turn-on-red. Richards Street currently provides only one-way traffic into the Aloha Tower complex. In addition, TMC recommended reverse-in angled street parking where possible on Aloha Tower Drive. See **Figure 7.39**.

To support the anticipated increase in pedestrian traffic in the area due to HART's Downtown Station, wider sidewalks with shade trees are recommended throughout the Aloha Tower complex. A minimum 25-foot-wide pedestrian promenade is envisioned to connect the Pier 5 to Pier 8 areas.

Shade trees, bus shelters, and benches should also be provided along this promenade. Bicycle lanes are also recommended throughout the area to connect to the bicycle lanes on Nimitz Highway and Bishop Street and the proposed facilities on Ala Moana Boulevard and Richards and Halekauwila Streets (O‘ahu Bike Plan 2019).

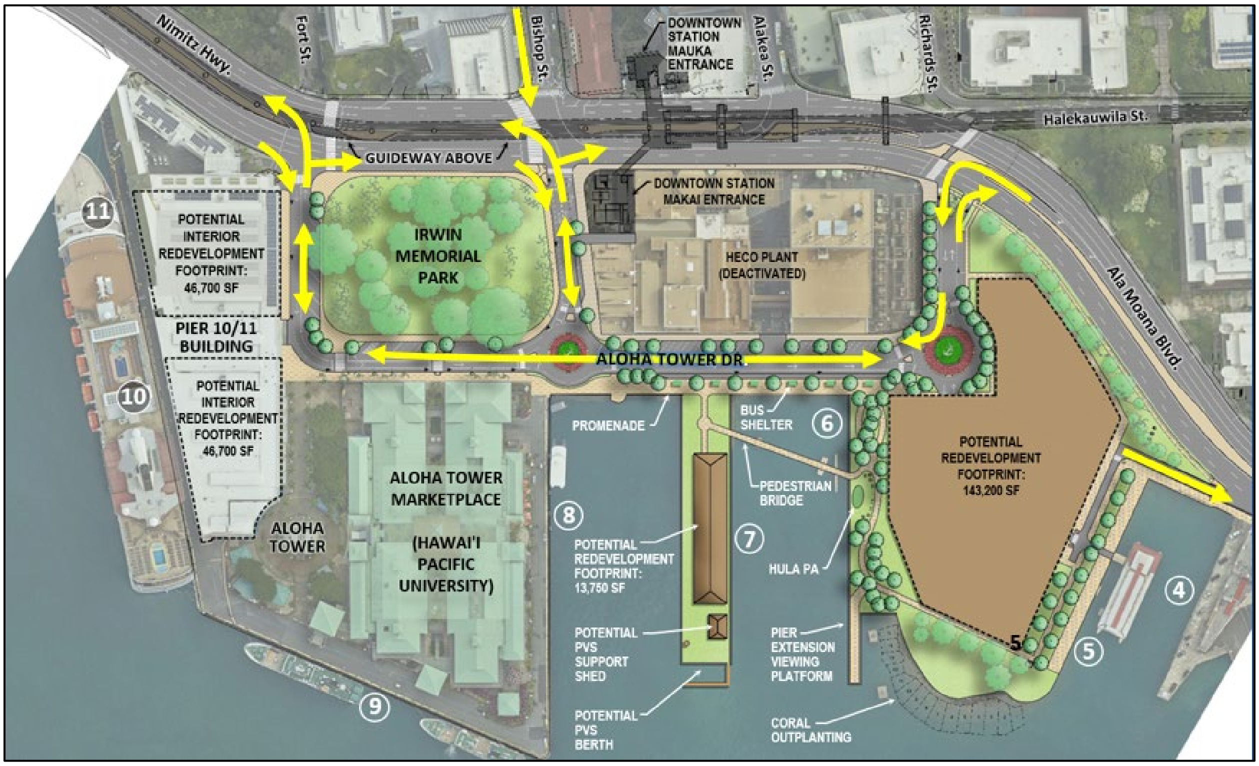

Figure 7.39 – Proposed Traffic Circulation at Aloha Tower Complex

7.6.3 Public Waterfront Development Guidelines and Considerations

The following guidelines are proposed for consideration by DOTH, ATDC, prospective developers, and Native Hawaiian and community stakeholders. These guidelines serve to support the overall goals of reconnecting the public to the Honolulu Harbor Waterfront, with a focus on the primary public waterfront areas at the Aloha Tower complex and the Piers 36 to 38 Fishing Village, but conceptually encompassing other waterfront areas in Honolulu Harbor and along the South Shore of O‘ahu, as well as *mauka-makai* connections. These guidelines provide a framework consistent with the concepts discussed in previous sections:

- Involve those who have lineal ties and *kuleana* (responsibility) to provide input and contribute in meaningful ways to the development of the Aloha Tower complex and other public waterfront improvements.
- Reconnect community to the water, where feasible, especially in locations where tradition cultural practices were held.
- Create awareness of historic and cultural resources.

  - Create interpretive and educational signage with relevant cultural information. Aside from the Aloha Tower complex, signage should be considered for other areas of the harbor with public interface. Signage could highlight historic features and stories about the harbor's history and development.
  - Effectively manage iconic historic architectural resources within the Aloha Tower complex and minimize modifications that would detract from its historic character and setting. Design of any new structures should be compatible with the historic structures. Considerations for materials, scale, context, views, and orientation include:
    - Similar materials between historic and new structures.
    - Level and quality of textures and details to create relatable human scale.
    - Variety of massing and streetscape to leverage visual and physical connections throughout the area.
    - Reference Secretary of the Interior's (SOI) Standards for Historic Properties.[38]
- Enhance *mauka-makai* connections to Iwilei, Chinatown, Downtown and Kakaʻako by coordinating with DOT-HWY, CCH, HECO and property owners on the *mauka* side of Ala Moana Boulevard and Nimitz Highway to enhance pedestrian facilities (e.g., cross walks, signage).
  - Improve pedestrian crossings at Aloha Tower Drive/Fort Street to Walker Park, at Bishop Street, and at Richards Street.
  - Use unique pavement textures and colors, signage and other physical motifs to visually emphasize the crossings to help reconnect the Aloha Tower complex with Downtown and unify the area.
  - Integrate wayfinding and pedestrian- and bicycle-oriented improvements at key, publicly-accessible harbor locations (e.g., Pier 38 and Aloha Tower) with regional pedestrian, bicycle and transit improvements to encourage residents and visitors to walk or bicycle to those locations.
  - Incorporate landscaping, street furniture, and interpretive signage along these key *mauka-makai* corridors.
  - Create economic and cultural synergies along these pathways.
- Improve connectivity between the Pier 2 Cruise Terminal, the Aloha Tower complex, and the Pier 38 Fishing Village.
  - Improve signage and wayfinding to orient the public and provide education on the significance of these areas and the stories that connect them.

[38] SOI's Standards for Historic Properties: https://www.nps.gov/tps/standards.htm

  - o Use design motifs and textures in pavements and common design elements in landscaping, including the use of coastal native plants and “canoe” plants,[39] to reinforce Honolulu Harbor’s maritime character and function and the harbor’s historic and cultural ties to Native Hawaiian culture.
  - o Consider implementing a shared-use, multi-modal path instead of a traditional sidewalk to connect these locations.
  - o Work with DOT-HWY for improvements within the ROW.
- Enhance wayfinding
  - o Incorporate more and better signage.
  - o Consider using technology-based tools/apps.
  - o Coordinate with the CCH's wayfinding efforts.
- Consider and integrate all modes of transportation at the Aloha Tower complex and as a means of connecting Pier 2, the Aloha Tower complex and the Pier 38 Fishing Village.
  - o Develop a pedestrian-oriented promenade along the *makai* side of Aloha Tower Drive – widen sidewalks (25 FT minimum width) and include bus pull-outs to support cruise and day excursion operations.
  - o Consider pedestrian-friendly street concepts such as roundabouts and Woonerfs (shared-streets).
  - o Coordinate pedestrian improvements with the HART rail station and TheBus public transit system, including providing a bus stop and pull-out along Aloha Tower Drive.
  - o Make accommodations for shuttle services, rideshare services, etc., between these locations.
  - o Provide bicycle lanes and parking.
- Enhance public waterfront streetscapes with:
  - o Street trees – consider native kou to honor historic name for the area.
  - o Include benches and bus shelters, for example at the extended bus pullout near Pier 7.
  - o Use artistic sidewalk pavements relevant to the history/culture of the harbor and to highlight the pedestrian spaces and activate the streetscape.
  - o Add design features in the centers of the proposed roundabouts.
- Plant native, hardy, easy-to-maintain landscaping species, including “canoe” plants.

[39] Canoe plants are the plants that were originally brought to Hawaiʻi by the ancient Polynesians. The Polynesians came here by canoe, thus the name “canoe plants” was given to these plants.

7.7 Administration and Harbors Operations

The HHMP recommends the following facility improvements to support maritime administration and operations at Honolulu Harbor.

- Pier 2 - Renovate the historic DOH building for use as administrative office space by DOTH or a maritime operator.
- Pier 11 – Renovate the historic Hale ʻAwa Kū Moku building for continued administrative use either by DOTH or as leased office space. Consider opportunities for integrating the administrative/office use with public waterfront development concepts for the Aloha Tower complex.
- Pier 19 – Relocate the DOTH Oʻahu District Baseyard from its current location on Sand Island Access Road to a new interim location at Pier 19.
    - Renovate the Pier 19 shed and SuperFerry Terminal to create office, maintenance shop and storage space for Oʻahu District Baseyard operations.
    - Use adjacent yard areas for fleet vehicle parking and equipment storage. Pave fleet vehicle parking areas, as necessary. Consider providing EV charging stations to support partial conversion of fleet to electric power (see **Sections 4.2.1.1** and **8.2.1**).
    - Maintain the existing security fence separation within the Pier 19 shed to separate cargo operations from baseyard use.
    - Maintain the Hawaiʻi Pilots' existing driveway access from Nimitz Highway, facility space and berthing at Pier 19.
    - Maintain the existing driveway access at Nimitz Highway and Kukahi Street to the Piers 19 and 20 cargo terminal.

7.8 Education and Research

The UH Marine Center, located at Pier 35, and HPU, located at the Aloha Tower Marketplace, comprise the primary activities/users within the Education and Research land use areas. HPU is responsible for developing and maintaining its facilities according to the terms of its lease. Recommended improvements to the piers and maritime facilities at Aloha Tower are described in **Sections 7.5.1.3** and **7.5.2**. Additional development concepts for the Aloha Tower complex are described in **Section 7.6.2**.

At Pier 35, the existing pier and landside facilities are adequate to support the research vessels and operations at this location. However, the projected SLR of 3.2 FT by 2060 will reduce the pier face freeboard to less than the minimum 5-FT required for research vessels and workboats. The HHMP therefore recommends the following improvement to Pier 35:

- Based on periodic risk assessments, including reassessment of SLR projections and rate of SLR increase, construct a minimum 20-FT wide raised apron to form a sea wall at the pier face to adapt to projected SLR of 3.2 FT by 2060. Keep the landside areas at their current height behind the sea wall to avoid associated redevelopment costs and disruption to existing land uses. Install motor vehicle access ramps onto the raised apron.

7.9 Layberth and Anchorage

7.9.1 Berths and Layberths

According to the 2050 berthing demand projections presented in **Chapter 5**, linear berthing capacity must increase by approximately 2,000 LF to maintain an optimal berth utilization rate of 30 percent at unscheduled piers and 50 percent at scheduled piers in the harbor. These utilization rates allow for minimal berthing conflicts within the pier and more efficient operations.

The HHMP recommends two locations in the harbor to develop a total of 2,160 LF of new berth facilities. See **Figure 7.40.**

Potential New Layberth (LF)	
Projected New Layberth Need	1,921
Potential New Layberth	
Tyco Pier	1,200
Pier 38 (for fishing vessels)	960
Total	2,160

Figure 7.40 – Proposed New Layberth and Anchorage

- The Tyco Pier at Sand Island consists of two existing mooring dolphins and a concrete pier that combined accommodate 600 LF of berthing. The Tyco Pier is currently not included in DOTH's berth inventory; however, the water side of the Tyco facility could be brought under

DOTH jurisdiction for layberth use. The HHMP recommends adding mooring dolphins along the edge of Sand Island at the Tyco Pier to increase the layberth to 1,200 LF.

- At Pier 38, the HHMP recommends developing 960 LF of new berth for use by fishing vessels, work boats and as layberth. This segment of new berth should consider a combination of sheet pile/bulkhead construction and floating docks.

In addition to the recommended new layberth, the HHMP identifies the following additional underutilized piers that will become available through built and/or operational improvements:

- Pier 7 provides approximately 900 LF of berthing. The west side of the pier is currently occupied by the Falls of Clyde, which is slated for removal from Honolulu Harbor. The east side of the pier was occupied by the derelict passenger ship Kulamanu, which was removed from the harbor in 2019. The availability of Pier 7 for active passenger vessels and layberth will help relieve berthing demand in the harbor.
- Piers 22 and 23 provide approximately 900 LF of underutilized berthing. The segment of these piers that is not part of "Tug Row" (Piers 21 and 22), has been used for long-term storage of inactive small workboats and passenger vessels. Use of these piers is constrained by the dry-dock operations at Piers 24 and 25, and by the condition of the pier and subsurface rock outcroppings that affect navigation. Recommended improvements to these piers (see **Section 7.3.5**) will make them useful for active use by workboats, passenger boats and as layberth.

7.9.2 Anchorage

The HHMP recommends that the DOTH request USCG approval of a fourth offshore Honolulu Harbor / Māmala Bay Anchorage. The addition of a fourth offshore anchorage will increase capacity to accommodate projected increases in cargo activity at Honolulu Harbor and provide the Harbor Master with more flexibility to manage cargo vessel calls at the harbor. See **Figure 7.40**.

7.9.3 Navigational Improvements and Aids to Navigation

The current configuration of Honolulu Harbor's navigation transit channels and turning basins has remained largely unchanged since World War II and has not been updated to accommodate the increasing size of vessels (see **Figure 7.41)**. Honolulu Harbor's narrow channels, including the 500-FT wide Main Entrance Channel and 400-FT wide (defined navigation width) Kapālama Transit Channel, and the limited maneuvering area in the two turning basins presents operational and navigational challenges for large vessels. Larger vessels have more surface area above the water line, called "free board," that acts as a sail in windy conditions, making navigation in the harbor more challenging. Trained pilots and updated tugboat technology have helped operators accommodate these challenges; however, additional small-scale and large-scale improvements could further improve navigational safety in the harbor.

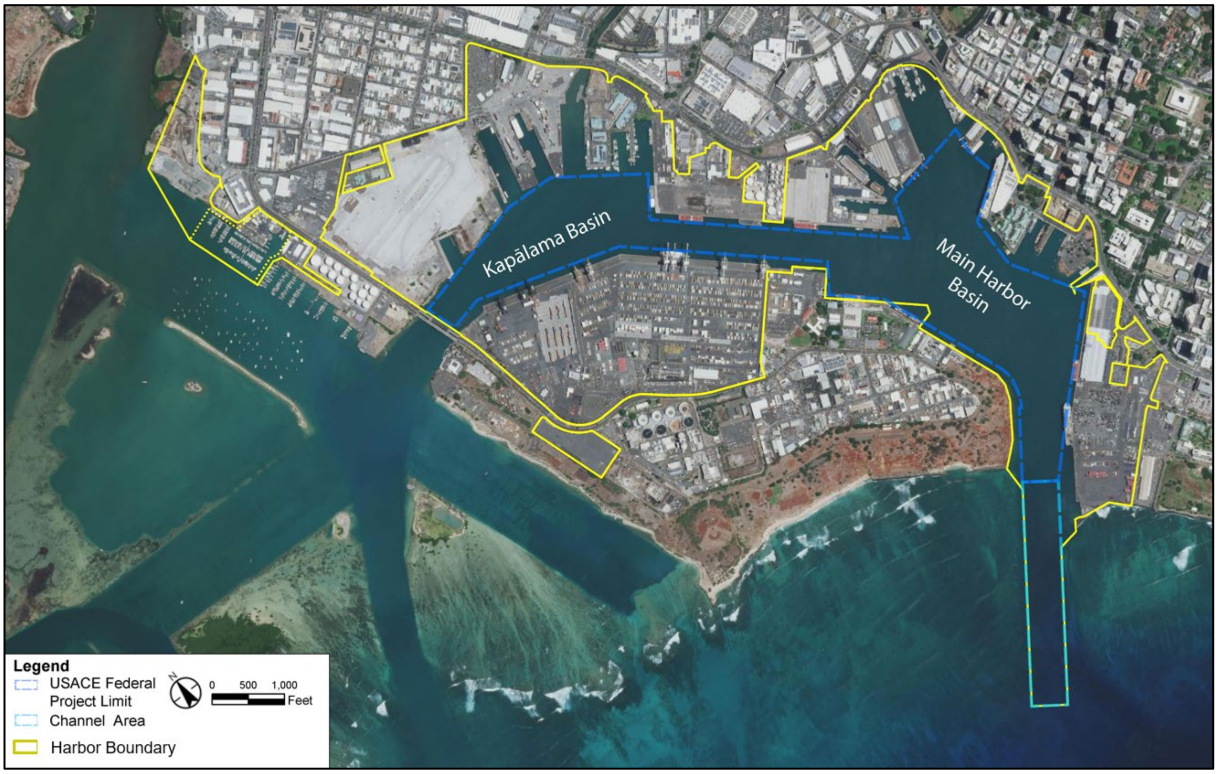

Figure 7.41 – USACE Federal Project Limit

Representatives from the maritime community identified numerous small-scale aids to navigation that would improve navigational safety in Honolulu Harbor. Installation of wind monitors to gauge atmospheric conditions, and deployment of buoys that capture accurate real-time environmental information can help pilots and ship operators understand water currents and assess how existing environmental conditions may affect navigation. The data collected could be used in coordination with DOTH, vessel operators and harbor pilots to develop minimum and maximum parameters for environmental conditions to ensure safe navigation. Installation of navigation ranges (day boards and night ranges with light markers) would aid inbound and outbound vessels transiting through the Kapālama Transit Channel by providing visual reference points to align the ships course. Automatic Identification System (AIS) for Aids to Navigation (AtoN) radar system, could provide an additional tool to improve safe navigation. The AIS AtoN radars offer one of many options for navigational aids in case a hurricane destroys the DOTH Control Tower radar system. In addition, the maritime community noted that more nighttime lighting would improve visibility and navigational safety. The installation and maintenance of navigational aids is generally the jurisdiction of the USCG and therefore outside of the scope of the HHMP.

Major navigation improvements (e.g., channel widening, deepening the draft depth, and opening a second channel entrance) involve improvements within the federal project limit, which is under the jurisdiction of the USACE (see **Figure 7.41**). DOTH should coordinate with the USACE to conduct a feasibility study to evaluate costs and benefits of these navigation improvements.

The harbor's Main Entrance Channel adjacent to Pier 1 (Fort Armstrong Terminal) has a depth of 45 FT, a defined navigational width of 500 FT and an overall width of 730 FT between the edge of Sand Island and the face of Pier 1. It is the only access to the harbor for ship transit. A preliminary, high-level channel widening analysis conducted for the HHMP (see **Appendix N**) determined that the existing entrance channel width is acceptable for the largest vessels (up to 135-foot-beam Ovation Class cruise vessels) that typically call at Honolulu Harbor, but slightly undersized for larger vessels (158-foot-beam Aframax/Suezmax cargo vessels) that occasionally call at the harbor.[40] See **Figure 7.42.** The proximity of Pier 1 adjacent to the navigation channel must also be considered when scheduling arrival/departures by large cargo vessels and berthing at Pier 1. See **Section 7.2.1** for additional discussion about berthing constraints at Pier 1.

Access to the harbor through Kalihi Channel at the north end of Sand Island is conditional and limited to small vessels with drafts of less than 20 FT and air drafts of less than 13 FT due to constraints of the fixed bridge and channel depth. Reopening a second harbor entrance channel would have multiple benefits to navigation. In the event that the main harbor entrance channel becomes blocked by a grounded vessel or storm debris, the "hub" of Hawai'i's hub-and-spoke harbors system would be functionally disrupted and distribution of food, materials and supplies that the state's population and economy depend upon would be significantly impacted. A second harbor entrance enhances port resiliency by reducing the risk of interruption of cargo delivery to Honolulu Harbor and offers an alternate navigation route in and out of the harbor that can improve navigational efficiency.

The HHMP recommends several alternatives for consideration to replace the existing Sand Island Bridge and allow reopening of the second harbor entrance.

- Alternative 1: Fixed bridge with sufficient air draft to allow transit by tug-and-barge operators and commercial fishing vessels. This would relieve congestion in the main entrance channel by redirecting smaller vessel traffic through the second entrance. If the main entrance channel

[40] Aframax and Suezmax cargo vessels require "Conditional Acceptance" by USCG prior to entering the harbor. "Conditional Acceptance" is granted by USCG after evaluating the ability of the vessel to safely navigate the harbor under prevailing conditions.

becomes blocked, tug-and-barge operations could continue to deliver essential cargo to O‘ahu. See **Figures 7.43** and **7.44.**

- Alternative 2: Moveable bridge, such as a swing bridge, bascule bridge or lifting bridge, that would only allow for emergency access to the harbor, including for container cargo vessels. See **Figure 7.45**.
- Alternative 3: Moveable bridge with sufficient air draft that would allow transit by tug, barge and commercial fishing vessels for daily operations but could be opened for container cargo vessels during emergencies when the Main Entrance Channel is inaccessible.

All alternatives would require deepening of the Kalihi Channel. The current authorized depth is 23 FT. For cargo vessels, an authorized depth of 45 FT is recommended, and dredged depth would need to extend the full length of the channel to Māmala Bay.

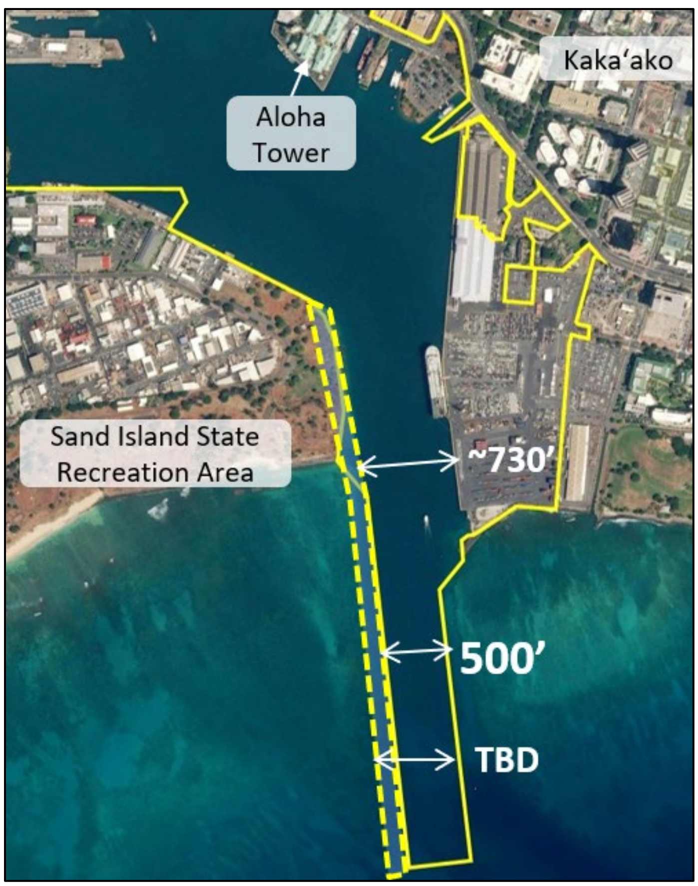

Figure 7.42 – Honolulu Harbor Main Entrance Channel Widening

Figure 7.43 – Existing Bascule Bridge Across Kalihi Channel with 13-FT Air Draft

Figure 7.44 – Example of Bridge with 65-FT Air Draft – Palm Coast Parkway Bridge, FL
(Source: Gletzold, 2010)

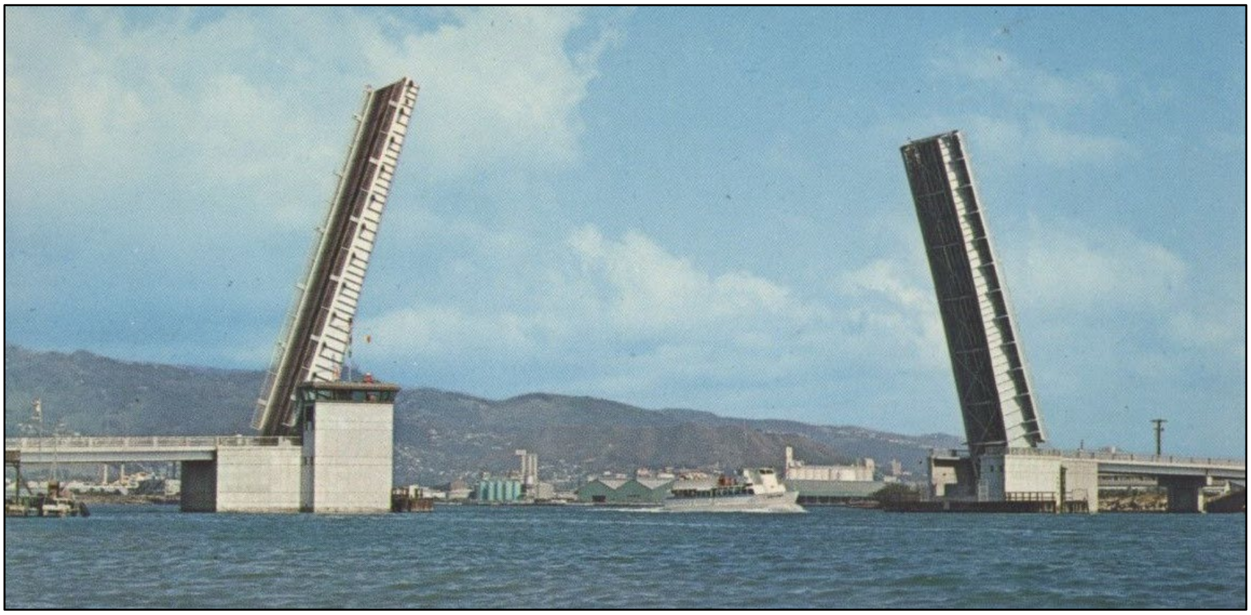

Figure 7.45 – Bascule Bridge Across Kalihi Channel in Open Position
(Source: Bridgehunter, n.d.)

The Kapālama Transit Channel has an available channel width of 400-FT, with a full width of 600-FT between the berth faces on either side of the channel. The preliminary channel widening analysis determined that the required channel width for one-way traffic for a container-cargo vessel is 372 FT. Considering the full 600-FT width of the channel, this leaves approximately 114 FT on either side of the channel or 228 FT on one side for one-way traffic. See **Figure 7.46.** Navigating the channel with a cargo vessel berthed on each side is challenging. **Figure 7.47** offers a view from the bridge of an inbound cargo vessel navigating the channel with cargo vessels berthed at the Sand Island Terminal (left) and an automobile RO/RO vessel berthed at Piers 31 to 33 and a petroleum tank ship berthed at Pier 30 (right). Widening the channel by cutting back the Piers 31 to 33 pier face would allow for ships berthed at the pier to be recessed from the navigation channel and provide an additional margin of safety for transiting vessels. See **Section 7.2.4** for additional discussion on cutting back the pier face. The preliminary analysis conducted for the HHMP also highlighted that the water depth in Kapālama Transit Channel (~40 FT) is shallower than the design depth for a container cargo vessel and petroleum tank ship (42.9 FT).

Figure 7.46 – Kapālama Transit Channel Preliminary Widening Analysis

Figure 7.47 – Navigating Kapālama Transit Channel Inbound (View East)
(Source: Hawai'i Pilots)

The HHMP recommends the following navigation improvements:

- Widen and deepen the operational draft of the Main Entrance Channel, Main Harbor Basin, Kapālama Basin and Kapālama Transit Channel to accommodate all design vessels. Maritime operators noted that the existing harbor depth varies, due to both variation in the design depths and to variable build-up of sediment deposits.
- Reopen a second harbor entrance at Kalihi Channel to accommodate smaller vessels such as fishing vessels, tugboats and barges.
- Dredge and deepen water depths along the pier faces to accommodate the greatest variety of vessels to allow for operational flexibility. Focus on the multi-purpose and non-exclusive dedicated-use cargo piers: 1, 2, 19 and 20, 29, 31 to 33, and 39 to 41, and Sand Island. The recommended minimum depth at all cargo piers is minus 45 FT. Note that projected SLR of 3.2 FT by 2060 may negate the need to deepen the drafts at some piers depending upon the rate of sedimentation at any particular pier.
- Conduct engineering evaluation of impacts of dredging on existing piles and bulkheads and phase dredging with sheet pile/bulkhead reconstruction to prevent undermining pier facilities.

7.10 Development Constraints

7.10.1 Land Management: Long-Term Leases and Land Agreements

There are several long-term leases and land agreements that extend beyond the HHMP's 2050 planning horizon. They include the FTZ, which is established by Executive Order and is under the authority of DBEDT, HPU campus at Aloha Tower, Toell U.S.A. water bottling plant near Pier 23, Pacific Shipyards International at Piers 23 and 24, UH at Pier 35, and the Fishing Village at Piers 36 to 38. Long-term lease areas are highlighted red in **Figure 7.48.** The HHMP makes no recommendations for changes to the lease agreements or to the existing land uses in these long-term lease areas. The HHMP development plan includes recommendations for improvements related to harbor resiliency and adaptation to climate change and SLR that will affect the pier structures along the entire harbor waterfront, including within waterfront long-term lease areas. There are also numerous leases that will expire during the HHMP planning horizon. The HHMP recommends uses in these areas that best serve the needs of Honolulu Harbor and the State.

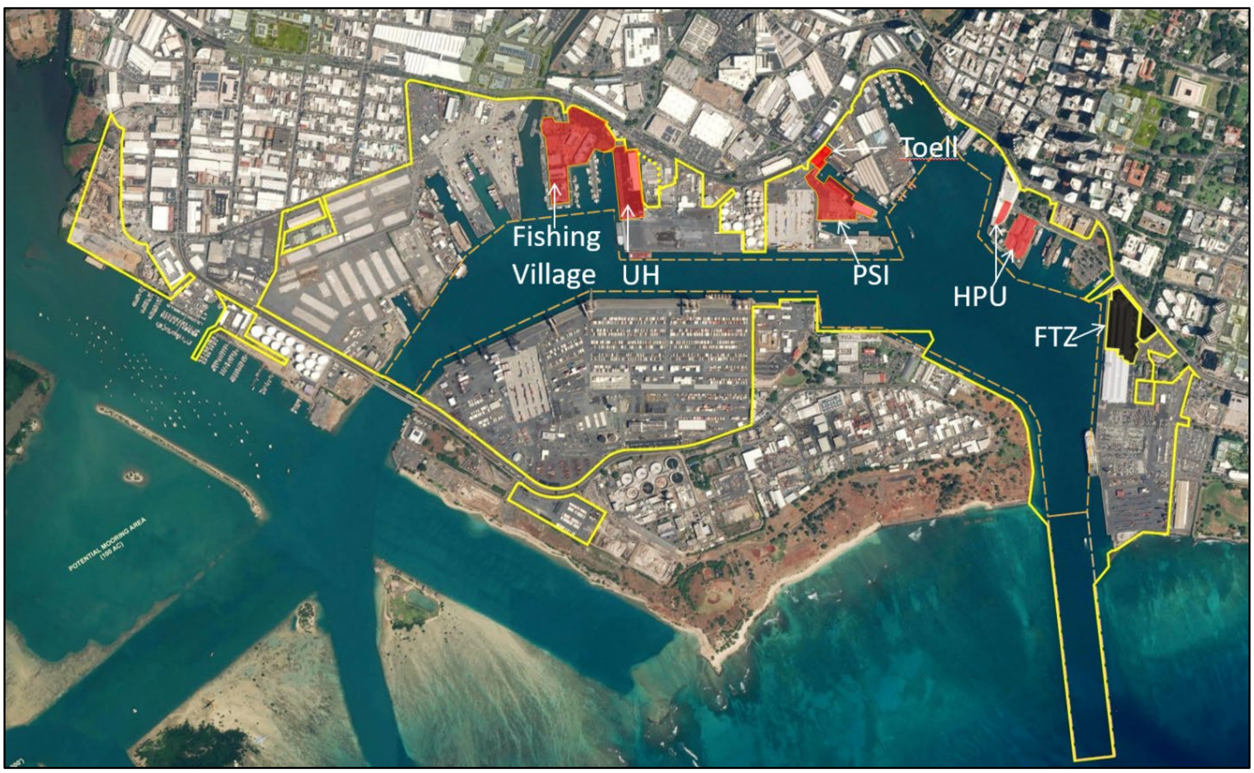

Figure 7.48 – Long Term Leases and Land Agreements

7.10.2 Environmental Constraints

- Wetlands exist throughout Ke'ehi Lagoon and on Sand Island. Within DOTH property, wetland conditions are most likely to occur in Pier 60 backland areas. HHMP projects that might affect wetlands will be subject to consultation and regulatory approval by relevant resource agencies including the USACE, USFWS, National Marine Fisheries Service (NMFS) and the State DOH and DLNR-DOFAW. Mitigation measures to address impacts to wetlands will be developed through the regulatory review process and may include creation of new, compensatory wetland areas to offset the project-related loss of any existing wetlands. See **Figure 7.49**.
- Corals exist throughout Honolulu Harbor and in adjoining offshore areas. A coral transplantation site is designated off the end of the Piers 5 and 6 peninsula for corals relocated due to the construction of KCT. A coral transplantation site is also located in the Pier 12 area. Corals are known to be present in the slipways of the Piers 6 to 9 area and elsewhere within the harbor. Seagrass has been mapped in several areas of the harbor, including the Main Entrance Channel, along the Diamond Head end of Sand Island, and off the Piers 4 to 8 area. See **Figure 7.49**.

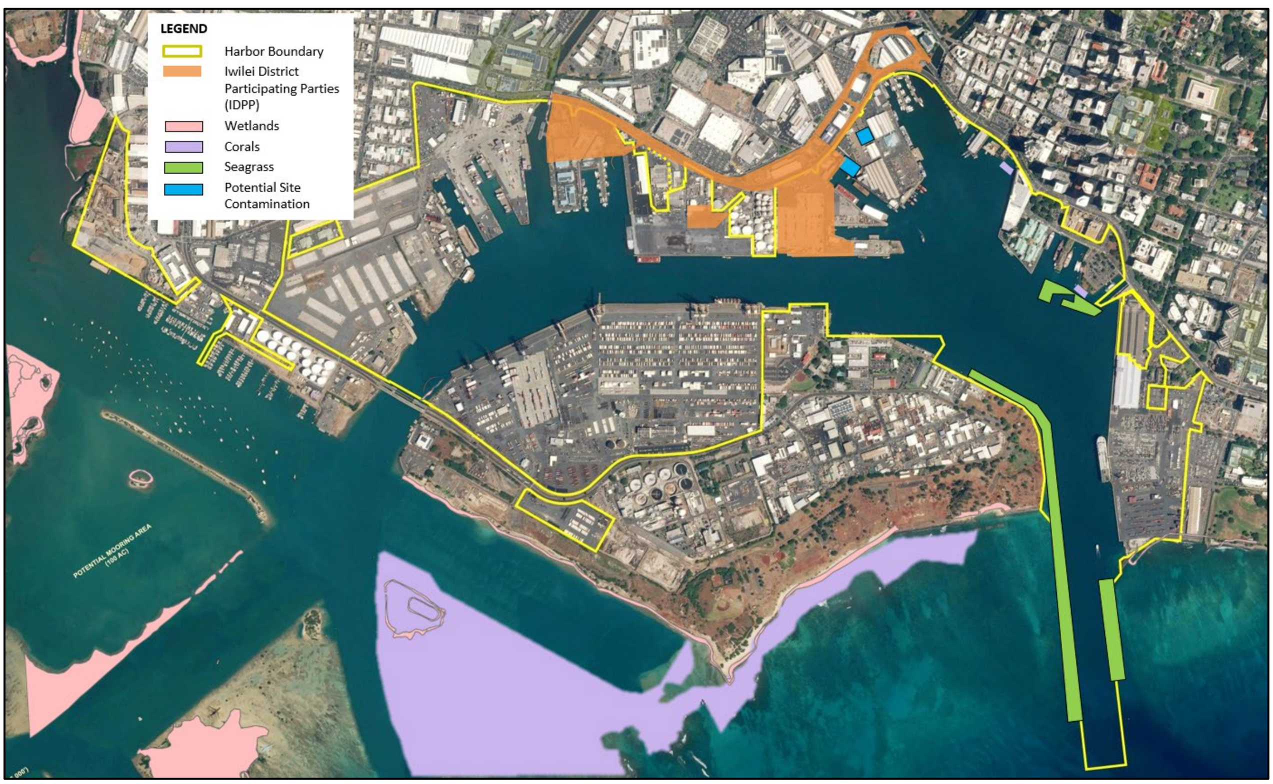

Figure 7.49 – Environmental Conditions
(Sources: USFWS and NOAA)

- Coral reefs and sea grass are considered Special Aquatic Sites under Section 404(b)(1) of the CWA. Planning project-related dredging to avoid coral reef habitat and sea grass meadows will eliminate the need to undertake compensatory mitigation for impacts to these areas. Any in-water work resulting from HHMP recommendations will require USACE DA permits, which require benthic surveys, consultation with relevant resource agencies and appropriate mitigation.

7.10.3 Hazardous Materials

- Many of the structures and sites within Honolulu Harbor property, such as the grain silos at Pier 23, are old and may be contaminated with lead, asbestos, polychlorinated biphenyls (PCBs), pesticides, petroleum products and other contaminants. Renovation, redevelopment and/or demolition of harbor facility structures will require Environmental Site Assessments, possibly including material and soil sampling, to identify the presence of hazardous materials as a basis for determining appropriate mitigation and/or disposal. This work is a routine part of project execution overseen by the DOTH Oʻahu District or by private partners operating under a permit or lease agreement with DOTH.
- There are soil and ground water contaminants throughout the Nimitz Highway Corridor due to historic petroleum operations in the area The Iwilei District Participating Parties (IDPP) is an organization of public and private entities, property owners and businesses that previously operated in certain areas around Honolulu Harbor. IDPP works with the DOH Hazard Evaluation and Emergency Response (HEER) to manage petroleum impacts resulting from its members' historical operations. The IDPP addresses certain petroleum contamination in areas known as "operable units" that are part of three Harbors areas: Piers 24-29, Pier 32 and mauka of Piers 35 to 38. Historic petroleum that was not recoverable is managed in place under DOH-HEER oversight. The IDPP's work area is identified on **Figure 7.50**. The IDPP operable units extend into Harbors property in several locations makai of Nimitz Highway. Work activities in these areas must be undertaken in accordance with an Environmental Hazard Management Plan approved by DOH-HEER, to protect people and the environment. IDPP also manages a network of monitoring wells within the operable units and provides historic information to developers so they may plan appropriately to protect people and the environment. When subsurface construction work is conducted, oily soil and groundwater with oil sheens may be encountered and will require proper handling in accordance with all applicable state, county and federal regulations. Should offsite disposal be required, petroleum sheens and oily soils removed from these areas have to be properly handled and disposed in accordance with all applicable state, county and federal regulations. There is no current information that indicates to IDPP that petroleum contaminants that remain in the soil and groundwater in the IDPP operable units are expected to surface as areas flood and SLR increases, within the time frame of this 2050 Harbors Master Plan. However, the IDPP will work with DOH-HEER to further assess possible changes to historical contaminants resulting from SLR.

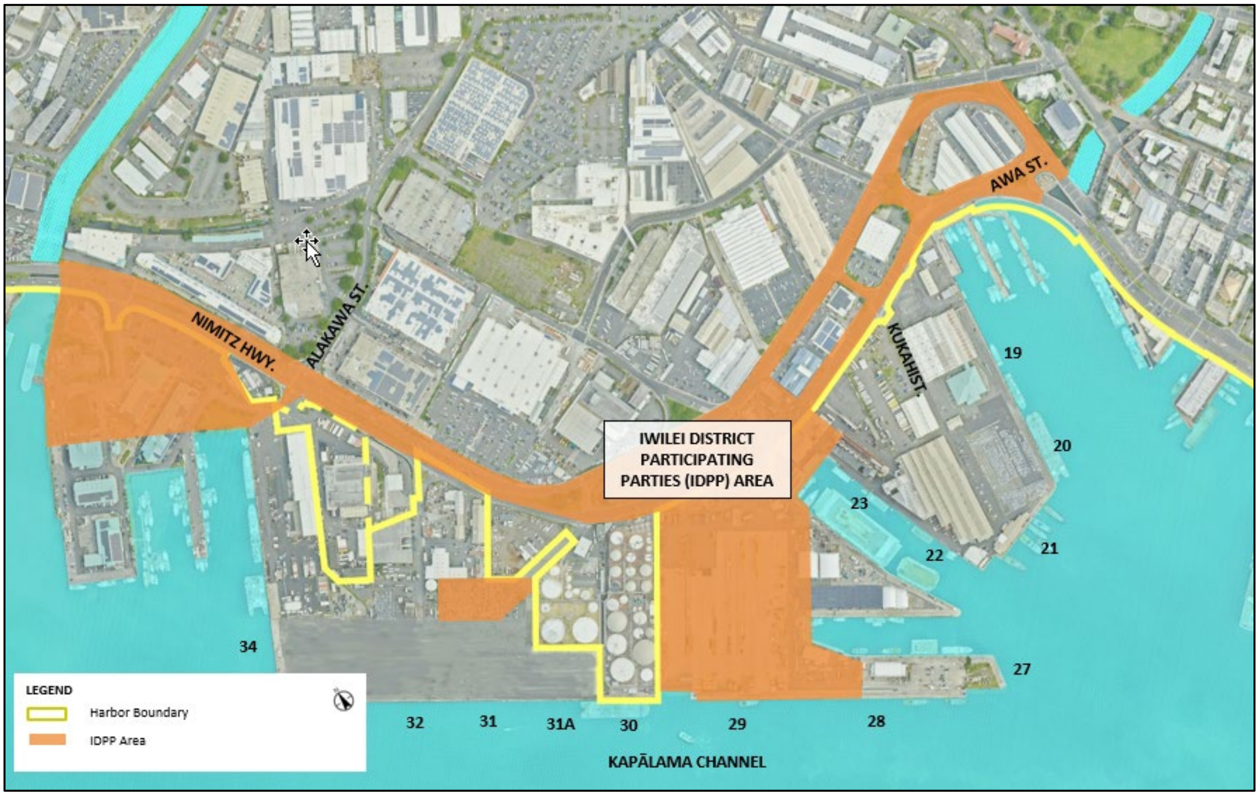

Figure 7.50 – IDPP Area Map

7.10.4 Tsunami Vulnerable Piers

The Honolulu Port Analyses for the Hawaiʻi Tsunami Scenarios (Martin and Chock, Inc., 2017) identified harbor areas that are particularly vulnerable to damage by tsunami. These include areas located more centrally in the interior of the harbor, including Piers 19 to 26, Piers 29 and 30, Pier 35, Piers 39 and 40, and Piers 51 to 53. The risk to these areas results from the return flow of the tsunami water as it retreats from the urban areas *mauka* of the harbor, carrying debris from the land into the harbor. The Piers 1 and 2 area, although impacted, are not identified as among the more vulnerable areas, which suggests support for its designation as the harbor's primary emergency staging/relief pier. See **Section 3.6.2.2.**

7.10.5 Sea Level Rise

The HHMP is consistent with the State guidelines for climate change and SLR adaptation which recommends that plans for improvements to critical infrastructure be based on 3.2 FT of SLR by mid-century. SLR projections are constantly being updated and an accelerated increase in SLR is possible. The HHMP recommends that periodic risk assessments be conducted for Honolulu Harbor including analysis of SLR measurements in the harbor, review of the latest scientific documentation on climate change and SLR, and reassessment of SLR projections. Risk assessments should be coordinated with the work of the Hawai'i Climate Commission, Hawai'i Office of Planning and Sustainable Development (OPSD),[41] DLNR, Office of Conservation and Coastal Land, UH SOEST and Sea Grant College Program, and be used to guide financing, phasing and design of infrastructure improvements in Honolulu Harbor. The HHMP recommends that the principle of flexible design be considered in harbor facility improvement projects. At a general level, flexible design requires that current and near-term projects be designed to preserve space and function to accommodate future adaptation strategies and phased facility improvements in response to changing environmental conditions. In addition, the HHMP recommends that "soft design" and natural solutions, such as beneficial use of wetlands, oyster beds, and vegetated costal buffers, be considered as water quality and SLR adaptation solutions for lands within DOTH jurisdiction where conditions and uses may be appropriate. See **Section 3.6.1.**

7.10.6 Cultural and Historic Resources

Cultural and historic sites and resources exist throughout Honolulu Harbor. These represent both opportunities to highlight the historic significance of the harbor to Hawai'i, as well as constraints that need to be considered in planning for specific areas. A description of cultural and historic resources in Honolulu Harbor is provided in **Sections 3.4.1** and **3.4.2** and summarized as follows:

- Cultural Materials and Human Burials – There are known burials and *Iwi Kūpuna* (ancestral bones) within Honolulu Harbor property, notably at the Interisland Cargo Terminal near Pier 39 and at Pier 15, and a high probability of encountering additional burials, particularly in areas located near the original, natural shoreline along the *mauka* side of the harbor. If *Iwi Kūpuna* or other cultural deposits are found in areas of the harbor, then DOTH must notify SHPD pursuant to HAR §13-280-3. In addition, the HHMP recommends that DOTH undertake early outreach with native Hawaiian individuals, families and organizations who have lineal or ancestral ties to the Honolulu Harbor area to identify potential areas of cultural significance and to guide appropriate treatment of inadvertently encountered *Iwi Kūpuna* and other cultural deposits.
- Numerous archaeological sites and features exist throughout harbor property, many of which are remnants of Honolulu Harbor's history of development, such as the hand-cut and hand-placed coral blocks used in the mid-1800s to create the original pier structure at Pier 12. The HHMP recommends that whenever possible and practicable, these historic remnants be preserved and where appropriate interpreted to highlight Honolulu Harbor's rich history and

[41] Act 178, SLH 2021 tasked OPSD to coordinate among all state agencies to improve the interagency coordination of climate change and SLR adaptation activities.

importance to the State. See **Section 8.8.2** for additional recommendations and **Appendix J** for a complete list of historic sites.

- National and state registers of historic places – Aloha Tower, Irwin Park, Piers 10 and 11 sheds and the Hale ʻAwa Kū Moku Building (DOTH Administration Building at Pier 11 and formerly known as the Matson Navigation Company Building) are listed on the State Register of Historic Places. Aloha Tower is also listed on the NRHP. Other structures located within Honolulu Harbor property are potentially eligible for listing on a historic register, based on findings of the LRFI and RLS prepared for the HHMP (refer to **Appendix K**). In addition, several structures adjacent to harbor land are either listed or eligible for listing, including the historic Immigration Building, the Pier 4 USCG office, and the HECO Downtown Power Plant. HHMP projects that could directly or indirectly affect historic resources will require consultation and approval by SHPD and appropriate mitigation. See **Section 8.8.1.**

7.10.7 HNL Airport Noise Contour

DOTA established noise mitigation contours around the HNL Airport based on the expected noise level of commercial airplanes. See **Figure 7.51**. The 70 decibel (dB) contour, which is approximately the noise level of a vacuum cleaner or heavy traffic, crosses the middle of Honolulu Harbor and includes adjacent areas in Keʻehi Lagoon. The 70 dB contour restricts residential uses. Any uses involving permanent liveaboard vessels or landside workforce housing that are proposed within the 70 dB area require consultation with DOTA. The HHMP does not recommend any residential uses within Honolulu Harbor.

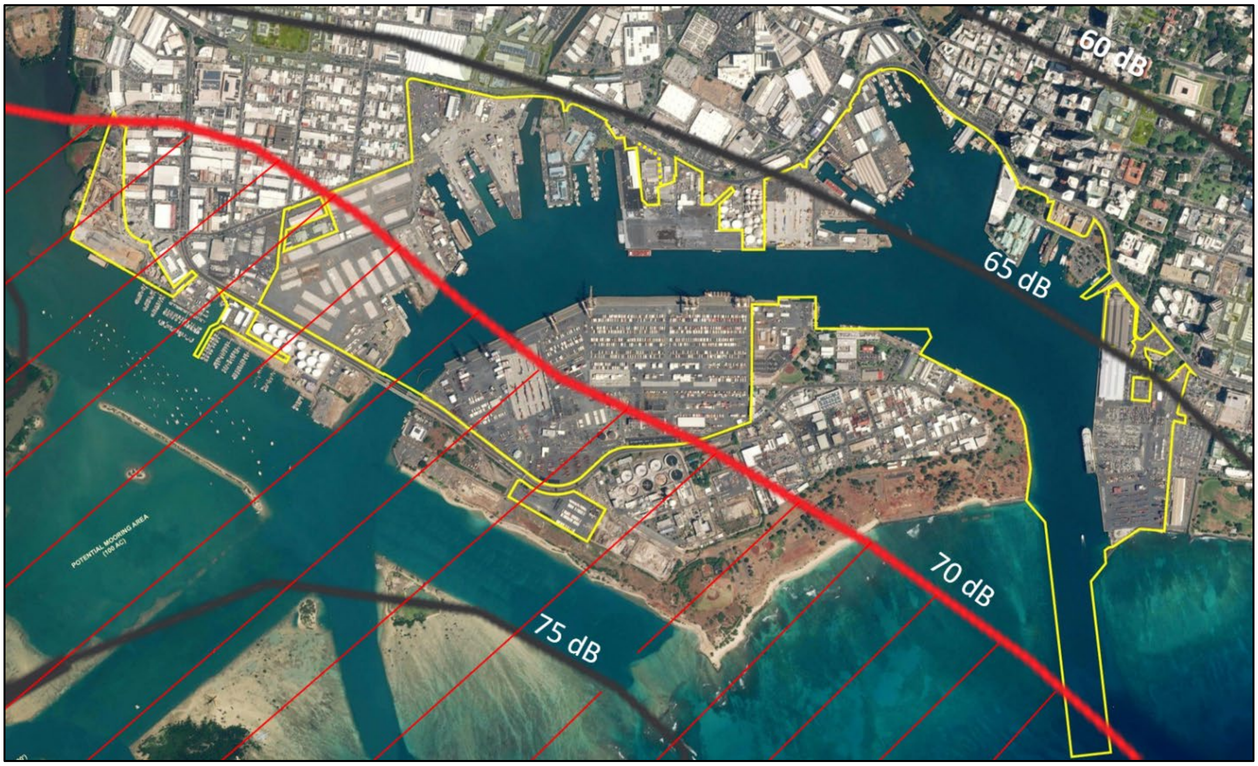

Figure 7.51 – Noise Contours

7.10.8 Height Limits/Airspace Considerations

The USDOT FAA has established a 163-foot-above-msl horizontal surface over Honolulu Harbor per Airspace Regulation CFR, Part 77. In addition, a One Engine Inoperative (OEI) departure slope is established over Honolulu Harbor to accommodate commercial aircrafts under emergency conditions (see **Figure 7.52**). A separate "Thread the Needle OEI" flight path is located over the *mauka* side of the harbor between the Matson's gantry cranes and the iHeart Radio Tower on Dillingham Boulevard. Proposed uses that involve tall structures or equipment such as gantry cranes within these slope areas require evaluation by the FAA through submittal of a FAA 7460-1 Notice of Construction form. The Airlines Committee of Hawaiʻi and DOTA are also consulted through this notification process to determine if mitigation measures are required for structures that exceed these height limits.

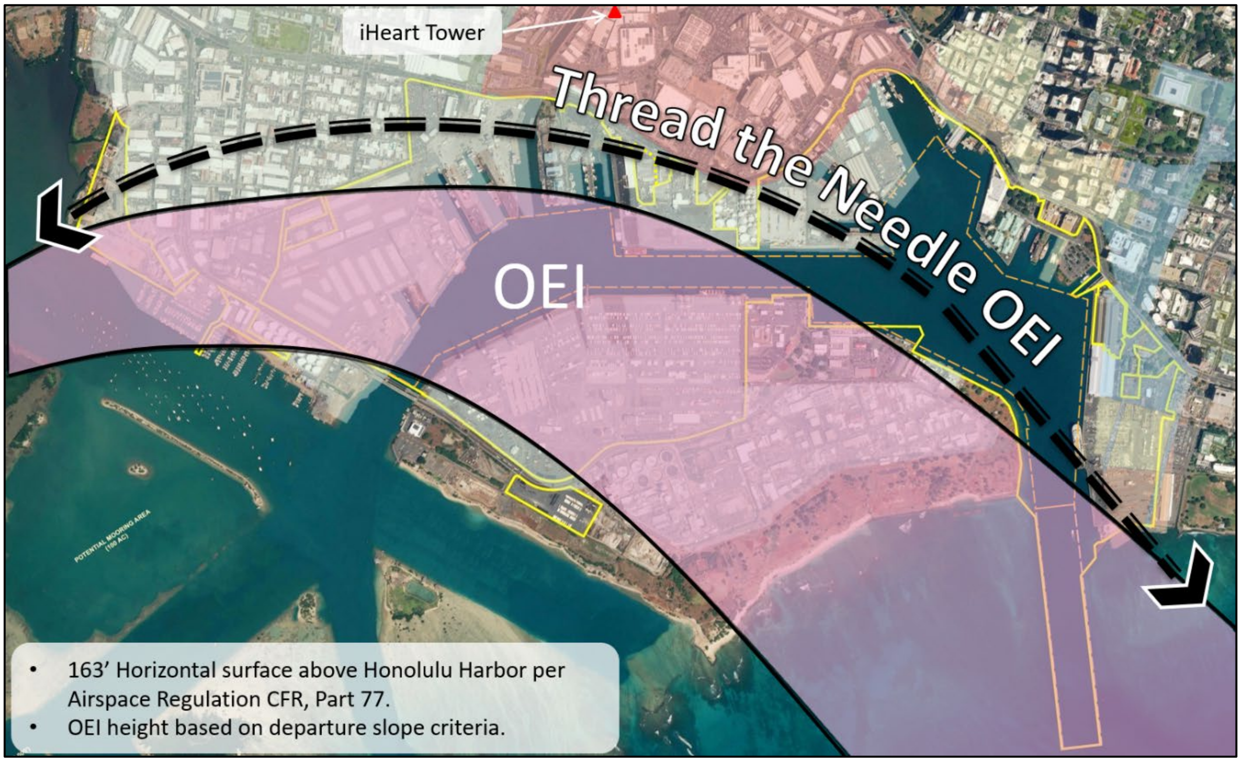

Figure 7.52 – Height Limits and One-Engine-Inoperative Flight Path

8.0 ADDITIONAL RECOMMENDATIONS

8.1 USACE Feasibility Study

DOTH is partnering with the USACE to conduct a feasibility study for various improvements to navigation and port resiliency at Honolulu Harbor. The project is being initiated in the latter half of 2022. The scope of the feasibility study may include:

- Main Entrance Channel Widening
- Kapālama Transit Channel Widening
- Second Harbor Entrance – Kalihi Channel Reopening
- Breakwater Protection for the Main Entrance Channel

The HHMP also recommends that the USACE study evaluate the concept of a lock and dam system for Honolulu Harbor as a long-term SLR adaptation strategy (see **Figure 8.1**). Each of these alternatives is summarized below.

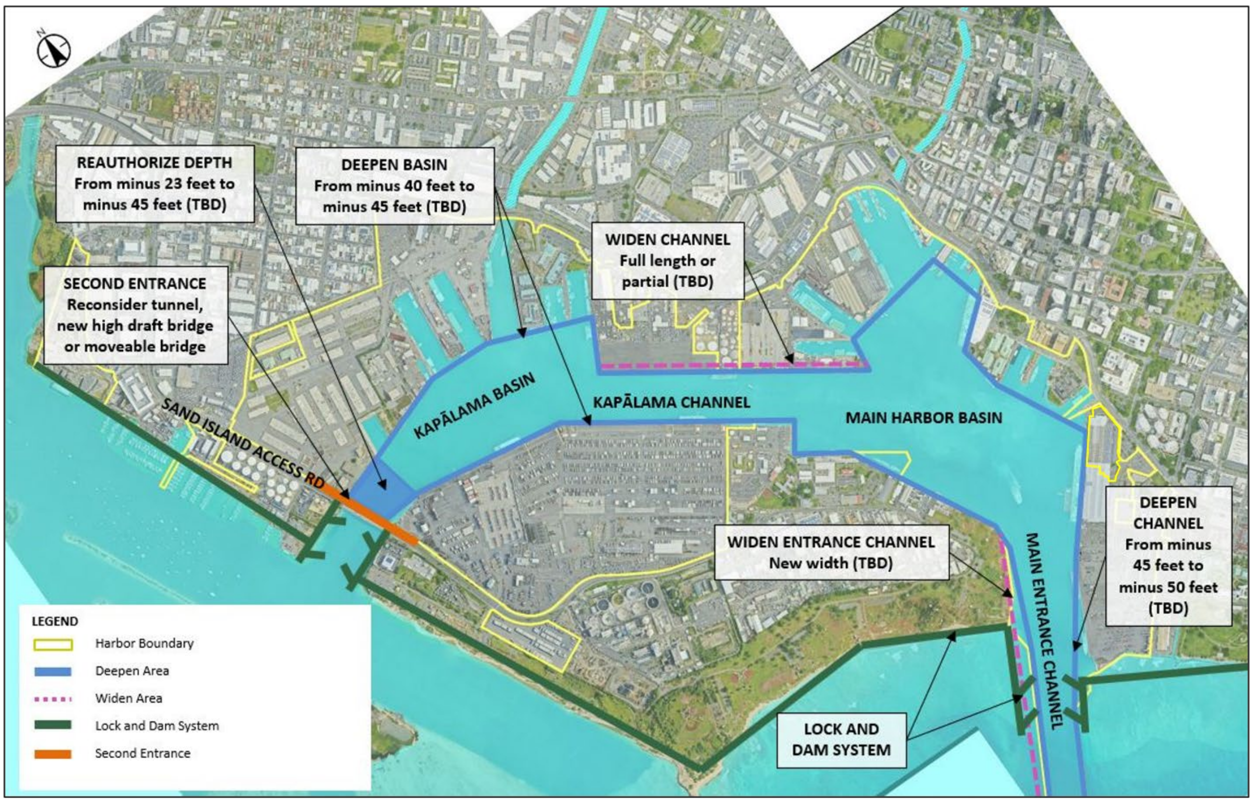

Figure 8.1 – Honolulu Harbor Modifications

8.1.1 Main Entrance Channel Widening

To support development of the HHMP, a high-level channel widening analysis was conducted for the Honolulu Harbor Main Entrance Channel (see **Appendix N**). The defined navigation channel through Honolulu Harbor's main entrance is 500 FT wide, while the physical width from the revetment on Sand Island, which defines the west boundary of the harbor entrance, to the face of Piers 1 and 2, which defines the east boundary of the channel, is approximately 730 FT. The analysis indicated that most vessels that call at Honolulu Harbor can navigate within the existing 500-foot-wide main channel. For example, the largest vessel that is expected to regularly call at Honolulu Harbor is a post-Panamax cruise vessel (e.g., Ovation Class). These vessels have a 135-FT beam and require a channel width of 439 FT for safe transit under typical conditions. The larger SuezMax and AfraMax vessels do not routinely call at Honolulu Harbor but have done so and can be expected to in the future. Vessels of this size transit the Pacific Ocean and may call at Honolulu to discharge cargo or for emergency repairs or fuel. These vessels have a beam of 164 FT and require a channel width of 514 FT based on the analysis. It is reasonable to expect that the trend of increasing vessel size will continue and that larger cruise ships and cargo vessels will call at Honolulu Harbor in the future.

Given the critical function of Honolulu Harbor as the center of Hawai'i's hub-and-spoke cargo distribution system, and as the only gantry-crane supported port in the state, the risk of the main channel becoming blocked by a grounded vessel is significant and is a concern voiced by many members of the maritime community. The Hawai'i Pilots noted that navigation through the main channel, particularly for incoming vessels that must maintain lower speeds, is challenged by the prevailing north-east trade winds that exert broad-side force against transiting vessels, by southern swells that strengthen currents in the harbor entrance, and by vessels berthed at the Piers 1 and 2 cargo terminal that, though outside of the defined navigation channel, reduce the room for countering the effects of wind and waves on safe navigation. For these reasons, the HHMP recommends that the main entrance channel be widened and supports the inclusion of this alternative in the USACE feasibility study (see **Section 7.2.1**).

The main entrance channel is bordered by platform reefs and seagrass on both sides. Both coral reefs and seagrass will require mitigation as a condition of USACE DA Permit approval. An assessment of regulatory requirements will be included in the USACE feasibility study. See **Section 9.5.1**.

8.1.2 Kapālama Transit Channel

The Kapālama Transit Channel was also analyzed as part of the high-level channel widening study. Kapālama Transit Channel has a physical channel width of 600 FT from pier face to pier face and a defined transit channel width of 400 FT. A cargo-container vessel with a 115-FT beam was used as the design vessel, which is based on the *Lurline*, Matson's new Kanaloa-class CON/RO vessel. The analysis determined that cargo container vessels with a 115-FT beam require a channel width of 372 FT for one-way transit under typical conditions. With a 115-FT beam vessel berthed on each side of the channel, there is only 370 FT of channel width available for a transiting vessel, which increases the navigational risk particularly during strong trade wind conditions.

In the short-term, DOTH can address navigational issues in the Kapālama Transit Channel through scheduling berth assignments, installing navigational aids such as dayboards to assist visual alignment from the ship bridge, and using additional tug assistance. In the long-term, the HHMP recommends that Piers 31 to 33 be cut back to at least fast land, approximately 30 FT from the pier face, and reconstructed with bulkhead construction. This would widen the channel with benefits to navigation and more efficient operations in the harbor. The HHMP recommends that Kapālama Transit Channel widening and the extent of the pier cut back be evaluated in the USACE feasibility study (see **Section 7.9.3**).

8.1.3 Second Harbor Entrance – Kalihi Channel

A second entrance to Honolulu Harbor would enhance port resiliency by creating redundant access, and thereby improve DOTH's ability to restore cargo delivery to Honolulu Harbor following a natural or man-made disaster. The existing Sand Island Access Road bascule bridge over Kalihi Channel was fixed in place in 1988 to allow the continuous flow of traffic, including container trucks, to and from Sand Island. However, with the bascule bridge fixed, Kalihi Channel was closed to commercial vessels and entry to and exit from Honolulu Harbor was limited to the Main Entrance Channel. Limited harbor access and an increase in the number and size of vessels has led to increased congestion in the harbor.

To ease congestion within the harbor and enhance port resiliency, the HHMP recommends that the existing bridge across the Kalihi Channel be replaced with a design that allows vessel transit through the channel. A reconnaissance study conducted in 2000 (RMTC, 2006) assessed high-clearance bridge alternatives to accommodate cargo and cruise vessels through Kalihi Channel. The study considered a bridge design with 138 FT of air draft and maximum structure height of 146 FT. The study noted that DOTA and FAA rules apply an airspace encroachment ceiling height of 163 FT at Kalihi Channel. The study concluded that a high-clearance bridge is not recommended because it could not be built high enough to accommodate cruise vessels, approach ramps would be long and require new right-of-way from private parcels in the vicinity, and due to visual impacts.

In 2006, the USACE conducted a feasibility study for construction of a tunnel to replace the existing twin bridges across Kalihi Channel. The study evaluated three alternatives based on different tunnel alignments and tunnel construction methods. The State DOT selected one alternative to develop into conceptual plans on which to base the benefit-cost analysis for the feasibility study. The USACE determined that the benefit-to-cost ratio for the conceptual plans was 1.10, with average annual benefits exceeding average annual costs by $1.88 million dollars. Therefore, construction of the proposed tunnel was considered to be economically justified. Today, the 2006 conceptual plan is no longer feasible. The conceptual tunnel alignment placed the tunnel approaches and entrance portals within KCT (approximately 3.5 acres in area) on the west side and within Sand Island Container Terminal (approximately 4.0 acres in area) on the east side of Kalihi Channel. These terminal areas are required for container cargo operations and are no longer available for tunnel development. In addition, the conceptual plan did not adequately evaluate provisions for bicycle, pedestrian and other alternative modes of transportation. A new feasibility study and benefit-cost analysis would be required if the DOTH and USACE wish to further consider the tunnel alternative.

As alternatives to a high-clearance bridge or tunnel, the HHMP recommends that the following bridge concepts be evaluated in the USACE feasibility study (see **Section 7.9.3**):

- A moveable bridge, such as a bascule bridge or swing bridge, to accommodate full-size cargo vessels in emergency events only;
- A fixed bridge with sufficient air draft (approximately 68 FT) to accommodate tug, barge and fishing vessels; or
- A hybrid of these concepts: a moveable bridge to accommodate full-size cargo vessels in emergency events only with sufficient air draft for tug, barge, and fishing vessel traffic.

Alternatives that accommodate full-size cargo vessels will also require dredging/deepening Kalihi Channel to a depth of 45 FT out to the open sea. The current depth is approximately 22 FT and the current authorized depth is 23 FT. The channel depth will have to be reauthorized by the USACE to a depth of 45 FT. Participants in the HHMP planning process noted that while Kalihi Channel would need to have a greater depth to accommodate cargo vessels, the width does not need to change, including the channel that leads to the ocean. In terms of coral losses, most of the coral resources are lateral to the channel and are not in the channel, thus losses may be minimal.

8.1.4 Breakwater

Honolulu Harbor's Main Entrance Channel and Piers 1 and 2 are directly exposed to wave surge from south swells, particularly in the summer months when storms in the southern hemisphere generate large waves that impact O'ahu's south shore. Interior areas of the harbor are also affected by wave energy that is reflected deeper into the harbor. Large swells that impact the Main Entrance Channel pose a risk to safe navigation into and out of the harbor and add challenges to berthing and cargo and cruise vessel operations across the berth at Piers 1 and 2. Maritime operators who participated in the HHMP planning process noted that impacts from wave energy could be reduced by the construction of protective breakwater structures at the entrance to Honolulu Harbor. The HHMP supports including an analysis of breakwater construction in the USACE feasibility study.

8.1.5 Lock and Dam System

In response to climate change and projected SLR, the HHMP recommends raising the height of pier decks, aprons and portions of the yards throughout Honolulu Harbor to maintain minimum operational freeboard (the measurement of the distance between the water level and pier deck height) for vessels to safely work across the berth, and to prevent inundation of the yards due to wave surge and overtopping (see **Section 3.6.1**). This alternative is costly and presents an array of design and constructability challenges related to integrating raised piers, aprons and yards with other port infrastructure and land uses in adjacent areas. It will require transitioning grades between piers with different heights and between terminals and the public roadways that serve them, maintaining design slopes in yard areas that ensure safe operational conditions for heavy equipment movements, as well as managing new drainage conditions in the port and adjacent lands. SLR is already affecting drainage outfalls in the harbor, with many outfalls partially or completely submerged during high and king tides, which creates backups in the drainage system that can cause flooding upstream.

As an alternative to undertaking complete reconstruction of the harbor facilities to raise pier deck heights, in effect building a whole new harbor, the HHMP recommends that the USACE study also analyze the feasibility of protecting the harbor with a lock and dam system. In concept, a lock and dam system would preserve existing water levels within the harbor and eliminate the need to elevate the existing pier facilities or raise drainage outlets and upstream drainage conveyance systems. However, a lock and dam system presents its own set of challenges for design, land acquisition, constructability and cost. In addition, it would require a significant change in harbor operations and vessel scheduling with the added requirement and time to navigate through the lock system. The study would also need to consider the feasibility of a one-way or two-way lock system, which would significantly affect operational time frames and costs for vessel operators.

8.2 General Infrastructure Recommendations and Standards

The following section describes general recommendations for harbor-wide infrastructure improvements and applicable standards where appropriate. Infrastructure recommendations for specific piers are described in the respective subsections of **Chapter 7**.

8.2.1 Electric Power and Lighting

The HHMP recommends upgrades to the electrical and lighting systems in the following locations:

- Provide shore-to-ship power supply at the Pier 2 Cruise Terminal, the Piers 10 and 11 Cruise Terminal, Piers 21 and 22 "Tug Row", Piers 16 to 18 Fishing Piers and Piers 36 to 38 Fishing Village. See specific piers for description of recommended shore-to-ship electrical improvements. The use of shore-to-ship power or "cold ironing" supports State goals related to renewable energy and air quality emissions controls (see **Section 4.2.1.1**). Shore-to-ship power system designs should be in accordance with IEC/ISO/IEEE 80005-1 CIE/ISO/IEEE 80005-1 Edition 1 (2012) International Standards. These systems require specific medium-voltage equipment and cables compatible with ship power systems. The systems will require connection to a HECO primary transformer as the power source, as well as installation of a substation, switch gear and control panels, mobile cable spools and ship connector staged adjacent to the berth to complete the connection between the switch gear and the ship.

- Provide EV charging stations for public parking areas in the Aloha Tower complex and at the Piers 36 to 38 Fishing Village, at the proposed Pier 19 O'ahu District Operations Baseyard for fleet vehicles, and in parking areas that serve DOTH Administration offices. Consider providing special EV charging stations for electric personal transportation devices (bicycles, scooters, skateboards and balance boards) at Aloha Tower complex and the Piers 36 to 38 Fishing Village to support alternative transportation modes.
- Utilize energy efficient LED luminaries and networked, wireless lighting control systems in all new, modified or replacement harbor facility exterior lighting. Ensure new systems are compatible with and can be integrated with the existing exterior lighting system. All lighting must be designed to meet illumination standards for safe operations and security, to be energy efficient, and to minimize light pollution (see **Section 4.2.1.2**).

8.2.2 Security Fencing and Boundary Treatments

The HHMP recommends boundary edge treatments and signage to provide aesthetic continuity of the harbor facilities from public vantage points, while ensuring the security of these facilities (see **Figure 8.2**). Major considerations determining the type and location of the boundary treatments include:

- Security requirements
- Adjacent land uses
- Public visibility
- Availability of materials
- Construction costs
- Maintenance requirements

The HHMP recommends that chain link fence with rubber coating and barbed wire on top be used as standard utility fencing for industrial areas of the harbor. This type of fence meets the security requirements of the harbor, is low-cost, easy to procure and easy to maintain. Chain link fence can be screened with vegetation in locations where sight-line visibility through the fence is not required for security.

Figure 8.2 – Utility Fencing

The HHMP recommends decorative fencing for use in high-visibility areas and at special facilities such as the Aloha Tower complex, future maritime center at Piers 19 to 23, and the Piers 36 to 38 Fishing Village. Decorative fencing should be constructed of anodized, marine-grade aluminum picket fence material with or without concrete footing. This type of fence is high-cost to construct, can be difficult to procure and is difficult and costly to maintain; therefore, it should be reserved for locations where aesthetics is important and where it can serve as a landmark treatment to identify areas of public interest. See **Figure 8.3**.

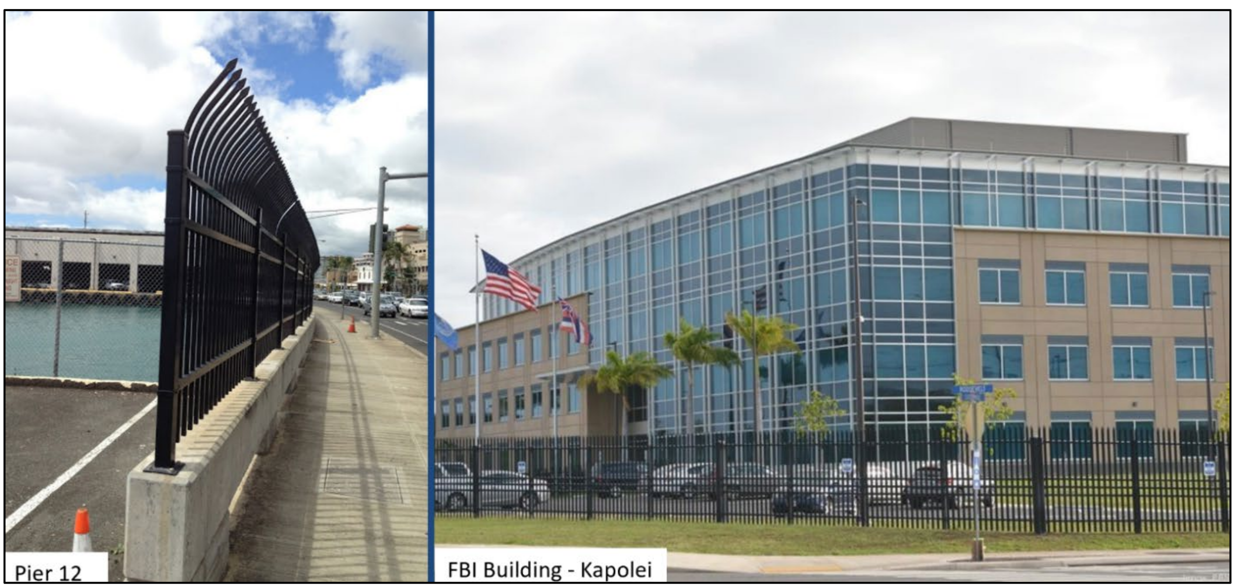

Figure 8.3 – Decorative Fencing

The HHMP recommends boundary landscaping along non-secure areas to improve appearance and at major driveway entrances to provide landmarks / visual cue for public orientation. The HHMP recommends the use of hardy, low-maintenance, drought-tolerant native plant species where possible (see **Figure 8.4**). Consider the following plant species:

- Naupaka (*Scaevola sericea*) or *Koki'o ke'oke'o* / Hawaiian White Hibiscus (*Hibiscus waimeae*) for hedges;
- Kou (*Cordia subcordata*), coconut (*Cocos sp.*), or plumeria (*Plumeria sp.*) trees for shade and visual cues.

Figure 8.4 – Landscape

8.2.3 Potable Water Systems

HHMP recommendations for potable water systems are described for individual piers in the respective development plans in **Chapter 7**. All water systems must comply with CCH BWS standards for potable water and fire protection.

8.2.4 Fire Protection Systems

There is limited capacity to fight a major fire at Honolulu Harbor. DOTH does not maintain dedicated marine firefighting personnel, equipment or facilities. Firefighting capacity previously provided by the fireboat *Moku Aki* (see **Figure 8.5**) and by the Clean Islands Council are no longer available. Instead, the response to maritime fires is a coordinated effort among the USCG, DOTH, CCH HFD fire fighters and commercial maritime operators. Fire response utilizes land-based HFD fire trucks and firefighting equipment, such as water hoses, and USCG and commercial vessels (see **Section 4.4.3**). Maritime operators noted that marine firefighting, particularly ship-board fires, involves unique fire environments that require specialized training and equipment that the CCH HFD does not possess. They also noted that commercial vessel operators, particularly tugboat crews, have some training as first responders to a fire but do not have adequate training or equipment to extinguish a marine fire. Moreover, firefighting puts commercial crews in danger and raises liability concerns for owners of commercial vessels. For these reasons, maritime operators that participated in the HHMP planning process recommended that DOTH work with other government agencies, including the USCG and CCH HFD, to improve marine firefighting capabilities in Honolulu Harbor, including staffing firefighters with specialty training and equipment for fighting marine and shipboard fires.

Upgrades to the potable water systems recommended in **Chapter 7** at individual piers also address HHMP recommendations for fire protection water system improvements. Fire sprinkler systems that meet NFPA 13 standards are required for recommended new development and redevelopment in Honolulu Harbor.

Figure 8.5 – Moku ʻahi Fireboat
(Source: Honolulu Star-Advertiser, 2017)

8.2.5 Drainage System / Regional Drainage Master Plan

The HHMP recommends that DOTH participate with other city, state and federal agencies in the preparation of a regional drainage master plan. DOTH would not be the lead agency in this undertaking due in part to the limits of its jurisdictional boundaries. The regional drainage master plan should coordinate agency requirements among the multiple jurisdictions involved as well as identify strategies to address the drainage tributaries that discharge into Honolulu Harbor, including the Iwilei, Sand Island and Pahounui Drive drainage tributary systems. The regional drainage master plan should also identify improvements and modifications to the storm water drainage system to address climate change and SLR. In particular, the drainage master plan should identify upstream improvements to reduce discharges of sediments, debris and pollutants in runoff water, and systemic modifications to address drainage outfalls that will become submerged due to projected SLR.

8.2.6 Sewer System

HHMP recommendations for sewer systems are described for individual piers in the respective development plans in **Chapter 7**. A SCA must be approved by the CCH for any proposed new sewer connection. New shore-to-ship sewer connections for cruise ship operations may be subject to special conditions to prevent large sewer discharges from cruise ships.

8.3 Strategic Committee for Climate Change and SLR

The HHMP emphasizes the tremendous, existential challenge posed by climate change and SLR to Hawaiʻi and our way of life in the islands. Through the lens of the commercial harbors system, climate change and SLR are projected to have significant effects on harbor infrastructure and operations that will require creative, cooperative, and costly solutions. Most of the forecasted impacts require a multi-jurisdiction response, such as impacts to roadway and drainage infrastructure, the effects of rising groundwater levels on road and building foundations and in the migration of soil and groundwater contaminants, and impacts on public budgets and financing to pay for adaptation strategies.

The HHMP recognizes the limitations of the master planning process to develop definitive solutions for adapting harbor infrastructure and operations to meet the challenges of climate change and SLR. The infrastructure recommendations in this document provide a starting point for discussion and refinement. They serve to highlight the critical role of Honolulu Harbor in distributing the goods our island communities rely on for our well-being and survival and the scale of the problems we must overcome to ensure that the commercial harbors system continues to function to deliver those goods and services. The HHMP recommendations related to SLR are challenged by unanswered questions and unresolved issues related to design, engineering and constructability, as well as implications for vessel operations. Through the planning process, the maritime community highlighted specific concerns related to pier design and the potential impacts that raising pier heights, as proposed in the HHMP, will have on RO-RO operations and the ability to place ramps on the pier apron within safe operating tolerances.

Therefore, the HHMP recommends that the DOTH establish and facilitate a Strategic Committee for Climate Change and SLR (Strategic Committee) with representatives from the maritime industry, government agencies, academia, and the private sector to develop design solutions to address pier and yard adaptation to SLR. The Strategic Committee would be tasked with looking at Hawaiʻi's commercial harbors system as a whole and developing standardized design solutions to adapt port infrastructure to new conditions created by climate change and SLR. Recognizing that ports throughout the world are developing solutions to the same challenges, the Strategic Committee would also be tasked with surveying other ports for SLR design treatments that can be adopted and modified for use in Hawaiʻi, and developing collaborative relationships with other port operators to exchange experience and working solutions.

8.4 Inter-Agency and Community Coordination

The HHMP recognizes that many of the project recommendations in this document may have short- and long-term impacts on adjacent land uses, infrastructure, utilities, and other resources located outside of the Honolulu Harbor boundary. In such cases, implementation of plan recommendations will require coordination variably among DOTH and city, state and federal agencies, multi-jurisdictional committees, adjacent landowners, business and industry groups, community organizations, and the Kānaka Maoli community. The HHMP recommends that DOTH assess projects in the initial stages of implementation to identify the appropriate entities that should be involved and start coordination early.

8.5 Cybersecurity

Maritime operations and electronic data are vulnerable to cyber threats and are prime targets for cyber attacks for a multitude of reasons, including, but not limited to, its critical role as data hubs for shipping lines, cargo terminals, trucking and logistics.

There is the need to promote cybersecurity in the maritime area as marine infrastructure presents its own particular set of risks and vulnerabilities. For example, Honolulu Harbor's maritime sector is heavily reliant on complex information technology and operational technology; and it is increasingly dependent on the use of Internet of Things (IoT)-enabled devices and automated systems that integrate communications, control, and information processing. Cyber threats to this digital infrastructure can generate operational interruptions and data corruption in the maritime industry, which can have serious effects for Honolulu Harbors' trade, economic well-being, and overall port security.

Maritime transportation is critical to Hawaii's flow of commerce and the movement of essential goods inbound and outbound of Honolulu Harbor, which serves as the distribution hub for the entire state. With the maritime industry increasingly digitalizing and automating its operations, there are increased concerns and growing calls for the industry to accelerate its advances in cyber security. As Hawaii's ocean transportation network operates on a "just-in-time" supply chain, it relies heavily on efficiencies provided by digitalization, which provides additional efficiency gains. Port officials, shipping carrier operators and port organization leaders need to be aware of the maritime cyber risk landscape and take appropriate actions to mitigate cyber risk both internally and to the maritime industry as a whole. When cyber mitigation risk measures are employed, it helps to ensure the port system is better protected and more responsive to the evolving needs of Honolulu Harbor and of the state.

While the HHMP recognizes that addressing cybersecurity is critical for continued efficient operations of Honolulu Harbor, it is not, however, the appropriate vehicle to undertake the deep exploration needed to develop cybersecurity plans. Future development of any maritime-specific cybersecurity plans by the maritime community should be coordinated with the appropriate federal and/or state agencies.

8.6 Reconsider Aloha Tower Development Corporation Jurisdictional Boundaries

The Aloha Tower Development Corporation (ATDC) has authority over land use decisions within the Aloha Tower complex, which includes landside areas adjacent to Piers 5 through 11, from the pier face and/or shoreline extending *mauka* to Nimitz Highway / Ala Moana Boulevard, with the exception of Pier 7 which is entirely under DOTH jurisdiction.[42] DOTH also retains jurisdiction over all waterside uses adjacent to Piers 5 through 11 (see **Sections 3.5.1.2, 3,5.2.1 and 6.2.4,** and **Figure 7.34**). ATDC's mandate, established in HRS 206J, is to oversee the redevelopment of the Aloha Tower complex to strengthen the international economic base of the community in trade activities, to enhance waterfront beautification and public access to make it a "people place", and to better serve modern maritime uses. See **Section 3.5.2**.

Through the HHMP planning process, members of the maritime community expressed support for continued maritime use of landside areas within the Aloha Tower complex and concern regarding the displacement of maritime uses if these lands are redeveloped for other purposes under ATDC's authority. In particular, maritime representatives on the PAC expressed support for preserving use of the Piers 10 and 11 sheds for maritime operations, including the sheds' continued use as a second cruise terminal. Although HRS 206J identifies accommodating modern maritime uses among ATDC's development objectives, members of the maritime community noted that the ATDC's powers and limitations under the statute do not guarantee the primacy of maritime uses when making land use decisions for the Aloha Tower complex. On this basis, maritime operators requested that DOTH and ATDC consider reviewing the Aloha Tower complex boundaries with the objective of restoring DOTH jurisdiction over the Piers 10 and 11 sheds and potentially other areas adjacent to the pier facilities in the Aloha Tower complex.

8.7 Relocate Fishing Village

Honolulu Harbor is a deep-draft harbor with limited and finite space for deep-draft vessel operations, yet the number and size of deep-draft commercial vessels operating in Honolulu Harbor continues

[42] HRS §206J-3

to increase. Many maritime operators noted that given the demand for deep-draft vessel facilities, it does not make sense to have shallow-draft commercial fishing vessels berthed in the harbor if they can be accommodated elsewhere. In addition to occupying deep-draft space, the approximately 150-vessel commercial fishing fleet contributes to navigational challenges in the harbor by populating the harbor with numerous smaller vessels maneuvering around larger, less controllable deep-draft vessels thereby raising the potential for collision. Deep-draft vessel operators also noted challenges related to communication and language barriers among vessel operators and concerns about vessel conditions that could affect safe navigation within the harbor. Fishing vessel operators noted that they receive lower priority by the Harbor Master, in favor of deep-draft vessels, and are often stuck offshore for hours waiting while large cargo or cruise vessels navigate the Main Entrance Channel before the fishing vessels are approved to enter the harbor.

To address these issues and open up harbor berthing and landside areas for deep-draft vessel operations, deep-draft vessel operators recommended that DOTH consider relocating the entire commercial fishing vessel fleet, including vessels at Piers 16 - 18 and Piers 36 - 38, fish auction and fleet support services to new pier facilities outside of Honolulu Harbor (see **Figure 8.6**). As cargo demand grows in the future, it will be more costly and difficult to develop deep-draft industrial port facilities than to develop shallow-draft pier facilities. This alternative could also improve fishing fleet operations by eliminating long wait times to enter the harbor and by consolidating fishing fleet berthing and operations in a single location. A potential location for the shallow-draft fishing fleet is in Ke‘ehi Lagoon, possibly at or near Pier 60; however, no studies have been conducted to determine the location's suitability. The fishing fleet could operate from a floating dock facility with landside areas for the auction house, ice factory, fueling, fishing boat provisioners and services.

The HHMP does not recommend this action within the current 2050 planning horizon for two reasons. One, the Pier 38 Fishing Village Domestic Commercial Fishing Village Tenants AOAO and individual tenants, including the fish auction, ice factory, POP Fishing & Marine Supply retailer that service the fishing fleet and various seafood restaurants that have long-term leases with DOTH that extend to 2064. These businesses are integral to a successful commercial fishing fleet pier facility and ideally would relocate with the fleet. Two, while deep-draft vessel congestion in Honolulu Harbor will inevitably increase, the capacity and demand analysis prepared for the HHMP determined that with the development of KCT, the deep-draft facilities in Honolulu Harbor are able to accommodate projected cargo throughput through 2050 with only minor changes to existing operations. Moreover, there is surplus capacity for cargo operations when taking all the multi-purpose cargo piers into account. Therefore, there is not sufficient demand for additional deep-draft pier facilities within the harbor to warrant relocating the shallow-draft commercial fishing fleet at this time.

Nevertheless, the HHMP recommends continuing to monitor demand for additional deep-draft pier facilities within the harbor, as well as consider initiating a feasibility study to assess the long-term concept of developing a consolidated commercial fishing fleet pier facility in Ke‘ehi Lagoon or other potential locations and redeveloping Piers 16 to 18 for work boats and Piers 36 to 38 for work boats and deep-draft vessel operations. Developing a new pier facility in Keʻehi Lagoon or other potential locations and relocating the commercial fishing fleet requires a long lead time for planning and design, environmental review and regulatory processes, to procure funding and to bid and construct the project. The HHMP therefore recommends that this concept be reconsidered during future planning processes for Honolulu Harbor.

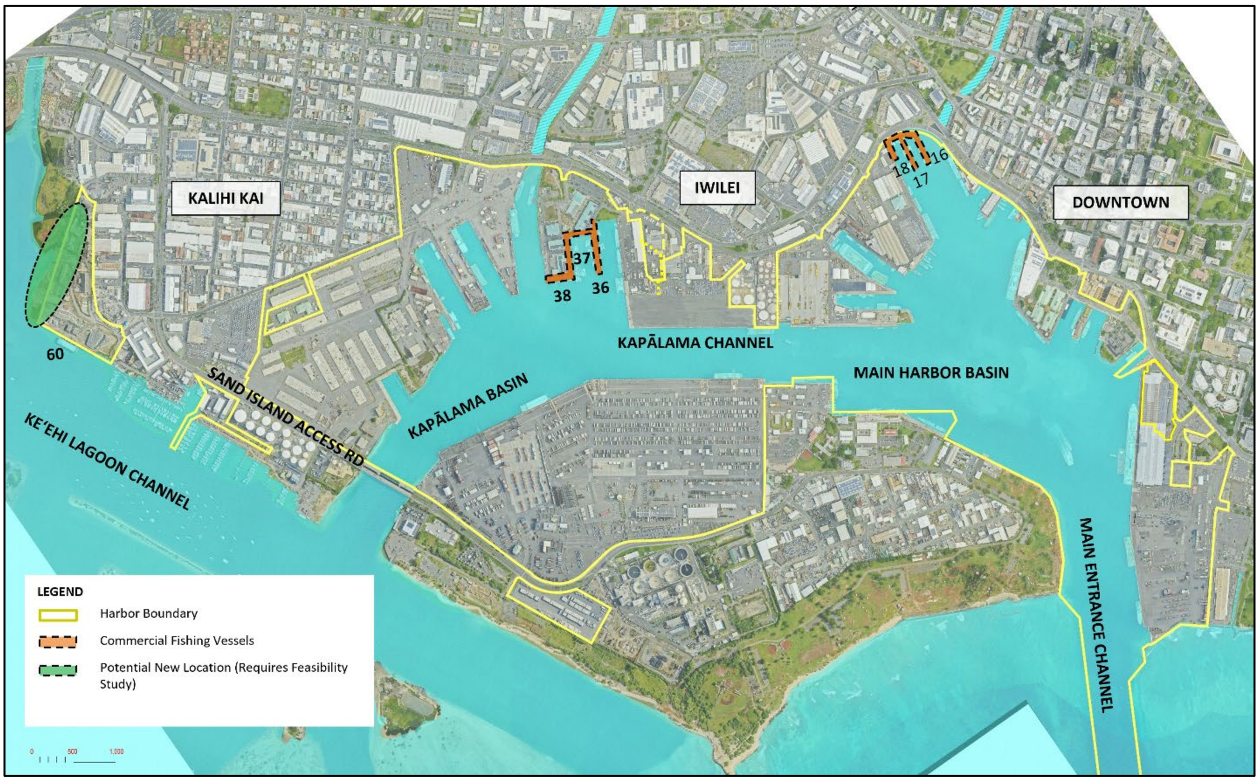

Figure 8.6 – Fishing Fleet Relocation

8.8 Land Acquisition

The HHMP includes existing harbor facility capacity and demand analysis (see **Chapter 5**) which determined that Honolulu Harbor has sufficient capacity to accommodate projected cargo throughput demand to 2050 with relatively minor changes to existing operations. Based on this analysis, there is no need to expand Honolulu Harbor at present. However, the HHMP identifies the following properties for possible acquisition for their ability to improve harbor operations (see **Figure 8.7**).

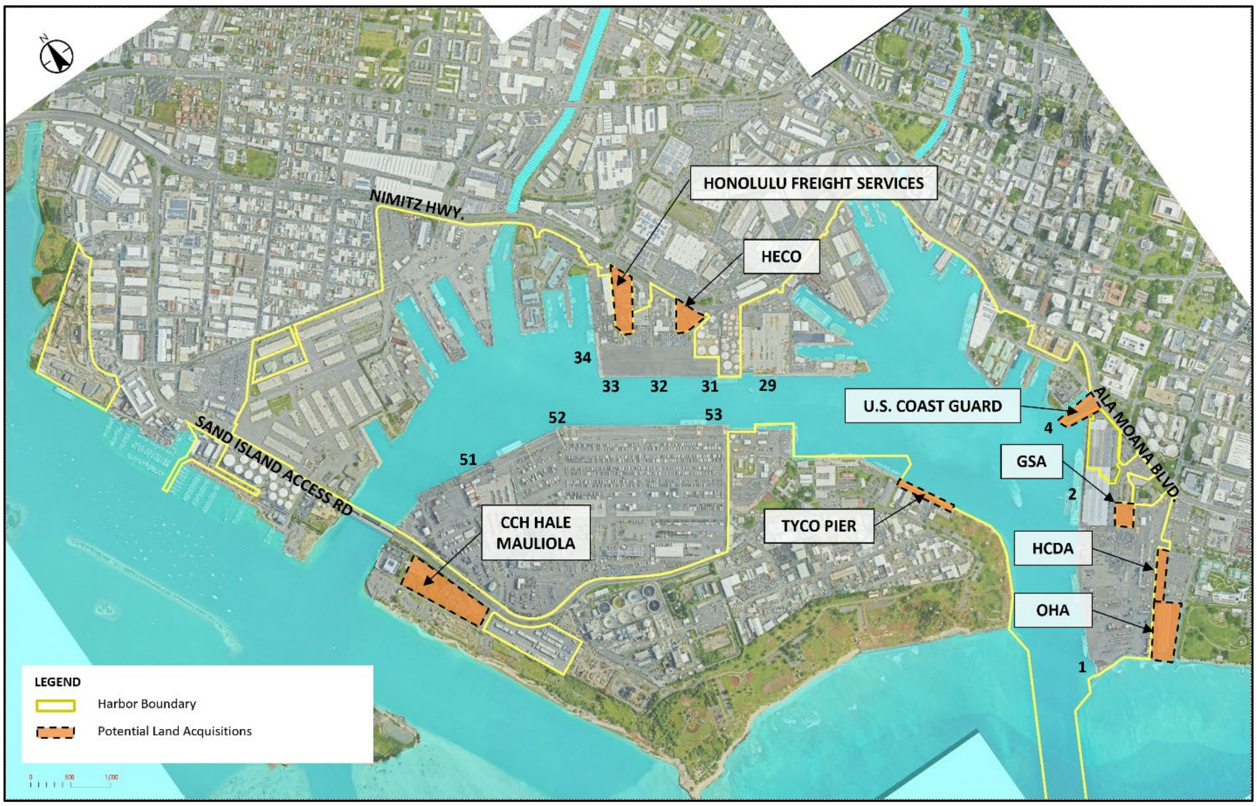

Figure 8.7 – Potential Land Acquisition Properties

- **OHA Parcel** – OHA has jurisdiction over a 5-acre parcel contiguous with the Pier 1 cargo yard (TMK 2-1-015: 051). If OHA and DOTH can negotiate a mutually beneficial agreement for DOTH's use of this parcel, it is ideally situated adjacent to the Pier 1 yard to facilitate expansion of the yard area. The existing warehouse on the property could serve a variety of uses to support cargo operations at Piers 1 and 2, including use as an automobile processing facility for newly delivered vehicles, use as an equipment storage shed and maintenance workshop, and/or use by DOA and CBP as a cargo inspection facility.

- **HCDA Parcel** - HCDA has jurisdiction over lands in Kakaʻako Makai, including a 0.8-acre parcel contiguous with the Pier 1 entry gate (TMK 2-1-015: 052) that is used for at-grade parking. Acquisition of a narrow, vacant strip of this parcel aligned with the Pier 1 entry gate lanes, could be used to expand and enhance gate operations.

- **Federal GSA Parcel** – The "GSA Lot" is an approximately 1.5-acre parcel (TMK 2-1-015: 020) owned by the federal government. The parcel is ideally situated at the front of the Pier 2 Cruise Terminal building and could be used to improve cruise passenger ground transportation staging and circulation. The GSA lot is currently used for at-grade parking by federal employees. The HHMP recommends that DOTH consider negotiating an exchange with the federal government for possibly the former DOH building/lot, the "ballpark" lot or other land areas with the GSA lot.

- **HECO Nimitz Parcel** – HECO owns an approximately 2.4-acre triangular parcel (TMK 1-5-035-006) on Nimitz Highway contiguous with the Piers 31 to 34 cargo yard and adjacent back land areas owned by DOTH. The parcel is largely undeveloped and primarily used for vehicle storage. This parcel could be used to expand the Piers 31 to 33 cargo yard or to increase backland areas for use by maritime support services. It is also well situated to serve as a long-term location for the DOTH Oʻahu District Operations baseyard. The baseyard is planned for relocation from its current site on the *makai* side of Sand Island Access Road, where it is subject to periodic flooding from high and king tides, to an interim site at Pier 19.

- **HFS Parcel** – HFS operates a break-bulk freight-handling service on a 3.7-acre parcel (TMK 1-5-035: 010) under long-term lease from DOTA. The parcel is located contiguous with the Piers 31 to 34 cargo terminal and adjacent to the UH Marine Center at Pier 35. The State is in the process of conveying jurisdiction of the parcel from DOTA to DOTH. Acquisition of this parcel will expand areas under DOTH jurisdiction used for maritime support services. This parcel could also be used to develop a direct driveway connection between the Piers 31 to 33 cargo terminal and the signalized intersection at Alakawa Street. A direct driveway connection would improve access to and from the cargo terminal and reduce congestion on Nimitz Highway by accommodating a direct left-turn movement out of the terminal instead of the existing right-out-only condition that requires west-bound truck traffic to first turn right onto eastbound Nimitz Highway then execute a U-turn to head west.

- **CCH Hale Mauliola Temporary Housing Facility** – The CCH leases from the State a portion of TMK 1-5-041: 334 located on Sand Island for use as the Hale Mauliola temporary housing facility. The Institute of Human Services operates the facility, which services approximately 100 individuals, in partnership with CCH. DOTH recognizes the success of the program at Hale Mauliola and has no intention to displace this use. If in the future, the Hale Mauliola program moves to another location, this site is well-situated in proximity to the Sand Island Terminal to supplement cargo operations at the terminal. The site could be used for chassis or container storage, cargo inspection, after-hours container pick-up and drop-off, employee parking or other uses to support terminal operations.

- **U.S. Coast Guard – Pier 4**
  Pier 4 includes a historic building that is currently used for the USCG Regional Exam Center. The pier berth is used by small, USCG patrol boats and tender boats. The Pier 4 berth may also be used as a layberth by maritime operators, subject to USCG approval and scheduling. Because use of Pier 4 for layberth is conditional and outside of DOTH control, it is not included in the berthing analysis conducted for the HHMP. If in the future, the Pier 4 facility is no longer required by the USCG for their mission, the HHMP recommends that DOTH negotiate with the USCG for its acquisition to be used for additional layberth and inclusion in the Aloha Tower complex redevelopment.

  USCG Base Honolulu on Sand Island is located adjacent to the Pier 53 cargo terminal on Sand Island. It is the command center for the USCG's Hawaiʻi operations and provides berthing for the USCG's fast response cutters, buoy tenders, patrol boats and work boats. It is outside of DOTH jurisdiction. There is an approximately 50-FT wide by 330-FT long strip of land adjacent to Pier 53C owned by DOTH and situated between the USCG Base property and the waterfront. The USCG has expressed interest in acquiring this area to develop as additional berthing for their fleet. This land area is partially paved and has no pier improvements; it is currently vacant and used informally by Matson for miscellaneous storage but is largely unutilized. The HHMP recommends that DOTH negotiate with the federal government for exchange of this land area with other federal lands that may better serve DOTH's operations in Honolulu Harbor, such as Pier 4 or the "GSA Lot" located adjacent to the Pier 2 Cruise Terminal.

- **TYCO Pier** – The TYCO Pier is located on Sand Island adjacent to the entrance to SISRA. The land and water areas are under DLNR jurisdiction and leased to TE SubCom (formerly TYCO Electronics) for cable ship operations. The current lease is expected to expire in the near future, at which time the landside areas will revert to DLNR, and the waterside areas will come under DOTH jurisdiction. Acquisition of this facility will allow DOTH to install mooring dolphins to expand the existing 600-LF berth to 1,200 LF for layberth use.

8.9 FTZ No. 9

FTZ No. 9 has occupied the *mauka* half of the Pier 2 Cruise Terminal building since 1982 (see **Figure 8.8**). It is currently managed by DBEDT. The FTZ operates completely independently from DOTH's operations; however, DOTH maintains jurisdiction over the pier and apron adjacent to the FTZ facility. A federal grant was used to construct the Homer A. Maxey International Trade Resource Center wing of the FTZ Pier 2 facility which requires that the facility must remain in use for the grant's stated purpose for the projected life of the facility. See **Section 3.5.1.4**.

The FTZ's clients benefit from the facility's proximity to the waterfront and convenient access to cargo operators for import and export of goods. However, FTZ operations are not necessarily waterfront-dependent compared to other maritime operations administered by DOTH. In the future, if DOTH and DBEDT/FTZ can negotiate a mutually beneficial agreement, including identification of a suitable relocation site for FTZ operations, the Pier 2C shed and parking area used by the FTZ could be brought back under DOTH jurisdiction. The acquired FTZ area could be used for a variety of maritime functions; most suitably would be to expand the Pier 2 Cruise Terminal to accommodate passenger embark/debark operations for two cruise vessels simultaneously berthed at Piers 1 and 2.

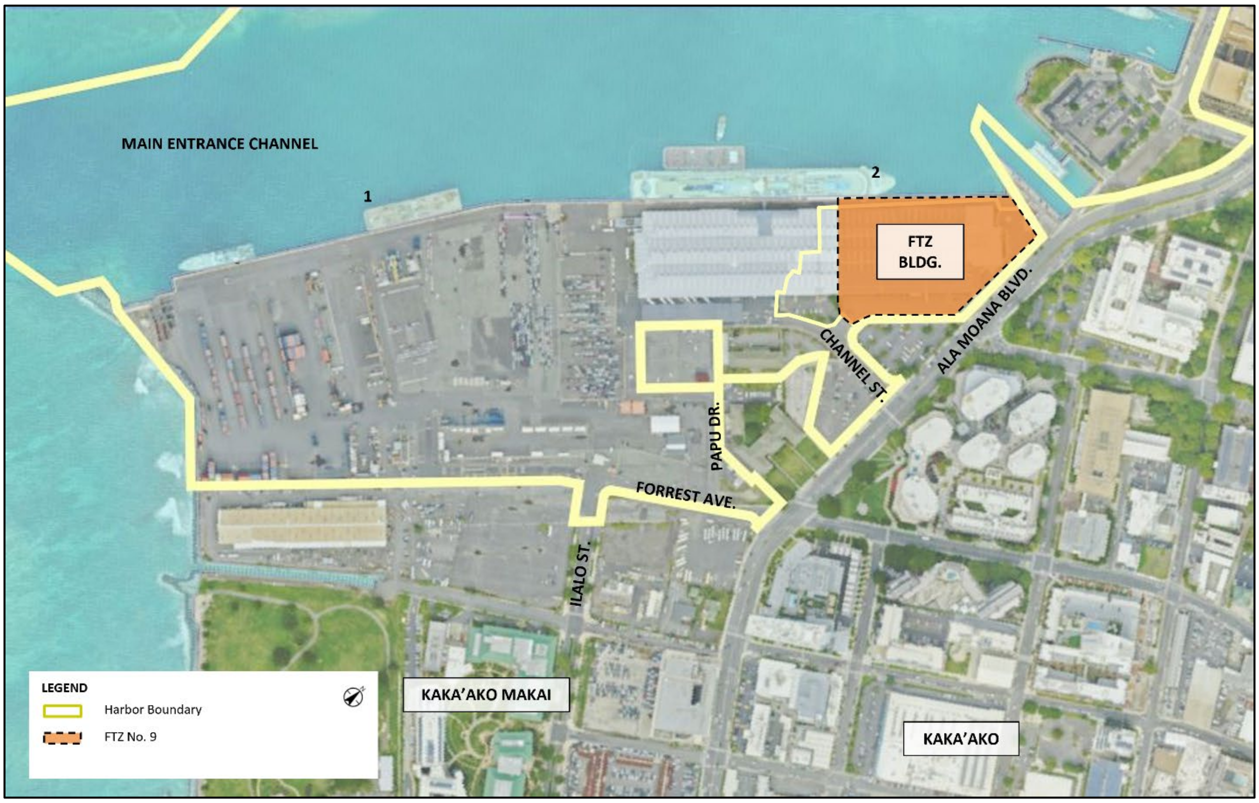

Figure 8.8 – FTZ No. 9

8.10 Continued Cultural Outreach and Recognition

In the interest of honoring the land occupied by Honolulu Harbor and the Hawaiian families that have lived there, the HHMP recommends that DOTH continue to conduct cultural outreach to build relationships with the Hawaiian families and community members with *kuleana* in the land on which Honolulu Harbor lies. The purpose of establishing and strengthening relationships between DOTH and the native Hawaiian families and community members is to help guide the stewardship and management of DOTH's land, to fulfill requirements of the laws and regulatory process governing the protection of cultural resources and practices, to support opportunities to reconnect the community to the Harbor, and to honor the historical and cultural activities and practices at the harbor and the individuals who have *kuleana* to perpetuate those practices.

DOTH met with several families and community members in July 2021 (see **Section 2.5.1**) to request input and perspectives on the HHMP. Specific focus was on the Aloha Tower complex where there are opportunities for development. The Aloha Tower complex area is a significant cultural area in terms of past habitation for *aliʻi* (nobles) and Hawaiian culture (see **Figure 8.9**). DOTH recognizes that although most of the features shown in **Figure 8.9** and around Honolulu Harbor are no longer visible, the significance of the area still exists, is relevant to the Hawaiian families and should be remembered.

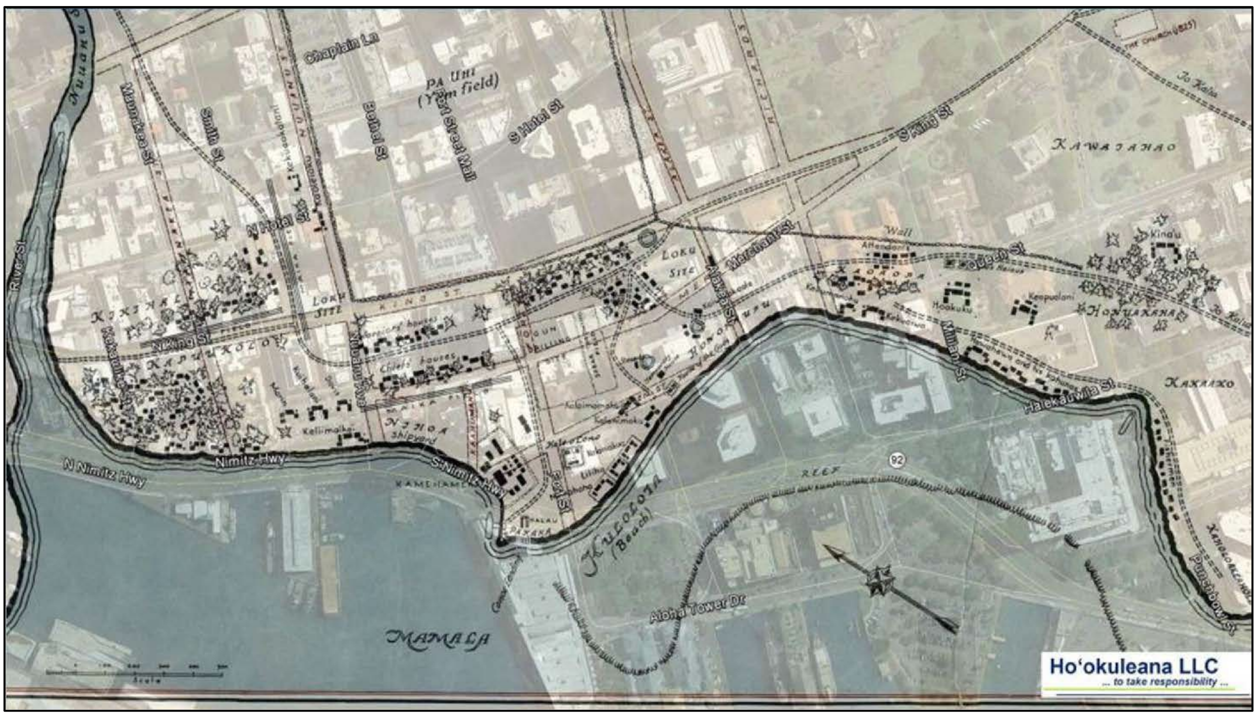

Figure 8.9 – 1810 Map Overlay of the Aloha Tower Complex
(Source: Manuel Kuloloio)

Although the Aloha Tower complex was given special focus in the meetings, the entire Honolulu Harbor contains areas and features of historic and cultural significance. From *moʻōlelo*, as well as the historic and archaeological record, there are many known historic and cultural associations, sites and deposits within the land areas under DOTH jurisdiction, and potential for encountering many more, including *Iwi Kūpuna*. With respect to *Iwi Kūpuna*, DOTH should strive to:

- Preserve and protect areas with known *Iwi Kūpuna.*
- Be aware of areas with potential cultural and archaeological sensitivity where there is a higher likelihood of encountering *Iwi Kūpuna* and cultural artifacts and resources, such as

areas near the original shoreline, and areas where fishponds previously existed. Conduct appropriate investigation, studies and consultation when planning projects in these areas.
- Coordinate closely with those who have lineal ties to the area, as well as with SHPD and Oʻahu Island Burial Council, regarding the proper care and disposition of any newly identified *Iwi Kūpuna* and other cultural or historic resources

Establishing relationships with native Hawaiian families with *kuleana* in the *ahupuaʻa* occupied by Honolulu Harbor area will help DOTH to ensure that historic and cultural sites and materials are appropriately treated.

8.11 RLS / LRFI Recommendations

8.11.1 RLS Recommendations

An architectural RLS was conducted for the HHMP to determine the historic significance of buildings and structures within Honolulu Harbor. Of 59 eligible properties identified within the harbor boundary, 27 were deemed HPV. A summary of the findings is provided in **Section 3.4.2** and **Appendix K**. The historic architectural evaluation and recommendations for eligibility was completed on an individual or potential district basis within the historic context of Honolulu Harbor.

DOTH should, where feasible, maintain and/or adaptively re-use identified HPV structures. For any future projects that might affect historic properties, the HHMP recommends consultation with SHPD be conducted on a case-by-case / site-by-site basis to determine appropriate mitigation measures unless a Memorandum of Understanding (MOU) or a Programmatic Agreement (PA) is developed among DOTH, SHPD and other participating parties as appropriate.

Potential Historic Districts

Based on the results of the RLS, it is recommended that Honolulu Harbor be evaluated comprehensively as a potential historic district and that the Oʻahu District Operations Baseyard and the Sand Island Terminal be considered as separate potential historic districts (See **Figure 8.10** and **Figure 8.11**).

> "To be considered a historic district, it must be significant, as well as being an identifiable entity. It must be important for historical, architectural, engineering, or cultural values."

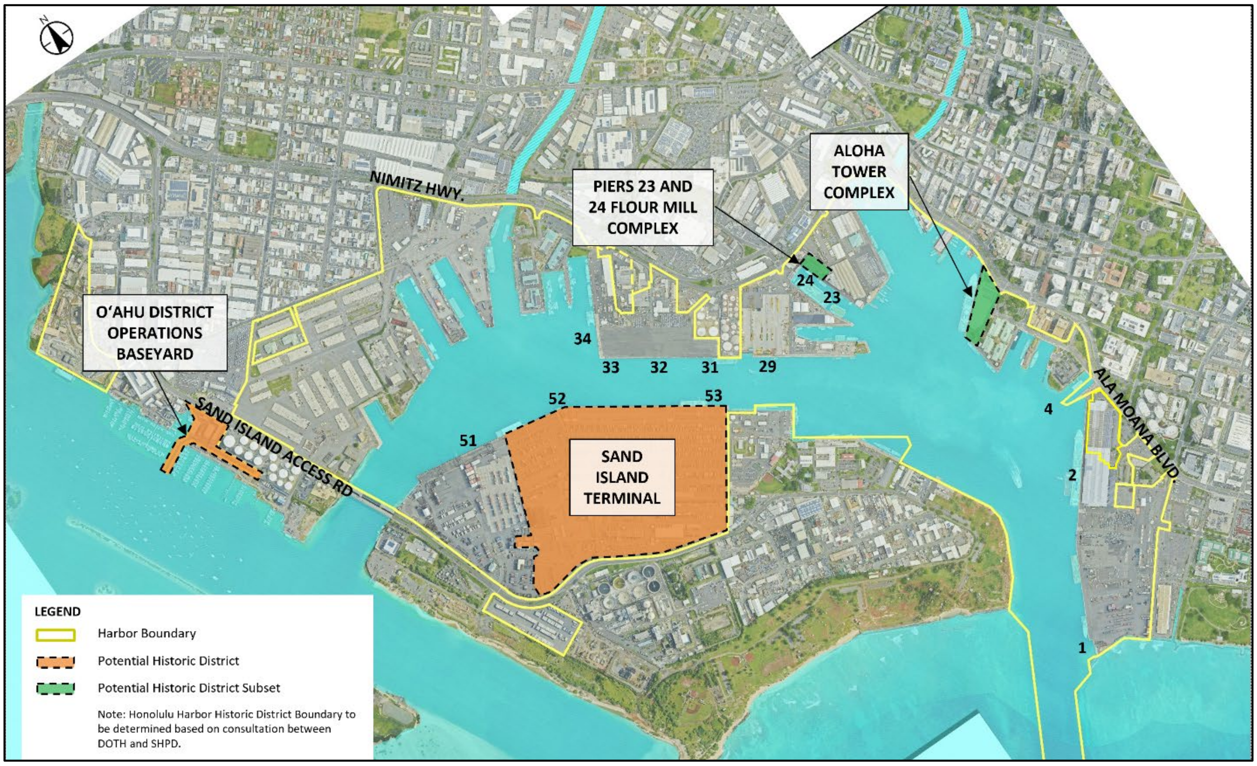

Figure 8.10 – Potential Historic Districts and Subsets

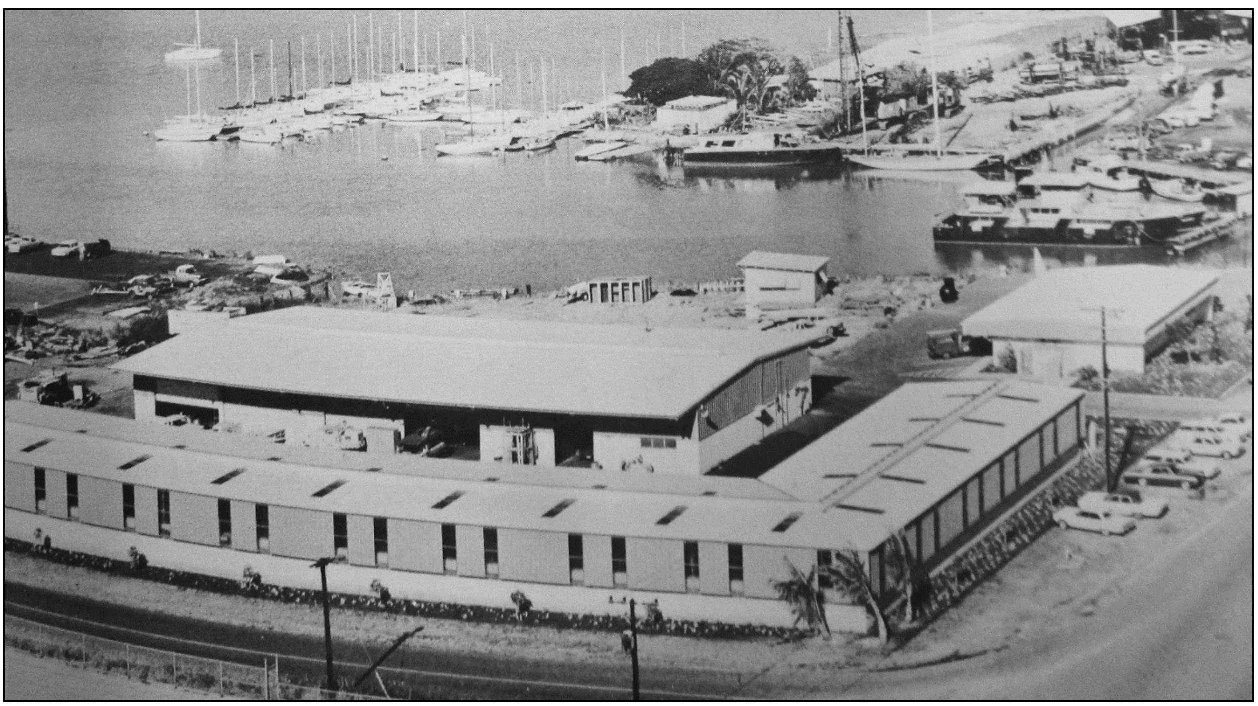

Figure 8.11 - Baseyard at Sand Island in 1971
(Source: Hawai'i Department of Transportation, n.d.)

Potential Historic District Subsets

The Aloha Tower complex at Piers 9 to 11 and the Flour Mill complex at Piers 23 and 24 (see **Figure 8.12**) are to be considered comprehensively as separate potential historic district subsets. The properties in each of the subset are HPV properties. The Aloha Tower complex recommendations are to keep the adjacent buildings scale low, to emphasize the Aloha Tower landmark and encourage the use of the mezzanine level at Piers 10 and 11 for DOTH's programming functions.

HPV and Eligible Properties Recommendations

The HHMP recommends that for all properties determined to be HPV and Eligible, DOTH should keep and use these properties through ongoing repair and maintenance or rehabilitation following the SOI Standards. However, should DOTH need to remove these properties due to documented infeasibility to keep the structure, mitigation should be coordinated through early consultation with the SHPD. It should be noted that HPV properties will have a higher level of community interest, justification, and mitigation effort. For both HPV and Eligible properties, DOTH should use the architectural RLS and assessment data sheets as identification documentation. Original character defining features documented in the data sheet should not be destroyed, removed, or altered, during the course of project planning and construction.

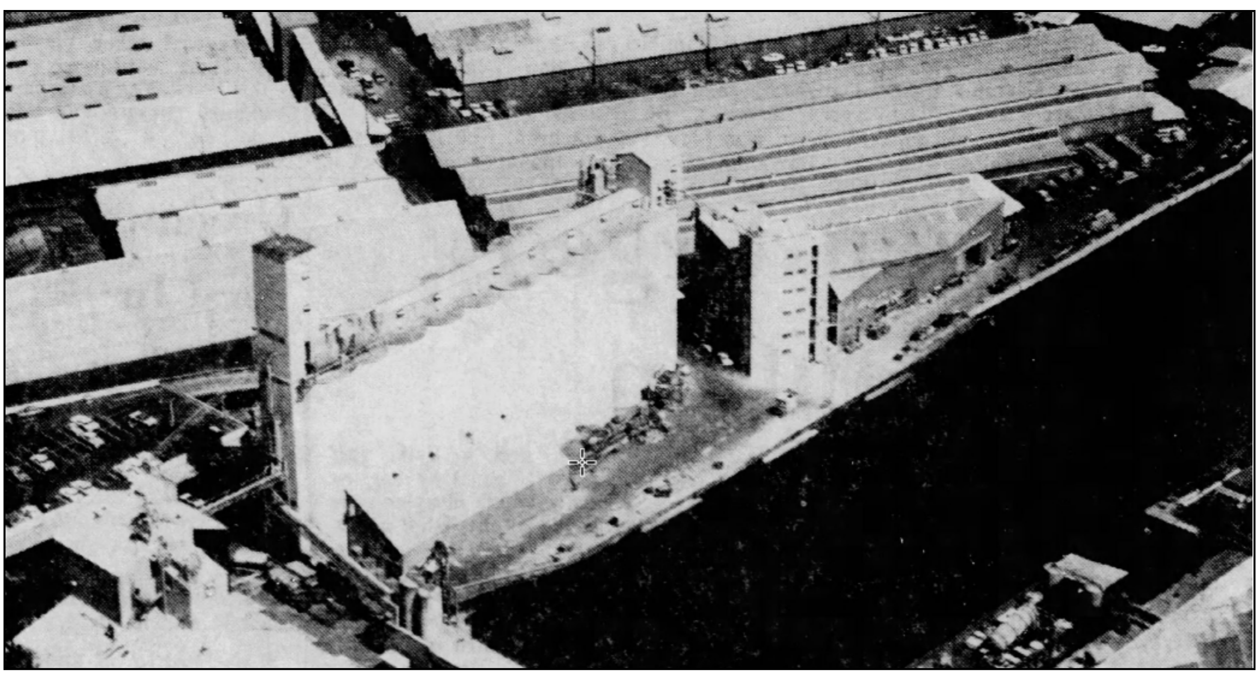

Figure 8.12 – Pier 23 Flour Mill and Grain Storage (1964)
(Source: Fung Associates Inc., 2021)

Further Consultation Recommendations

The HHMP recommends development of a PA for selected DOTH owned properties, identified through consultation with SHPD, in order to streamline future DOTH projects and project planning under the historic review process. The HHMP also recommends that future projects that involve modifications to the piers or renovations/alterations to the existing buildings or demolition and/or new construction be reviewed by the SHPD to meet historic compliance requirements under HRS Chapter 6E-8. It is also recommended that any new construction project be designed and constructed in a compatible design to the existing buildings at Honolulu Harbor following the SOI Standards. If eligible and/or HPV historic properties on the site will be affected, potential mitigation measures may need to be undertaken pursuant to HAR 13-275-8. Potential mitigation could include, but is not limited to, Historic American Buildings Survey documentation, development of education and interpretive materials, and community involvement in the development of mitigation measures. Final mitigation measures for all projects that may affect historic resources as identified should be determined through consultation between DOTH and the SHPD.

8.11.2 LRFI Recommendations

An Archaeological LRFI was prepared for Honolulu Harbor as part of the HHMP planning process. A summary of the LRFI findings is provided in **Section 3.4.2** and in **Appendix J**. Based on the historic properties identified in the LRFI, and the potential for additional subsurface historic properties within the Honolulu Harbor boundaries, the HHMP recommends that a PA or MOU be developed in consultation with SHPD to include project review procedures and mitigation measures of historic and archaeological properties. The PA or MOU should include the following:

- Development of preservation plans for several of the observed historic properties, including all areas of human remains and the seaward foundation of Pier 12, which is understood to include dressed limestone blocks from the original Honolulu Fort (see **Figure 8.13**).
- Determine where additional archaeological monitoring or subsurface testing programs may be warranted, particularly for projects involving ground disturbance. The HHMP recognizes that subsurface testing programs may need to be considered for projects in areas of higher historic sensitivity, including Piers 1 and 2 (Fort Armstrong), Pier 11 (Pākākā Point/Honolulu Fort area), in the area of Young Brothers' Pier 40 (burial associations), Pier 60 (Apili, Pāhounui, and Pāhouiki fishponds), and Sand Island (Piers 51 to 53; Quarantine Island and Sand Island Internment Camp). Archaeological monitoring programs have been implemented for Piers 12, 15, and 41 to 43. Subject to SHPD consultation, additional archaeological monitoring programs may be necessary for Piers 1 and 2, 8 to 11, 19 to 35, 39, 40, 60, and areas of Sand Island.
- Establish requirements for conducting consultation with the Hawaiian community and any interested Native Hawaiian organizations (OHA, etc.) regarding previously identified human

burials, or any possible areas where burials may be encountered within the study area, including outreach to knowledgeable parties to gather additional information.

- Develop an interpretive program to inform and educate the general public about the history of Honolulu Harbor and the significance of specific sites, to include signage and graphics in public areas and recommendations for maritime tenants to include similar materials in their customer service areas.
- Identify conditions and requirements for formal preservation plans (as in the case of Pier 12).
- Assign SIHP designations for identified potential historic properties.
- Develop guidelines or an approach to planned redevelopment of the Piers 39/40 area, due to the high likelihood of identifying human burials in the area.
- Develop recommendations regarding possible dedication of land within the harbor for a gathering place for the community.

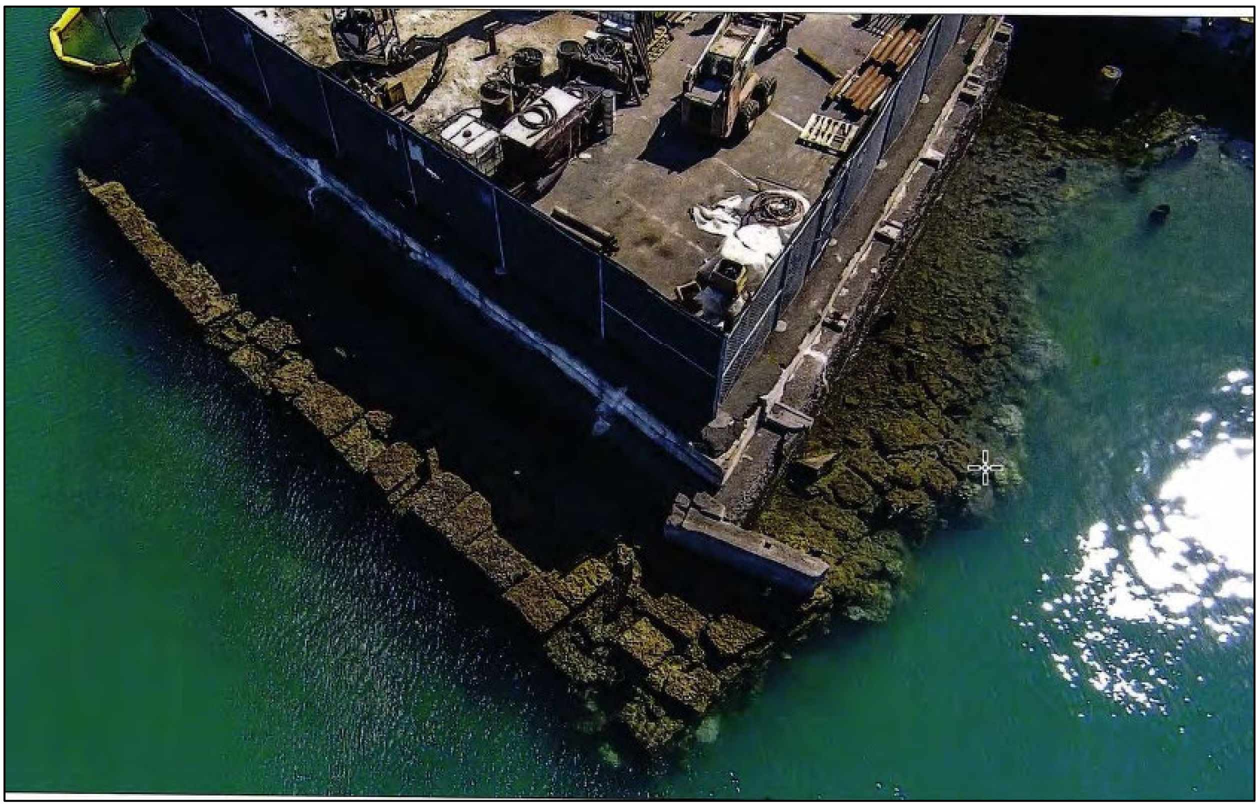

Figure 8.13 – Submerged Cut Limestone Blocks at Pier 12 (Brewer's Wharf)
(Source: CSH, 2021)

8.12 Harbor Administration – Hybrid Wharfage / Land Rent System

Honolulu Harbor generates revenue from cargo operations through a system of fees for wharfage, dockage, demurrage, storage, mooring, use of state utilities, and other fees, as established in HAR §19-44. Wharfage fees are based on tonnage of incoming, outgoing and transshipped cargo, calculated by weight or volume as appropriate. DOTH also charges rents on areas leased by preferred cargo operators for their private facilities at dedicated non-exclusive use terminals, such as building areas, utilities, and gantry crane tracks. DOTH does not charge cargo operators rent for the use of yard areas for cargo handling and sets limits on the length of time cargo can be stored without charge. Land rents, in addition to or in lieu of wharfage fees, are used in many ports around the world as a means to incentivize terminal operators to use land areas more efficiently. In the future, beyond the 2050 HHMP planning horizon, as cargo volumes and demand for cargo facilities increase, a land rent system might be considered for Honolulu Harbor to incentivize cargo operators to maximize the use of the harbor's finite land areas.

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9.0 IMPLEMENTATION PLAN

9.1 Phasing and Cost Estimates of Improvements

The HHMP is not a decision-making document; it provides a range of alternatives to address existing and future facility and operational needs at Honolulu Harbor, and considerations and criteria for prioritizing projects. Project prioritization and phasing will ultimately be decided by DOTH and undertaken through one of the existing project programs (see **Sections 2.5** through **2.7**). The following discussion describes prioritization criteria for DOTH decision makers to consider when programming projects and financing. The subsequent section applies the prioritization criteria to the HHMP alternatives to offer suggested phasing for HHMP implementation.

9.2 Prioritization Criteria

Aside from projects required to ensure the safety of the public and maritime operators, no single criterion outweighs the others; each project is prioritized based on a rational balance of the following criteria.

9.2.1 Logical Sequence

In many cases, projects must follow a logical sequence, that is, some projects must precede or follow other projects. For example, improvements to the Piers 1 and 2 multi-purpose cargo terminal should follow the opening of KCT which will create the necessary terminal space to relocate the existing Piers 1 and 2 cargo operations. KCT will also allow Pasha's operations at Piers 51A and B to be relocated, thereby opening up areas of the Sand Island Terminal for improvements. Also, before a new maritime center facility can be constructed at Piers 19 to 23, existing structures at the site need to be demolished and removed, and pier foundations may need to be strengthened to support the development of a multi-story, reinforced concrete building.

9.2.2 Conditions Assessment / End of Asset Design Life

Facilities that are reaching the end of their designed life or that are identified through routine conditions assessments or by other means to need immediate improvement to maintain safe working conditions and operational function should be given priority for improvement over facilities that are in satisfactory condition. During the HHMP planning process, members of the maritime community identified various harbor facilities for priority improvement, such as the Piers 21 and 22 "Tug Row" support buildings, Pier 18, Pier 27E, and the Interisland Terminal piers, due to their condition.

9.2.3 Synergy With Other Project(s)

Some projects might not be priority as a stand-alone undertaking, i.e., based on their condition or logical sequencing, but might be advanced for consideration where they have synergy with another project that is a higher priority. For example, Piers 21 and 22 are recommended for improvement, but are determined to be in satisfactory condition based on the 2021 conditions assessment and therefore are not a priority project. However, it might be appropriate to undertake pier improvements concurrently with the redevelopment of "Tug Row" support buildings as a total facility improvement project. This could realize synergies in reduced costs to mobilize construction, and in scheduling to minimize the duration of construction disruptions. Another example is redevelopment of Piers 5 and 6, which are not a priority for improvement. However, if the landside areas of Piers 5 and 6 are redeveloped under a PPP, it would present an opportunity to undertake improvements to Piers 5 and 6 at the same time so that the improvements would be integrated with the planned landside design and uses.

9.2.4 Public-Private Partnership (PPP) Opportunity

The HHMP identifies several areas in Honolulu Harbor (Piers 12 through 29A) as potential sites for redevelopment through PPPs (see **Section 7.3**). As a general recommendation, the HHMP proposes increased use of long-term leases (25- to 35-year terms) with maritime operators to allow them to obtain financing for pier facility improvements. In the Piers 5 and 6 landside area of the Aloha Tower complex, which is under ATDC jurisdiction, the HHMP recommends development of a multi-story, multi-use building, traffic circulation and pedestrian promenade improvements through a PPP (see **Section 7.6.2.1**). These projects may be undertaken opportunistically and prioritized based on the interest of a private partner. PPPs also create opportunities for synergistic projects to improve harbor facilities.

9.2.5 Affordability

Affordability refers to the ability of DOTH to finance a planned project within a given time period as well as the ability of a facility improvement to generate revenue to service project financing. This criterion considers programming projects for near-, mid- and long-term implementation based on available budgets and financing options. For example, the cost to improve the Pier 29 apron, which will effectively create a new cargo pier, is significantly more affordable relative to proposed reconstruction of Piers 1 and 2. When complete, operations at Pier 29 are more likely to be able to service the cost of the improvements through wharfage, dockage and other revenues generated at that cargo pier compared to Piers 1 and 2.

9.2.6 Climate Change and SLR

This criterion prioritizes projects that are recommended to address the effects of climate change and SLR on harbor facilities and operations. Climate change and SLR present urgent risks for the well-being of Hawaiʻi's population and sobering challenges for the State and maritime operators to overcome to ensure continued efficient operations of the commercial harbors system. The adverse effects of climate change and SLR are, to the majority of the population, perceived as a slow-motion experience; and to some extent that is true, with SLR increases projected out over decades. However, the impacts of climate change and SLR are already directly evident at Honolulu Harbor. The Oʻahu District baseyard adjacent to Sand Island Access Road and Keʻehi Lagoon now routinely experiences flooding during high tides and king tides rendering portions of the baseyard unusable. Many of the drainage outfalls into Honolulu Harbor are partially submerged, a condition which will worsen with SLR causing backups in the drainage system and upstream flooding. Lower frequency but higher intensity storm events discharge large volumes of runoff water, debris and sediment into the harbor with adverse effects on safe navigation. Development of adaptation strategies and facility improvements to respond to these changing conditions will require time, substantial cost and coordination among the public and private sectors, and thus should be prioritized for early action.

9.2.7 DOTH CIP Criteria

DOT's Departmental Service Manual (DSM), Section 05.05.01 *Policy Statement,* says that CIP, Special Maintenance and special projects should be authorized and prioritized in an efficient and cost-effective manner. Further, CIP projects should be prioritized using the following criteria: public safety, existing systems preservations, State and Federal law compliance, major replacements, revenue enhancements, energy efficiency, functional improvements and systems modernizations, capacity expansion and congestion mitigation. A table of all the proposed HHMP improvements identified with the relevant prioritization criteria is provided in **Appendix I**. While the DSM does not provide specific definitions for these criteria, the HHMP interprets the criteria to be defined as follows:

- **Public Safety** – Projects that are required to maintain public safety and safe working conditions for maritime operators and harbor users are given the highest priority.
- **Existing Systems Preservation** – This relates to projects that are required to prevent deterioration and maintain the safe function of existing harbor facilities. This could include direct improvements to repair, strengthen or otherwise upgrade a facility, or to construct protective measures, such as improved fendering, revetments or replacement of pile-and-deck pier construction with sheet pile/bulkhead piers to improve pier resiliency.
- **State and Federal Compliance** – Projects that are required to comply with state and federal regulations are given priority but may be programmed to give DOTH reasonable time to undertake the required improvements. An example of a federal and state regulatory

compliance project is the establishment and maintenance of a coral outplanting to offset corals displaced from harbor improvement projects.

- **Major Replacements** – Major replacement projects are those required to replace facilities that are essential to maintaining harbor function and capacity before they become unusable. This might include replacement of a pier or support buildings, such as the proposed improvements to Pier 29, or relocation of a major facility, such as the proposed relocation of the O'ahu District Operations Baseyard.
- **Revenue Enhancements** – This criterion prioritizes projects that enhance revenue generation from harbor facilities. An example is the proposed maritime center at Pier 23 which would create leasable office space for maritime tenants and possibly leasable automobile storage space for automobile importers and dealerships to conduct automobile prepping, processing or storage.
- **Energy Efficiency** – Priority is also given to projects that improve energy efficiency both as a matter of cost savings as well as reducing the carbon footprint of harbor operations. Examples of energy efficiency projects include replacing facility lighting with energy efficient LED fixtures, and installation of EV charging stations to promote reduction in internal combustion engine use.
- **Functional Improvements and System Modernizations** – This criterion pertains to projects that make harbor operations more efficient with the objectives of reducing both capital costs for facility improvements and achieving savings in operational costs which can be passed on to the residents of Hawai'i. An example of functional improvements and system modernization projects include the development of KCT, which will expand harbor capacity to accommodate future cargo throughput into the coming decades, as well as create another gantry crane supported terminal that will foster competition among the major terminal operators. KCT includes modern, automated truck gate facilities that will streamline container truck processing, thereby increasing gate capacity as well as saving time and money.
- **Capacity Expansion and Congestion Mitigation** – Similar to functional improvements and modernization of harbor facilities, this criterion prioritizes projects that are focused on expanding capacity and reducing congestion in the harbor. An example of this type of project would be construction of KCT which will add 89 acres of cargo yard to Honolulu Harbor, or creation of new layberth. A project to reopen the second harbor entrance via Kalihi Channel, which would reduce vessel traffic congestion in the Main Entrance Channel and congestion through the harbor, would also be prioritized under this criteria.

9.3 Rough Order of Magnitude (ROM) Cost Estimates

ROM cost estimates provide a high-level measurement of the scale of a recommended facility improvement and a means to compare projects and strategize priorities based on funding availability and financing time frames. ROM costs are derived from rough quantity calculations of the project area, excavation and fill quantities, linear footage of piers to be improved, floor area of buildings, and the number and type of facility features to which unit costs from previous, comparable harbor projects are then applied. The costs are then adjusted based on an annual cost escalation rate. The ROM costs prepared for the HHMP are provided in **Appendix M** and summarized in **Table 9.1** based on FY 2023 costs and escalated costs for years 2030, 2040 and 2050.

9.4 HHMP Recommended Project Prioritization

The major HHMP projects described in **Chapter 7** were prioritized based on the HHMP criteria discussed above and are presented in **Table 9.2**. Projects are grouped as high-, medium- and low-priority as well as "opportunistic". Opportunistic projects include non-urgent projects that may be initiated through agreements among private partners, DOTH and/or ATDC. Within each category, projects are not listed in priority order. HHMP project priorities and the accompanying rationale statements, serve as suggestions for DOTH decision-makers to consider when programming financing and improvements to Honolulu Harbor facilities. DOTH is not obligated to implement projects according to HHMP priorities as priorities may change based on evolving conditions, unexpected occurrences, and availability of financing.

Table 9.1 - Rough Order of Magnitude Cost Estimate Summary

Proposed Improvement	FY 2023 [2]	FY 2030 [1,2]	FY 2040 [1,2]	FY 2050 [1,2]
Harbor-Wide Improvements	$81,500,000	$114,683,000	$186,795,000	$304,290,000
Layberth Improvements	$3,845,000	$5,411,000	$8,814,000	$14,359,000
Piers 1A, 1B, and 2A - Multi-Use Pier Reconstruction	$435,212,000	$612,408,000	$997,482,000	$1,624,902,000
Pier 2 Cruise Terminal Pier Upgrades	$296,368,000	$417,034,000	$679,260,000	$1,106,517,000
Pier 2 DOH Building Renovation	$10,000,000	$14,072,000	$22,921,000	$37,339,000
Piers 5 and 6 and Mini Park - Maritime Upgrades	$512,344,000	$720,944,000	$1,174,264,000	$1,912,881,000
Piers 7 to 11 Aloha Tower Area Improvements	$171,071,000	$240,723,000	$392,087,000	$638,712,000
Piers 12-15 Modernization	$29,742,000	$41,852,000	$68,168,000	$111,046,000
Piers 16-18 Fishing Pier Improvements	$75,653,000	$106,455,000	$173,393,000	$282,458,000
Piers 19 and 20 Multi-purpose Cargo Terminal	$188,184,000	$264,803,000	$431,308,000	$702,603,000
Piers 21 and 22 "Tug Row" Improvements	$114,397,000	$160,974,000	$262,193,000	$427,114,000
Piers 22 and 23 Maritime Support Pier Improvements	$173,474,000	$244,104,000	$397,594,000	$647,682,000
Piers 19 and 23 Maritime Center	$409,788,000	$576,633,000	$939,212,000	$1,529,980,000
Piers 24 to 29A Maritime Support Pier Improvements	$510,499,000	$718,348,000	$1,170,036,000	$1,905,993,000
Pier 29 Multi-purpose Cargo Pier Improvements	$91,400,000	$128,614,000	$209,485,000	$341,252,000
Piers 31 to 34 Multi-purpose Cargo Terminal Improvements	$363,729,000	$511,821,000	$833,647,000	$1,358,014,000
Pier 35 UH Research Pier	$135,604,000	$190,815,000	$310,797,000	$506,290,000
Pier 36 Fishing Village Pier Extension	$74,896,000	$105,390,000	$171,658,000	$279,632,000
Pier 38 Fishing Village Pier Improvements and Expansion	$70,892,000	$99,756,000	$162,482,000	$264,684,000
Pier 38 Maritime Support Area Improvements	$17,462,000	$24,572,000	$40,023,000	$65,198,000
Piers 39 to 41 Interisland Terminal Modernization	$898,384,000	$1,264,159,000	$2,059,045,000	$3,354,192,000
Piers 51-53 Sand Island Terminal Improvements	$1,124,275,000	$1,582,021,000	$2,576,774,000	$4,197,574,000
Pier 60 Aggregate and Cargo Pier Improvements	$146,037,000	$205,496,000	$334,709,000	$545,243,000
Total	**$5,934,756,000**	**$8,351,088,000**	**$13,602,147,000**	**$22,157,955,000**
Piers 1 & 2 Consolidated Cruise Terminal Options and Alternatives				
Passenger Access Option 1 - Mobile Staging Equipment	$750,000	$1,056,000	$1,720,000	$2,802,000
Passenger Access Option 2 - Elevated Retractable Walkway	$14,850,000	$20,897,000	$34,037,000	$55,447,000
Terminal Building Option 1 - Renovate Existing Building	$40,000,000	$56,286,000	$91,678,000	$149,344,000
Terminal Building Option 2 - New Semi-Permanent Structure	$12,500,000	$17,590,000	$28,651,000	$46,673,000
Terminal Building Option 3 - New Permanent Structure	$50,000,000	$70,358,000	$114,599,000	$186,683,000
Alt 1 - Semi-Permanent Structure / Mobile Staging Equip.	$13,250,000	$18,645,000	$30,369,000	$49,472,000
Alt 2a - Renovate Existing Terminal Bldg. / Mobile Staging Equip.	$40,750,000	$57,342,000	$93,398,000	$152,146,000

Proposed Improvement	FY 2023 [2]	FY 2030 [1,2]	FY 2040 [1,2]	FY 2050 [1,2]
Alt 2b - Renovate Existing Terminal Bldg. / Elevated Walkway	$54,850,000	$77,183,000	$125,715,000	$204,791,000
Alt 3a - New Permanent Terminal Bldg. / Mobile Staging Equip.	$50,750,000	$71,413,000	$116,317,000	$189,481,000
Alt 3b - New Permanent Terminal Bldg. / Elevated Walkway	$64,850,000	$91,254,000	$148,634,000	$242,126,000

1. 5 percent annual cost escalation.
2. Cost estimate values for recommended improvement items are rounded up to the nearest thousandths. See Appendix M for ROM cost estimate worksheets.

Table 9.2 – HHMP Recommended Project Prioritization

Priority [1]	Project	Prioritization Rationale
High	High priority projects include improvements to build harbor resiliency and adapt to climate change and SLR, to take advantage of near-term project sequencing opportunities, and to address essential harbor facilities that are in poor condition.	
	Piers 1-2 Multi-purpose Cargo Terminal Modernization	• Piers 1 and 2 are in 'Fair' to 'Poor' condition. Pier 1B is recommended for repair "with some urgency."[2] • When KCT opens for operations in 2024, most of the current operations at the Piers 1 and 2 cargo terminal will relocate to KCT. Any remaining operations can be relocated to other piers in the harbor, without impacting operations, creating an opportunity to vacate all or portions of Piers 1 and 2 to undertake reconstruction. • Piers 1 and 2 are identified as priority resiliency piers (see **Section 6.2.1.3)** for staging post-disaster response and for receiving and distributing emergency supplies. Piers 1 and 2 require improvements to adapt to climate change and SLR, and to support the resiliency pier function. • Reconstruction of Piers 1 and 2 requires a long lead time for financing, procurement, planning, design, and regulatory clearances.
	Piers 39-40 Interisland Terminal Modernization	• The condition of Piers 39 to 40 is 'Fair';[2] however, the deck areas adjacent to the piers lack adequate strength to support grounded container operations and the use of top-pick equipment, which limits yard capacity at the terminal. The terminal operator also noted that the pier structures, including fendering, are damaged in some areas and in need of repair (see **Section 7.2.5**). • Cost of improvements to the Interisland Terminal can be funded in part by revenue generation through tariffs. Increasing terminal yard capacity has the potential for increasing revenue generated at this terminal.

Priority [1]	Project	Prioritization Rationale
		• Improvements to the Interisland Terminal do not need to wait for KCT to become operational. Displaced operations can be accommodated at other multi-purpose cargo piers in the harbor.
	Piers 19-20 Multi-purpose Cargo Terminal Modernization	• Pier 19 is assessed as 'Poor' and Pier 20 as 'Fair' condition.[2] The poor condition warrants priority repair or reconstruction. • Reconstruction and strengthening of Piers 19 and 20 may be a prerequisite for the future development of a new maritime center at Piers 19 to 23. • Improvements to Piers 19 and 20 do not need to wait for KCT to become operational. Displaced operations can be accommodated at other multi-purpose cargo piers in the harbor.
	Piers 21-22 "Tug Row" Improvements	• Piers 21 and 22 are assessed as 'Satisfactory';[2] however, the "Tug Row" support buildings are in dilapidated condition and in urgent need of replacement, thus it might be appropriate to undertake pier improvements concurrently with the redevelopment of "Tug Row" support buildings as a total facility improvement project. In addition, tug operators noted that the pier deck is not strong enough to support truck-mounted cable spools and cranes used to service the tugboats. Operators also noted that the pier substructure is subject to scouring and potential undermining from the propulsion wash of the tugboats and would benefit from reconstruction using sheet pile/bulkhead construction. • Reconstruction and strengthening of Piers 21 and 22 may be a prerequisite for the future development of a new maritime center at Piers 19 to 23.
	Pier 29 Multi-purpose Cargo Terminal Modernization	• The Pier 29 apron is in 'Poor' condition and warrants priority attention. Reconstruction of the apron, including infilling the undeveloped "notch" segment, will augment the recently reconstructed yard to essentially create a new cargo pier. • Cost of improvements to Pier 29 can be funded in part by revenue generation through tariffs. Increasing the capacity of usable berth length has the potential for increasing revenue generated at this terminal.

Priority [1]	Project	Prioritization Rationale
		• Improvements to Pier 29 does not need to wait for KCT to become operational. Operations displaced during construction can be accommodated at other multi-purpose cargo piers in the harbor.
	Piers 51-53 Sand Island Container Terminal Modernization	• When KCT opens for operations in 2024, Pasha's current operations at the Piers 51A and B will relocate to KCT, opening the vacated piers for either improvements or to accommodate displaced operations from other areas of the Sand Island Terminal that are prioritized for improvement by the terminal operator.
	Initiate USACE Feasibility Study • Main Entrance Channel Widening • Kapālama Transit Channel Widening • Kalihi Channel Bridge Replacement • Breakwater Protection for Main Channel • Other modifications to address resiliency and climate change/SLR	• Undertaking the USACE feasibility study requires a long-lead time to secure funding and complete the required benefit/cost analysis (BCA). • If the BCA proves favorable for an alternative, project execution will likewise require a long lead time for financing, procurement planning, design, and regulatory clearances. • The projects are all important to improving the harbor's resiliency and port restoration capacity, as well as its ability to adapt to climate change and SLR.
	Establish the SLR Strategic Committee	• The SLR Strategic Committee is proposed as a key resource for developing design solutions for harbor facility adaptation improvements to address climate change and SLR. The work of the Strategic Committee will potentially inform the design of all major harbor modernization projects. Therefore, creation of the Strategic Committee is a high priority.
Medium	These improvements are less urgent or involve facilities that are prioritized as less critical to harbor resiliency and function than high priority projects but are still important for medium and long-term improvement of harbor capacity and function.	
	Demolish Grain Silos at Pier 23	• The grain silos are unutilized and constrain efficient use of valuable waterfront pier space for use by a maritime support service operator. • Demolition of the grain silos is a pre-requisite for reconstruction of Pier 23 and widening the adjacent slipway. It is also a prerequisite for development of a new maritime center at Piers 19 to 23.

Priority [1]	Project	Prioritization Rationale
	Piers 22-23 Reconstruction and Slipway Widening	• Piers 22 and 23 are in 'Satisfactory'[2] condition but are underutilized due to the narrow slipway and related operational conflicts with PSI drydock operations at Piers 24 and 25; subsurface rock outcroppings that require deeper draft vessels to breast off the pier face; and limited yard area due to the presence of the vacant grain silos and warehouse structures. • Reconstruction of Piers 22 and 23 may be a prerequisite for the future development of a new maritime center at Piers 19 to 23. • Cost of improvements to Pier 23 can be funded in part by revenue generation through tariffs and lease rents from a dedicated user.
	Pier 23 Maritime Center	• Development of the maritime center at Piers 19 to 23 will require a long lead time to finance, procure, plan, design and obtain construction approvals. This alternative might be feasible only through a PPP. These issues require early action to initiate this effort. • Development of the maritime center will generate revenue through lease rents and user fees that will contribute to recovering the costs of development.
	Piers 5-6 Reconstruction	• There is no urgency to reconstruct the piers based on their condition. Reconstruction of the piers should be coordinated with redevelopment of the landside areas under ATDC jurisdiction through a PPP. Redevelopment of the Piers 5 and 6 land area is a priority for the ATDC.
	Pier 60 Improvements	• Pier 60 backland redevelopment has long-term potential for revenue generation. Improvements will require a long-lead time to coordinate with the adjacent landowners for right-of-way acquisition. • Pier and yard improvements are necessary to mitigate ground subsidence and flooding and to eliminate potential for comingling of sediment from aggregate stockpiles in drainage water.
	"Tyco Pier" – Layberth Dolphins	• Tyco Pier layberth improvements require extinguishing the State's land lease with Tyco and authorizing DOTH jurisdiction over the waterside facilities.

Priority [1]	Project	Prioritization Rationale
		• Additional layberth is required in the harbor, but there is sufficient capacity and workarounds for the short-term.
	Pier 31-34 Multi-purposed Cargo Terminal Modernization	• Ongoing projects to improve pier and yard function for general cargo use reduce the urgency to undertake major reconstruction. • SLR is projected to eliminate the clearance beneath the pier that is required to access the underside of the pile-and-deck pier structure for inspection and maintenance. Reconstruction is necessary to improve pier resiliency.
Low	Low priority projects include non-urgent projects that may be undertaken in the future upon end of facility design life or when capacity demand or operational conditions change.	
	Pier 16 Widening	• There are suitable work-arounds at other piers where fishing vessels can access motor vehicles for servicing, fueling and provisioning fishing boats. • Pier widening can wait until the pier reaches the end of its functional life and needs to be reconstructed.
	Pier 36 Extension	• There are existing work-arounds for commercial fishing boat berthing so the additional berthing created by extending Pier 36 is not urgent. • P&R Water Taxi operations may be relocated from the end of Pier 36 in the near future which will open up berthing space for fishing boats.
	Pier 38 New Berth Construction	• There are existing work-arounds to accommodate fishing boat operations and berthing at Pier 38. Although the expanded pier will improve commercial fishing vessel operations (loading/unloading, provisioning, fueling, servicing), operational changes can improve access and efficiency at the pier.
Opportunistic	Opportunistic projects include non-urgent projects that may be initiated through agreements among private partners, DOTH and/or ATDC	
	Aloha Tower Complex Redevelopment	• Redevelopment of landside areas of the Aloha Tower complex depends on a PPP agreement among the DOTH, ATDC and viable private developer.

Priority [1]	Project	Prioritization Rationale
	Piers 1 and 2 Cruise Terminal Consolidation	• Development of new facilities to support a consolidated cruise terminal building or major renovations to the existing terminal building at Pier 2 require mutual investment commitments by the cruise industry and the State.
	Pier 23 Maritime Center	• Development of a new maritime center at Pier 23 may be initiated by an interested private developer through a PPP agreement with DOTH.
	Piers 12 and 13-14 Improvements	• Improvements to Piers 12 to 14 may be initiated by a maritime operator interested in investing in facility improvement under a long-term lease agreement with DOTH.

[1] HHMP project priorities, serve as suggestions for DOTH decision-makers to consider when programming financing and improvements to Honolulu Harbor facilities. DOTH is not obligated to implement projects according to HHMP priorities as priorities may change based on evolving conditions, unexpected occurrences, and availability of financing.

[2] Conditions Assessment Study of Harbor Waterfront Structures, DOTH, October 2021.

9.5 Permitting and Approvals

9.5.1 Federal

A USACE DA Permit may be needed for projects involving work in, over or under the water; placement or discharge of dredged or fill material in the water; or transport of dredged material for disposal at an ocean site. USACE DA Permits are anticipated to be required for reconstruction of pier facilities where in-water work is required, channel widening, and reopening of a second harbor entrance including dredging channel access between the harbor and open ocean. USACE approval is authorized by the following statutes:

- CWA Section 404;
- RHA Section 10; and
- MPRSA Section 103

Projects that alter or could affect the usefulness of a USACE public work may need a Section 408 Letter of Permission in accordance with RHA Section 14.

Projects that involve federal land, funds or regulatory approval will also require preparation of an environmental review document in accordance with the National Environmental Policy Act (NEPA).

Additional federal approvals and consultations that may be required for harbor improvement projects include:

- CWA, Section 401 Water Quality Certification for projects involving a CWA Section 404 DA permit from the USACE;
- ESA Section 7 consultation with NMFS and USFWS;
- NHPA Section 106 consultation with the State Historic Preservation Officer and Native Hawaiian organizations;
- Magnuson-Stevens Act, Essential Fish Habitat consultation with NMFS;
- Navigable Airspace analysis by the FAA (FAA Form 7460-2, Obstruction Evaluation/Airport Airspace Analysis) for projects involving new buildings or structures that might encroach above the 163-FT horizontal airspace ceiling above Honolulu Harbor;
- Coastal Zone Management Program Federal Consistency Review with OPSD;
- National Flood Insurance Program evaluation; and
- Projects involving renovation of existing structures, demolition or ground disturbance may be subject to other federal requirements, including those relating to hazardous materials and waste.

9.5.2 State

Proposed facility improvement projects within Honolulu Harbor require the following regulatory reviews and approvals:

- Preparation of an HRS 343 Environmental Assessment or Environmental Impact Statement for any project involving actions listed in HRS 343-5 and that do not qualify for an exemption in accordance with DOT's approved Comprehensive Exemption List;
- Compliance with adaptation goals and guidelines established by the Hawaiʻi Climate Change Initiative – Act 286 of 2012;
- HRS 6E Historic Preservation Review in consultation with SHPD; and
- CWA, Section 402 National Pollutant Discharge Elimination System Permits for projects involving more than one acre of area or that involve discharges of construction dewatering, industrial water, or hydrotesting effluent.

9.5.3 CCH

Within the jurisdictional boundaries of Honolulu Harbor, DOTH is exempt from CCH regulatory oversight and permit approvals.[43] However private tenants under lease to DOTH may be required to obtain permit approvals (e.g., building permits, Special Management Area permits, etc.) from CCH under special circumstances depending on the nature of the proposed project activity.

[43] HRS 266-2(7)(b): Notwithstanding any law or provision to the contrary, the DOT is authorized to plan, construct, operate, and maintain any commercial harbor facility in the State, including, but not limited to, the acquisition and use of lands necessary to stockpile dredged spoils, without the approval of county agencies.

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