DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
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DEPUTY DIRECTOR

August 27, 2021

2020/ED-12(ST)

Ms. Mary Alice Evans, Director
Environmental Review Program
Office of Planning and Sustainable Development
State of Hawaii
235 South Beretania Street, Room 702
Honolulu, Hawaii 96813-2437

Dear Ms. Evans:

| | |
|---|---|
| SUBJECT: | Chapter 343, Hawaii Revised Statutes<br>Final Environmental Assessment (FEA) |
| Project: | Krueger Shore Protection Mitigative Improvements |
| Applicant: | David and Terri Krueger |
| Agent: | G70 (Jeffery Overton) |
| Location: | 1226 Mokulua Drive - Lanikai |
| Tax Map Key: | 4-3-005: 056 |
| Request: | Shoreline Setback Variance<br>Chapter 23, Revised Ordinances of Honolulu |
| Proposal: | To modify an existing 105-foot long concrete seawall by inserting sheet piles to its backside (mauka), adding a concrete sheet pile cap and a one-foot high concrete splash lip at the top of the seawall. The sheet pile cap will be secured to the seawall and held in place by 25-foot long steel rods connected to multiple concrete deadmen located further mauka of the seawall. |
| Determination: | Finding of No Significant Impact (FONSI) |

With this letter the Department of Planning and Permitting (DPP) hereby transmits the FEA and FONSI for the subject Project located within the 40-foot shoreline setback at the above location in the Koolaupoko District, on the island of Oahu. Please publish this finding in the next edition of *The Environmental Notice* on September 8, 2021.

22-027

**From:** webmaster@hawaii.gov
**To:** DBEDT OPSD Environmental Review Program
**Subject:** New online submission for The Environmental Notice
**Date:** Monday, August 30, 2021 4:51:18 PM

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**Action Name**

Krueger Residence Seawall Modification and Repair

**Type of Document/Determination**

Final environmental assessment and finding of no significant impact (FEA-FONSI)

**HRS §343-5(a) Trigger(s)**

- (3) Propose any use within a shoreline area

**Judicial district**

Koʻolaupoko, Oʻahu

**Tax Map Key(s) (TMK(s))**

(1)4-4-005:056

**Action type**

Applicant

**Other required permits and approvals**

building, grading, grubbing, stockpiling and trenching permits

**Discretionary consent required**

Shoreline Setback Variance and Special Management Area Use Permit

**Approving agency**

Department of Planning and Permitting

**Agency contact name**

Steve Tagawa

**Agency contact email (for info about the action)**

stagawa@honolulu.gov

**Email address or URL for receiving comments**

stagawa@honolulu.gov

**Agency contact phone**

(808) 768-8024

**Agency address**

650 South King Street
Honolulu, Hawaii 96813
United States
Map It

**Applicant**

David and Terri Krueger

**Applicant contact name**

David Krueger

**Applicant contact email**

jeff@g70.design

**Applicant contact phone**

(808) 523-5866

**Applicant address**

111 S. King Street, Suite 170
honolulu, hawaii 96813
United States
Map It

**Was this submittal prepared by a consultant?**

Yes

**Consultant**

G70

**Consultant contact name**

Steve Tagawa

**Consultant contact email**

stagawa@honolulu.gov

**Consultant contact phone**

(808) 768-8024

**Consultant address**

650 South King Street
Honolulu, Hawaii 96813
United States
Map It

**Action summary**

To modify a nonconforming concrete seawall located at the makai boundary of the 18,376-square foot shoreline parcel at 1226A Mokulua Drive in Lanikai. The modification involves inserting sheet piles in back (mauka) of the 105-foot long seawall. The sheet piles will be driven 9 feet below the existing seawall and capped with a concrete cap secured to the seawall. A 1-foot high concrete splash lip extension to the top of seawall is also proposed. This assembly will be anchored by steel rods connected to concrete deadman constructed 25 feet mauka and below the existing grade.

The subject property and three adjacent parcels to the southeast (Waimānalo) are protected by a boulder rip-rap or "rock blanket" which was authorized by both the State and the City in 1968. The existing boulder rip-rap of the adjacent parcel to the north (Kailua) is unauthorized.

The project requires both a Shoreline Setback Variance and Major SMA permit.

**Reasons supporting determination**

The proposed action was determined not to have a potential significant environmental effect as is set forth in Section 11-200.1-13, HAR.

**Attached documents (signed agency letter & EA/EIS)**

- Krueger.FONSI.pdf
- Krueger.FONSI1.pdf

**Shapefile**

- The location map for this Final EA is the same as the location map for the associated Draft EA.

**Authorized individual**

Steve Tagawa

**Authorization**

- The above named authorized individual hereby certifies that he/she has the authority to make this submission.

# KRUEGER SHORE PROTECTION MITIGATIVE IMPROVEMENTS

## FINAL ENVIRONMENTAL ASSESSMENT

### KAILUA, ISLAND OF O'AHU

APPLICANT:

DAVID AND TERRI KRUEGER

PREPARED BY:

G70

111 S. KING STREET, SUITE 170
HONOLULU, HI 96813

SEPTEMBER 2021

# KRUEGER SHORE PROTECTION MITIGATIVE IMPROVEMENTS

## FINAL ENVIRONMENTAL ASSESSMENT

KAILUA, ISLAND OF O'AHU
TMK: (1) 4-3-005:056

APPLICANT:

DAVID AND TERRI KRUEGER
1226A MOKULUA DRIVE
KAILUA, O'AHU, HAWAI'I

PREPARED BY:

G70

111 S. KING STREET, SUITE 170
HONOLULU, HI 96813

APPROVING AGENCY:

CITY AND COUNTY OF HONOLULU
DEPARTMENT OF PLANNING AND PERMITTING
650 SOUTH KING STREET
HONOLULU, HAWAI'I 96813

SEPTEMBER 2021

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# Acronyms and Abbreviations

| | |
|---|---|
| AIS | Archaeological Inventory Survey |
| BLNR | Board of Land and Natural Resources |
| BMPs | Best Management Practices |
| BWS | Board of Water Supply |
| CAB | Clean Air Branch |
| CDUP | Conservation District Use Permit |
| City | City and County of Honolulu |
| CRM | Concrete Rubber Masonry |
| CWA | Clean Water Act |
| CZM | Coastal Zone Management |
| DBEDT | Department of Business, Economic Development, and Tourism |
| DDC | Department of Design and Construction, City |
| DLNR | Department of Land and Natural Resources, State |
| DPP | Department of Planning and Permitting, City |
| DOE | Department of Education, State |
| DOH | Department of Health, State |
| DOT | Department of Transportation, State |
| EA | Environmental Assessment |
| EMS | Emergency Medical Services, City |
| ESA | Endangered Species Act |
| FEMA | Federal Emergency Management Agency |
| FIRM | Floor Rate Insurance Map |
| FONSI | Finding of No Significant Impact |

| | |
|---|---|
| GHG | Greenhouse gas |
| HAR | Hawai‘i Administrative Rules |
| HDOT | Department of Transportation Harbors Division, State |
| HECO | Hawaiian Electric Company |
| HFD | Honolulu Fire Department |
| HPD | Honolulu Police Department |
| HRS | Hawai‘i Revised Statutes |
| IBC | International Building Code |
| IPCC | Intergovernmental Panel on Climate Change |
| LUC | Land Use Commission, State |
| LUO | Land Use Ordinance |
| MRCI | Marine Research Consultants, Inc. |
| msl | Mean Sea Level |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| NRCS | Natural Resources Conservation Service |
| OCCL | Office of Conservation and Coastal Lands, State |
| OCCSR | Office of Climate Change, Sustainability, and Resiliency |
| OEQC | Office of Environmental Quality Control, State |
| OHA | Office of Hawaiian Affairs |
| ORMP | Ocean Resource Management Plan |
| PacIOOS | Pacific Islands Ocean Observing System |
| ROH | Revised Ordinances of Honolulu |
| SAAQS | Station Ambient Air Quality Standards |
| SEI | Sea Engineering, Inc. |
| sf | Square feet |

| | |
|---|---|
| SHPD | State Historic Preservation Division |
| SLR | Sea level rise |
| SLRXA | SLR Exposure Area |
| SMA | Special Management Area |
| SSV | Shoreline Setback Variance |
| State | State of Hawai‘i |
| TMK | Tax Map Key |
| UH | University of Hawai‘i |
| USACE | U.S. Army Corps of Engineers |
| USDA | U.S. Department of Agriculture |
| USFWS | U.S. Fish and Wildlife Service |
| XTEZ | Extreme Tsunami Evacuation Zone |

Section 1

# Introduction

## Chapter 1

# Introduction

This Environmental Assessment (EA) has been prepared in accordance with the requirements of Chapter 343, Hawai‘i Revised Statutes (HRS), and Title 11, Chapter 200.1, Hawai‘i Administrative Rules (HAR), Department of Health, which set forth the requirements for the preparation of environmental assessments. The property is located within the shoreline area and will require the approval of a Shoreline Setback Variance (SSV) pursuant to Revised Ordinances of Honolulu (ROH), Chapter 23, Shoreline Setbacks and a Special Management Area (SMA) Use Permit pursuant to ROH, Chapter 25, Special Management Area. Chapters 23 and 25 of the ROH requires the preparation of an EA consistent with Chapter 343 HRS and Chapter 11-200.1 HAR.

## 1.1 Project Information Summary

| | |
|---|---|
| **Type of Document:** | Environmental Assessment (EA) |
| **Project Name:** | Krueger Shore Protection Mitigative Improvements |
| **Applicants:** | David and Terri Krueger |
| **Agent:** | G70<br>111 S. King Street, Suite 170<br>Honolulu, HI 96813 |
| **Accepting Authority:** | Department of Planning and Permitting<br>650 South King Street, 7th Floor<br>Honolulu, HI 96813<br>Telephone: (808) 768-8049 |
| **EA Trigger:** | HRS 343-5(a)(3) Use within a Shoreline Setback Area<br>ROH Chapter 23, Shoreline Setbacks<br>ROH Chapter 25, Special Management Area |
| **Project Location:** | 1226a Mokulua Drive<br>Kailua, O‘ahu, Hawai‘i *(Figure 1-1)* |
| **Tax Map Keys (TMK) and Landowners:** | (1) 4-3-005: 056<br>David and Terri Krueger *(Figure 1-1)* |
| **Project Area:** | Approximately 3,000 square feet (SF)<br>(nearshore portion of 18,376 square-foot TMK) |
| **State Land Use District:** | Urban District |
| **City & County of Honolulu Zoning:** | R-10 (Residential District) |
| **Ko‘olau Poko Sustainable Communities Plan:** | Low Density Residential |

| | |
|---|---|
| **Special Management Area:** | Within Special Management Area *(Figure 1-2)* |
| **Flood Zone:** | AE/X *(Figure 1-3)* |
| **Anticipated Determination:** | Finding of No Significant Impact (FONSI) |

## 1.2 Overview of the Planned Project

The project site consists of a single residential property located on Mokulua Drive in the community of Lanikai, Kailua, Koʻolaupoko District on the island of Oʻahu (*Figure 1-1*). The site is identified by TMK (1) 4-3-005: 056. The property is fronted by a shore protection system which is comprised of a seawall constructed of unreinforced concrete and a rock apron composed of basalt boulders that runs along the length of the seawall. The existing shore protection system is dilapidated and presents structural deficiencies. Under a Grant of Non-Exclusive Easement S-6043 (hereinafter referred to as "the easement"), the Grantee is required to maintain the easement area in a safe condition. See the following *Section 1.3* for details about the easement. To meet the requirements of the easement, in an appropriate manner for the scale of the project site and surrounding coastal environment, the property owner is seeking to maintain the existing shore protection system with mitigative improvements. Mitigative improvements to the existing shore protection system involves the insertion of sheetpile into hard substrate landward of the existing shore protection system to improve its structural integrity. The sheetpile stabilization system will be structurally connected by the construction of a concrete width extension sheetpile cap dowelled into the existing shore protection system. Further detail on the Proposed Action is provided in *Chapter 2.0*.

## 1.3 Project Background

In 1999, the previous owner inquired with the City and County of Honolulu (City) Department of Planning and Permitting (DPP) to consolidate accreted beach lands makai of the parcel prior to purchasing the property (1999/CLOG-3593(ST)). Although construction permits and other land use authorization permits could not be located for the existing shoreline protection system, affidavits filed for the property indicated that the wall was built prior to World War II and has been buried for the past 38 years. Additionally, although the older wall cannot be seen in 1967 aerial photos, the wall was possibly buried at that time (*Appendix A, DPP letter dated July 13, 1999, File Number 1999/CLOG-4318(ASK)*). The existing seawall structure is therefore considered nonconforming.

The rock apron was permitted on October 14, 1968 by the State of Hawaiʻi Department of Transportation (HDOT) Harbors Division for construction *(Appendix B*, *Shore Waters Construction Permit No. 1395*). On November 20, 1968, a variance was approved by the Zoning Board of Appeals for four properties along the Lanikai coastline, including the subject property, to construct a rock apron seaward of the nonconforming seawall and within the zone of wave action (*Appendix C*, *Variance Related to the Zone of Wave Action No. 1968/Z-124*).

In 2012, the Hawai‘i Board of Land and Natural Resources (BLNR) approved disposition of a term, non-exclusive easement for seawall and revetment purposes. The easement was executed by the Hawai‘i State Legislature on September 27, 2013. The easement confers unto the Grantee the “right, privilege, and authority to use, maintain, repair, replace and remove the existing seawall and steps over, under, and across State-owned land”. The easement also requires that the Grantee “shall keep the easement area and the improvements thereon in a safe condition”. The easement is valid for fifty-five (55) years and will expire on September 27, 2069 (*Appendix D, Amendment of Grant of Non-Exclusive Easement S-6043*). The project shoreline was certified by the State Department of Accounting and General Services, Survey Division on April 3, 2014. An updated shoreline survey was subsequently conducted, and the shoreline did not change. The shoreline certification was approved by DLNR on November 13, 2020 (*Appendix E, Shoreline Certification Map, File No. OA-1911*).

Documents detailing the regulatory status of the existing shoreline protection system are included within *Appendix A.*

In 2017, an investigation was performed by APTIM Environmental and Infrastructure, Inc. as a routine inspection to assess the general overall condition of the structure, assign condition assessment ratings, and identify recommended actions for future maintenance activities. Based on field observations and criteria established in the Waterfront Facilities Inspection and Assessment Manual (ASCE, 2015), the revetment was given a condition assessment rating of “Fair” as all primary structural elements are sound but minor to moderate defects were observed, and repairs were recommended. However, the seawall was given a condition assessment rating of “Serious” as advanced deterioration, overstressing, and breakage may significantly affect the load-bearing capacity of primary structural elements. Therefore, repairs to the seawall were determined to be carried out on a high-priority basis with urgency.

## 1.4 Purpose of the Environmental Assessment

Pursuant to Chapter 343 HRS and Chapter 11-200.1 HAR, development within the shoreline area is the trigger for preparation of the EA. DPP is the accepting authority. In the City and County of Honolulu, development within the shoreline area also requires an SSV pursuant to Chapter 23 ROH and SMA compliance pursuant to Chapter 25 ROH. Processing an SSV application by the DPP is a two-phase process. The first phase involves the acceptance of the Chapter 343 HRS EA. After the environmental review process, an SSV application will be processed by the DPP and include a public hearing. The SSV permit will require approval by the Honolulu City Council.

In accordance with Hawai‘i’s Environmental Review process, a Draft EA was prepared to inform interested parties of the Proposed Action, disclose and examine the potential environmental impacts, provide mitigation measures, and seek agency and public comment on subject areas that should be addressed. The Draft EA was published by the State Office of Environmental Quality Control (OEQC) in *The Environmental Notice* on January 23, 2021 and was followed by a 30-day public comment period. All relevant written public comments received during the 30-day public comment period were provided with a written response for inclusion and use in the preparation of this Final EA. Documentation of the consultation process is provided in *Chapter 7.0*.

Pursuant to the 13 significance criteria specified by HAR Chapter 11-200.1-13, DPP determined that preparation of an Environmental Impact Statement is not required for the Project, and hereby issues a Finding of No Significant Impact (FONSI). See further discussion in *Chapter 6.0*.

## 1.5 Permits and Approvals Required

Several other approvals will be required from the State of Hawai‘i (State) and City to implement the project, as outlined in *Table 1-1* below:

**Table 1-1 List of Required Government Permits and Approvals**

| Permit or Approval | Approving Authority |
|---|---|
| Final Environmental Assessment / FONSI, Chapter 343 HRS | DPP |
| Special Management Area Use Permit, Major, Chapter 25 ROH | DPP |
| Shoreline Setback Variance, Chapter 23 ROH | DPP |
| Minor Shoreline Structure | DPP |
| Zoning Adjustment | DPP |
| Certified Shoreline Survey | Department of Land and Natural Resources |
| Chapter 6E HRS Compliance Historic Resources | DLNR, State Historic Preservation Division (SHPD) |
| Grading, Grubbing, Trenching and Stockpiling Permits | DPP |
| Building Permits (Demolition, Buildings, Electrical, Plumbing) | DPP |

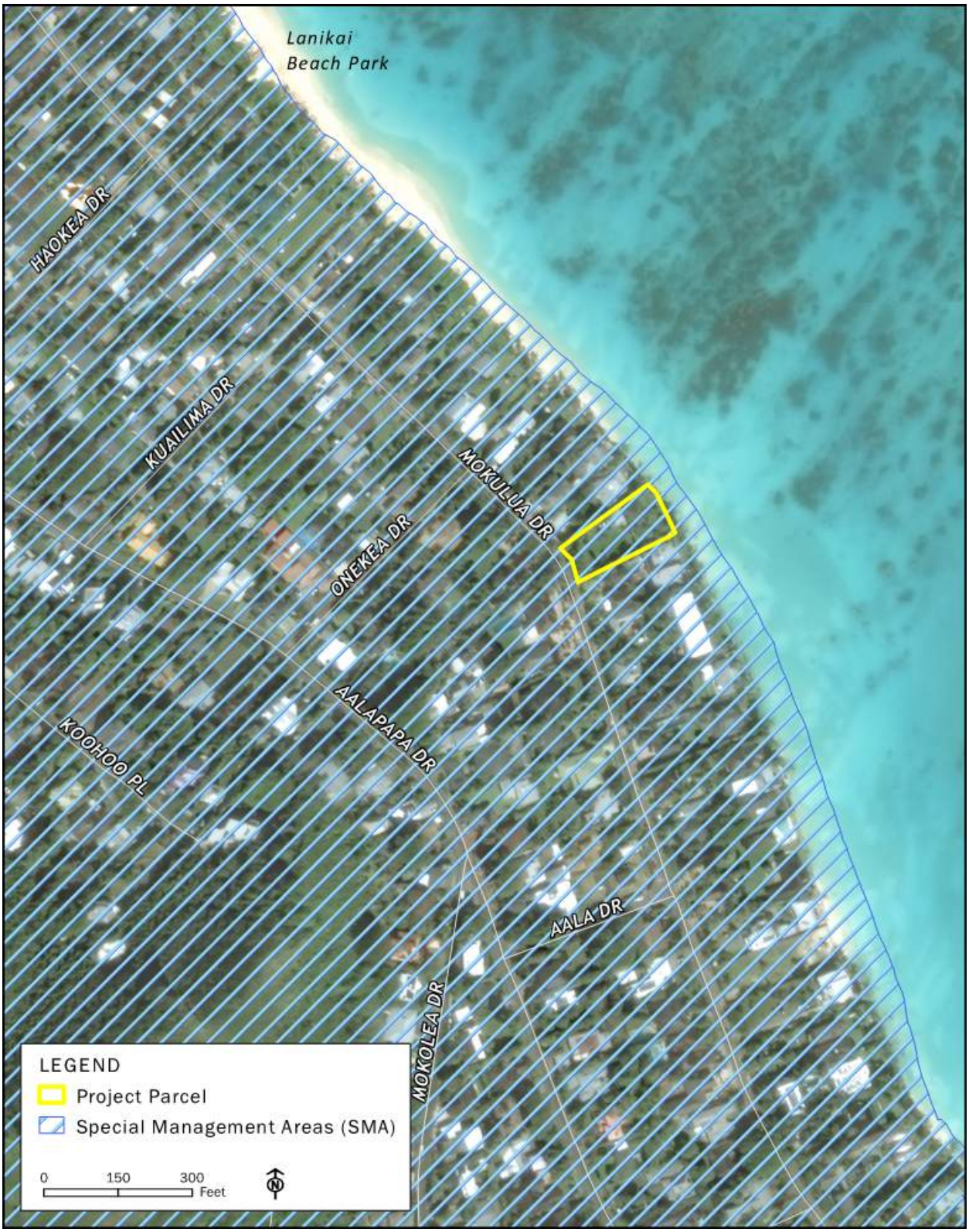
The U.S. Army Corps of Engineers, Honolulu District was consulted in preparation of this EA. It is anticipated that Department of the Army permit authorization pursuant to the Clean Water Act (CWA), Section 404 (33 U.S. Code 1344) or Rivers and Harbors Act of 1899, Section 10 (33 U.S. Code 403) is not required because mitigative improvements to the existing shore protection system will not occur above, within, or below Waters of the U.S. Consequently, the project will not require a Water Quality Certification pursuant to the CWA, Section 401.

Notably, a Conservation District Use Permit (CDUP) from the DLNR-Office of Conservation and Coastal Lands (OCCL) is not required because the proposed mitigative improvements would be landward of the shoreline, outside of the Conservation District, which includes all lands makai of the certified shoreline. The shoreline fronting the subject property has been surveyed and the approved shoreline certification from the DLNR included in *Appendix E*.

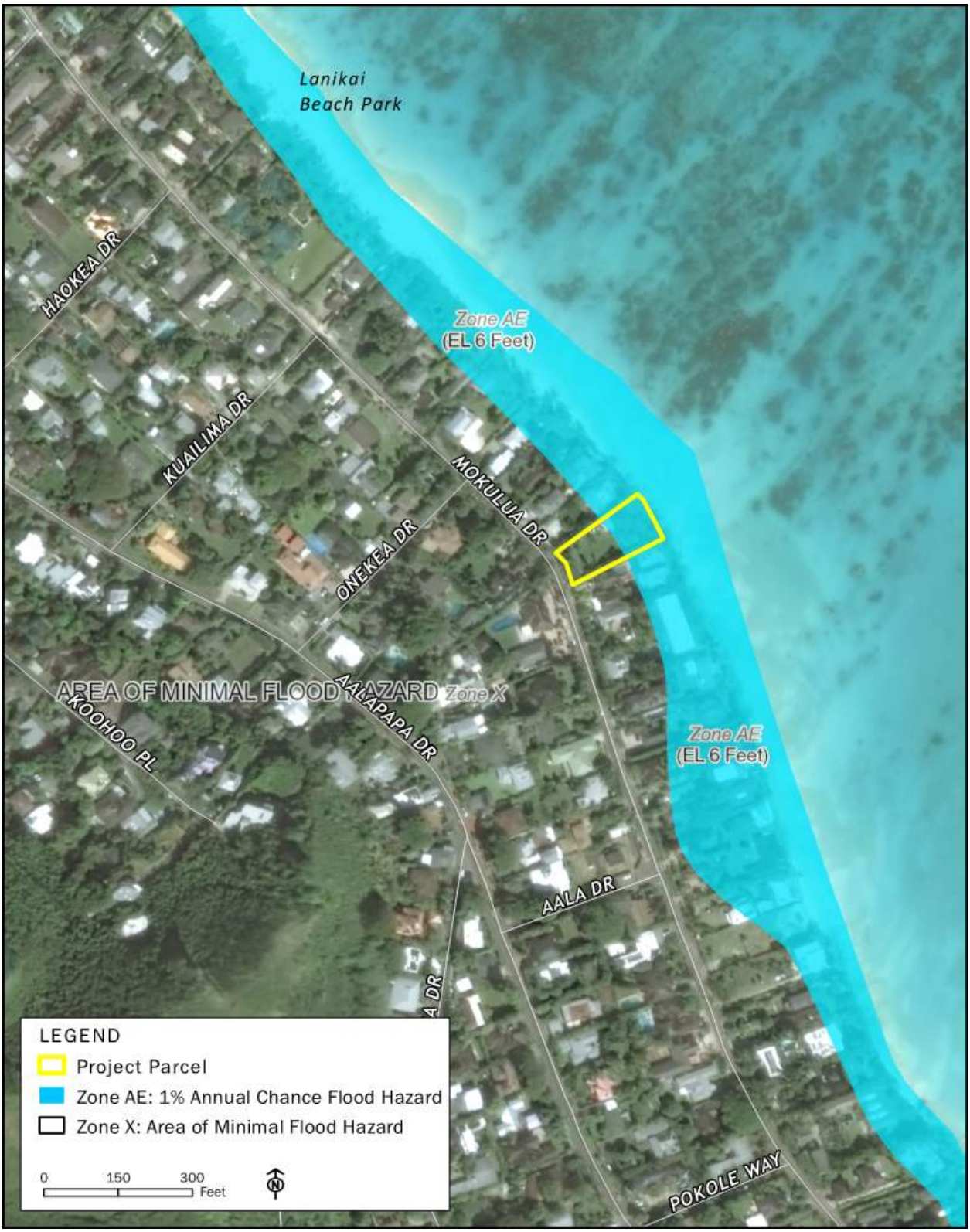
## 1.6 Agencies, Organizations and Individuals Contacted During the Consultation Process

Early consultation letters were sent out to various stakeholder agencies in June 2020 to initiate the environmental review process. Four agencies and one community organization provided early consultation comments. The Draft EA was subsequently published in *The Environmental Notice* on January 23, 2021. Publication of the Draft EA was followed by a 30-day public comment period. A total of seven State and City agencies or agency divisions and community organizations commented on the Proposed Action. Further discussion on agencies and organizations consulted, comments received, and responses is provided in *Chapter 7.0*.


**Project Location and TMK Parcel** **Figure 1-1**




**Special Management Area** **Figure 1-2**




**Federal Emergency Management Agency (FEMA) Flood Zone** **Figure 1-3**

Section 2

# Project Description

Chapter 2

# Project Description

## 2.1 Project Location

The project site consists of a single residential property identified by TMK (1) 4-3-005: 056 located on Mokulua Drive in the community of Lanikai, Kailua, Koʻolaupoko District on the island of Oʻahu (*Figure 1-1*). The project site spans approximately 120 feet along a central portion of the Lanikai Coast, which is approximately 8,000 linear feet (1.5 miles) stretching from Wailea Point to Alāla Point. The project site occupies approximately 1.5 percent of the entire Lanikai shoreline length and is one of 108 residential parcels, most of which are protected by a hardened shoreline structure. The project is situated on Low Density Residential zoned lands which are privately owned. The property is bound by the Pacific Ocean to east, Mokulua Drive to the west, and private residences to the north and south. The property is fronted by a shore protection system consisting of a seawall constructed of unreinforced concrete and a rock apron composed of basalt boulders that runs along the length of the seawall. The north and south adjacent properties are fronted by similar shore protection structures. See *Figure 2-1, Project Site Photograph (Sea Engineering, Inc. (SEI))*.


**Project Site Photograph (SEI)** **Figure 2-1**

## 2.2 Site Characteristics

*Existing Uses and Conditions*

The project site consists of a single residential parcel with a total land area of 18,376 square feet (0.42-acre) and a total shoreline frontage of 105 feet. The concrete driveway connects Mokulua Drive to the existing two-story single-family home, which is set back 40 feet from the existing shoreline. The home is currently being threatened by active shoreline erosion due to undermining of the seawall.

Terrestrial elevation ranges at the project site range from 7 to 11 feet above mean sea level (msl). The property is fronted by a shore protection system comprised of a seawall that is constructed of unreinforced concrete and a rock apron that is composed of basaltic boulders ranging from 9 to 18 inches in diameter. The rock apron is approximately 4 feet high, 10 feet wide, and runs along the length of the seawall. The current conditions of the shoreline are shown in *Figures 2-2 and 2-3*. The seawall is nonconforming, while the rock apron is permitted by HDOT Harbors (see *Section 1.3*).

SEI evaluated the existing shore protection system, and provided a detailed description in *Appendix F, Coastal Assessment for Krueger Shore Protection Mitigative Improvements* (May 2021). The existing seawall is approximately 90 feet long and 6 to 8 feet tall, as referenced from the beach sand elevation at the time of inspection of the site in 2019. The top of the wall varies in elevation from about +5 feet to +7 feet msl. The top of the wall is approximately 16 to 17 inches wide with apparent front and rear batters of about 1H:12V to 1.5H:12V. Based on these batters and wall heights, the base of the wall is estimated to be approximately 2.4 feet wide. Two concrete counterforts are located on the landward side of the wall at approximately 43 feet and 70 feet from the north end, respectively (*Figure 2-4*). The seawall terminates approximately 20 feet from the northwest property corner. Wave action is causing erosion of the terrestrial soils in this area.

The seawall appears to have been constructed in six segments, or panels. Vertical joints are visible between each panel section. There is evidence of concrete repairs at several of the panel joints. An approximately 1 to 2-inch-wide gap was observed at the panel joint between the subject seawall and the south adjacent seawall

Settlement was observed along the northern portion of the seawall, which is likely due to the loss of subgrade support from erosion of the underlying substrate. In the areas where settlement was observed, outward rotation of the wall has also occurred. Most noticeable failure is at the return on the north end of the seawall which has disconnected from the main wall structure. The outward rotation of the wall may be attributed to a loss of bearing support fronting the wall and/or an increase in the active lateral forces due to saturated soil conditions. See *Appendix F* for additional photos depicting the existing conditions and deterioration of the seawall.

Further, the seawall appears to have been constructed on soft substrate that is highly susceptible to scour and erosion. Sinkholes are apparent along the entire length of the seawall. The sinkholes likely formed due to internal erosion of the sandy substrate from beneath and behind the seawall.

**Existing Conditions – North End of Shoreline (SEI)** **Figure 2-2**

**Existing Conditions – South End of Shoreline (SEI)** **Figure 2-3**

*Adjacent Land Uses*

Land uses adjacent to the project site include residential areas to the north and south, Mokulua Drive to the southwest, and the Pacific Ocean to the northeast. The project site is located along a predominantly armored shoreline characterized by a mix of seawalls, rock aprons, and revetments that extends approximately 4,000 linear feet from Wailea Point to the central portion of Lanikai Beach. The south adjacent property is fronted by a seawall that appears to be of similar construction, while the north adjacent property is fronted by a concrete rubble masonry (CRM) seawall and rock apron composed of loose basalt boulders.

Narrow sand beaches exist along portions of the Lanikai shoreline and there is some public access to these areas, but lateral shoreline access is limited between them. Shoreline public access is not available through or alongside the subject property. The closest beach access points are 350 feet northwest and 400 feet southeast of the property. Lanikai Beach, with wide fringing limestone reef flats protecting the coastline, is a recreational destination for snorkelers, swimmers, and spearfishermen. Large portions of the beach adjacent to the property are submerged at high tide, though the beach may be used by beachgoers during low tide. There are no notable surf breaks directly offshore of the project site. Surfing areas are located far offshore, outside of the reef crest for the wide, shallow, fringing reef. Very limited off-street vehicular parking is available for beachgoers along Mokulua Drive, and its side streets with the closest public restrooms and showers located at Kailua Beach Park.

*Shoreline Characteristics*

The project coastline is characterized by a wide fringing reef that extends over 3,000 feet offshore and along the Mokulua Islands. The fringing reef is incised with channels or depressions at numerous locations and has numerous sand patches. The shallow reef crest and reef flat dissipate wave energy as it approaches the shoreline. During typical conditions, significantly less wave energy reaches the shoreline than exists in deep water due to the shallow depths of the reef and subsequent wave breaking. However, wave energy still reaches the shoreline at higher water levels and cross-shore currents still occur.

The shoreline is shaped by the prevailing tradewind waves. These waves experience refraction and diffraction past the Mokulua Islands and over the shallow fringing reef, resulting in a very complex nearshore wave pattern.

Sand in Lanikai Beach and the nearshore sand fields is mobilized through active longshore and cross-shore transport. Typical patterns on windward Oʻahu beaches show sand being pushed offshore with winter swell events and a gradual transport back onshore during summer tradewind swell conditions. Longer term sand dynamics of Lanikai Beach have changed due to the extensive armoring of the shoreline, particularly along the southern portion of the shoreline, south of the project site.

Prior to the late 1970's, Lanikai Beach showed a trend of accretion. This trend reversed causing erosion along the shoreline and, in response, property owners constructed seawalls and other hardened shoreline protection structures (Romine and Fletcher, 2012). The project site is located at the north end of a predominantly armored shoreline that extends approximately 4,000 feet south to Wailea Point. The shoreline north of the project site transitions to a wider, dry beach with backshore dune formation and stable vegetation. Many of the properties in this area are fronted by shore protection structures that have been buried as the shoreline has accreted over time. The beach extends approximately 2,500 feet north of the project site. The remaining 1,200 feet of shoreline extending to Alāla Point is fronted by shore protection structures. See *Figure 2-4*.

.


**Project Site and Surrounding Shoreline Characteristics (SEI)** **Figure 2-4**

## 2.3 Purpose and Need for Action

The objective of the Proposed Action is to maintain the existing shore protection system in a safe condition, pursuant to the conditions of the easement. The easement confers unto the Grantee the "right, privilege, and authority to use, maintain, repair, replace and remove the existing seawall and steps over, under, and across State-owned land". The easement also requires that the Grantee "shall keep the easement area and the improvements thereon in a safe condition". In order to adhere to the conditions of the easement, damage and structural deficiencies of the existing shore protection system must be addressed. The objective of the Proposed Action is also to provide long-term protection from increased coastal erosion. Shoreline erosion has encroached on properties in Lanikai with nearly all properties protected by shoreline protection structures (*Figure 2-4*). Coastal erosion has persisted, posing increased threats to the property and home. Further, maintaining the existing shore protection system with mitigative improvements is an appropriate solution given the smaller residential scale of the project site. While alternatives such as Managed Retreat or beach nourishment may be considered as an alternative to address erosion threats, such methods require a wider, regional approach. The purpose of the Proposed Action is to address erosion threat in a manner that is appropriate with the scale of the project site. See *Chapter 4.0* for further discussion. Additionally, mitigative improvements would be the least invasive and minimize adverse environmental effects, while meeting the requirements of the easement.

Mitigative improvements will be outside of the State Conservation District, starting mauka of the certified shoreline and extending landwards towards the existing residence. The Proposed Action will involve activities within the shoreline area; therefore, preparation of an EA pursuant to Chapter 343 HRS is required. An EA is also requisite for submittal of the forthcoming SSV and compliance with the Shoreline Setback and Special Management Area ordinances. Activities in a shoreline area are defined and regulated in ROH Chapters 23 and 25. Per ROH 23-1.8 (b)(3), the director may grant a variance upon finding that the proposed activity meets the hardship standard. The proposed action meets the hardship criteria as listed in ROH 23-1.8 (b)(3) Hardship Standard. Please refer to *Chapter 5.8, Shoreline Setbacks* and *Chapter 5.9 Special Management Area* for further discussion.

## 2.4 Proposed Action

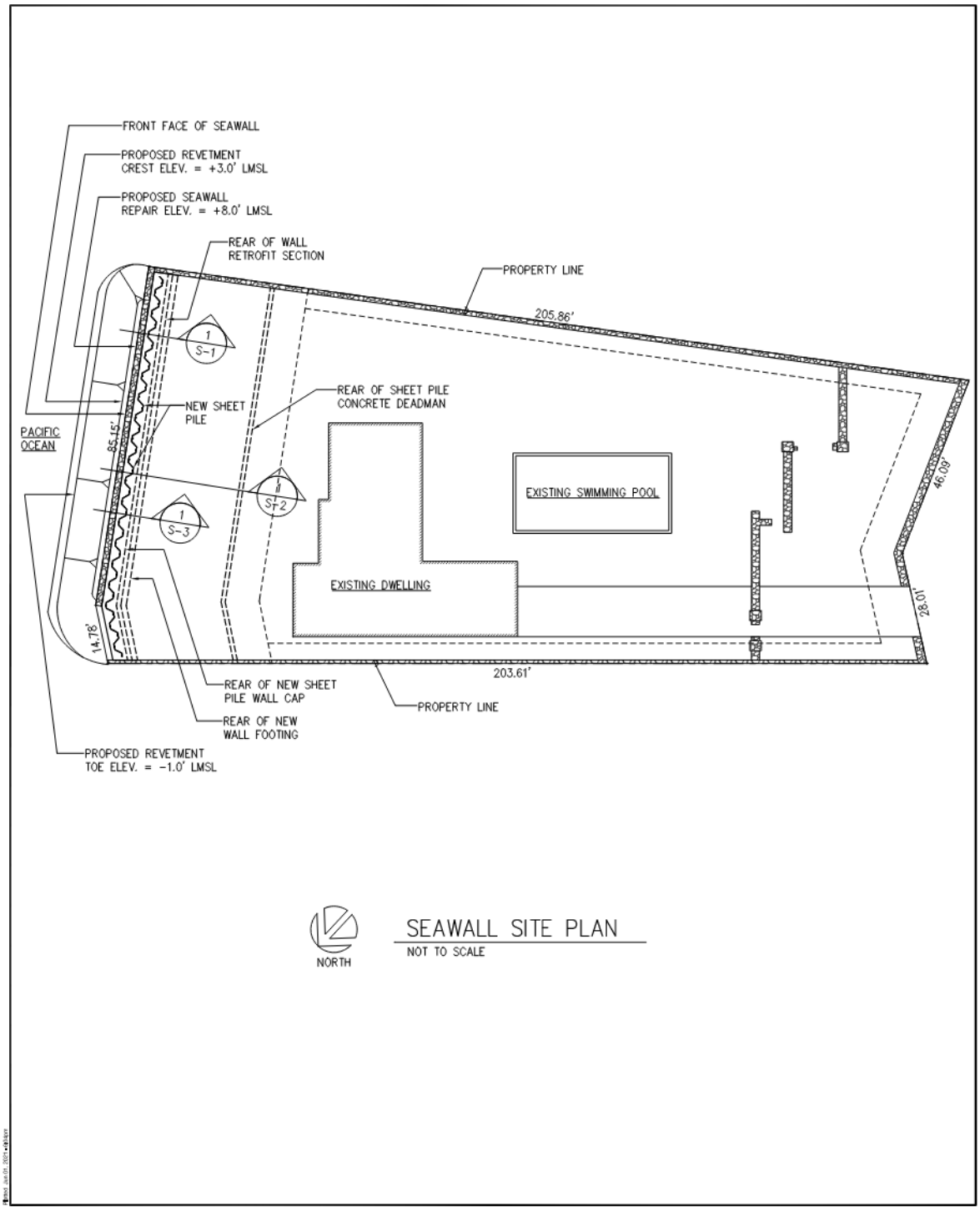
The existing shore protection system exhibits a variety of damage and structural deficiencies including settlement, outward rotation, cracking, undermining, and sinkholes. The most critical structural deficiency is the shallow depth of the existing foundation, which makes the seawall vulnerable to scour and undermining. To address these issues, the Proposed Action was developed through an engineering alternatives analysis by SEI (May 2021) that evaluated eight alternatives (see *Appendix F*). The following discusses the Proposed Action, and a discussion of each alternative analyzed is provided in *Chapter 4.0*.

*Design Characteristics*

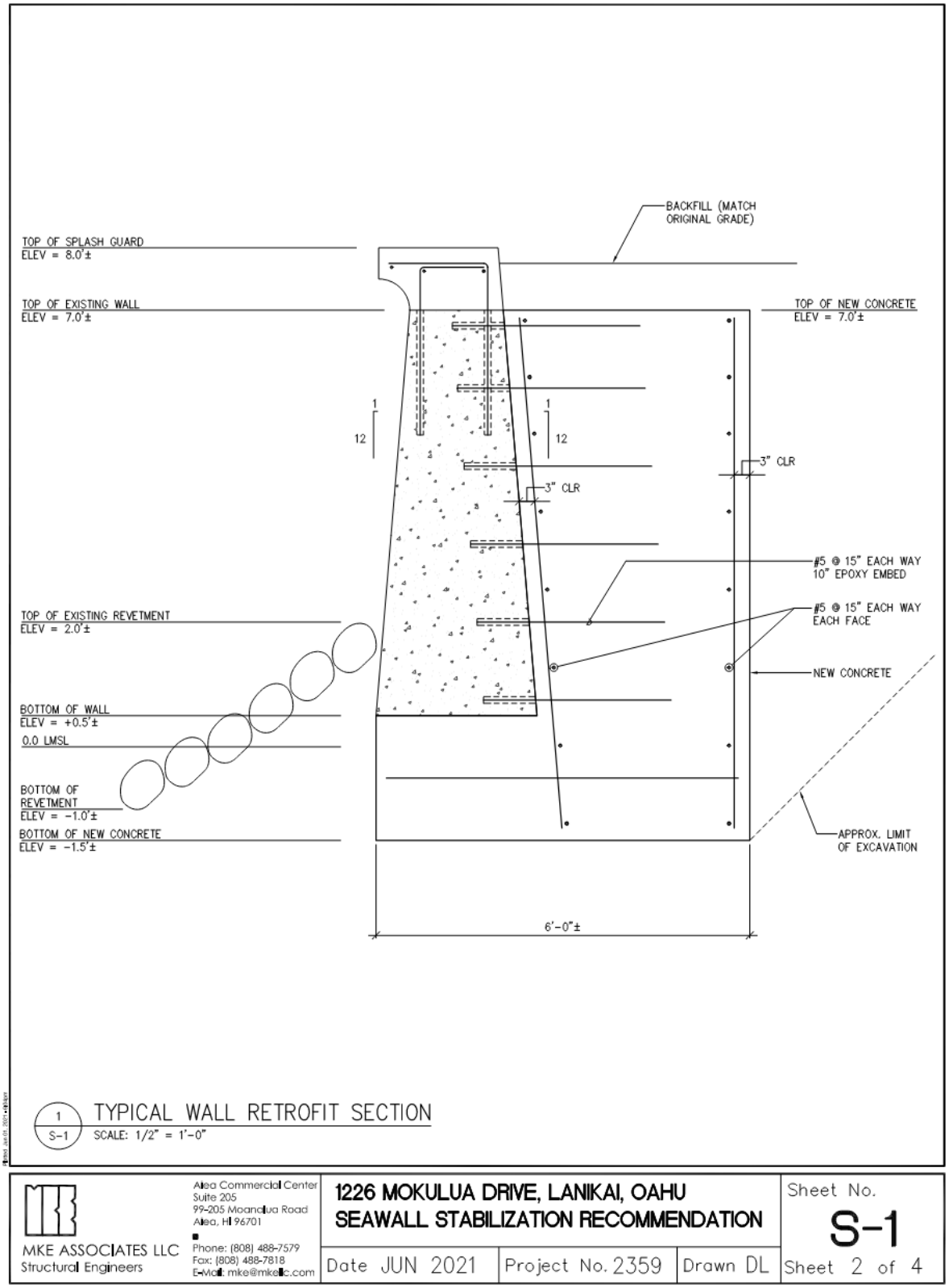
The Proposed Action is the "Seawall Repair and Improvement" alternative discussed in the Coastal Assessment (*Appendix F*), which was preferred because it would meet the project objectives in a manner that is appropriate to the scale of the project site and would be the least environmentally invasive alternative. Additionally, the Seawall Repair and Improvement alternative would meet the project objectives in a cost-effective manner, while minimizing potential impacts to adjacent shorelines. The Proposed Action retains the existing shore protection system and structurally connects a sheetpile stabilization system landward of the existing system. The sheetpile would connect to the existing seawall by the construction of a concrete width extension and sheetpile cap dowelled to the seawall. This would mitigate additional settling and rotation should undermining of the wall continue. See *Figures 2-5* to *2-8* for the conceptual plans prepared by MKE Associates LLC.

The Seawall Repair and Improvement alternative would retain the existing rock apron. An advantage of using a rock apron in a coastal environment is its capacity to disperse wave energy. This wave dispersion characteristic significantly reduces reflected wave energy while also preventing the downward motion of reflected wave energy that results in scour of the natural sediment. By dispersing wave energy as it impacts the shoreline, these installations improve the longevity of the backing structure and assist in protecting the backshore when paired with a seawall. Construction activity for the Proposed Action will take place in the City's shoreline setback area. No construction activity pertaining to the Proposed Action will take place seawards of the existing shore protection system in the State Conservation District.

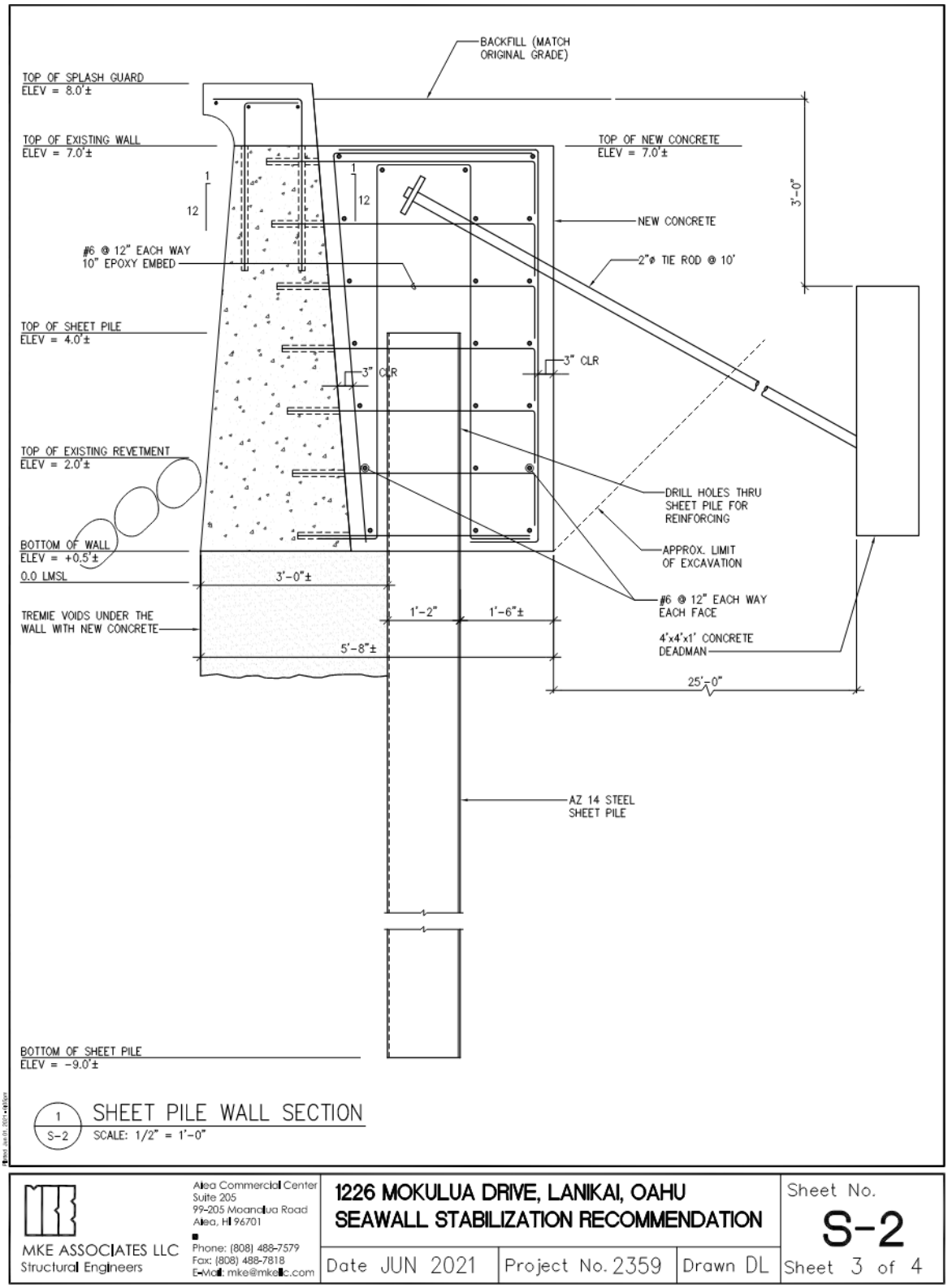
In a study of shoreline structures in Lanikai and their relationship to coastal conditions, Lipp (1995) showed that measured beach profiles in Lanikai were of similar slope fronting beaches and dissipative seawalls (i.e., seawalls with rubblemound/scour aprons). Maintaining the existing rock apron will help to reduce scour with a significant reduction in reflected wave energy. This reduction in wave energy at the face of the seawall is expected to steepen the beach profile and allow sand to build up makai of the structure when there is available material. Lipp (1995) documented this effect in Lanikai and it has been corroborated with empirical evidence from the region.



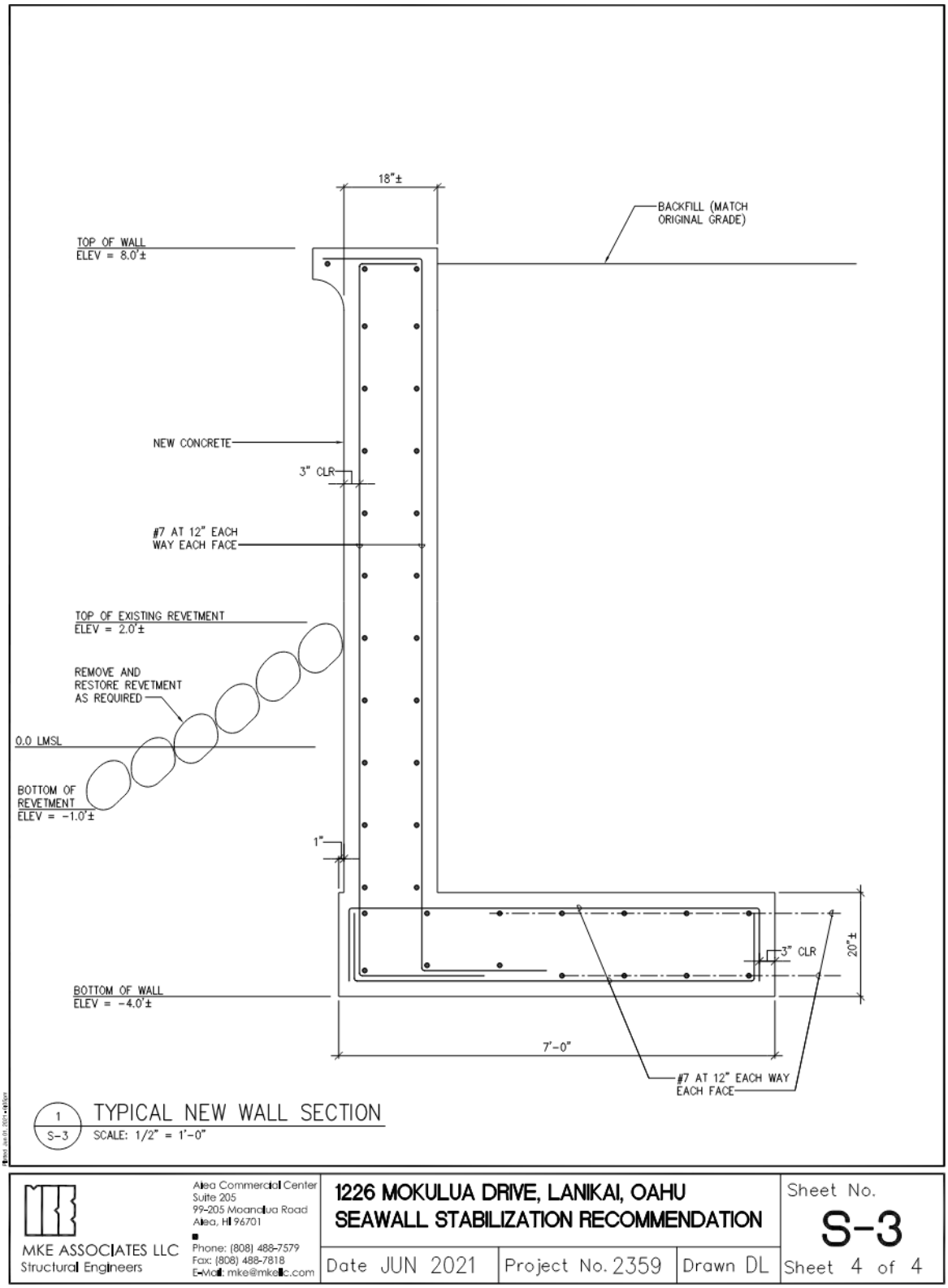

**Conceptual site plan for seawall repair and improvements** **Figure 2-5**




**Section view of conceptual design for seawall repair and improvements** **Figure 2-6**




**Section view of conceptual design for seawall repair and improvements** **Figure 2-7**




**Section view of conceptual design for seawall repair and improvements** **Figure 2-8**

Maintaining the existing shore protection system with mitigative improvements is preferable because it meets the project objectives at the scale of the project site and is less invasive, minimizing potential environmental impacts. A sheetpile stabilization system landward of the existing shore protection system would provide adequate resistance to design lateral forces and overturning moments produced by the retained soil and may extend the life of the structure for an undetermined amount of time. Additionally, maintaining the existing shore protection system with mitigative improvements is the most cost-effective alternative as it would require less excavation and would eliminate the costs to demolish and remove the existing shore protection structure.

*Construction Characteristics*

Construction will require demolition and removal of the existing concrete counterforts. Construction will be accomplished from the upland areas with minimal disturbance to site topography. Vegetation clearing and grubbing will be very limited. Implementing the sheetpile stabilization system will require excavation in the yard area, landward of the existing shore protection system. Construction materials and equipment will be stored on the property. Construction work will be performed in accordance with the Federal, State, and City code and design standards.

Construction activity hours will be from 8:00 am to 6:00 pm. Construction will adhere to applicable noise regulations pursuant to HAR, Title 11, Chapter 46. Typical construction vehicles will be used on the jobsite for the project. These may include front-end loader, dump truck, and flatbed delivery trucks. As necessary, a permit will be obtained from Department of Transportation (DOT) Highways for transport of light trucks, backhoe, oversize equipment and overweight loads.

Nearshore ocean water quality in the project vicinity will be protected by the implementation of Best Management Practices (BMPs) during the construction period. To minimize temporary effects of suspended sediments in nearshore waters, mitigation such as a floating silt curtain may be deployed along the seaward edge of the construction segment, to contain the limited amount of suspended material along the immediate beach area during construction. Implementing the sheetpile stabilization system landward of the existing seawall will allow the existing shore protection system to serve as a functional barrier to protect the construction work area and be highly effective in maintaining runoff and suspended sediment from reaching the ocean.

The combined effects of multiple BMPs should result in improved protection for both nearshore water quality and the construction area. Work will be completed over a course of 90 to 120 days.

Several alternative designs are further discussed and evaluated in *Chapter 4.0.* Maintaining the existing shore protection structure with mitigative improvements falls within the conditions of the easement with the “right, privilege, and authority to use, maintain, repair, replace and remove the existing seawall.” The sheetpile stabilization system is appropriate for the scale of the project site and is the least environmentally invasive alternative. This system will mitigate additional settling, rotation and undermining, and continue to protect the property from increasing shoreline erosion. The Proposed Action does not substantially or adversely impact existing lateral shoreline access or coastal processes, nor existing view planes to or along the shoreline.

## 2.5 Access, Utilities, and Infrastructure

Overall existing conditions, impacts, and mitigation measures for utilities are discussed in *Chapter 3.0* of this document. Existing vehicular access to the project site is from Mokulua Drive. The subject property has water supply (BWS), sewer, electricity (HECO), communications, and municipal solid waste collection services. The Proposed Action does not require construction of new infrastructure or alteration of existing utilities, and access to the site will continue to be on Mokulua Drive.

## 2.6 Summary of Project Cost

The projected cost for the repair of the existing shore protection system is anticipated to exceed $500,000.

Section 3

# Description of the Environmental Setting, Potential Impacts and Mitigation Measures

Chapter 3

# Description of the Environmental Setting, Potential Impacts, and Mitigation Measures

This section describes the existing environmental setting and identifies possible impacts of the mitigative improvements to the shore protection system. Strategies to mitigate potential impacts are also identified.

## 3.1 Topography

***Existing Conditions***

The project site rests on a relatively flat coastal plain and gently slopes from approximately 5 feet above msl along the makai boundary to approximately 15 feet above msl on the mauka boundary along Mokulua Drive.

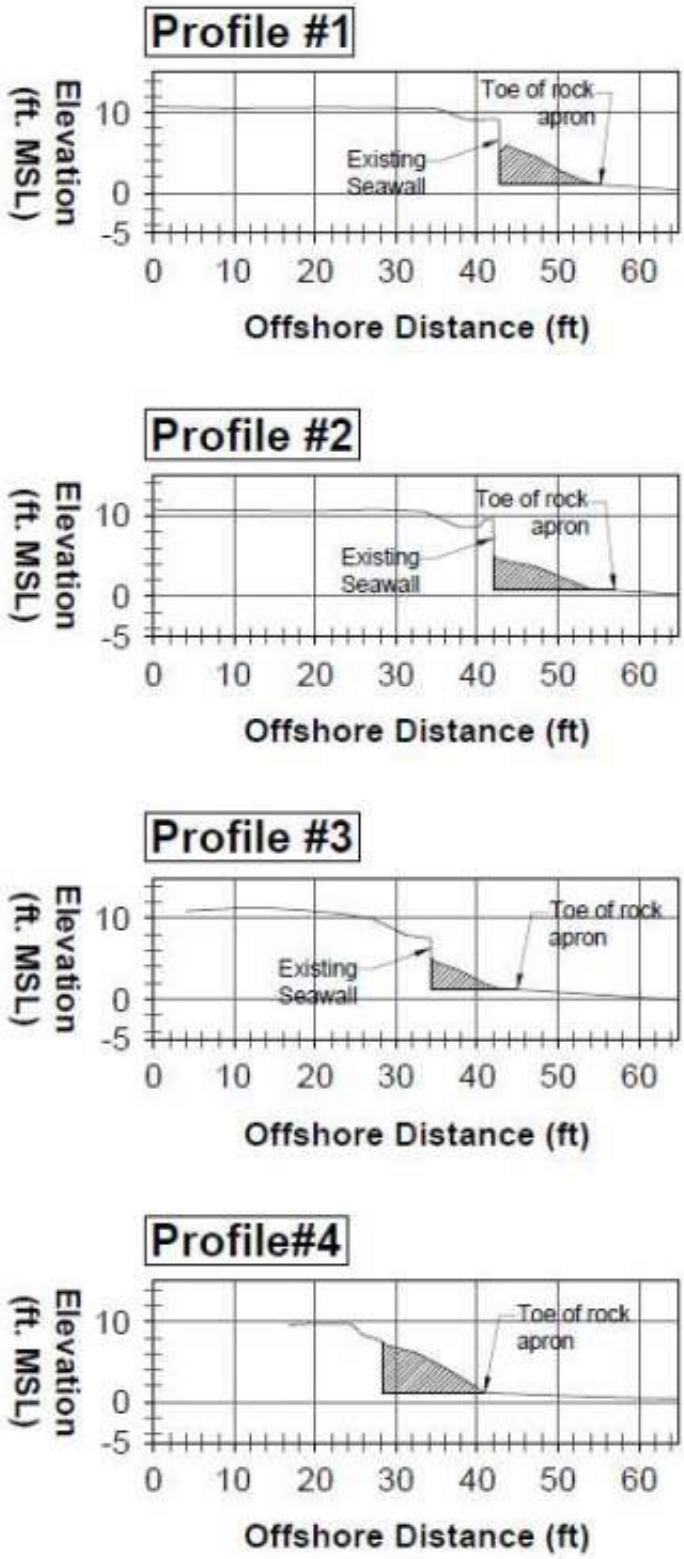
SEI conducted a topographic survey in July 2020 to collect elevation data of the backshore, foreshore, and nearshore waters fronting the project site (*Appendix E*). Shoreline profiles were generated through the topographic survey data to show the cross-shore profile of the seawall and rock apron *(Figure 3-1* and *Figure 3-2)*.

- **Profile 1:** Profile 1 is located on the southern portion of the parcel and extends from the southern edge of the existing residence to the toe of the rock apron.
- **Profile 2:** Profile 2 is located at the mid portion of the parcel and extends from the boundary of the concrete slab of the home to the toe of the rock apron.
- **Profile 3:** Profile 3 is located at the northern portion of the parcel and extends from the edge of concrete slab of the home to the toe of the rock apron.
- **Profile 4:** Profile 4 is located at the northern portion of the parcel and extends from the northern edge of the existing residence to the toe of the rock apron. There is no seawall present at this profile.

***Anticipated Impacts and Mitigation Measures***

The sheetpile stabilization system will be placed landward of the shoreline and the existing shore protection system. Construction-related activity to bring the shore protection system in a safe condition and is not anticipated to substantially alter the site's topography. Construction BMPs will be implemented pursuant to the required Grading Permit to mitigate potential impacts of soil erosion and fugitive dust during grading or excavation. Construction BMPs may include, but are not limited to, a stabilized construction entrance, stabilization of disturbed areas, and maintenance of equipment. Additional mitigation may include removal of unsuitable soils under foundations BMPs will also be deployed at exposed areas to minimize potential runoff.


**Existing Shoreline Protection Profiles** **Figure 3-1**




**Exisiting Shoreline Protection Profiles** **Figure 3-2**

## 3.2 Soils and Erosion Conditions

***Existing Conditions***

Soil types within the project site are identified in the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Web Soil Survey. The USDA NRCS system classifies soils by type and permeability characteristics, including run-off and erosion. The site consists of Beaches and Jaucus Sand, 0-15 percent slopes (JaC) (*Figure 3-3*). This type of soil is well drained, and runoff is low.

Geotechnical investigations were conducted by APTIM (February 2019) and Shinsato Engineering, Inc. (July 2020). The investigations included a total of three (3) test borings and a laboratory analysis on the soil samples to determine their engineering properties. The backfill soil and seawall subgrade appears to be a fine to medium grain calcareous sand. Bore #1 and Bore #2 of the APTIM (2019) investigation encountered what appeared to be a hard, nonerodable substrate approximately 15 to 20 feet below the backfill ground elevation. Bore #1 of the Shinsato (2020) investigation (*Figure 3-4)* encountered loose, light brown and tan, fine grained calcareous sand to a depth of 9 feet. Below 9 feet, the sand was found to be medium to coarse grained and medium dense in consistency. At 10.5 feet, the bore hole caved in. Proving below 10.5 feet disclosed medium dense to dense soil to a depth of 26.5 feet below grade then grading to very dense to the final depth of the boring at 28.33 feet where there was a refusal to further probing. Groundwater was encountered at a depth of 7’10” below the existing grade. SEI previously conducted water jet probing at several properties near the project site. Probe refusal was encountered at -6 to -8 feet msl.

The seawall was constructed on loose sandy substrate that has a high susceptibility to erosion. As a result, settlement was observed along the northern portion of the seawall. The settlement is likely due to the loss of subgrade support from erosion of underlying soil. Additionally, the loss of subgrade support from erosion of underlying soil and the loss of bearing support fronting the seawall due to soil saturation has contributed to the slight outwards rotation of the seawall’s northern portion. The northern portion of the seawall has settled and rotated outwards, disconnecting the seawall return and the main seawall structure. Ongoing erosion exposed the bottom of the seawall on the northern end, where a sandy substrate is visually noticeable.

Sinkholes were observed behind the central and northern portions of the seawall. The sinkholes were likely formed due to internal erosion of the sandy backfill material from behind and beneath the seawall foundation. The sinkholes behind the central portion of the seawall were generally less than 24 inches deep and approximately 6 feet in width. Sinkholes behind the seawall’s northern portion were previously backfilled with materials including concrete and boulders that appear to be from the rock apron. Although sinkholes were not observed along the southern portion of the seawall, undermining is likely occurring in this area as well.

The longer-term dynamics of Lanikai Beach’s sands have changed with the gradual armoring of the shoreline. Prior to the late 1970s, Lanikai Beach showed accreting sands, which gradually reversed, causing erosion along the shoreline. In response, seawalls and other hardened shoreline structures were constructed by shoreline property owners. The project site is situated at a headland where the orientation of the shoreline transitions from approximately 160 degrees (to the south) to 135 degrees (to the north). The dominant shoreline change trend to the south has been erosion, whereas accretion has been the dominant trend to the north.

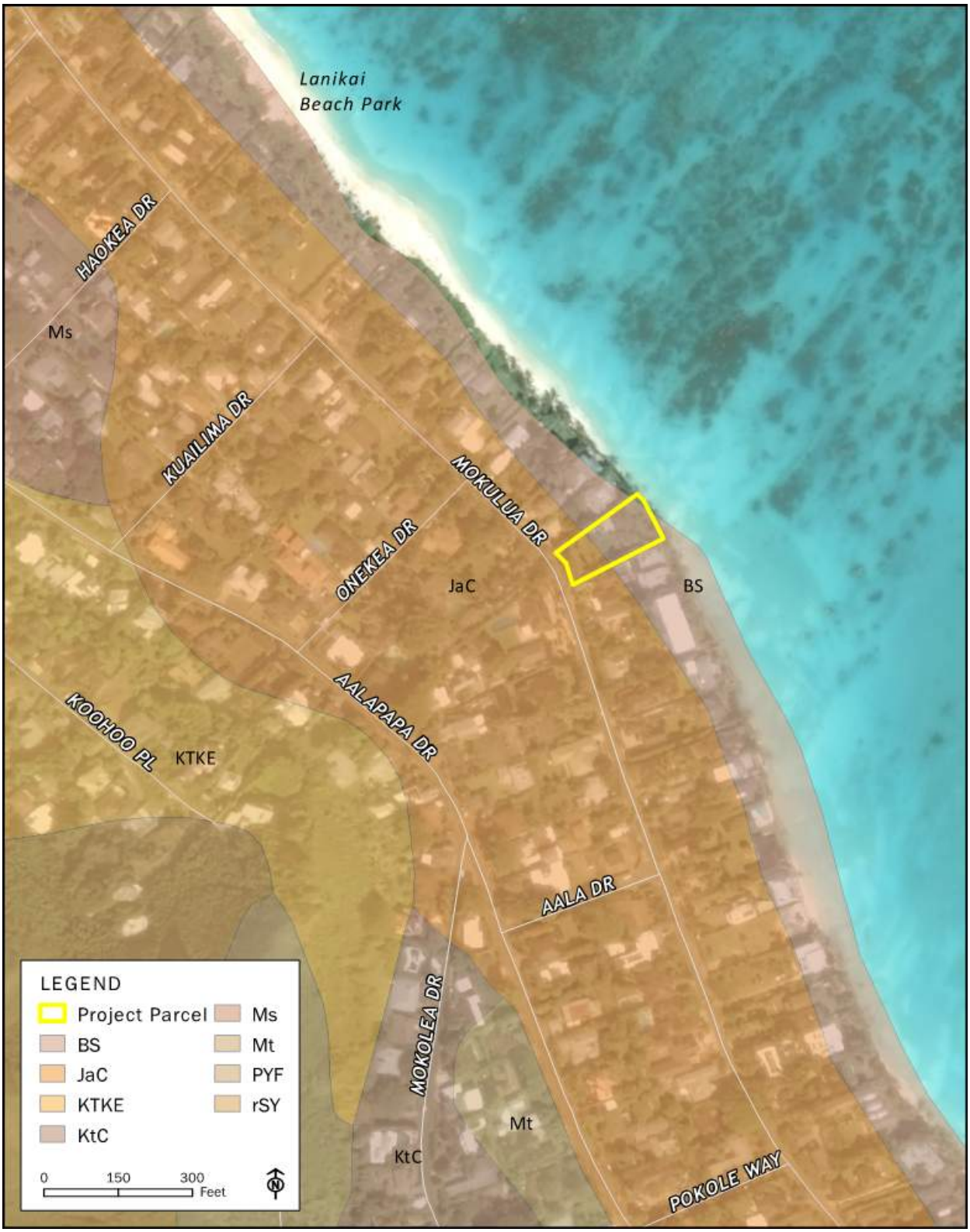
Datable ground photographs provide evidence that the project site's shoreline have been experiencing ongoing erosion for many years as the seawall appears to be constructed before WWII (DPP Letter dated July 13, 1999). The project site is bounded by a CRM seawall and rock apron to the north and a vertical concrete seawall and rock apron to the south. Further north of the project site lays approximately 4,000 linear feet of armored shoreline. The project site's shoreline is characterized as a wet beach that moves with inflation and deflations.

Offshore, the Lanikai area is characterized by expansive fringing limestone reef flats over 3,000 feet offshore along the Mokulua Islands. There are channels or depressions at numerous locations along the reef. During typical conditions, significantly less wave energy reaches the shoreline. Wave energy still reaches the shore at high water levels and cross-shore currents still exist. Sands in the area are mobilized through active longshore transport. Typical patterns for East O'ahu show sand being pushed offshore with winter swells and gradual transport back onshore during summer trades.

***Anticipated Impacts and Mitigation Measures***

Installation of the sheetpile stabilization system will require excavation in the yard area. Erosion control practices will comply with County, State, and Federal regulations. BMPs will be implemented pursuant to the required Grading Permit to mitigate potential impacts of soil erosion and fugitive dust during excavation. BMPs may include a floating silt curtain to contain the limited amount of suspended material along the immediate beach area during construction. Construction-related activity will take place landward of the existing shore protection system, which will allow the seawall to serve as a functional barrier to protect the ocean from runoff and suspended sediment from construction-related activity.

The objective of the project is to bring the shoreline protection structure into safe condition, pursuant to the conditions of the easement, and protect the property from increased coastal erosion. The soil composition will not change, and the project will not adversely affect the shoreline of adjoining properties or public lateral access and sand flow.




**Soils Map** **Figure 3-3**

## LOG OF BORING NO. 1

DRILLING METHOD: **Badger Drill Rig**
HAMMER WEIGHT (lbs): **140**
HAMMER DROP (in): **30**

ELEVATION (FT.): **Unknown**
DEPTH OF BORING (FT.): **28.33**
DEPTH TO GROUNDWATER (FT.): **7'-10"**
DATE DRILLED: **07/09/2020**

| DEPTH (FT.) | GRAPHIC SYMBOL | UNIFIED SOIL CLASSIFICATION | DESCRIPTION | SAMPLE | BLOWS/FOOT | COLOR | MOISTURE | CONSISTENCY | DRY DENSITY (PCF) | MOISTURE CONTENT (% OF DRY WT.) | PENETROMETER (TSF) | TORVANE STRENGTH (TSF) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | SP-SM | SAND (calcareous), with fines, few roots | | | light brown | sl. moist | loose | | | | |
| | | SP | SAND (calcareous), fine grained, trace of fines | | | tan | | | | | | |
| 2 | | | | ■ | 10 | | | | 85.4 | 2.9 | | |
| | | | | | | | moist | | | | | |
| 4 | | | | ■ | 7 | | | | 89.5 | 6.0 | | |
| 6 | | | | | | | very moist | | | | | |
| | | | | ■ | 14 | | ▼ | | 90.9 | 14.9 | | |
| 8 | | | | | | | | | | | | |
| | | | --medium to coarse grain | | | | | medium dense | | | | |
| 10 | | | | ■ | 19 | | | | 95.8 | 15.6 | | |
| | | | --hole caved in to 8' | | 14 | | | | | | | |
| | | | --probed from 10.5' with a 2-inch diameter probe tip attached to AW rods; driven with the 140-lb. hammer falling from a height of 30-incehs | | 20 | | | | | | | |
| 12 | | | | | 36 | | | dense | | | | |
| 14 | | | | | 42 | | | | | | | |
| | | | | | 54 | | | | | | | |
| 16 | | | | | 41 | | | | | | | |
| | | | | | 36 | | | | | | | |
| 18 | | | | | 23 | | | medium dense | | | | |
| | | | | | 22 | | | | | | | |
| 20 | | | | | 15 | | | | | | | |
| | | | | | 13 | | | | | | | |
| 22 | | | | | 16 | | | | | | | |
| | | | | | 11 | | | | | | | |
| 24 | | | | | 12 | | | | | | | |
| | | | | | 18 | | | | | | | |
| 26 | | | | | 20 | | | | | | | |
| | | | | | 51 | | | very dense | | | | |
| 28 | | | --refusal at 28'-4" | | 100/10" | | | | | | | |
| | | | END OF BORING | | | | | | | | | |
| 30 | | | | | | | | | | | | |

Project: KRUEGER PROPERTY SEAWALL
1226 MOKULUA DRIVE
Project No.: 19-0067

**SHINSATO ENGINEERING, INC.**
CONSULTING GEOTECHNICAL ENGINEERS
98-747 KUAHAO PL. #E, PEARL CITY, HI 96782

**PLATE 3**

**Boring Samples (Shintsato)** **Figure 3-4**

## 3.3 Climate

***Existing Conditions***

According to the University of Hawai‘i Geography Department *Climate of Hawai‘i* interactive mapping tool, the windward and northern regions of the island are typically wetter than the western and southern regions. A typical year in Lanikai has approximately 31.4 inches of rainfall, and an average of 2.6 inches of rainfall per month. The wettest month of the year is December with an average of 4.9 inches of rainfall. The annual average air temperature in Lanikai is 73.8°F. The average monthly low temperature is around 70.1°F in January and the average monthly high temperature is around 77.3°F in August.

*Anticipated Impacts and Proposed Mitigation*

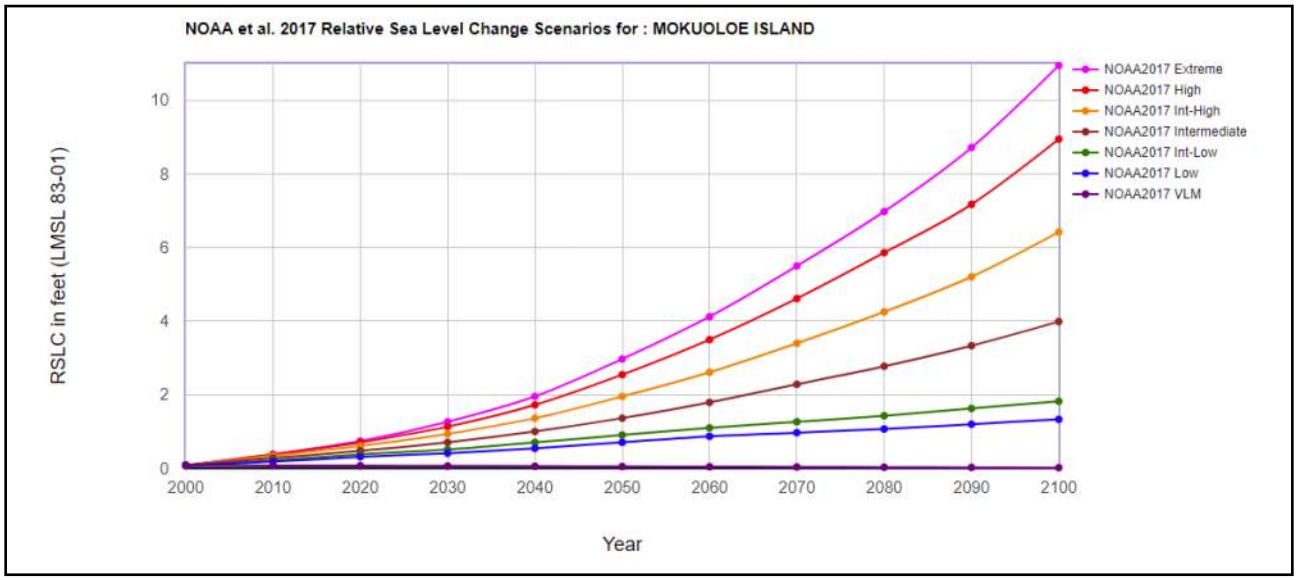
The project is not anticipated to result in nor constitute a source of impact to rainfall or climate of the project area or region. Therefore, no mitigation measures are required.

## 3.4 Climate Change and Sea Level Rise

***Existing Conditions***

Rapid anthropogenic climate change is a well-established fact within the scientific community. As a result of climate change, oceans are warming and acidifying, ice sheets and glaciers are melting, and sea levels are rising (NASA, 2018). Sea level rise (SLR) is negatively impacting beaches and shorelines in Hawai‘i. Impacts may include beach narrowing and beach loss, loss of land due to erosion, and infrastructure damage due to inundation and flooding. The impacts from anomalous sea level events (e.g., king tides, mesoscale eddies, storm surge) are also likely to increase.

The National Oceanic and Atmospheric Administration (NOAA) recently revised their sea level change projections through 2100 considering up-to-date scientific research and measurements. Mean SLR scenarios for Hawai‘i based on NOAA projections are depicted in *Figure 3-5*. An important conclusion of this regional climate assessment is that NOAA recommends the revised *Intermediate* rate for planning and design purposes in Hawai‘i. The *Intermediate* rate projects that sea level in Hawai‘i will rise 2.3 feet by 2070. Given the recent upwardly revised projections and the potential for future revisions, consideration may also be given to the *Intermediate-High* rate for planning and design purposes, which projects that sea level in Hawai‘i will rise 3.4 feet by 2070.




**Hawai‘i Sea Level Rise Projections (adapted from NOAA, 2017)** **Figure 3-5**

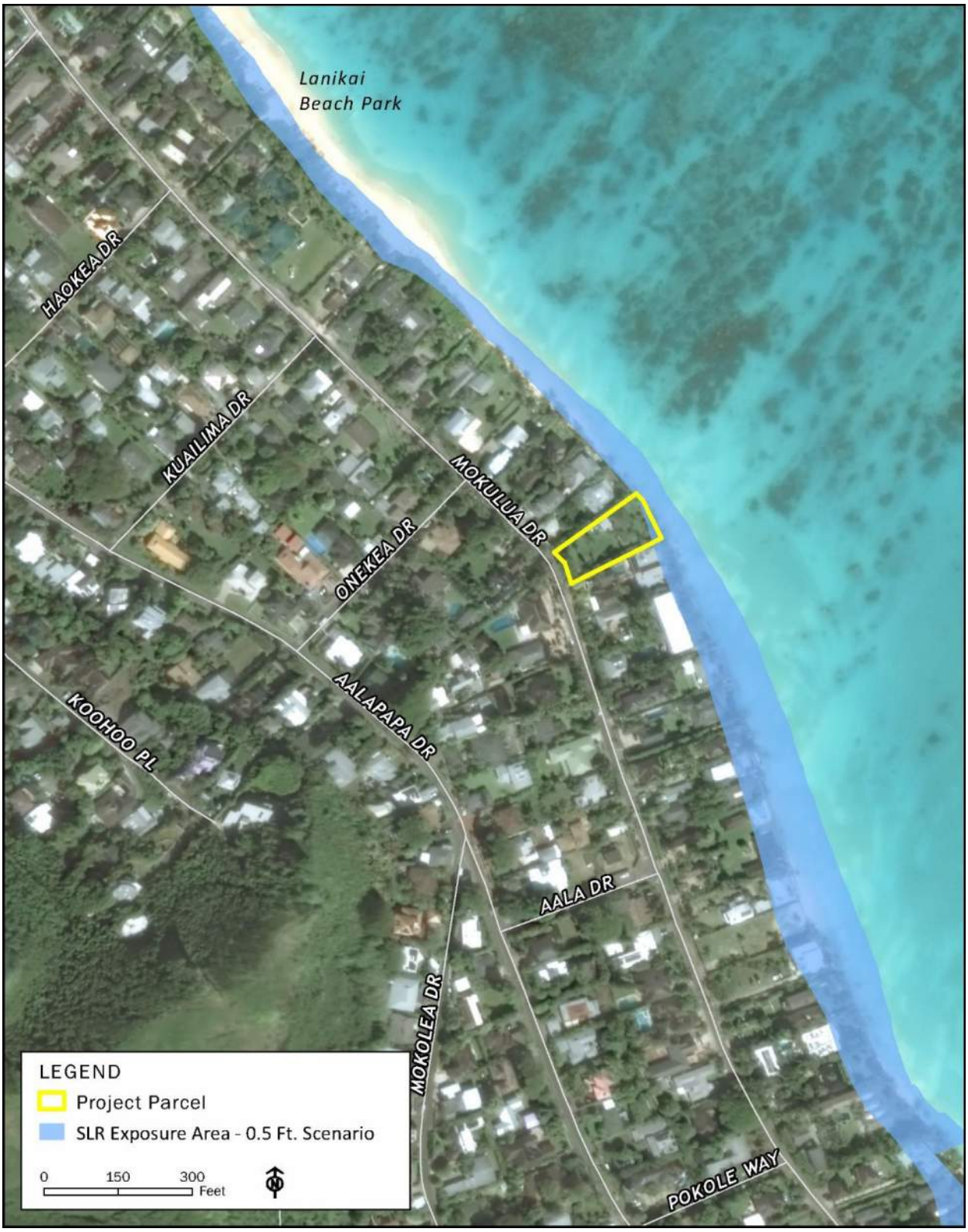
In 2017, the Hawai‘i Climate Commission published the *Sea Level Rise Vulnerability and Adaptation Report for Hawai‘i*, which discusses the anticipated impacts of projected future SLR on coastal hazards, and the potential physical, economic, social, environmental, and cultural impacts of SLR in Hawai‘i (Hawai‘i Climate Change Commission, 2017). The report combines data from the Intergovernmental Panel on Climate Change (IPCC) Assessment Report 5 (IPCC 2014), NOAA, the National Aeronautics and Space Administration, and the best-available peer-reviewed scientific research articles. According to the report, “While the IPCC’s “business as usual” scenario, where greenhouse gas (GHG) emissions continue at the current rate of increase, predicts up to 3.2 feet of global SLR by year 2100 (IPCC 2014), recent observations and projections suggest that this magnitude of SLR could occur as early as year 2060 under more recently published highest-end scenarios (Sweet et al. 2017). As such, questions remain around the exact timing of that rise due largely to uncertainties around future behavior of Earth’s cryosphere and global GHG emission trajectories. For this reason, it is vital that the magnitude and rate of SLR is tracked as new projections emerge, plan for 3.2 feet of SLR now, and be ready to adjust that projection upward.” The Hawai‘i Sea Level Rise Viewer model developed by the University of Hawai‘i (UH) Pacific Islands Ocean Observing System (PacIOOS) models the potential impacts that a 3.2-foot rise in sea level would have on coastal hazards include passive flooding, annual high wave flooding, and coastal erosion. The footprint of these three hazards were combined to define the project extent of chronic flooding due to SLR, referred to as the Sea Level Rise Exposure Area (SLRXA) (PacIOOS, 2018).

At the City level, Mayor Kirk Caldwell issued Directive 18-2 on climate change and SLR in July 2018 with the intention of establishing City policies to address climate change and SLR in accordance with the 2017 *Sea Level Rise Vulnerability and Adaptation Report for Hawaii*, and two publications from the Climate Change Commission: *Sea Level Rise Guidance* and the *Climate Change Brief*, both of which were adopted on June 5, 2018. The guidance issued through these publications echoed that a 3.2-foot SLR scenario by the end of the century was a reasonable benchmark for planning purposes (City Climate Change Commission, 2018). Directive 18-2 Section (V)(8) also stated, “Permitting permanent shoreline armoring is generally inconsistent with this directive and should only be considered as a last resort where it supports significant public benefits and will result in insignificant negative impacts to coastal resources and natural shoreline processes.”

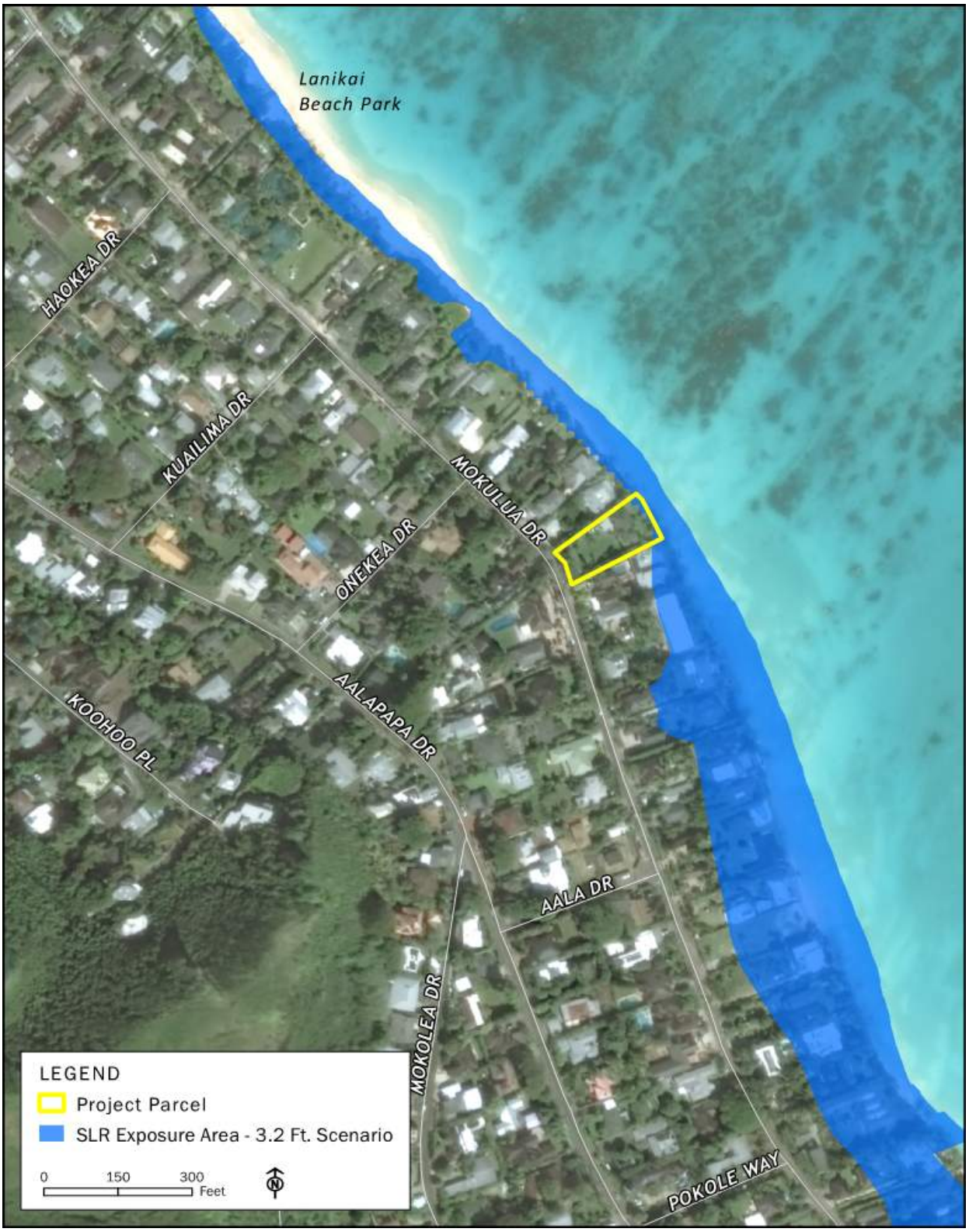
The property is located on along the shoreline, and a portion, including the seawall, is within the SLRXA, as indicated in the Hawai‘i Sea Level Rise Viewer. See *Figure 3-6* for the 0.5-feet scenario and *Figure 3-7* for the 3.2 feet scenario. Data from the Hawai‘i Sea Level Rise Viewer indicates that the project site will not be vulnerable to passive flooding or annual high wave flooding under both the 0.5-foot and 3.2-foot scenarios (SEI, 2020). However, the property could be exposed to erosion with 0.5 to 3.2 feet of SLR. The results of the erosion model represent the combined results of measured, historical erosion rates and the compounding impacts of projected higher water levels associated with projected SLR. The model results indicate that the project site will experience accretion with 3.2 feet of SLR (SEI, 2020).

***Anticipated Impacts and Mitigation Measures***

SLR is not expected to have short-term impacts on the project. Construction activity is anticipated to generate limited GHG emissions from combustion and exhaustion and will adhere to State DOH Air Quality Standards as discussed in *Section 3.10 Air Quality* to minimize short-term impacts. The Proposed Action will have no long-term effect on climatic conditions, and therefore no mitigation measures are required.




**0.5-Foot Sea Level Rise Scenario** **Figure 3-6**




**3.2-Foot Sea Level Rise Scenario** **Figure 3-7**

The project site is situated at a headland where the orientation of the shoreline transitions from approximately 160 degrees (to the south) to 135 degrees (to the north). The dominant shoreline change trend to the south has been erosion, whereas accretion has been the dominant trend to the north. The SLRXA model projects that the shoreline south of the project site will experience increased erosion and flooding with SLR, whereas the shoreline to north will experience accretion and minimal flooding. The significant variability of the projected hazards over a small geographic area suggests that further study is required in order to quantify the potential impacts of SLR at the project site.

In the long term, a SLR of 2.3 feet was chosen by SEI for design purposes at the project site. The 2.3-foot SLR scenario projects that the shoreline south of the project site will experience increased erosion and flooding, whereas the shoreline to the north will experience accretion and minimal flooding. This corresponds to the Intermediate rate over a 50-year design life which is suitable for planning and design purposes for a project of this scale. The property is not affected by inundation in the more near term 0.5-foot SLR scenario.

The 2.3-foot SLR scenario was utilized as a basis for the design life for the various shoreline protection alternatives discussed in *Chapter 4.0*. While critical infrastructure such as roads, power plants, and hospitals may require the highest level of protection, it is reasonable to design coastal protection and stabilization structures for a lesser level, in this case a 50-year lifespan. Coastal structures require ongoing monitoring and maintenance due to their exposure to the degrading effects of marine processes. The basis of design parameters and consequent design life are based on typical functional use of similar coastal structures. Designing for conditions, such as significantly higher sea levels, that are predicted for time periods that well exceed the design life of the structure will produce more robust installations but will well exceed their functional performance requirements during their serviceable lifespans.

There are multiple factors to consider when planning for SLR at the subject property including site history and context, protecting the existing dwelling, protecting adjacent structures, preserving lateral access, and promotion of natural shoreline processes. The existing shore protection system is comprised of a seawall and rock apron that has been fronting the project site for half a century and is covered under a Grant of Non-exclusive Easement. The property owners are meeting the conditions and terms of the easement and are proposing to retain the existing seawall with mitigative improvements. No new structures are being proposed. Retaining the seawall with mitigative improvement is generally accepted as protection, which is considered one of the three major approaches to sea-level rise and will further protect the property and single-family home (Codiga and Wager, 2011).

Designing for a lesser SLR of 2.3 feet is still consistent with the City & County of Honolulu Mayor's Directive 18-2, as the SLR that the coastal stabilization structures evaluated in by SEI (2020) (*Appendix F*) are expected to experience during their design lifetime would likely be less than the 3.2 feet presented in the directive. The property is not affected by inundation in the more near term 0.5 feet SLR scenario.

## 3.5 Natural Hazards

The following section summarizes the SEI (2020) report evaluating the property's exposure to natural hazards, with particular emphasis on coastal hazards, including tsunami, hurricanes, Kona storms, still water rise, and coastal flooding, in addition to seismic activity.

***Existing Conditions***

*Hurricanes*

Tropical cyclones originate over warm ocean waters, and they are considered hurricane strength when they generate sustained wind speeds over 64 knots (74 mph). Hurricanes that form near the equator, and in the central North Pacific usually move toward the west or northwest. During the primary hurricane season of July through September, hurricanes generally form off the west coast of Mexico and move westward across the Central Pacific. These storms typically pass south of the Hawaiian Islands and sometimes have a northward curvature near the islands. Late season hurricanes follow a somewhat different track, forming south of Hawaiʻi and moving north toward the islands. Three hurricanes have passed through the Hawaiian Islands in the past 25 years: Hurricanes ʻIwa in 1982 and Iniki in 1992, both passing near or over the island of Kauaʻi as well as Hurricane Iselle in 2014 passing over the island of Hawaiʻi. These storms caused high surf and wave damage on multiple shores of the islands. Although not a frequent or even likely event, hurricanes will be considered in the project design, particularly with regard to shoreline structures, both in the water and on land near the shore.

*Kona Storms*

Although somewhat protected by the southeast tip of Oʻahu, the study site is susceptible to damage from Kona storms, which occur during winter months, generally between October and April. Kona storms typically generate waves with significant heights of 9 to 16 feet and periods of 8 to 11 seconds. Occasional strong Kona storms have caused extensive damage to the south- and west-facing shorelines on Oʻahu. Deepwater wave heights during a severe Kona storm in January 1980 were about 17 feet with a period of 9 seconds.

*Tsunami Inundation*

Most tsunamis in Hawaiʻi originate from the tectonically active areas located around the Pacific Rim (e.g., Alaska, Japan, and Chile). Waves created by earthquakes in these areas take hours to reach Hawaiʻi, and the network of sensors that is part of the Pacific Tsunami Warning System can provide Hawaiʻi with several hours advance warning prior to the arrival of tsunami waves generated from these locations. Less commonly, tsunamis originate from seismic activity in the Hawaiian Islands, and there is less warning for these locally generated events. In 1946, a tsunami was generated in the Aleutian Islands and was one of the most destructive tsunamis to strike Hawaiʻi. The water level rise in Lanikai during the 1946 tsunami was 7 feet.

The City classifies tsunami evacuation zones into the following three designations: Tsunami Evacuation Zone, where evacuation is required for any tsunami warning; Extreme Tsunami Evacuation Zone (XTEZ), where additional areas must be evacuated only during an extreme tsunami event generated from earthquakes of Magnitude 9 or higher on the Richter scale; and, safe areas that are anticipated to be outside the inundated areas. The project site sits within an area designated as a Tsunami Evacuation Zone (*Figure 3-8*).


**Tsunami Evacuation Zone** **Figure 3-8**

*Still Water Rise*

Storms and large waves produce storm surge and wave setup that results in elevated water levels at the project site shoreline. During prevailing annual conditions this water level rise can be on the order of a foot above the tide level. However, during extreme events, the still water level rise can be significantly greater.

*Coastal Flooding*

The project site is relatively flat and level with an elevation ranging from approximately 5 to 15 feet above msl. Based on the FEMA Flood Insurance Rate Map (FIRM) map number 15003C0290H, effective November 5, 2014, the property is in Zone AE and Zone X (*Figure 1-3)*. The project site, where the repairs to the seawall will be accomplished is located in Zone AE. Zone AE is defined as, "areas subject to inundation by the 1-percent chance flood event by detailed methods." Zone X is defined as "areas of minimal flood hazard, which are the areas outside the Special Flood Hazard Area and higher than the elevation of the 0.2 percent-chance flood" (FEMA 2017). The property is not located within the VE zone which indicates wave velocity.

*Seismic Activity*

Per the 2006 International Building Code (IBC) seismic design maps, the entire City and County of Honolulu could experience seismic activity around 0.15 of the earth's gravitational acceleration (g-force) under a 1.0 second spectral response acceleration event. In comparison, the County of Hawai'i, with its ongoing volcanic activity, could experience ground motion anywhere from 0.30 up to 1.23 of the earth's g-force. In May 2018, the island of Hawai'i experienced a 6.9 magnitude earthquake due to volcanic activity at Kīlauea (USGS Earthquake Hazards Program).

***Anticipated Impacts and Mitigation Measures***

Short-term impacts of natural hazards to the project site are related to construction. If a hurricane, tropical storm, flooding, high winds, or seismic activity occur during repair of the seawall, construction activities would cease, and equipment will be secured in work and support areas. Essential equipment may also be located on higher elevations wherever feasible to avoid inundation from storm surges.

NASA research points to an increase in the severity and frequency of storms and SLR as a result of climate change (NASA, 2018). Effects of SLR on the project site are discussed in *Section 3.4*. The purpose of the project is to reduce the subject property's overall vulnerability to natural hazards that may contribute to shoreline erosion conditions. Maintaining the existing shore protection system with mitigative improvements will bring the system into a safe condition, pursuant to the conditions of the easement, and protect the property from impacts during storm events.

## 3.6 Oceanographic Setting

SEI conducted a coastal assessment of the project site, included in *Appendix F*. The coastal assessment includes a description of the project site's oceanographic setting, is summarized below.

***Existing Conditions***

*Winds*

The prevailing winds throughout the year are the northeasterly tradewinds. The average frequency of tradewinds varies from more than 90% during the summer season to only 50% in January, with an overall annual frequency of 70%. Tradewinds are produced by the outflow of air from the Pacific Anticyclone high-pressure system, also known as the Pacific High. The center of this system is located well north and east of the Hawaiian Islands and moves to the north and south seasonally. In the summer months, the center moves to the north, causing the tradewinds to be at their strongest from May through September. In the winter, the center moves to the south, resulting in decreasing tradewind frequency from October through April. During these months, the tradewinds continue to blow; however, their average monthly frequency decreases to 50%. Westerly or Kona winds occur primarily during the winter months and are generated by low pressure or cold fronts that typically move from west to east past the Hawaiian Islands.

During the winter months, wind patterns of a more transient nature increase in prevalence. Winds from extra-tropical storms can be very strong from almost any direction, depending on the strength and position of the storm. The low-pressure systems associated with these storms typically track west to east across the North Pacific north of the Hawaiian Islands. At Honolulu International Airport, wind speeds resulting from these storms have on several occasions exceeded 60 mph. Kona winds are generally from a southerly to a southwesterly direction, usually associated with slow-moving low-pressure systems known as Kona lows situated to the west of the island chain. These storms are often accompanied by heavy rains.

*Tides*

Hawaiʻi tides are semi-diurnal with pronounced diurnal inequalities (i.e., two high and low tides each 24-hour period with different elevations). A modulation of the tidal range results from the relative position of the moon and the sun: when the moon is new or full, the moon and the sun act together to produce larger "spring" tides; when the moon is in its first or last quarter, smaller "neap" tides occur. The geometry of the oceans - the basin shape, local coastline, bays, and even harbor geometry - has a significant effect on the local behavior of the tides.

Tidal predictions and historical extreme water levels are given by the Center for Operational Oceanographic Products and Services, NOS, NOAA, website. A tide station is located at Moku O Loʻe (Coconut Island) in Kāneʻohe Bay. Water level data based on the 1983-2001 tidal epoch is shown in *Table 3-1*.

| Table 3-1 Water level data for Moku o Loʻe, Station 1612480 (NOAA, 2020) | | |
|---|---|---|
| Datum | Elevation (feet, MLLW) | Elevation (feet, MSL) |
| Mean Higher High Water | +2.12 | +1.07 |
| Mean High Water | +1.80 | +0.75 |
| Mean Sea Level | +1.05 | 0.00 |
| Mean Low Water | +0.31 | -0.74 |
| Mean Lower Low Water | 0.00 | -1.05 |

Hawaiʻi is subject to periodic extreme tide levels due to large oceanic eddies and other oceanographic phenomena that have recently been recognized and that sometimes propagate through the islands. Mesoscale eddies produce tide levels that can be up to 0.5 to 1.0 ft higher than normal for periods up to several weeks (Firing and Merrifield, 2004). Temporary sea-level rise has also been associated with phenomena related to the El-Nino/Southern Oscillation (ENSO).

*Waves*

The wave climate in Hawaiʻi is dominated by long period swell generated by distant storm systems, relatively low amplitude, short period waves generated by more local winds, and occasional bursts of energy associated with intense local storms. Typically, Hawaiʻi receives five general surface gravity wave types: 1) northeast tradewind waves, 2) southeast tradewind waves 3) southern swell, 4) North Pacific swell, and 5) Kona wind waves.

Tradewind waves occur throughout the year and are the most persistent April through September when they usually dominate the local wave climate. These winds result from the strong and steady tradewinds blowing from the northeast quadrant over long fetches of open ocean. Tradewind deepwater waves are typically between 3 and 8 feet high with periods of 5 to 10 seconds, depending upon the strength of the tradewinds and how far the fetch extends east of the Hawaiian Islands. The direction of approach, like the tradewinds themselves, varies between north-northeast and east-southeast and is centered on the east-northeast direction. The project site is directly exposed to tradewind waves, which represent a significant source of wave energy reaching the shoreline.

During the winter months in the northern hemisphere, strong storms are frequent in the North Pacific in the mid-latitudes and near the Aleutian Islands. These storms generate large North Pacific swells that range in direction from west-northwest to northeast and arrive at the northern Hawaiian shores with little attenuation of wave energy. These are the waves that have made surfing beaches on the north shores of Oʻahu and Maui famous. Deepwater wave heights often reach 15 feet and in extreme cases can reach 30 feet. Periods vary between 12 and 20 seconds, depending on the location of the storm. The project site is directly exposed to North Pacific swell approach from the north and northeast directions and these waves represent a significant source of wave energy reaching the shoreline.

Southern swell is generated by storms in the southern hemisphere and is most prevalent during the summer months of April through September. Traveling distances of up to 5,000 miles, these waves arrive with relatively low deepwater wave heights of 1 to 4 feet and periods of 14 to 20 seconds. Depending on the positions and tracks of the southern hemisphere storms, southern swells approach between the southeasterly and southwesterly directions. The project site is well sheltered from the direct approach southern swell by the island itself, and only a portion of the wave energy refracting and diffracting around the southeast end of the island reaches the shoreline.

Kona storm waves also directly approach the project site; however, these waves are fairly infrequent, occurring only about 10 percent of the time during a typical year. Kona waves typically range in period from 6 to 10 seconds with heights of 5 to 10 feet and approach from the southwest. Deepwater wave heights during the severe Kona storm of January 1980 were about 17 feet. The project site is well sheltered from the direct approach of Kona storm waves by the island itself, and only a portion of the wave energy refracting and diffracting around the southeast end of the island may reach the site.

Severe tropical storms and hurricanes obviously have the potential to generate extremely large waves, which in turn could potentially result in large waves at the project site. As discussed in *Section 3.5*, recent hurricanes impacting the Hawaiian Islands include Hurricane Iwa in 1982 and Hurricane Iniki in 1992.

Further description on deepwater waves, extreme deepwater waves, numeric modeling of wave approach, and nearshore wave heights is provided by SEI (2020) in *Appendix F*.

***Anticipated Impacts and Mitigation Measures***

Maintaining the seawall with mitigative improvements will not directly impact the oceanographic and coastal setting, nor will it affect the wind, wave, and tide conditions described above. However, these coastal conditions were considered in development of the project design. Winds, tides, waves, and other shoreline change trends were evaluated to assess the vulnerability of the property long-term coastal hazards. Existing conditions were also considered in developing appropriate alternatives and minimizing impacts to the coastal environment.

## 3.7 Marine Water Quality

An assessment of the existing condition of marine water chemistry in the offshore area of the project site that has the potential to be affected by the proposed seawall repairs was prepared by Marine Research Consultants, Inc (MRCI) (2020). The full report is included in *Appendix G.*

***Existing Conditions***

The PacIOOS Voyager mapping program displays the NOAA benthic habitat for the project area. The geomorphology and biology of benthic habitat for the area offshore of the project site is characterized by sand, scattered coral rock, pavement, and aggregate patch reef. Nearshore waters are classified by the USFWS as marine, intertidal, rocky shore that is regularly flooded. Offshore, coastal waters are classified as marine, subtidal, unconsolidated bottom (SEI, 2020)

Pursuant to HAR Chapter 11-54, DOH classifies the Pacific Ocean in the project area as a “Class A” marine water body, which are to be protected for recreational purposes and aesthetic enjoyment. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class.

Water chemistry field collection was conducted on May 15, 2020. Samples were collected at six locations along three study transects extending perpendicular to the shoreline approximately 50 m offshore. The results show elevated values of several nutrient constituents at the shoreline that decrease with distance from shore, a pattern evident on all three study transects. The most pronounced horizontal gradients were for dissolved silicate (Si) with elevated values at the shoreline. Salinity reflects this pattern with lower salinity levels near the shoreline. This pattern is indicative of freshwater entering the ocean at the shoreline and suggest that there may be two points of freshwater entry into the nearshore zone.

Similarly, turbidity, temperature, dissolved oxygen, and pH all display similar patterns, with peak values at the shoreline, and decreasing values with distance extending seawards. At the shoreline, all the values of all these constituents were slightly lower at the eastern boundary of the property.

The area within the scope of the project is within the specific criteria of the DOH-Water Quality Standards (DOH-WQS), with the caveat that this consideration is for a single sample set. As a result, it does not appear that there are any significant inputs of materials from land beyond the immediate shoreline that are affecting coastal ocean waters offshore of the project area.

***Anticipated Impacts and Mitigation Measures***

Maintaining the existing shore protection system with mitigative improvements is not anticipated to adversely affect the health of the nearshore marine environment. The sheetpile stabilization system will be placed landward of the existing seawall which will minimize runoff during the construction period and reduce construction impacts on the nearshore marine environment. During the short-term construction period, erosion will further be minimized through compliance with the City and County's grading ordinance and the applicable provisions of the DOH's Water Quality Standards (Title 11, Chapter 54, HAR) and Water Pollution Control requirements (Title 11, Chapter 55, HAR). Standard BMPs will be employed to minimize impacts, as detailed in subsequent construction plans. No significant storm drainage runoff to coastal water is anticipated. Construction BMPs to protect nearshore waters may include, but are not limited to, a floating silt curtain to contain limited amounts of suspended material along the immediate beach area and utilization of a temporary cofferdam to contain loose material and suspended sediment during excavation.

# 3.8 Biological Resources

## 3.8.1 Terrestrial Biology

***Existing Conditions***

The project site is situated within a coastal residential area of Kailua. Vegetation on the property includes coconut trees (*Cocos nucifera)* and naupaka (*Scaevola taccada),* and other ornamental plants. Patches of naupaka were removed in 2019 to investigate the backside of the seawall. No plant species found within the project site are known to be protected under State or Federal environmental laws.

It is likely that mammalian species commonly found in beach environments on the Windward side of the island, including rats (*Rattus sp.*), house mouse (*Mus musculus*), and Indian mongoose (*Herpestes a. auropunctatus*), may occasionally be present on the project site.

The Hawaiian Hoary bat (*Lasiurus cinereus semotus*), known in Hawaiian as ‘ōpe‘ape‘a, is an endangered species endemic to the Hawaiian Islands. According to the Department of Land and Natural Resources, the Hawaiian Hoary Bat, roosts in native and non-native vegetation from one to nine meters (3 to 29 feet) above ground level (USFWS, n.d.). The bat is known to inhabit forested areas and is not commonly observed in coastal environments like the subject property.

Avian species common to Lanikai include the common mynah (*Acridotheres tristis*), Red-Crested Cardinal (*Paroaria coronate*), Northern Cardinal (*Cardinalis cardinalis*), Java Sparrow (*Padda oryzivora*), Spotted Dove (*Streptopelia chenensis*), Zebra Dove (*Geopelia striata*), and Japanese White-eye (*Zosterops japonicus*). In addition, indigenous Hawaiian seabirds may traverse the project area during Seabird Fallout Season (September 15 - December 15) when young seabirds and adults start their navigation out to sea (DOFAW Seabird Fallout Season).

The Mokulua Islets, located off the Lanikai coast, is a nesting site for the indigenous wedged-tailed shearwaters (*puffinus pacificus*), known in Hawaiian as ‘ua‘u kani, and other common shorebird species (DOFAW, Mokulua Islets State Wildlife Sanctuary). During the breeding season wedge-tailed shearwaters excavate burrows on low, flat islands, and sand splits with little or no vegetation. Most eggs are laid in June with most young fledging in November (DLNR, Seabirds ‘Ua‘u kani or Wedge-tailed Shearwater).

The situation at 1226a Mokulua Drive is typical, presently ideal for burrows, because the sandy soil, recently exposed by cutting back of naupaka kahakai (*scaevola sericea*) shrubs. The exposed sandy scarp edge behind the seawall, along with the existing conditions at the project site with low levels of human traffic, noise and lights, have likely drawn attention from the wedged-tailed shearwaters, as three burrows were observed at the project site during a site visit on July 9, 2020. An additional site visit on July 31, 2020 was conducted with AECOS Inc. to confirm and assess impacts of the seawall repairs (*Appendix H*). Although initially three burrows were reported present, four burrows were observed on July 31. No sitting birds could be seen or heard during the site visits. Evidence surrounding each of the burrow sites indicated each was recently maintained, suggesting all four were recently active nests. Wedge-tailed shearwaters usually fledge after approximately 100 to 115 days of egg laying. So, in this case, fledging ought to occur sometime between late October through the end of November. As of November 2020, there was no evidence of current activity at the burrows which were formed by shearwaters during the summer. These burrows were either abandoned by the adults, or the burrow use for nesting has been completed and the young birds have fledged.

There are no known threatened or endangered terrestrial species present on the site or in the vicinity of the site.

***Anticipated Impacts and Mitigation Measures***

Maintaining the existing shore protection system with mitigative improvements may require the removal of the existing naupaka and palm trees adjacent to the seawall. There are Federal or State-listed threatened, endangered, or candidate flora species on site. No threatened or endangered mammals will be affected by construction or implementation of the project.

Potential impacts to shearwater bird are related to construction activity during shearwater nesting and fledging season, which begins in June and runs through the end of November. Construction activity may take place during the first and second quarter of the 2022 calendar year to avoid potential impacts during fledging season of the wedge-tailed shearwater bird. Before construction begins, a visual survey for seabirds and burrow nests will be conducted. If a burrow nest is discovered, work will cease within a minimum radius of 200 feet of the nest for a minimum of 60 days; if a nest with chicks is discovered work will cease for 30 days. These standard guidelines are intended to protect chicks and may be shortened if monitoring is conducted often enough to note when chicks have fledged, which usually occurs five to nine weeks after hatching. Additionally, a construction fence will be staked down across the sand scarp edge to deter additional burrowing on the property.

### 3.8.2 Marine Biology

***Existing Conditions***

A *Base Assessment of the Marine Environment* was prepared by MRCI in September 2020 (*Appendix G*). MRCI conducted field assessments of the physical, chemical, and biological composition of the nearshore waters encompassing the areas that could be affected by the repairs to the seawall and restructuring of the rock apron.

The PacIOOS Voyager mapping program displays the NOAA benthic habitat for the project area. The geomorphology and biology of benthic habitat for the area offshore of the project site is characterized by sand, scattered coral rock, pavement, and aggregate patch reef. Nearshore waters are classified by the USFWS as marine, intertidal, rocky shore that is regularly flooded. Offshore, coastal waters are classified as marine, subtidal, unconsolidated bottom.

The base of the seawall consists of rocks and boulders that form a band extending approximately one meter offshore. Two juvenile convict tangs (*Acanthrus triostegus)* were observed in the shallow rocky area along the base of the seawall. The boulders provide a habitat for attached marine species including *Cellana* (opihi) and crustose coralline algae. No corals or filamentous algae were observed on the boulders forming the base of the seawall.

The composition of the seafloor includes patches of rubble partially covered with turf algae. No coral, seagrass, or fish were observed offshore of the project area. Beyond 50 meters of the shoreline, the marine habitat consists of a sand bottom interspersed with patch reefs composed of fossil reef structures colonized by living coral colonies. The most common coral observed were *Montipora capitate, Montipora patula,* and *Porites compressa.* Several fish species were identified in the patch reef zone, including the convict tang (*Acanthurus* triostegus), yellow tang (*Zebrasoma flavescens*), sailfin tang (*Zebrasoma veliferum*), ringtail surgeon fish (*Acanthurus blochii*), goldring surgeon fish (*Ctenochaetus strigosus*), bluespine unicornfish (*Naso unicornis*), threadfin butterflyfish (*Chaetodon auriga*), bullethead parrotfish (*Chlororus spilurus*), palenose parrotfish (*Scarus Psittacus*), saddle wrasse (*Thalassoma duperrey*), and yellowfin goatfish (*Mulloidichthys vanicolensis*). These species are common on Hawaiian reefs and are not rare or unique species assemblages. No large individuals that would be considered favorable for human consumption were observed.

Marine protected species that frequent Hawaiian waters include the indigenous populations of Hawksbill turtle (*eretmochelys imbricate*) and the Hawaiian green sea turtle (*Chelonia mydas*), listed as endangered and threatened under the Endangered Species Act (ESA), respectively. Each of these species shows fidelity to their natal beaches, returning to nest during their reproductive years. Hawksbill turtles are known to mainly nest on the islands of Maui, Molokai and Hawai‘i (NOAA, n.d.).

The majority of the Hawaiian green sea turtle nesting (96%) occurs in the French Frigate Shoals located in the Northwestern Hawaiian Islands (NOAA, n.d.). Neither species of turtle was observed within the survey area over the course of the MRCI study, although they undoubtedly occur in the area. The shoreline at this property would not meet the criteria to support sea turtle nesting because it is not a natural sandy shoreline environment.

The humpback whale (*Megaptera novaeangliea*) is another ESA-listed species that are known to winter in the Hawaiian Island from December to April. Although the survey was conducted in May when most of the migrating population has left Hawai‘i, the survey area is not conducive to whale habitation owing to shallow depth and lack of access across the outer reef.

The Hawaiian monk seal (*monachus schauinslandi)* is also an ESA-listed species that is endemic to the waters off the Hawaiian Islands. These endangered seals commonly haul out onto sandy beaches to rest. NOAA Fisheries has revised the ESA Critical Habitat for the Hawaiian monk seal in the main Hawaiian Islands to include terrestrial habitat that extends 5 meters inland from the shoreline between designated boundary points (NOAA, 2015). The shoreline at this property would not meet the criteria to support monk seal conservation because it is not a natural sandy shoreline environment. No seals were observed during the course of the survey, although the sand beaches northwest of the property could provide haul-out areas.

***Anticipated Impacts and Mitigation Measures***

The existing conditions of the beachfront at the project site include a lack of sand dune habitat and an extreme seasonal fluctuation in beach sand levels, which does not allow nor provide an adequate area for sea turtles to nest or forage. Although the beachfront is not a suitable location for sea turtle nesting, during the construction period, the marine construction company will evaluate the shoreline area prior to daily construction activity to ensure no turtles are present. If any turtles are found, all construction activity will cease within 100 feet until the animal voluntarily leaves the area. Further, any construction-related debris or beach equipment that may pose an entanglement threat to green sea turtles from the project site shall be removed if not actively being used at the conclusion of the project. Project-related materials will not be stockpiled in the intertidal zone and reef flats. Repairing the seawall and restructuring the rock apron will not alter the existing conditions at the beachfront to provide a nesting site for turtles, no mitigation is proposed.

The existing beachfront at the project site does not provide a monk seal habitat. Mitigative improvements to the existing shore protection system will not alter the existing conditions at the beachfront, no mitigation is proposed.

Water quality best management practices will be incorporated during the construction period to minimize runoff in the marine environment. Maintaining the existing shore protection system with mitigative improvements will bring the shoreline protection system in a safe condition to further minimize erosion and sedimentation in the marine environment.

## 3.9 Traffic and Roadways

***Existing Conditions***

Mokulua Drive is the primary roadway serving the project site. Mokulua Drive is a one-way city street and provides the only vehicular access to the project site. A private driveway provides vehicular access into the property.

Bus service is provided to the project site by routes along Mokulua Drive, including Route 70. Traffic is typically busiest during weekday commuter periods and weekend afternoons. In addition to restricted parking on three-day weekends, the City reconfigured the intersection at Kailua Road and South Kalaheo Avenue into a roundabout in 2017, alleviating some of the area's traffic congestion due to the popularity of Kailua Beach Park and Lanikai Beach.

***Anticipated Impacts and Mitigation Measures***

The project not anticipated to adversely affect traffic along Mokulua Drive or the greater Kailua area. During the short-term construction period, all construction equipment and construction worker vehicles will be stored on the property and not along Mokulua Drive. Trucks delivering construction materials and disposing construction waste will be scheduled Monday through Friday during off hours throughout the day and respect to the Lanikai neighborhood. No additional mitigation is proposed.

## 3.10 Air Quality

***Existing Conditions***

The State DOH Clean Air Branch (CAB) has established the State Ambient Air Quality Standards (SAAQS). The DOH-CAB regularly samples ambient air quality at monitoring stations throughout the State, and annually publishes this information. On O‘ahu, there are four monitoring stations. The closest station to the project site is located in Honolulu, which measures $SO_2$, CO, $PM_{10}$, and $PM_{2.5}$.

Air quality in the State of Hawai‘i continues to be one of the best in the nation, and criteria pollutant levels remain well below SAAQS. According to the *Annual Summary 2018 Hawai‘i Air Quality Data,* air quality monitoring data compiled by the DOH indicates that the established air quality standards for all monitored parameters are consistently met throughout the State and on the island of O‘ahu. O‘ahu has relatively clean air, low in pollution, due in part to prevailing northeasterly trade winds. The relative absence of stationary pollutant sources in the area presumably keeps air quality in the project area at levels considered good (i.e., well within the air quality standards). Present air quality in the project area is primarily affected by motor vehicles, with carbon monoxide being the most abundant of the pollutants emitted. Air quality data from the nearest monitoring stations suggest that all National and State air quality standards are currently being met, although occasional exceedances of the more stringent State standards for carbon monoxide may occur near congested roadway intersections.

***Anticipated Impacts and Mitigation Measures***

Short-term construction will be consistent with general-related construction activity. Dust emissions from vehicle movement and soil excavation is anticipated. Construction related vehicles and construction crew members commuting to the site will also produce short-term emissions within the project area. Construction-related activity will adhere to DOH air quality standards.

The State of Hawai‘i Air Pollution Control regulations prohibit visible emissions of fugitive dust from construction activities at the property line. A dust control program will be implemented to control dust from construction activities. Fugitive dust emission will be controlled through the mitigation measures such as watering active upland work areas, using wind screens, keeping adjacent paved roads clean, covering open-bodied trucks, and limiting the area to be disturbed at any given time.

Upon completion, the project will not adversely affect long-term air quality. No mitigation is proposed.

## 3.11 Noise

***Existing Conditions***

Noise in the project area is characterized by natural noises due to wind in the surrounding foliage and the ocean waves. Existing background ambient noise levels within the project area are largely attributed to motor vehicle traffic along Mokulua Drive mauka of the project site. The noise levels around the project site are consistent with noise levels found in residential areas.

***Anticipated Impacts and Mitigation Measures***

There will be short-term noise generated during the short-term construction period; however, noise levels are not expected to adversely affect residents near the project site. Construction activities will comply with the provisions of the regulations for community noise control articulated in HAR Chapter 11-46. The contractor will be required to obtain a noise permit if the noise levels from construction activities are expected to exceed allowable levels. Heavy vehicles traveling to and from project site will comply with the State's administrative rules for vehicular noise control. Over the long term, the project will not affect ambient noise levels.

## 3.12 Utilities and Infrastructure

***Existing Conditions***

According to City and County of Honolulu GIS data, there are no existing drainage facilities serving the project site. A sewer lateral located at the southwest corner of the property connects to the gravity sewer main along Mokulua Drive. Stormwater at the property currently infiltrates rapidly into the sandy soils, with peak period flow overland towards the shoreline.

Electrical services are provided to the properties by HECO's overhead distribution lines. Existing residential uses at the property generate a demand for electrical and communication services.

***Anticipated Impacts and Mitigation Measures***

The project will not adversely affect public infrastructure such as roadways, water supplies, and electrical power. The project will not affect existing overhead service. No mitigation is proposed.

## 3.13 Socio-Economic Characteristics

***Existing Conditions***

The project site is located in Koʻolaupoko, Oʻahu within Census tract 112.02. In 2018, the Census tract had a residential population of approximately 1,500, which was approximately 0.1 percent of Oʻahu's total population. The population in this Census tract is slightly older in age compared to the overall age of Oʻahu's population as a whole. The racial mix of the area is comprised of proportionately more Caucasians, and fewer Native Hawaiians and Pacific Islanders than the island as a whole. The median household income in 2018 for Census tract 112.02 was $115,655. The area near the project site and throughout Lanikai consists primarily of single-family homes and the Lanikai Beach recreational area. The nearest commercial area is located about 2.3 miles to the northeast in Kailua.

***Anticipated Impacts and Mitigation Measures***

The project will not result in adverse socio-economics impacts. The project will not increase population of Census Tract 112.02 or the greater Koʻolaupoko District. Short-term construction-related activity will generate economic benefits through the local civilian construction sector. Additionally, construction materials expenditures will be in support of locally owned businesses. Upon completion, the project will have beneficial long-term impacts by providing the property with protection from increased coastal erosion.

# 3.14 Public Facilities and Services

This section discusses the potential for impacts to public facilities and services.

## 3.14.1 Educational Facilities

***Existing Conditions***

The project site is located within the State Department of Education's (DOE) Windward District, Kailua-Kalaheo Complex Area. The Kailua area currently contains 15 public schools operated under the State Department of Education. There are nine elementary schools, one intermediate school and two high schools. Educational facilities that serve the property include:

- Kailua Elementary School located at 315 Kuʻulei Road, is approximately 2.4 miles from the project site.
- Kaʻōhao Public Charter School located at 140 Alāla Road, is approximately 1.1 miles from the project site.
- Kailua Intermediate School located at 145 South Kainalu Drive, is approximately 2.1 miles from the project site.
- Kalaheo High School is located at 730 Iliiaina Street, is approximately 3.8 miles from the project site.

The public library in closest proximity to the property is the Kailua Public Library, located 1.87 miles northwest of the property.

***Anticipated Impacts and Mitigation Measures***

The project is not expected to significantly affect regional educational facilities and will not increase the population in the Koʻolaupoko District. No mitigation is proposed.

### 3.14.2 Recreational Facilities

***Existing Conditions***

The primary recreational area located in the vicinity of the project site are Lanikai Beach, a recreational destination for snorkelers, swimmers, and spearfishermen. The nearest City Department of Parks and Recreation-managed recreation area is Kailua Beach Park, located approximately 1 mile northwest. The 35-acre beach park is divided by Ka'elepulu Stream. The stream runs throughout Kailua and feeds into the beach. Kailua Beach Park includes covered and open picnic tables, food concession stands, barbeque grills, restroom facilities, beach showers, parking lots with free parking, kayak rentals, volleyball courts, and lifeguards on duty from 9:00AM to 5:30PM.

The public can easily gain access to the shoreline. Kailua Beach Park is heavily used by the public and has ongoing issues with shoreline erosion. High surf has taken out chunks of the shoreline reducing beach recreation areas and causing trees to lean or fall forcing the city to come and cut down trees. The City has tried to address the issue by spreading 1,500 cubic yards of sand along the shoreline, but eventually high surf caused areas that were filled with sand to become exposed again.

***Anticipated Impacts and Mitigation Measures***

The project will not adversely affect existing recreational facilities, include Lanikai Beach and Kailua Beach Park, therefore no mitigation is proposed. Beach access routes are located nearby to the site.

### 3.14.3 Police

***Existing Conditions***

The Lanikai area is served by Honolulu Police Department (HPD) District 4, which covers the area from Waimanalo to Kahuku. The Kailua Substation is located approximately 2.3 miles northwest of the project site.

***Anticipated Impacts and Mitigation Measures***

The project will not impact the HPD's operations or ability to provide adequate services to the surrounding community. No adverse impacts are anticipated, and no mitigation measures are proposed. Equipment mobilization and materials deliveries will be conducted following government requirements.

### 3.14.4 Fire

***Existing Conditions***

The Honolulu Fire Department (HFD) has 45 operating fire stations on the island of O'ahu. There are two fire stations serving the project site. Fire Station 18 Kailua is located approximately 2.2 miles north of the project site. Fire Station 19 'Aikahi is located approximately 3.8 miles north the project site. HFD will dispatch the closest fire engine in the case of an emergency.

HFD works with the Emergency Medical Services (EMS), who dispatches the closest available unit. During an emergency, this may be either an EMS ambulance or a fire engine depending on the type of emergency and location. Since there are only 20 EMS stations on Oʻahu, fire companies are frequently the first responder.

***Anticipated Impacts and Mitigation Measures***

The project will not impact the HFD's operations or ability to provide fire protection services to the project area and the surrounding residential neighborhood. No mitigation measures are proposed.

### 3.14.5 Emergency Medical Services

***Existing Conditions***

The nearest hospital to the project site is Adventist Health Castle, located approximately 3.9 miles northeast. The closest EMS ambulance is stationed at the Kailua Fire Station, which transports patients to Adventist Health Castle.

***Anticipated Impacts and Mitigation Measures***

The project will not impact the handling of EMS or medical emergencies within the surrounding neighborhood and greater project area. Adventist Health Castle will be accessible should there be an accident or illness affecting workers at the project site. Upon completion, the project will not impact EMS operations, no mitigation is proposed.

### 3.14.6 Solid Waste Management

***Existing Conditions***

Solid waste collection for the project area is provided by the City. The project site is provided weekly refuse collection on Tuesdays and recycling collection on Fridays.

***Anticipated Impacts and Mitigation Measures***

Short-term construction-related activity will generate very limited amounts of construction waste. Waste material will be properly disposed and not left for weekly refuse collection provided by the City. Upon completion, the project will not adversely affect refuse services provided by the City. No mitigation is proposed.

## 3.15 Historic, Archaeological and Cultural Resources

### 3.15.1 Historic and Archaeological Resources

An Archaeological Inventory Survey (AIS) was conducted by Keala Pono Archaeological Consulting (August 2020). The survey was designed to identify historic properties within the greater project area and includes a 100% pedestrian survey, and subsurface test excavations. There were no archaeological resources identified in the survey of the subject properties. Due to the AIS results, the report is presented as an Archaeological Assessment *(Appendix I)*. The Archaeological Assessment report was submitted to DLNR SHPD for agency review in November 2020 (Log. No. 2020.02653). As of August 2021, the report is still under review.

***Existing Conditions***

*History of the Project Area*

Historical maps of the broader Kailua area indicate that the property is located within the subdivision labeled as Alaapapa. Land use in the area consisted primarily of fisheries, and eventually coconut groves, cattle ranching, and dairies. As early as 1910, speculation of developing Kailua into a vacation destination and residential area began. Development of the area began in 1924, with Charles Frazier creating the 311-acre beachfront community called Lanikai in Ka‘ōhao.

*Previous Archaeological Research in the Vicinity of the Project*

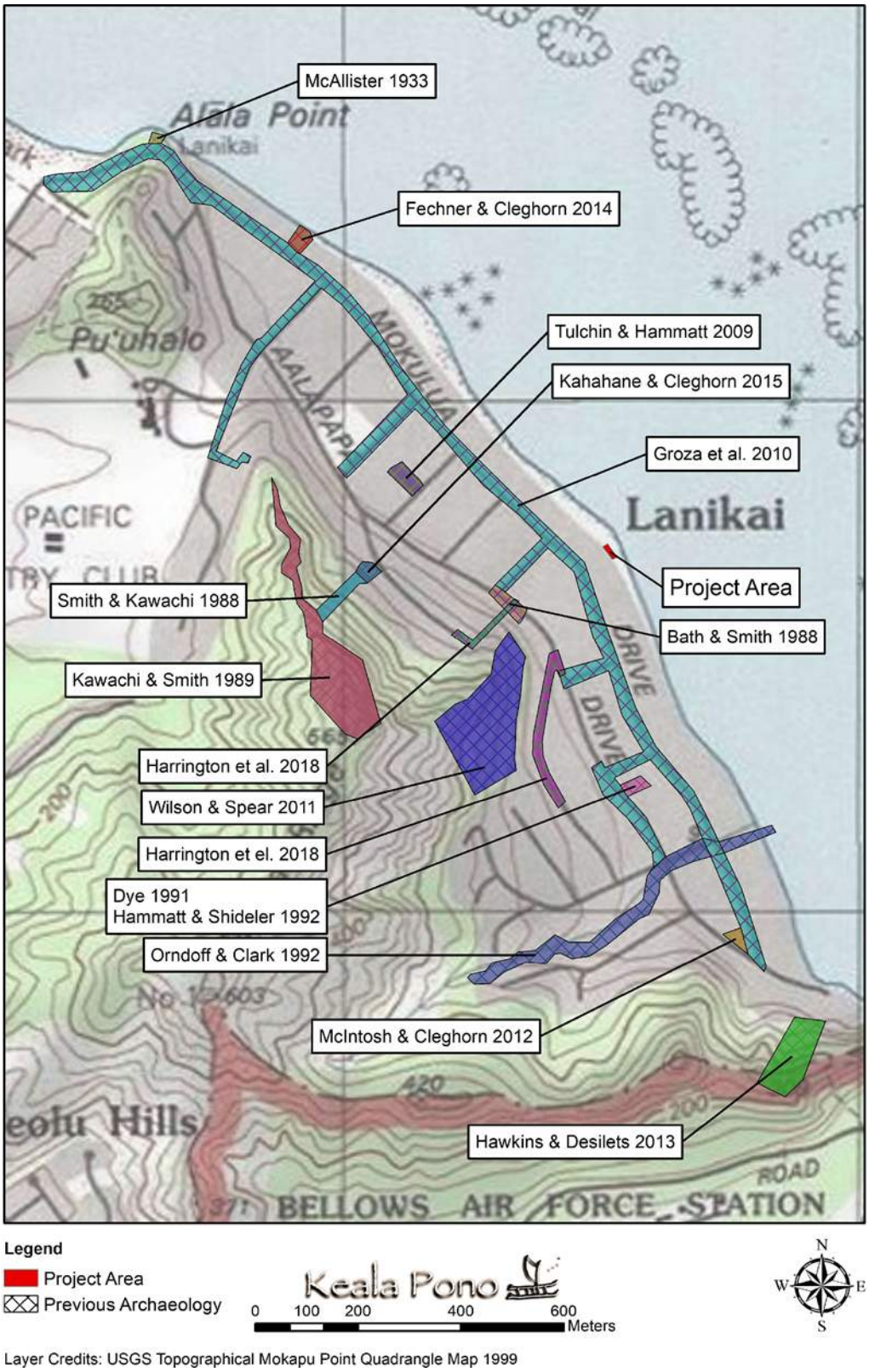
Information on known historic properties in the Lanikai area has been reported by numerous authors between 1933 and 2014. A heiau, WWII bunkers, human remains, and a pre-contact hearth have been identified or recovered from areas near the project parcel. The closest findings were documented by Dye (1991), Hammatt & Shideler (1992), and Groza et al. (2010), which identified human burials in beach lots north of the project site and a subsurface cultural layer to the west of the project area *(Figure 3-9)*.

*Results of the Archaeological Inventory*

The pedestrian survey of 100% of the project area as well as subsurface testing of three trenches of the project area resulted in negative findings for subsurface archaeological deposits or material. No archaeological resources were found. The entire project area has been previously disturbed by modern activity, and subsurface testing did not yield evidence of subsurface archaeological features or deposits. Stratigraphy from the site consisted primarily of mostly topsoil above a natural beach deposit.

***Anticipated Impacts and Mitigation Measures***

Maintaining the existing shore protection system with mitigative improvements is not expected to result in significant adverse impacts to historic properties of the site. Due to the presence of fill within the site, there is a very low expectation for the occurrence of historic properties. No adverse effects on archaeological, or historical resources are anticipated as a result of the project. No further archaeological work is recommended. The report has been submitted to SHPD for review under HRS §6E-42.




**Previous Archaeological Investigations in Lanikai (Keala Pono 2020)** **Figure 3-9**

### 3.15.2 Cultural Resources

Keala Pono contacted Mr. Alani Apio. Kumu Māpuana de Silva and Mr. Kihei de Silva to discuss cultural practices that occur in the project area. An interview with Kumu Māpuana de Silva conducted on March 21, 2021 is provided in *Appendix J*.

***Background***

*Historic Mo'olelo*

Kailua is associated with Menehune and early settlement of Oʻahu in pre-history. Menehune are the legendary race of people hailing from Kahiki who were known to be smaller in stature. They are known for having constructed things in Kailua and Pūowaina. In particular, the Mokulua Islands are said to have been built by the Menehune for protection. However, the construction was never completed after one night's work.

*Traditional Land Use*

Oʻahu's windward coast was noted for its "many attractive bays, beaches, and stream-watered lowlands and valleys all the way from Kailua to Laʻie" (Handy et al. 1991:268). Kailua itself was abundant in resources with fishponds, streams, and extensive wetlands which were converted into agriculture terraces. Kailua was a favorable place to live, especially for ruling chiefs. King Kamehameha lived and ruled from Kailua, where he was seen working in the fishponds. Upon the death of Kamehameha in 1819, windward lands under his rule were divided between his sons, Liholiho (Kamehameha II) and Kauikeaouli (Kamehameha III). The ahupuaʻa of Kailua went to Kauikeaouli.

After Kamehameha III's Māhele in 1848, land claims in windward Oʻahu were awarded to commoners. In the Koʻolaupoko District, 199 awards were awarded in the Kailua and Waimānalo ahupuaʻa. Most of the lands in windward Oʻahu went to Queen Kalama. She became the dominant landholder of those lands in Kailua, including claims in Kawainui and the ili of Mōkapu, Oneawa, and Keahupuaanui.

For commoners who sought individual land titles, the process required filing a claim with the Land Commission, having their land claim surveyed, testifying in person on behalf of their claim, and submitting a final Land Commission Award for a binding royal patent. Due to reasons such as an unfamiliarity with the process, distrust of the process, and/or the desire to cling to the traditional way of land tenure, the majority of the native population never received Land Commission Awards recognizing their land holdings.

There were a few Land Commission Awards granted in Lanikai, however one is located near the project area. Land Commission Award 2657:2 is 0.44 acres and was awarded to Mahuia. The LCA included two ʻāpana in Kailua with the first located in the ʻili of Kuailima and the second in Kaʻōhao adjacent to the project area to the north. The parcel is described in the Māhele Book as being located between the ocean to the east and the kula of the konohiki to the west.

*Historic Land Use*

In 1850 the Resident-Alien Act allowed foreigners to purchase lands in Hawaiʻi. After attempts to cultivate sugarcane and pineapple in Kailua, but never being productive, Chinese laborers moved off plantations to start rice farming in Kailua. By the end of the 1800s, the cattle industry also established a presence in the area, with operations near the Kailua flatlands by J.P. Mendonca and C. Bolte.

Historic maps show fisheries of Koʻolaupoko, naming Alaapapa Fishery and Kailua Fishery in the Lanikai area. Inland, Kaʻelepulu Fishpond is located where the subdivision of Enchanted Lakes is today.

In the beginning of the 20th century, the copra industry began in Kailua, with 10,000 coconut trees planted in 1908. The following year, an additional 130,000 trees were planted along 320 acres behind Kailua's shoreline, known today as Coconut Grove.

Around the same time, cattle ranching began expanding operations alongside existing dairy operations from Kaʻelepulu and Olomana down to Bellows Beach in Waimanalo. Raw milk was initially trucked from these operations to Meadow Gold (Dairymen's) in Honolulu for processing, but in 1950's the Campos, Moanalua, and Rico dairies united to form the Foremost Dairy based in Honolulu.

As early as 1910, speculation of turning Kailua into a vacation destination began. Beachfront properties along Kalaheo Road began being advertised for those who wish to build summer cottages. In 1917, following a decline in coconut oil demand, Arthur Rice of Hawaiian Copra Company initiated plans for residential subdivision development. More development followed, with upscale beachfront developments in Lanikai developed in 1924 by Charles R. Frazier. The name Lanikai was chosen by Frazier, thinking that it translated to 'heavenly sea,' although the literal Hawaiian translation is "sea heaven" or "marine heaven." The faux lighthouse of Lanikai was erected in 1926 as a monument, which has since been nominated to the National Register of Historic Places.

The Lanikai area was also historically used by the military during World War II. The "Lanikai Pillboxes" were constructed in the 1940s as observation bunkers for Battery Wailea and the nearby Bellows Field. Batter Wailea was armed with two guns and was operational between 1942 and 1945.

***Existing Conditions***

Cultural practices were not identified at the project site; however, it is possible that cultural practices such as traditional fishing or throw net practices occur in the greater surrounding area. Mr. Alani Apio of Kamau, LLC was contacted by Keala Pono on behalf of the Applicant to discuss current cultural practices that occur within the greater Lanikai area. Mr. Apio further recommended that Keala Pono contact Kumu Māpuana de Silva and Mr. Kihei de Silva for further consultation. Kumu Māpuana de Silva shared that the shoreline expands and narrows throughout the year as part of a natural process, and seawalls interrupt this process. The native Hawaiian community gathers marine resources in harmony with this natural movement of the sea, therefore access to the ocean is critical to daily cultural practices. In her opinion expressed during the interview, it would be best if the houses were not built so close to the sea. She also shared that there are known burials in the Kaʻōhao area, including at a site across the street from the project property.

***Anticipated Impacts and Mitigation Measures***

Background research indicates that there are no known cultural resources within the project site. Minimal to no impacts to Hawaiian cultural practices or resources at the site are anticipated. Existing cultural practices, such as fishing, that occur in the greater surrounding area of Kaʻōhao will not be impacted directly by the project. Kumu Māpuana de Silva expressed general concern about seawalls in Kaʻōhao and how this affects the natural shoreline and cultural access to the ocean. With potential for inadvertent cultural finds, should cultural materials be discovered during construction activities, all work shall cease immediately and an archaeologist from SHPD shall be notified. Construction-related activity will be suspended until further recommendations are made for the appropriate treatment of archaeological and/or cultural materials.

## 3.16 Visual Resources

***Existing Conditions***

The project site is located in along the coast in the Lanikai neighborhood of Kailua, in the Ko‘olaupoko District on the island of O‘ahu. The private residential property is developed with an existing home along with rock walls that demarcate the lot boundary. The project site is bounded by the Pacific Ocean, existing homes, and Mokulua Drive (*Figure 3-10A through 3-10F*).

Continuous views from Kailua Bay towards to shoreline are identified in the Ko‘olau Poko Sustainable Communities Plan (SCP) as a scenic viewshed in Map A-1, Open Space. The existing seawall and rock apron is part of the 4,300 feet of armored shoreline that is visible from the ocean. *Figures 2-1* and *2-4* provide aerial perspectives of the Lanikai shoreline.

***Anticipated Impacts and Mitigation Measures***

The sheetpile stabilization system will be placed landward of the existing seawall and is not anticipated to affect coastal views. Beginning at the surface elevation to a depth of 17 feet, the sheetpile wall and cap, tie rods, and a concrete deadman will be structurally connected to the existing seawall. The sheetpilize stabilization system will be placed beneath the surface and will not adversely affect coastal views and will not augment the current shoreline protection structure visible from the ocean. No significant adverse impacts to coastal views, scenic vistas or existing landscapes are anticipated. Ocean views will continue to be available.


**Site Photo Key (Source: Google Earth)** **Figure 3-10**

**View 1 from Mokulua Drive Facing Makai Towards the Residence and Project Area** **Figure 3-10A**

**View 2 Middle Portion of the Yard Facing Makai** **Figure 3-10B**

**View 3 Backside of Seawall and Yard Facing North** **Figure 3-10C**

**View 4 Accessibility from Yard at the Northern End of Property** **Figure 3-10D**

**View 5 Backside of Seawall and Yard Facing South** **Figure 3-10E**

**View 6 from Property, Rock Apron** **Figure 3-10F**

## 3.17 Potential Cumulative and Secondary Effects

Cumulative effects are impacts which result from the incremental effects of an activity when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertake such other actions. Erosion has occurred for decades along the Lanikai Shoreline. Since Lanikai is a chronically eroding shoreline, many homeowners opted to construct shoreline protection structures to stabilize the rapid recession of the shoreline. As discussed in *Section 1.3*, the existing seawall is considered nonconforming and the rock apron was permitted in 1968. Maintaining the existing shore protection system with mitigative improvements will bring the shoreline protection structure into safe condition, pursuant to the conditions of the easement executed in 2013 and protect the property from increased coastal erosion. The sheetpile stabilization system will be placed landwards of the existing seawall and is not anticipated to adversely affect shoreline processes at other sections of the Lanikai shoreline. The proposed action is designed to properly bring the existing shoreline protection structure into safe condition without adversely affecting shoreline protection structures at neighboring properties and public lateral access along the shoreline. The applicant will seek a SSV and will adhere to the applicable terms and conditions of approval tied to the permit.

Secondary effects are impacts that are associated with an activity but do not result directly from the activity. The proposed action will not result in adverse secondary impacts.

Short-term construction-related impacts on the environment as described throughout this section will be generated by the project, and mitigation measures will be implemented to minimize these impacts. Federal, State, and County environmental regulations will be met throughout the construction and operation of the project. Construction activity during the proposed project will generate direct employment as well as indirect employment in construction-related industries.

Section 4

# Alternatives to the Proposed Project

Chapter 4

# Alternatives to the Proposed Project

The primary objectives of the project are to repair damage and structural deficiencies of the existing shore protection structure, comply with the conditions of the easement to maintain the structures in a safe condition, and provide long-term protection for the property and existing single-family home.

To meet the objectives of the project, the following alternatives for shoreline protection at 1226a Mokulua Drive were evaluated:

A. No-Action
B. Managed Retreat
C. Beach Nourishment
D. Alternative Designs
   1. Rock Revetment
   2. Hybrid Seawall-Revetment
   3. Seawall Replacement
E. Seawall Removal
F. Preferred Alternative/Proposed Action – Seawall Repair and Improvements

Each alternative was evaluated according to the project objectives and whether it met the following criteria:

- Effectiveness (i.e., likelihood of satisfying the project objectives)
- Design Considerations (i.e., suitability, design life, durability)
- Costs (i.e., initial costs, recurring costs, entitlement costs)
- Feasibility (i.e., regulatory support, community support)
- Potential Impacts (i.e., shoreline, coastal process, marine habitat, shoreline access, and neighboring property and shoreline structures)

The following sections summarize each alternative, with emphasis on the effectiveness, design, and potential impact evaluation criteria. Details of each alternative are described in-depth the SEI Coastal Assessment (*Appendix F*). During the Draft EA public comment period, DPP requested that discussion of certain alternatives, including managed retreat, beach nourishment, and various shore protection options, be expanded. The following includes the expanded discussion with a level of discussion commensurate with the scope of the proposed action, as requested.

## 4.1 Alternative A – No-Action Alternative

The “No-Action” alternative is the baseline against which all other alternatives are measured, as it refers to the future site conditions that would result should the project not proceed. The No-Action alternative would involve leaving the seawall in its existing location and condition with no modifications or improvements.

The existing shore protection system has been protecting the project site and the adjacent properties from erosion and wave overtopping for nearly half a century. With time, the conditions of the seawall and rock apron have deteriorated. If the seawall is not repaired, it can be expected to continue to deteriorate. If the seawall deteriorates to a point that it is no longer serviceable, the structure may fail, or removal may be required. The failure or removal of the shore protection system will not protect the terrestrial area and ultimately expose the property and existing single-family home to erosion and flooding. The project site and adjacent properties would further be exposed to increased hazard risk. The existing shore protection system is currently in serviceable condition, maintaining the seawall with mitigative improvements is feasible.

No-Action Alternative Evaluation:

Advantages

- No cost

Disadvantages

- Does not address the damages and structural deficiencies of the existing seawall.
- Does not comply with the requirements of the easement.
- Does not provide long-term protection for the property and existing single-family home.
- Continued deterioration of the seawall could create a risk to public health and safety.

Although the No-Action alternative would have no immediate impacts to the project site, nearshore water, or adjacent properties, the likelihood of the seawall failing will increase over the long-term, as the seawall continues deteriorate throughout time. If no mitigative action is taken, while the existing seawall is in serviceable condition, damage will continue and the level of deterioration would eventually result in failure which would negatively affect the project site, adjacent properties and nearshore waters. The No-Action alternative would not satisfy the project objectives and is therefore not the preferred solution.

## 4.2 Alternative B – Managed Retreat

Managed Retreat, which is also referred to as “adaptive realignment”, is a coastal management strategy that focuses on strategic relocation of existing and new development away from the shoreline area and out of vulnerable areas. Managed retreat is intended to allow the shoreline to naturally move inland, rather than fixing the shoreline with engineered shore protection structures. Retreat may be accomplished horizontally or vertically in nature. Horizontal retreat seeks to reduce hazards exposure by moving structures further inland, whereas vertical retreat strategies seek to reduce exposure by elevating structures above the hazard.

Managed Retreat is a concept that continues to be evaluated for applicability in Hawai‘i. The State Office of Planning (OP) published a report entitled, *Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai‘i.* The report outlined steps for the State of Hawai‘i to develop a managed retreat plan. The report states, “…to have a cogent and comprehensive retreat plan, it requires long-range planning, legal changes, funding, and some level of community agreement, understanding and support for retreat.” Additionally, the report recognizes that retreat from coastal hazards can be incremental and may take decades to complete.

Managed Retreat throughout Lanikai would require substantial redevelopment or relocation of the existing residential parcels. Relocation would, at a minimum, require substantial redevelopment of approximately 37 acres of land between Mokulua Drive and the current shoreline. A project of this magnitude would fundamentally alter the natural and built environments of the area, and the appearance and character of the Lanikai community.

Managed Retreat at the project site would potentially involve removal of the existing shore protection system and the relocation of the single-family home further inland for the construction of a shore protection structure set back at a minimum of 40 feet from the shoreline. While removal of the existing shore protection system would naturally allow the terrestrial area to erode and sand to migrate along the beach, the eroded sand would be unstable, mobilize, and spread throughout the littoral system during normal seasonal beach processes. Allowing the terrestrial area to erode naturally would expose adjacent neighbors to increased coastal hazards and sea level rise vulnerabilities. Additionally, relocating the single-family home would require demolition. The single-family home is 80 years old and the foundation is slab-on-grade. Moving the home from its current location is not a practical option. The project site is within the City "Residential" Zoning District with a height restriction of 25-30 feet, which significantly limits the opportunity for a vertical retreat strategy. While this alternative may reduce vulnerability of infrastructure to coastal hazards and sea level rise, complete redevelopment of the property is not a reasonable or economically practical alternative.

Managed Retreat Alternative Evaluation:

Advantages

- Reduces vulnerability of infrastructure to coastal hazards and sea level rise.
- Avoids costs and requirements associated with shore protection or beach restoration.
- Allows the shoreline to migrate naturally.

Disadvantages

- Does not address the damage and structural deficiencies of the existing seawall.
- Does not comply with the requirements of the State easement.
- Does not provide long-term protection for the property and existing single-family home.
- Would only be effective if implemented at the community-wide level.
- No existing rules, programs, or policies to manage or facilitate the retreat process.

Although Managed Retreat would reduce the vulnerability of infrastructure to coastal hazards and sea level rise and allow the shoreline to migrate naturally, Managed Retreat would not be feasible nor reasonable for an individual landowner to undertake a regional solution. The project site is one of 108 individual parcels that extends approximately 8,000 feet (1.5 miles) along the Lanikai shoreline. The shoreline fronting the project site spans approximately 120 feet, which is approximately 1.5 percent of the entire length of the shoreline in Lanikai. Managed Retreat would fundamentally alter the existing character of the Lanikai community. Furthermore, Lanikai Beach is a Public Trust resource that is owned and managed by the State of Hawai'i. The Property Owner is not responsible for managing the Public Trust.

It is generally accepted that there are three major approaches to sea-level rise: accommodation, protection, and retreat (Codiga and Wager, 2011). Managed Retreat is an example of an adaptation strategy to respond to rising sea levels. However, it is not the only option to adapt to sea level rise, and other approaches including accommodation and protection should be thoroughly evaluated as stand-alone approaches or in combination to address site-specific needs and circumstances. Additionally, the feasibility and potential impacts, both positive and negative, of Managed Retreat should also be thoroughly evaluated and understood prior to implementation.

Plans and strategies for Managed Retreat should be developed and evaluated through long-range planning efforts in coordination with State and County agencies, the community, existing landowners, and various stakeholders. Planning and outlining strategies for Managed Retreat could begin through the Community Development Planning (CDP) process, which is coordinated by the City and County of Honolulu. Notably, the project site is situated within the Lanikai area which is part of the Koʻolau Poko Sustainable Communities Plan. This Plan was last updated in August 2017 but did not discuss or outline measures of Managed Retreat.

Until Managed Retreat policies, regulations, tools, and programs are in place to implement Managed Retreat in a heavily developed residential community such as Lanikai, strategies to address sea-level rise including accommodation and protection should be considered. The Proposed Action is an interim solution and would not preclude the implementation of other sea level rise adaptation strategies going forward. The multi-decadal process of planning for and implementing Managed Retreat should not preclude the Property Owner from fulfilling their objective to protect their property from erosion and flooding and maintain the easement area in a safe condition.

## 4.3 Alternative C – Beach Nourishment

Beach nourishment typically involves placement of beach fill to specified profiles that are designed to augment the natural morphology of the beach to offset the effects of chronic, seasonal, or episodic erosion. Regulatory agencies and the public are generally supportive of beach nourishment because it has minimal environmental impacts and is consistent with State and County policies that seek to preserve and enhance beach resources and shoreline public access.

The shoreline fronting the seawall consists of a narrow sandy beach that is dynamic and ephemeral. The beach consists of a thin veneer of sand with no evidence of stable beach profile. When sand is present along the shoreline, the beach is generally exposed only during lower tides. At high tide, waves wash up to the seawall and the beach face is entirely submerged. Beach nourishment at the project site would consist of placing sand directly on the shoreline to increase the elevation and width of the beach.

One of the factors that limits the effectiveness of beach nourishment projects is the loss of sand due to natural littoral processes, such as longshore and cross-shore sediment transport. Sand placed only at the project site would be unstable and would be expected to mobilize and spread throughout the littoral system during normal seasonal beach processes. Engineered containment structures, such as T-head groins (*Figure 4-1)*, would be required to stabilize the sand and maintain a stable beach.

T-head groins decrease and reorient the amount of wave energy reaching the beach and create artificial littoral cells to stabilize the sand. Beach nourishment is effective when accompanied by the construction of groins to restore and maintain a stable beach.

**Example of Beach Nourishment with T-Head Groins (Iroquois Point, O‘ahu, Hawai‘i) Figure 4-1**

A disadvantage of beach nourishment with stabilizing groins is the potential for down drift effects that can negatively impact nearby shorelines. In order to avoid the potential for down drift effects, the scale of the project would need to be expanded as a regional effort to include a sufficient number of groins spanning a significant length of the shoreline.

In 2009, the U.S. Army Corps of Engineers and the Department of Land and Natural Resources evaluated options for large-scale beach nourishment in Lanikai. The first option is for the direct placement of sand with no stabilization. The design calls for approximately 182,000 cubic yards of sand producing a dry beach at width of approximately 30 feet. In 2009, the estimated cost was $33,000,000 with additional nourishment every 8.4 years costing approximately $109,000,000 over a span of 50 years. The second option is for the direct placement of sand with the construction of twelve T-head groins. The design calls for approximately 146,000 cubic yards of sand producing a dry beach at a width of approximately 30 feet. The initial estimated cost including the construction of the twelve T-head groins was $33,400,000 in 2009. Maintaining the beach and T-head groins over a span of 50 years is approximated to cost $41,600,000. The construction of the T-head groins would be located seawards of the shoreline, requiring easements from the State which would further increase costs.

Beach Nourishment Alternative Evaluation:

Advantages

- Improves lateral shoreline access.
- Provides some additional protection against erosion and flooding.

Disadvantages

- Does not address the damage and structural deficiencies of the existing seawall.
- Does not comply with the requirements of the easement.
- Does not provide long-term protection for the property and existing single-family home.
- Requires an adequate quantity of compatible beach quality sand.
- Requires discharge of fill material (sand) in waters of the United States.
- Groins and beach fill would have a very large structural footprint along the shoreline with environmental impacts exceeding the proposed action.
- Project would need to be a regional effort spanning multiple properties.
- Project would be cost-prohibitive for an individual landowner.
- Groins would require easements.

Beach nourishment at the project site, which would consist of placing sand directly on the shoreline to increase the elevation and width of the beach, would be ineffective in the long-term without the necessary stabilizing structures typical of a larger, regional-scale beach nourishment effort. Discharge of fill material into the water would have additional, potentially adverse, environmental impacts. Furthermore, this alternative would not comply with the conditions of the easement. Beach nourishment is therefore not the preferred solution.

## 4.4 Alternative D – Alternative Designs

SEI proposed three alternative design strategies for the shoreline protection system at 1226a Mokulua Drive, including rock revetment, hybrid seawall-revetment, and seawall replacement, which are summarized and evaluated, below.

### 4.4.1 Rock Revetment

A revetment is a sloping, un-cemented structure constructed of wave-resistant material. The most common method of revetment construction is to place a layer of armor stone, sized according to the design wave height, over an underlayer of smaller rock that sits atop geotextile filter fabric. The underlayer is designed to distribute the weight of the armor layer and to prevent loss of fine material through voids in the revetment. An example of a rock revetment is shown in *Figure 4-2*.

Advantages of a revetment system is the rough, porous rock surface and sloping face of the structure, which will tend to absorb wave energy, reduce wave reflection, and may help to promote accretion of sand on a sandy beach when a sufficient volume of sand is available in the littoral system. Revetments are more effective in reducing wave reflection, runup, and overtopping, which increases the potential for sand accumulation seaward of the structure. Because of its durability, flexibility, and reduced wave reflection, a revetment is often considered the best erosion control/shore protection measure for sites where shoreline hardening is considered appropriate.

The design of a rock revetment is dependent on sea level elevation, design wave height, and scour depth. Additionally, it is preferred that the toe of the revetment be founded on hard, non-erodible substrate to prevent scour and undermining of the structure.

**Rock Revetment at Kahului Harbor (Kahului, Maui, Hawai‘i)** **Figure 4-2**

Based on its design criteria, SEI evaluated two options for a rock revetment at the project site. Both options would extend beyond the limits of the easement area and would require demolition and removal of the existing shore protection system. Return walls would also be required to stabilize and protect the adjacent properties and existing shore protection structures. Both revetment designs incorporate a 2.3-foot higher than present sea level, with consequent increases in predicted wave exposure and scour depth. Utilizing 2.3 feet of sea level rise, which is currently projected for 50 years in the future, provides suitable design criteria within the effective life span of similar structures. Structure maintenance, improvements, or replacement would be appropriate at the end of the structure's projected life span or when environmental changes exceed design conditions. Adaptation to rising sea levels and their resulting impacts predicted at time frames beyond the structure's design life should be incorporated at that time.

The first revetment option would be to construct a rock revetment landward of the existing seawall (*Figure 4-3*). The crest of the structure would be placed at +10.5 feet msl to match the existing backshore topography with a slope of 1V:1.5H to ensure stability. The structure would be 40.2 feet wide with a total area of 3,880 square feet. The entire structure would be located within the Shoreline Setback of the existing property (City/County jurisdiction). The structure would occupy 100 percent of the yard area and would encroach 4 feet into the footprint of the existing single-family home.

To mitigate the need to modify or remove the existing single-family home, the second option would be to construct a rock revetment beginning at the seaward edge of the existing rock apron (*Figure 4-4*). The structure would be 40.2 feet wide with a total area of 3,970 square feet. The landward portion of the structure would be located within the Shoreline Setback Area. The seaward portion of the structure would extend into the State Conservation District. The structure would occupy approximately 70 percent of the yard area seaward of the existing single-family home.

<u>Rock Revetment Alternative Evaluation:</u>

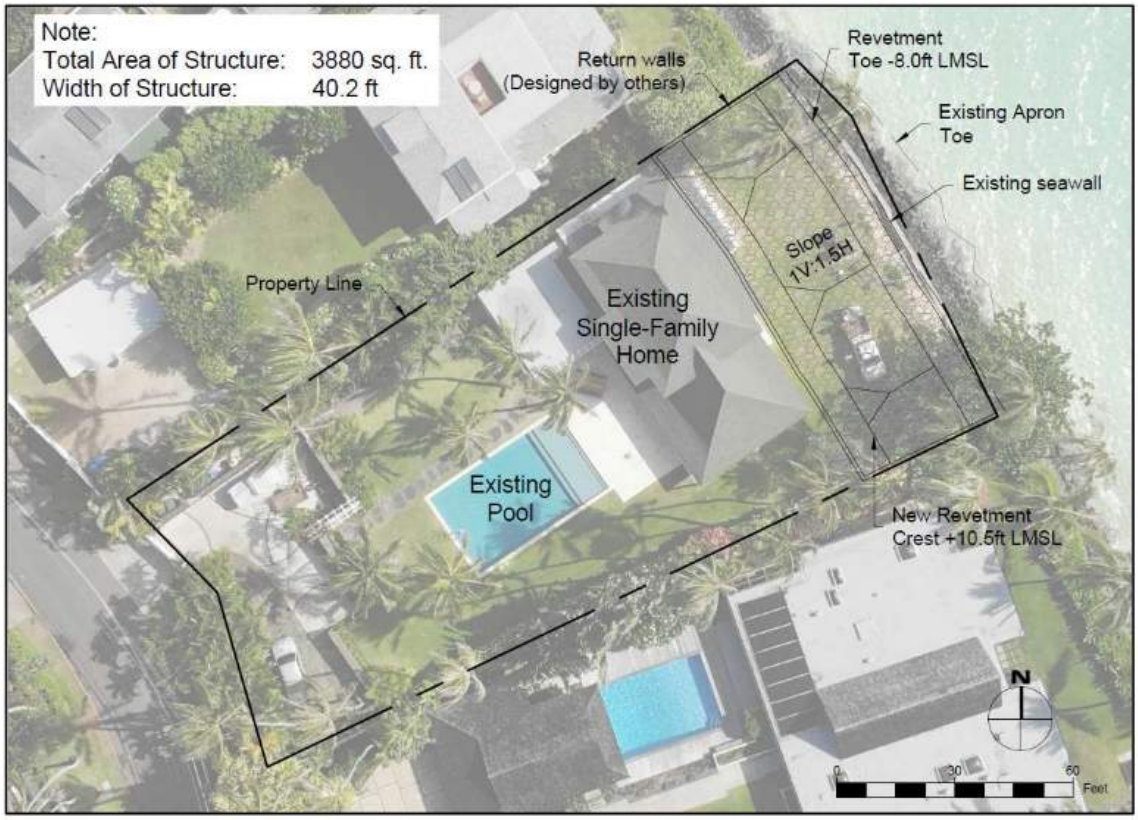
<u>Advantages</u>

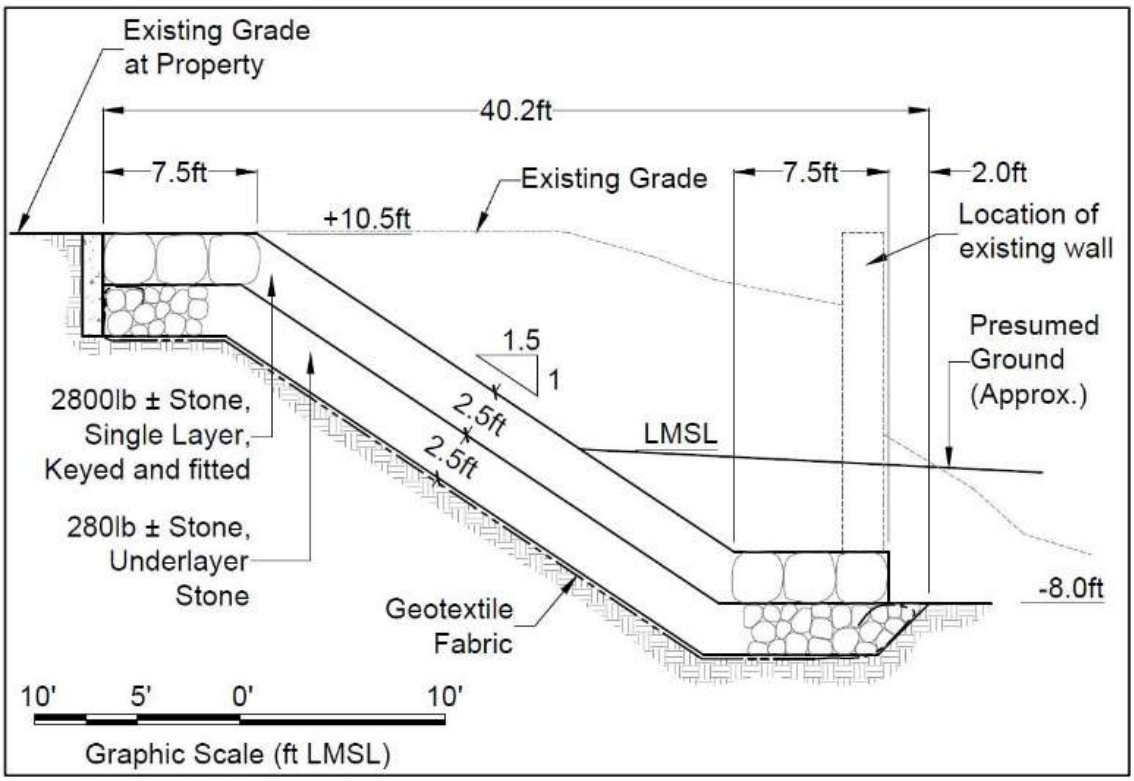
- Provides long-term protection for the property and existing single-family home.
- Better wave energy dissipation characteristics than a seawall.
- Less reflective than a seawall and may facilitate sand accretion seaward of the structure.

<u>Disadvantages</u>

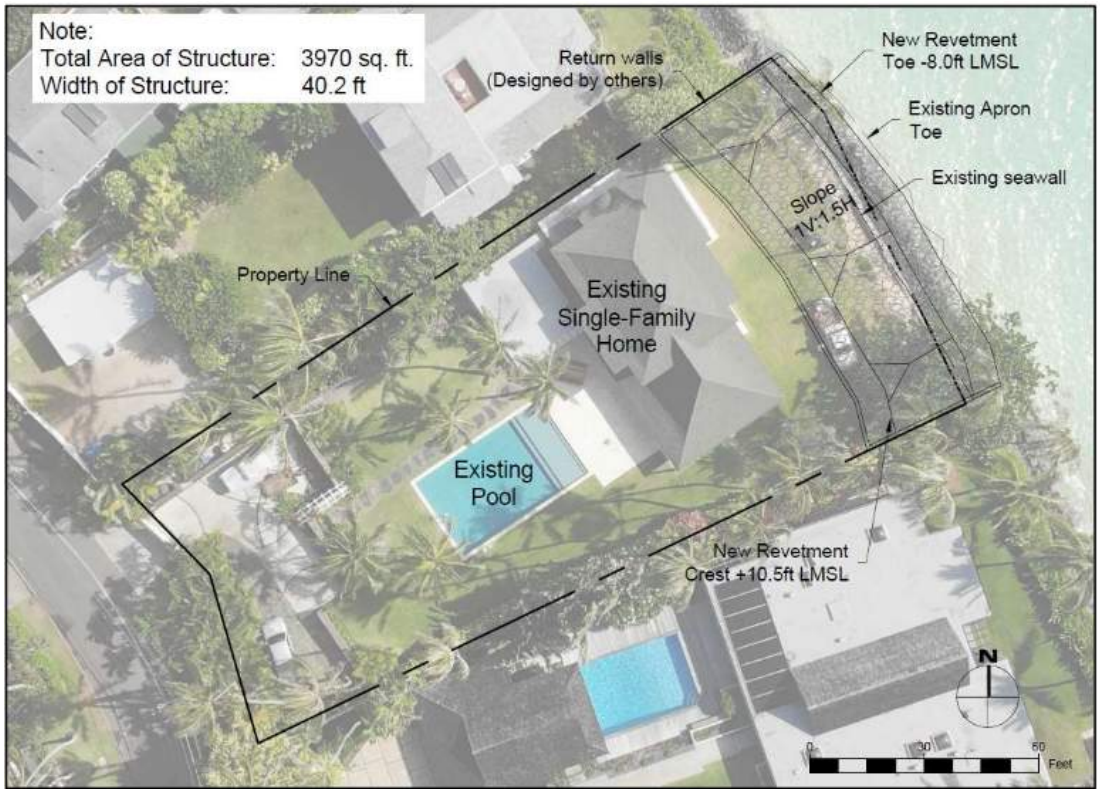
- Largest structural footprint of the options considered.
- Only feasible if a portion of the structure extends seaward of the shoreline.
- Requires demolition and removal of the existing seawall and rock apron.

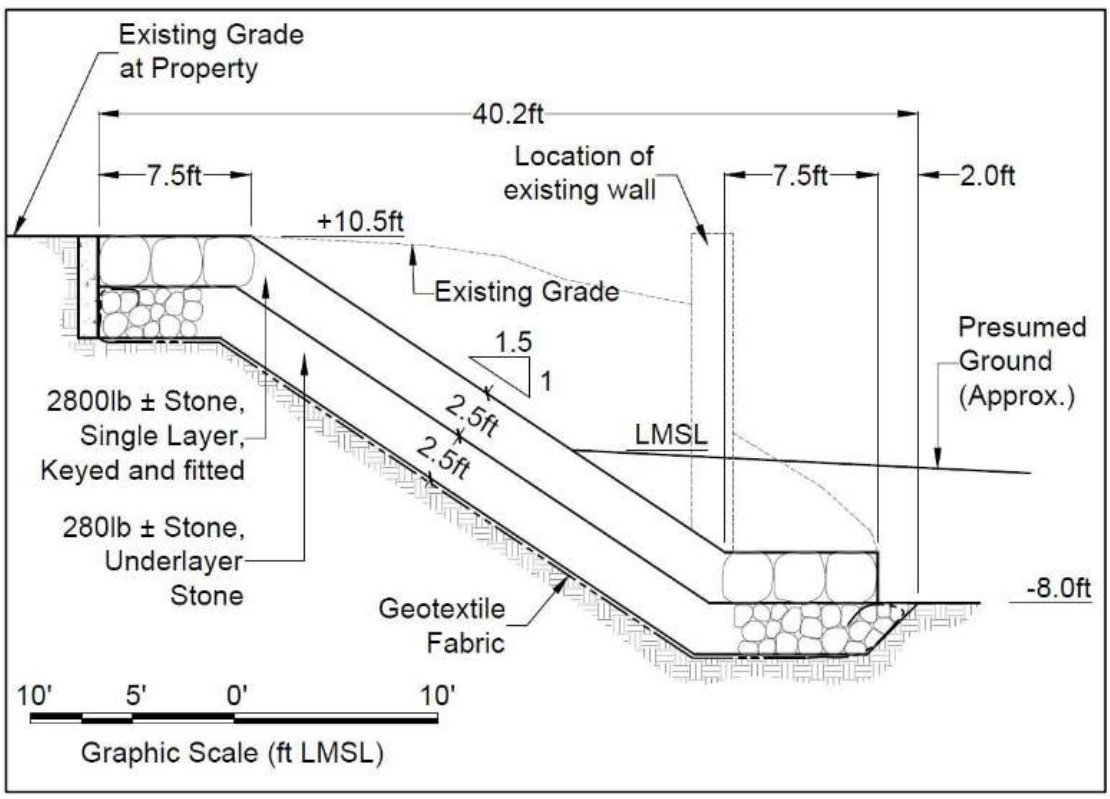
A rock revetment would be an appropriate engineering solution for the project site. However, the revetment would have a very large structural footprint, and significant environmental effects with the demolition and removal of the existing shore protection system. The rock revetment would exceed the size of the existing single-family home and at minimum, occupy over 20 percent of the total area of the property and require demolition and relocation of the single-family home. In addition, there would be the need for additional side yard retaining wall structures within the shoreline area to protect the adjacent properties and existing shore protection structures. Given these considerations, the construction of a rock revetment is not the preferred alternative.




**Conceptual View for Rock Revetment Landward of the Shoreline** **Figure 4-3**




**Conceptual View for Rock Revetment Seaward of the Shoreline** **Figure 4-4**

### 4.4.2 Hybrid Seawall-Revetment

The hybrid seawall-revetment alternative would involve demolition and removal of the existing shore protection system and construction of a new hybrid structure composed of two primary elements: a seawall (i.e., vinyl sheet pile, reinforced concrete, or cemented rock masonry), and a uniform armor rock rubble mound revetment (*Figure 4-5*). Hybrid seawall-revetments have a slightly smaller structural footprint than a traditional rock revetment and would be designed to withstand changing design wave conditions as sea level rises. Properly designed and constructed hybrid seawall-revetments are durable, flexible, and highly resistant to wave damage.

SEI evaluated two options for a hybrid seawall-revetment at the project site. Both designs incorporate a 2.3-foot higher than present sea level, with consequent increases in predicted wave exposure and scour depth. Utilizing 2.3 feet of sea level rise, which is currently projected for 50 years in the future, provides suitable design criteria within the effective life span of similar structures. Structure maintenance, improvements, or replacement would be appropriate at the end of the structure's projected life span or when the environment changes beyond design conditions. Adaptation to rising sea levels and its resulting impacts predicted at time frames beyond the structure's design life should be incorporated at that time. The armor and underlayer stone size and placement would be the same as for the rock revetment options. Like the rock revetment option, a hybrid seawall-revetment would extend beyond the limits of the easement area and would require demolition and removal of the existing seawall and rock apron. Return walls within the shoreline setback area would also be required to stabilize and protect the adjacent properties and existing shore protection structures.

**Hybrid Seawall-Revetment (Kapaʻa, Kauaʻi, Hawaiʻi)** **Figure 4-5**

The first design option would be to construct a hybrid seawall-revetment landward of the existing seawall (*Figure 4-6*). The crest of the structure would be placed at +10.5 feet msl to match the existing backshore topography with a slope of 1V:1.5H to ensure stability. The structure would be 32.9 feet wide with a total area of 3,145 square feet. The entire structure would be in the Special Management Area. The structure would occupy approximately 90 percent of the yard area seaward of the existing single-family home.

The second option would be to construct a hybrid seawall-revetment beginning at the seaward edge of the existing rock apron (*Figure 4-7)* The structure would be 32.9 feet wide with a total area of 3,225 square feet. The landward portion of the structure would be in the City/County jurisdiction. The seaward portion of the structure would be in the State Conservation District. The structure would occupy approximately 60 percent of the yard area seaward of the existing single-family home.

Hybrid Seawall-Revetment Alternative Evaluation:

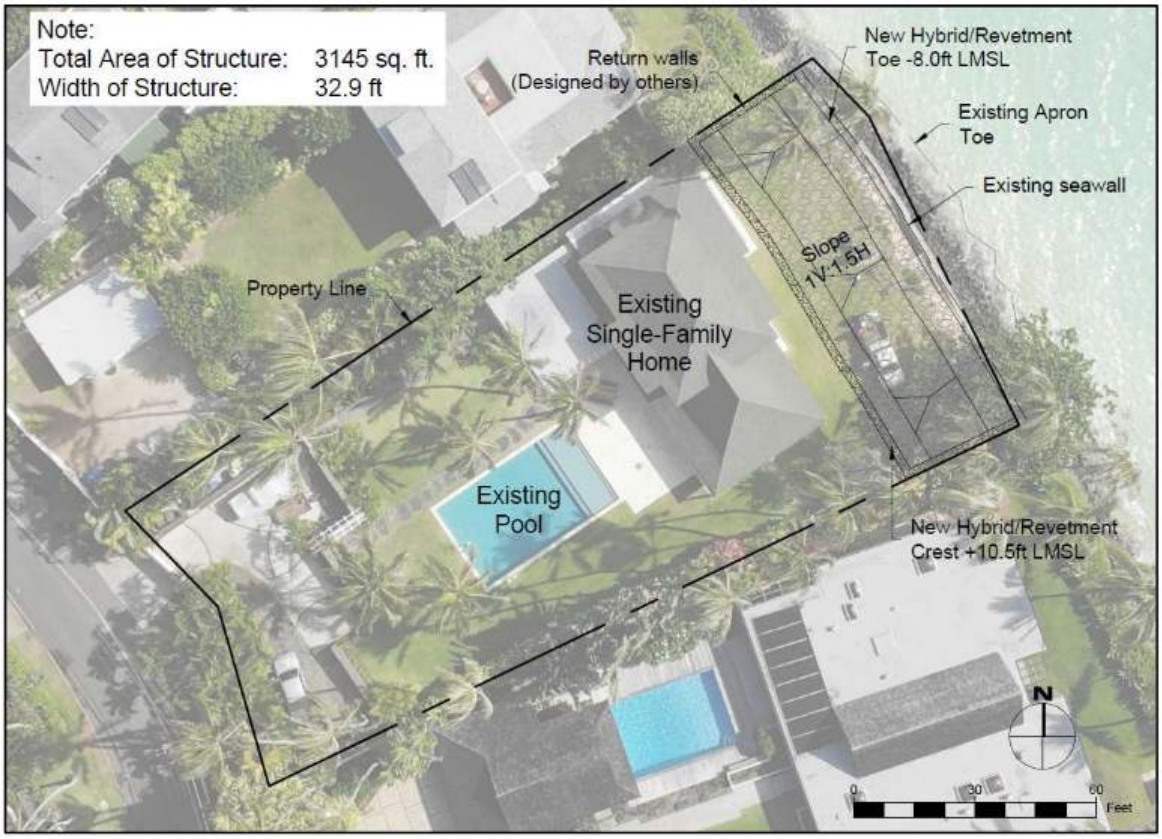
Advantages

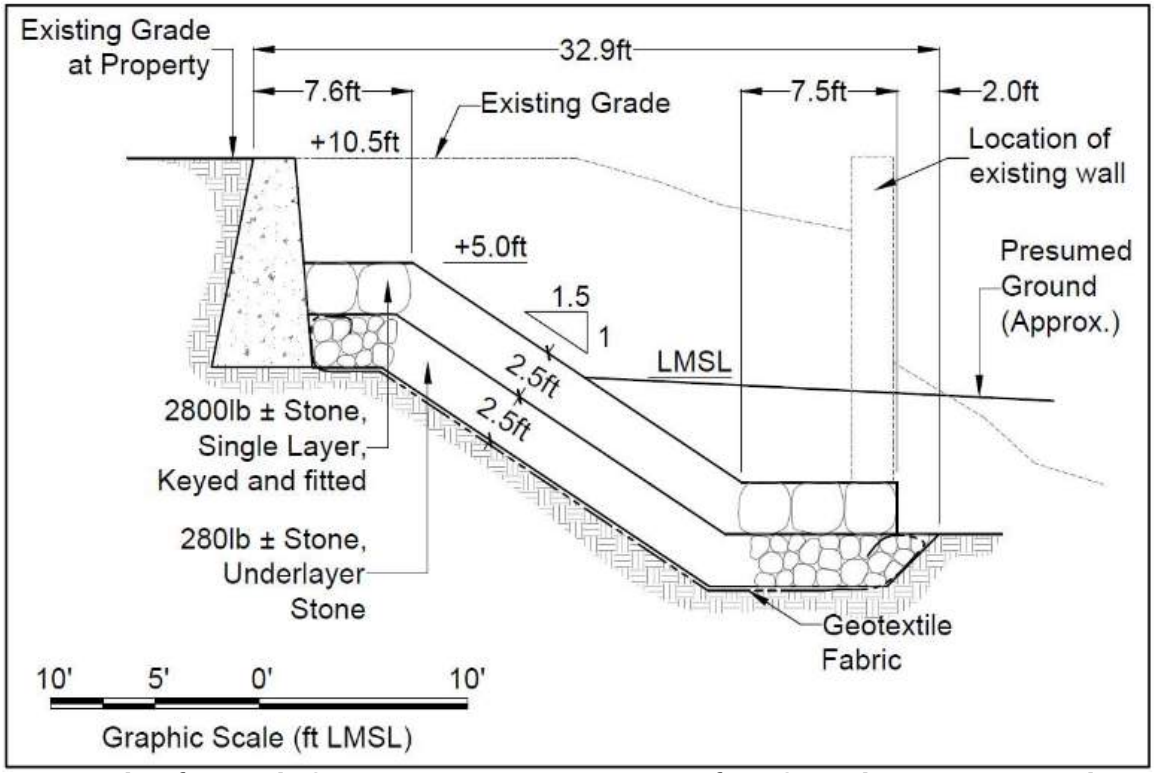
- Provides long-term protection for the property and existing single-family home.
- Better wave energy dissipation characteristics than a seawall.
- Less reflective than a seawall and may facilitate sand accretion seaward of the structure.
- Does not negatively impact lateral shoreline access.

Disadvantages

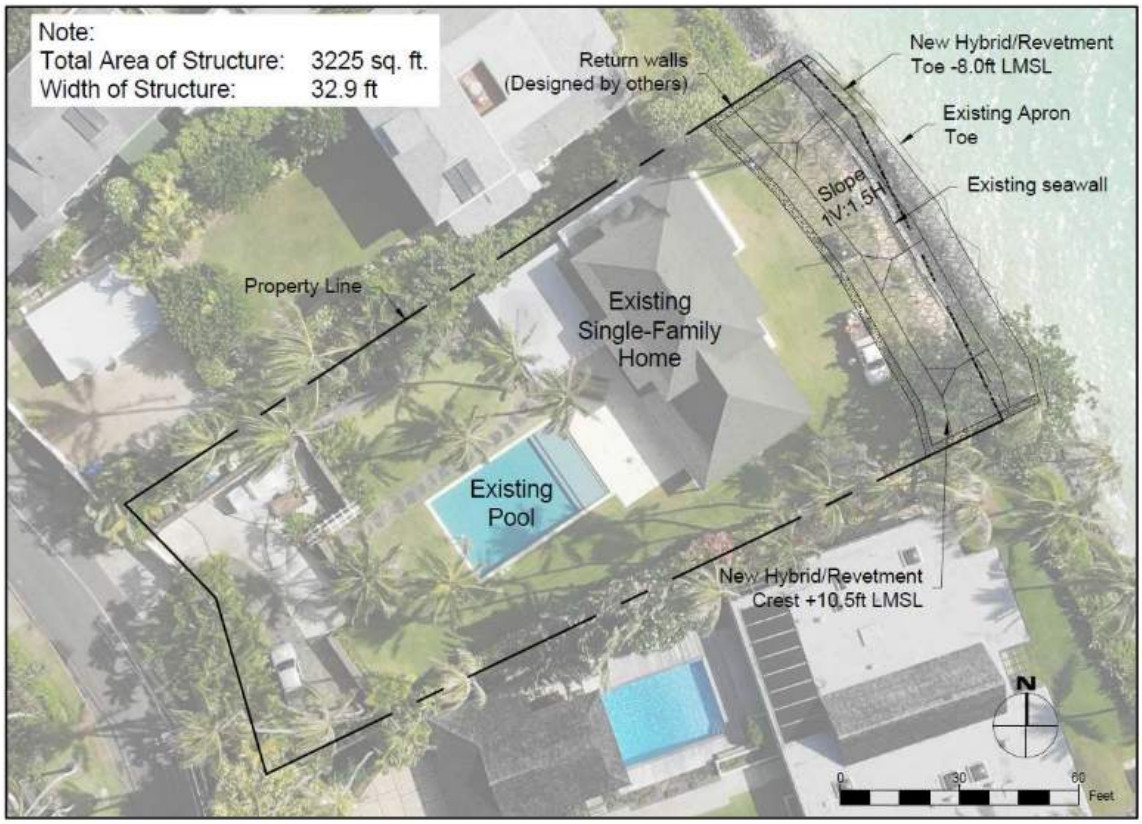
- Large structural footprint.
- Requires demolition and removal of the existing seawall and rock apron.

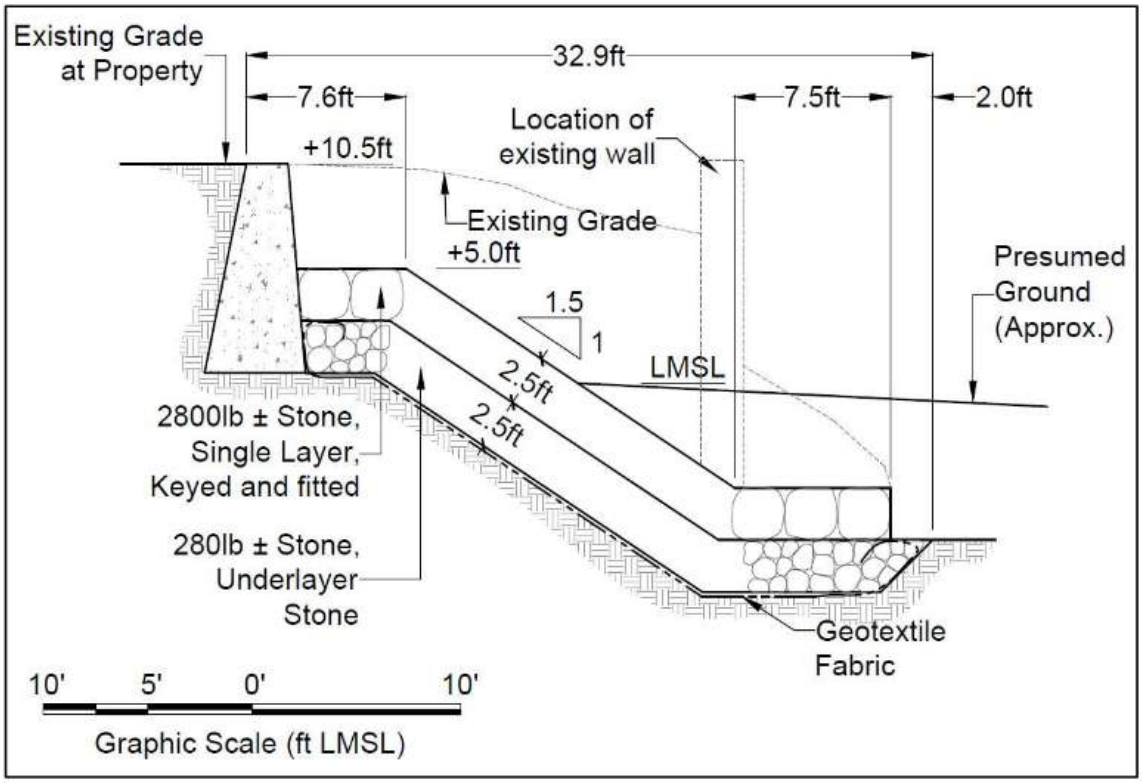
Although a hybrid seawall-revetment would be an appropriate engineering solution for the project site, the hybrid seawall-revetment would have a large structural footprint, which would occupy at minimum 17.5 percent of the total area of the property and would exceed the size of the single-family home. Construction of a hybrid seawall-revetment would require demolition and removal of the existing shore protection system. In addition, there would be the need for additional structures within the shoreline setback area to protect the adjacent properties and existing shore protection structures. Given these considerations, the hybrid seawall-revetment is not the preferred alternative.




**Conceptual View for Hybrid Seawall-Revetment Landward of the Shoreline** **Figure 4-6**




**Conceptual Section View for Hybrid Seawall-Revetment Seaward of the Shoreline Figure 4-7**

### 4.4.3 Seawall Replacement

Seawalls are vertical or sloping concrete, concrete rubble masonry (CRM), cement masonry unit (CMU), or sheet pile wall used to protect the land from wave damage and erosion. A seawall, if properly designed and constructed, is a proven, durable, and relatively low-maintenance shore protection method. Seawalls also have the advantage of having a relatively small footprint along the shoreline.

Seawalls are not flexible structures and their structural stability is dependent on the design and strength of their foundations. If the foundation of a seawall is breached, hydraulic action can erode the retained sediment inshore of the wall. With the loss of enough retained sediment, the ground surface behind the seawall will collapse and sinkholes will form. Sinkholes can compromise the structural integrity of a seawall and may result in failure of the structure. To avoid foundation problems, the seawall foundation should be well below the potential scour depth, which can require extensive excavation.

The impervious and vertical face of a seawall results in very little wave energy dissipation. Incident wave energy is deflected upward, downward, and seaward. Reflected wave energy can inhibit accretion of sand seaward of the wall. The downward energy component can cause scour at the base of the wall. Therefore, the foundation of a seawall is critical for its stability, particularly on sandy and eroding shorelines. Ideally, seawalls are constructed on hard, non-erodible substrate.

Replacing the existing seawall would require demolition and removal of the existing seawall and rock apron, and construction of a new deep foundation wall landward of the existing wall within the property. A conceptual design for a seawall replacement was prepared by MKE (*Figure 4-8).*

<u>Seawall Replacement Alternative Evaluation:</u>

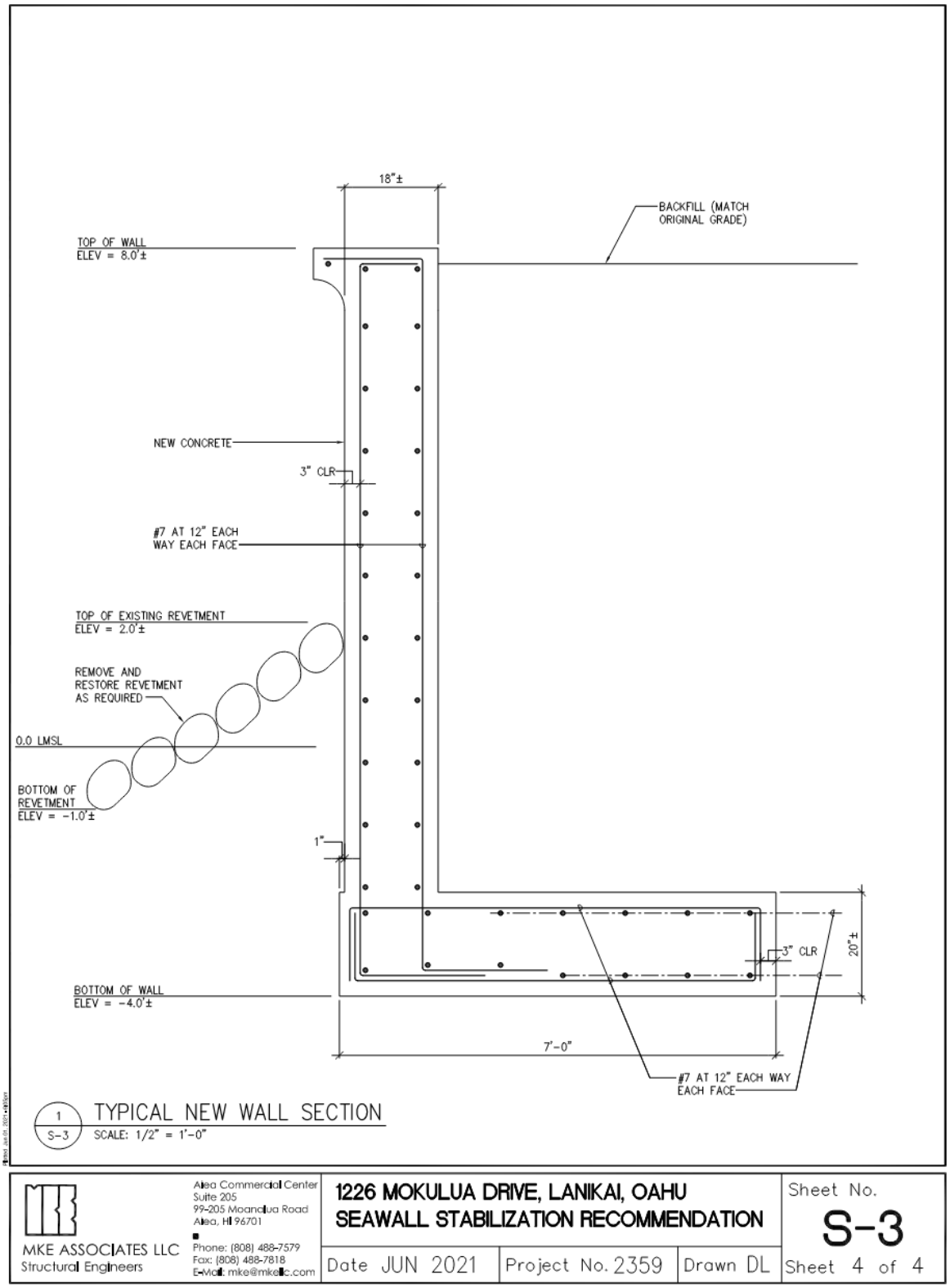
<u>Advantages</u>

- Provides long term protection against erosion and flooding.
- Provides more options to improve the seawall (e.g., appearance, size, ocean access).

<u>Disadvantages</u>

- Construction duration would be significantly longer than the repair option.
- Excavation to the depth required for scour resistance would be difficult and costly.
- Requires demolition and removal of the existing seawall and rock apron.

Replacing the seawall is an appropriate engineering solution for the project site and would achieve the project objective of providing long-term protection for the property and existing single-family home. However, due to the high costs for demolition and removal of the existing seawall, and regulatory restrictions on construction of new shore protection structures, seawall replacement may not be a feasible option.




**Conceptual Design for Seawall Replacement** **Figure 4-8**

## 4.5 Alternative E – Seawall Removal

The seawall removal alternative would involve removing the existing seawall and rock apron and allowing the shoreline to migrate naturally. The shore protection system has been fronting the project site for nearly half a century and has been protecting the project site and the adjacent properties from erosion and wave overtopping. If the seawall and rock apron were to be removed, the terrestrial area would be exposed to erosion, wave overtopping and flooding would occur more frequently, and property damage would be expected. Demolition and removal of the seawall would require extensive excavation, which would disturb a large volume of the existing soil in the terrestrial area making it more unconsolidated and prone to erosion. While erosion of the terrestrial sediment may result in a temporary increase in beach width, the eroded material would be unstable and would be expected to mobilize and spread throughout the littoral system during normal seasonal beach processes.

As sea levels continue to rise, this would likely result in significant erosion, flooding, and permanent loss of land. The seawall is over half a century old and is in a deteriorated, but serviceable condition for maintenance and improvements. The existing shore protection system is covered by an easement that confers unto the Grantee the "right, privilege, and authority to use, maintain, repair, replace and remove the existing seawall". The easement also requires that the Grantee "shall keep the easement area and the improvements thereon in a safe condition". Mitigative improvements are necessary in order to maintain the seawall in a safe condition and prevent it from being "substantially or completed destroyed", which would result in termination of the easement. If the structurally integrity of the seawall is not improved and continues to deteriorate to a point that it is no longer serviceable, the structure may eventually fail, or removal may be required.

Seawall Removal Alternative Evaluation:

Advantages

- Provides long term protection against erosion and flooding.
- Provides more options to improve the seawall (e.g., appearance, size, ocean access).

Disadvantages

- Construction duration would be significantly longer than the repair option.
- Excavation to the depth required for scour resistance would be difficult and costly.
- Requires demolition and removal of the existing seawall and rock apron.

Removing the seawall would not achieve the project objectives and would expose the project site and adjacent properties to increased hazard risk. The seawall is in a serviceable condition and mitigative improvements are feasible. Seawall removal is therefore not the preferred solution.

## 4.6 Preferred Alternative/Proposed Action – Seawall Repair and Improvement

Maintaining the existing shore protection system with mitigative improvements is the preferred alternative as described in *Section 2.3*. The alternative includes installation of sheetpile on the landward side of the existing seawall. The existing seawall and the sheetpile stabilization system will be structurally connected by a concrete sheetpile cap dowelled to the existing seawall. This will mitigate additional settling and rotation should undermining continue. The existing rock apron will remain in its place (*Figure 2-5)*. An advantage of using a rock apron in a coastal environment is its capacity to disperse wave energy. This wave dispersion characteristic significantly reduces reflected wave energy while also preventing the downward motion of reflected wave energy that results in scour of natural sediment. By dispersing wave energy as it impacts the shoreline, these installations would improve the longevity of the backing structure and assist in protecting the backshore when paired with a seawall.

An alternative design could be accomplished by driving sheetpile along the existing seawall. The sheetpile would be driven to hard substrate, minimizing any future soil erosion as well as providing adequate bearing, overturning, and sliding resistance. One option would be to install a steel sheetpile cutoff wall and associated tieback system seaward of the existing wall. This option would require existing voids beneath the seawall foundation to be filled to support the wall. This design is not preferred over the proposed action because installation of sheetpile seaward of the seawall may result in increased environmental impacts and reduce the design life of the seawall. The proposed action is more costly; however, the applicant seeks to establish a more long-term solution.

<u>Seawall Repair Evaluation:</u>

<u>Advantages</u>

- Improves structural integrity without having to construct a new seawall.
- Avoids costs for demolition and removal of the existing seawall and rock apron.
- May extend the life of the structure for an undetermined amount of time.
- Would have the least impact on the appearance of the shoreline.
- Concrete cap would provide additional protection from sea level rise.
- Construction costs would be significantly lower than the seawall replacement option.
- Construction would be significantly faster than the seawall replacement option.
- No substantial impacts on existing lateral shoreline access or coastal processes.
- No substantial impacts on existing viewplanes to or along the shoreline.
- Provides more options to improve the seawall (e.g., appearance, size, ocean access).

<u>Disadvantages</u>

- Requires demolition and removal of the existing concrete counterforts.
- More expensive than installing sheetpile seaward of the existing seawall.

Compared to all alternatives considered, maintaining the existing shore protection system with mitigative improvements would require less excavation and would not require the demolition and removal of the existing seawall or rock apron. This would be the least invasive alternative, minimizing potential environmental impacts and would be the most cost-effective option. A sheetpile stabilization system landward of the existing seawall would provide adequate resistance to design lateral forces and overturning moments produced by the retained soil and may extend the life of the structure for an undetermined amount of time. Additionally, the conditions of the easement would be met. Maintaining the existing shore protection system with mitigative improvements is therefore the preferred solution.

Section 5

# Plans and Policies

## Chapter 5

# Plans and Policies

In this chapter, the project's consistency with applicable land use policies set forth in the Hawai‘i State Plan, State Land Use Law, State Coastal Zone Management Program, Hawai'i Water Quality Standards, City and County of Honolulu General Plan, City and County of Honolulu Ko‘olau Poko Sustainable Communities Plan, City and County of Honolulu Land Use Ordinance, Shoreline Setbacks, Special Management Area, and the *Ola: Resilience Strategy* are discussed.

## 5.1 Hawai‘i State Plan

The Hawai‘i State Plan establishes a statewide planning system that provides goals, objectives, and policies that detail priority directions and concerns of the State of Hawai‘i; these will be discussed as they relate to the project.

It is the goal of the State, under the Hawai‘i State Planning Act (Chapter 226 HRS), to achieve the following:

- A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawai‘i present and future generations.
- A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.
- Physical, social, and economic well-being, for individuals and families in Hawai‘i, that nourishes a sense of community responsibility, of caring, and of participation in community life (Chapter 226-4 HRS).

Specific objectives and policies of the State Plan that pertain to the project are as follows:

*Section 226-11 Objectives and policies for the physical environment--land-based, shoreline, and marine resources.*

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

*(1) Prudent use of Hawai‘i's land-based, shoreline, and marine resources.*

*(2) Effective protection of Hawai‘i's unique and fragile environmental resources.*

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

*(1) Exercise an overall conservation ethic in the use of Hawai‘i's natural resources.*

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

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

*(6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawai'i.*

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

Discussion: The project's use of the area is consistent with State and County land use districts and zoning designations. No endangered plant species, animal species, or habitats are known in the project area. The project is not anticipated to pose threats to Native Hawaiian endangered plant or animal species and habitats. However, as noted in *Section 3.8* of this document, the federally threatened sea turtle, may nest in the nearby shoreline area, and seabirds may overfly the project area.

Construction activities will be limited to daylight hours and will not use construction work lights to avoid attracting seabirds and/or disorienting sea turtles. The project is not anticipated to result in substantial impacts to environmental and marine resources.

*Section 226-12 Objectives and policies for the physical environment—scenic, natural beauty, and historic resources.*

*(a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawai'i's scenic assets, natural beauty, and multi-cultural/historical resources:*

*(b) To achieve the scenic, natural beauty, and historic resources objectives, it shall be the policy of this State to:*

*(1) Promote the preservation and restoration of significant natural and historic resources.*

*(3) Promote the preservation of views and vistas to enhance the landscapes, and other natural features.*

*(5) Encourage the design of developments and activities that complement the natural beauty of the islands.*

Discussion: The project will not pose adverse impacts to existing scenic assets or cultural/historical resources at the project site. As reviewed in *Section 3.16* of this EA, scenic viewsheds identified in the *Ko'olau Poko Sustainable Communities Plan* and the *Coastal View Study* include panoramic views of the coastline from the ocean. The project is located along Mokulua Drive surrounded by single-family homes which obscure views of the seawall from the roadway towards the ocean. Views toward the coast from the ocean would not be adversely impacted given that the shore protection system already exists, and surrounding properties also include shoreline protection structures. Maintaining the shore protection system with mitigative improvements would have a smaller footprint than alternatives discussed in *Section 4.0* and could be considered an aesthetic improvement to the shoreline.

As discussed in *Section 3.15*, an AIS was conducted for the project. The study indicated no effects to cultural, archaeological, or historical resources are anticipated to result from the project.

*Section 226-13 Objectives and policies for the physical environment--land, air, and water quality.*

*(a) Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:*

*(1) Maintenance and pursuit of improved quality in Hawai'i's land, air, and water resources.*

*(b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:*

*(2) Promote the proper management of Hawai'i's land and water resources.*

*(5) Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.*

*(6) Encourage design and construction practices that enhance the physical qualities of Hawai'i's communities.*

Discussion: The project is appropriately scaled and will maintain Hawai'i's natural and scenic resources. The project is not anticipated to adversely affect coastal resources. Protective measures will be carried out to address potential impacts to the physical environment (land, air, and water) that may occur during construction of the project.

## 5.2 Hawai'i State Land Use District

Under the Chapter 205 HRS, all lands of the State are to be classified in one of four categories: urban, rural, agricultural, and conservation lands. The State Land Use Commission (LUC), an agency of the DBEDT, is responsible for each district's standards and for determining the boundaries of each district (Chapter 205-2(a), HRS). The LUC is also responsible for administering all requests for district reclassifications and/or amendments to district boundaries, pursuant to Chapter 205-4, HRS, and the HAR, Title 15, Chapter 15 as amended. Under this Chapter, all lands in Hawai'i are classified into four land use districts: (1) Conservation, (2) Agricultural; (3) Urban, and (4) Rural.

The Urban District generally includes lands characterized by "city-like" concentrations of people, structures and services. This District also includes vacant areas for future development. Jurisdiction of this district lies primarily with the respective counties. Generally, lot sizes and uses permitted in the district area are established by the respective County through ordinances or rules.

Discussion: As classified by the State of Hawai'i LUC, the project site is situated within the State Urban District (*Figure 1-2*). The project is consistent with permitted uses for the Urban District with approval of a County Shoreline Setback Variance and SMA compliance and will not require district reclassification or boundary amendments to amend the existing land use designation.

## 5.3 Hawai'i Coastal Zone Management

The Coastal Zone Management Act of 1972 (16 USC Section 1451), as amended through Public Law 104-150, created the coastal management program and the National Estuarine Research Reserve system. The coastal states are authorized to develop and implement a state coastal zone management program. Hawai'i Coastal Zone Management (CZM) Program received federal approval in the late 1970's. The objectives of the State's CZM Program articulated in Chapter 205A-2 HRS are to protect valuable and vulnerable coastal resources such as coastal ecosystems, special scenic and cultural values, and recreational opportunities. The objectives of the program are also to reduce coastal hazards and to improve the review process for activities proposed within the coastal zone.

Most recently, amendments to Chapter 205A-2 HRS were adopted on September 15, 2020 through Act 16 (SB2060, SD2, HD2). The following subsections examine the project's conformance with the objectives of the Hawai'i CZM Law articulated in Parts I, II (Special Management Area), and III (Shoreline Setbacks) of Chapter 205A HRS, with adopted amendments presented below.

*PART I. COASTAL ZONE MANAGEMENT*

*Section 205A-2 Coastal Zone Management Program; Objectives and Policies*

*(b) Objectives*

*(1) Recreational Resources*

*(A) Provide Coastal Recreational Opportunities Accessible to the Public.*

*(c) Policies*

*(1) Recreational Resources*

*(A) Improve coordination and funding of coastal recreation planning and management.*

*(B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:*

*(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;*

*(ii) Requiring replacement of coastal resources having significant recreational value including, but not limited to surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;*

*(iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;*

*(iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;*

*(v) Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;*

*(vi) Adopting water quality standards and regulating point and non-point sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;*

*(vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, artificial reefs for surfing and fishing; and*

*(viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, county authorities; and crediting such dedication against the requirements of Section 46-6.*

Discussion: The project will not affect existing public access to coastal recreational resources. Narrow sand beaches exist sporadically along portions of the entire Lanikai coastline, with public beach access points throughout the area. The closest beach access points are 350 feet northwest and 400 feet southeast of the property. The shore protection system has been fronting the property for nearly half a century. Furthermore, the project will maintain the existing shore protection system in its current position with mitigative improvements and will not alter existing shoreline conditions at the project site and will not infringe on public ocean access to the shoreline for swimming, fishing, and other recreational activities.

Construction will be in accordance with State and Federal water quality regulations. No storm water or sewer management systems are necessary.

*(b) Objectives*

*(2) Historic Resources*

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

*(c) Policies*

*(2) Historic Resources*

*(A) Identify and analyze significant archaeological resources;*

*(B) Maximize information retention through preservation of remains and artifacts or salvage operations; and*

*(C) Support state goals for protection, restoration, interpretation and display of historic resources.*

Discussion: An AIS was conducted for the project area to assess the potential for locating archaeological resources. The study did not identify evidence of archaeological or cultural resources at the site. The report determined no action was required due to negative findings.

*(b) Objectives*

*(3) Scenic and Open Space Resources*

*(A) Protect, preserve and where desirable, restore or improve the quality of coastal scenic and open space resources.*

*(c) Policies*

*(A) Identify valued scenic resources in the coastal zone management area;*

*(B) Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline.*

*(C) Preserve, maintain and where desirable, improve and restore shoreline open space and scenic resources; and*

*(D) Encourage those developments that are not coastal dependent to locate in inland areas.*

Discussion: As described in *Section 3.15,* the action will not adversely affect vistas or scenic resources in the surrounding area. The project is consistent with the City and County of Honolulu General Plan, Koʻolau Poko Sustainable Communities Plan, and Zoning regulations. The seawall will achieve a uniform height of 8 feet above msl. The existing seawall varies in height across its length due to settlement and is 7 feet above msl at its highest section. This additional height will not impede existing panoramic views of the Koʻolau mountains from the shore or change the physical characteristics of the shoreline.

*(b) Objectives*

*(4) Coastal Ecosystems*

*(A) Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.*

*(c) Policies*

*(A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;*

*(B) Improve the technical basis for natural resource management;*

*(C) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;*

*(D) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and*

*(E) Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.*

Discussion: The project will protect the shoreline property from high wave action events and rapid erosion, which in turn prevents soil and vegetation from entering the ocean and polluting adjacent coastal waters. As discussed in *Section 3.8*, the project is not anticipated to pose adverse effects to biological species or coastal ecosystems. To mitigate for potential impacts during construction, BMPs to control pollutants and prevent the release of construction-related debris from entering coastal waters as discussed throughout this EA will be applied.

*(b) Objectives*

*(5) Economic Uses*

*(A) Provide public or private facilities and improvements important to the State's economy in suitable locations.*

*(c) Policies*

*(A) Concentrate coastal dependent development in appropriate areas;*

*(B) Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and*

*(C) Direct the location and expansion of coastal dependent development to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:*

*i. Use of designated locations is not feasible;*

*ii. Adverse environmental effects are minimized; and*

*iii. The development is important to the State's economy*

Discussion: The project is consistent with State and County plans and land use regulations and is seeking an SSV for construction of the shoreline stabilization system. The City's regulatory review of the proposed action in the context of Act 16 (SB2060, SD2, HD2) adopted on September 15, 2020 is forthcoming. The project is not anticipated to result in adverse social, visual, and environmental impacts in the coastal zone management area.

*(b) Objectives*

*(6) Coastal Hazards*

*(A) Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.*

*(c) Policies*

*(A) Develop and communicate adequate information about storm wave, tsunami, erosion, subsidence, and point and nonpoint pollution hazards;*

*(B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;*

*(C) Ensure that developments comply with requirements of the National Flood Insurance Program; and*

*(D) Prevent coastal flooding from inland projects.*

Discussion: The purpose of the project is to prevent high wave action and flooding from further exacerbating coastal erosion issues fronting the residential property. The project supports the objectives and policies with regards to coastal hazards. See *Section 3.5* for discussion.

*(b) Objectives*

*(7) Managing Development*

*(A) Improve the development review process, communication, and public participation in the management of coastal resources and hazards.*

*(c) Policies*

*(A) Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;*

*(B) Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and*

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

Discussion: The project supports the objectives and policies with regards to managing development in coastal areas. This EA is prepared in accordance with HRS, Chapter 343 and complies with the requirements for assessing and communicating the potential short and long-term impacts of a coastal structure.

*(b) Objectives*

*(8) Public Participation*

*(A) Stimulate public awareness, education, and participation in coastal management.*

*(c) Policies*

*(A) Promote public involvement in coastal zone management processes;*

*(B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and*

*(C) Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.*

Discussion: Public participation is a requirement of the Chapter 343 HRS environmental review process. The OEQC is the governing agency of EA publications, and makes available all EAs for public review and comment. The public is provided 30 days to submit comments on the EA. Information regarding the coastal issues and processes is publicly provided in the EA, along with proposed mitigation measures for coastal concerns. Consulted parties in the process are also encouraged to provide input regarding the project during the Draft EA. Following the EA process, the public will have another opportunity to comment on the project during the SSV application process, which requires a public hearing.

*(b) Objectives*

*(9) Beach Protection*
*(A) Protect beaches for public use and recreation.*

*(c) Policies*

*(A) Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes and minimize loss of improvements due to erosion;*

*(B) Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities;*

*(C) Minimize the construction of public erosion-protection structures seaward of the shoreline;*

*(D) Prohibit private property owners from creating a public nuisance by inducing or cultivating the private property owner's vegetation in a beach transit corridor; and*

*(E) Prohibit private property owners from creating a public nuisance by allowing the private property owner's unmaintained vegetation to interfere or encroach upon a beach transit corridor.*

Discussion: In alignment with policies of the CZM area, the proposed action will maintain the existing shore protection system and structurally connect it to the sheetpile stabilization system, located landwards of the shoreline. No new structures will be constructed. The property owners will continue to maintain the existing naupaka bush located behind the seawall to prohibit interference or encroachment upon the beach transit corridor. No additional vegetation will be cultivated that would interfere or encroach upon the beach transit corridor and create a public nuisance fronting the project site. Shoreline public access is not available through or alongside the subject property.

*(b) Objectives*

*(10) Marine resources*

*(A) Promote the protection, use, and development of marine and coastal resources to assure their sustainability.*

*(c) Policies*

*(A) Ensure the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;*

*(B) Coordinate the management of marine and coastal resources and activities management to improve effectiveness and efficiency;*

*(C) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;*

*(D) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;*

*(E) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and*

*(F) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.*

Discussion: The project will not adversely affect marine resources. Appropriate BMPs as discussed throughout this EA will be used during construction to prevent the release of materials that have the potential to impact marine and coastal resources. A Coastal Assessment by SEI (2021) examined the alternatives to stabilize the Lanikai shoreline fronting the subject property and taking into consideration the marine resources of the area (*Appendix F)*. Repairs to the existing seawall is the preferred alternative, as discussed *Chapter 4.0*.

*PART II. SPECIAL MANAGEMENT AREA*

Each county is responsible for designating a SMA that extends inland from the shoreline. Development within the SMA is subject to County approval to ensure the proposal is consistent with the policies and objectives of the Hawai‘i CZM Program. Guidelines from Chapter 205A-26 are used to evaluate projects within the SMA.

*Section 205A-22 Definitions*

*"Development" means any of the uses, activities, or operations on land or in or under water within a special management area that are included below:*

*(1) Placement or erection of any solid material or any gaseous, liquid, solid, or thermal waste;*
*(2) Grading, removing, dredging, mining, or extraction of any materials;*
*(3) Change in the density or intensity of use of land, including but not limited to the division or subdivision of land;*
*(4) Change in the intensity of use of water, ecology related thereto, or of access thereto; and*
*(5) Construction, reconstruction, demolition, or alteration of the size of any structure*

*"Development" does not include the following:*

*(1) Construction or reconstruction of a single-family residence that is less than seven thousand five hundred square feet of floor area and is not part of a larger development;*
*(2) Repair or maintenance of roads and highways within existing rights-of-way;*
*(3) Routine maintenance dredging of existing streams, channels, and drainage ways;*
*(4) Repair and maintenance of underground utility lines, including but not limited to water, sewer, power, and telephone and minor appurtenant structures such as pad mounted transformers and sewer pump stations;*
*(5) Zoning variances, except for height, density, parking, and shoreline setback;*
*(6) Repair, maintenance, or interior alterations to existing structures;*
*(7) Demolition or removal of structures, except those structures located on any historic site as designated in national or state registers;*
*(8) Use of any land for the purpose of cultivating, planting, growing, and harvesting plants, crops, trees, and other agricultural, horticultural, or forestry products or animal husbandry, or aquaculture or mariculture of plants or animals, or other agricultural purposes;*
*(9) Transfer of title to land;*
*(10) Creation or termination of easements, covenants, or other rights in structures or land;*
*(11) Final subdivision approval; provided that in counties that may automatically approve tentative subdivision applications as a ministerial act within a fixed time of the submission of a preliminary plat map, unless the director takes specific action, a special management area use permit if required, shall be processed concurrently with an application for tentative subdivision approval or after tentative subdivision approval and before final subdivision approval;*
*(12) Subdivision of land into lots greater than twenty acres in size;*
*(13) Subdivision of a parcel of land into four or fewer parcels when no associated construction activities are proposed; provided that any land that is so subdivided shall not thereafter qualify for this exception with respect to any subsequent subdivision of any of the resulting parcels;*
*(14) Installation of underground utility lines and appurtenant aboveground fixtures less than four feet in height along existing corridors;;*
*(15) Structural and nonstructural improvements to existing single-family residences, where otherwise permissible;*
*(16) Nonstructural improvements to existing commercial structures; and*

*(17) Construction, installation, maintenance, repair, and replacement of emergency management warning or signal devices and sirens; provided that whenever the authority finds that any excluded use, activity, or operation may have a cumulative impact, or a significant environmental or ecological effect on a special management area, that use, activity, or operation shall be defined as "development" for the purpose of this part."*

Discussion: The forthcoming City regulatory review of the proposed action will be made in the context of Act 16 (SB2060, SD2, HD2) adopted on September 15, 2020, as this shoreline structure repair project is regulated under the Special Management Area ordinance (ROH Chapter 25).

As discussed in *Section 3.4*, the project will not be vulnerable to passive flooding or annual high wave flooding under both the 0.5-foot and 3.2-foot scenarios (SEI, 2021). However, the property could be exposed to erosion with 0.5 to 3.2 feet of sea level rise. The results of the erosion model represent the combined results of measured, historical erosion rates and the compounding impacts of projected higher water levels associated with projected sea level rise.

*Section 205A-26 Special Management Area Guidelines*
*(1) All development in the special management area shall be subject to reasonable terms and conditions set by the authority in order to ensure:*

*(A) Adequate access, by dedication or other means, to publicly owned or used beaches, recreation areas, and natural reserves is provided to the extent consistent with sound conservation principles;*

*(B) Adequate and properly located public recreation areas and wildlife preserves are reserved;*

*(C) Provisions are made for solid and liquid waste treatment, disposition, and management that will minimize adverse effects upon special management area resources; and*

*(D) Alterations to existing land forms and vegetation, except crops, and construction of structures shall cause minimum adverse effect to water resources and scenic and recreational amenities and minimum danger of floods, wind damage, storm surge, landslides, erosion, siltation, or failure in the event of earthquake.*

Discussion: The project will not adversely affect access to publicly owned or used beach, recreation, and natural areas. The closest beach access points are 350 feet northwest and 400 feet southeast of the property. Points of access will not be affected by the project. During construction, potential effects to water quality of nearshore marine waters will be mitigated through employment of BMPs to control potential sediment and stormwater runoff.

The purpose of the project is to reduce the subject property's overall vulnerability to natural hazards that may contribute to shoreline erosion conditions. Maintaining the shore protection system with mitigative improvements will bring the shoreline protection structure into safe condition, pursuant to the conditions of the easement, and protect the property from impacts of sea level rise and storm events. See *Sections 3.4 and 3.5.*

*(2) No development shall be approved unless the authority has first found:*

*(A) That the development will not have any substantial adverse environmental or ecological effect, except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health, safety, or compelling public interests. Such adverse effects shall include, but not be limited to, the potential cumulative impact of individual developments, each one of which taken in itself might not have a substantial adverse effect, and the elimination of planning options;*

*(B) That the development is consistent with the objectives, policies, and special management area guidelines of this chapter and any guidelines enacted by the legislature; and*

*(C) That the development is consistent with the county general plan and zoning. Such a funding of consistency does not preclude concurrent processing where a general plan or zoning amendment may also be required.*

Discussion: Decades of erosion along the Lanikai shoreline resulted in the construction of various shoreline protection structures, including seawalls, to protect property. As discussed in *Section 3.4*, with 0.5 feet to 3.2 feet of SLR, the project could be exposed to further erosion. Several alternatives were evaluated to meet the objectives of the proposed action. Maintaining the shore protection system with mitigative improvements would have the least environmental impact and is necessary to maintain the seawall in safe condition, pursuant to conditions of the easement. Allowing the seawall to continue to dilapidate or removing it altogether would affect adjacent properties. See *Chapter 4.0* for a discussion on all alternatives.

The entire project site is within the SMA as delineated by the City and County of Honolulu. Amendments to Chapter 205A HRS requires confirmation by DPP of the exempt status of the existing seawall and its pending repair from a SMA permit. Consistency of the project with various State and City plans and policies is discussed throughout this *Chapter 5.0*.

*(3) The authority shall seek to minimize, where reasonable:*

*(A) Dredging, filling or otherwise altering any bay, estuary, salt marsh, river mouth, slough or lagoon;*

*(B) Any development which would reduce the size of any beach or other area usable for public recreation;*

*(C) Any development which would reduce or impose restrictions upon public access to tidal and submerged lands, beaches, portions of rivers and streams within the special management areas and the mean high tide line where there is no beach;*

*(D) Any development which would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast; and*

*(E) Any development that would adversely affect water quality, existing areas of open water free of visible structures and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land."*

Discussion: The project does not involve dredging, filling, or alterations to surface waters, nor would it reduce the size of any beach or area usable for public recreation. Mitigative improvements would not affect views of the shoreline from the water, as discussed in *Section 3.16*. During construction BMPs as discussed in *Section 3.7* will be employed to minimize effects to water quality.

*PART III. SHORELINE SETBACKS*

An SSV is required when structures are planned within the shoreline area. Shoreline area is defined by Chapter 205A-41 HRS as,

> *"'Shoreline area' shall include all of the land area between the shoreline and the shoreline setback line and may include the area between mean sea level and the shoreline; provided that if the highest annual wash of the waves is fixed or significantly affected by a structure that has not received all permits and approvals required by law or if any part of any structure in violation of this part extends seaward of the shoreline, then the term 'shoreline area' shall include the entire structure."*

As with SMA permits, DPP is the granting authority for SSV approvals in the City and County of Honolulu. DPP's rules are adopted as Chapter 23 ROH.

*Section 205A-42 Determination of the shoreline*

*(a) The board of land and natural resources shall adopt rules pursuant to chapter 91 prescribing procedures for determining a shoreline and appeals of shoreline determinations that are consistent with subsection (b); provided that no determination of a shoreline shall be valid for a period longer than twelve months, except where the shoreline is fixed by artificial structures that have been approved by appropriate government agencies and for which engineering drawings exist to locate the interface between the shoreline and the structure.*

Discussion: The DLNR OCCL is the regulatory agency responsible for managing land uses on the State's submerged lands, which extend to the highest wash of the highest wave, as identified by the certified shoreline defined in HRS Chapter 205A. Permits for any development on the property are contingent upon a new approved certified shoreline from DLNR. The project shoreline was certified by the State on April 3, 2014. An updated shoreline survey was subsequently conducted, and the shoreline did not change. The shoreline certification was approved by DLNR on November 13, 2020 (*Appendix E, Shoreline Certification Map, File No. OA-1911*).

The applicant must obtain approval from the City DPP for an SSV to maintain the existing shore protection system with a sheetpile stabilization system located landward of the certified shoreline. The project qualifies for a variance under Chapter 205A-45(a)(9), as a private improvement that artificially fixes the shoreline.

*Chapter 205A-46 Variances*

*(a) A variance may be granted for a structure or activity otherwise prohibited in this part if the authority finds in writing, based on the record presented, that the proposed structure of activity is necessary for or ancillary to:*

*8. Private facilities or improvement which will neither adversely affect beach processes nor artificially fix the shoreline; provided that the authority also finds that hardship will result to the applicant if the facilities or improvements are not allowed within the shoreline area;*

*9. Private facilities or improvements that may artificially fix the shoreline; provided that the authority may consider hardship to the applicant if the facilities or improvements are not allowed within the shoreline area; and the authority imposes conditions to prohibit any structure seaward of the existing shoreline unless it is clearly in the public interest;*

Discussion: Criteria for granting a shoreline setback variance are provided in Part III of Chapter 205A-46 HRS and Chapter 23-1.8 ROH. The planned shoreline protection system is anticipated to meet the criteria required for a SSV under both regulations. See *Section 5.8* for discussion.

### Hawai‘i Ocean Resources Management Plan

The Hawai‘i Ocean Resources Management Plan (ORMP) Is a comprehensive plan spearheaded by the CZM with collaboration from Federal, State, County, and community members. The ORMP is a statewide plan seeking to address Hawai‘i’s resource management issues and encourages holistic stewardship from land to sea (ORMP, 2020) as defined in HRS Chapter 205A-62(1). The 2020 ORMP is the fifth version of the Plan which is built upon previous plans with its original publication in 1985. The 2020 ORMP is centered around three Focus Areas listed below.

*Focus Area I: Development & Coastal Hazards*

> Goal: Develop a statewide integrated shoreline management strategy to address the compounding impacts to Hawai‘i’s shorelines of coastal development, climate change and sea level rise, erosion, and other chronic coastal hazards.

*Focus Area II: Land-Based Pollution*

> Goal: Design management strategies and programs to recognize and incorporate the connection of land and sea, facilitating the broad adoption of green infrastructure practices to reduce polluted runoff from within watersheds.

*Focus Area III: Marine Ecosystems*

> Goal: Promote fishing practices that adopt the wisdom of both traditional ecological knowledge and scientific ecological knowledge to improve fish stocks.
>
> Goal: Effectively manage networks of healthy coral reefs while improving the health of reef ecosystems at priority sites identified by the State of Hawai‘i Coral Program.
>
> Goal: Minimize the likelihood of aquatic alien species introduction and spread into and within Hawai‘i from sources associated with vessels.

Discussion: Although the project falls within the focus area of Development & Coastal Hazards, the proposed action is to maintain an existing seawall with mitigative improvements, and does not involve any new coastal development pursuant to the goals outlined within the Plan. Shoreline management for existing development including managed retreat and shifting development away from the shoreline remains a statewide challenge addressed in the CZM report, *Accessing the Feasibility and Implication of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai‘i*. Although shoreline management for existing development has been addressed, the existing shore protection system is within an easement granted from the State. Pursuant to the conditions of the easement, the grantee maintains the “Right, privilege, and authority to use, maintain, repair, replace and remove existing seawall and revetment.”

## 5.4 Hawai'i Water Quality Standards

The State of Hawaiʻi Department of Health, Clean Water Branch Hawaiʻi Water Quality Standards 11-54, HAR were most recently revised in 2014.

The project is consistent with the applicable objectives and policies for state water quality standards as described below.

*General Policy of Water Quality Antidegradation*

*(a) Existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.*

*(b) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the director finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the state's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the director shall assure water quality adequate to protect existing uses fully. Further, the director shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.*

*(c) Where existing high-quality waters constitute an outstanding resource, such as waters of national and state parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.*

*(d) In those areas where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Clean Water Act.*

Discussion: Construction may cause temporary elevated levels of suspended sediment. Construction BMPs will be implemented to control water quality fronting the project area. After the shoreline stabilization system is intact, long term water quality impacts are not anticipated.

## 5.5 City and County of Honolulu General Plan

Adopted by resolution in 1977, the 1992 revised edition of the General Plan for the City and County of Honolulu sets forth the long-range objectives for the general welfare and prosperity of the people of Oʻahu and broad policies to attain those objectives. The Draft 2035 Oʻahu General Plan Update was published in November 2012, and the Revised General Plan was submitted to the City Council in April 2018 for approval. A Final Revised General Plan Update is still pending as of October 2020. The General Plan Update provides objectives and policies intended to guide and coordinate City land use planning and regulation, and budgeting for operations and capital improvements.

The project is consistent with the applicable objectives and policies of the City and County of Honolulu Revised 2035 Oʻahu General Plan described below.

*Natural Environment*

*Objective A: To protect and preserve the natural environment.*

- *Policy 1: Protect Oahu's natural environment, especially the shoreline, valleys, and ridges from incompatible development*
- *Policy 2: Seek the restoration of environmentally damaged areas and natural resources.*
- *Policy 4: Require development projects to give due consideration to natural features such as slope, flood and erosion hazards, water-recharge areas, distinctive landforms, and existing vegetation, as well as plan for coastal hazards that threaten life and property.*
- *Policy 7: Protect the natural environment from damaging levels of air, water, and noise pollution.*
- *Policy 8: Protect plants, birds, and other animals that are unique to the State of Hawai'i and the Island of O'ahu, and protect their habitats.*

*Objective B: To preserve and enhance natural landmarks and scenic views of O'ahu for the benefit of both residents and visitors as well as future generations.*

- *Policy 2: Protect O'ahu's scenic views, especially those seen from highly developed and heavily traveled areas.*
- *Policy 4: Promote public access to the natural environment for recreational, educational, and cultural purposes and the maintenance thereof in a way that does not damage natural or cultural resources.*

*Public Safety and Community Resilience*

*Objective B: To protect residents and visitors and their property against natural disasters and other emergencies, traffic and fire hazards, and unsafe conditions.*

- *Policy 2: Require all developments in areas subject to floods and tsunamis, and coastal erosion to be located and constructed in a manner that will not create any health or safety hazards or cause harm to natural and public resources.*

*Culture and Recreation*

*Objective B: To protect, preserve and enhance O'ahu's cultural, historic, architectural, and archaeological resources.*

- *Policy 2: Identify, and to the extent possible, preserve and restore buildings, sites, and areas of social, cultural, historic, architectural, and archaeological significance.*

*Objective D: To provide a wide range of recreational facilities and services that are readily available to residents and visitors alike, and to balance access to natural areas with the protection of those areas.*

- *Policy 7: Ensure and maintain convenient and safe access to beaches, ocean environments and mauka recreation areas in a manner that protects natural and cultural resources.*

Discussion: The project supports the objectives of the Revised General Plan Update. Development of the project will not pose significant adverse impacts to the natural environment and seeks to preserve the existing shoreline from accelerated erosion rates. As discussed in *Section 3.15,* an AIS was conducted for the project site which indicated no significant findings. Lastly, the recreational resources and public access points at Lanikai Beach will be unaffected by the project.

## 5.6 City and County of Honolulu Koʻolau Poko Sustainable Communities Plan

Complementing the General Plan are the eight regional plans, prepared by the City DPP. Two areas are identified as "development plans," which provide guidance for future growth and development, while the other six areas are identified as "sustainable communities plans" which aim to maintain the region's character and ensure modest development. Each regional plan implements the objectives and policies of the General Plan and provides direction on public policy, investment, and decision-making within each respective region. Together with the General Plan, they guide population and land use growth over a 20- to 25-year time span.

The project is within the Koʻolau Poko Sustainable Communities Plan area. The Koʻolau Poko Sustainable Communities Plan was first adopted by Ordinance 97-49 in 1997, and last revised in 2017 (Ordinance No. 17-42). The Koʻolau Poko Sustainable Communities Plan establishes policy to preserve the character and promote sustainable development in the Koʻolau Poko District, and projects essentially no growth over the 25-year planning horizon. This vision for Koʻolau Poko's future articulated in the plan is shaped around the following two principal concepts: first, the protection of the communities' natural, scenic, cultural, historic and agricultural resources, and, second, the need to improve and replace, as necessary, the region's aging infrastructure systems.

The Koʻolau Poko Sustainable Communities Plan establishes the region's role in Oʻahu's development pattern by establishing policies for the following land use types: Open Space Preservation; Parks and Recreation; Historic and Cultural Resources; Agricultural Use; Residential Use; Commercial and Industrial Uses; Institutional Uses; and Military Uses. The policies and/or guidelines applicable to the project area provided below:

*3. Land Use Policies and Guidelines*

*3.1 Open Space Preservation*

*3.1.1 Policies*

- *Protect endangered species and their habitats.*
- *Protect scenic beauty and scenic views and provide recreation.*

*3.1.3.2 Shoreline Areas*

- *Prohibit the use of shore armoring structures, considering alternative measures such as beach replenishment.*
- *Analyze the possible impact of sea level rise for new public and private projects in shoreline areas and incorporate, where appropriate and feasible, measures to reduce risks and increase resiliency to impacts of sea level rise.*

Discussion: The Koʻolau Poko Sustainable Communities Plan Urban Land Use Map identifies the property within the community growth boundary in an area designated as low-density residential. The project site is further identified in the Koʻolau Poko Sustainable Communities Plan Open Space Map, designated as a panoramic viewshed from the ocean looking towards the coastline. Mitigative improvements will include installation of a splash guard on the top of the existing seawall and will increase the height of the wall by one foot from 7 feet above msl to 8 feet above msl, which will not adversely affect views identified in the plan. The project will protect scenic beauty and scenic views and will not alter the visual character of the shoreline, consistent with the Koʻolau Poko Sustainable Communities Plan.

The purpose of the project to maintain the existing shore protection in a safe condition, pursuant to the conditions of the easement and protect the property from increased coastal erosion. Therefore, it is consistent with the policies and guidelines addressing coastal hazards, as the subject property has been under increased threat by coastal erosion and overwash from storm events. Alternative measures to provide protection for the subject property, including beach replenishment, have been analyzed and discussed in *Chapter 4.0.* Maintaining the existing shore protection system with mitigative improvements was found to be the least environmentally invasive and falls in alignment with the conditions of the easement.

During the Draft EA comment period, DPP referenced the Koʻolau Poko Sustainable Communities Plan's guideline to prepare "beach management plans", which may serve as a prototype for erosion-prone areas to incorporate the long-term effects of climate change and SLR and to address seasonal and long-term erosion and accretion. The Plan acknowledges that beach management plans are very location-specific. The U.S. Army Corps of Engineers (USACE) evaluated regional beach nourishment for Lanikai as part of the Southeast Oʻahu Regional Sediment Management Demonstration Project. The report evaluated options for beach nourishment with or without stabilizing structures. Beach nourishment without stabilizing structures would require 182,000 cubic yards (cubic yards) of sand with an initial cost of $33 million. Additional renourishment of the beach was projected to be necessary every 8.4 years, resulting in an estimated total cost over 50 years of $109 million. Beach nourishment with stabilizing structures would require construction of 12 groins and placement of 146,000 cy of sand with an initial cost of $33.4 million and a total cost of $41.6 million over 50 yrs. These options are clearly cost-prohibitive for a single landowner to consider. Therefore, such plans and efforts such as beach replenishment are more appropriately conducted as part of a wider, regional effort rather than by individual landowners alone.

The project will also promote efforts to protect natural, cultural, and historic resources. No developed coral colonies or rare/unique marine communities were identified directly offshore from the property. Construction activities will employ BMPs as discussed throughout this EA to protect water quality and marine species.

## 5.7 City and County of Honolulu Land Use Ordinance

The purpose of the Land Use Ordinance (LUO) is to regulate land use in a manner that will encourage orderly development in accordance with adopted land use policies, including the County General Plan and development plans. The LUO is also intended to provide reasonable development and design standards. These standards are applicable to the location, height, bulk and size of structures, yard areas, off-street parking facilities, and open spaces, and the use of structures and land for agriculture, industry, business, residences or other purposes (ROH, Chapter 21).

Discussion: The subject property is designated as R-10 Residential by the City and County of Honolulu's LUO (*Figure 1-3*). According to Section 21-3.70(b) of the LUO, the intent of R-10 zoning district is to provide areas for large lot developments, typically located at the outskirts of urban development. Non-dwelling uses which support residential neighborhood activities are also permitted. Repairs to the existing shoreline protection system will protect adjacent properties from coastal hazards and is therefore consistent with the intent and use of the R-10 zoning designation. However, because the repair of the shore protection system is located within the shoreline setback area, the project is subject to approval of an SSV by the Honolulu City Council. Additionally, as recommended by DPP during the Draft EA period, a zoning adjustment permit to increase the height of the seawall to 8 feet above msl in the R-10 zoning district will be sought. The additional height increase will achieve a uniform height to bring the existing seawall into a safe condition.

## 5.8 Shoreline Setbacks

To accomplish the objectives of Chapter 205A HRS discussed in *Section 5.3,* shoreline setback areas were established, and counties were authorized to develop and administer permitting systems to control development within the shoreline setback area. The shoreline setback area encompasses the land between the certified shoreline and the shoreline setback line, generally established 40 feet inland from the certified shoreline with exceptions that allow for adjustments. The proposed repairs to the existing shoreline protection system are located within the shoreline setback area.

City Shoreline Setback rules are defined in Chapter 23 ROH pursuant to Chapter 205A HRS and regulated by the City DPP. The purpose of the policy is to:

> *"(a) protect and preserve the natural shoreline, especially sandy beaches; to protect and preserve public pedestrian access laterally along the shoreline and to the sea; and to protect and preserve open space along the shoreline…[and to] reduce hazards to property from coastal floods."* (ROH Section 23-1.2)

Specifically, Chapter 23 ROH establishes standards that generally prohibit within the shoreline area any construction or activity which may adversely affect beach processes, public access along the shoreline, or shoreline open space. However, allowances are permitted for specific structures and circumstances with the approval of a variance. Notably, Act 16 (SB2060, SD2, HD2) adopted on September 15, 2020 amended HRS Chapter 205A . The City DPP is in the process of making revisions to Chapter 23 ROH, which must then be adopted by the Honolulu City Council. The following subsections analyze the project's consistency with the current regulations under Chapter 23 ROH.

*Section 23-1.5(b). The following structures and activities are prohibited within the shoreline area, with the following exceptions:*

> *(1) Minor structures and activities permitted under rules adopted by the department which do not affect beach processes or artificially fix the shoreline and do not interfere with public access, public views or open space along the shoreline. If, due to beach erosion or other cause, the director determines that a minor structure permitted under this section may affect beach processes or public access or has become located seaward of the shoreline, the director or other governmental agency having jurisdiction may order its removal;*
>
> *(4) Nonconforming structures or structures that have received a shoreline setback variance;*

Discussion: The existing seawall is a nonconforming structure, while the rock apron is permitted by HDOT Harbors. The sheetpile stabilization system will be installed landward of the certified shoreline. The sheetpile stabilization system is needed to maintain the deteriorating seawall in a safe condition in accordance with the conditions of the easement and will protect the existing residence from increased shoreline erosion. The applicant will obtain an SSV prior to construction activities.

*Section 23-1.8 (b)(3) Hardship Standard*

*(A) A variance may be granted for an activity or structure that is necessary or ancillary to the following private facilities or improvements, if hardship will result to the applicant if the facilities or improvements are not allowed within the shoreline area:*

*(i) Private facilities or improvements which will neither adversely affect beach processes nor artificially fix the shoreline; and*

*(ii) Private facilities or improvements that may artificially fix the shoreline, but only if hardship is likely to be caused by shoreline erosion and conditions are imposed prohibiting any such structure seaward of the existing shoreline unless it is clearly in the public interest.*

*(B) For the purposes of this subsection, hardship may be found only if:*

*(i) The applicant would be deprived of reasonable use of the land if required to comply fully with the shoreline setback ordinance and the shoreline setback rules;*

*(ii) The applicant's proposal is due to unique circumstances and does not draw into question the reasonableness of this chapter and the shoreline setback rules; and*

*(iii) The proposal is the practicable alternative which best conforms to the purpose of this chapter and the shoreline setback rules.*

*(C) Before granting a hardship variance, the director must determine that the applicant's proposal is a reasonable use of the land. Because of the dynamic nature of the shoreline environment, inappropriate development may easily pose a risk to individuals or to the public health and safety. For this reason, the determination of the reasonableness of the use of land should properly consider factors such as shoreline conditions, erosion, surf and flood conditions and the geography of the lot.*

*(D) Hardship shall not be determined as a result of a zone change, plan review use approval, subdivision approval, cluster housing approval, planned development housing approval, conditional use permit, or any other discretionary land use permit granted after June 16, 1989.*

Discussion: The project meets the prerequisite of a variance to be granted for private improvements that may artificially fix the shoreline. The existing shore protection system is an ancillary structure to a private residence. The use of the property for a private residence is considered a reasonable use of land. The existing residence is located 40 feet from the certified shoreline. Hardship will result to the applicant if the improvements are not allowed within the shoreline area because the existing seawall is deteriorating, affecting its integrity. If the applicant does not repair the seawall, conditions of the easement would not be met. Further deterioration to the seawall would occur, undermining its structural stability and threatening the existing residence. Loss of a private residence due to compliance with shoreline setback rules would deprive the owner of reasonable use of the land. No structures would be constructed seaward of the certified shoreline.

Alternatives were thoroughly evaluated in *Chapter 4.0*. Relocation of the applicant's residential structure using the remaining unbuilt areas is not possible since there is little open space remaining and the home is slab on grade construction. Removal of the existing shoreline protection without replacement would instantly result in active erosion. This action would release large quantities of earth material into the nearshore water while causing a significant landward movement of the shoreline. From site context and an engineering standpoint, repairs to the existing seawall was determined to be the best practicable alternative that best met the purpose of the shoreline setback rules.

Unique circumstances exist in the Lanikai shoreline setting, and as discussed in *Section 2.2*, there is a historical trend of erosion along the Lanikai shoreline. The shoreline makai of the existing shore protection is a wet beach that moves with inflation and deflation. There is no dry beach at the project site.

Additional analysis of the hardship criteria articulated in Chapter 23-1.8(b)(3)(B) ROH will be provided in a forthcoming SSV application to be submitted to DPP after completion of the EA process.

## 5.9 Special Management Area

Part II of Chapter 205A HRS outlines control, policies, and guidelines for development within an area along the shoreline referred to as the SMA. CZM policies are administered at the county level. The SMA is a regulated zone extending inland from the shoreline to a landward boundary typically delineated by the county. The purpose of the SMA is to preserve, protect, and where possible, to restore the natural resources of the coastal zone of Hawai'i. Special controls on development within the SMA are necessary to avoid permanent loss of valuable resources and foreclosure of management options. In the City and County of Honolulu, management of lands within the SMA is regulated through Chapter 25 ROH. Permit review guidelines in Chapter 25 ROH used by DPP and the City Council are derived from Section 205A-26 HRS.

<u>Discussion:</u> As shown in *Figure 1-5*, the project site is located entirely within the SMA. Under the existing regulations set forth in Chapter 25 ROH, the existing shore protection is considered accessory to the single-family home on the property. Pursuant to Section 25-1.3 ROH, "Development" does not include, "(O) Structural and nonstructural improvements to existing single family residences including additional dwelling units, where otherwise permissible".

Notably, Act 16 (SB2060, SD2, HD2), adopted on September 15, 2020 amended HRS Chapter 205A. DPP is in the process revising Chapter 25 ROH, and their approach to regulating the repair of this shoreline structure is forthcoming. The project's compliance with SMA Review Guidelines is discussed in *Section 5.3*.

The project will not interfere with existing public access, nor will it pose adverse impacts to public beaches or recreation areas. The project will not have adverse impacts on areas of open water, potential fisheries, fisheries, wildlife habitat, or agricultural land. Construction mitigation measures will be implemented as outlined in *Section 3.8* to prevent impacts to biological resources. As previously discussed, the project will not affect the line of sight to the ocean from Mokulua Drive or any State highway.

## 5.10 Ola: O‘ahu Resilience Strategy

The Office of Climate Change, Sustainability, and Resiliency (OCCSR) was established by the City Charter in 2016 and tasked with tracking climate change science and its potential impacts. As a part of this task, the office was responsible for developing O‘ahu’s first resilience strategy. After 18 months of outreach with community stakeholders, government agencies, and the for- and non-profit sectors, OCCSR published *Ola: Resilience Strategy* on May 31, 2019. The strategy identifies 44 actions which directly address the challenge of long-term affordability and the impacts of climate change. Actions are organized in the following four pillars: 1) Remaining Rooted, 2) Bouncing Forward, 3) Climate Security, and 4) Community Cohesion. The strategy is consistent with the City’s Multi-Hazard Pre-Disaster Mitigation Plan update (2018).

The 44 Actions includes a description, resilience co-benefits, lead City agency and partners involved, timeframe, measures of success, and a spotlight which offers a story of the action already implemented. Actions are described in relation to the Aloha+ Challenge sustainability goal(s) and the UN Sustainable Development Goal(s) that align with the action.

The proposed action is consistent with the following goals and actions items of the *Ola: Resilience Strategy* (2019):

*PILLAR II. BOUNCING FORWARD*
*Goal 1: Pre-Disaster Preparation*
*Action 12. Launch Hurricane Retrofit Program for Vulnerable Homes*
*Action 14. Establish Future Conditions Climate Resilience Design Guidelines*
*Goal 2: Effective Disaster Response*
*Action 18. Increase O‘ahu’s Preparedness Utilizing Scenario Modeling and Artificial Intelligence*
*PILLAR III. CLIMATE SECURITY*
*Goal 3: Climate Resilient Future*
*Action 29. Protect Beaches and Public Safety with Revised Shoreline Management Rules*
*Action 30. Protect Coastal Property and Beaches Through Innovation and Partnerships*

Discussion: The project site is directly exposed to natural hazards approaching from the east. The proposed action is consistent with the Strategy’s goals for pre-disaster preparation and disaster response: mitigative improvements to the existing shore protection system will protect against shoreline erosion associated with natural hazards and will be designed to increase resilience to SLR based on the 2.3-foot SLR scenario. See *Sections 3.4* and *3.5* for further discussion.

Recently, Act 16 (SB2060, SD2, HD2) adopted on September 15, 2020 amended HRS Chapter 205A. The City DPP is currently making revisions to Chapters 23 and 25 ROH. Because the regulatory framework that supports climate security and a climate resilient future remains a work-in-progress, actions by individual landowners to invest in improvements that protect coastal property, beaches and public safety (such as the proposed action) should be encouraged.

Section 6

# Findings Supporting the Anticipated Determination

Chapter 6

# Findings Supporting the Determination

## 6.1 Determination

Based on a review of the significance criteria outlined in Chapter 343 HRS, and Chapter 11-200.1-13 HAR, the project is determined to not result in significant adverse effects on the natural or human environment. A Finding of No Significant Impact (FONSI) is anticipated.

## 6.2 Reasons Supporting the Determination

The potential impacts of the project have been fully examined and discussed in this EA. As stated earlier, there are no significant environmental impacts expected to result from the project. This determination is based on the assessments as presented below for criterion (1) to (13) (Chapter 11-200.1-13(b) HAR).

*(1) Irrevocably commit a natural, cultural or historic resource.*

The archaeological and cultural landscapes have been documented in studies conducted specifically for the project area. As detailed in *Section 3.15* of this report, the project does not involve any known loss or destruction of existing natural, cultural, archaeological or historical resources. Due to the presence of fill within the project site, there is a very low expectation for the occurrence of historic properties. If any cultural or archaeological resources are unearthed or ancestral remains are inadvertently discovered during construction, the DLNR, SHPD, the O‘ahu Island Burial Council representative and participating interests from lineal descendants and individuals will be notified. The treatment of these resources will be conducted in strict compliance with the applicable historic preservation and burial laws.

*(2) Curtail the range of beneficial uses of the environment.*

The project will not curtail the range of beneficial uses of the environment. Although HRS Chapter 91 generally prohibits construction activities within the shoreline area, the seawall is considered a nonconforming structure (present in 1953 and constructed before WWII) and the rock apron is permitted by HDOT. An easement was granted September 27, 2013 which provides the right, privilege, and authority to use, maintain, repair, replace, and remove the existing seawall and apron over, under, and across state-owned land. The project will bring the shoreline protection structure into safe condition, pursuant to the conditions of the easement, and provide a beneficial effect, by protecting the existing home and preventing erosion of the shoreline.

*(3) Conflict with the State's environmental policies or long-term environmental goals established by law.*

The project does not conflict with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 343 HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders. See *Chapter 5.0* for discussion of the project's consistency with State and City planning policies.

As discussed throughout the EA, there are various factors to consider in selecting the preferred design that meets the purpose of the project including the site history, neighboring property owners, promoting lateral shoreline access, and preserving the existing coastal and marine habitat. Alternative designs have been thoroughly analyzed in *Section 4.0* of the EA. There are currently no guidelines set forth by the State or the City outlining a regional approach for coastal areas to mitigate impacts of sea level rise, nor are there guidelines outlining measures private property owners may take to protect their properties from the impacts of sea level rise. Thorough analysis of the proposed action finds that this alternative is the least impactful to the surrounding environment as it does not include any demolition or removal, construction of a new seawall, and repair work will take place landwards of the existing seawall.

*(4) Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State.*

The project will result in short-term economic benefits during construction that includes direct, indirect, and induced employment opportunities and multiplier effects, but not at a level that would generate significant economic activity. The project will repair the existing shoreline protection structure into safe condition, pursuant to the conditions of the easement, and continue to protect the existing residence from erosion and property loss. No cultural practices are anticipated to be affected by the project.

*(5) Have a substantial adverse effect on public health.*

The project is consistent with existing land uses and is not expected to affect public health. There will be temporary construction-related impacts to air quality from possible dust emissions and temporary degradation of the acoustic environment in the immediate vicinity resulting from construction equipment operations. The project will comply with State and County regulations during the construction period and will implement BMPs to minimize temporary impacts.

*(6) Involve adverse secondary impacts, such as population changes or effects on public facilities.*

The approval of the project will not incur secondary impacts, such as population changes or effects on public facilities. After evaluation of the alternative designs proposed, maintaining the existing shore protection system with mitigative improvements is the preferred alternative as it minimizes potential impacts to the surrounding environment and neighboring shoreline structures, and is the most appropriate for the size and scale of the property.

*(7) Involve a substantial degradation of environmental quality.*

The project will not involve a substantial degradation of environmental quality. Long-term impacts to air and water quality, noise, and natural resources are not anticipated. The use of standard construction and erosion control BMPs will minimize the anticipated construction-related short-term impacts. Construction activity will be accomplished landward of the existing seawall, which will allow the seawall to provide further protection against runoff and sediment into nearshore marine waters.

The purpose of the proposed action is also to provide long-term protection from increased coastal erosion, which will protect the water quality of nearshore marine waters.

*(8) Is individually limited but cumulatively have substantial adverse effect upon the environment or involved a commitment for larger actions.*

Erosion is a widespread problem throughout the Lanikai coast. Mitigative improvements will not have substantial negative effects upon the environment and will not be a precursor for future actions.

*(9) Have a substantial adverse effect on a rare, threatened or endangered species, or its habitat.*

Although wedge-tailed shearwater bird burrows were observed at the project site, mitigation measures as outlined in *Section 3.5.1* will be employed prior to construction to mitigate potential impacts to the shearwater birds nesting on the property. The project site does not contain a habitat for the Hawaiian hoary bat. Due to the narrow or non-existent beachfront at the subject property, the beachfront is not suitable location for sea turtle nesting or foraging or a habitat for monk seals. No impacts are anticipated.

*(10) Have a substantial adverse effect on air or water quality or ambient noise levels.*

Temporary impacts associated with construction are identified throughout *Chapter 3.0* of this EA. Short-term effects on air, water quality, and ambient noise levels during construction will be mitigated through adherence with State and City regulations and mitigation measures as discussed throughout this EA. No detrimental long-term impacts to air, water, or acoustic quality are anticipated from the project.

*(11) Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, freshwater, or coastal waters.*

The property lies within Flood Zone AE and Zone X and within the designated tsunami zone. Zone AE is defined as, “areas subject to inundation by the 1-percent chance flood event by detailed methods.” Zone X is defined as “areas of minimal flood hazard, which are the areas outside the Special Flood Hazard Area and higher than the elevation of the 0.2 percent- chance flood. The project site located along an erosion-prone shoreline area. The purpose of the project is to maintain the existing shore protection system in a safe condition pursuant to the easement and protect the property from ongoing shoreline erosion. Maintaining the existing shore protection system with mitigative improvements will protect the existing residential structure from rapid erosion threat, which has been exacerbated by climate change and sea level rise and ensure the continued habitability of the residence. See *Chapters 3.4* and *3.5* for further discussion.

*(12) Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies.*

The project will be located on a privately-owned property at 1226a Mokulua Drive along the Lanikai coast of O‘ahu. Installation of the sheetpile stabilization system to maintain the existing seawall will be accomplished landward of the existing seawall and beneath the surface. The sheetpile stabilization system will not significantly hinder the views of the shoreline within the project vicinity. No adverse impacts are anticipated.

*(13) Require substantial energy consumption or emit substantial greenhouse gases.*

Construction of the project will not require substantial energy consumption when compared to other similar-sized projects. No long-term impacts to energy resources or increase in GHG emissions are anticipated.

## 6.3 Summary

Based on the findings and information in this EA, further evaluation of the project's impacts through the preparation of an Environmental Impact Statement is not warranted. The EA recommends mitigation measures to alleviate impacts when such impacts are identified. A Finding of No Significant Impact (FONSI) is issued for this project. The project will have the beneficial effect of protecting not only the subject property but adjacent properties from ongoing erosion. The proposed action is the most appropriate alternative for the size and scale of the project site. Thorough analysis of the proposed action finds that this alternative is the least impactful to the surrounding environment as it does not include any demolition or removal, construction of a new seawall, and will be accomplished landwards of the existing shoreline and shore protection system, minimizing impacts to the public shoreline area.

Section 7

# List of Agencies, Organizations and Individuals Receiving Copies of the EA

Chapter 7

# List of Agencies, Organizations and Individuals Receiving Copies of the EA

## 7.1 Consultation List

Early consultation on the Project was carried out on June 9, 2020 with five agencies and one community organization group providing early consultation comments. The Draft EA was subsequently published in *The Environmental Notice* on January 23, 2021. Publication of the Draft EA was followed by a 30-day public comment period. A total of seven State and City agencies or agency divisions and community organizations commented on the Proposed Action. Parties contacted in preparation of the Draft EA process, Draft EA comments received, and those that will receive a publication notification of the Final EA are identified in *Table 7.1* below. Comment letters received during the Early Consultation and Draft EA public comment period are provided in *Appendix K and L-1.*

**Table 7-1 Agencies, Organizations and Individuals Receiving Copies of the EA**

| Respondents and Distribution | Early Consultation | Received Early Consultation Comments | Receiving Draft EA | Comments Received | Receiving Final EA/ FONSI |
|---|---|---|---|---|---|
| **Federal Agencies** | | | | | |
| U.S. Army Corps of Engineers | X | | X | | X |
| U.S. Fish and Wildlife Service | X | | X | X | X |
| U.S. National Marine Fisheries Service | X | | X | | X |
| **State of Hawai'i Agencies** | | | | | |
| Department of Accounting and General Services | | | X | X | X |
| Department of Business, Economic Development & Tourism (DBEDT) – Office of Planning | X | X | X | X | X |
| Department of Health (DOH) | X | | X | | X |
| Department of Land and Natural Resources (DLNR) | X | | X | | X |
| DLNR, Division of Aquatic Resources | | | X | | X |
| DLNR, State Historic Preservation Division | X | | X | | X |
| DLNR, Office of Conservation and Coastal Lands | X | X | X | | X |

**Table 7-1 Agencies, Organizations and Individuals Receiving Copies of the EA**

| Respondents and Distribution | Early Consultation | Received Early Consultation Comments | Receiving Draft EA | Comments Received | Receiving Final EA/ FONSI |
|---|---|---|---|---|---|
| Office of Hawaiian Affairs | X | | X | X | X |
| **City and County of Honolulu Agencies** | | | | | |
| Department of Corporation Counsel | | | X | | X |
| Department of Design and Construction | X | X | | X | X |
| Department of Facility Maintenance | | | X | X | X |
| Department of Planning and Permitting | X | X | X | X | X |
| Department of Parks and Recreation | | | X | | X |
| Office of Climate Change, Sustainability and Resiliency | | | X | | X |
| State Senator Chris Lee<br>State Senate District 25 | | | X | | X |
| State Representative Lisa Marten<br>State House District 51 | | | X | | X |
| State Representative Patrick Pihana Branco<br>State House District 50 | | | | | X |
| Council Member Ester Kiaʻāina<br>Honolulu City Council District 3 | | | X | | X |
| Chair Bill Hicks<br>Kailua Neighborhood Board No. 31 | X | X | X | | X |
| **Libraries** | | | | | |
| Hawaiʻi State Library, Hawaiʻi Documents Center | | | X | | X |
| Kailua Public Library | | | X | | X |
| **Private Organizations** | | | | | |
| Lanikai Association | X | | X | | X |
| **Individuals** | | | | | |
| Phil and Mollie Foti | X | | X | | X |
| Tom Cestare | X | | X | | X |

## 7.2 Summary of Comments

Comments received during the Draft EA comment period have been organized by major topics in *Table 7.2*. The major comment topics include background information regarding the easement and the proposed action, biological resources, archaeological and cultural resources, construction impacts and BMPs, alternative approaches and designs to protect the property, land use approvals and compliance with plans and policies, sea level rise, coastal erosion, and the anticipated determination of the proposed action. Please refer to the comment letters located in *Appendix L-1.* The table below also includes responses to comments received during the Draft EA comment period. In order to address specific and technical comments received by the accepting agency, DPP, the Applicant prepared and directly provided a response letter. DPP's comment letter and the Applicant's response are provided in *Appendix L-2.*

| Table 7.2 DEA Summary of Comments and Responses | | |
|---|---|---|
| **Comments** | **Commenter and Date of Comment Letter** | **Responses** |
| **Project Description** | | |
| 1. Section 1.2 - Overview of the Planned Project: The title of the Final EA, as well as all the references to the proposed Project, should be revised to "Modification" rather than Repair of Existing Shore Protection. The Project proposes numerous additions to an existing nonconforming concrete seawall, it exceeds the repairs allowable under Section 23-1.6, Revised Ordinances of Honolulu (ROH), and therefore requires that a Shoreline Setback Variance (SV) be obtained. The modifications proposed include:<br>- Increasing the overall height of the seawall with the addition of a new concrete cap which includes a six-inch radius splash lip. The addition changes its height from five to seven feet above mean sea level (MSL) to six to eight feet above MSL;<br>- Extending the seawall foundation by nine feet with the insertion of steel sheet piles on its mauka face, along the entire 90-foot length. The sheet piles will be secured to the seawall by the addition of a concrete cap, to be anchored to the seawall with dowels and adhesive. The sheet pile cap will more than double the seawall's current width of 16 to 17 inches;<br>- Bracing of the new concrete sheet pile-cap will be accomplished by multiple two-inch-diameter steel tie rods anchored to multiple 4- x 4-foot concrete dead men buried 25 feet further mauka and three feet below the existing grade; and<br>- Demolishing two existing concrete counterforts or perpendicular extensions | DPP; March 3, 2021 (File No. 2020/ED-12(ST)) | The Final EA has been renamed Krueger Shore Protection Mitigative Improvements. After thorough analysis of alternative methods and designs to maintain the easement area in a safe condition, maintaining the existing shore protection system with mitigative improvements is the most feasible approach for the scale of the project. Additionally, maintaining the existing shore protection structure with mitigative improvements would be the least invasive alternative and reduce any adverse effects to the nearshore coastal environment and adjoining properties. Mitigative improvements to maintain the existing shore protection system in a safe condition would be completed landwards of the shoreline and existing seawall, and therefore would not alter current shoreline characteristics at the project site. |

| Table 7.2 DEA Summary of Comments and Responses | | |
|---|---|---|
| **Comments** | **Commenter and Date of Comment Letter** | **Responses** |
| **Project Background** | | |
| 2. Section 1.3 Project Background: The language used in this section and others throughout the Draft EA, implies that maintaining the seawall is somehow mandated as an obligation of the Non-Exclusive Easement (S-6043) granted by the State Board of Land and Natural Resources (BLNR) in 2013. However, we find that it is much more appropriate to emphasize other requirements of the Non-Exclusive Easement; to disclose more recent actions by the BLNR and the State Department of Land and Natural Resources (DLNR); and to emphasize the significant changes in City and State Laws which are much more relevant for the forthcoming applications for an SV and a Special Management Area (SMA) Use Permit: | DPP; March 3, 2021 (File No. 2020/ED-12(ST)) | Non-Exclusive Easement (S-6043) was approved by the Hawai‘i State Legislature and recorded in the State of Hawai‘i Bureau of Conveyances on October 14, 2014. The easement is a legal contract between the Grantor (State of Hawai‘i) and the Grantee (David and Terri Krueger). Therefore, the Grantee is legally and contractually obligated to adhere to all terms and conditions of the easement, as described below.<br><br>The easement confers unto the Grantee the “right, privilege, and authority to use, maintain, repair, replace and remove the existing seawall and revetment”. Repair is, therefore, a permissible activity.<br><br>Condition 1 states that the Grantee is required to “maintain the easement area in a safe condition”. Further, Condition 6 states that the Grantee “shall keep the easement area and the improvements thereon in a safe, clean, sanitary, and orderly condition”. Thus, the Grantee is legally and contractually obligated to maintain the structure in safe condition.<br><br>Condition 12 states that the “Grantor reserves the right to withdraw the easement for public use or purposes, at any time during the term of this easement”. If the Grantor (State of Hawai‘i) or the Department of Land and Natural Resources (DLNR)/Board of Land and Natural Resources (BLNR) have changed their policies or positions on the matter, we expect that they would notify the Grantee of such changes and seek resolution. |

| Table 7.2 DEA Summary of Comments and Responses | | |
|---|---|---|
| **Comments** | **Commenter and Date of Comment Letter** | **Responses** |
| | | Condition 19 states that "the Grantee is prohibited from rebuilding or altering said seawall and revetment without first obtaining the appropriate permission from Grantor". This language was addressed by the BLNR for the Waimānalo Paradise Seawall Repairs project. The BLNR agreed that the Grantee had the right to alter the structure and the easement language was amended accordingly. Given the similarities between these two projects, and the fact that the Waimānalo Paradise easement was amended very recently (September 2019), we believe that this represents the current position of the DLNR and BLNR. See attached easement amendment (*Appendix L-3*).<br><br>Condition 24 states that "the Grantee shall maintain, repair and upkeep the existing seawall and revetment in a condition satisfactory to the Grantor" and that "any improvements to the existing seawall and revetment shall be subject to the prior written approval of the Board of Land and Natural Resources and any other appropriate permission". This condition clearly demonstrates that the Grantee is required to maintain the structures, and that improvements to the structures and permissible.<br><br>In 2020, the BLNR and City approved similar modifications (stabilizing structures, wall height increase, new structures) to a seawall in Waimānalo. See attached Board approval (*Appendix L-4*), FEA-FONSI (File No. 2020/ED-2(AB)) (*Appendix L-5*) and SSV approval (File No. 2019/SV-3(AB)) (*Appendix L-6*). |

| Table 7.2 DEA Summary of Comments and Responses | | |
|---|---|---|
| **Comments** | **Commenter and Date of Comment Letter** | **Responses** |
| a. Non-Exclusive Easement: Although the State did renew and grant a small amendment (for a 40-square foot increase due to the receding shoreline) of S-6043 for the encroachment of the existing shoreline protection structure onto the beach more than 50 years ago (1968), it did not do so to the exclusion of other State and City requirements. The more pertinent language in this Easement is found in both the "Assumptions" and "Assignment," which requires the Assignee to "comply with all applicable laws and ordinances," which includes Chapters 205A, HRS, and Chapter 23 and Chapter 25, ROH. | DPP; March 3, 2021 (File No. 2020/ED-12(ST)) | The proposed action is to maintain the existing shore protection system with mitigative improvements as described in the EA. The owner will comply with all applicable laws and ordinances, including obtaining a SSV and SMA Use Permit.<br><br>The City recently issued an FEA-FONSI and SSV for the Waimānalo Paradise Seawall Repairs project, which is similar to the subject project (see *Appendices L-5 and L-6*). The DPP determined that the proposed repairs and modifications proposed under this project complied with all applicable laws and ordinances, which included HRS Chapter 205A and ROH Chapter 23 and Chapter 25. |
| b. State DLNR: Despite its 2013 renewal of the Non-exclusive Easement, the State DLNR more recently determined in 2018 (Correspondence OA-19-29) that modifying the existing seawall with sheet piles was a major alteration to the existing structure, and therefore, required that a Conservation District Use Permit (CDUA) be obtained from the BLNR.<br><br>They further stated that seawalls contradict the "current policies and objectives for beach protection provided under HRS 205A-2(9)." Their determination is especially relevant since according to the certified shoreline survey, nearly half of the southern portion of the seawall (41.78 feet) is within the State Conservation District. | DPP; March 3, 2021 (File No. 2020/ED-12(ST)) | b. Thank you for providing reference to Correspondence OA-19-29. To clarify, Correspondence OA-19-29 refers to an old design of the project that is not being considered. Correspondence OA-19-29 states that the proposed repairs “would entail the installation of 138 linear feet of interlocking steel sheet pile driven directly seaward of the existing seawall”. The proposed repairs also included “adjustment of armor stones in the rock rubblemound revetment, which is seaward of the existing seawall”. The proposed repairs also included “the addition of concrete stairs near the northern extent of the existing seawall such that it would lie partially outside of the current structure footprint”.<br><br>The proposed repairs discussed in Correspondence OA-19-29 would have involved construction of new structures seaward of the existing seawall, seaward of the shoreline, in the Conservation District. |

| Table 7.2 DEA Summary of Comments and Responses | | |
|---|---|---|
| **Comments** | **Commenter and Date of Comment Letter** | **Responses** |
| | | The Krueger Shore Protection Mitigative Improvements project proposed in this EA would be entirely landward of the existing seawall and landward of the shoreline. The proposed mitigative improvements are intended to stabilize the existing seawall and would not interact directly with the ocean. No repairs or modifications to the existing rock revetment are proposed under the proposed action.<br><br>DLNR stated that “seawalls contradict the current policies and objectives for beach protection provided under HRS 205A-2(9)". The proposed mitigative improvements are intended to stabilize the existing shore protection system. This project does not involve construction of a new seawall.<br><br>We acknowledge that a small portion of the existing seawall is located in the Conservation District. This portion of the seawall consists of 40 square feet, which is 3 percent of the total encroachment area (1,308 square feet). The proposed mitigative improvements must be approved by the BLNR. If the BLNR determines that a Conservation District Use Permit (CDUP) is required for this small portion of the existing seawall, the Applicant will submit a Conservation District Use Application (CDUA). |

| Table 7.2 DEA Summary of Comments and Responses | | |
|---|---|---|
| **Comments** | **Commenter and Date of Comment Letter** | **Responses** |
| Furthermore, in 2018 the BLNR also denied a request (CDUA:OA-3821) to allow a "scour apron" to be added makai of a previously modified concrete seawall which was part of the original four-parcel 1968 rock blanket (Parcel 94). that segment of the same nonconforming seawall, was the subject of an SV granted by the DPP on February 25, 2005 (No. 2004/SV-21) which also allowed its foundation to be modified (i.e., add a four-foot deep, 7.7-foot wide concrete rubble masonry base). What remained of the 1968 "rock blanket" makai of the seawall, was removed as a condition of SV No. 2004/SV-21. | DPP; March 3, 2021 (File No. 2020/ED-12(ST)) | The Applicant was not involved in this proceeding and is therefore not in a position to opine as to the reason(s) that DLNR made their determination. However, we note that there are significant differences between the referenced project and the proposed action.<br><br>CDUA OA-3821 proposed new structures seaward of the shoreline in the Conservation District. As noted in comment letter, the rock blanket that previously existed was removed by the landowner, so there were no existing structures at the time of the application and no easement that would have obligated the landowner to perform any work or the DLNR to authorize any work seaward of the shoreline in the Conservation District. Furthermore, the proposed structure would have been located in the beach transit corridor and had the potential to negatively impact lateral shoreline access.<br><br>We also note that in Correspondence OA-19-29, DLNR stated that they had no objections to reworking armor stones in the existing rock revetment fronting the Krueger property. While mitigative improvements to the existing rock revetment are not being proposed, we believe that this is indicative of DLNR's position on the matter. |

| Table 7.2 DEA Summary of Comments and Responses | | |
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| c. Mayor's Directive 18-02: The Mayor's Directive issued on July 16, 2018, requires all City Departments and Agencies to conserve and enhance a natural, dynamic shoreline wherever possible. It also directs Departments to recognize climate change mitigation and adaptation as an urgent matter, use the Sea Level Rise (SLR) Guidance and Hawaii SLR Vulnerability and Adaptation Report in planning decisions. The proposed seawall modification generally conflicts with these objectives, and are considered a last resort, and only where there are significant public benefits and insignificant negative impacts to coastal resources and natural shoreline processes. | DPP; March 3, 2021 (File No. 2020/ED-12(ST)) | We reviewed Mayor's Directive 18-02, which is referenced in *Section 3.4* of the EA. It is our understanding that the Directive relates to new construction rather than existing structures. Furthermore, we note that the Directive also requires the City "to develop and implement land use policies, hazard mitigation actions, and design and construction standards that mitigate and adapt to the impacts of climate change and sea level rise".<br><br>It is generally accepted that there are three major approaches to sea-level rise: accommodation, protection, and retreat. *Protection* is defined as "hardening of a system in its existing location to withstand impacts from changing conditions (e.g., shoreline hardening such as seawalls and revetments) (Codiga and Wager, 2011).<br><br>The subject shoreline has been armored (protected) for over 50 years. The shoreline is already fixed by a legal, nonconforming structure covered by a non-exclusive easement. The proposed mitigative improvements are intended to protect the property and are therefore considered a valid method to adapt to climate change and sea level rise.<br><br>Notably, the Directive was issued on July 16, 2018 by the previous Mayor Kirk Caldwell. We understand that the City's approach may be evolving under the present Mayor Rick Blangiardi. |

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| d. Act 16 (2020) State Legislature of Hawaii (SLH): On September 15, 2020, the State Legislature amended the Coastal Zone Management Statute, Chapter 205A, HRS, which among other changes, revised the language for granting a shoreline variance in areas with sandy beaches by requiring a demonstratable interest to the general public in addition to hardship to the Applicant. Section 205A-46(a)(9) now states:<br>"Private facilities or improvements that may artificially fix the shoreline; provided that the authority may consider hardship to the applicant if the facilities or improvements are not allowed within the shoreline area; provided further that a variance to artificially fix the shoreline shall not be granted in areas with sand beaches or where artificially fixing the shoreline may interfere with existing recreational and waterline activities unless the granting of the variance is clearly demonstrated to be in the interest of the general public;" | DPP; March 3, 2021 (File No. 2020/ED-12(ST)) | Act 16 appears to relate to new construction rather than existing structures. The shoreline is already fixed by a legal, nonconforming structure covered by a non-exclusive easement. The proposed action will not change this condition. Furthermore, the improvements will be located landward of the existing seawall and therefore will not infringe on public access.<br><br>Chapter 205A, Section 205A-46(a)(9) states that "The authority may consider hardship to the applicant if the facilities or improvements are not allowed within the shoreline area".<br><br>On March 27, 2020, the DPP issued an SSV for construction of a new seawall in Lanikai, Oʻahu, approximately 900 feet south of the subject property (see *Appendix L-7*).<br><br>On November 20, 2020, the DPP issued an SSV for repair and modification of an existing nonconforming seawall in Waimānalo, Oʻahu that was covered by a non-exclusive easement from the State of Hawaii (see *Appendix L-6*).<br><br>While we acknowledge that these determinations were made prior to the adoption of Act 16, the rationale that the DPP provided in the variance determinations is relevant as it relates to the proposed action.<br><br>Chapter 205A, Section 205A-46(a)(9) states that "a variance to artificially fix the shoreline shall not be granted in areas with sand beaches or where artificially fixing the shoreline may interfere with existing recreational and waterline activities unless the granting of the variance is clearly demonstrated to be in the interest of the general public".<br><br>The subject shoreline is already fixed by a legal, nonconforming structure that is covered by a non-exclusive easement. The proposed action will not change this condition. Furthermore, the improvements will be located landward of the existing seawall and will have no impact on public access, nor will it alter current shoreline conditions fronting the project site. |

| Table 7.2 DEA Summary of Comments and Responses | | |
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| **Proposed Action** | | |
| Section 2.4 Proposed Action: The Final EA should explain how the existing seawall can be realigned to allow the proper insertion of interlocking steel sheet piles without first removing portions of the existing "rock blank" upon which it rests, at least temporarily (see Exhibit 2.5). In addition, we must emphasize that the forthcoming SV application requires construction plans which are stamped by a licensed professional structural engineer. As such, the non-specific boulders of the "rock blank" and missing seawall foundation (i.e., floating) depicted on the Sheet Pile Wall Section, is not sufficient. The Final EA should include exhibits of the Project in Plan View, which illustrate the multiple dead men relative to the existing dwelling and all other improvements within the 40-foot shoreline setback. | DPP; March 3, 2021 (File No. 2020/ED-12(ST)) | Preliminary construction plans have been prepared by licensed professional structural engineers, MKE Associates, LLC. The design of the proposed action does not include the removal of the existing rock blanket, nor does it entail realignment of the existing seawall. The sheetpile stabilization system landwards of the existing seawall would mitigate any additional settling and rotation should undermining of the seawall continue. Figure 2-5 located in Chapter 2 of the Final EA provides a plan view of the proposed improvements to the existing shore protection system relative to the existing dwelling. The forthcoming SV application will provide stamped construction plans and details including drawings depicting the requested illustrations. |
| **Sea Level Rise** | | |
| The Draft EA, page 3-4, acknowledged that the long-term dynamics of Lanikai Beach's sands have changed with the gradual armoring of the shoreline. In addition, page 4-2, the seawall has been protecting the project site and the adjacent properties from erosion and wave overtopping for nearly half a century. For informational purposes, the Final EA may assess the long-term impacts of 3.2 feet sea level rise on the subject region and seawalls, and discuss a long-term plan to enhance the existing seawalls with justifications for actions, or consider a long-term alternative in the region, such as retreat or relocation of the shorefront properties to restore dunes and the beach along the shoreline, with social and economic cost analysis. | OP; February 22, 2021 (File No. DTS 202102170909LI) | We acknowledge that this portion of Lanikai is experiencing chronic erosion and beach loss. We also acknowledge that widespread shoreline armoring has been installed in response to this erosion.<br><br>The Draft EA and Coastal Assessment (*Appendix F*) provide considerable discussion of potential long-term alternatives for the Lanikai region, including managed retreat, beach nourishment, and various shore protection options. These discussions have been expanded to a level of discussion commensurate with the scope of the proposed action, as requested. |

| Table 7.2 DEA Summary of Comments and Responses | | |
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| | | The Lanikai region spans approximately 8,000 linear feet (1.5 miles) of shoreline extending from Wailea Point to Alāla Point. There are 108 individual parcels along the Lanikai shoreline, most of which are armored by seawalls and revetments. The proposed mitigative improvements are limited to the subject property, which spans approximately 120 linear feet of shoreline frontage and only accounts for approximately 1.5 percent of the entire length of shoreline in Lanikai. It is neither reasonable or feasible for an individual landowner to evaluate or propose regional alternatives that would affect the entire community of Lanikai. An effort of this magnitude would require a more substantial level of analysis. |
| **Biological Resources** | | |
| Based on your project location and description, we have noted the species most likely to occur within the vicinity of the project area, in the 'Occurs In or Near Project Area' column. Please note this list is not comprehensive and should only be used for general guidance. We have added to the PIFWO website, located at https://www.fws.gov/pacificislands/promo.cfm?id=177175840 recommended conservation measures intended to avoid or minimize adverse effects to these federally protected species and best management practices to minimize and avoid sedimentation and erosion impacts to water quality. | USFWS; February 11, 2021 (File No. 01EPIF00-2021-TA-0175) | We appreciate the reference of the species most likely to occur within the vicinity of the project area and the recommended conservation measures to avoid or minimize adverse effects to federally protected species. Furthermore, the EA includes a letter prepared by AECOS (*Appendix H*) outlining mitigation measures to avoid any adverse effects to the wedge-tailed shearwater bird. With recommended avoidance and minimization measures, the project is not anticipated to affect federally protected species. Additionally, we acknowledge the site specific BMPs recommended by USFWS to minimize and avoid impacts to water quality. The applicant is a private landowner. As there is no federal funding, authorization, or permit associated with this action, no formal consultation under Section 7 of the Endangered Species Act is required. |

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| According to the Draft EA, page 3-21, Wedge-tailed Shearwaters usually fledge after approximately 100 to 115 days of egg laying, and fledging at the site may occur sometime between late October through the end of November. OP suggests that the Final EA discuss an appropriate schedule for the proposed project to avoid potential impacts on seabirds nesting and fledging. | OP; February 22, 2021 (File No. DTS 202102170909LI) | *Section 3.8.1* of the EA includes a discussion of the projected construction schedule. Construction activity will begin in the first quarter of 2022 and wrap up in the second quarter of 2022. The project site will be inspected and managed to ensure no shearwater nests are present or affected during the course of construction. |
| **Archaeological and Cultural Resources** | | |
| Given that burials have been found in nearby lots with Jaucus sand and that it is not totally uncommon to also find burials in beach sand, OHA requests that archaeological monitoring be considered for the project during the HRS 6E review process. The DEA indicates that the AA is still under review by the State Historic Preservation (SPHD). OHA further kindly requests to be provided copies on any SHPD comment letters. | OHA; February 22, 2021 | As noted in *Section 3.15*, should any archaeological resources be discovered during construction activities, all work will cease immediately and an archaeologist from SHPD will be notified. Construction-related activity will be suspended until further recommendations are made for the appropriate treatment of archaeological and/or cultural resources. Although the public comment period of the Draft EA has concluded, we will notify OHA of comments from SHPD. |
| In review of the DEA portion on cultural resources, it does not appear an adequate level of analysis has been conducted. The DEA only describes an overview of existing historical documents, but does acknowledge that traditional fishing and throw nets may be occurring in the surrounding area. it is believed that these practices will not be impacted and that no cultural practices are occurring on the project site. OHA notes, however, that there is no mention of any kind of cultural outreach or interview process. | OHA; February 22, 2021 | Thank you for providing the guidelines to assess cultural impacts. Mr. Alani Apio of Kamau, LLC and Kumu Hula Māpuana and Mr. Kihei de Silva were consulted with to discuss cultural practices that may occur in the greater project area. Comments received from these discussions reiterated the importance of cultural resources of the Kaohao area, and historical shoreline hardening in the area. *Section 3.15* of the EA includes a summary of the outreach that was conducted. A full report of the interviews is located in *Appendix J*. |

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| Guidelines for assessing cultural impacts are provided by the Office of Environmental Quality Control (OEQC) in the Guide to Implementation and Practice of the Hawaii Environmental Policy Act, Exhibit 1-1, 2012 Edition. The process should involve an attempt to consult with community folks and cultural practitioners to ascertain ethnographic information on cultural resources and practices that occur on the site or in the broader area. As the DEA fails to mention any type of outreach specific to cultural related consultation, it is unclear if the project will effect cultural practices occurring nearby. We thus encourage the applicant to complete a cultural analysis or cultural impact assessment (CIA) that is compliant with these guidelines and minimally reach out to any recognized descendants from the area. OHA would further like to remind the applicant that the lack of any formal methodology or explanation specifically targeted at traditional and customary practices could prevent the approving agency from assessing the identity and scope of valued cultural and natural resources in the area. Articles IX and XII of the State of Hawai‘i Constitution requires that government agencies must “promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups.” Article XII Section 7 of the State of Hawai‘i Constitution states: “the State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua‘a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778…” | OHA; February 22, 2021 | Please see response above. |

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| In Ka Pa‘akai O Ka ‘Aina v. Land Use Commission, 94 Haw. 31 (2000), hereinafter Ka Pa‘akai, the Hawai‘i Supreme Court, reiterated the importance of Section 7 and reaffirmed that the State and its agencies are obligated to reasonably protect the traditional and customary rights of Hawaiians. The Supreme Court ruling States that agencies are obligated to make the assessment of cultural practices, independent of a developer or applicant. Typically, information gathered during a CIA or cultural impact study during HRS 343 can help to inform the approving agency during the Ka Pa‘akai process. However, there is no apparent outreach methodology for how cultural impacts were assess within the DEA.<br>The Ka Pa‘akai court decision set forth that a proper analysis of cultural impacts shall include: 1) the identity and scope of valued cultural, historical, or natural resources in the subject area, including the extent to which traditional and customary native Hawaiian rights are exercised; 2) the extent to which those resources – including traditional and customary native Hawaiian rights – will be affected or impaired by the proposed action; and, 3) the feasible action, if any, to be taken by the (agency) to reasonably protect native Hawaiian rights if they are found to exist. Generally, the “subject area” is not restricted to the project area as areas adjacent to the project area could be indirectly or directly impacted by actions within the project area. OHA recommends that the applicant work with the approving agency to carefully evaluate the Ka Pa’akai requirements and the OEQC guidelines for CIAs. | OHA; February 22, 2021 | Thank you for your guidance on the Ka Pa‘akai court decision and the proper analysis of cultural impacts. In the completion of the EA process, cultural practitioners were consulted for their comments regarding the proposed action. *Section 3.15.2* of the EA includes a summary of the outreach that has been conducted. Background research indicates there are no known cultural practices that have occurred and currently occur at the project site. Mitigative improvements are not anticipated to affect cultural fishing practices or other cultural practices that may occur in the greater surrounding area. Should any cultural or historic resources be discovered during the construction activity period, SHPD will be notified immediately and all work will be suspended until further recommendations are made for the appropriate treatment of archaeological and/or cultural materials. |

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| **Alternative Designs** | | |
| 5. Section 4.4 Alternative D - Alternative Designs: We strongly suggest that a more thorough and robust discussion be provided which explains how the engineered Rock Revetment and Hybrid Seawall-Revetment alternatives do not better meet the third hardship criteria required to grant an SV pursuant to Section 23-1.8(b)(3)(B)(iii), ROH. | DPP; March 3, 2021<br>(File No. 2020/ED-12(ST)) | When compared with the proposed action, a rock revetment or hybrid seawall-revetment would be substantially more expensive, would have a substantially larger structural footprint, would require more extensive excavation and permanent removal of existing substrate, and would fundamentally alter the existing environment and configuration of the shoreline.<br><br>Construction of a rock revetment or hybrid seawall revetment would require demolition and removal of the existing seawall and rock apron, and permanent removal of excavated material. Temporary shoring would be required to protect and stabilize the existing single-family home and the adjacent properties and structures during construction. Additional permanent structures (i.e., return walls) would be required to protect and stabilize the adjacent properties and structures after construction. The single-family home may also need to be modified to accommodate structures of this size.<br><br>A rock revetment of hybrid seawall-revetment would also significantly expand the structural footprint within the property. A rock revetment would be 40.2 feet wide with a total area of 3,880 feet$^2$. The structure would occupy over 20 percent of the total area of the property and would be 30 percent larger than the existing single-family home. A hybrid seawall-revetment would be 32.9 feet wide with a total area of 3,225 feet$^2$. The structure would occupy about 17.5 percent of the parcel and would be 20 percent larger than the existing single-family home.<br><br>Based on these considerations, we feel that the proposed action is the most practicable alternative that best conforms with ROH Section 23-1.8(b)(3)(B)(iii). |

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| Specifically, how do these two practicable alternatives not provide a greater potential for the accumulation of sand along this and the adjacent sandy beach to the north. We note that since the original 1968 approval of the "rock blanket," and even as late as 2007, there was a considerable dry sand beach fronting this portion of Lanikai Beach (see attached photos). Given the presence of submerged sand in this littoral cell as is clearly shown in Figures 1-3, 2-1, and others, if the encroaching "rock blanket" were removed and an engineered revetment built seven to eight feet further mauka (on the Applicant's own property), how would lateral shorelines access for the general public not be improved (i.e., wet sands is more passible than a basalt rubble rip-rap). | DPP; March 3, 2021<br>(File No. 2020/ED-12(ST)) | The design team investigated the shoreline response to removing the seawall and rock apron and constructing a rock revetment entirely inshore of the present location of the seawall.<br><br>The existing shore protection system protects the backshore area and reduces incident wave energy and reflection. The rock apron also affords the opportunity to accrete sand against it, as evidenced by observations and measurements at neighboring locations where rock aprons also exist. The extent and stability of the sand accretion is dependent on factors such as the size of the apron, the reflective characteristics of the apron and wall, nearshore sand supply, currents, and wave conditions. At higher water levels and wave conditions, the apron would be less effective, as more wave energy would pass over the apron increasing reflectivity from the seawall, and flattening the beach profile.<br><br>Removing the seawall and rock apron and constructing a revetment would initially produce a small cove-type feature, where the waterline would move inshore along the face of the revetment, approximately 20 feet from its present location along the face of the seawall. The elevation of the sandy seafloor offshore of the existing seawall is approximately -4 feet mean lower low water (mllw). It is reasonable to expect that sand would fill in the cove up to at least elevation -4 feet mllw. Any further beach development, however, is dictated by the location of the beach toe in relation to the revetment. |

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| | | The beach toe is the step in the beach profile located at the base of the beach face. The toe is a hydrodynamic and geomorphic feature that is developed by the interaction between the downrush of water from the previous wave and the dynamics of the next incoming wave. The beach toe is a profile feature that is commonly used, at least partially, to define the limits of the active beach. The existing beach toe through this region is immediately offshore of the rock aprons. Removal of the existing shore protection would provide space for potential sand accretion and beach development, although to a very limited extent. Given sufficient nearshore sand, a nominal amount of accretion would be expected to occur in front of the revetment. The resulting beach, however, is not expected to be very substantial. The furthest offshore the beach toe could develop is in its present location. From there, the beach face would slope upward toward shore at an expected slope of approximately 1V:10H (vertical to horizontal), based on nearby measurements. This would intersect the revetment at elevation +2 ft mllw. This indicates that the beach would be submerged by each incoming wave. Downrush of water from the revetment would be expected to depress the profile.<br><br>A natural beach profile requires a certain amount of space to develop and stabilize. A wider beach would therefore require movement of the beach toe further seaward. To achieve a beach with crest elevation of +6 ft mllw, the beach toe would have to be 100 feet offshore of the revetment, or 80 feet beyond where it currently exists. Attempts to nourish the beach on a property-by-property basis would produce a perturbation (i.e., bulge) in the shoreline that would be expected to be straightened out by wave action over the course of a few tidal cycles. The only way to move the beach toe seaward and produce a stable beach is through regional beach accretion over the entire littoral cell. There does not appear to be enough sand in the system for this to occur. |

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| | | The other way to produce a wider beach would be to move the revetment further inland. To achieve the concept +6-foot crest, the revetment would have to be shifted inland by about 80 feet, which would put the revetment mauka of the existing single-family home. |
| Additionally, the stated concern for this alternative's need for added flank protection of adjacent parcels, particularly to the north (Parcel 55), is diminished by the fact that its rip-rap and concrete rubble masonry seawall are unauthorized (i.e., illegal) | DPP; March 3, 2021 (File No. 2020/ED-12(ST)) | The purpose of this project is to maintain the existing shore protection system in a safe condition and continue to protect the property from increasing coastal erosion. The design of the Seawall Repair and Improvement alternative does not include plans for the construction of flanking protection. |
| **Plans and Policies Compliance** | | |
| Page 1-4, states that it is anticipated that Department of the Army permit authorization pursuant to the Clean Water Act, Section 404 or Rivers and Harbors Act of 1899, Section 10 is not required. If a U.S. Army Corps of Engineers permit is required, the applicant shall consult with OP on the policies and procedures that govern Coastal Zone Management (CZM) Act federal consistency reviews. | OP; February 22, 2021 (File No. DTS 202102170909LI) | We acknowledge this comment. As discussed in *Section 1.5* of the EA, mitigative improvements will take place landwards of the existing seawall. The U.S. Army Corps of Engineers, Honolulu District were consulted with in preparation of this EA and confirmed that a permit is not required with construction activity not occurring above, within, or below Waters of the U.S. |

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| The Final EA should provide the determination of the State Department of Land and Natural Resources, State Historic Preservation District (SHPD), regarding the project review under HRS Chapter 6E-42. Should any archaeological or cultural resources, or burials be discovered during ground excavation, all construction shall be ceased immediately. Subsequent work shall proceed only upon an archaeological clearance from the SHPD. | OP; February 22, 2021 (File No. DTS 202102170909LI) | The Archaeological Assessment *(Appendix I)* was submitted to SHPD in November 2020 as noted in Section 3.15.1 of the EA. Results from the 100% pedestrian survey and subsurface tests did not find any archaeological or cultural resources at the project site. Mitigative improvements are not anticipated to disturb any archaeological or cultural resources. Although it is not anticipated that any archaeological or cultural, or burials will be discovered, should any archaeological resources be discovered during construction activities, all work will cease immediately and an archaeologist from SHPD will be notified. Construction-related activity will be suspended until further recommendations are made for the appropriate treatment of archaeological and/or cultural resources. |
| 7. Section 53 Hawaii Coastal Zone Management (CZM): The discussion of CZM policies in this section, particularly with regard to Section 205A-2(c)(10) Beach and Coastal Dune Protection, must be significantly expanded. Specifically, how can allowing for the fortification of a hardened structure which has likely accelerated beach migration to continue for another 50 years, be considered as consistent with these policies. | DPP; March 3, 2021<br>(File No. 2020/ED-12(ST)) | While we acknowledge the potential negative impacts associated with hardened shoreline structures, there is no definitive evidence to support the assumption that the existing structures “have likely accelerated beach migration”. Shore protection structures are typically constructed in response to erosion, suggesting that the erosion was already occurring at the time of construction. The fact that the beach continued to erode after construction cannot necessarily be directly attributed to the presence of the structures. |

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| | | The existing seawall and rock apron were constructed in 1968. In your previous comment, you note that "even as late as 2007, there was a considerable dry sand beach fronting this portion of Lanikai Beach" and provided dateable photos. A dry beach was present nearly 40 years after the structures were constructed, which indicates that the structures themselves have not prevented the potential for sand accretion and beach formation in this area. This condition is observable along the central portion of Lanikai, where the shoreline is predominantly armored, but the structures are buried in sand and a dry beach is present. These conditions challenge the assumption that the relationship between shoreline armoring and beach erosion in Lanikai are directly correlated and that the shoreline armoring is the primary cause of the erosion.<br><br>We acknowledge that removal of all the existing shore protection structures in Lanikai would allow for the natural migration of the shoreline and a beach would likely be present. However, removal of individual shore protection structures is unlikely to have an appreciable positive impact on the beach or lateral shoreline access. |

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| | | The proposed action is consistent with the objectives of HRS Chapter 205A-2(c)(9) Beach and coastal dune protection.<br><br>*A. protect beaches and coastal dunes for:*<br>*i. Public use and recreation.*<br><br>The proposed action is located entirely landward of the shoreline on private property and will not infringe of public use and recreation seaward of the shoreline.<br><br>*ii. The benefit of coastal ecosystems.*<br><br>The proposed action is located entirely landward of the shoreline and will have no impact on marine species, ecosystems, or habitat seaward of the shoreline. Furthermore, any ecosystem services currently provided landward of the existing seawall would be restored to their original condition after construction.<br><br>*iii. Use as natural buffers against coastal hazards.*<br><br>The subject shoreline has been armored for over 50 years. The only way to allow the dune to be used as a natural buffer against coastal hazards would be to remove the structure. The advantages and disadvantages of this option are discussed in *Section 4.5* of the EA. Removing the seawall would not achieve the project objectives and would expose the project site and adjacent properties to increased hazard risk. This would conflict with the objectives of HRS Chapter 205A-2(6)(A) to “reduce hazard to life and property from coastal hazards”. |

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| 8. Section 5.6 Koolau Poko Sustainable Communities Plan (KSCP): The Final EA should also include a discussion of the Guidelines for Shoreline Areas which are contained in Section 3.2.3.2. In particular, on page 3-9 which explicitly states, "Prohibit the use of shoreline armoring structures, considering alternative measures such as beach replenishment." The KSCP also advises "Beach Management Plan" may serve as a prototype for erosion-prone areas to incorporate the long-term effects of climate change and SLR and to address seasonal and long-term erosion and accretion. | DPP; March 3, 2021<br>(File No. 2020/ED-12(ST)) | The EA and Coastal Assessment (*Appendix F*) provide considerable discussion of potential long-term alternatives for the Lanikai region, including managed retreat, beach nourishment, and various shore protection options. We have expanded these discussions with a level of discussion commensurate with the scope of the proposed action, as requested.<br><br>The USACE evaluated regional beach nourishment for Lanikai as part of the Southeast Oʻahu Regional Sediment Management Demonstration Project. The report evaluated options for beach nourishment with or without stabilizing. Beach nourishment without stabilizing structures would require 182,000 cubic yards of sand with an initial cost of $33 million. Additional renourishment of the beach was projected to be necessary every 8.4 years, resulting in an estimated total cost over 50 years of $109 million. Beach nourishment with stabilizing structures would require construction of 12 groins and placement of 146,000 cy of sand with an initial cost of $33.4 million and a total cost of $41.6 million over 50 yrs. These options are clearly cost-prohibitive for a single landowner to consider.<br><br>Furthermore, the geographic scope of the projects would be disproportionate to the scope of the proposed action, which is limited to a single residential parcel. The Lanikai region spans approximately 8,000 linear feet (1.5 miles) of shoreline extending from Wailea Point to Alāla Point. There are 108 individual parcels along the Lanikai shoreline, most of which are armored by seawalls and revetments. The proposed mitigative improvements are limited to the subject property, which spans of approximately 120 linear feet of shoreline frontage, approximately 1.5 percent of the entire length of shoreline in Lanikai. It is realistically unfeasible for an individual landowner to evaluate or propose regional options that could affect the entire community of Lanikai. An effort of this magnitude would require a more substantial level of analysis. |

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|---|---|---|
| **Comments** | **Commenter and Date of Comment Letter** | **Responses** |
| | | The State of Hawaiʻi recently published a report entitled *Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawaiʻi* (Hawaiʻi Office of Planning, 2019). The report presented next steps for the State of Hawaiʻi to develop a managed retreat plan. The report states that "… to have a cogent and comprehensive retreat plan, it requires long-range planning, legal changes, funding, and some level of community agreement, understanding and support for retreat." The report also noted that retreat from chronic coastal hazards (e.g., erosion and sea level rise) can be incremental and may take decades to complete. Until managed retreat policies, regulations, tools, and programs are in place to implement on a State- or County-level, other appropriate solutions should be considered. Further, the geographic scale of managed retreat is disproportionately larger than the proposed action. It would be more appropriate to address managed retreat as part of the community development planning process. Please note that managed retreat is not identified as a priority in the Koʻolau Poko Sustainable Communities Plan.<br><br>The proposed action would not preclude the community from implementing managed retreat or beach nourishment at some point in the future. |
| **Permit Review and Requirements** | | |
| OP concurs that the forthcoming City regulatory review of the proposed action will be made in the context of Act 16, Session Laws of Hawaii 2020. Prior to the adoption of amendments to county SMA and shoreline setback rules or ordinances, the provisions of HRS Chapter 205A, as amended, shall prevail. | OP; February 22, 2021 (File No. DTS 202102170909LI) | As noted in *Section 1.5* of the EA, the proposed action will adhere to Act 16, Session Laws of Hawaii 2020 and apply for a Special Management Area permit under review of the City and County Council. |

| Table 7.2 DEA Summary of Comments and Responses | | |
|---|---|---|
| **Comments** | **Commenter and Date of Comment Letter** | **Responses** |
| 3. Section 1.5 Permits and Approvals Required: Similarly, Act 16, also eliminated the single-family dwelling exemption in the SMA for all shoreline parcels, regardless of whether dwelling floor area is less than 7,500 SF. Consequently, this section and other references to the SMA should clearly state that a Major SMA Use Permit will need to be obtained from the City Council for "development" in excess of $500,000 in value. | DPP; March 3, 2021 (File No. 2020/ED-12(ST)) | *Section 1.5* of the EA has been revised to clarify that the applicant is seeking a SMA (Major) Use Permit to repair the seawall in alignment with the passing of Act 16. |
| 6. Zoning Adjustment: The proposed seawall modification increases the structure to more than six feet in height within the required five-foot rear yard, as defined by the LUO. Therefore, a Zoning Adjustment for retaining wall height will also be needed, should an SMA Use Permit be granted by the City Council. The Final EA should be revised to include a new section that addresses this permit requirement and the LUO criteria for its approval. | DPP; March, 3, 2021 (File No. 2020/ED-12(ST)) | A Zoning Adjustment permit has been added to the list of permits and required approvals in *Section 1.5* and has been discussed in *Section 5.7* of the EA. |
| **Construction Impacts** | | |
| The staging area for the proposed project shall be located outside of the shoreline area as defined in HRS Chapter 205A-41. OP suggests that the Final EA discuss site-specific mitigation measures with a water quality monitoring plan if possible to prevent any runoff, sediment, soil and debris potentially resulting from the proposed construction, including excavation, grading and staging, from adversely impact the marine water. | OP; February 22, 2021 (File No. DTS 202102170909LI) | Site specific mitigation measures and best management practices to minimize and avoid adverse effects to marine waters are discussed in *Section 3.7*. A Baseline Assessment for the Marine Environment was prepared by Marine Research Consultants, Inc. in September 2020 (*Appendix G*). The report indicates with proper management and mitigation practices, and compliance with State and City requirements relating to water quality, the proposed action should have little to no potential significant impacts to the surrounding marine environment and nearshore waters. |

| Table 7.2 DEA Summary of Comments and Responses | | |
|---|---|---|
| **Comments** | **Commenter and Date of Comment Letter** | **Responses** |
| **Anticipated Determination** | | |
| 9. Section 6.2 Reasons Supporting the Anticipated Determination: This section discusses the Significance Criteria set forth in determining whether an EIS is required pursuant to the EIS rules, Title 11-200.1-13.<br>(2) Curtal the range of beneficial uses of the environment. We note that this section incorrectly states that HES Chapter 91, rather than HRS Chapter 205A-44, which generally prohibits construction within the shoreline area. | DPP; March 3, 2021 (File No. 2020/ED-12(ST)) | Thank you for clarifying the applicable rules governing the shoreline setback area. *Section 6.2* has been revised to clarify that HRS Chapter 205A-44 generally prohibits construction activity within the shoreline area. |
| (3) Conflict with the State's environmental policies or long-term environmental goals established by law. As previously discussed, the Project (more so than the alternatives not preferred by the Applicant), does conflict with the State's environmental policies and long-term environmental goals. We reiterate that the Non-Exclusive Easement renewed seven years ago, speaks more the assignment and assumption of the Grantee's (State) obligations to comply with all applicable rules, laws and regulations, rather than al entitlement to maintain a failing structure allowed more than 50 years ago. | DPP; March 3, 2021 (File No. 2020/ED-12(ST)) | Thank you for your comment. As discussed throughout the EA, there are various factors to consider in selecting the preferred design that meets the purpose of the project including the site history, neighboring property owners, promoting lateral shoreline access, and preserving the existing coastal and marine habitat. Alternative designs have been thoroughly analyzed in *Section 4.0* of the EA. There are currently no guidelines set forth by the State or the City outlining a regional approach for coastal areas to mitigate impacts of sea level rise, nor are there guidelines outlining measures private property owners may take to protect their properties from the impacts of sea level rise. Thorough analysis of the proposed action finds that this alternative is the least impactful to the surrounding environment as it does not include any demolition or removal, construction of a new seawall, and repair work will take place landwards of the existing seawall. |

Section 8

# References

## Chapter 8

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# Appendices

Appendix A

# 1226a Mokulua Drive Legal Documents Nonconforming Status of the Seawall

DEPARTMENT OF PLANNING AND PERMITTING

**CITY AND COUNTY OF HONOLULU**

650 SOUTH KING STREET, 7TH FLOOR ! HONOLULU, HAWAII 96813
Phone: (808) 523-4414 ! Fax: (808) 527-6743

JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

1999/CLOG-4318(ASK)

Mr. Joel Cavasso
Century 21
Kailua Beach Realty
130 Kailua Road, Suite 110
Kailua, Hawaii 96734

Dear Mr. Cavasso:

Existing Seawall at 1226 Mokulua Drive
Tax Map Key: 4-3-5: 56

This responds to your inquiry regarding the seawall located at the above address. You have provided three affidavits, two stating that the wall was built before World War II and a third indicating that the wall has been buried under the sand for the past 38 years.

Although the wall cannot be seen in the 1967 aerial photos on file with our department, it is possible that the wall was buried at that time. We have no evidence that the wall is illegal. Based on the information currently available, we assume that the wall is non-conforming.

Should you have any questions regarding the above, you may contact Ardis Shaw-Kim of our staff at 527-5349.

Very truly yours,

JAN NAOE SULLIVAN
Director of Planning and Permitting

JNS:am

posse doc 5660
g:joel

Retrieve Update Insert Modify Delete Locate Print

| | | | |
|---|---|---|---|
| Job Description: | fax transmittal fr Joel Cavasso/Century 21 Kailua Beach Realty of recap of mtg w/A. Challacombe re existing seawall | | |
| Job Type: | Correspondence log | Date Created: | Jul 01, 1999 |
| Status: | Correspondence filed | Created By: | EKELLY |
| Parent Job: | | Date Completed: | Jul 13, 1999 |
| Specific Location: | | | |

Details | Processes | Docs | Doc Sort | Notes | TMK | Customers | Warnings | Fees | Project

| Process Type | Status | Assigned To | Outcome | Scheduled Start | Date Completed | Description |
|---|---|---|---|---|---|---|
| Open mail and provide desc | Complete | ELAINE KELLY (INA( | Opened | Jul 01, 1999 | Jul 01, 1999 | |
| Review and determine actio | Complete | ART CHALLACOMBI | Reviewed - | mmm dd, yyyy | Jul 02, 1999 | |
| Designate to planner | Complete | ART CHALLACOMBI | Designated | mmm dd, yyyy | Jul 02, 1999 | |
| Gather/review information | Complete | ANN ASAUMI; ARDIS | Gathered | mmm dd, yyyy | Jul 13, 1999 | |
| Prepare response letter | Complete | ANN ASAUMI; ARDIS | Prepared | mmm dd, yyyy | Jul 13, 1999 | |
| Review response | Complete | ART CHALLACOMBI | Reviewed | mmm dd, yyyy | Jul 13, 1999 | |
| Sign response letter | Complete | ART CHALLACOMBI | Signed | mmm dd, yyyy | Jul 13, 1999 | |
| Mail response letter | Complete | ANN ASAUMI | Mailed | mmm dd, yyyy | Jul 13, 1999 | |
| File correspondence | Complete | ANN ASAUMI | Filed | mmm dd, yyyy | Jul 13, 1999 | To SI TMK: 4-3-5: 56 |

Appendix B

# HDOT Shore Waters Construction Permit No. 1395

PERMIT NO. 1395

DEPARTMENT OF TRANSPORTATION

HARBORS DIVISION

State of Hawaii

APPROVED BY DEPARTMENT OF TRANSPORTATION, HARBORS DIVISION

Work under this permit is approved as described in the foregoing application subject to the following CONDITIONS and must be completed prior to September 25, 1969, or permit will be considered null and void:

(1) Permittee shall indemnify and hold the State of Hawaii, its boards, commissions, agencies, officers, servants, employees, and agents free and harmless from any and all lawsuits or actions of every nature and kind which may be brought for or on account of any personal injury or death, or property damage, direct or indirect, arising or growing out of Permittee's exercise of the rights granted under this permit.

(2) Permittee shall obey and comply with all applicable ordinances, laws, rules and regulations of the City & County of Honolulu, the State, and of the United States of America, and of any political subdivision or agency, authority, or commission with respect to all phases of the construction, operation, and maintenance of any and all improvements authorized under this permit.

(3) Permittee shall take out and keep current all licenses and permits (whether county, state, or federal) required for the conduct of its operations and/or construction, maintenance, and repair of any and all improvements authorized under this permit, and shall pay promptly when due all fees therefor.

(4) The Department of Transporation hereby reserves the right to cancel this permit at any time and for any reason or to require the Permittee to suspend operations without being liable to the Permittee in any way whatsoever for damages.

(5) Permittee shall obtain approval, before construction, from the following agencies:

1. Department of Land and Natural Resources
2. U. S. Army Corps of Engineers
3. City and County of Honolulu's Planning Department

Date September 25, 1968

Acting Chief, Harbors Division

October 14, 1968

Mr. Elia A. Long
c/o Long & Melone, Ltd.
Suite 601, 333 Queen St.
Honolulu, Hawaii 96813

Dear Sir:

This is in reference to our letter of October 2, 1968 granting you, Mr. Fred F. Hedemann, Hawaiian Trust Co., Ltd. (Trustee) and Mr. John F. Rosa interim right-of-entry to construct a protective stone "blanket" immediately seaward of your respective properties at Lanikai, Kailua, Oahu in accordance with the conditions of Department of Transportation Harbors Division Shore Waters Construction Permit No. 1395.

At its meeting of October 11, 1968 under agenda Item F-11 (copy enclosed), the Board of Land and Natural Resources confirmed the above right-of-entry to construct the protective stone "blanket".

Should you have any questions, please feel free to contact us.

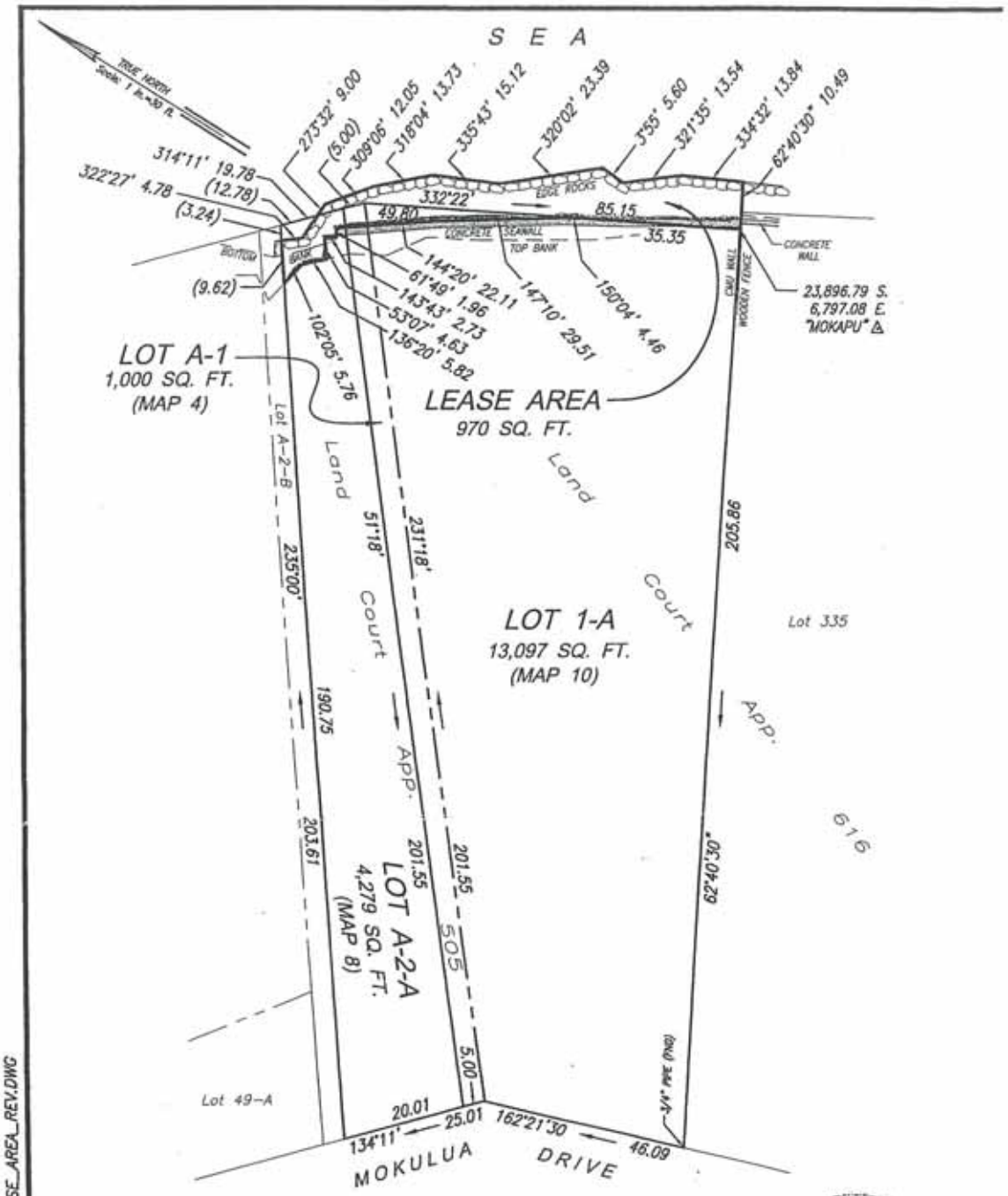
Very truly yours,

JAMES W. DITOR
Program Administrator
Division of Land Management

Enc.

cc: Harbors Div., Dept. of Transportation
U. S. Army Corps of Engineers, Hon.
City & County of Honolulu, Planning Dept.
Mr. Fred F. Hedemann
Hawaiian Trust Co., Ltd.
Mr. John F. Rosa

EXHIBIT "D"




# PLAN SHOWING LEASE AREA FRONTING LOTS A-1 (MAP 4) AND LOT A-2-A (MAP 8) OF LAND COURT APPLICATION 505 AND LOT 1-A (MAP 10) OF LAND COURT APPLICATION 616

AT KAILUA, KOOLAUPOKO, OAHU, HAWAII

TAX MAP KEY: (1) 4 - 3 - 005: 056

OWNERS: James H. and Barbara-Jeann Duncan

ADDRESS: 1226 Mokulua Drive
Kailua, Hawaii 96734

ROBERT K.Y. LEE
LICENSED PROFESSIONAL LAND SURVEYOR
No. 5075
HAWAII, U.S.A.

This work was prepared by me or under my direct supervision.

Robert K.Y. Lee
Licensed Professional Land Surveyor
Certificate Number 5075

MAY 27, 2008

JH_C:\SURVEY CAD FILES\2008\4675\DWG\4675_LEASE_AREA_REV.DWG

JOB NO.: 4675
FB. NO.: 1695
8.5" X 14" = 0.8 Sq. Ft.

**TOWILL SHIGEOKA & ASSOCIATES, INC.**
**LAND SURVEYORS**

2153 N. KING STREET
SUITE 308
HONOLULU, HAWAII 968

"HIBIT" E"


Looking towards Kailua from parcel 56


Looking towards Waimanalo from parcel 56

EXHIBIT "F"

Appendix C

# Variance Related to the Zone of Wave Action No. 1968/Z-124

# VARIANCE

NO. 1968/2-124

November 20, 1968

68/Z-124

Mr. Elia A. Long
333 Queen Street, Suite 601
Honolulu, Hawaii 96813

Dear Mr. Long:

SUBJECT: Variance - Lanikai, 1226 to 1254-B
Mokulua Drive
Tax Map Key: 4-3-05: 56, 57, 76, and 88
Applicants: Elia A. Long, et al

The Zoning Board of Appeals at its meeting on November 7, 1968, held a duly authorized public hearing to consider your request for a variance from Ordinance No. 2837, relating to setback from zone of wave action, to permit the construction of a protective rock "blanket" extending seaward from the existing seawall within the 10-foot setback from zone of wave action for four (4) parcels of land situated at 1226 to 1254-B Mokulua Drive in Lanikai.

It was the decision of the Board to approve the variance and a copy of the Findings of Fact, Conclusions of Law, and Decision and Order is enclosed. Before proceeding with the protective rock "blanket" please be sure to obtain the necessary clearance from other governmental agencies who have jurisdiction along the waterfront.

Very truly yours,

ZONING BOARD OF APPEALS

By
Frank Skrivanek
Planning Director

Enclosure

___ :Gay

ZONING BOARD OF APPEALS OF THE CITY AND COUNTY OF HONOLULU

STATE OF HAWAII

| | |
|---|---|
| IN THE MATTER OF THE APPLICATION<br><br>OF<br><br>ELIA A. LONG<br>FRED F. HEDEMANN<br>JOHN F. ROSA, AND<br>HAWAIIAN TRUST CO., LTD., TRUSTEE<br><br>FOR A VARIANCE | ) |

## FINDINGS OF FACT, CONCLUSIONS OF LAW, AND DECISION AND ORDER

### I. APPLICATION

The Zoning Board of Appeals at its meetings on October 24, and November 7, 1968, considered the application by Elia A. Long, Fred F. Hedemann, John F. Rosa, and Hawaiian Trust Company, Ltd., Trustee, for a variance from Ordinance No. 2837, relating to setback from zone of wave action to permit the construction of a protective rock "blanket" extending seaward from the existing seawall within the zone of wave action for four (4) parcels of land at 1226 to 1254-B Mokulua Drive in Lanikai.

A public hearing on this matter was held by the Zoning Board of Appeals on November 7, 1968, in accordance with Section 5-515(3) of the City Charter.

### II. FINDINGS OF FACT

On the basis of the evidence presented, the Board hereby finds:

1. The four parcels in question are situated on the makai side of Mokulua Drive, between a point opposite Aala Drive

and Onekea Drive, at 1226 to 1254-B Mokulua Drive, identified by Tax Map Key 4-3-05: 56, 57, 76, and 88, in Lanikai, Koolaupoko, Oahu;

2. The lots front on Mokulua Drive and have depths of approximately 200 feet;

3. The existing seawall along the ocean frontage is 2 feet in width and approximately 5 feet in height and the seawall abuts a sandy shoreline;

4. The seawall is a nonconforming structure, constructed prior to the enactment of Ordinance No. 2837 which became effective August 19, 1966;

5. The zone of wave action line is the existing seawall inasmuch as it limits the advancement of waves inland. From inspection on the ground and from all indications, the entire seawall seems to be inside the property line. Therefore, any proposed construction within 5 to 6 feet on the ocean side of the wall would be contrary to Ordinance No. 2837 and thus requires a variance;

6. The applicant's proposal of construction of a protective stone "blanket" (seawall rock barrier) seaward from the existing seawall would necessitate variance from Section 1 (c) of Ordinance No. 2837, which prohibits any structure including but not limited to buildings, seawall, groin and revetment from being placed or erected within 10 feet of the zone of wave action as measured horizontally and landward from the inland boundary line of the zone of wave action, on any lot which is situated immediately adjacent to a sandy beach;

7. Waves are undermining the existing seawall which may create a hazardous condition and will eventually result in erosion of the properties under discussion;

8. The applicants have obtained permission to proceed with the rock barrier from the Corps of Engineers, Department of Army; Department of Land and Natural Resources, State of Hawaii; and Department of Transportation, Harbors Division; and

9. There were no protests filed in person or by letter during or prior to the public hearing.

## III. CONCLUSIONS OF LAW

The Board made the following Conclusions of Law:

1. By reason of peculiar and unusual circumstances pertaining to the physical characteristics of the property, practical difficulty and unnecessary hardship would result from a strict enforcement of the existing zoning regulations;

2. The request is due to unique circumstances and not to the general conditions in the neighborhood which reflect the unreasonableness of the zoning ordinance; and

3. The use sought by the variance will not alter the essential character of the locality nor be contrary to the intent and purpose of the zoning ordinance and will not adversely affect the adjoining property owners.

## IV. DECISION AND ORDER

Pursuant to the foregoing Findings of Fact and Conclusions of Law, it was the decision of the Zoning Board of Appeals at its meeting on November 7, 1968, that the application for a variance from Ordinance No. 2837, relating to the Zone of Wave Action, be approved for the four (4) lots identified by Tax Map Key 4-3-05: Parcels 56, 57, 76, and 88, on the basis that it found sufficient evidence to meet the three conditions of hardship specified in the City Charter, and the construction of the protective rock "blanket" extending seaward from the

existing seawall within the zone of wave action be subject to submission of a revised plan satisfactory to the Planning Director showing the utilization of larger rocks (approximately 400 lb. stones) for the rock "blanket" which shall be made a part of the variance.

Dated at Honolulu, Hawaii, this 7th day of November, 1968.

ZONING BOARD OF APPEALS OF THE
CITY AND COUNTY OF HONOLULU
STATE OF HAWAII

By_____
Jonah Ting, Chairman

____:cag

Appendix D

# Grant of Non-Exclusive Easement (S-6043)

31 AM

STATE OF HAWAII
BUREAU OF CONVEYANCES
RECORDED
October 14, 2014 8:01 AM
Doc No(s) A-54000412

/s/ NICKI ANN THOMPSON
REGISTRAR

1 1/7 ZMA
B-32534026

LAND COURT SYSTEM | REGULAR SYSTEM

Return by Mail ( ✓ ) Pickup ( ) To:

State of Hawaii
DLNR
P.O. Box 621
Hon. HI 96805

TG: 201408164-S R$(1)
TGE: 14-040-067
Trish Furtado

Total Number of Pages:

Tax Map Key No. (1)4-3-005:seaward of 056

AMENDMENT OF GRANT OF NON-EXCLUSIVE EASEMENT NO. S-6043

THIS AGREEMENT, made and entered into this 22 day of August, 2014, by and between the State of Hawaii, by its Board of Land and Natural Resources, hereinafter referred to as the "Grantor," and JAMES HUGH DUNCAN and BARBARA-JEANN DUNCAN, husband and wife, as tenants in the entirety, whose address is 26908 Malibu Cove Colony, Malibu, California 90265, hereinafter referred to as the "Grantee";

WITNESSETH:

WHEREAS, Grant of Non-Exclusive Easement S-6043 dated September 27, 2013, recorded in the State of Hawaii, Bureau of Conveyances as Document No. A-51790561, was issued to Grantee; and

WHEREAS, the Grantee desires that Grant of Non-Exclusive Easement No. S-6043 be amended; and

WHEREAS, the Board of Land and Natural Resources, at its meeting held on June 13, 2014, has approved the amendment to Grant of Non-Exclusive Easement No. S-6043 for the purposes of:

558859_1.DOC

PRELIM. APPR'D.
Department of the
Attorney General

1. Revising the area to be 1,308 square feet due to a recent shoreline survey map which showed that the encroachment area is 1,308 square feet and not 1,268 square feet as previously determined; and

2. Stipulating the consideration for the difference between the old area and the new area to be TWO THOUSAND SIX HUNDRED EIGHTY AND NO/100 DOLLARS ($2,680.00).

NOW, THEREFORE, the Grantor and Grantee covenant and agree that:

1. At page 2, at line 3 to line 10, the following is hereby deleted being: "'Non-Exclusive Seawall and Revetment Easement,' containing an area of 1,268 square feet, more or less, more particularly described in Exhibit "A" and delineated on Exhibit "B," both of which are attached hereto and made parts hereof, said exhibits being respectively, a survey description and survey map prepared by the Survey Division, Department of Accounting and General Services, State of Hawaii, designated C.S.F. No. 25,194 and dated June 8, 2012," and in its place the following shall hereby replace said deletion: "(Revised-June 2014) Non-Exclusive Seawall and Revetment Easement," containing an area of 1,308 square feet, more or less, more particularly described in Exhibit "A-1" and delineated on Exhibit "B-1," both of which are attached hereto and made parts hereof, said exhibits being respectively, a survey description and survey map prepared by the Survey Division, Department of Accounting and General Services, State of Hawaii, designated C.S.F. No. 25,376 and dated June 19, 2014."

2. The consideration for the difference between the old area and the new area is TWO THOUSAND SIX HUNDRED EIGHTY AND NO/100 DOLLARS ($2,680.00).

IN CONSIDERATION THEREOF, the Grantor and Grantee further agree that this Amendment of Grant of Non-Exclusive Easement No. S-6043 is subject to all the covenants and conditions in the Grant of Non-Exclusive Easement No. S-6043, except as herein provided.

This Amendment, read in conjunction with the Grant of Non-Exclusive Easement No. S-6043 sets forth the entire agreement between the Grantor and Grantee; and the Grant of Non-Exclusive Easement No. S-6043 as amended and modified hereby shall not be altered or modified in any particular except by a memorandum in writing signed by the Grantor and Grantee.

IN WITNESS WHEREOF, the STATE OF HAWAII, by its Board of Land and Natural Resources, has caused the seal of the Department of Land and Natural Resources to be hereunto affixed and the parties hereto have caused these presents to be executed the day, month, and year first above written.

STATE OF HAWAII

Approved by the Board of Land and Natural Resources at its meeting held on June 13, 2014.

By _____
WILLIAM J. AILA, JR.
Chairperson
Board of Land and Natural Resources

GRANTOR

APPROVED AS TO FORM:

_____
PAMELA K. MATSUKAWA
Deputy Attorney General

Dated: 8/7/2014

_____
JAMES HUGH DUNCAN

_____
BARBARA-JEANN DUNCAN

GRANTEE

558859_1.DOC



PRELIM. APPR'D.
Department of the Attorney General

**STATE OF HAWAI'I**
**SURVEY DIVISION**
**DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES**
**HONOLULU**

C.S.F. No. 25,376 June 19, 2014

(REVISED-JUNE 2014)
NON-EXCLUSIVE
SEAWALL AND REVETMENT EASEMENT
Affecting Lots A-1 and A-2-A of Land Court Application 505
and Lot 1-A of Land Court Application 616

Kailua, Koolaupoko, Oahu, Hawaii

Being a portion of the submerged land of Kailua Bay and the submerged land within Lots A-1 and A-2-A of Land Court Application 505 and Lot 1-A of Land Court Application 616.

Beginning at the south corner of this easement, at the southeast corner of Lot 1-A as shown on Map 10 of Land Court Application 616 and on the north boundary of Lot 335 as shown on Map 56 of Land Court Application 616, the coordinates of said point of beginning referred to Government Survey Triangulation Station "MOKAPU" being 23,896.79 feet South and 6797.08 feet East, thence running by azimuths measured clockwise from True South:-

1. 152° 22' 41.74 feet along Lot 1-A as shown on Map 10 of Land Court Application 616;

2. 146° 26' 27.60 feet along the remainder of Lot 1-A as shown on Map 10 of Land Court Application 616;

PRELIM. APPR'D.
Department of the
Attorney General



EXHIBIT "A-1"

| | | |
|---|---|---|
| 3. | 144° 20' | 22.11 feet along the remainder of Lot 1-A as shown on Map 10 of Land Court Application 616, remainder of Lot A-1 as shown on Map 4 of Land Court Application 505 and remainder of Lot A-2-A as shown on Map 8 of Land Court Application 505; |
| 4. | 61° 49' | 10.14 feet along the remainder of Lot A-2-A as shown on Map 8 of Land Court Application 505; |
| 5. | 132° 02' | 11.88 feet along the remainder of Lot A-2-A as shown on Map 8 of Land Court Application 505; |
| 6. | 235° 00' | 14.16 feet along Lot A-2-B as shown on Map 8 of Land Court Application 505; |
| 7. | 235° 00' | 4.34 feet; |
| 8. | 298° 59' | 1.41 feet; |
| 9. | 313° 27' | 18.58 feet; |
| 10. | 320° 52' | 16.49 feet; |
| 11. | 319° 06' | 13.47 feet; |
| 12. | 345° 52' | 7.94 feet; |
| 13. | 303° 37' | 8.61 feet; |
| 14. | 0° 19' | 6.37 feet; |
| 15. | 308° 25' | 5.41 feet; |
| 16. | 349° 07' | 8.82 feet; |
| 17. | 311° 51' | 12.44 feet; |
| 18. | 344° 24' | 10.84 feet; |
| 19. | 62° 40' 30" | 8.82 feet; |

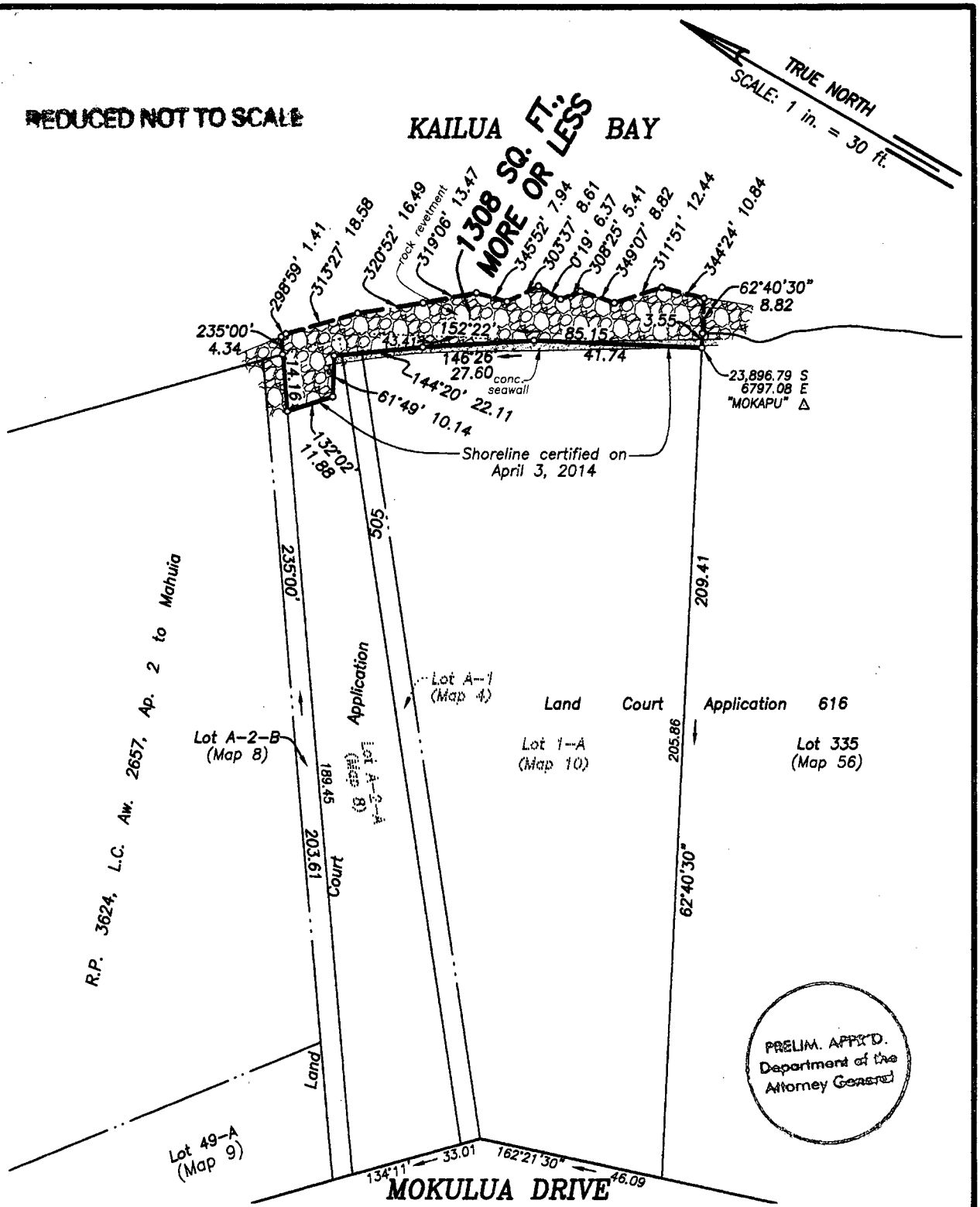
20. 62° 40' 30" 3.55 feet along Lot 335 as shown on Map 56 of Land Court Application 616 to the point of beginning and containing an AREA OF 1308 SQUARE FEET, MORE OR LESS.

SURVEY DIVISION
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
STATE OF HAWAII

By: _____
Gerald Z. Yonashiro
Land Surveyor tkt

Compiled map and desc. furn. by Towill Shigeoka & Assoc., Inc. Said map and desc. have been examined and checked as to form and mathematical correctness but not on the ground by the Survey Division.

PRELIM. APPR'D.
Department of the
Attorney General




# (REVISED–JUNE 2014)
# NON–EXCLUSIVE
# SEAWALL AND REVETMENT EASEMENT

*Affecting Lots A–1 and A–2–A of Land Court Application 505 and Lot 1–A of Land Court Application 616*

*Kailua, Koolaupoko, Oahu, Hawaii*

*Scale: 1 inch = 30 feet*

Job 0–119(14)

C. BK.

EXHIBIT "B-1"

*Fronting Parcel 56 of TMK: 4–3–05*

SURVEY DIVISION
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
STATE OF HAWAII

C.S.F. NO. 25,376

RDM June 19, 2014

Appendix E

# Certified Shoreline (November 13, 2020)

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

**STATE OF HAWAII**
**DEPARTMENT OF LAND AND NATURAL RESOURCES**

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

RECEIVED
NOV 19 2020
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
Honolulu, Hawaii 96817-5031

November 13, 2020

File No.: OA-1911

Austin, Tsutsumi & Associates, Inc.
501 Sumner Street, Suite 521
Honolulu, Hawaii 96817

Dear Applicant:

Subject: Transmittal of Signed Shoreline Certification Maps
Owner(s): Krueger Trust
Tax Map Key: (1) 4-3-005:056

Enclosed please find three (3) copies of the certified shoreline survey maps for the subject property.

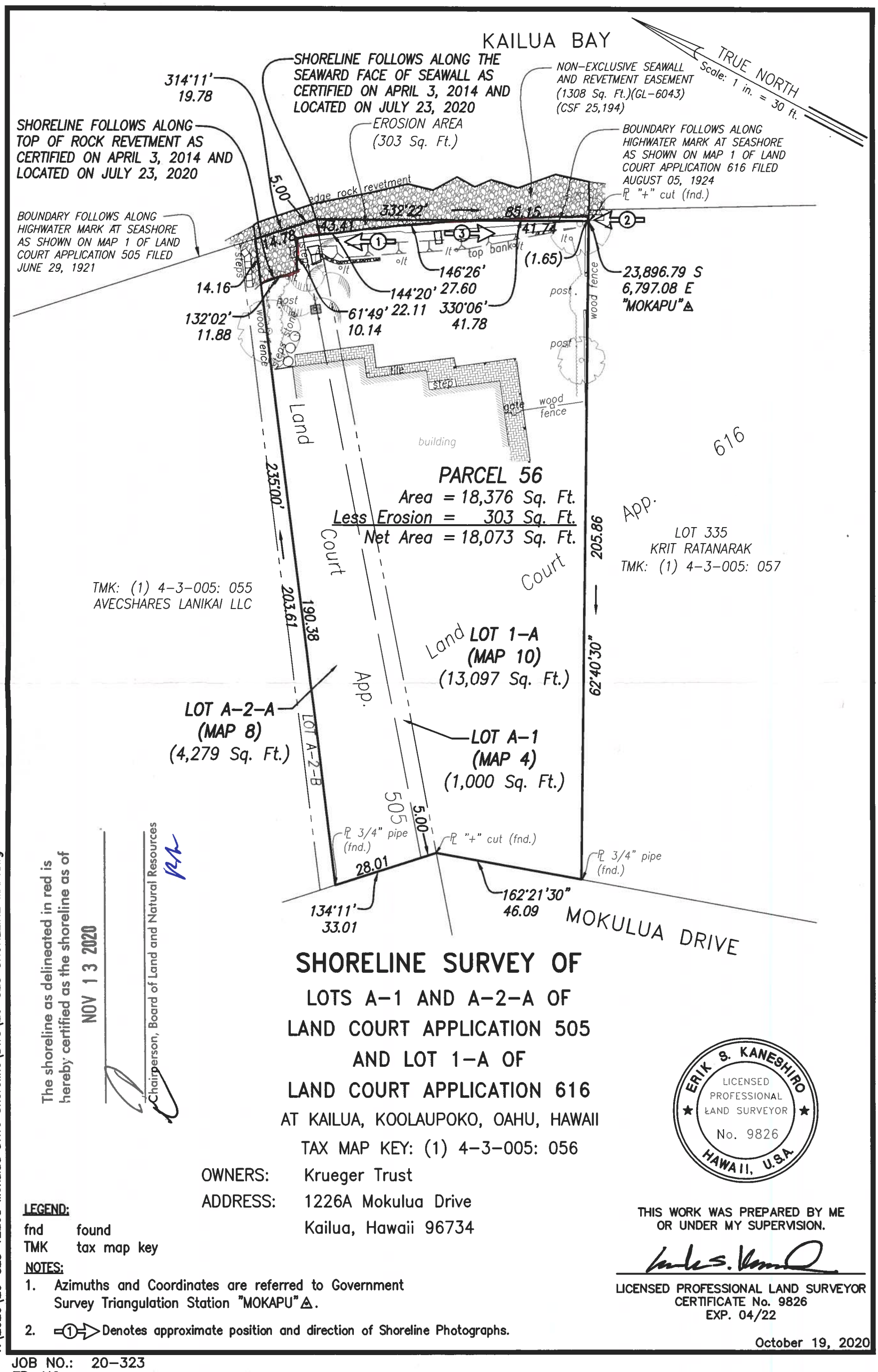
If you have any questions, please feel free to call us at (808) 587-0424. Thank you.

Sincerely,

Cal Miyahara
Shoreline Disposition Specialist

Enclosures

cc: DAGS




# SHORELINE SURVEY OF

## LOTS A-1 AND A-2-A OF LAND COURT APPLICATION 505 AND LOT 1-A OF LAND COURT APPLICATION 616

AT KAILUA, KOOLAUPOKO, OAHU, HAWAII

TAX MAP KEY: (1) 4-3-005: 056

OWNERS: Krueger Trust

ADDRESS: 1226A Mokulua Drive
Kailua, Hawaii 96734

The shoreline as delineated in red is hereby certified as the shoreline as of NOV 13 2020

Chairperson, Board of Land and Natural Resources

ERIK S. KANESHIRO
LICENSED PROFESSIONAL LAND SURVEYOR
No. 9826
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

LICENSED PROFESSIONAL LAND SURVEYOR
CERTIFICATE No. 9826
EXP. 04/22

October 19, 2020

**LEGEND:**

fnd found
TMK tax map key

**NOTES:**

1. Azimuths and Coordinates are referred to Government Survey Triangulation Station "MOKAPU".
2. ①▷ Denotes approximate position and direction of Shoreline Photographs.

JOB NO.: 20-323
FB. NO.:
10" X 15"

Y:\2020\20-323 1226a Mokulua Drive Shoreline\DWG\20-323 SHORELINE MAP.dwg

Appendix F

# Sea Engineering, Inc. Coastal Assessment Krueger Seawall Repairs (May 2021)

# Coastal Assessment for Krueger Shore Protection Mitigative Improvements

*Lanikai, Oahu, Hawaii*

*May 2021*

***Prepared for:***
David and Terri Krueger
1226A Mokulua Drive
Kailua, HI 96734
Tax Map Key No. (1) 4-3-005:056

***Prepared by:***
Sea Engineering, Inc.
Makai Research Pier
41-305 Kalanianaole Hwy
Waimanalo, HI  96795

*Job No. 25751*

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# 1. INTRODUCTION

## 1.1 Background

Sea Engineering, Inc. (SEI) was hired to prepare a Coastal Assessment for the Krueger Shore Protection Mitigative Improvements project. The project site is located at 1226a Mokulua Drive, Kailua, Oahu, Hawaii, 96734; Tax Map Key No. (1) 4-3-005:056. The project site is fronted by a seawall and rock apron that that are in a deteriorated condition. The property owners are evaluating potential options to repair or replace the existing shore protection.

The purpose of this Coastal Assessment is to collect the data and information necessary to understand the problem and inform the development of conceptual engineering solutions that are appropriate for the site conditions. The objective of this Coastal Assessment is to assess current conditions, evaluate potential engineering alternatives, present conceptual alternatives, and identify the preferred alternative.

The Coastal Assessment is an important component of the environmental review and regulatory permitting process. This Coastal Assessment complies with the Office of Environmental Quality Control (OEQC) guidelines for assessing shoreline alteration projects, including a detailed description of the existing shoreline and coastal processes; historical shoreline erosion rates; site maps; oceanographic setting; coastal hazards; description of improvements; and review of alternatives.

## 1.2 Location

The project site consists of a single residential property located in the community of Lanikai, approximately 0.70 mi southeast of Alala Point, and approximately 0.76 mi northwest of Wailea Point. The project site is bounded by Mokulua Drive to the west and the Pacific Ocean to the east. The location of the project site is shown in Figure 1-1 and Figure 1-2. Oblique aerial photographs of the project site are shown in Figure 1-3. The project site is located along a predominantly armored shoreline that extends approximately 4,000 ft from Wailea Point to the central portion of Lanikai. The project site is fronted by a seawall that is constructed of unreinforced concrete and a rock apron that is composed of basalt boulders that runs along the length of the seawall. The north and south adjacent properties are fronted by similar shore protection structures. (Figure 1-3).

## 1.3 Objectives

The existing seawall and rock apron are covered by a term, non-exclusive easement from the State of Hawaii (Easement S-6043). The easement confers unto the Grantee the "right, privilege, and authority to use, maintain, repair, replace and remove the existing seawall and steps over, under, and across State-owned land". The easement also requires that the Grantee "shall keep the easement area and the improvements thereon in a safe condition".

The objectives of the proposed mitigative improvements are to:

- Repair damage and structural deficiencies of the existing seawall.
- Comply with the conditions of the easement to maintain the structures in a safe condition.
- Provide long-term protection for the property and existing single-family home.

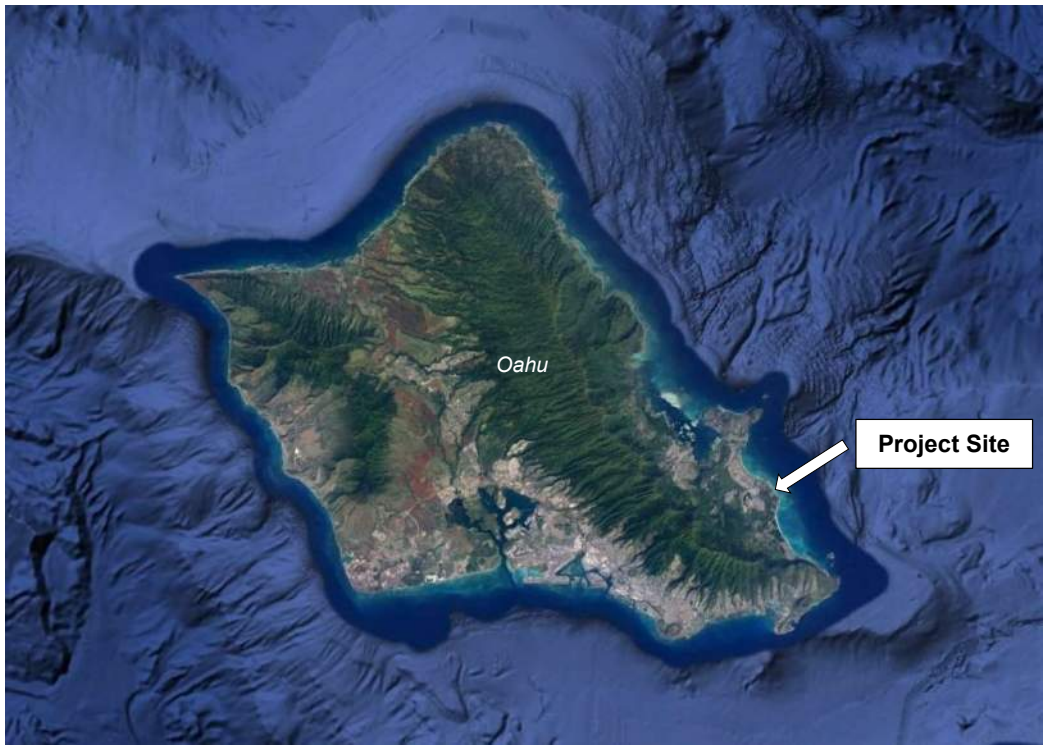


**Figure 1-1 Project site location on Oahu, Hawaii (Google Earth)**


**Figure 1-2 Project site location in Lanikai, Oahu (Google Earth)**

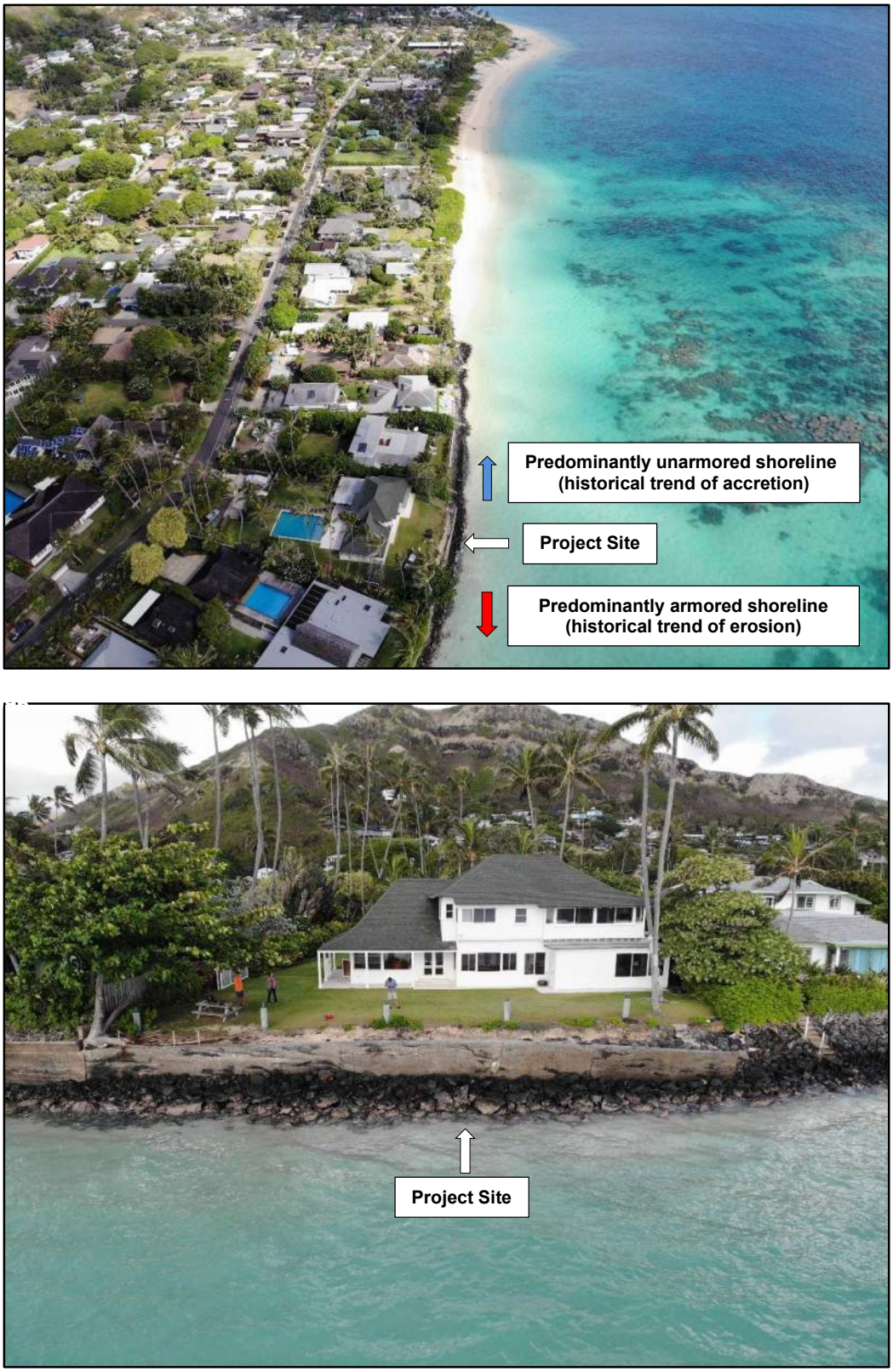


**Figure 1-3 Oblique aerial photographs of the project site (July 2020)**

# 2. PROJECT SITE DESCRIPTION

## 2.1 Regional Setting

The project site is located along Mokulua Drive at the seaward edge of a relatively flat coastal plain in the community of Lanikai on the southeast coast of Oahu. The coastline is dominated by narrow beaches, discontinuous coastal dunes, and broad shallow fringing reefs. The region is intensely developed, and many beaches suffer from chronic and episodic erosion. The backshore area at the project site consists of a single residential parcel. Lateral shoreline access is limited due to the extensive shoreline armoring and lack of beach width in the Lanikai area.

The project coastline is characterized by a wide fringing reef that extends over 3,000 ft offshore and along the Mokulua Islands. The fringing reef is incised with channels or depressions at numerous locations and has numerous sand patches. The shallow reef crest and reef flat dissipate wave energy as it approaches the shoreline. During typical conditions, significantly less wave energy reaches the shoreline than exists in deep water due to the shallow depths of the reef and subsequent wave breaking. However, wave energy still reaches the shoreline at higher water levels and cross-shore currents still occur. Sand in Lanikai Beach and the nearshore sand fields is mobilized through active longshore and cross-shore transport. Typical patterns on windward Oahu beaches show sand being pushed offshore with winter swell events and a gradual transport back onshore during summer tradewind swell conditions. Longer term sand dynamics of Lanikai Beach have changed due to the extensive armoring of the shoreline, particularly along the southern portion of the shoreline, south of the project site.

Prior to the late 1970's, Lanikai Beach showed a trend of accretion. This trend reversed causing erosion along the shoreline. In response, property owners constructed seawalls and other hardened shoreline structures (Romine and Fletcher, 2012). The project site is located at the north end of a predominantly armored shoreline that extends approximately 4,000 ft south to Wailea Point. The shoreline north of the project site transitions to a wider, dry beach with backshore dune formation and stable vegetation. Many of the properties in this area are fronted by shore protection structures that have been buried as the shoreline has accreted over time. The beach extends approximately 2,500 ft north of the project site. The remaining 1,200 ft of shoreline extending to Alala Point is fronted by shore protection structures.

## 2.2 Existing Conditions

The project site consists of a single residential parcel with a total land area of 18,376 $ft^2$ (0.42 acres) and a total shoreline frontage of 105 ft. Terrestrial elevation ranges from 7 to 11 ft above mean sea level (msl). The project site is fronted by a seawall that is constructed of unreinforced concrete and a rock apron that is composed of basaltic boulders that are 9 to 18 inches in diameter. The rock apron is approximately 4 ft high, 10 ft wide, and runs along the length of the seawall. Aerial and ground photographs showing the current condition of the shoreline are shown in Figure 2-1 through Figure 2-3

There are no construction permits or other land use authorizations for the seawall. However, datable ground photographs have shown that the seawall existed in its current shape and location in 1953. The rock apron was permitted in 1968 by the Hawaii Department of Transportation Harbors Division (Shore Waters Construction Permit No. 1395) and Hawaii Board of Land and Natural

Resource. In 2012, the Hawaii Board of Land and Natural Resources approved disposition of a term, non-exclusive easement for seawall and revetment purposes. The easement was executed by the Hawaii State Legislature on September 27, 2013 (Grant of Non-Exclusive Easement S-6043). The easement confers unto the Grantee the "right, privilege, and authority to use, maintain, repair, replace and remove the existing seawall and steps over, under, and across State-owned land". The easement also requires that the Grantee "shall keep the easement area and the improvements thereon in a safe condition". The easement is valid for fifty-five (55) years and will expire on September 27, 2069.

The seawall is approximately 90 ft long and 6 to 8 ft tall, as referenced from the beach sand elevation at the time of the inspection. The top of the wall varies in elevation from about +5 ft to +7 ft mean sea level (msl). The top of the wall is approximately 16 to 17 inches wide with apparent front and rear batters of about 1H:12V to 1.5H:12V (horizontal to vertical). Based on these batters and wall heights, the base of the wall is estimated to be approximately 2.4 ft wide. Two concrete counterforts are located on the landward side of the wall at approximately 43 ft and 70 ft from the north end, respectively (Figure 2-4). The seawall terminates approximately 20 ft from the northwest property corner. Wave action is causing erosion of the terrestrial soils in this area (Figure 2-5).

The seawall appears to have been constructed in six (6) segments, or panels. Vertical joints are visible between each panel section. There is evidence of concrete repairs at several of the panel joints (Figure 2-6). An approximately 1 to 2-inch-wide gap was observed at the panel joint between the subject seawall and the south adjacent seawall (Figure 2-7).

Settlement was observed along the northern portion of the seawall. The settlement was approximately 24 inches relative to the southern portion of the wall (Figure 2-8). The settlement is likely due to loss of subgrade support from erosion of the underlying substrate. Outward rotation of the wall has also occurred in these areas (Figure 2-9) and the return at the north end of the seawall has disconnected from the main wall structure (Figure 2-10). The outward rotation of the wall may be attributed to a loss of bearing support fronting the wall and/or an increase in the active lateral forces due to saturated soil conditions.

The seawall appears to have been constructed on loose sand that is highly susceptible to scour and erosion. At a portion of the wall about 30 ft from the north end, where the bottom of the wall was visible, sandy substrate was visible under the wall. Sinkholes are apparent along the entire length of the seawall (Figure 2-11). The sinkholes likely formed due to internal erosion of the sandy substrate from beneath and behind the seawall foundation.


**Figure 2-1 Existing conditions (July 2020)**

**Figure 2-2 Existing conditions – north end of shoreline (July 2020)**

**Figure 2-3 Existing conditions – south end of shoreline (July 2020)**

**Figure 2-4 Counterfort on inshore side of seawall (July 2020)**

**Figure 2-5 Backshore erosion along north end of shoreline (July 2020)**

**Figure 2-6 Concrete repairs at panel joint (July 2020)**

**Figure 2-7 Gap between subject seawall and south adjacent seawall (July 2020)**

**Figure 2-8 Settlement along northern portion of seawall (July 2020)**

**Figure 2-9 Outward rotation along northern portion of seawall (July 2020)**

**Figure 2-10 Disconnected return at north end of seawall (July 2020)**

**Figure 2-11 Sinkholes inshore of existing seawall (July 2020)**

## 2.3 Geotechnical Assessment

Geotechnical investigations were conducted by APTIM (February 2019) and Shinsato Engineering, Inc. (July 2020). The investigations included a total of three (3) test borings and a laboratory analysis on the soil samples to determine their engineering properties. The backfill soil and seawall subgrade appears to be a fine to medium grain calcareous sand. Bore #1 and Bore #2 of the APTIM (2019) investigation encountered what appeared to be a hard, nonerodable substrate approximately 15 to 20 ft below the backfill ground elevation. Bore #1 of the Shinsato (2020) investigation (Figure 2-12) encountered loose, light brown and tan, fine grained calcareous sand to a depth of 9 ft. Below 9 ft, the sand was found to be medium to coarse grained and medium dense in consistency. At 10.5 ft, the bore hole caved in. Probing below 10.5 ft disclosed medium dense to dense soil to a depth of 26.5 ft below grade then grading to very dense to the final depth of the boring at 28.33 ft where there was refusal to further probing. Groundwater was encountered at a depth of 7'10" below the existing grade. SEI previously conducted water jet probing at several properties near the project site. Probe refusal was encountered at -6 to -8 ft msl. For the structural evaluation of the wall including preliminary repair design, the recommended soil parameters are as follows:

1. <u>Ultimate soil bearing value for evaluation of the existing wall:</u>
   The ultimate soil bearing pressure may be assumed as 1,500 psf for each foot of width plus 2,000 psf for each foot of embedment. For example, a 4-ft-wide footing bearing directly on the soil (no embedment), the ultimate soil bearing capacity would be 6,000 psf. With 1 foot of embedment, the ultimate bearing capacity for the 4-ft-wide footing would increase to 8,000 psf. Note: the above assumes positive contact between the bottom of the footing and the subgrade soil.

2. <u>Allowable soil bearing value:</u>
   Apply a minimum factor of safety of 3.0 to the ultimate soil bearing value to obtain the allowable soil bearing value. The recommended maximum allowable soil bearing value is 4,000 psf in order to limit the anticipated foundation settlement to less than 1-inch. Higher bearing values will result in an increase in the foundation settlement. The bearing value may be increased by one-third (1/3) for momentary loads due to wind or seismic forces. The maximum edge pressure shall not exceed the maximum allowable soil bearing pressure. The minimum footing embedment 12 inches below the anticipated depth of soil scour or bearing on a nonerodable substrate.

3. <u>Lateral earth pressure coefficients:</u>

| | |
|---|---|
| * Passive Earth Coefficient | Kp = 4.55 |
| * Active Earth Coefficient | Ka = 0.22 (unrestrained condition) |
| | Ko = 0.33 (restrained condition) |
| Coefficient of friction | 0.83 x DL |
| Soil Unit Weight | 110 pcf (moist) |
| | 60 pcf (submerged) |

   The passive and active earth pressures may be determined by multiplying the respective earth coefficient by the soil unit weight (either above water - moist, or under water - submerged). Apply an appropriate factor of safety for allowable design values.

**LOG OF BORING NO. 1**

DRILLING METHOD: **Badger Drill Rig**
HAMMER WEIGHT (lbs): **140**
HAMMER DROP (in): **30**

ELEVATION (FT.): **Unknown**
DEPTH OF BORING (FT.): **28.33**
DEPTH TO GROUNDWATER (FT.): **7'-10"**
DATE DRILLED: **07/09/2020**

| DEPTH (FT.) | GRAPHIC SYMBOL | UNIFIED SOIL CLASSIFICATION | DESCRIPTION | SAMPLE | BLOWS/FOOT | COLOR | MOISTURE | CONSISTENCY | DRY DENSITY (PCF) | MOISTURE CONTENT (% OF DRY WT.) | PENETROMETER (TSF) | TORVANE STRENGTH (TSF) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | SP-SM | SAND (calcareous), with fines, few roots | | | light brown | sl. moist | loose | | | | |
| | | SP | SAND (calcareous), fine grained, trace of fines | | | tan | | | | | | |
| 2 | | | | ■ | 10 | | | | 85.4 | 2.9 | | |
| | | | | | | | moist | | | | | |
| 4 | | | | ■ | 7 | | | | 89.5 | 6.0 | | |
| 6 | | | | | | | very moist | | | | | |
| | | | | ■ | 14 | | ▼ | | 90.9 | 14.9 | | |
| 8 | | | | | | | | | | | | |
| | | | –medium to coarse grain | | | | | medium dense | | | | |
| 10 | | | | ■ | 19 | | | | 95.8 | 15.6 | | |
| | | | –hole caved in to 8' | | 14 | | | | | | | |
| | | | –probed from 10.5' with a 2-inch diameter probe tip attached to AW rods; driven with the 140-lb. hammer falling from a height of 30-inches | | 20 | | | | | | | |
| 12 | | | | | 36 | | | dense | | | | |
| 14 | | | | | 42 | | | | | | | |
| | | | | | 54 | | | | | | | |
| 16 | | | | | 41 | | | | | | | |
| | | | | | 36 | | | | | | | |
| 18 | | | | | 23 | | | medium dense | | | | |
| | | | | | 22 | | | | | | | |
| 20 | | | | | 15 | | | | | | | |
| | | | | | 13 | | | | | | | |
| 22 | | | | | 16 | | | | | | | |
| | | | | | 11 | | | | | | | |
| 24 | | | | | 12 | | | | | | | |
| | | | | | 18 | | | | | | | |
| 26 | | | | | 20 | | | | | | | |
| | | | | | 51 | | | very dense | | | | |
| 28 | | | –refusal at 28'-4" | | 100/10" | | | | | | | |
| | | | END OF BORING | | | | | | | | | |
| 30 | | | | | | | | | | | | |

Project: KRUEGER PROPERTY SEAWALL
1226 MOKULUA DRIVE
Project No.: 19-0067

**SHINSATO ENGINEERING, INC.**
CONSULTING GEOTECHNICAL ENGINEERS
99-747 KUAHAO PL. #E, PEARL CITY, HI 96782

PLATE 3

**Figure 2-12 Boring log from project site (Shinsato, 2020)**

## 2.4 Certified Shoreline

In Hawaii, the shoreline boundary of property may be subject to change because of the action of the waves in adding to (accretion) or taking away (erosion) land along the shoreline and is subject to redetermination according to the laws of the State of Hawaii. Shoreline boundaries are typically determined by a certified shoreline. The "shoreline" in Hawaii is defined as:

> *"the upper reaches of the wash of the waves, other than storm or seismic waves, at high tide during the season of the year in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth, or the upper limit of debris left by the wash of the waves (Hawaii Administrative Rules §13-222)."*

The shoreline plays an important role in establishing jurisdictional boundaries for coastal land uses in Hawaii. Submerged lands seaward of the shoreline are located in the State Conservation District and come under the administrative jurisdiction of the Hawaii Department of Land and Natural Resources (DLNR). Lands inland of the shoreline are located in the Special Management Area and Shoreline Setback Area and come under the administrative jurisdiction of the counties. A certified shoreline is typically a prerequisite for obtaining approvals for land uses in the Conservation District and Special Management Area. The certified shoreline also establishes the landward limits of the *beach transit corridor*, which is intended to provide lateral public access seaward of the shoreline.

The project site shoreline was certified by the State of Hawaii on April 3, 2014 (Figure 2-13). The certified shoreline confirmed that the shoreline is located along the seaward face of seawall and top of the rock apron.

## 2.5 Shoreline Profiles

SEI conducted a topographic survey in July 2020 to collect elevation data of the backshore, foreshore, and nearshore waters fronting the project site. Four (4) shoreline profiles were generated through the topographic survey data to show the cross-shore profile of the seawall and rock apron (Figure 2-14 and Figure 2-15). Elevations are relative to mean sea level (msl). There is no seawall present at Profile 4.

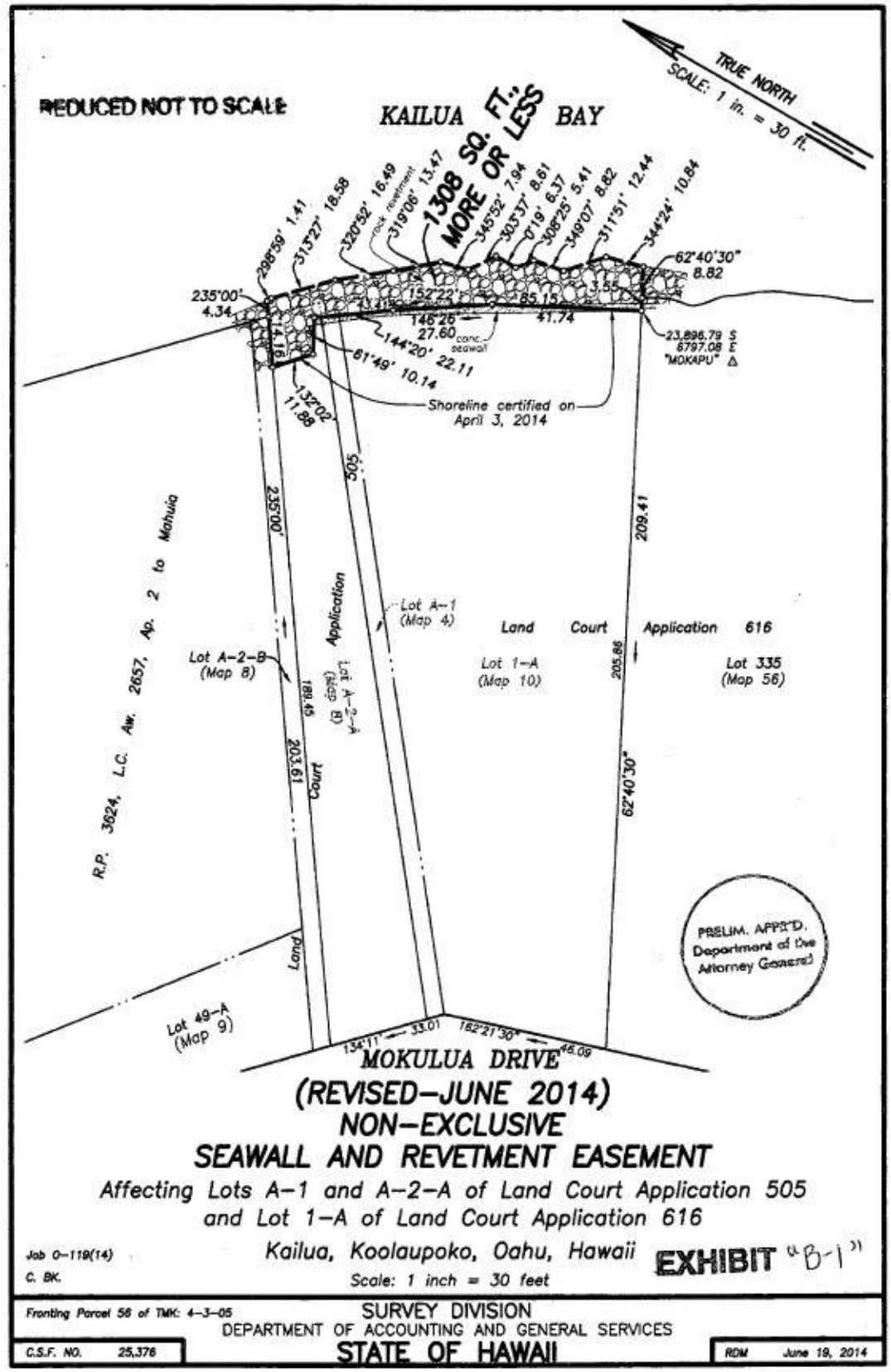


**Figure 2-13 Shoreline as certified by the State of Hawaii April 3, 2014**


**Figure 2-14 Profile transect locations**

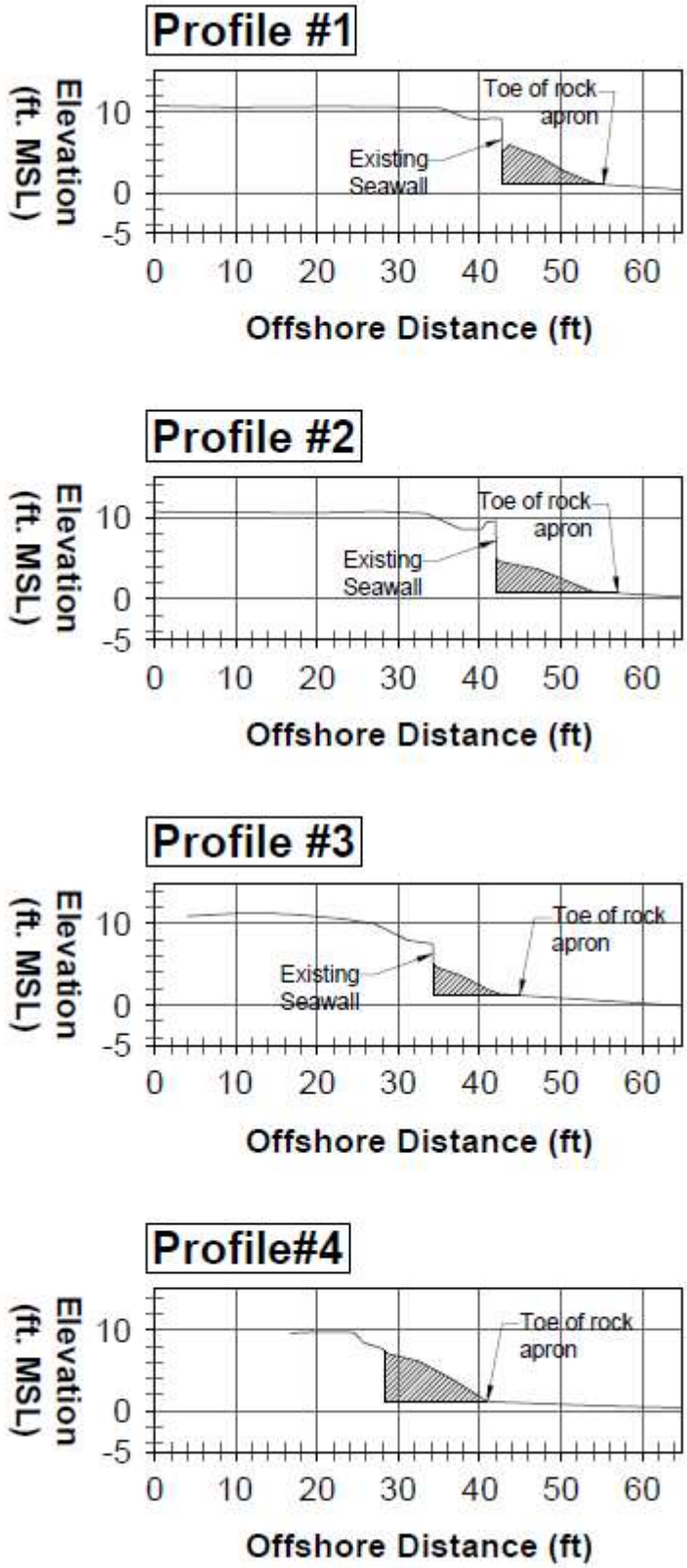


**Figure 2-15 Profiles from topographic survey (July 2020)**

## 2.6 Historical Shoreline Change

Historical shoreline change for Lanikai has been analyzed with aerial photographs by the University of Hawaii Coastal Geology Group (CGG, 2019). The CGG compared the low water mark digitized from National Ocean Survey topographic survey charts (T-sheets) from 1911 and 1928, and eleven (11) aerial photographs between 1949 and 2015.

The project site shoreline corresponds with Transect 66 of the CGG study (Figure 2-16). The CGG analysis determined that the dominant shoreline change trend for the project site has been accretion at an average rate of 0.2 ft/yr. While this rate is representative of the average, smoothed, long-term trend for the shoreline from 1911 to 2015, it does not account for fluctuations in beach width that have occurred since the study was completed. It should also be noted that the historical trend has an uncertainty of 0.9 ft/yr, which is nearly five times the historical rate of 0.2 ft/yr.

Figure 2-16 shows the historical shoreline positions and uncertainty levels for Transect 66. The project site shoreline was relatively stable from 1949 to 1971. Accretion was the dominant trend from 1975 to 1988. However, erosion has been the dominant trend since 1996. From 1996 to 2015, the shoreline has retreated approximately 95 ft.

Romine and Fletcher (2012) found that, prior to the late 1970's, a pattern of accretion was present in southern Lanikai. After this time, a pattern of erosion began and increased in severity with the installation of additional hardened structures throughout the neighboring shoreline. Fletcher et al. (1997) found that changes in beach volume along the Lanikai coastline tend to be related to chronic fluctuations in alongshore sand transport and sediment deficiencies, rather than event-based erosion because the offshore reef platform diminishes incoming swell. Boccichio (2009) found that Lanikai has experienced a series of decadal-scale erosion and accretion events producing > 50 m changes in beach width over a 60-yr period, and that shoreline behavior is governed by a significant southeast to northwest trend in net sand transport.

The U.S. Army Corps of Engineers (2009) analyzed historical shoreline change and sediment transport in Lanikai from 1996 to 2005 (Figure 2-17). The project site is located at an inflection point where the dominant long-term shoreline change trend transitions from accretion (north of the project site) to erosion (south of the project site). The shoreline north of the project site is predominantly sandy beach, whereas the shoreline to the south is predominantly armored. Given the lack of beach to the south, and the dominant direction of sand transport being southeast to northwest, there does not appear to be a natural mechanism for sustainable sand accretion at the project site.

Anderson et al. (2015) found that, due to increasing sea level rise, average shoreline recession (erosion) in Hawaii is expected to be nearly twice the historical extrapolation by the year 2050, and nearly 2.5 times the historical extrapolation by the year 2100. In the absence of the existing shore protection, the project site would likely experience significant erosion with rising sea levels.


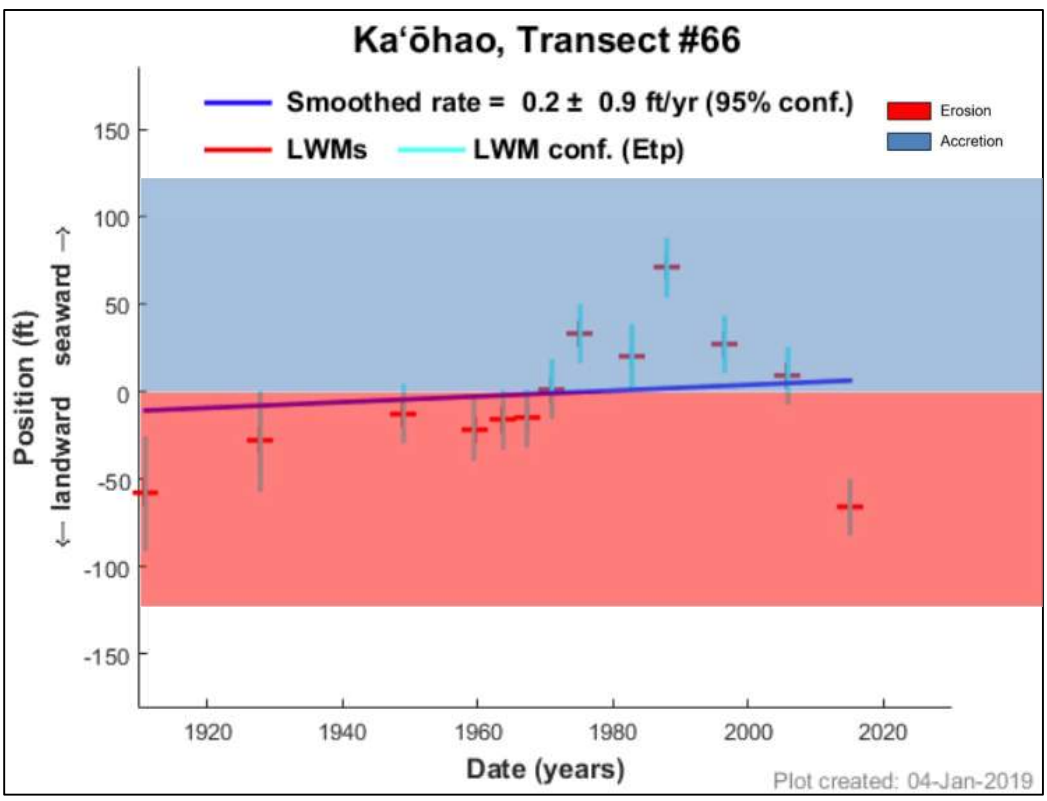


**Figure 2-16 Historical shoreline change rates for the project site (CGG, 2019)**

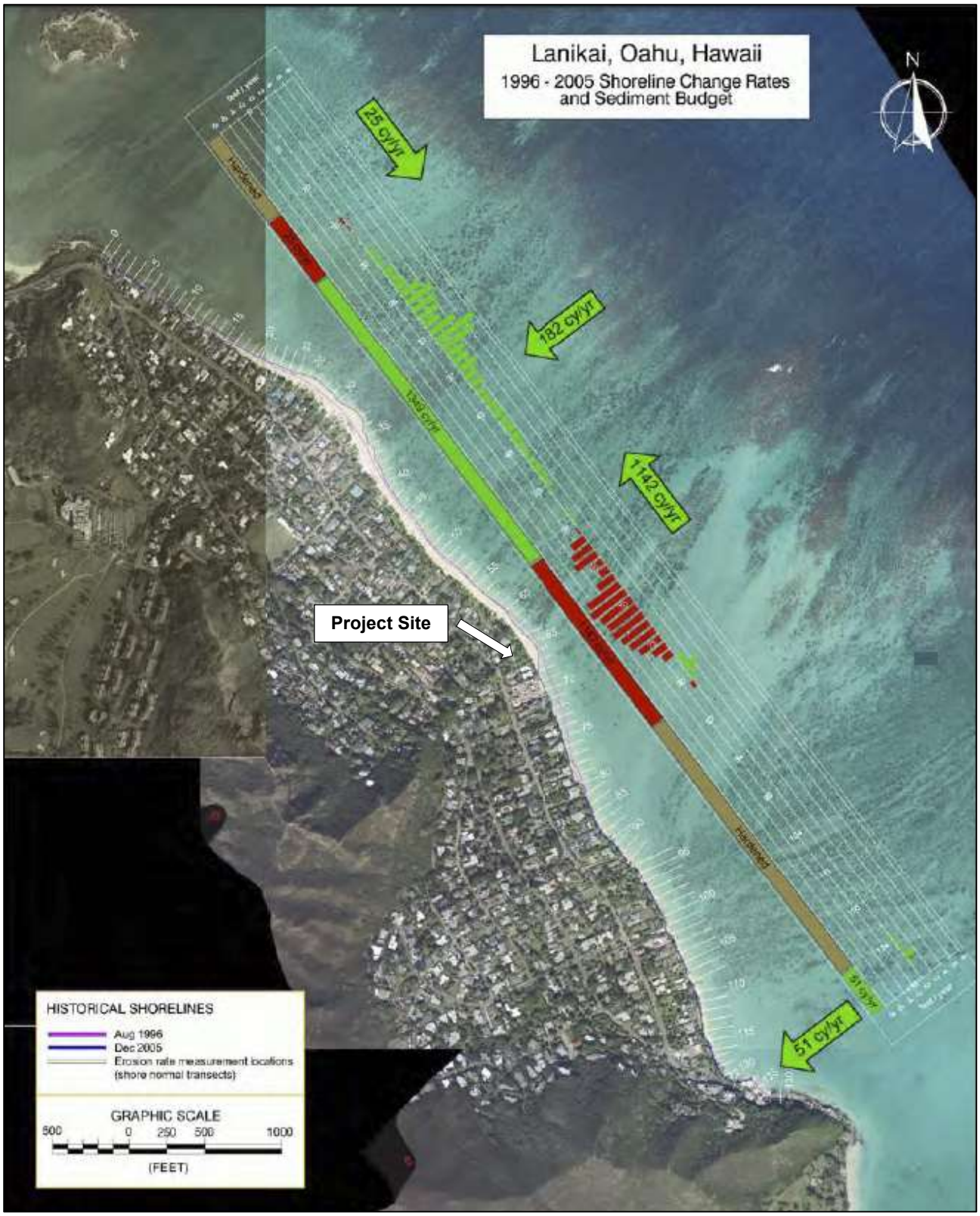


**Figure 2-17 Lanikai shoreline change and sediment budget, 1996-2005 (USACE, 2009)**

# 3. PHYSICAL SETTING

## 3.1 Geology and Soils

The surficial geology of the low-lying Lanikai coastal plain is primarily Holocene beach deposits (Sherrod et al., 2007) windward of the Koʻolau Volcano. The Koʻolau lavas are found within the watershed mauka of the project site. They are divided into the Koʻolau Basalt and the Honolulu Volcanics.

The Ko'olau Basalt primarily consists of Pliocene aged shield stage tholeiitic basalt, which plays an important role in the Ka'elepulu watershed. Koʻolau Basalt rocks can be divided into three groups; lava flows (aʻa and pahoehoe), pyroclastic deposits, and dikes. Lava flows associated with Koʻolau basalt are usually thinly bedded. Each bed is a unique flow, composed of aʻa and pahoehoe flows. Interspersed with these flows are pyroclastic deposits. Aʻa flows contains a solid central core between two gravely clinker layers. Pahoehoe flows are usually characterized by a smooth ropy texture. Pyroclastic deposits originate from explosive volcanism and are composed of friable sand-like ash and indurated tuff deposits. Dikes are thin near planar sheets of rock that intruded or squeezed into existing lava flows or pyroclastic deposits.

The shoreline is characterized by an extensive fringing reef complex associated with a broad, shallow, and generally smooth reef flat. The fringing reef parallels most of the coastline. The Lanikai shoreline consists of carbonate sand beaches with varying widths. The foreshore (beach) soils are classified as "beaches" (Figure 3-1). Landward of the subject property, soils are classified as Jaucus Sand (JaC) with 0 to 15% slopes (USDA, 2018).

## 3.2 Bathymetry

Figure 3-2 shows water depths (in meters) relative to mean sea level (msl) offshore of the project site. Water depths range from 0 to 5 meters on the inner reef flat, which extends approximately 3,700 ft offshore. Water depths along the reef crest range from 1 to 3 meters. Water depths on the outer reef range from 3 to 10 meters before dropping off into deeper waters offshore.

## 3.3 Benthic Habitat

The Pacific Island Ocean Observing System's (PacIOOS) Voyager web-based mapping program displays the National Oceanographic and Atmospheric Administration's (NOAA) benthic habitat data for the project site. These maps show the biology (Figure 3-3), geography (Figure 3-4), and geomorphology (Figure 3-5) of benthic habitat offshore of the project site, which is characterized by sand, scattered coral rock, and aggregate patch reef that is uncolonized or has live coral. The U.S. Fish and Wildlife Service classifies the nearshore waters as marine, intertidal, rocky shore that is regularly flooded. Offshore, the coastal waters are classified as marine, subtidal, unconsolidated bottom. The Hawaii Department of Health (DOH) classifies the nearshore waters as Class A Marine Waters.

## 3.4 Coastal Uses

Lanikai (originally referred to as *Ka'ōhao*) was developed as a subdivision in 1924. The majority of properties in Lanikai are zoned for residential purposes and the first residential structures were constructed around 1926 (Lanikai Association, 2020). Narrow sandy beaches exist along portions of Lanikai, particularly the northern and central portions of the shoreline (north of the project site). Lanikai Beach is bordered by a wide fringing limestone reef flats and is a recreational destination for paddlers, snorkelers, swimmers, and spearfishermen. There are no notable surf breaks in the vicinity of the project site. Surfing areas are located well offshore, outside of the crest of the wide, shallow, fringing reef. There are eleven (11) beach rights-of-way in Lanikai that provide perpendicular access to the shoreline. Eight (8) of the rights-of-way are owned by the Lanikai Association, and the remaining three (3) are owned by the City and County of Honolulu (Lanikai Association, 2020). The public beach rights-of-way closest to the project site are approximately 655 ft (0.1 mi) to the northwest, and 400 ft (0.075 mi) to the southeast. Lateral shoreline access is abundant along the northern and central portions of Lanikai but limited along the southern portion of the shoreline where the beach is chronically eroding. There is typically no beach present along the shoreline fronting the project site. When sand is present, it is typically completely submerged at high tide.

## 3.5 Zoning and Land Uses

The project site is zoned R-10 Residential. The area landward of the shoreline is located in the Special Management Area (SMA) and Urban Land Use District. The area seaward of the shoreline is located in the Resource Subzone of the Conservation District.


**Figure 3-1 Soil types within the project site (USDA)**

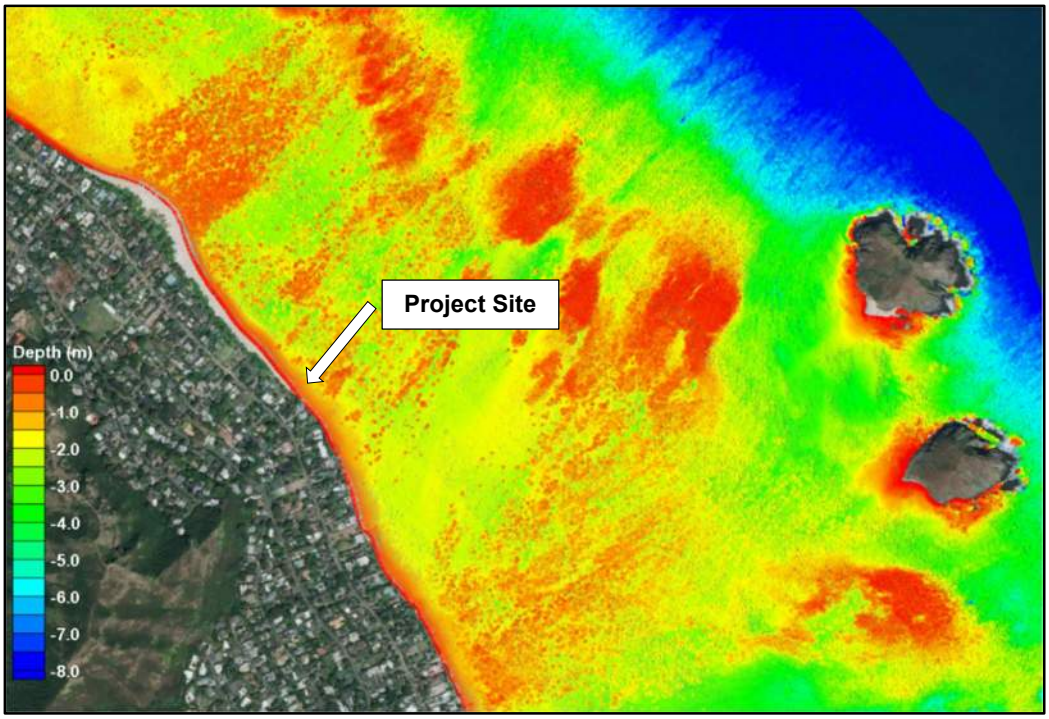


**Figure 3-2 Bathymetry for the project site, in meters (NOAA LiDAR)**


**Figure 3-3 Benthic habitat biology for the project site (PacIOOS, 2020)**


**Figure 3-4 Benthic habitat geography for the project site (PacIOOS, 2020)**

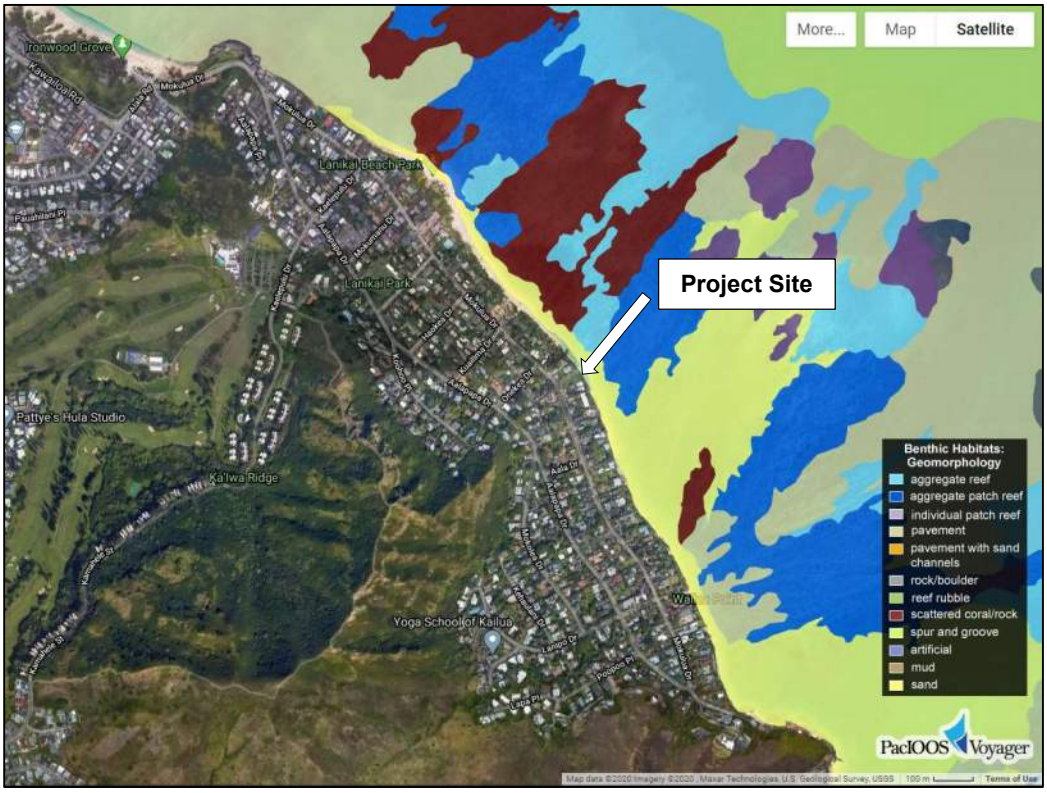


**Figure 3-5 Benthic habitat geomorphology for the project site (PacIOOS, 2020)**

# 4. OCEANOGRAPHIC SETTING

The neighborhood of Lanikai is nestled between the mountains and the ocean on the windward side of Oahu. The 1.5-mi-long shoreline lies between the rocky headlands of Alala Point (to the north) and Wailea Point (to the south). By 1959, the Lanikai coastline was intensely developed, and a series of seawalls and revetments had been constructed to protect properties from the effects of coastal erosion. The north and south portions of the Lanikai coastline have experienced extensive beach loss and those seawalls and revetments are presently exposed to wave attack.

The reef flat offshore of Lanikai is primarily a fossilized reef. Portions of the reef are emergent at low tide and the deeper areas are covered with a veneer of sand. The Mokulua Islands, large basaltic outcrops from the sea floor, are located about 4,000 ft offshore and rise approximately 200 ft above sea level. The water becomes increasingly deeper offshore of the islands.

The shoreline is shaped by the prevailing tradewind waves. These waves experience refraction and diffraction past the Mokulua Islands and over the shallow fringing reef, resulting in a very complex nearshore wave pattern. Bulges in the sandy shoreline are centered 1,900 ft and 3,800 ft south of Alala Point. These bulges are produced by convergent wave patterns caused by refraction and diffraction past the Mokulua Islands and the reef. A third bulge, centered opposite Lanipo Drive, has been armored.

## 4.1 Winds

The prevailing winds throughout the year are the northeasterly tradewinds. The average frequency of tradewinds varies from more than 90% during the summer season to only 50% in January, with an overall annual frequency of 70%. Tradewinds are produced by the outflow of air from the Pacific Anticyclone high-pressure system, also known as the Pacific High. The center of this system is located well north and east of the Hawaiian Islands and moves to the north and south seasonally. In the summer months, the center moves to the north, causing the tradewinds to be at their strongest from May through September. In the winter, the center moves to the south, resulting in decreasing tradewind frequency from October through April. During these months, the tradewinds continue to blow; however, their average monthly frequency decreases to 50%. Westerly or Kona winds occur primarily during the winter months and are generated by low pressure or cold fronts that typically move from west to east past the Hawaiian Islands. Figure 4-1 shows a wind rose diagram applicable to the project site based on wind data recorded daily at the Kaneohe Marine Corps Base Hawaii (MCBH).

During the winter months, wind patterns of a more transient nature increase in prevalence. Winds from extra-tropical storms can be very strong from almost any direction, depending on the strength and position of the storm. The low-pressure systems associated with these storms typically track west to east across the North Pacific north of the Hawaiian Islands. At Honolulu International Airport, wind speeds resulting from these storms have on several occasions exceeded 60 mph. Kona winds are generally from a southerly to a southwesterly direction, usually associated with slow-moving low-pressure systems known as Kona lows situated to the west of the island chain. These storms are often accompanied by heavy rains.

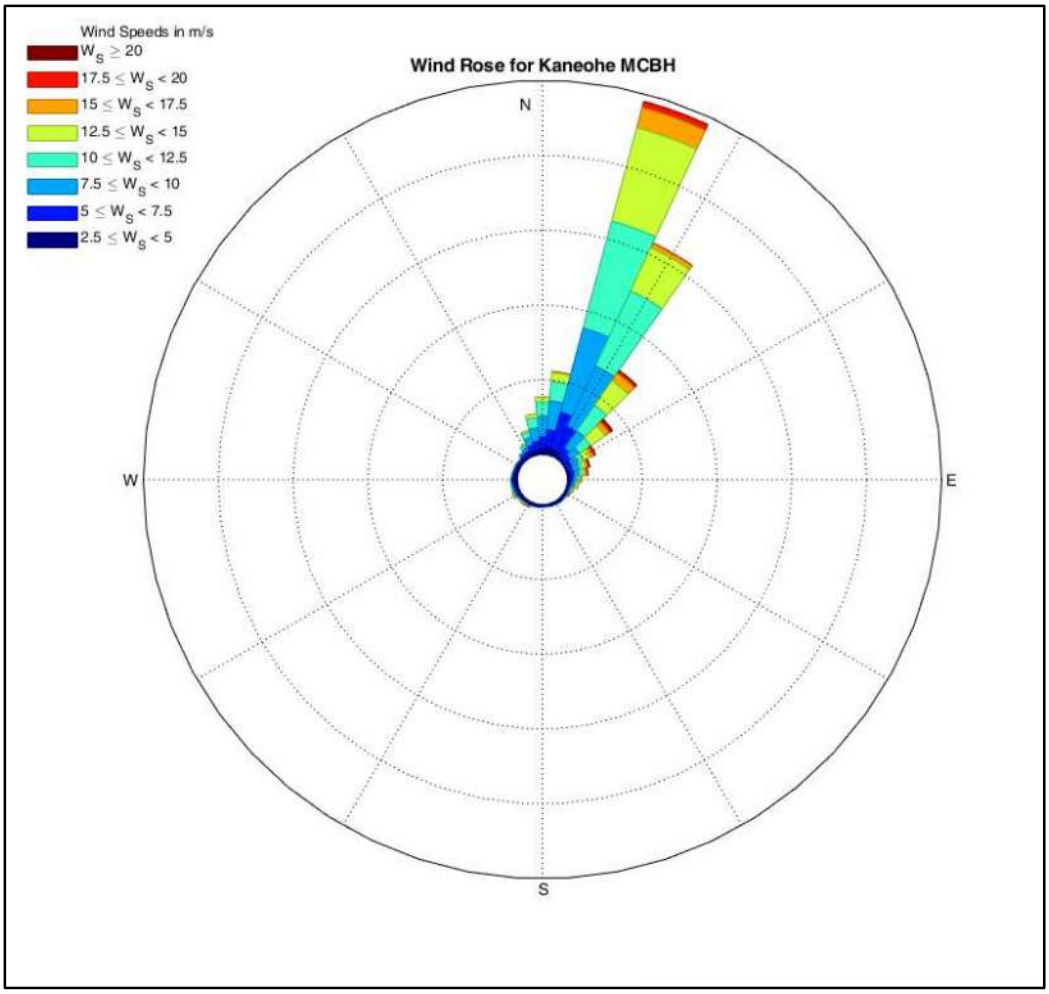


**Figure 4-1 Wind Rose Kaneohe MCBH (July 2016 to July 2018)**

## 4.2 Water Levels

### *4.2.1 Tides*

Hawaii tides are semi-diurnal with pronounced diurnal inequalities (i.e., two high and low tides each 24-hour period with different elevations). A modulation of the tidal range results from the relative position of the moon and the sun: when the moon is new or full, the moon and the sun act together to produce larger "spring" tides; when the moon is in its first or last quarter, smaller "neap" tides occur (Rapaport, 2013). The cycle of spring to neap tides and back is half the 27-day period of the moon's revolution around the earth and is known as the fortnightly cycle. The combination of diurnal, semi-diurnal and fortnightly cycles dominates variations in sea level throughout the Hawaiian Islands.

The geometry of the oceans - the basin shape, local coastline, bays, and even harbor geometry - has a significant effect on the local behavior of the tides. On scales of oceanic basins, tides exist as very long waves propagating in patterns determined by their period and the geometry of the basin. Lines along which high tide occurs at the same time (referred to as “phase lines”) converge to several points where the tidal range is zero. There are four of these points, called "amphidromes" in

the Pacific: one in the North Pacific near the dateline, one near the equator in the eastern North Pacific, one in the central South Pacific near Tahiti, and one east of New Zealand. Phase lines rotate counterclockwise around the amphidromes in the North Pacific and clockwise around those in the South Pacific. For example, in the Hawaiian Islands, the offshore diurnal tide reaches Hawaii Island first, then sweeps across the islands of Maui, Oahu, and finally Kauai. Tidal currents result from tidal variations of sea level, and near the shore are often stronger than the large-scale circulation (Rapaport, 2013).

Tidal predictions and historical extreme water levels are given by the Center for Operational Oceanographic Products and Services, NOS, NOAA, website. A tide station is located at Moku O Loe (Coconut Island) in Kaneohe Bay. Water level data based on the 1983-2001 tidal epoch is shown in Table 4-1.

**Table 4-1 Water level data for Moku O Loe, Station 1612480 (NOAA, 2020)**

| Datum | Elevation (ft, MLLW) | Elevation (ft, MSL) |
|---|---|---|
| Mean Higher High Water | +2.12 | +1.07 |
| Mean High Water | +1.80 | +0.75 |
| Mean Sea Level | +1.05 | 0.00 |
| Mean Low Water | +0.31 | -0.74 |
| Mean Lower Low Water | 0.00 | -1.05 |

Hawaii is also subject to periodic extreme tide levels due to large oceanic eddies and other oceanographic phenomena that have recently been recognized and that sometimes propagate through the islands. *Mesoscale eddies* produce tide levels that can be up to 0.5 to 1.0 ft higher than normal for periods up to several weeks (Firing and Merrifield, 2004). Temporary sea-level rise has also been associated with phenomena related to the El-Nino/Southern Oscillation (ENSO).

### *4.2.2 Sea Level Rise*

The present rate of global mean sea-level change (SLC) is +3.4 ± 0.4 mm/yr (Sweet, 2017), where a positive number represents a rising sea level. SLC appears to be accelerating compared to the mean of the 20$^{th}$ Century. Factors contributing to the measured rise in sea level include decreasing global ice volume and warming of the ocean. Sea level, however, is highly variable. The historical sea level trend for Moku O Loe, Station 1612480, is shown in Figure 4-2 (NOAA, 2020). The relative sea level trend is +1.69 ± 0.53 mm/yr (95% confidence) based on monthly data for the period 1957 to 2021, which is equivalent to a change of 0.55 ft in 100 yrs. The tide gauge data also show interannual anomalies exceeding 0.65 ft at Moku O Loe.

The National Oceanic and Atmospheric Administration (NOAA) recently revised their sea level change projections through 2100 taking into account up-to-date scientific research and measurements. NOAA is projecting that global sea level rise, as shown by their “Extreme” scenario, could be as high as about 11 ft by 2100. NOAA’s recent report also identifies specific regions that are susceptible to a higher-than-average rise in sea level. Hawaii has thus far experienced a rate of sea level rise that is less than the global average; however, this is expected to change. Hawaii is in the “far field” of the effects of melting land ice. This means that those effects

have been significantly less in Hawaii compared to areas closer to the ice melt. Over the next few decades, this effect is predicted to spread to Hawaii, which will then experience sea level rise greater than the global average.

Figure 4-3 and Table 4-2 presents mean sea level rise scenarios for Hawaii based on the revised NOAA projections, taking into account the far-field effects. While the projections are based on the most current scientific models and measurements, discretion is necessary for selecting the appropriate scenario. Selecting the appropriate sea level change projection is a function of many parameters, including topography, coastal setting, criticality of infrastructure, the potential for resilience, budget, and function.

An important conclusion of the regional climate assessment is that NOAA's revised *Intermediate* rate is recommended for planning and design purposes in Hawaii. The *Intermediate* rate projects that sea level in Hawaii will rise 2.3 ft by 2070 (Table 4-2). Given the recent upwardly revised projections and the potential for future revisions, consideration may also be given to the *Intermediate-High* rate for planning and design purposes, which projects that sea level in Hawaii will rise 3.4 ft by 2070.

In 2017, the Hawaii Climate Commission published the Hawaii Sea Level Rise Vulnerability and Adaptation Report, which discusses the anticipated impacts of projected future sea level rise on coastal hazards, and the potential physical, economic, social, environmental, and cultural impacts of sea level rise in Hawaii (Hawaii Climate Commission, 2017). A key recommendation of the report was that 3.2 ft of sea level rise should be adopted as a statewide vulnerability zone for planning purposes. The planning horizon for the project site is 50 yrs, which corresponds with the NOAA Intermediate-High scenario projection of 3.2 ft of sea level rise by 2070. Planning for 3.2 ft of sea level is consistent with the recommendations from the 4th National Climate Assessment (2018) and the Hawaii Sea Level Rise Vulnerability and Adaptation Report (2017).

A sea level rise of 2.3 ft was chosen for design purposes at the project site. This corresponds to the Intermediate rate over a 50-yr design life which is suitable for planning and design purposes for a project of this scale. While critical infrastructure such as roads, power plants, and hospitals may require the highest level of protection, it is reasonable to design coastal protection and stabilization structures for a lesser level, in this case a 50-yr lifespan. Coastal structures require ongoing monitoring and maintenance due to their exposure to the degrading effects of marine processes. The basis of design parameters and consequent design life are based on typical functional use of similar coastal structures. Designing for conditions, such as significantly higher sea levels, that are predicted for time periods that well exceed the design life of the structure will produce more robust installations but will well exceed their functional performance requirements during their serviceable lifespans. Designing for a lesser sea level rise is still consistent with the City and County of Honolulu Mayor's Directive 18-2, as the sea level rise that the coastal stabilization structures evaluated in this report are expected to experience during their design life would likely be less than the 3.2 ft presented in the Directive.

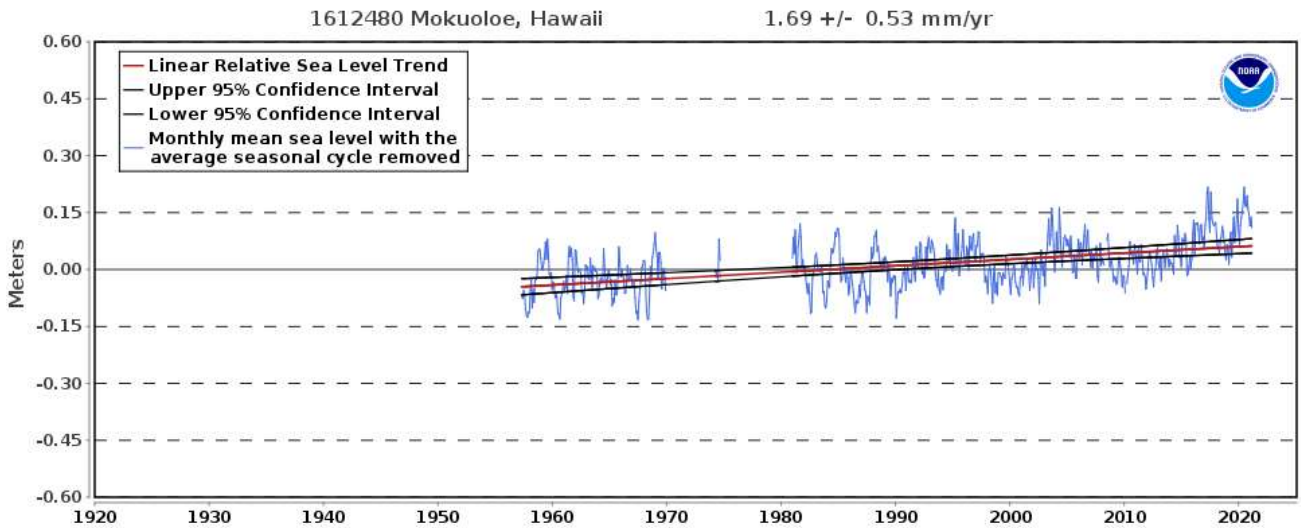


**Figure 4-2 Relative sea level trend, Moku O Loe, Hawaii, 1957 to 2019 (NOAA, 2020)**

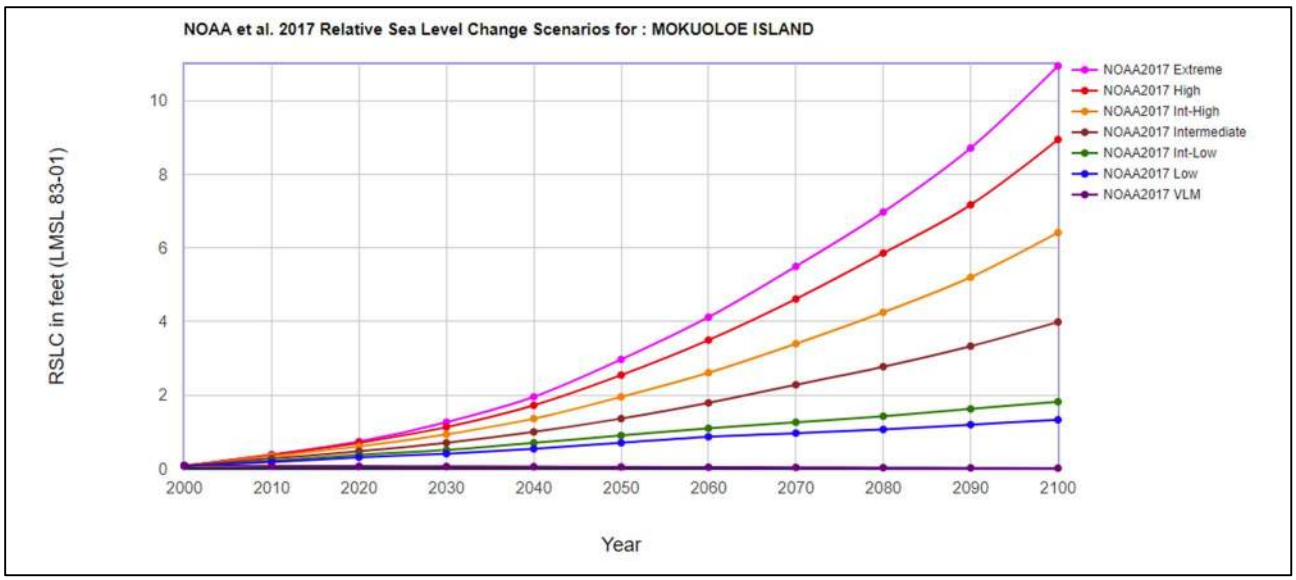


**Figure 4-3 Hawaii local mean sea level rise projections, in ft (adapted from NOAA, 2017)**

**Table 4-2 Hawaii local mean sea level rise scenarios, in ft (adapted from NOAA, 2017)**

| Scenario | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | 2080 | 2090 | 2100 |
|---|---|---|---|---|---|---|---|---|---|
| **Extreme** | 0.7 | 1.3 | 2.0 | 3.0 | 4.1 | 5.5 | 7.0 | 8.7 | 10.9 |
| **High** | 0.7 | 1.1 | 1.7 | 2.5 | 3.5 | 4.6 | 5.9 | 7.2 | 8.9 |
| **Intermediate-High** | 0.6 | 0.9 | 1.4 | 2.0 | 2.6 | 3.4 | 4.3 | 5.2 | 6.4 |
| **Intermediate** | 0.5 | 0.7 | 1.0 | 1.4 | 1.8 | 2.3 | 2.8 | 3.3 | 4.0 |
| **Intermediate-Low** | 0.4 | 0.5 | 0.7 | 0.9 | 1.1 | 1.3 | 1.4 | 1.6 | 1.8 |
| **Low** | 0.3 | 0.4 | 0.5 | 0.7 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 |

## 4.3 Waves

### *4.3.1 General Wave Climate*

The wave climate in Hawaii is dominated by long period swell generated by distant storm systems, relatively low amplitude, short period waves generated by more local winds, and occasional bursts of energy associated with intense local storms. Typically, Hawaii receives five general surface gravity wave types: 1) northeast tradewind waves, 2) southeast tradewind waves 3) southern swell, 4) North Pacific swell, and 5) Kona wind waves. The dominant swell regimes for Hawaii are shown in Figure 4-4 .

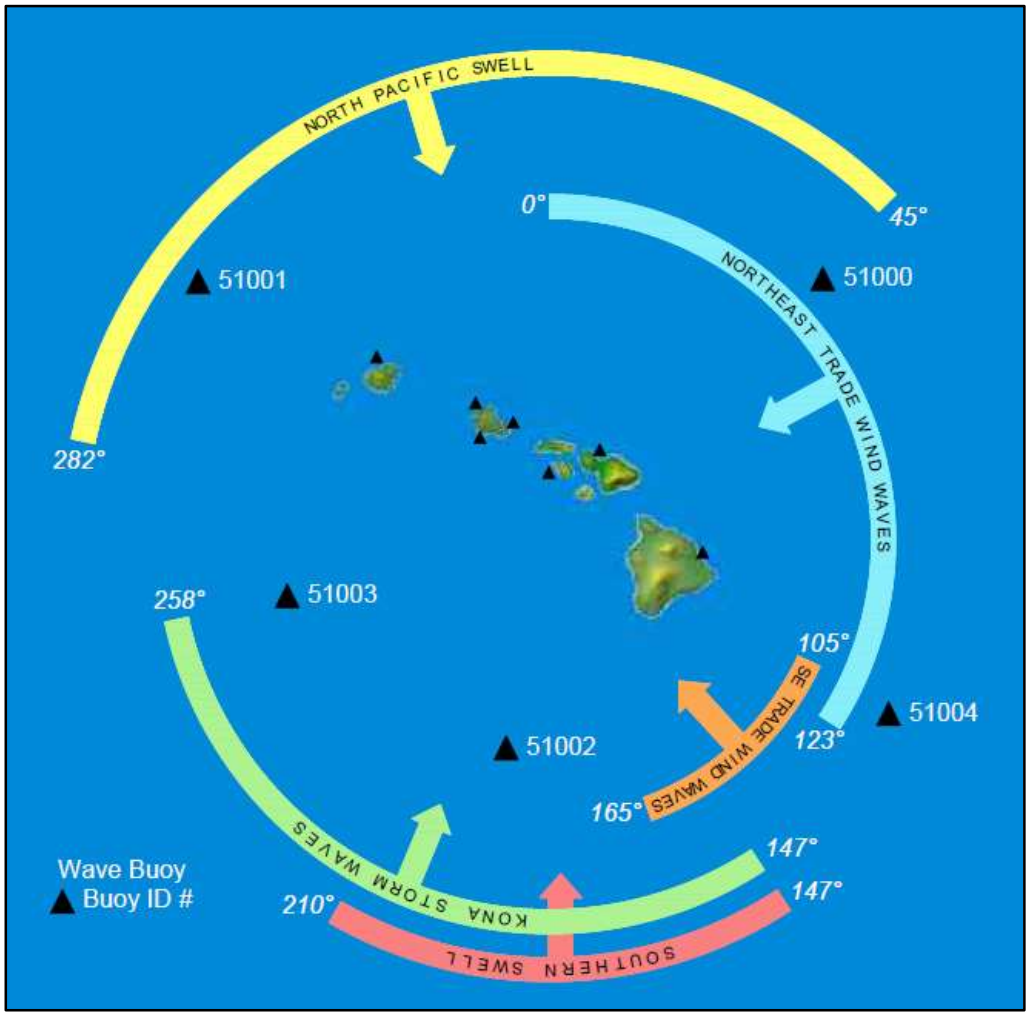


**Figure 4-4 Hawaii dominant swell regimes**

Tradewind waves occur throughout the year and are the most persistent April through September when they usually dominate the local wave climate. These winds result from the strong and steady tradewinds blowing from the northeast quadrant over long fetches of open ocean. Tradewind deepwater waves are typically between 3 and 8 ft high with periods of 5 to 10 sec, depending upon the strength of the tradewinds and how far the fetch extends east of the Hawaiian Islands. The direction of approach, like the tradewinds themselves, varies between north-northeast and east-southeast and is centered on the east-northeast direction. The project site is directly exposed to tradewind waves, which represent a significant source of wave energy reaching the shoreline.

During the winter months in the northern hemisphere, strong storms are frequent in the North Pacific in the mid-latitudes and near the Aleutian Islands. These storms generate large North Pacific swells that range in direction from west-northwest to northeast and arrive at the northern Hawaiian shores with little attenuation of wave energy. These are the waves that have made surfing beaches on the north shores of Oahu and Maui famous. Deepwater wave heights often reach 15 ft and in extreme cases can reach 30 ft. Periods vary between 12 and 20 sec, depending on the location of the storm. The project site is directly exposed to North Pacific swell approach from the north and northeast directions and these waves represent a significant source of wave energy reaching the shoreline.

Southern swell is generated by storms in the southern hemisphere and is most prevalent during the summer months of April through September. Traveling distances of up to 5,000 mi, these waves arrive with relatively low deepwater wave heights of 1 to 4 ft and periods of 14 to 20 sec. Depending on the positions and tracks of the southern hemisphere storms, southern swells approach between the southeasterly and southwesterly directions. The project site is well sheltered from the direct approach southern swell by the island itself, and only a portion of the wave energy refracting and diffracting around the southeast end of the island reaches the shoreline.

Kona storm waves also directly approach the project site; however, these waves are fairly infrequent, occurring only about 10 percent of the time during a typical year. Kona waves typically range in period from 6 to 10 sec with heights of 5 to 10 ft and approach from the southwest. Deepwater wave heights during the severe Kona storm of January 1980 were about 17 ft. The project site is well sheltered from the direct approach of Kona storm waves by the island itself, and only a portion of the wave energy refracting and diffracting around the southeast end of the island may reach the site.

Severe tropical storms and hurricanes obviously have the potential to generate extremely large waves, which in turn could potentially result in large waves at the project site. Recent hurricanes impacting the Hawaiian Islands include Hurricane Iwa in 1982 and Hurricane Iniki in 1992. Iniki directly hit the island of Kauai and resulted in large waves along the southern shores of all the Hawaiian Islands. Damage from these hurricanes was extensive. Although not a frequent or even likely event, they should be considered in the project design, particularly with regard to shoreline structures, both in the water and on land near the shore.

### *4.3.2 Prevailing Deepwater Waves*

Wave data available from the National Oceanographic and Atmospheric Administration (NOAA) was compiled and analyzed to identify the primary components of the wave climate affecting the project site. These data provide a 31-yr wave record and were statistically analyzed to determine the frequency of occurrence of different wave heights, periods, and directions along the coast. Coastal processes in this region are dominated by wave energy, as this coastline is exposed to both Tradewind waves and North Pacific swell. Understanding the magnitude and frequency of these events at the stream mouths and along the entire region's coastline is a key aspect of evaluating stream flow impacts to the marine ecosystem.

Wave hindcasting is a tool used to calculate past wave events based on weather models and historical data (Hubertz, 1992). With the proper inputs, wave hindcast models can calculate historical wave climates anywhere in the world. Hindcast model outputs are often recorded for a single location, known as a "virtual buoy". WaveWatch III (WWIII) is a numerical wave model used to forecast and hindcast waves. Hindcast data for a 31-yr period (1979-2010) are available around the Hawaiian Islands from the NOAA National Centers for Environmental Prediction (NCEP). For this study, hindcast data were obtained from virtual buoy Station 51202, located approximately 3 mi offshore of the project site (Figure 4-5 ).

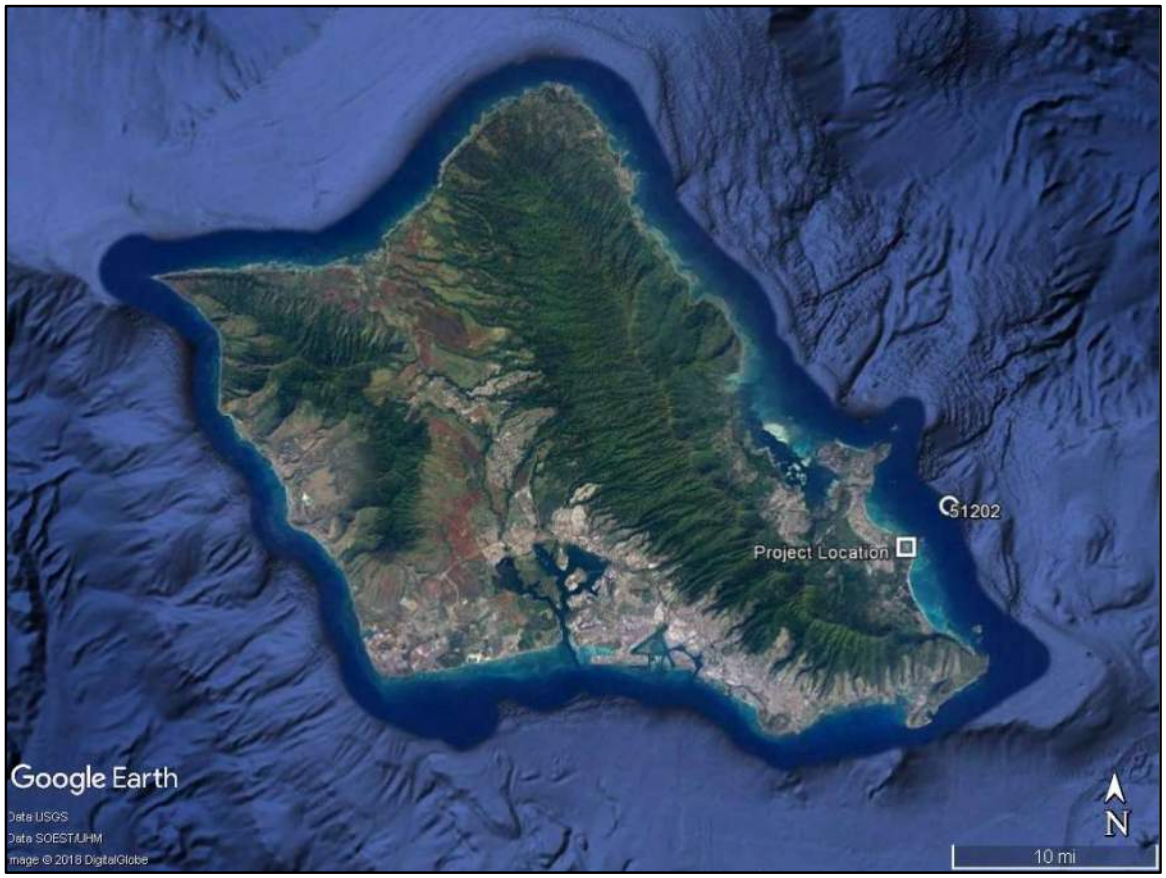


**Figure 4-5 Project site and virtual buoy locations**

It is rare for the sea state to consist of a singular wave condition. Wave events are described by wave height, peak period, and peak direction. The wave parameters from the hindcast model are calculated from a modeled wave spectrum. The spectrum shows the distribution of wave energy relative to wave direction and wave frequency (wave frequency is the inverse of wave period). This methodology allows multiple wave conditions to be accounted for at the same time for a more accurate description of the sea state. Figure 4-6 is a wave height rose diagram that shows the percent occurrence of wave height and direction for waves as measured at virtual buoy Station 51202. Figure 4-7 is a wave period rose diagram that shows the percent occurrence of wave period and direction for waves as measured at virtual buoy Station 51202.

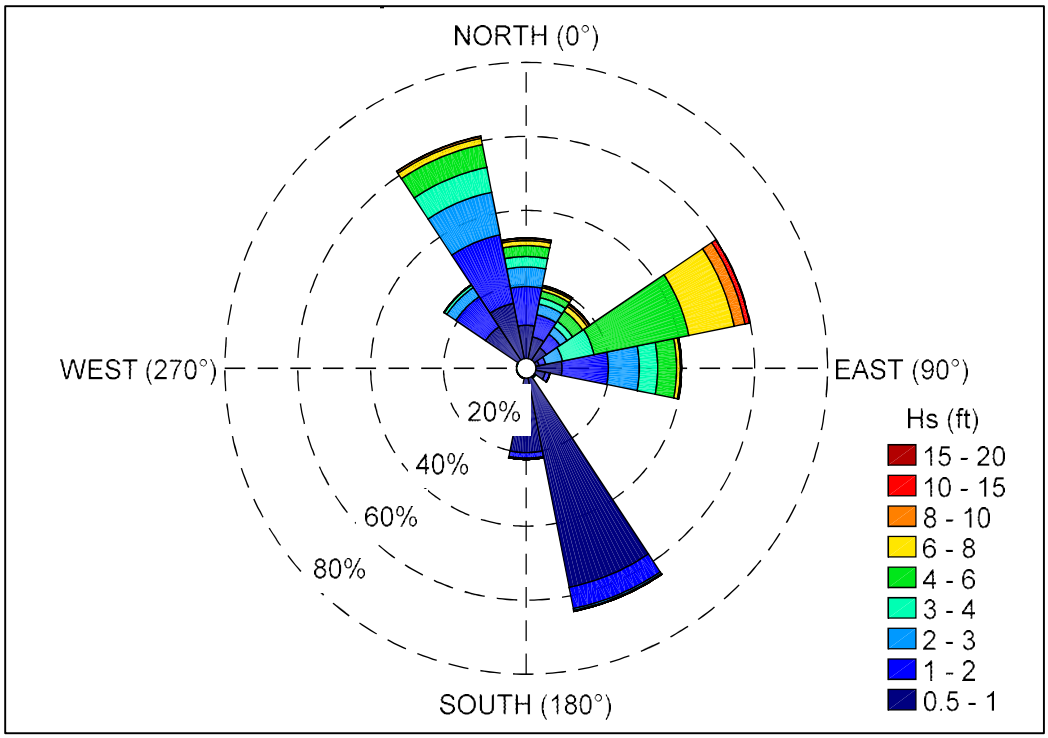


**Figure 4-6 Station 51202 virtual buoy wave height rose from Jan 1979 to Jan 2010**

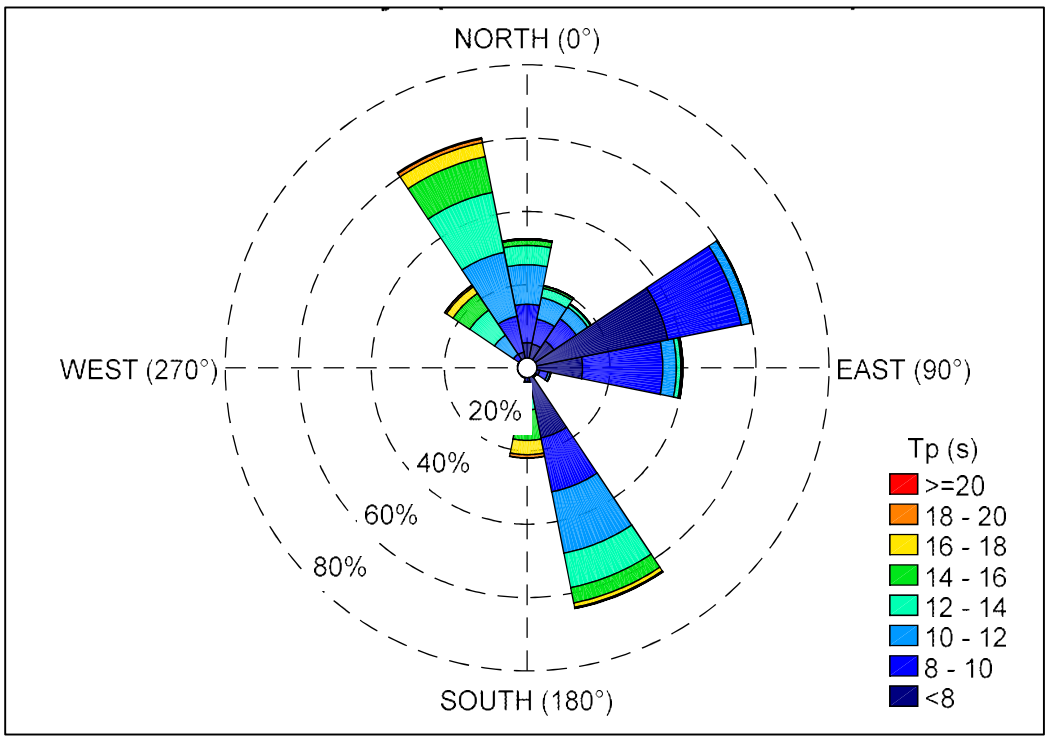


**Figure 4-7 Station 51202 virtual buoy wave period rose from Jan 1979 to Jan 2010**

### *4.3.3 Extreme Deepwater Waves*

Historical wave buoy data allows the prediction of extreme wave events. These are infrequent, large, powerful, low probability wave events that are typically used for design purposes. For example, a 50-yr return period wave event is an extreme event with a 1/50 (i.e., 2%) chance of occurring in any given year. Wave buoy data was compiled from the Coastal Data Information Program (CDIP) buoy station 098 located approximately 3 mi northeast of the project site (Figure 4-8). Wave data for this buoy spans over a 17-yr period between August 2000 to March 2018. Extreme wave heights were investigated by filtering the buoy data by direction and period for waves within the project site's direct exposure window, between 0˚ and 45˚ (NE swell), with periods of 12 sec or greater.

The extreme wave height data were used to generate a Weibull extreme value distribution for return period wave heights. The Weibull Distribution is a tool for looking at the relationship between the size of waves and how frequently they occur at a given location. Analysis requires a long-term data set with well-documented wave events. These events are sorted by size, and frequency of occurrence can be assessed by how often these events occur in the record. The relationship is logarithmic, and a linear fit can be established with a best fit linear regression of the data. Though not all wave events will be co-located on the line, its general trend represents the nature of the size and frequency relationship of wave events at a specific location. Wave height versus return period is shown on Figure 4-9 and Table 4-3. The ten largest wave events from directions south to west (180º to 270º TN) during the period of record are shown on Table 4-4.


**Figure 4-8 Location of CDIP buoy 098 in relation to the project site**

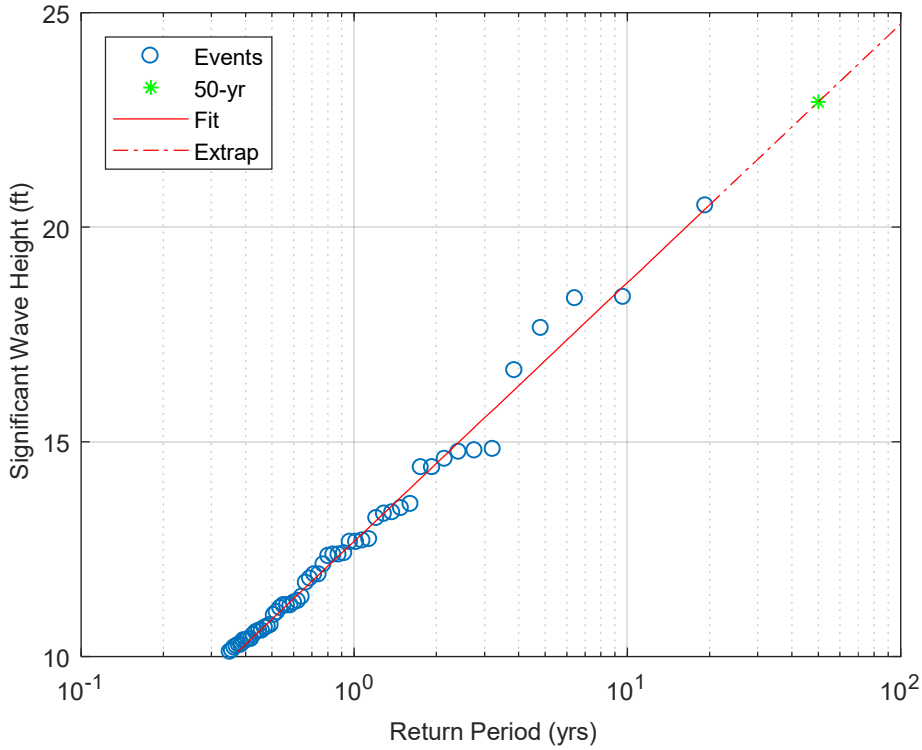


**Figure 4-9 CDIP 098 Return period 17-yr (Aug 2000 to Mar 2018)**

**Table 4-3 Return period significant wave heights at CDIP 098**

| Return Period (yrs) | Hs (ft) |
|---|---|
| **1** | 12.7 |
| **2** | 14.5 |
| **5** | 16.9 |
| **10** | 18.7 |
| **25** | 21.1 |
| **50** | 22.9 |

**Table 4-4 Top 10 NE wave events recorded at CDIP 098**

| Date | Hs (ft) | Tp | Dp |
|---|---|---|---|
| Nov 21, 2003 | 20.5 | 17 | 37 |
| Feb 22, 2016 | 18.4 | 18 | 1 |
| Mar 14, 2009 | 18.3 | 14 | 10 |
| Nov 12, 2009 | 17.6 | 13 | 28 |
| Nov 29, 2003 | 16.7 | 13 | 7 |
| Dec 01, 2002 | 14.8 | 17 | 7 |
| Nov 23, 2017 | 14.8 | 15 | 5 |
| Jan 27, 2008 | 14.8 | 13 | 44 |
| Mar 18, 2016 | 14.6 | 15 | 13 |
| Dec 04, 2007 | 14.4 | 18 | 2 |

## 4.4 Numerical Modeling of Wave Approach

As deepwater waves propagate toward shore, they begin to encounter and be transformed by the ocean bottom. In shallow water, the wave speed becomes related to the water depth. As waves slow down with decreasing depth, the process of wave shoaling steepens the wave and increases the wave height. Wave breaking occurs when the wave profile shape becomes too steep to be maintained. This typically occurs when the ratio of wave height to water depth is about 0.78 and is a mechanism for dissipating the wave energy. Wave energy is also dissipated due to bottom friction. The phenomenon of wave refraction is caused by differential wave speed along a wave crest as the wave passes over varying bottom contours and can cause wave crests to converge or diverge and may locally increase or decrease wave heights. Not strictly a shallow water phenomenon, wave diffraction is the lateral transmission of wave energy along the wave crest and would cause the spreading of waves in a shadow zone, such as occurs behind a breakwater or other barrier.

Simulating Waves Nearshore (SWAN) is a third-generation wave model developed by Delft University of Technology that computes random, short-crested wind-generated waves in coastal regions and inland waters (Booij, et al, 1999). The SWAN model can be applied as a steady state or non-steady state model and is fully spectral (over the total range of wave frequencies). Wave propagation is based on linear wave theory, including the effect of wave generated currents. SWAN provides many output quantities, including two-dimensional spectra, significant wave height and mean wave period, and average wave direction and directional spreading. For this project, the SWAN model was used to transform waves from deep water to the project site.

A nested 4-grid setup in the SWAN wave model was used to propagate the extreme deepwater design waves to the project site. The wave conditions are applied along all boundaries of the largest grid, which has a resolution of 1,640 ft and nests intermediate grids down to a nearshore grid with a resolution of 66 ft. The SWAN nesting grid layout is shown in Figure 4-10. Figure 4-11 shows the nearshore transformation of the 50-yr northeast swell (22.9 ft significant wave height, 12 second period, and 35° direction) to the project site.

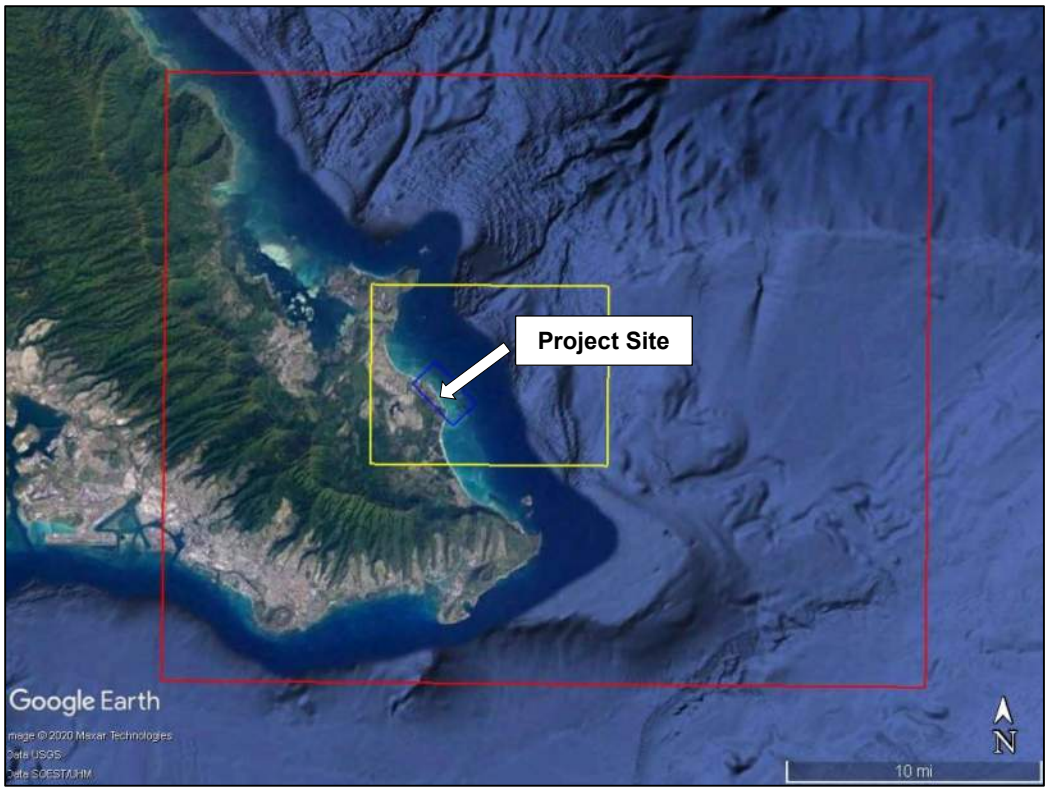


**Figure 4-10 Layout of SWAN nested grids**

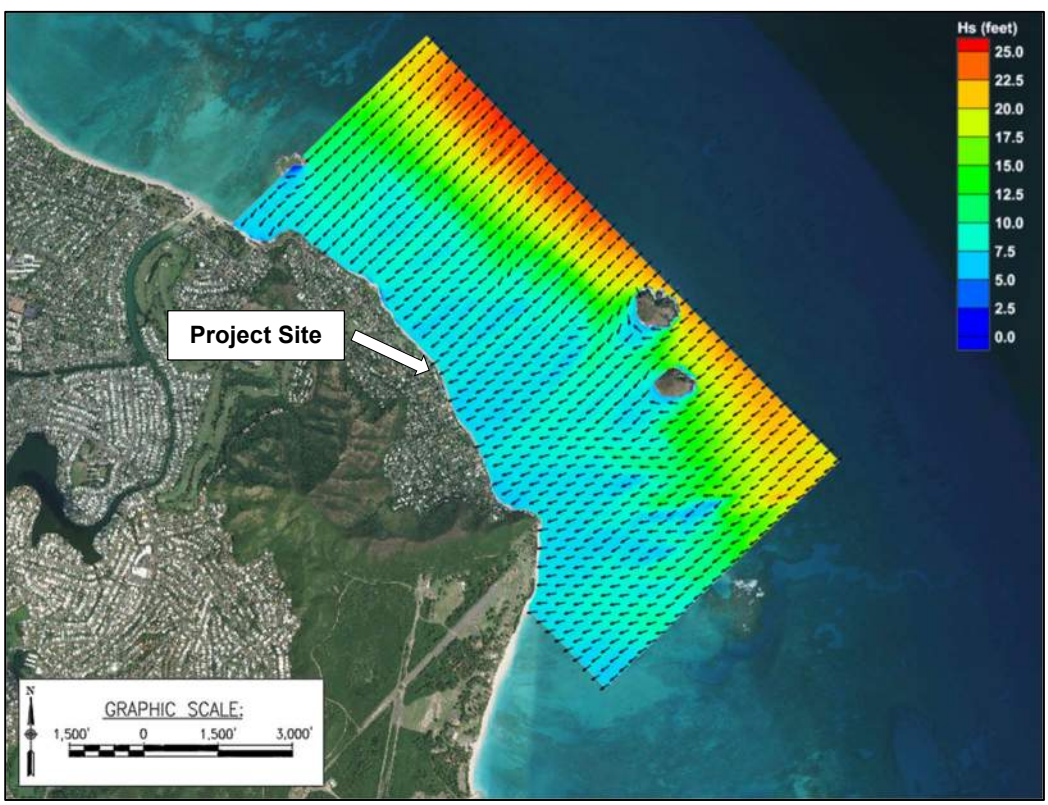


**Figure 4-11 Nearshore significant wave height transformation from the design 50-yr Northeast swell event**

## 4.5 Still Water Levels and Nearshore Wave Heights

During high wave conditions, the nearshore water level may be elevated above the tide level by the action of breaking waves. This water level rise, termed wave setup, could be as much as 1 to 2 ft during severe storm wave conditions. During hurricane conditions, an additional water level rise due to wind stress and reduced atmospheric pressure can occur. Collectively termed "storm surge," this can potentially add another 1 to 2 ft to the still water level.

During a storm or large wave conditions, there may be multiple zones of wave breaking. Wave heights are said to be *depth-limited* because once the water depth becomes shallow enough the wave breaks, losing size and energy. The wave, however, may reform before it reaches the shoreline and break again when the depth-limited ratio is again attained. The still water level rise during storm events is an important design consideration because it allows larger wave heights to reach the shoreline than during lower water levels. Estimation of still water level rise for a specific design wave event may be accomplished by a traditional analytical methodology which uses bathymetry and wave heights as inputs. Still-water level rise at the shoreline is a combination of astronomical tide, storm surge, and wave setup.

Wave setup is a function of the breaking wave height, period, and bottom topography. The mass transport of water due to breaking waves produces wave setup—the increase in water depth shoreward of the breaker zone. The available analytical methods for calculating wave setup have been simplified and assume long, straight, parallel bathymetric contours, continuous breaking waves, and breaker zones relatively near shore; these methods are presented in the U.S. Army Corps of Engineers Shore Protection Manual (1984) and Coastal Engineering Manual (2006). Experience has shown that these methods tend to overpredict wave setup because the natural environment has discontinuous breaking zones, irregular bathymetry, channels, and gaps in the reef that allow for a relief of wave setup.

# 5. COASTAL HAZARDS

## 5.1 Hurricanes

Tropical cyclones originate over warm ocean waters, and they are considered hurricane strength when they generate sustained wind speeds over 64 knots (74 mph). Hurricanes that form near the equator, and in the central North Pacific usually move toward the west or northwest. During the primary hurricane season of July through September, hurricanes generally form off the west coast of Mexico and move westward across the Central Pacific. These storms typically pass south of the Hawaiian Islands and sometimes have a northward curvature near the islands. Late season hurricanes follow a somewhat different track, forming south of Hawaii and moving north toward the islands. Three hurricanes have passed through the Hawaiian Islands in the past 25 yrs: Hurricanes Iwa in 1982 and Iniki in 1992, both passing near or over the island of Kauai as well as Hurricane Iselle in 2014 passing over the island of Hawaii. These storms caused high surf and wave damage on multiple shores of the islands. The *Windward Oahu Hurricane Vulnerability Study* (Sea Engineering, 1990) indicates that a theoretical model hurricane passing over the island from the south/southwest could result in deep-water waves 44.2 ft high with periods of 14.6 sec for Oahu's north and east shores.

## 5.2 Kona Storms

Although somewhat protected by the southeast tip of Oahu, the study site is susceptible to damage from Kona storms, which occur during winter months, generally between October and April. Kona storms typically generate waves with significant heights of 9 to 16 ft and periods of 8 to 11 sec. Occasional strong Kona storms have caused extensive damage to the south- and west-facing shorelines on Oahu. Deepwater wave heights during a severe Kona storm in January 1980 were about 17 ft with a period of 9 sec.

## 5.3 Tsunamis

Tsunamis are waves that result from large-scale displacements of the seafloor. They are most commonly caused by large magnitude earthquakes (typically magnitude 7.0 or greater). If the earthquake involves a large segment of land that displaces a large volume of water, the water will travel outwards in a series of waves, each of which extends from the ocean surface to the seafloor where the earthquake originated. Tsunami waves typically have small wave heights in deep water but can have wavelengths of hundreds of miles and travel at speeds up to 500 mi per hour. A tsunami can travel from one side of the Pacific to the other in less than a day. The speed decreases rapidly as the water shoals. The waves increase greatly in height as they shoal and can push further inland. The water then recedes, also at considerable speed, and the recession often causes as much damage as the original wavefront itself. Most tsunamis in Hawaii originate from the tectonically active areas located around the Pacific Rim (e.g., Alaska, Japan, and Chile). Waves created by earthquakes in these areas take hours to reach Hawaii, and the network of sensors that is part of the Pacific Tsunami Warning System can provide Hawaii with several hours advance warning prior to the arrival of tsunami waves generated from these locations. Less commonly, tsunamis originate from seismic activity in the Hawaiian Islands, and there is less warning for these locally generated events. In 1946, a tsunami was generated in the Aleutian Islands and was one of the most destructive tsunamis to strike Hawaii. The water level rise in Lanikai during the 1946 tsunami was 7 ft. The U.S. Geological Survey (Fletcher et al., 2002) has given the project site a tsunami hazard rating of 3 out of 4 **(**Figure 5-1**).**

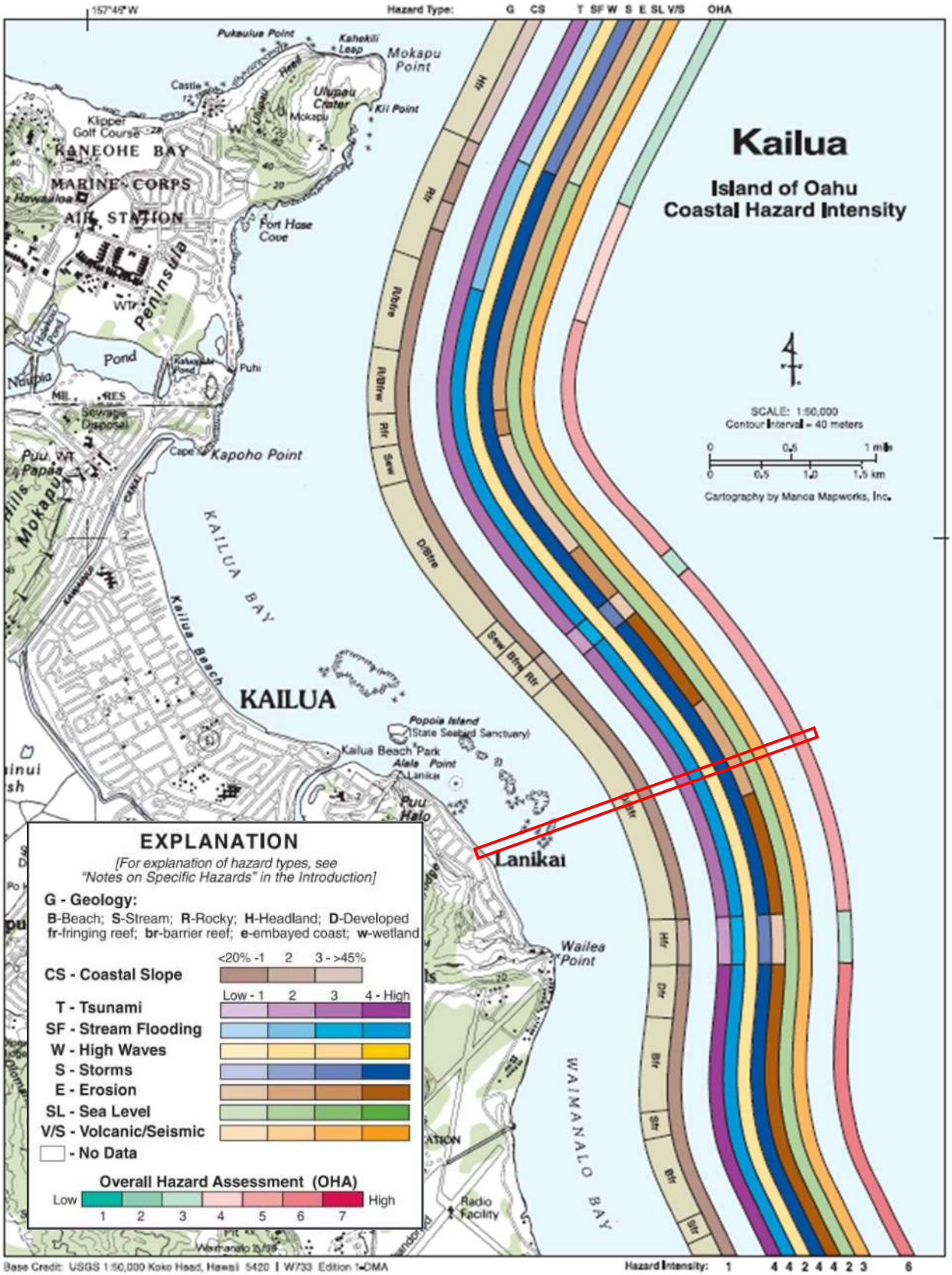


**Figure 5-1 Composite hazard map with project site shown in red (USGS, 2002)**

## 5.4 Still Water Rise

Storms and large waves produce storm surge and wave setup that results in elevated water levels at the project site shoreline. During prevailing annual conditions this water level rise can be on the order of a foot above the tide level. However, during extreme events, the still water level rise can be significantly greater.

## 5.5 Coastal Flooding

The National Flood Insurance Program, administered by the Federal Emergency Management Agency (FEMA), produces maps identifying flood hazards and risks. Figure 5-2 shows the flood hazard map for the project site. The map indicates that the seaward portion of the property is in Flood Zone AE, which designates areas subject to inundation by the 1% annual chance flood event. The Base Flood Elevation (BFE) is 6 ft. The map also indicates that the inland portion of the project site is in Flood Zone X, which designates areas determined to be outside the 0.2% annual chance floodplain.


**Figure 5-2 Flood hazard zones for the project site (FEMA)**

## 5.6 Projected Impacts of Sea Level Rise

Sea level rise is negatively impacting beaches and shorelines in Hawaii. Impacts include beach narrowing and beach loss, loss of land due to erosion, and infrastructure damage due to inundation and flooding. The impacts from anomalous sea level events (e.g., king tides, mesoscale eddies, storm surge) are also increasing. A 2015 study found that, due to increasing sea level rise, average shoreline recession (erosion) in Hawaii is expected to be nearly twice the historical extrapolation by 2050, and nearly 2.5 times the historical extrapolation by 2100 (Anderson et al., 2015).

The *Hawaii Sea Level Rise Vulnerability and Adaptation Report* (Hawaii Climate Change Commission, 2017) discusses the anticipated impacts of projected future sea level rise on coastal hazards, and the potential physical, economic, social, environmental, and cultural impacts of sea level rise in Hawaii. A key component of the report was a numerical modeling effort by the University of Hawaii (UH) to estimate the potential impacts of a 3.2-foot rise in sea level. UH used the most current available information on climate change and sea level rise from the Intergovernmental Panel on Climate Change (IPCC) Assessment Report 5 (AR5). The UH numerical modeling is based on the upper end of the IPCC AR5 representative concentration pathway (RCP) 8.5 sea level rise scenario, which predicts up to 3.2 ft of global sea level rise by the year 2100. However, based on recent peer-reviewed publications, it is possible that sea level rise could be significantly greater than the RCP 8.5 sea level rise scenario by the end of this century. Sweet et al. (2017) suggest that global mean sea level rise in the range of 6.4 ft to 8.8 ft is physically plausible by the end of this century, which is significantly higher than the worst-case IPCC AR5 projections.

UH modeled the potential impacts that a 3.2-foot rise in sea level would have on coastal hazards including passive flooding, annual high wave flooding, and coastal erosion. The footprint of these three hazards were combined to define the projected extent of chronic flooding due to sea level rise, referred to as the *sea level rise exposure area (SLR-XA)*. Flooding in the SLR-XA is associated with long-term, chronic hazards punctuated by annual or more frequent flooding events. The SLR-XA model results for the project site are shown in Figure 5-3 through Figure 5-6.

Figure 5-3 depicts the potential for passive flooding with 3.2 ft of sea level rise. Passive flooding includes areas that are hydrologically connected to the ocean (marine flooding) and low-lying areas that are not hydrologically connected to the ocean (groundwater). The model results indicate that the project site will not be vulnerable to passive flooding with 3.2 ft of sea level rise.

Figure 5-4 depicts the potential for annual high wave flooding with 3.2 ft of sea level rise. The annual high wave flooding model propagates the maximum annually recurring wave, calculated from historical wave buoy data, over the reef and to the shore along 1-dimensional cross-shore profiles extracted from a 1-meter digital elevation model. The model depicts the spatial extent of inundation that is greater than 10cm in depth. The model results indicate that the project site will be vulnerable to a nominal amount of annual high wave flooding with 3.2 ft of sea level rise.

Figure 5-5 depicts the estimated area that could be exposed to erosion with 0.5 to 3.2 ft of sea level rise. The results of the erosion model represent the combined results of measured, historical erosion rates and the compounding impacts of projected higher water levels associated with projected sea level rise. The model results indicate that the project site will experience up to 40 to 50 of erosion with 3.2 ft of sea level rise.

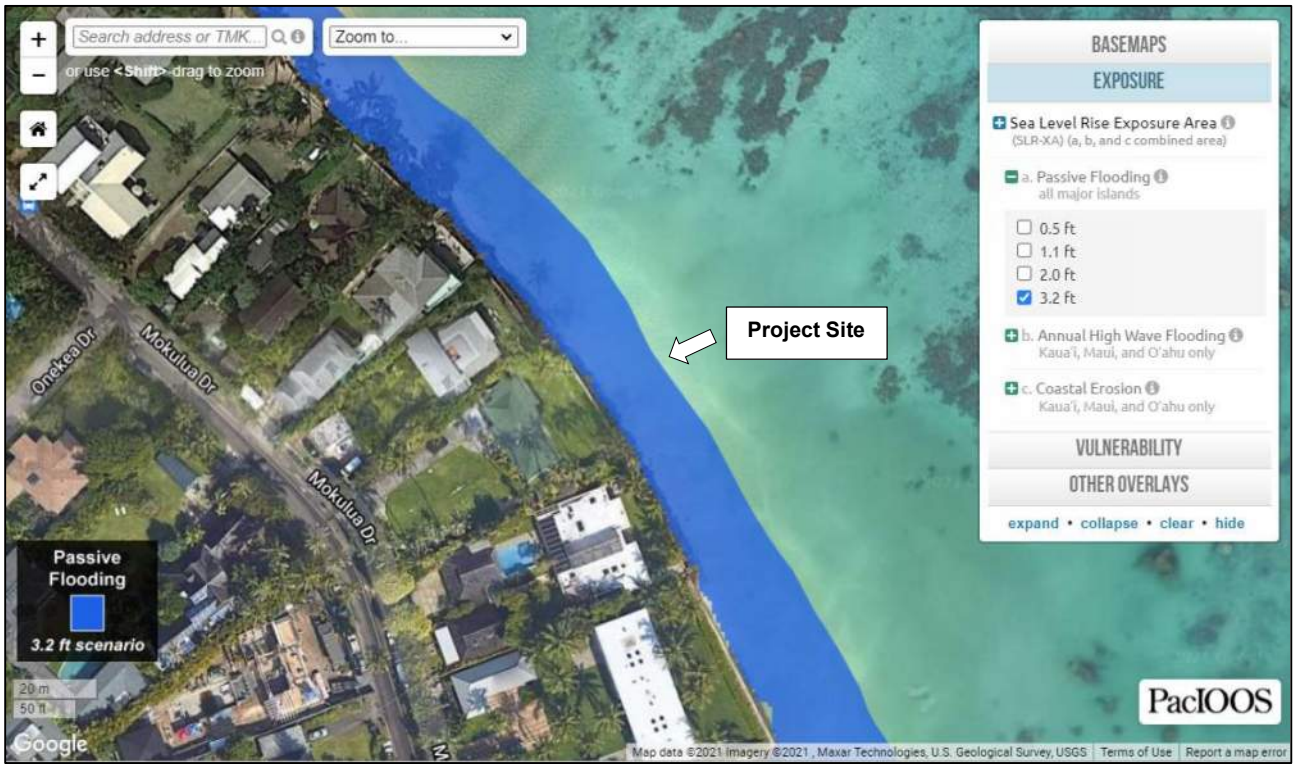


**Figure 5-3 Passive flooding with 3.2 ft of sea level rise (PacIOOS, 2020)**

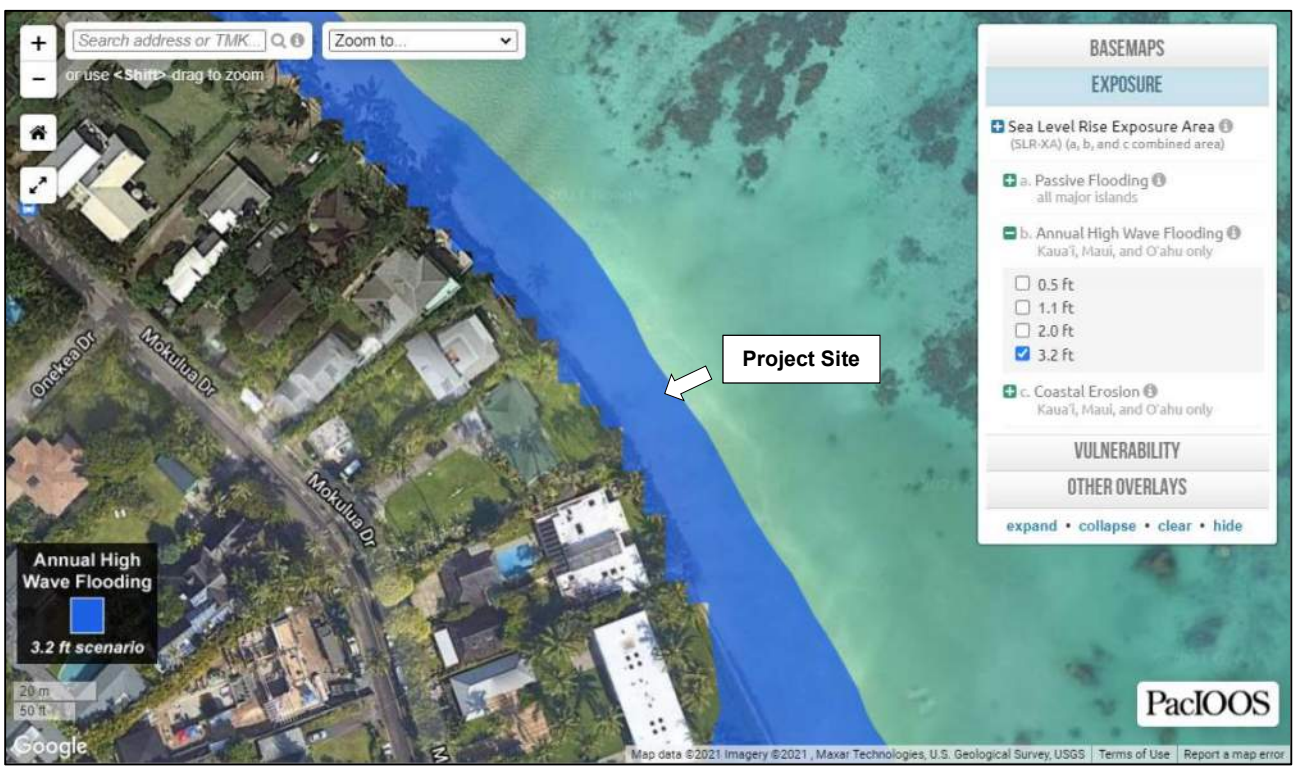


**Figure 5-4 Annual high wave flooding with 3.2 ft of sea level rise (PacIOOS, 2020)**


**Figure 5-5 Coastal erosion with 0.5 to 3.2 ft of sea level rise (PacIOOS, 2020)**

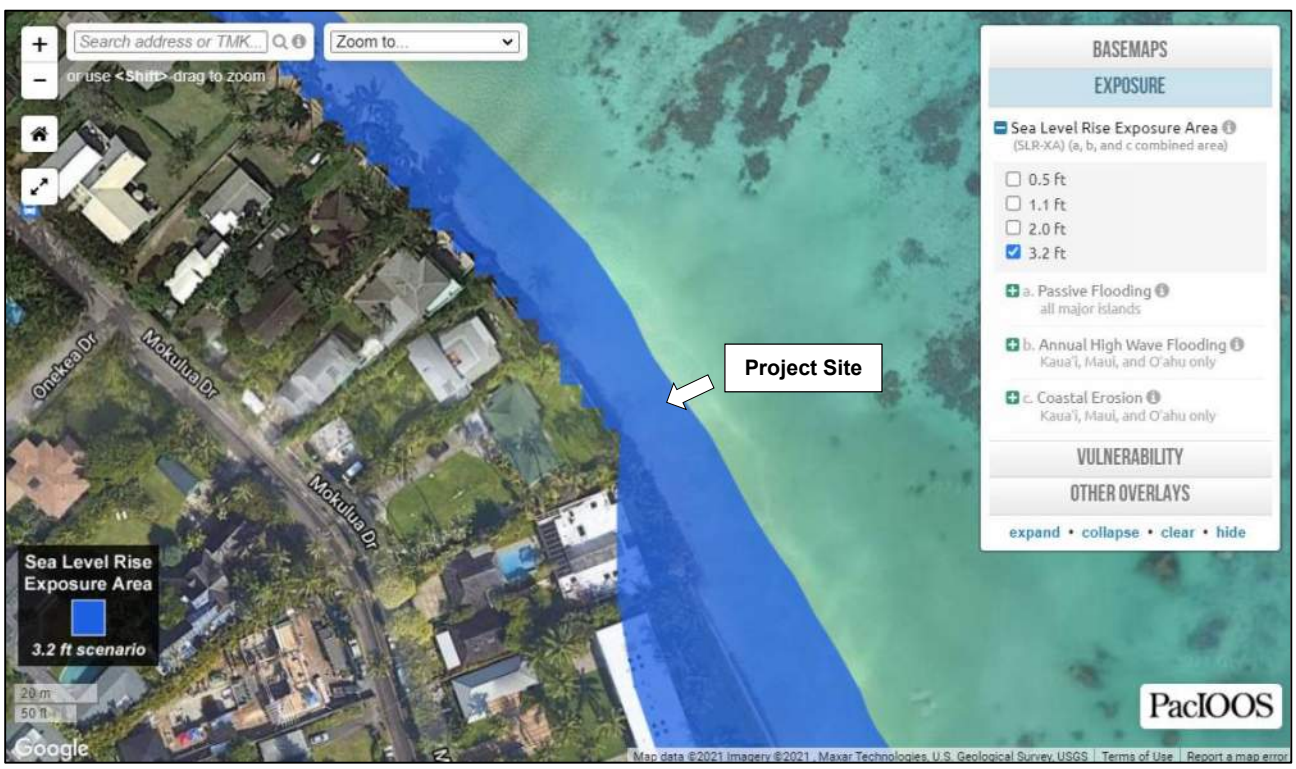


**Figure 5-6 Combined hazard exposure with 3.2 ft of sea level rise (PacIOOS, 2020)**

The erosion model results are useful for considering the potential impacts of erosion at the island or community level; however, there are certain assumptions, limitations, and uncertainties that must be understood when considering the results at the parcel level. The projected erosion hazard lines for the project site are derived from historical erosion rates that are based on historical shoreline positions at individual transects located 20 m apart along the coastline. Erosion projections that are based on historical erosion rates may not be entirely accurate predictions of future conditions but are often used for planning purposes.

The portion of the SLR-XA erosion model used to project coastal response to rising sea levels assumes that all changes in the nearshore, shoreline, and terrestrial area (to the maximum extent of erosion) are occurring in mobile sandy substrate. The model implicitly assumes that sand moves freely along the affected dry and submerged coastal profile, allowing the entire system to respond to the effects of sea level rise. However, the assumption that the affected system is composed entirely of sand is not accurate for much of Oahu's coastline, including the project site, where shallow fringing reefs dominate the nearshore. Another notable assumption occurs where projected erosion impacts are presented along shorelines with engineered structures, such as seawalls and revetments. The model uses the all-sand substrate for predictive modeling but does not account for the presence of engineered shore protection structures. Typically, these structures are utilized to abate the impacts of shoreline erosion and act counter to the natural drivers of shoreline retreat.

The coastline of Oahu is characterized by a broad spectrum of environments that include locations where sand is no longer present, the geology of the coastline has fundamentally changed, the coastline has areas of harder substrate, the shoreline is armored or otherwise engineered, and a myriad of others that are not an 'all sand' environment. A sea level rise influenced model that predicts coastal change in an all-sand environment is not expected to accurately predict coastal change across the full spectrum of coastal environments present on Oahu. At the project site, the nearshore is dominated by a shallow fringing reef with a thin veneer of sand, and the seawall and rock apron create a physical boundary between the terrestrial and marine environments. The structures protect the terrestrial area from erosion and there is no expectation of erosion while the structures are intact. The project site is a location where, due to the presence of an engineered shoreline, the inherent environmental assumptions upon which the erosion model are based are not met. Furthermore, the erosion model does not account for the potential longevity of the structures.

Figure 5-6 depicts the Sea Level Rise Exposure Area (SLR-XA), which represents the combined footprint of the three individual hazards that were modeled - passive flooding, annual high wave flooding, and coastal erosion - with 3.2 ft of sea level rise. It is important to understand the underlying assumptions, limitations, and uncertainties of the SLR-XA model when considering the results at the parcel level. The project site is situated at a headland where the orientation of the shoreline transitions from approximately 160 degrees (to the south) to 135 degrees (to the north). The dominant shoreline change trend to the south has been erosion, whereas accretion has been the dominant trend to the north. The SLR-XA model projects that the shoreline south of the project site will experience increased erosion and flooding with sea level rise, whereas the shoreline to north will experience accretion and minimal flooding (Figure 5-5). The significant variability of the projected hazards over a small geographic area suggests that further study is required in order to quantify the potential impacts of sea level rise at the project site.

# 6. ALTERNATIVES ANALYSIS

## 6.1 Introduction

The objectives for the Krueger Shore Protection Mitigative Improvements project are to:

- Repair damage and structural deficiencies of the existing seawall.
- Comply with the conditions of the easement to maintain the structures in a safe condition.
- Provide long-term protection for the property and existing single-family home.

SEI evaluated eight (8) alternatives to determine if they are suitable for the project site conditions and capable of achieving the project objectives:

- No Action
- Managed Retreat
- Beach Nourishment
- Rock Revetment
- Hybrid Seawall-Revetment
- Seawall Removal
- Seawall Replacement
- Seawall Mitigative Improvements

Alternatives were evaluated based on the following criteria:

- Effectiveness (i.e., capable of achieving the project objectives)
- Design Considerations (i.e., suitability, durability, design life)
- Costs (i.e., initial costs, recurring costs, cost-benefit ratio)
- Feasibility (i.e., constructability, regulatory requirements, community support/opposition)
- Potential Impacts (i.e., coastal processes, environment, shoreline access, adjacent properties)

Ideally, the recommended engineering alternative would satisfy the project objectives, while minimizing potential negative impacts to the natural and built environment.

## 6.2 No Action

The No Action alternative would involve leaving the seawall and rock apron in its existing location and condition with no repairs or improvements. This approach would do nothing to improve the condition or functionality of the seawall. The seawall is over half a century old and is in a deteriorated condition. If the seawall is not repaired and improved, the structure can be expected to continue to deteriorate. If the seawall deteriorates to a point that it is no longer serviceable, the structure may fail, or removal may be required.

The seawall protects the project site and the adjacent properties from erosion and wave overtopping. If the seawall were to fail or be removed, the terrestrial area would be unprotected. The shoreline would be exposed to erosion, flooding would occur more frequently, and property damage would be expected. Failure or removal of the seawall would expose the project site and the adjacent properties to increased hazard risk. The seawall is in a serviceable condition and repairs and improvements are feasible.

Advantages

+ No cost.

Disadvantages

- Does not address the damages and structural deficiencies of the existing seawall.
- Does not comply with the requirements of the easement.
- Does not provide long-term protection for the property and existing single-family home.
- Continued deterioration of the seawall could create a risk to public health and safety.

No Action would have no immediate impacts to the project site, the nearshore waters, or adjacent properties. However, the likelihood of seawall failure would increase over the long-term. If no mitigative action is taken to repair and improve the seawall, damage will continue and the level of deterioration of the seawall could eventually result in failure, which would negatively impact the project site and adjacent properties. No Action would not satisfy the project objectives and is therefore not the preferred alternative.

## 6.3 Managed Retreat

Managed retreat (also referred to as "adaptive realignment") is a coastal management strategy that focuses on strategic relocation of existing and new development away from the shoreline and out of vulnerable areas. The objective of managed retreat is to allow the shoreline to naturally move inland rather than fixing the shoreline with engineered structures. Managed retreat in a heavily developed residential area, like Lanikai, would likely require a phased approach that may be implemented over the course of several decades. A project of this magnitude would require extensive planning and coordination between government agencies, the community, the affected landowners, and the general public.

Managed retreat would likely require relocating the existing single-family home further from the shoreline. The home is 80 yrs old, and the foundation is slab-on-grade, so moving the home from its current location is not a practicable alternative. Redevelopment of the property would likely require demolition of the existing single-family home and pool. Additional structures would also be required to protect and stabilize the neighboring properties and shore protection structures. While this option may reduce vulnerability of infrastructure to coastal hazards and sea level rise, complete redevelopment of the property is not a reasonable or practical option.

Managed retreat at the project site could potentially involve removal of the existing seawall and rock apron, which would allow the terrestrial area to erode and sand to migrate naturally along the beach. While this may result in a temporary increase in beach width, the eroded sand would be unstable and would be expected to mobilize and spread throughout the littoral system during normal seasonal beach processes. In the absence of the seawall, the terrestrial area would be exposed to erosion and flooding, and the project site and adjacent properties would be more vulnerable to coastal hazards and sea level rise.

Advantages

+ Reduces vulnerability of infrastructure to coastal hazards and sea level rise.
+ Avoids costs and requirements associated with shore protection or beach restoration.

+ Allows the shoreline to migrate naturally.

Disadvantages

- Does not address the damages and structural deficiencies of the existing seawall.
- Does not comply with the requirements of the easement.
- Does not provide long-term protection for the property and existing single-family home.
- Would only be effective if implemented at the community level.
- No existing rules, programs, or policies to manage or facilitate the retreat process.

The proposed mitigative improvements are an interim solution to allow sufficient time for long-term sea level rise adaptation plans to be developed and implemented. These long-term plans may include strategic retreat of infrastructure away from the shoreline or a combination of strategies such as continued beach restoration plus intermittent movement of structures and facilities away from the shoreline triggered by the impacts of recurring erosion and flooding.

The State of Hawaii recently published a report entitled *Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai'i* (Hawai'i Office of Planning, 2019). The report presented next steps for the State of Hawaii to develop a managed retreat plan. The report states that "… to have a cogent and comprehensive retreat plan, it requires long-range planning, legal changes, funding, and some level of community agreement, understanding and support for retreat." The report also notes that retreat from chronic coastal hazards (e.g., erosion and sea level rise) can be incremental and may take decades to complete. Based on these findings, the report suggests the following next steps to develop a statewide managed retreat plan:

- Determine the feasibility and implication of additional managed retreat tools.
- Establish criteria for areas to be retreated and priority list(s).
- Identify funding to retreat areas and review tax implications of retreat.
- Review State and County land uses to determine where it may be possible to retreat to.
- Review State and County plans to determine where they may be amended or updated or both to support retreat.
- Review laws and regulations that may have to be amended or adopted or both to facilitate retreat at the State or County or both levels.
- Engage in outreach to the communities to obtain their input and buy-in for retreat strategies to be adopted.

Managed retreat is not the only option to adapt to sea level rise.

It is generally accepted that there are three major approaches to sea-level rise: accommodation, protection, and retreat (Codiga and Wager, 2011). Managed retreat is an example of an adaptation strategy to respond to rising sea levels. However, it is not the only option to adapt to sea level rise and the other options (accommodation and protection) should be thoroughly evaluated as stand-alone approaches or in combination to address site-specific needs and circumstances. The feasibility and cumulative impacts (positive and negative) of managed retreat should also be thoroughly evaluated and understood prior to implementation.

The geographic scale of managed retreat is disproportionately larger than the proposed action.

The Lanikai region spans approximately 8,000 ft (1.5 mi) of shoreline extending from Wailea Point to Alala Point. There are 108 individual residential parcels along the Lanikai shoreline, most of which are armored by seawalls and revetments. The proposed mitigative improvements are limited to the subject property, which spans approximately 120 ft of shoreline, which is approximately 1.5 percent of the entire length of shoreline in Lanikai. Managed retreat would fundamentally alter the character of the Lanikai community as it exists today. Furthermore, Lanikai Beach is a Public Trust resource that is owned and managed by the State of Hawaii. The adjacent landowners are not responsible for managing the beach resource. It is not reasonable or feasible for an individual landowner to evaluate or propose a regional solution, such as managed retreat, that would have such a profound impact on the environment, Public Trust resources, and the surrounding community.

Managed retreat should be evaluated as part of the community development planning process.

Managed retreat will likely require substantial redevelopment or relocation of the existing residential parcels that currently exist along the Lanikai shoreline. Relocation at this scale would, at a minimum, require substantial redevelopment of approximately 37 acres of land between Mokulua Drive and the shoreline, affecting over 108 individual landowners. A project of this magnitude would fundamentally alter nearly every aspect of the natural and built environments in this area, and the appearance and character of the Lanikai community as it exists today.

Managed retreat plans should be developed in coordination and collaboration with State and County agencies, the community, existing landowners, and other stakeholders that would be affected. Ideally, managed retreat would be initially evaluated as part of the Community Development Planning (CDP) process, which is coordinated by the City and County of Honolulu. Lanikai is part of the Ko‘olau Poko Sustainable Communities Plan, which was last updated in August 2017. The plan does not discuss managed retreat.

Current retreat options within existing regulations.

Managed retreat for individual land uses would involve modification, relocation, or removal of existing structures to reduce hazard exposure and maintain a natural shoreline. Shoreline setbacks are an existing regulation requiring individual development actions to be set back a minimum distance from the shoreline, creating a buffer zone that reduces the potential for shorefront development to be exposed to erosion and flooding. The City and County of Honolulu requires shoreline setbacks for new construction (and redevelopment) along the shoreline. Setbacks are calculated and implemented during the County permitting process, after the environmental review process is completed, and prior to commencement of construction. Shoreline setbacks are calculated and measured from the certified shoreline. The proposed mitigative improvements would be located entirely landward of the shoreline and would not alter the location of the certified shoreline or the shoreline setback.

The timeline for managed retreat is disproportionately longer than the proposed action.

Managed retreat should be evaluated through long-range planning beginning with the community planning process. One suitable venue for assessment, community input, and prioritization of managed retreat could be the Primary Urban Center Development Plan, which is in the process of being updated. It will take decades to envision, plan, fund, and implement a managed retreat plan for Waikīkī and the community planning provides an appropriate multi-decadal planning outlook.

Beach restoration can be completed in a matter of years as an iterative, interim mitigation and adaptation measure. Multiple beach restoration efforts, nature-based sea-level rise adaptation measures, could be completed in the time it will take to implement a comprehensive and holistic managed retreat plan at Waikīkī. Moreover, beach restoration can be an integral step in a broader and more inclusive managed retreat plan, providing a nature-based solution and allowing additional time for other sea-level rise adaptation measures on a coastline.

Until managed retreat policies, regulations, tools, and programs are in place to implement managed retreat in a heavily developed residential community like Lanikai, other appropriate solutions should be considered. The proposed mitigative improvements are an interim solution and would not preclude the implementation of other sea level rise adaptation strategies in Lanikai in the future. The multi-decadal process of planning for and implementing managed retreat should not preclude the landowner from fulfilling their objective to protect their property from erosion and flooding.

## 6.4 Beach Nourishment

Beach nourishment typically involves placement of beach fill to specified profiles that are designed to augment the natural morphology of the beach to offset the effects of chronic, seasonal, or episodic erosion. Regulatory agencies and the public are generally supportive of beach nourishment because it has minimal environmental impacts and is consistent with State and County policies that seek to preserve and enhance beach resources and shoreline public access.

The shoreline fronting the seawall consists of a narrow sandy beach that is dynamic and ephemeral. The beach consists of a thin veneer of sand with no evidence of stable beach profile. When sand is present along the shoreline, the beach is generally exposed only during lower tides. At high tide, waves wash up to the seawall and the beach face is entirely submerged. Beach nourishment at the project site would consist of placing sand directly on the shoreline to increase the elevation and width of the beach.

One of the factors that can limit the effectiveness of beach nourishment projects is the loss of sand due to natural littoral processes, such as longshore and cross-shore sediment transport. Sand placed only at the project site would be unstable and would be expected to mobilize and spread throughout the littoral system during normal seasonal beach processes. Engineered containment structures, such as groins, would be required to stabilize the sand and maintain a stable beach. T-head groins decrease and reorient the amount of wave energy reaching the beach and create artificial littoral cells to stabilize the sand. An example of beach nourishment with stabilizing T-head groins is shown in Figure 6-1.

Beach nourishment accompanied by the construction of groins to stabilize the sand fill would be the most effective means to restore and maintain a stable beach, while providing a natural protective buffer to protect the terrestrial area and infrastructure. A series of groin structures accompanied by beach fill would create stable, wide beach cells within the groins, stable fillets on the outside of each groin, and would reduce the loss of sand to the north and south.

**Figure 6-1 Example of beach nourishment with T-head groins (Iroquois Point, Oahu)**

A disadvantage of beach nourishment with stabilizing groins is the potential for down drift effects that can negatively impact nearby shorelines. The scale of the project would need to be expanded to include a sufficient number of groins spanning a significant length of shoreline. This would require a regional effort to restore and maintain a beach along this section of coastline. In addition to the large scale of the project, finding an appropriate source of beach sand has become a significant challenge for beach nourishment projects in Hawaii. Offshore sand mining has become a viable alternative to terrestrial sand mining; however, due to the high costs for sand recovery and transportation, offshore sand is only practical for large-scale beach nourishment projects.

In 2009, the U.S. Army Corps of Engineers and Hawaii Department of Land and Natural Resources evaluated options for large-scale beach nourishment at Lanikai. The first option was for direct placement of sand with no stabilizing structures. The conceptual design produced a dry beach width of 30 ft and would require 182,000 $cy^3$ of sand for the initial nourishment at an estimated cost of $33,000,000. Additional nourishment of the beach was projected to be necessary every 8.4 yrs, resulting in an estimated total cost over 50 yrs of $109,000,000. The second option included construction of twelve (12) T-head groins. This concept also produced a minimum dry beach width of 30 ft and required 146,000 $cy^3$ of sand for an estimated initial cost of $33,400,000 and a total cost of $41,600,000 over 50 yrs. The groins would be located seaward of the shoreline, so easements would be required for the groins, which would further increase costs.

<u>Advantages</u>

+ Increases beach volume and width.
+ Improves lateral shoreline access.

+ Provides some additional protection against erosion and flooding.
+ Agencies and the public are generally supportive of beach nourishment projects.

Disadvantages

- Does not address the damage and structural deficiencies of the existing seawall.
- Does not comply with the requirements of the easement.
- Does not provide long-term protection for the property and existing single-family home.
- Requires an adequate quantity of compatible beach quality sand.
- Requires discharge of fill material (sand) in waters of the United States.
- Groins and beach fill would have a very large structural footprint along the shoreline.
- Project would need to be a regional effort spanning multiple properties.
- Very high costs for design, environmental review, permitting, construction.
- Groins would require easements.

Small-scale beach nourishment without stabilizing structures would not be effective at the project site, and large-scale beach nourishment with stabilizing structures is not practical at the parcel level. Beach nourishment is therefore not the preferred alternative.

## 6.5 Rock Revetment

A revetment is a sloping, un-cemented structure constructed of wave-resistant material. The most common method of revetment construction is to place a layer of armor stone, sized according to the design wave height, over an underlayer of smaller rock that sits atop geotextile filter fabric. The underlayer is designed to distribute the weight of the armor layer and to prevent loss of fine material through voids in the revetment. An example of a rock revetment is shown in Figure 6-2.

An advantage of a revetment is that the rough, porous rock surface and sloping face of the structure will tend to absorb wave energy, reduce wave reflection, and may help to promote accretion of sand on a sandy beach when a sufficient volume of sand is available in the littoral system. Additional advantages of revetments are that materials are readily available and localized damage can be easily repaired by placement of additional armor stone.

The rough and porous surface and flatter slope of revetments absorb and dissipate more wave energy than the smooth vertical surfaces of seawalls. Revetments are more effective in reducing wave reflection, runup, and overtopping, which increases the potential for sand accumulation seaward of the structure. Because of its durability, flexibility, and reduced wave reflection, a revetment is often considered the best erosion control/shore protection measure for sites where shoreline hardening is considered appropriate.

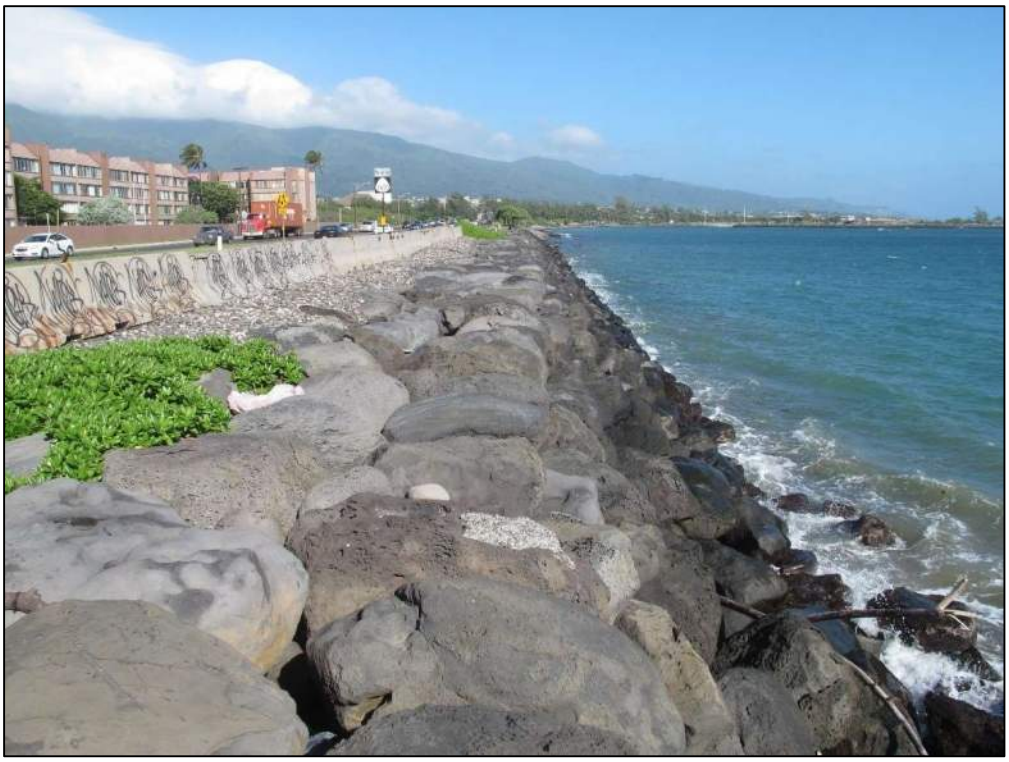

**Figure 6-2 Rock revetment at Kahului Harbor (Kahului, Maui, Hawaii)**

Properly designed and constructed rock revetments are durable, flexible, and highly resistant to wave damage. Rock revetment design is dependent on sea level elevation, design wave height, and scour depth. The revetment designs presented below incorporate a 2.3-foot higher than present sea level, with consequent increases in predicted wave exposure and scour depth. Utilizing 2.3 ft of sea level rise, which is currently projected for 50 yrs in the future, provides suitable design criteria within the effective life span of similar structures. Structure maintenance, improvements, or replacement are appropriate at the end of the structure's projected life span or when environmental changes exceed design conditions. Adaptation to rising sea levels and their resulting impacts predicted at time frames beyond the structure's design life should be incorporated at that time.

Armor stone size is based on the design wave height, $H_s$, at the structure during a 50-yr NE swell. This wave height $H_s$ was modeled to be 5.1 ft. The required armor stone weight for stability under the design wave height is given by the Hudson Formula (USACE, 1984/2006):

$$W = \frac{w_r {H_s}^3}{K_D (S_r - 1)^3 cot\theta}$$

where:

$W$ = weight in pounds of an individual armor stone
$w_r$ = unit weight of the stone, 160 lb/ft$^3$
$H_s$= wave height, 5.1 ft
$K_D$ = armor stone stability coefficient, 2
$S_r$ = specific gravity of the stone relative to seawater, 2.5
cot $\theta$ = cotangent of the groin side slope, 1.5

The armor layer is typically two stone diameters in thickness; however, an adjustment can be made for single stone layer design. For this design, the stone weight is increased by 30% and the stones are required to be keyed and fitted for maximum stability. The suggested armor stone weight using the Hudson Formula for single stone armor layer is therefore 2,800 lbs with a corresponding nominal diameter of approximately 2.6 ft. A range of ±25% of the median weight is typically utilized, which yields a stone weight range of 2,100 to 3,500 lbs. Underlayer stone is sized at approximately 1/10 the armor stone weight, resulting in underlayer stone size between about 200 and 350 lbs. The nominal diameter for this stone weight is 1.2 ft. The underlayer sizing is important to provide porosity for energy dissipation, to achieve interlocking between the armor and underlayer, and to ensure that the underlayer material cannot be removed through voids in the armor layer. The underlayer stone should be placed in a layer two stone-widths thick, or 2.4 ft.

It is preferred that the toe of the revetment be founded on hard, non-erodible substrate to prevent scour and undermining of the structure. Based on the results of the geotechnical investigations, the depth to hard nonerodable substrate is more than 28 ft below the existing backshore grade. In the absence of hard substrate, a scour apron can be designed to mitigate the effects of scour. The revetment toe would consist of a three-stone wide apron at the approximate scour depth, in this case, the top of the scour apron would be at -5.5 ft msl.

SEI evaluated two options for a rock revetment at the project site. Both options would extend beyond the limits of the easement area and would require demolition and removal of the existing seawall and rock apron. Return walls would also be required to stabilize and protect the adjacent properties and existing shore protection structures.

The first option would be to construct a rock revetment landward of the existing seawall (Figure 6-3 and Figure 6-4). The crest of the structure would be placed at +10.5 ft msl to match the existing backshore topography with a slope of 1V:1.5H (vertical to horizontal) to ensure stability. The structure would be 40.2 ft wide with a total area of 3,880 $ft^2$. The entire structure would be in the Special Management Area. The structure would occupy 100% of the yard area and would encroach 4 ft into the existing single-family home. To mitigate the need to modify or remove the existing single-family home, an alternative would be to construct a rock revetment beginning at the seaward edge of the existing rock apron (Figure 6-5 and Figure 6-6).

<u>Advantages</u>

- \+ Provide long-term protection for the property and existing single-family home.
- \+ Better wave energy dissipation characteristics than a seawall.
- \+ Less reflective than a seawall and may facilitate sand accretion seaward of the structure.
- \+ Does not negatively impact lateral shoreline access.

<u>Disadvantages</u>

- – Largest structural footprint of the options considered.
- – Very high costs for design, environmental review, permitting, and construction.
- – Only feasible if a portion of the structure extends seaward of the shoreline.
- – Requires demolition and removal of the existing seawall and rock apron.
- – Public could traverse the revetment creating potential privacy, security, and liability issues.

- Uncertainty regarding entitlement implications and regulatory requirements.
- Agency and public opposition to construction of new shore protection structures.

The existing combination of a seawall and rock apron protects the backshore from erosion and reduces incident wave energy and reflection. The rock apron also affords the opportunity to accrete sand against it, as evidenced by observations and measurements at neighboring locations where rock aprons also exist. The extent and stability of the sand accretion is dependent on factors such as the size of the apron, the reflective characteristics of the rock apron and seawall, nearshore sand supply, currents, and wave conditions. At higher water levels and wave conditions, the rock apron would be less effective, as more wave energy would pass over the apron increasing reflectivity from the seawall and flattening the beach profile.

Removing the seawall and rock apron and constructing a rock revetment would initially produce a small cove-like feature, where the waterline would move inshore along the face of the revetment, approximately 20 ft inshore from its present location along the face of the seawall. The elevation of the sandy seafloor offshore of the existing seawall is approximately -4 ft mllw. It is reasonable to expect that sand would fill in the cove up to at least elevation -4 ft mllw. Any further beach development, however, would be dictated by the location of the beach toe in relation to the revetment.

The beach toe is a profile feature located at the seaward edge of the beach face that is commonly used to define the limits of the active beach. The beach toe is a hydrodynamic and geomorphic feature that is developed by the interaction between the down rush of water from the previous wave and the dynamics of the next incoming wave. The existing beach toe through this portion of Lanikai is typically located immediately offshore of the rock aprons. Removal of the Krueger seawall and rock apron would provide space for potential sand accretion and beach development, although only to a very limited extent. Given sufficient nearshore sand, a nominal amount of accretion would be expected to occur in front of the revetment; however, the resulting beach would not be very substantial. The furthest offshore the beach toe could develop is in its present location. From there, the beach face would slope upward toward shore at an expected slope of approximately 1V:10H (vertical to horizontal), intersecting the revetment at elevation +2 ft mllw. At this elevation, the beach would be submerged by each incoming wave, and the down rush of water from the revetment would be expected to flatten the beach profile.

A natural beach profile requires a certain amount of space to develop and stabilize. A wider beach would therefore require movement of the beach toe further seaward. To achieve a beach crest elevation of +6 ft mllw, the beach toe would have to be approximately 100 ft offshore of the revetment, or 80 ft beyond where it currently exists. Attempts to nourish the beach on a property-by-property basis would produce a perturbation (i.e., bulge) in the shoreline that would be expected to be straightened out by wave action over the course of a few tidal cycles. The only way to move the beach toe seaward and produce a stable beach is through regional beach accretion over the entire littoral cell. However, there does not appear to be an adequate volume of sand in the littoral system for this to occur. An alternative approach to produce a wider beach would be to move the revetment further inland. To achieve a beach crest elevation of +6 ft crest, the revetment would have to be shifted inland by about 80 ft, which would put the revetment landward of the existing single-family home.

When compared with the proposed action, a rock revetment would be substantially more expensive, would have a substantially larger structural footprint, would require more extensive excavation and permanent removal of existing substrate, and would fundamentally alter the existing environment and configuration of the shoreline.

Construction of a rock revetment would require demolition and removal of the existing seawall and rock apron, and permanent removal of excavated material. Temporary shoring would be required to protect and stabilize the existing single-family home and the adjacent properties and structures during construction. Additional permanent structures (i.e., return walls) would be required to protect and stabilize the adjacent properties and structures after construction. The single-family home may also need to be modified to accommodate structures of this size.

A rock revetment would also significantly expand the structural footprint within the property. The structure would be 40.2 ft wide with a total area of 3,880 $ft^2$. The structure would occupy over 20 percent of the total area of the property and would be 30 percent larger than the existing single-family home.

A rock revetment is an appropriate engineering solution for the project site. However, given the very large structural footprint, high costs for design, environmental review, permitting, and construction, and the need for additional structures to protect the adjacent properties and existing shore protection structures, a rock revetment is not the preferred alternative.

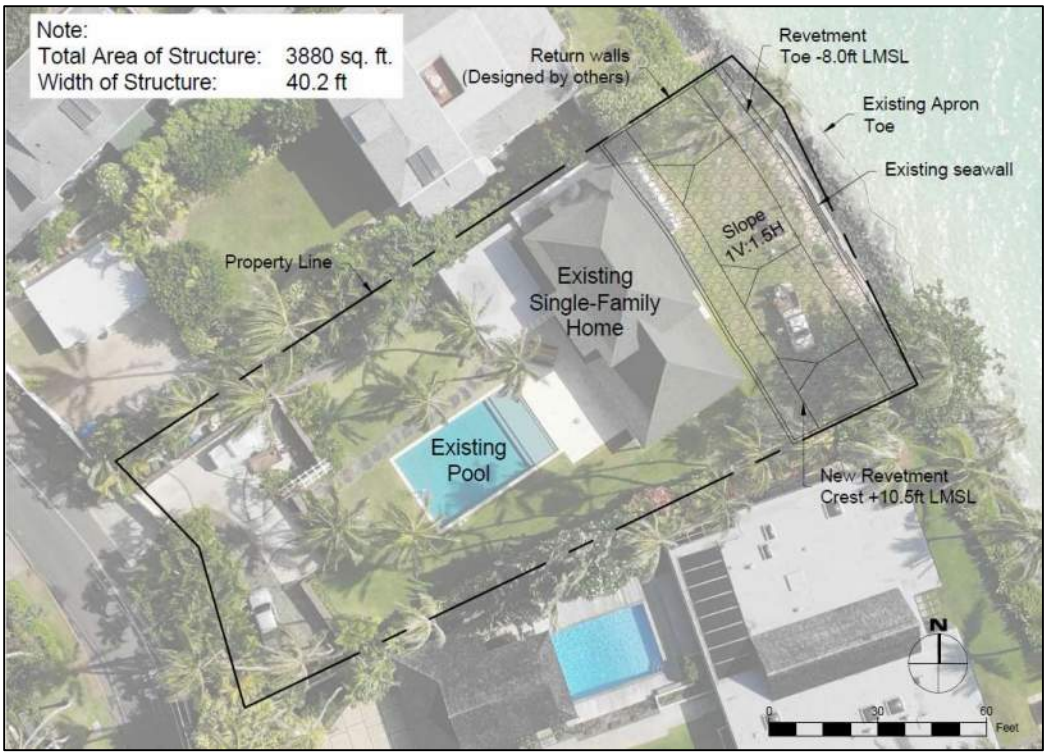


**Figure 6-3 Conceptual plan view for rock revetment landward of the shoreline**

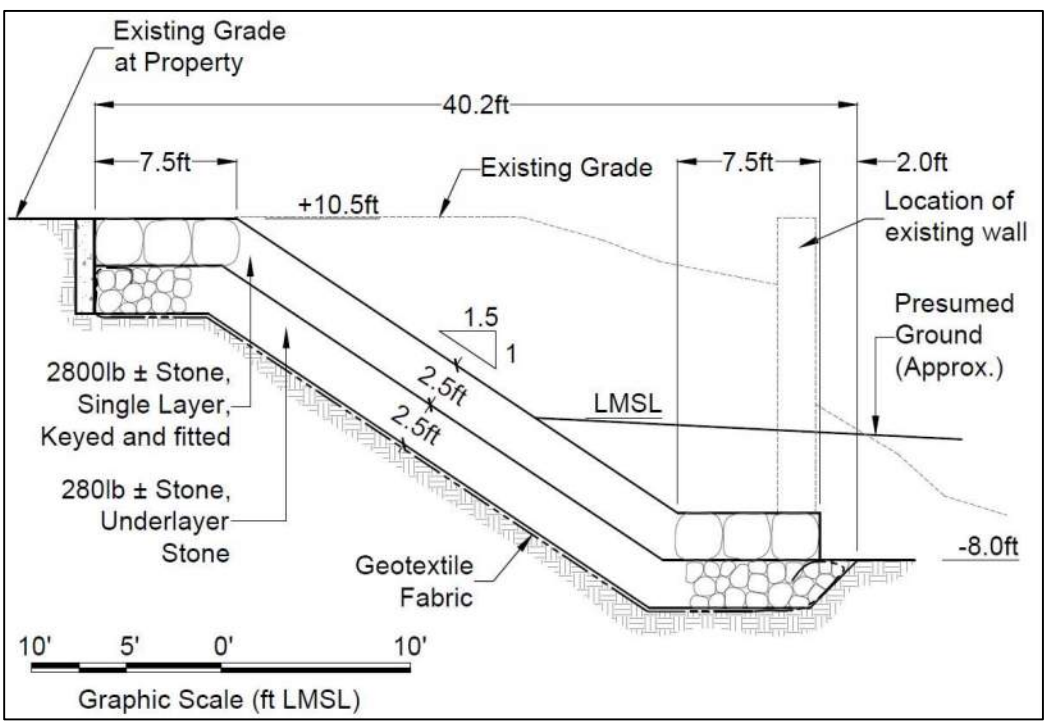


**Figure 6-4 Conceptual section view for rock revetment landward of the shoreline**

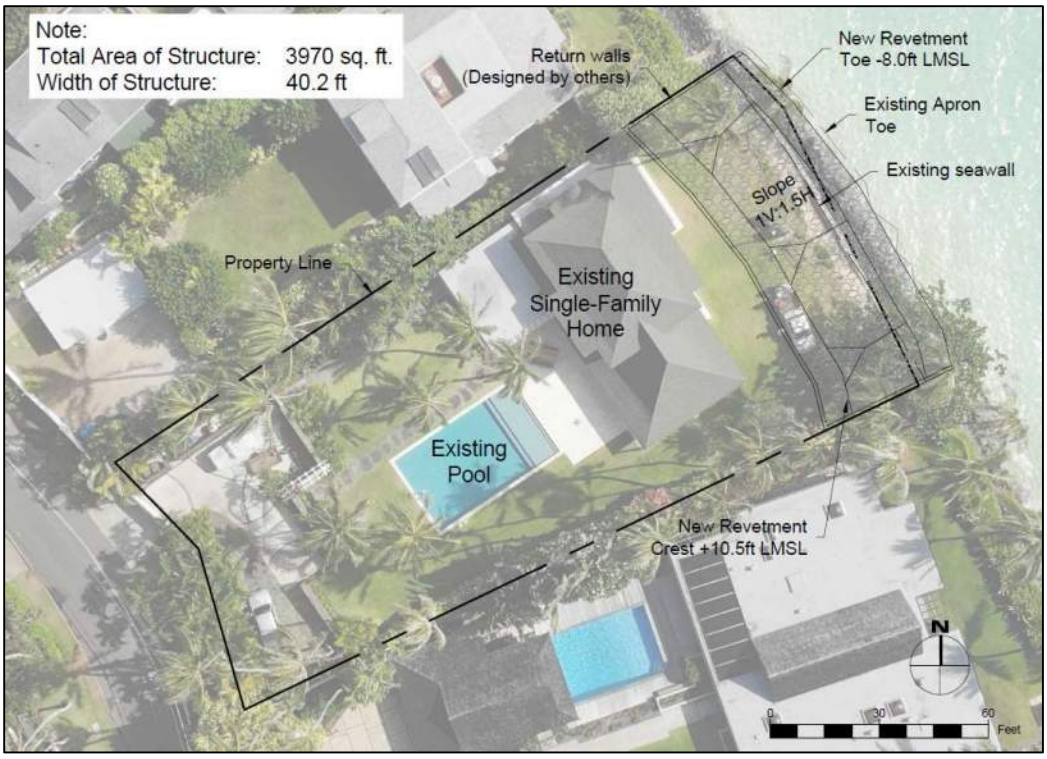


**Figure 6-5 Conceptual plan view for rock revetment seaward of the shoreline**

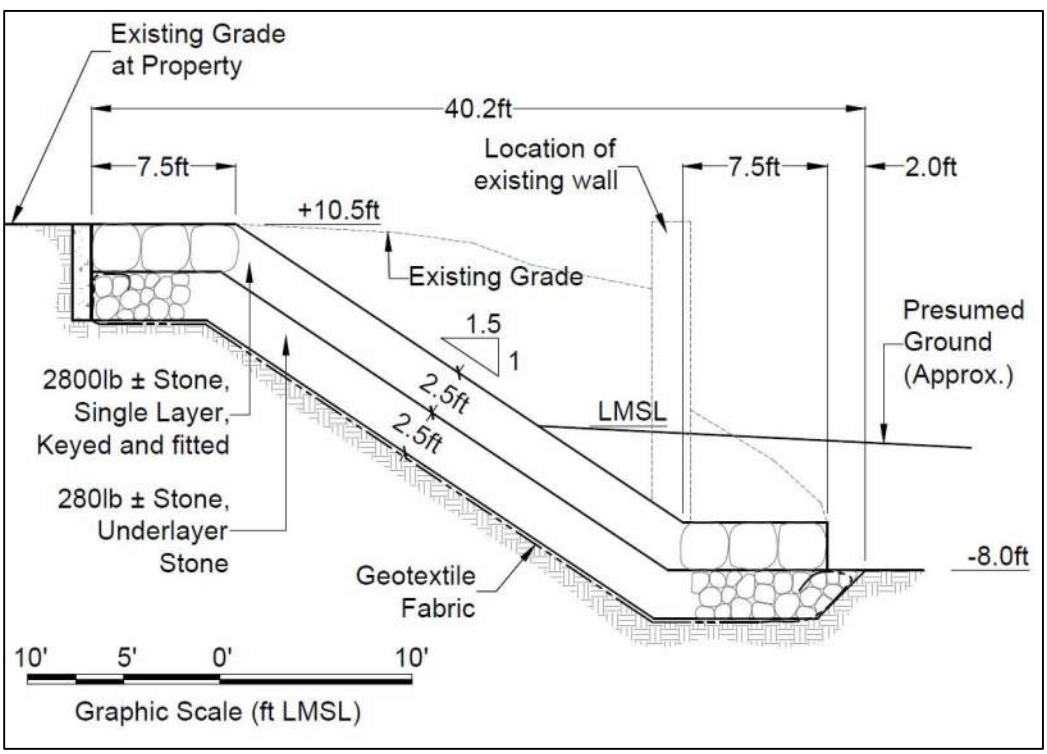


**Figure 6-6 Conceptual section view for rock revetment seaward of the shoreline**

## 6.6 Hybrid Seawall-Revetment

Another potential long-term engineering solution for the project site is a hybrid seawall-revetment, which is a shore protection structure that is composed of two primary elements: a seawall (e.g., sheet pile, reinforced concrete, or cemented rock masonry) and a uniform armor rock rubblemound revetment. An example of a hybrid seawall-revetment is shown in Figure 6-7.

**Figure 6-7 Hybrid seawall-revetment (Kapaa, Kauai, Hawaii)**

An advantage of a hybrid seawall-revetment is that the structure has a slightly smaller structural footprint than a traditional rock revetment and can be designed to be modified to withstand changing design wave conditions as sea level rises. Additional advantages of a hybrid seawall-revetment are that materials are readily available and localized damage can be easily repaired by placement of additional armor stone. Properly designed and constructed hybrid seawall-revetments are durable, flexible, and highly resistant to wave damage. A disadvantage of a hybrid seawall-revetment is that it would still have a relatively large structural footprint within the property.

<u>Advantages</u>

+ Provide long-term protection for the property and existing single-family home.
+ Better wave energy dissipation characteristics than a seawall.
+ Less reflective than a seawall and may facilitate sand accretion seaward of the structure.
+ Does not negatively impact lateral shoreline access.

Disadvantages

- Large structural footprint.
- Very high costs for design, environmental review, permitting, and construction.
- Requires demolition and removal of the existing seawall and rock apron.
- Public could traverse the structure creating potential privacy, security, and liability issues.
- Agency and public opposition to construction of new shore protection structures.

The hybrid seawall-revetment design is dependent on sea level elevation, design wave height, and scour depth. The designs presented below incorporate a 2.3-foot higher than present sea level, with consequent increases in predicted wave exposure and scour depth. Utilizing 2.3 ft of sea level rise, which is currently projected for 50 yrs in the future, provides suitable design criteria within the effective life span of similar structures. Structure maintenance, improvements, or replacement are appropriate at the end of the structure's projected life span or when the environment changes beyond design conditions. Adaptation to rising sea levels and their resulting impacts predicted at time frames beyond the structure's design life should be incorporated at that time.

SEI evaluated two options for a hybrid seawall-revetment at the project site. The armor and underlayer stone size and placement would be the same as for the rock revetment options. Both options would extend beyond the limits of the easement area and would require demolition and removal of the existing seawall and rock apron. Return walls would also be required to stabilize and protect the adjacent properties and existing shore protection structures.

The first option would be to construct a rock a hybrid seawall-revetment landward of the existing seawall (Figure 6-8 and Figure 6-9). The crest of the structure would be placed at +10.5 ft msl to match the existing backshore topography with a slope of 1V:1.5H (vertical to horizontal) to ensure stability. The structure would be 32.9 ft wide with a total area of 3,145 $ft^2$. The entire structure would be in the Special Management Area. The structure would occupy approximately 90% of the yard area seaward of the existing single-family home.

An alternative would be to construct a hybrid seawall-revetment beginning at the seaward edge of the existing rock apron (Figure 6-10 and Figure 6-11). The structure would be 32.9 ft wide with a total area of 3,225 $ft^2$. The landward portion of the structure would be in the Special Management Area. The seaward portion of the structure would be in the Conservation District.

The existing seawall and rock apron combination serve to protect the backshore and reduce incident wave energy and reflection. The rock apron also affords the opportunity to accrete sand against it, as evidenced by observations and measurements at neighboring locations where rock aprons also exist. The extent and stability of the sand accretion is dependent on factors such as the size of the apron, the reflective characteristics of the rock apron and seawall, nearshore sand supply, currents, and wave conditions. At higher water levels and wave conditions, the rock apron would be less effective, as more wave energy would pass over the apron increasing reflectivity from the seawall and flattening the beach profile.

Like the rock revetment option, removing the seawall and rock apron and constructing a hybrid seawall-revetment would initially produce a small cove-like feature that would provide space for potential sand accretion and beach development. However, the amount of accretion would be minimal, and the resulting beach would be largely submerged.

When compared with the proposed action, a hybrid seawall-revetment would be substantially more expensive, would have a substantially larger structural footprint, would require more extensive excavation and permanent removal of existing substrate, and would fundamentally alter the existing environment and configuration of the shoreline.

Construction of a hybrid seawall revetment would require demolition and removal of the existing seawall and rock apron, and permanent removal of excavated material. Temporary shoring would be required to protect and stabilize the existing single-family home and the adjacent properties and structures during construction. Additional permanent structures (i.e., return walls) would be required to protect and stabilize the adjacent properties and structures after construction. The single-family home may also need to be modified to accommodate structures of this size.

A rock revetment of hybrid seawall-revetment would also significantly expand the structural footprint within the property. A hybrid seawall-revetment would be 32.9 ft wide with a total area of 3,225 $ft^2$. The structure would occupy about 17.5 percent of the parcel and would be 20 percent larger than the existing single-family home.

A hybrid seawall-revetment is an appropriate engineering solution for the project site. However, given the large structural footprint, high costs for design, environmental review, permitting, and construction, and the need for additional structures to protect the adjacent properties and existing shore protection structures, a hybrid seawall-revetment is not the preferred alternative.

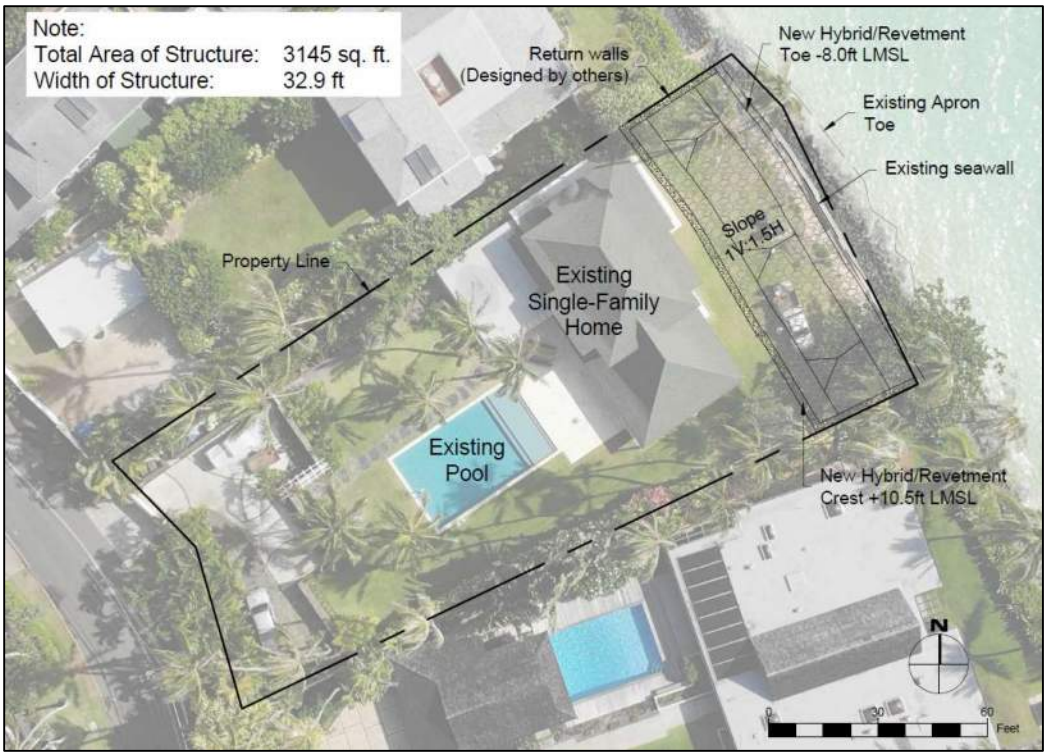


**Figure 6-8 Conceptual plan view for hybrid seawall-revetment landward of the shoreline**

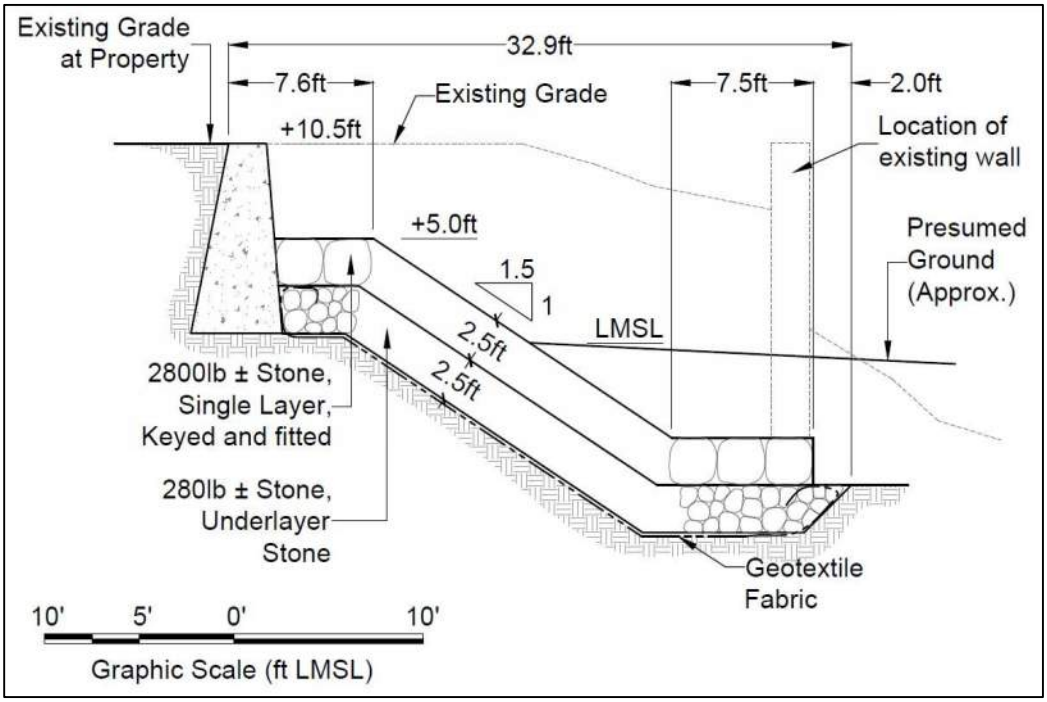


**Figure 6-9 Conceptual section view for hybrid seawall-revetment landward of the shoreline**

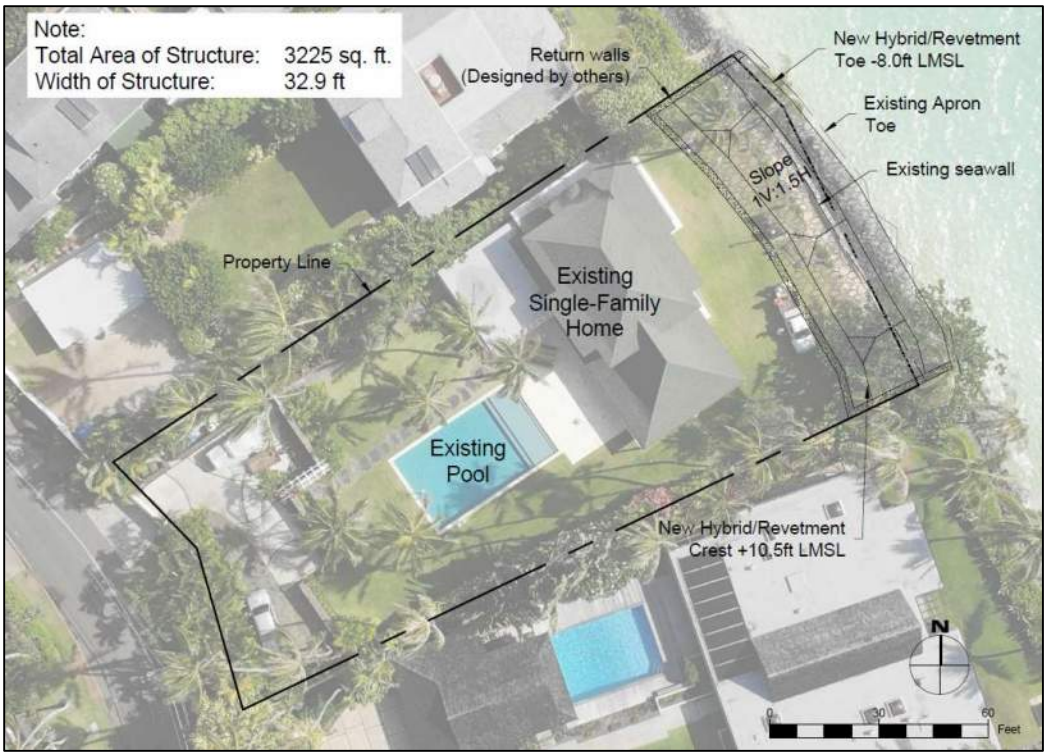


**Figure 6-10 Conceptual plan view for hybrid seawall-revetment seaward of the shoreline**

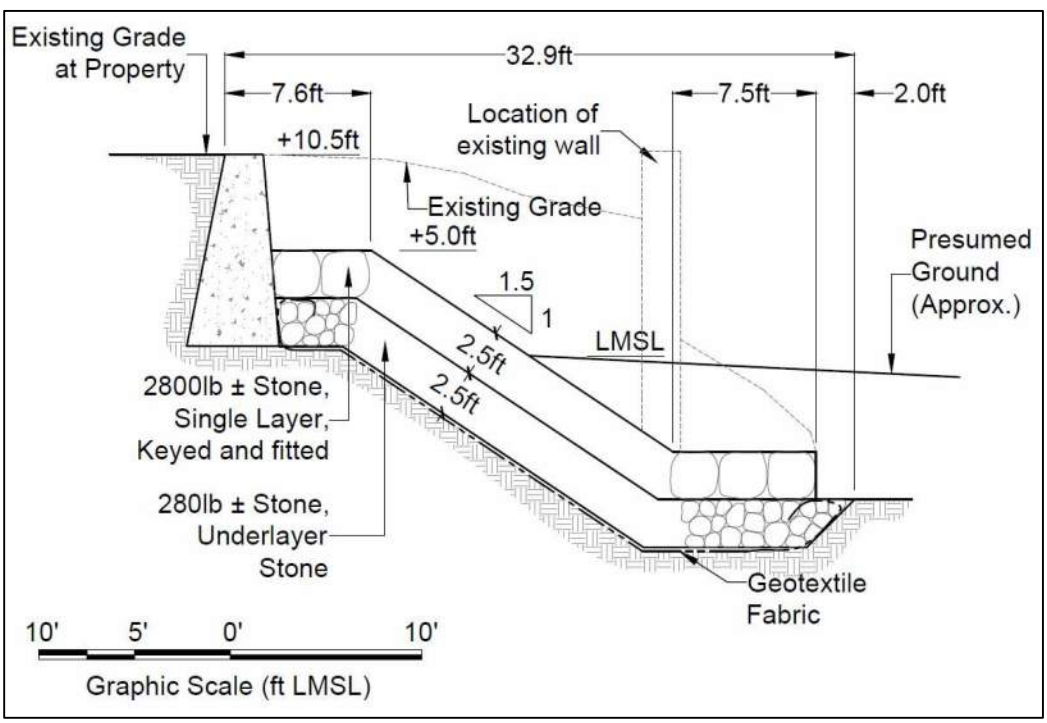


**Figure 6-11 Conceptual section view for hybrid seawall-revetment seaward of the shoreline**

## 6.7 Seawall Removal

The seawall removal alternative would involve removing the existing seawall and rock apron and allowing the shoreline to migrate naturally. As sea levels continue to rise, this would likely result in significant erosion, flooding, and permanent loss of land. The seawall is over half a century old and is in a deteriorated condition. The seawall is covered by an easement that confers unto the Grantee the "right, privilege, and authority to use, maintain, repair, replace and remove the existing seawall". The easement also requires that the Grantee "shall keep the easement area and the improvements thereon in a safe condition". Repairs and improvements are necessary in order to maintain the seawall in a safe condition and prevent it from being "substantially or completed destroyed", which would result in termination of the easement. If the seawall is not repaired and improved and continues to deteriorate to a point that it is no longer serviceable, the structure may eventually fail, or removal may be required.

<u>Advantages</u>

+ Would eliminate the need for mitigative improvements.

<u>Disadvantages</u>

- Does not address damage and structural deficiencies of the existing seawall.
- Does not provide long-term protection for the property and existing single-family home.
- High costs for demolition and removal.
- Potential environmental impacts during the demolition and removal process.
- Could potentially damage or destabilize adjacent shore protection structures.

The seawall protects the project site and the adjacent properties from erosion and wave overtopping. If the seawall were to be removed, the terrestrial area would be exposed to erosion, wave overtopping and flooding would occur more frequently, and property damage would be expected. Demolition and removal of the seawall would require extensive excavation, which would disturb a large volume of the existing soil in the terrestrial area making it more unconsolidated and prone to erosion. While erosion of the terrestrial sediment may result in a temporary increase in beach width, the eroded material would be unstable and would be expected to mobilize and spread throughout the littoral system during normal seasonal beach processes.

Seawall removal would not achieve the project objectives and would expose the project site and adjacent properties to increased hazard risk. The seawall is in a serviceable condition and repairs and improvements are feasible. Seawall removal is therefore not the preferred alternative.

## 6.8 Seawall Replacement

A seawall is a vertical or sloping concrete, concrete rubble masonry (CRM), cement masonry unit (CMU), or sheet pile wall used to protect the land from wave damage and erosion. A seawall, if properly designed and constructed, is a proven, durable, and relatively low-maintenance shore protection method. Seawalls also have the advantage of having a relatively small footprint along the shoreline.

Seawalls are not flexible structures, and their structural stability is dependent on the design and strength of their foundations. If the foundation of a seawall is breached, hydraulic action can erode the retained sediment inshore of the wall. With the loss of enough retained sediment, the ground surface behind the seawall will collapse and sinkholes will form. Sinkholes can compromise the structural integrity of a seawall and may result in failure of the structure. To avoid foundation problems, the seawall foundation should be well below the potential scour depth, which can require extensive excavation.

The impervious and vertical face of a seawall results in very little wave energy dissipation. Incident wave energy is deflected upward, downward, and seaward. Reflected wave energy can inhibit accretion of sand seaward of the wall. The downward energy component can cause scour at the base of the wall. Therefore, the foundation of a seawall is critical for its stability, particularly on sandy and eroding shorelines. Ideally, seawalls are constructed on hard, non-erodible substrate.

A new wall can be designed and constructed to provide adequate bearing, overturning, and sliding resistance with a spread footing set at a depth below design scour level. In addition to providing adequate wall resistance against design forces, the advantage of this option is that it will be designed to account for the risk of scour and undermining. A conceptual plan for a new seawall is shown in Figure 6-12.

<u>Advantages</u>

+ Designed to meet current structural code requirements.
+ Provides long term protection against erosion and flooding.
+ Provides more options to improve the seawall (e.g., appearance, size, ocean access).

<u>Disadvantages</u>

– Construction costs would be significantly higher than the repair and improvement option.
– Construction duration would be significantly longer than the repair and improvement option.
– Excavation to the depth required for scour resistance would be difficult and costly.
– Requires demolition and removal of the existing seawall and rock apron.
– Agency and public opposition to construction of new shore protection structures.

Seawall replacement is an appropriate engineering solution for the project site and would achieve the project objective to provide long-term protection for the property and existing single-family home. However, due to the high costs for demolition and removal of the existing seawall, and regulatory restrictions on construction of new shore protection structures, seawall replacement may not be a feasible option.

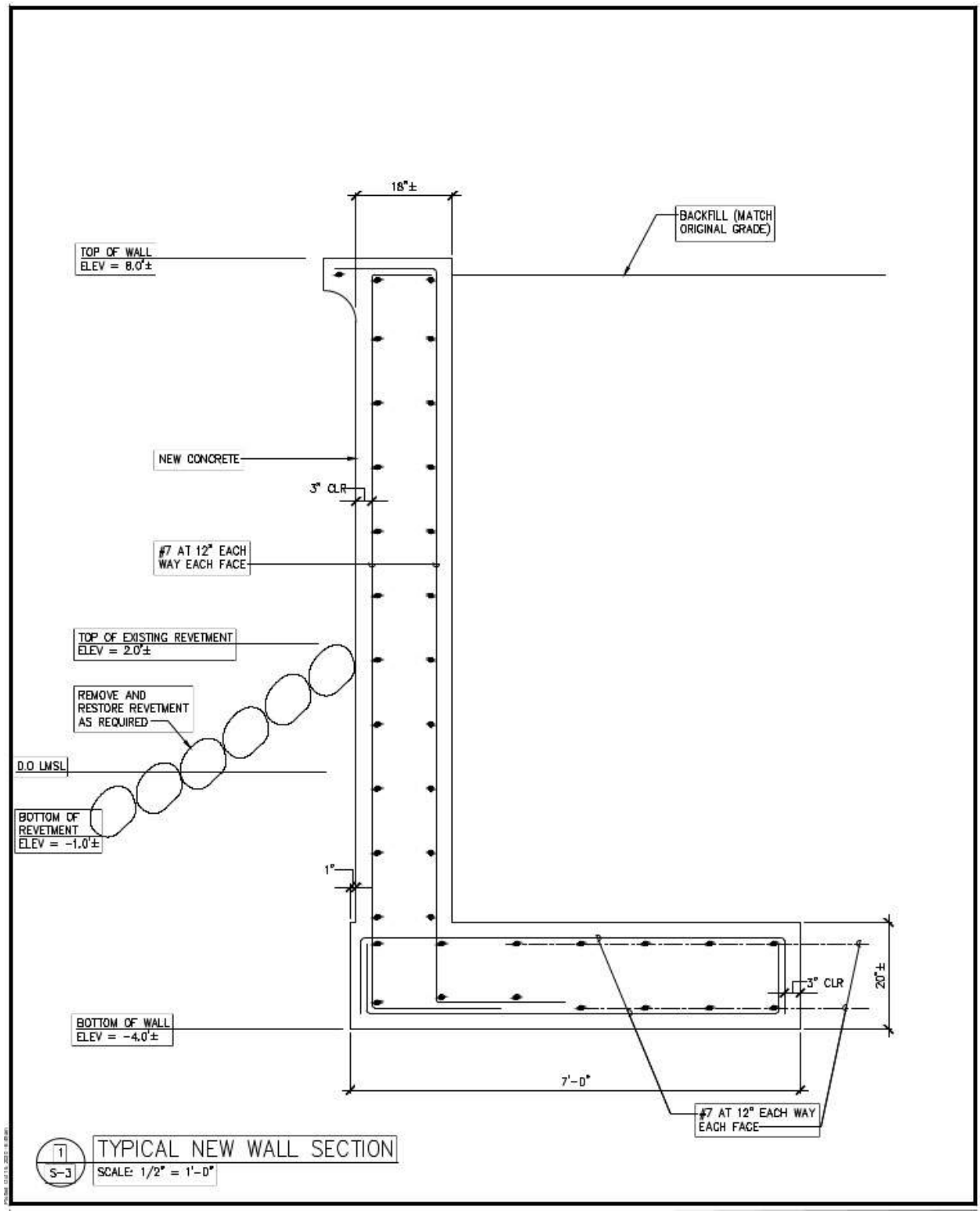


**Figure 6-12 Conceptual design for seawall replacement (MKE)**

## 6.9 Seawall Repair and Improvement

The existing seawall exhibits a variety of damage and structural deficiencies including settlement, outward rotation, cracking, undermining, and sinkholes. The most critical structural deficiency is the shallow depth of the existing foundation, which makes the wall vulnerable to scour and undermining. To address these issues, the seawall should be repaired or replaced. A conceptual plan for the seawall repair and improvement option is shown in Figure 6-13.

Seawall repair and improvement could be accomplished by driving sheetpile along the existing seawall. The sheetpile would be driven to hard substrate, thereby preventing any future scour and undermining. as well as providing adequate bearing, overturning, and sliding resistance. One option would be to install a steel sheetpile cutoff wall and associated tieback system seaward of the existing wall. This option would require filling existing voids beneath the seawall foundation to support the wall.

An alternative would be to install sheetpile on the landward side of the existing seawall. The existing seawall and the sheetpile wall would be structurally connected by construction of a concrete width extension and sheetpile cap dowelled to the existing wall. This would mitigate additional settling and rotation should undermining of the wall continue. The landward sheetpile option is anticipated to be significantly more expensive than placing the sheetpile seaward of the wall due to the addition of the dowelled concrete cap and increased sizes for the sheetpile and tieback system to accommodate the added load demands from the existing wall.

<u>Advantages</u>

+ Improves structural integrity without having to construct a new seawall.
+ Avoids costs for demolition and removal of the existing seawall and rock apron.
+ May extend the life of the structure for an undetermined amount of time.
+ Would have the least impact on the appearance of the shoreline.
+ Concrete cap would provide additional protection from sea level rise.
+ Construction costs would be significantly lower than the seawall replacement option.
+ Construction would be significantly faster than the seawall replacement option.
+ No substantial impacts on existing lateral shoreline access or coastal processes.
+ No substantial impacts on existing viewplanes to or along the shoreline

<u>Disadvantages</u>

– Requires demolition and removal of the existing concrete counterforts.
– More expensive than installing sheetpile seaward of the existing seawall.

The seawall repair and improvement option would retain the existing rock apron. An advantage of using a rock apron in a coastal environment is its capacity to disperse wave energy. This wave dispersion characteristic significantly reduces reflected wave energy while also preventing the downward motion of reflected wave energy that results in scour of the natural sediment. By dispersing wave energy as it impacts the shoreline, these installations improve the longevity of the backing structure and assist in protecting the backshore when paired with a seawall.

In a study of shoreline structures in Lanikai and their relationship to coastal conditions, Lipp (1995) showed that measured beach profiles in Lanikai were of similar slope fronting beaches and dissipative seawalls (i.e., seawalls with rubblemound/scour aprons). Maintaining the existing rock apron will help to reduce scour with a significant reduction in reflected wave energy. This reduction in wave energy at the face of the seawall is expected to steepen the beach profile and allow sand to build up makai of the structure when there is available material. Lipp (1995) documented this effect in Lanikai, and it has been corroborated with empirical evidence from the region.

Repairing and improving the seawall is the most cost-effective option as it would require less excavation and would eliminate the costs to demolish and remove the existing seawall. The work is also less invasive and minimizes potential environmental impacts. A sheetpile wall landward of the existing seawall would provide adequate resistance to design lateral forces and overturning moments produced by the retained soil and may extend the life of the structure for an undetermined amount of time. Seawall repair and improvement is therefore the preferred alternative.

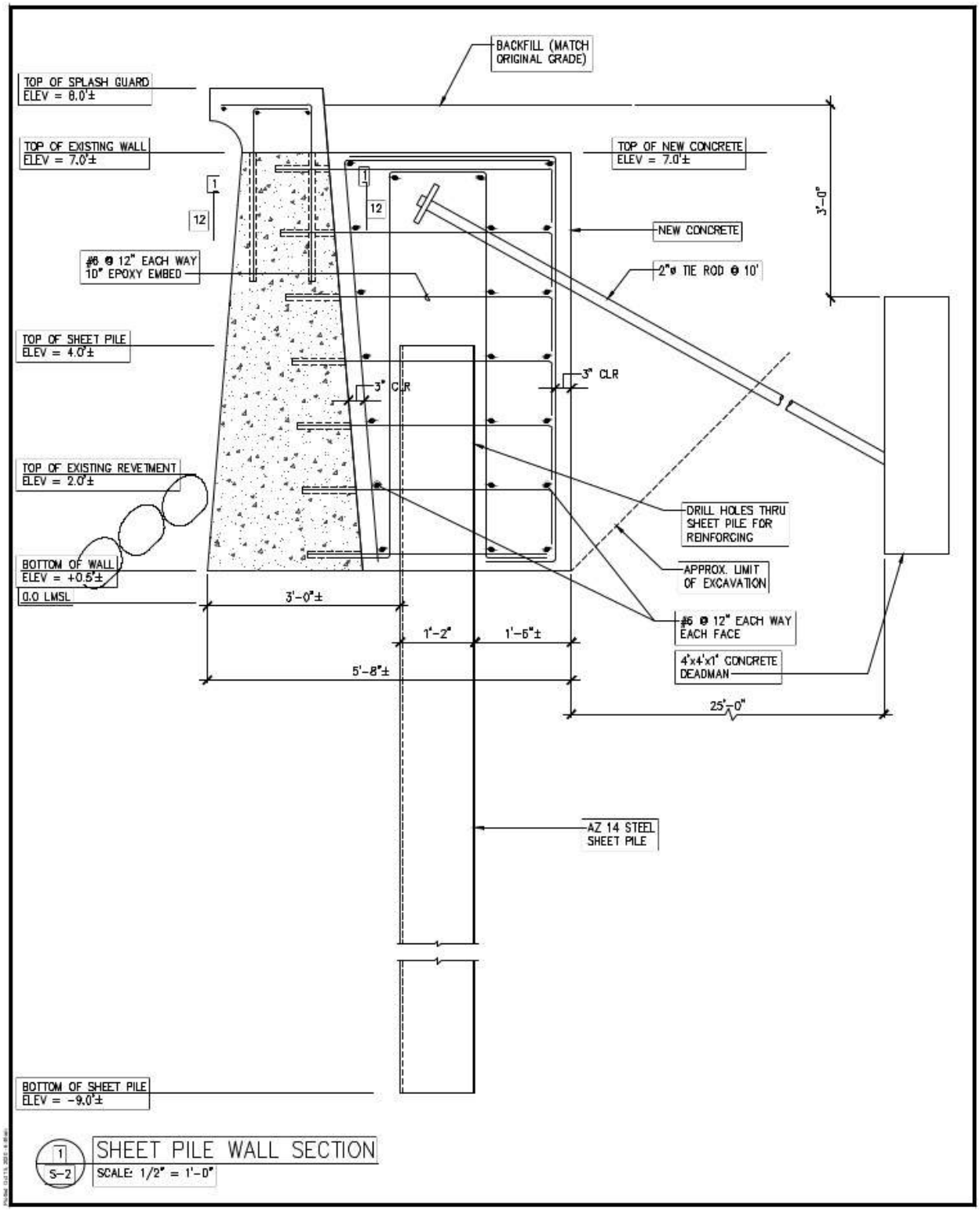


**Figure 6-13 Conceptual plan for seawall repair and improvement (MKE)**

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Appendix G

# Marine Research Consultants, Inc. Baseline Assessment of the Marine Environment 1226 Mokulua Drive, Kreuger Seawall Kailua, Oahu, Hawaii, (September 2020)

# BASELINE ASSESSMENT OF THE MARINE ENVIRONMENT
# 1226 MOKULUA DR, KRUEGER SEAWALL
# KAILUA, OAHU, HAWAII

Prepared for:

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September 6, 2020

## *I. INTRODUCTION AND PURPOSE*

The Krueger Lanikai property at 1226 Mokulua Dr., Kailua, Oahu, is fronted by a 90 foot-long, 6 to 8-foot-high seawall constructed of unreinforced concrete. The seawall is fronted by a rock apron that is approximately 4 feet high, 10 feet wide, and runs along the length of the seawall. The rock apron is composed of basaltic boulders 9 to 18 inches in diameter (Figure 1).

A structural assessment of the condition of the seawall was conducted by MKE Associates LLC under subcontract to Sea Engineering, Inc. This survey identified various forms of damage including gaps between the subject seawall and the south adjacent wall, settlement along the southern portion of the wall, and outward rotation of the wall. Evidence of previous repairs include concrete work at several panel joints as well as infill of the sinkholes with concrete and boulders.

Sea Engineering, Inc., presented two options to address the failing seawall. The first option entailed repair of the existing seawall; the second option included replacement of the existing seawall. SEI has recommended repair as the preferred alternative as it is the least expensive, is the least invasive with minimal potential for environmental impacts, and is the most feasible from a regulatory perspective.

Proposed seawall repair procedures will include:

- Driving a sheet pile along the existing seawall.
- Installing a steel sheet pile cutoff wall and associated tieback system seaward of the existing wall.
- Filling existing voids beneath the seawall foundation to support the wall.
- Reworking the rock apron armor stone to achieve a uniform structure with appropriate layering.
- Installing geotextile fabric to mitigate backshore erosion.

This report, intended to support the 401 Water Quality Certification (WQC) application, provides results of field assessments of the physical/chemical and biological composition of nearshore waters encompassing the areas that may be affected by the retrofits of the Krueger Seawall.

**Figure 1.** Krueger Lanikai Seawall, 1226 Mokulua Dr., Kailua, Oahu.

## *II. WATER QUALITY*

### A. Methods

The purpose of the assessment is to provide a quantitative depiction of the existing condition of marine water chemistry in the area that has the potential to be affected by the proposed seawall retrofit project. Evaluation of the existing condition of the water chemistry provides an insight into the physical and chemical factors that influence the marine setting. Understanding the existing physical and chemical conditions of the marine environment provides a basis for predicting the potential affects that might occur as a result of the proposed project.

Water chemistry field collection was conducted on May 15, 2020. Water chemistry was assessed by collecting three linear sets of samples (i.e. transects) extending perpendicular to the shoreline from the highest wash of waves to approximately 50

m offshore. All samples were collected by investigators swimming from shore. Transect 1 was located off the southeast end of the property line, Transect 2 extended from the center of the property, and Transect 3 was located off the northwest end of the property line (Figure 2).

Water samples were collected at six locations along each transect. The first sample was collected as close to the shoreline as possible; samples were then collected at 1, 5, 10, 20, and 50 meters (m) from the shoreline. Such a sampling scheme is designed to span the greatest range of salinity with respect to potential freshwater efflux at the shoreline. Sampling was more concentrated in the nearshore zone because this area is closest to the region where seawall work will be performed, and hence is most important with respect to identifying the effects of shoreline modification. At sampling stations within 10 m of the shoreline, water samples were collected at the mid-point of the water column. Beyond 10 m from the shoreline, two samples were collected at each station: a surface sample was collected within 10 centimeters (cm) of the air-water interface, and a bottom sample was collected within 20 cm of the seafloor.

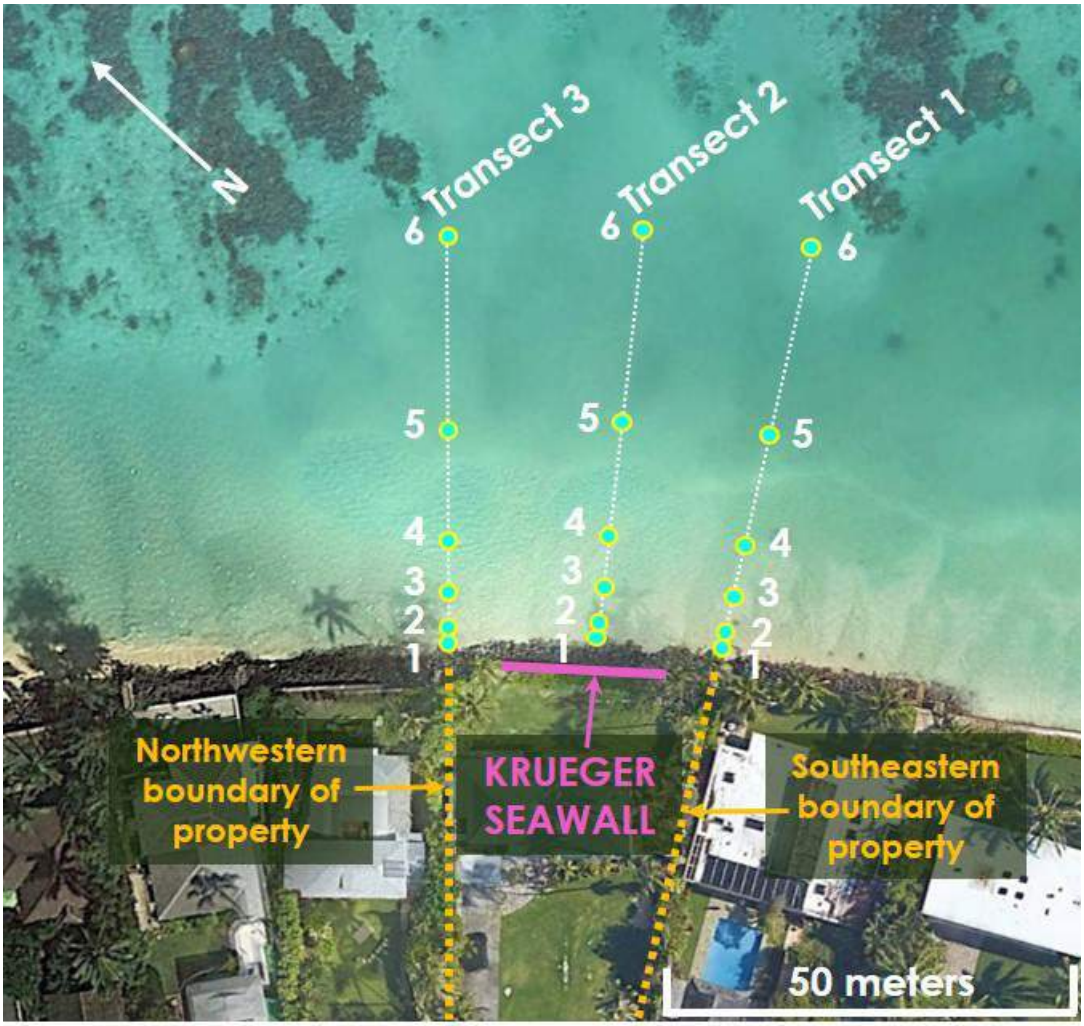



**Figure 2.** Aerial photograph of section of Lanikai shoreline showing location of the Krueger Seawall at 1226 Mokulua Dr., Kailua, Oahu. Also shown are locations of water sampling stations along three transects that extend from the shoreline to approximately 50 m offshore.

Water quality constituents evaluated included all specific criteria designated for open coastal waters in Chapter 11-54, Section 06 (b) (Open Coastal waters) of the State of Hawaii Department of Health Water Quality Standards (DOH-WQS). These criteria include: total nitrogen (TN), nitrate + nitrite nitrogen ($NO_3^-$ + $NO_2^-$, hereafter referred to as $NO_3^-$), ammonium nitrogen ($NH_4^+$), total phosphorus (TP), Chlorophyll a (Chl *a*), turbidity, temperature, pH, and salinity. In addition, dissolved silicate (Si) and orthophosphate phosphorus ($PO_4^{-3}$) were reported because these constituents are sensitive indicators of biological activity and the degree of groundwater mixing.

Analyses for Si, $NH_4^+$, $PO_4^{3-}$, and $NO_3^-$ were performed with a Seal Analytical AutoAnalyzer 3 HR (AA3HR) using standard methods for seawater analysis. TN and TP were analyzed in a similar fashion following digestion. Total organic nitrogen (TON) and total organic phosphorus (TOP) were calculated as the difference between TN and dissolved inorganic N and TP and dissolved inorganic P, respectively.

Water for other analyses was kept chilled until analysis. Chl *a* was measured by filtering 150 ml through GFF/F glass-fiber filters; pigments on filters were extracted in 90% acetone in the dark at -20 °C for 24 hours. Fluorescence of the extract was measured with a Turner Designs Trilogy Fluorometer model 7200-000 equipped with an extracted chlorophyll non-acidification module. Salinity was determined using a Mettler Toledo Seven Excellence Multi-parameter meter with an InLab 731-ISM conductivity probe, calibrated to a Hach Instruments traceable salinity standard of 35.00 ppt, 53.0 mS/cm, with a readability of 0.01 parts per thousand (‰ or ppt). Turbidity was determined using a Hanna Instruments Model #HI88703 Turbidimeter and reported in nephelometric turbidity units (NTU) (precision of 0.01 NTU). *In situ* measurements of salinity, temperature, and depth were acquired using an RBR-Concerto CTD calibrated to factory standards.

EPA and Standard Methods (SM) methods that were employed for chemical analyses, as well as detection limits, are listed in the Code of Federal Regulations (CRF) Title 40, Chapter 1, Part 136, are as follows:

**$NH_4^+$**: EPA 350.1, Rev. 2.0 or SM4500-NH3 G, detection limit 0.48 µg/L.
**$NO_3^-$ + $NO_2^-$**: EPA 353.2, Rev. 2.0 or SM4500-NO3F, detection limit 0.084 µg/L
**$PO_4^{-3}$**: EPA 365.5 or SM4500-P F, detection limit 0.28 µg/L.
**Total P:** EPA 365.1, Rev. 2.0 or SM4500-P E J, detection limit 0.93 µg/L.
**Total N:** SM 4500-N C., detection limit 1.96 µg/L.
**Si**: EPA 370.1 or SM 4500 SiO2 E, detection limit 0.45 µg/L.
**Chlorophyll *a***: SM 10200, detection limit 0.006 µg/L.
**pH**: EPA 150.1 or SM4500H+B, detection limit 0.002 pH units
**Turbidity:** EPA 180.1, Rev. 2.0 or SM2130 B, detection limit 0.008 NTU.
**Temperature:** SM 2550 B, detection limit 0.01 degrees centigrade.
**Salinity:** SM 2520, detection limit 0.003 ppt.
**Dissolved Oxygen:** SM4500 O G, and detection limit 0.01% sat.

All fieldwork was conducted by Dr. Steven Dollar and Ms. Andrea Millan. All laboratory analyses were conducted by Marine Consulting and Analytical Resources, LLC, located in Honolulu, Hawaii.

## B. Results

### *1. Distribution of Chemical Constituents*

The base of the Krueger Seawall consists of boulders that are submerged at high tide and exposed at low tide. Extending from the seawall approximately 50 m offshore to the outer boundary of the study area the seafloor consists of medium-grained sand. In the outer regions of the study area, patches of coral rubble were interspersed in the sand. Water depth at the outer boundary of the survey area was approximately 1.5 m.

Tables 1 and 2 show results of all water chemistry analyses on samples collected off the Krueger Seawall on May 15, 2020. Concentrations of eight dissolved nutrient constituents are plotted as functions of distance from the shoreline in Figure 3. Values of salinity, Chl *a*, turbidity, pH, temperature, and dissolved oxygen are plotted as functions of distance from the shoreline in Figure 4.

Elevated values of several nutrient constituents at the shoreline that decrease with distance from shore were evident on all three transects. The most pronounced horizontal gradients were for Si, which show elevated values at the shoreline and at 5 m from the shoreline, with a small decrease in the sample 1 m from shore. Salinity reflects this pattern with lowest salinity at the locations with highest Si (Figure 3). Plots of $PO_4^{3-}$, $NO_3^-$ and $NH_4^+$ also show the decrease at 1 m from the shoreline. The pattern of elevated nutrients and lower salinity near the shoreline is indicative of freshwater entering the ocean at the shoreline. Of interest is that the values of nutrients at 1 m are lower that at 5 m and the values of salinity are higher at 1 m and lower at 5 m. This suggests that there may be two points of freshwater entry into the nearshore zone.

From the shoreline to 20 m offshore, $PO_4^{3-}$ and $NO_3^-$ showed a slight gradient of decreasing concentration in Transects 1 and 3. This trend was not present in Transect 2. TN and TON were slightly elevated in the shoreline samples (most pronounced in Transect 1) and showed consistent concentrations at the other five

locations. $NH_4^+$ was elevated in the samples within 10 m of the shoreline before reaching consistent concentrations at 20 m and 50 m from the shoreline. TOP and TP showed no consistent concentration gradient with distance from shore.

Chl *a*, turbidity, temperature, dissolved oxygen, and pH all display similar patterns, with peak values at the shoreline, and decreasing values with distance seaward (Figure 4). At the shoreline, the values of all of these constituents were slightly lower at Transect 1, located at the eastern boundary of the Krueger property.

2. *Compliance with DOH-WQS Criteria*

State of Hawaii Department of Health Water Quality Standards (DOH-WQS) that apply to the area offshore of the Kreuger property are listed as "open coastal water" in HRS Chapter §11-54-6(b). Two sets of standards are listed depending on whether an area receives more than 3 million gallons per day (mgd) of freshwater input per shoreline mile ("wet standards"), or less than 3 mgd of freshwater input per shoreline mile ("dry"). As the study area off the northeast coast of Oahu likely receives less than 3 mgd per mile in May, dry criteria were used for this evaluation.

The DOH-WQS are also separated into three standards: 1) geometric means, 2) "not to exceed (NTE) more than 10% of the time," and 3) "NTE more than 2% of the time." As all of these classifications require multiple samplings, they cannot be used for a strict evaluation of whether a single sampling can be used to determine compliance. However, the values from a single sample set can provide a guideline to evaluate the overall status of sampled waters in terms relative to State standards.

Values that exceed the "NTE more than 10% of the time" are shaded blue and values that exceed the "NTE more than 2% of the time" are shaded peach in Tables 1 and 2. The $NH_4^+$ value from the shoreline sample of Transect 1 was the only nutrient sample to exceed State standards. Concentrations of $PO_4^{3-}$, $NO_3^-$, Si, TOP, TON, TP, and TN did not exceed DOH-WQS limits at any of the sampling sites.

The shoreline samples on Transects 2 and 3, as well as the 50 m from the shoreline deep sample of Transect 2, exceeded the DOH 10% limit for Chl *a*. Several values of turbidity near the shoreline of all three transects exceeded the DOH 2% limit and

all values exceeded the DOH 10% limit. The elevated turbidity relative to the DOH dry standards is likely a result of resuspension of the sediment by wave forces affecting the entire survey area and surrounding nearshore waters, which is not a typical condition in open coastal habitats in Hawaii.

With the exceptions described above, the area within the scope of the present project is within the specific criteria of the DOH-WQS, with the caveat that this consideration is for a single sample set. As a result, it does not appear that there are any significant inputs of materials from land beyond the immediate shoreline that are impacting coastal ocean waters offshore of the Kreuger Seawall project site.

## *III. BIOTIC COMMUNITY STRUCTURE*

### A. Methods

Biotic community structure of the marine environment was semi-quantitatively assessed on May 15, 2020, by investigators swimming throughout the area from the shoreline to approximately 75 m offshore at each of the survey transect sites described in the sections above (Figure 2). During these reconnaissance swims, notes were taken on physical structure and marine species abundance. Numerous photographs were taken of typical features of all habitats to provide a descriptive representation of the area fronting the project site.

### B. Results

The base of the seawall consists of rocks and boulders that form a band extending approximately one meter offshore. Two juvenile convict tangs (*Acanthurus triostegus*) were observed in the shallow rocky area along the base of the seawall. The boulders provide habitat for attached marine species including *Cellana* sp. (opihi) and crustose coralline algae (Figure 5). No corals or filamentous algae were observed on the boulders forming the base of the seawall.

The seafloor adjacent to the boulders supporting the seawall consists of a sand surface devoid of any solid surfaces. Further offshore but within 50 m of the shoreline the composition of the seafloor includes patches of rubble partially

covered with turf algae (Figure 6). No coral, seagrass, or fish were observed within this region.

The marine habitat beyond approximately 50 m of the seawall consists of a sand bottom interspersed with patch reefs composed of fossil reef structures colonized by living coral colonies (Figure 7). Water depth in this area is approximately 2 m. At low tide, the coral heads extend to the water surface. The most common corals observed were *Montipora capitata*, *Montipora patula,* and *Porites compressa*. Several small colonies of *Porites lobata* were also observed. Many colonies of *P. compressa* were heavily overgrown with macroalgae, primarily *Asparagopsis taxiformis*, and cyanobacteria. An unidentified octocoral was observed growing on dead portions of stony coral (Figure 8). This species resembles *Xenia elongata,* which has not been previously recorded in Hawaii. Of note is that the patch reefs off Lanikai were severely impacted by the global El Nino bleaching events of 2014 and 2015. Hence, much of the coral observed during this survey was likely less than five years old.

The only other macroinvertebrate observed in this area was the black sea cucumber (*Holothuria atra*). No seagrass was observed on the sandy bottom.

The most abundant fish species in the patch reef zone were the convict tang (*Acanthurus triostegus*), yellow tang (*Zebrasoma flavescens*), sailfin tang (*Zebrasoma veliferum*), ringtail surgeonfish (*Acanthurus blochii*), goldring surgeonfish (*Ctenochaetus strigosus*), bluespine unicornfish (*Naso unicornis*), threadfin butterflyfish (*Chaetodon auriga*), bullethead parrotfish (*Chlororus spilurus*), palenose parrotfish (*Scarus psittacus*), saddle wrasse (*Thalassoma duperrey*), and yellowfin goatfish (*Mulloidichthys vanicolensis*).

## C. Threatened and Endangered Species

Several species of marine animals that occur in Hawaiian waters have been declared threatened or endangered by Federal jurisdiction. The threatened green sea turtle (*Chelonia mydas*) occurs commonly throughout the Hawaiian Islands and is frequently observed in the nearshore areas of Oahu. The endangered hawksbill turtle (*Eretmochelys imbricata*) is known infrequently in Hawaiian waters.

No sea turtles were observed within the survey area during the present study, although they undoubtedly occur in the area.

Populations of the endangered humpback whale (*Megaptera novaeangliae*) winter in the Hawaiian Islands from December to April. While the present survey was conducted in May when most of the migrating population has left Hawaiian waters, the survey area is not conducive to whale habitation owing to shallow depth and lack of access across the outer reef. The Hawaiian monk seal, (*Monachus schauinslandi*) is an endangered earless seal that is endemic to the waters off the Hawaiian Islands. Monk seals commonly haul out of the water onto sandy beaches to rest. No seals were observed during the present survey work at the Krueger Seawall, although the sand beaches northwest of the property could provide haul-out areas.

## *IV. DISCUSSION and CONCLUSIONS*

The purpose of this assessment is to assemble baseline information to make valid evaluations of the potential for impacts to the marine environment from the proposed repair of the seawall fronting the Krueger property. The information collected in this study provides the basis to understand some of the important processes that are operating in the nearshore ocean in order to address any concerns that might be raised in the planning process for the proposed project.

The physical structure of the intertidal marine habitat adjacent to the seawall is composed of boulders and rocks. Seaward of the rock base, the seafloor consists of a uniform sand bottom. Beyond 50 m of the seawall the sand flat grades into an area of patch reefs.

Analysis of a series of water samples collected along transects that extended from the shoreline of the project site to 50 m offshore indicates that there is a minimal input of groundwater at the shoreline along the seawall. Naturally occurring groundwater contains higher nutrient concentrations than seawater, resulting in elevated concentrations in nearshore samples compared to offshore samples. However, only $NH_4^+$ from the shoreline sample of Transect 1 exceeded State standards for nutrients. Concentrations of $PO_4$, $NO_3^-$, Si, TOP, TON, TP, and TN did

not exceed DOH-WQS limits at any of the sampling sites. Two shoreline samples and one offshore sample exceeded the DOH 10% limit for Chl *a*. Several values of turbidity near the shoreline of all three transects exceeded the DOH 2% limit and all values exceeded the DOH 10% limit. The elevated turbidity near the shoreline is likely a result of resuspension of the sediment by wave energy affected the shallow water column. Overall, water quality off the Krueger Seawall site represents typical marine settings in Hawaii with no indication of any contamination from activities on land.

Results of biotic surveys reveal that the boulders forming the base of the seawall do not serve as settling surfaces for corals or seagrass. The only macroinvertebrate that was observed on the boulders were opihi (*Cellana* sp.). The sand flats adjacent to the seawall were also devoid of corals and seagrass. At a distance of approximately 50 m offshore, numerous patch reefs colonized by several species of common Hawaiian corals and algae occur. A host of common Hawaiian reef fish were observed on the patch reefs. Of note is that the patch reefs off Lanikai were severely impacted by the global El Nino bleaching events of 2014 and 2015. Hence, much of the coral observed during this survey had recovered from this stress over the last five years.

Although no sea turtles were observed during the survey, they likely occupy the area at times. The possible small temporary changes to water quality that might occur from the seawall repair process should not be of a magnitude to affect turtle behavior, as they are often observed in turbid waters. However, during construction operations, observers should be in place to spot any turtles that might enter the work area. If turtles are observed in the active construction area, a mitigation plan should be implemented to stop work until turtles leave the area.

Based on the results of this survey, it can be concluded that with proper management and mitigation practices, the proposed seawall repairs should have little or no potential for significant effects to the existing marine environment.

**TABLE 1**. Results of analysis of water chemistry samples collected May 15, 2020, off the Krueger Seawall project site. Nutrient concentrations are shown in micromolar (µM) units. Abbreviations as follows: S=surface; D=deep; DFS=distance from shore. Also shown are the State of Hawaii, Department of Health (DOH) "not to exceed (NTE) more than 10% of the time" and "NTE more than 2% of the time" water quality standards for open coastal waters under "dry" conditions. Peach shaded values exceed DOH 10% standards. Blue shaded values exceed DOH 2% standards. For transect site locations, see Figure 2.

| TRANSECT | NUMBER | DEPTH | DFS (m) | $PO_4^{3-}$ (µM) | $NO_3^-$ (µM) | $NH_4^+$ (µM) | Si (µM) | TOP (µM) | TON (µM) | TP (µM) | TN (µM) | Salt (ppt) | Chl *a* (µg/l) | TURB (NTU) | TEMP (°C) | pH (rel) | O2 %sat |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | S | 0 | 0.05 | 0.31 | 1.15 | 7.13 | 0.24 | 10.23 | 0.30 | 11.69 | 34.47 | 0.49 | 0.86 | 27.74 | 8.072 | 99.230 |
| | 2 | S | 1 | 0.06 | 0.24 | 0.13 | 4.61 | 0.19 | 6.51 | 0.25 | 6.87 | 34.58 | 0.37 | 1.48 | 27.70 | 8.072 | 98.360 |
| | 3 | S | 5 | 0.08 | 0.28 | 0.32 | 5.86 | 0.22 | 6.27 | 0.30 | 6.88 | 34.54 | 0.34 | 0.96 | 27.65 | 8.072 | 99.572 |
| | 4 | S | 10 | 0.05 | 0.25 | 0.19 | 4.08 | 0.24 | 6.67 | 0.30 | 7.11 | 34.69 | 0.32 | 0.74 | 27.44 | 8.060 | 96.764 |
| | 5 | S | 20 | 0.07 | 0.17 | 0.10 | 3.69 | 0.27 | 6.40 | 0.34 | 6.67 | 34.80 | 0.37 | 0.78 | 27.45 | 8.053 | 94.353 |
| | 5 | D | 20 | 0.06 | 0.11 | 0.10 | 2.48 | 0.25 | 6.46 | 0.31 | 6.66 | 34.76 | 0.38 | 0.83 | 27.42 | 8.047 | 93.580 |
| | 6 | S | 50 | 0.04 | 0.19 | 0.09 | 2.30 | 0.24 | 6.52 | 0.27 | 6.80 | 34.80 | 0.31 | 0.77 | 27.37 | 8.033 | 93.886 |
| | 6 | D | 50 | 0.05 | 0.23 | 0.22 | 2.88 | 0.30 | 6.89 | 0.34 | 7.34 | 34.80 | 0.33 | 0.67 | 27.38 | 8.036 | 93.918 |
| 2 | 1 | S | 0 | 0.10 | 0.22 | 0.35 | 8.07 | 0.25 | 6.81 | 0.35 | 7.38 | 34.40 | 0.61 | 1.99 | 27.88 | 8.086 | 101.158 |
| | 2 | S | 1 | 0.05 | 0.19 | 0.07 | 4.96 | 0.26 | 6.28 | 0.31 | 6.55 | 34.58 | 0.40 | 1.84 | 27.85 | 8.074 | 102.689 |
| | 3 | S | 5 | 0.07 | 0.28 | 0.34 | 6.25 | 0.21 | 6.73 | 0.28 | 7.35 | 34.58 | 0.38 | 1.16 | 27.82 | 8.078 | 102.601 |
| | 4 | S | 10 | 0.08 | 0.19 | 0.32 | 4.12 | 0.25 | 6.76 | 0.32 | 7.27 | 34.72 | 0.31 | 0.95 | 27.61 | 8.072 | 99.237 |
| | 5 | S | 20 | 0.04 | 0.20 | 0.10 | 4.23 | 0.25 | 6.79 | 0.29 | 7.08 | 34.72 | 0.32 | 0.64 | 27.66 | 8.064 | 97.251 |
| | 5 | D | 20 | 0.05 | 0.20 | 0.12 | 5.64 | 0.21 | 6.69 | 0.27 | 7.01 | 34.68 | 0.39 | 0.67 | 27.50 | 8.060 | 96.276 |
| | 6 | S | 50 | 0.08 | 0.24 | 0.08 | 3.18 | 0.25 | 7.12 | 0.33 | 7.43 | 34.80 | 0.30 | 0.77 | 27.45 | 8.042 | 94.097 |
| | 6 | D | 50 | 0.04 | 0.20 | 0.15 | 2.38 | 0.33 | 6.90 | 0.37 | 7.25 | 34.83 | 0.80 | 2.08 | 27.45 | 8.044 | 93.304 |
| 3 | 1 | S | 0 | 0.08 | 0.51 | 0.19 | 6.46 | 0.29 | 7.26 | 0.37 | 7.95 | 34.53 | 0.50 | 1.54 | 27.97 | 8.088 | 102.012 |
| | 2 | S | 1 | 0.08 | 0.27 | 0.34 | 4.10 | 0.23 | 6.91 | 0.31 | 7.52 | 34.65 | 0.38 | 0.53 | 27.81 | 8.075 | 100.732 |
| | 3 | S | 5 | 0.08 | 0.29 | 0.17 | 4.84 | 0.29 | 6.76 | 0.37 | 7.21 | 34.57 | 0.35 | 1.25 | 27.89 | 8.079 | 102.650 |
| | 4 | S | 10 | 0.07 | 0.25 | 0.20 | 4.36 | 0.29 | 6.35 | 0.36 | 6.80 | 34.65 | 0.34 | 1.11 | 27.63 | 8.081 | 98.516 |
| | 5 | S | 20 | 0.06 | 0.07 | 0.08 | 3.28 | 0.23 | 6.82 | 0.30 | 6.97 | 34.79 | 0.38 | 0.62 | 27.62 | 8.060 | 98.505 |
| | 5 | D | 20 | 0.07 | 0.13 | 0.08 | 2.51 | 0.19 | 7.08 | 0.26 | 7.29 | 34.79 | 0.49 | 0.89 | 27.56 | 8.051 | 98.087 |
| | 6 | S | 50 | 0.06 | 0.06 | 0.07 | 2.84 | 0.17 | 6.52 | 0.23 | 6.65 | 34.76 | 0.33 | 0.69 | 27.51 | 8.048 | 94.678 |
| | 6 | D | 50 | 0.06 | 0.11 | 0.10 | 2.69 | 0.21 | 7.65 | 0.28 | 7.87 | 34.83 | 0.44 | 0.86 | 27.51 | 8.048 | 95.656 |
| DOH NTE 10% | | | | | 0.71 | 0.36 | | | | 0.97 | 12.86 | * | 0.50 | 0.50 | ** | *** | **** |
| DOH NTE 2% | | | | | 1.43 | 0.64 | | | | 1.45 | 17.86 | | 1.00 | 1.00 | | | |

* Salinity shall not vary more than ten percent from natural or seasonal changes condsidering hydrologic input and oceanographic conditions.
** Temperature shall not vary more than 1 °C from "ambient conditions."
*** pH shall not vary more than 0.5 units from a value of 8.1.
**** Dissolved Oxygen not less than 75% saturation.

**TABLE 2**. Results of analysis of water chemistry samples collected May 15, 2020, off the Krueger Seawall project site. Nutrient concentrations are shown in micrograms per liter (µg/L). Abbreviations as follows: S=surface; D=deep; DFS=distance from shore. Also shown are the State of Hawaii, Department of Health (DOH) "not to exceed (NTE) more than 10% of the time" and "NTE more than 2% of the time" water quality standards for open coastal waters under "dry" conditions. Peach shaded values exceed DOH 10% standards. Blue shaded values exceed DOH 2% standards. For transect site locations, see Figure 2.

| TRANSECT | NUMBER | DEPTH | DFS (m) | $PO_4^{3-}$ (µg/L) | $NO_3^-$ (µg/L) | $NH_4^+$ (µg/L) | Si (µg/L) | TOP (µg/L) | TON (µg/L) | TP (µg/L) | TN (µg/L) | Salt (ppt) | Chl *a* (µg/l) | TURB (NTU) | TEMP (°C) | pH (rel) | O2 %sat |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | S | 0 | 1.67 | 4.33 | 16.09 | 199.61 | 7.58 | 143.22 | 9.25 | 163.63 | 34.47 | 0.49 | 0.86 | 27.74 | 8.072 | 99.230 |
| | 2 | S | 1 | 1.71 | 3.30 | 1.85 | 129.03 | 6.01 | 91.09 | 7.71 | 96.24 | 34.58 | 0.37 | 1.48 | 27.70 | 8.072 | 98.360 |
| | 3 | S | 5 | 2.36 | 3.96 | 4.49 | 163.96 | 6.88 | 87.80 | 9.24 | 96.25 | 34.54 | 0.34 | 0.96 | 27.65 | 8.072 | 99.572 |
| | 4 | S | 10 | 1.64 | 3.55 | 2.65 | 114.14 | 7.53 | 93.37 | 9.17 | 99.57 | 34.69 | 0.32 | 0.74 | 27.44 | 8.060 | 96.764 |
| | 5 | S | 20 | 2.14 | 2.41 | 1.41 | 103.34 | 8.32 | 89.59 | 10.46 | 93.41 | 34.80 | 0.37 | 0.78 | 27.45 | 8.053 | 94.353 |
| | 5 | D | 20 | 1.89 | 1.53 | 1.36 | 69.57 | 7.62 | 90.40 | 9.51 | 93.28 | 34.76 | 0.38 | 0.83 | 27.42 | 8.047 | 93.580 |
| | 6 | S | 50 | 1.15 | 2.70 | 1.27 | 64.35 | 7.30 | 91.27 | 8.45 | 95.24 | 34.80 | 0.31 | 0.77 | 27.37 | 8.033 | 93.886 |
| | 6 | D | 50 | 1.46 | 3.28 | 3.04 | 80.71 | 9.21 | 96.43 | 10.67 | 102.75 | 34.80 | 0.33 | 0.67 | 27.38 | 8.036 | 93.918 |
| 2 | 1 | S | 0 | 3.01 | 3.12 | 4.83 | 225.85 | 7.78 | 95.32 | 10.79 | 103.26 | 34.40 | 0.61 | 1.99 | 27.88 | 8.086 | 101.158 |
| | 2 | S | 1 | 1.43 | 2.71 | 0.97 | 138.85 | 8.10 | 87.97 | 9.53 | 91.64 | 34.58 | 0.40 | 1.84 | 27.85 | 8.074 | 102.689 |
| | 3 | S | 5 | 2.08 | 3.95 | 4.76 | 174.86 | 6.60 | 94.19 | 8.68 | 102.90 | 34.58 | 0.38 | 1.16 | 27.82 | 8.078 | 102.601 |
| | 4 | S | 10 | 2.36 | 2.68 | 4.49 | 115.43 | 7.65 | 94.58 | 10.01 | 101.75 | 34.72 | 0.31 | 0.95 | 27.61 | 8.072 | 99.237 |
| | 5 | S | 20 | 1.15 | 2.77 | 1.40 | 118.53 | 7.84 | 94.99 | 8.99 | 99.16 | 34.72 | 0.32 | 0.64 | 27.66 | 8.064 | 97.251 |
| | 5 | D | 20 | 1.67 | 2.79 | 1.64 | 157.86 | 6.65 | 93.69 | 8.32 | 98.11 | 34.68 | 0.39 | 0.67 | 27.50 | 8.060 | 96.276 |
| | 6 | S | 50 | 2.39 | 3.30 | 1.13 | 89.15 | 7.72 | 99.65 | 10.11 | 104.08 | 34.80 | 0.30 | 0.77 | 27.45 | 8.042 | 94.097 |
| | 6 | D | 50 | 1.18 | 2.77 | 2.11 | 66.59 | 10.34 | 96.58 | 11.51 | 101.46 | 34.83 | 0.80 | 2.08 | 27.45 | 8.044 | 93.304 |
| 3 | 1 | S | 0 | 2.36 | 7.12 | 2.60 | 180.85 | 9.00 | 101.62 | 11.36 | 111.34 | 34.53 | 0.50 | 1.54 | 27.97 | 8.088 | 102.012 |
| | 2 | S | 1 | 2.51 | 3.78 | 4.72 | 114.88 | 7.15 | 96.71 | 9.66 | 105.21 | 34.65 | 0.38 | 0.53 | 27.81 | 8.075 | 100.732 |
| | 3 | S | 5 | 2.45 | 4.03 | 2.31 | 135.48 | 9.10 | 94.65 | 11.54 | 101.00 | 34.57 | 0.35 | 1.25 | 27.89 | 8.079 | 102.650 |
| | 4 | S | 10 | 2.17 | 3.57 | 2.76 | 122.12 | 9.13 | 88.85 | 11.30 | 95.17 | 34.65 | 0.34 | 1.11 | 27.63 | 8.081 | 98.516 |
| | 5 | S | 20 | 1.95 | 1.03 | 1.08 | 91.95 | 7.28 | 95.46 | 9.23 | 97.57 | 34.79 | 0.38 | 0.62 | 27.62 | 8.060 | 98.505 |
| | 5 | D | 20 | 2.23 | 1.86 | 1.16 | 70.25 | 5.82 | 99.10 | 8.05 | 102.12 | 34.79 | 0.49 | 0.89 | 27.56 | 8.051 | 98.087 |
| | 6 | S | 50 | 1.83 | 0.86 | 1.04 | 79.39 | 5.16 | 91.23 | 6.98 | 93.13 | 34.76 | 0.33 | 0.69 | 27.51 | 8.048 | 94.678 |
| | 6 | D | 50 | 1.98 | 1.55 | 1.46 | 75.34 | 6.66 | 107.16 | 8.64 | 110.17 | 34.83 | 0.44 | 0.86 | 27.51 | 8.048 | 95.656 |
| **DOH NTE 10%** | | | | | 10.00 | 5.00 | | | | 30.00 | 180.00 | * | 0.50 | 0.50 | ** | *** | **** |
| **DOH NTE 2%** | | | | | 20.00 | 9.00 | | | | 45.00 | 250.00 | | 1.00 | 1.00 | | | |

* Salinity shall not vary more than ten percent from natural or seasonal changes condsidering hydrologic input and oceanographic conditions.
** Temperature shall not vary more than 1 °C from "ambient conditions."
*** pH shall not vary more than 0.5 units from a value of 8.1.
**** Dissolved Oxygen not less than 75% saturation.

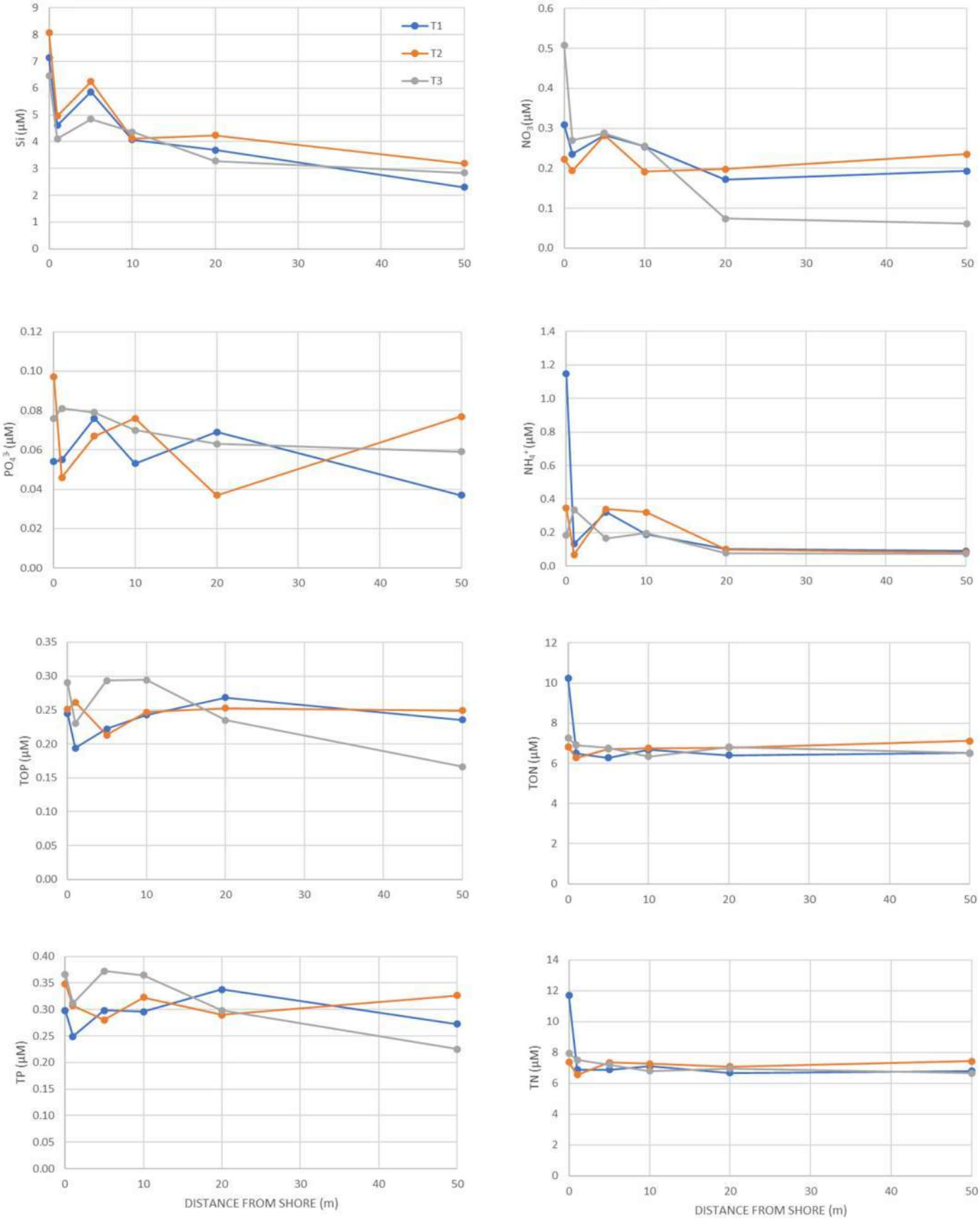



**Figure 3**. Plots of dissolved nutrients in surface samples collected on May 15, 2020, along three transects that extended from the shoreline to 50 meters from shore fronting the Krueger Seawall at 1226 Mokulua in Kailua, Oahu. For transect locations, see Figure 2.

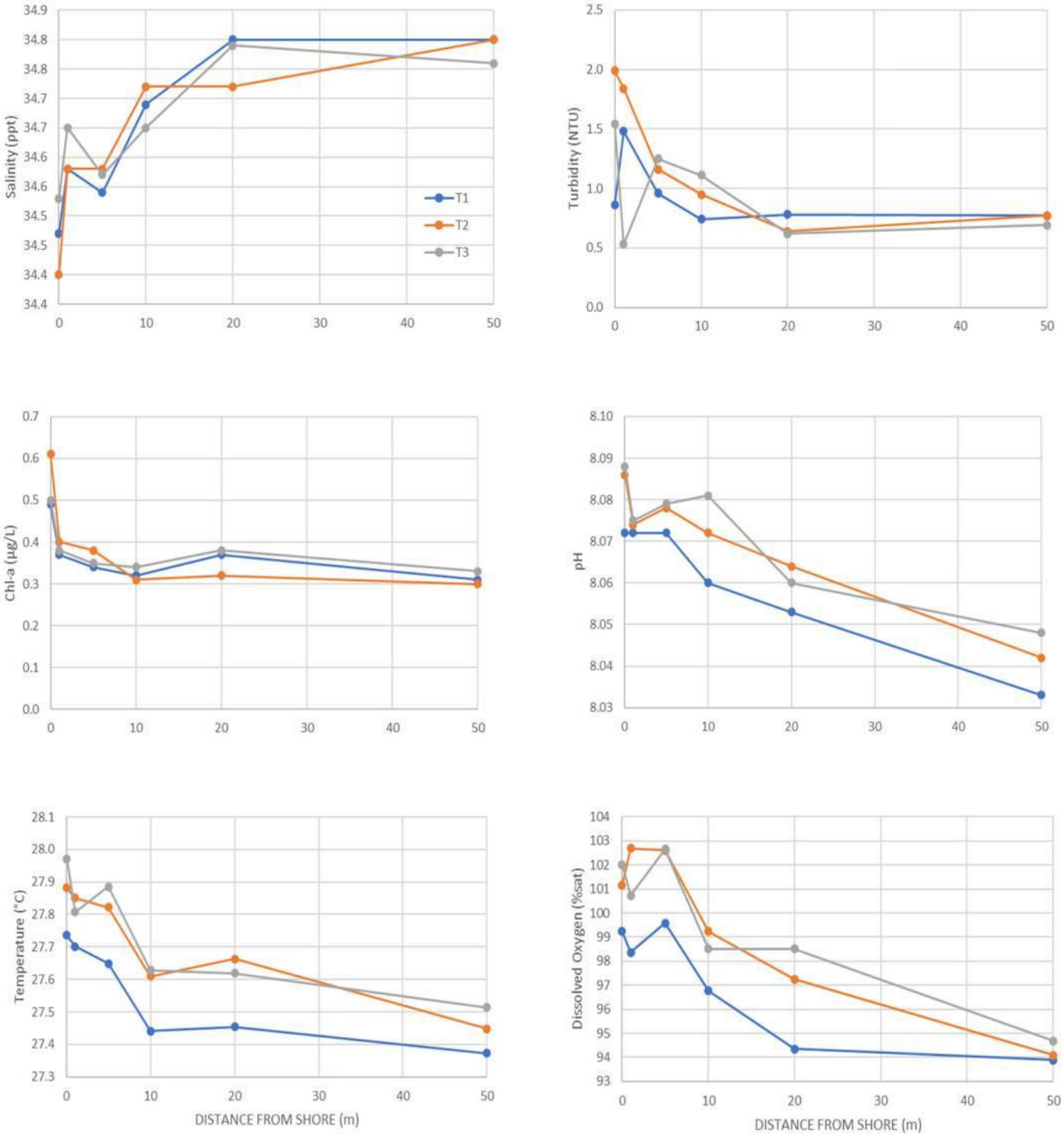



**Figure 4.** Plots of water quality constituents in surface samples collected on May 15, 2020, along three transects that extended from the shoreline to 50 meters from shore fronting the Krueger Seawall at 1226 Mokulua in Kailua, Oahu. For transect locations, see Figure 2.

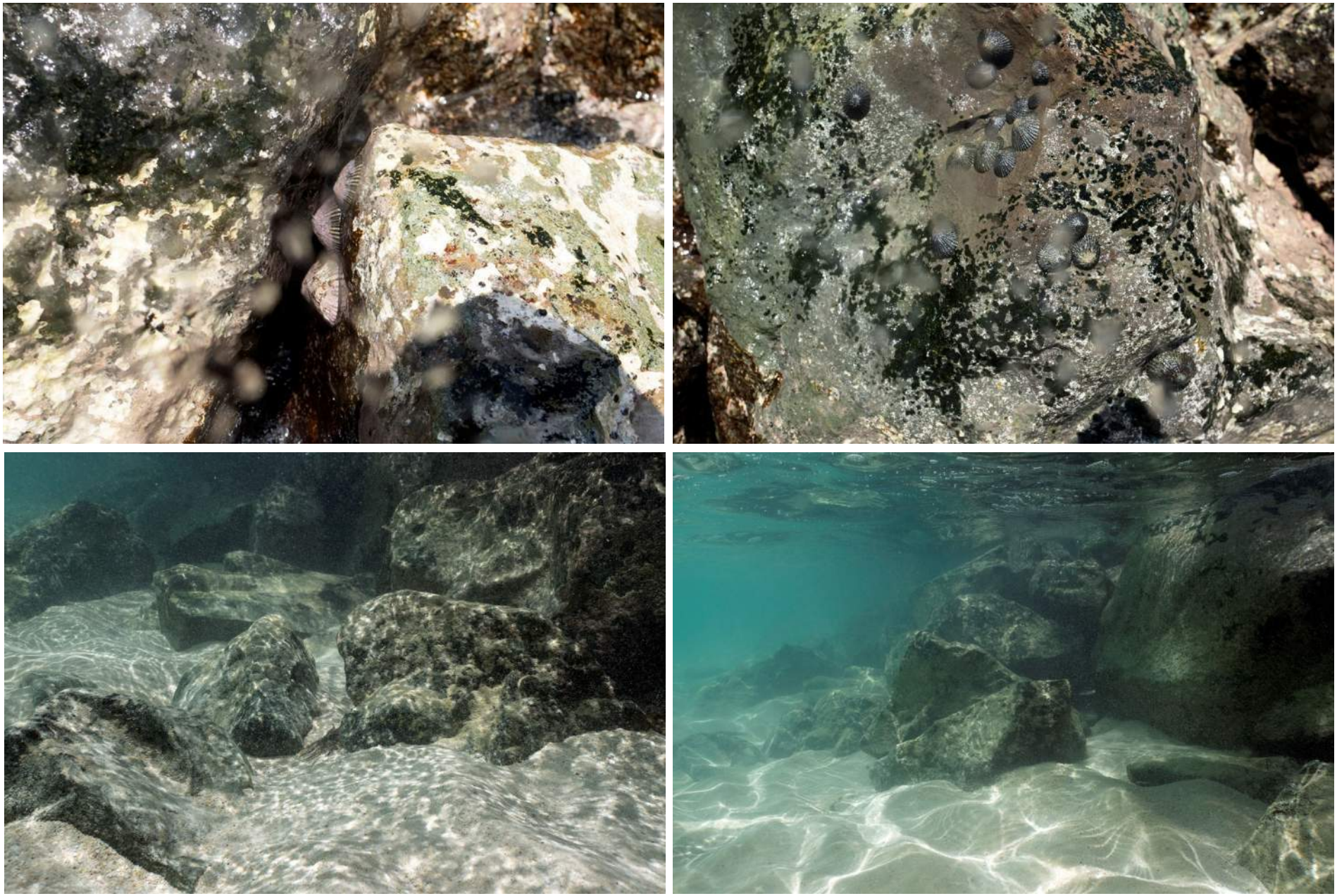


**Figure 5**. Top photographs show opihi (*Cellana* sp.) inhabiting wave washed boulders and stones supporting the seawall. Bottom photographs show submerged boulders and stones at the base of the seawall.

**Figure 6**. Top photographs show sandy bottom, which extends from the base of the boulders supporting the seawall to approximately 50 m offshore. Bottom photographs show rubble on sandy bottom offshore of the Krueger Seawall.

**Figure 7**. Top photographs show reef between 50 and 75 m offshore of the Krueger Seawall. Bottom left photograph shows colony of *Montipora capitata*. Bottom right photograph shows tire colonized by *Montipora patula,* turf algae, and macroalgae.

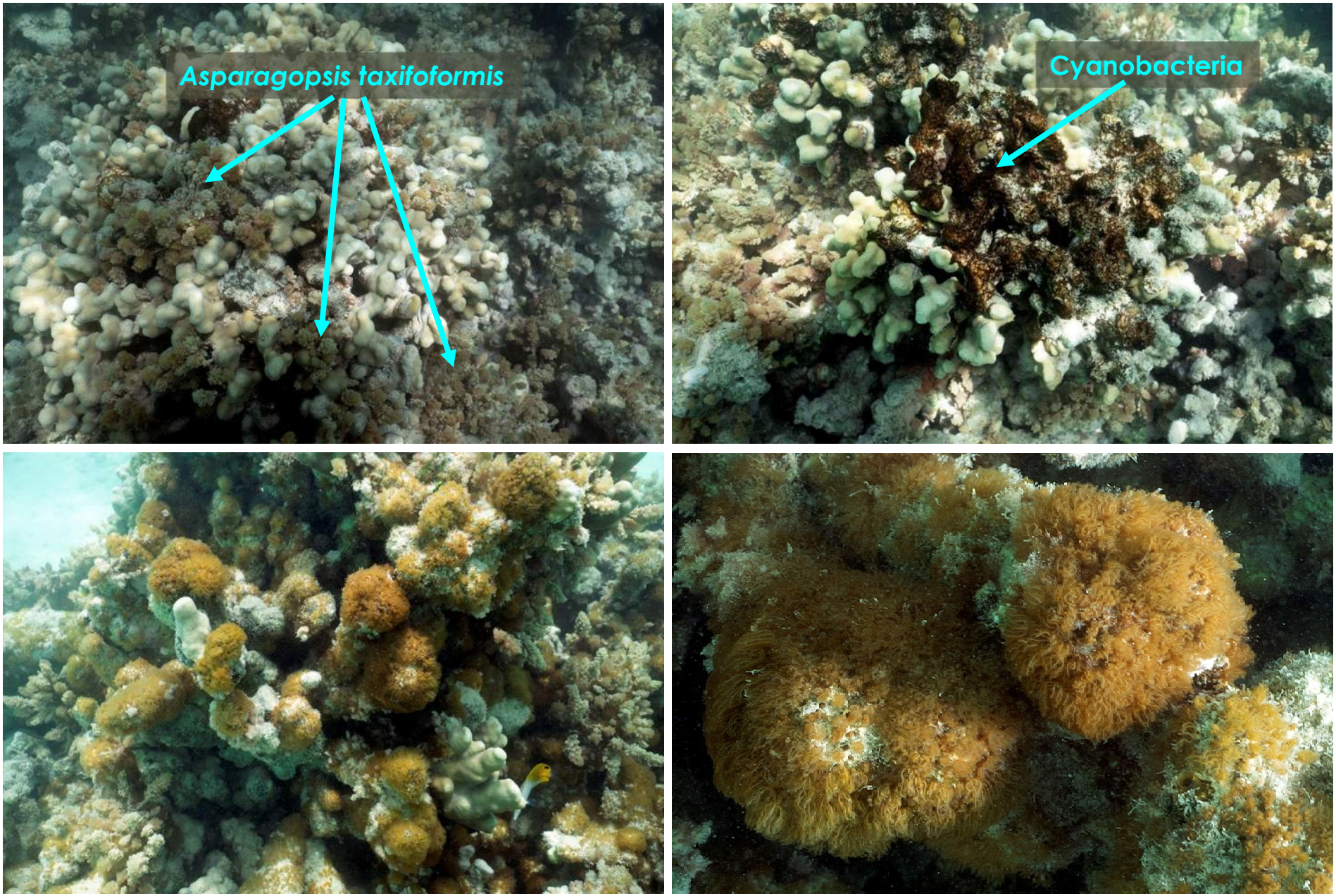



**Figure 8**. Photographs were collected between 50 and 75 m offshore of the Krueger Seawall. Top images show overgrowth of *Porites compressa* by *Asparagopsis taxiformis* (left) and cyanobacteria (right). Bottom images show overgrowth of reef by unknown organism, possibly *Xenia elongata*.

Appendix H

# AECOS Memo
# Observations on Nesting Wedged-tailed Shearwaters on a Private Home Site in Lanikai
# (September 2020)

# DRAFT
# Observations on nesting Wedged-tailed Shearwaters on a private home site in Lanikai

Reginald David and Eric Guinther
*AECOS* Inc.

September 14, 2020

This brief report presents observations and an assessment of Wedge-tailed Shearwater (*ʻuaʻu kani* or *Ardenna pacifica*) nesting behind a seawall at 1226A Mokulua Drive, Lanikai, Oʻahu. This bird constructs burrows in sandy soil behind the shore or in rock crevices. The situation at 1226A Mokulua Drive is typical, actually presently ideal for burrows, because the sandy soil—recently exposed by cutting back of *naupaka kahakai* (*Scaevola sericea*) shrubs—is a low scarp, stabilized by roots of a lawn behind (Figures 1 and 6). However, the seawall is failing and needs to be replaced.

Eric Guinther visited the site on July 31, 2020, responding to a request to confirm and assess impacts of the new seawall preconstruction efforts on at least one occupied nest first observed on July 11 (Jeff Overton, G70, pers. comm.). Although initially reported that three burrows were present, a fourth burrow was apparently constructed sometime in the last week of July, as four were observed on July 31. These were photographed (Figures 2, 3, 4, and 5) and an attempt made to confirm presence, or at least active use, at each burrow. However, no sitting birds could be seen or heard. Evidence surrounding each of the burrow sites indicated each was recently maintained, suggesting all four were recently active nests.

Wedge-tailed Shearwaters are protected under both the federal Migratory Bird Treaty Act (MBTA) and State of Hawaii statutes as a native species. What that protection means in practice, is that neither the birds nor their burrows should be disturbed until their nests fail, are abandoned, or fledge young birds. Wedge-tailed Shearwaters usually fledge after approximately 100 to 115 days of egg laying. So, in this case, fledging ought to occur sometime between late October through the end of November.

No practical way exists to obtain a permit to allow disturbance of the nesting burrows. Given the location of the burrows, the high predator load in a developed area—including cats, dogs, and rats—the chances that the nests will go full term are low.

By now (September 2020), determining if the burrows are still active is relatively straight forward as the eggs should have hatched if they are going to, and the chicks must be fed on a regular basis; the area around and close to active burrows should show a lot of footprints, and the smell of any active burrows is distinctive.

Reginald David

Eric Guinther

Figure 1. View of the seawall and exposed strip of sand between lawn and seawall where nesting is occurring, looking west.

Figure 2a and 2b. Burrow No. 1; note bird tracks around entrance to burrow.

Figure 3a and 3b. Burrow No.2.  Appears maintained.

Figure 4a and 4b. Burrow No. 3. Tracks visible; appeared after July 11.

Figure 4c. Burrow No.3; note fresh dropping on grass above burrow.

Figure 5 (upper). Burrow No.4. Appeared after July 11.
Figure 6 (lower). Burrow area looking east.

Appendix I

# Keala Pono Archaeological Consulting, LLC
# Archaeological Assessment for the Repair of a Noncomforming Seawall at 1226a Mokulua Drive in Lanikai, Kailua Ahupuaʻa, Koʻolaupoko District, Island of Oʻahu (August 2020)

# DRAFT—Archaeological Assessment for the Repair of a Nonconforming Seawall at 1226A Mokulua Drive in Lanikai, Kailua Ahupuaʻa, Koʻolaupoko District, Island of Oʻahu

**TMK: (1) 4-3-005:056**

**Prepared For:**

David & Teri Krueger, Landowners

August 2020

Keala Pono Archaeological Consulting, LLC ● PO Box 1645, Kaneohe, HI 96744 ● Phone 808.381.2361

# DRAFT—Archaeological Assessment for the Repair of a Nonconforming Seawall at 1226A Mokulua Drive in Lanikai, Kailua Ahupuaʻa, Koʻolaupoko District, Island of Oʻahu

**TMK: (1) 4-3-005:056**

**Prepared For:**

David & Teri Krueger, Landowners

**Prepared By:**

Windy Keala McElroy, PhD
and
Kālenalani McElroy, MA

August 2020

Keala Pono Archaeological Consulting, LLC ● PO Box 1645, Kaneohe, HI 96744 ● Phone 808.381.2361

## MANAGEMENT SUMMARY

An archaeological inventory survey (AIS) was conducted for a beach lot property in Lanikai at 1226a Mokulua Drive, Kailua Ahupuaʻa, Koʻolaupoko District, Oʻahu at TMK: (1) 4-3-005: 056. The survey was done in preparation for ground disturbance associated with repairs to the property's concrete seawall. The archaeological work included a pedestrian survey that covered 100% of the project area, as well as test excavations consisting of three trenches. The property has been disturbed by modern use, and no archaeological remains were found on the surface. Likewise, no subsurface cultural features or deposits were encountered during excavation. No further work is recommended.

## CONTENTS

## FIGURES



## TABLES

# INTRODUCTION

At the request of homeowners David and Teri Krueger, Keala Pono Archaeological Consulting conducted an archaeological inventory survey (AIS) for seawall repairs in Lanikai, Kailua Ahupuaʻa, Koʻolaupoko District, Oʻahu. Construction will take place on the makai (east) side of TMK: (1) 4-3-005:056 located at 1226a Mokulua Drive. This work was designed to identify, document, assess significance, and provide mitigation recommendations for any historic properties that may be located in the project area in anticipation of the proposed repairs.

This report is drafted to meet the requirements and standards of state historic preservation law, as set out in Chapter 6E of the Hawaiʻi Revised Statutes and the State Historic Preservation Division's (SHPD's) draft *Rules Governing Standards for Archaeological Inventory Surveys and Reports*, Hawaii Administrative Rules (HAR) §13–276. Due to negative findings, the AIS results are presented as an archaeological assessment per HAR §13–275-5(b)(5)(A).

The report begins with a description of the project area and a historical overview of land use, Hawaiian traditions, and archaeology in the area. The next section presents methods used in the fieldwork, followed by results of the survey. Project results are summarized and recommendations are made in the final section. Hawaiian words and technical terms are defined in a glossary at the end of the document.

## The Project Location and Description

The project area is located in Kailua on the coast of Lanikai, Koʻolaupoko District, on the island of Oʻahu (Figure 1). The survey consists of 380 $m^2$ (4,000 $ft^2$) on the makai (east) side of the beachfront parcel TMK: (1) 4-3-005:056 (Figure 2). The parcel is .17 ha (.42 ac.) and owned by the Krueger Trust. The property is bounded by the ocean on the east, Mokulua Drive on the west, and private lots on the north and south. The existing seawall is constructed from unreinforced concrete and is roughly 24.4 m (90 ft) long, 40.6–43.2 cm (16–17 in) wide at the top, and 1.5–2.1 m (5–7 ft) high amsl. Construction activities for the repair project consists of inserting sheet pile and a dowelled cap along the dilapidated seawall to prevent further erosion and improve its structural integrity. Installing geotextile fabric and restacking of the rock apron on the makai side of the seawall is also necessary. These basalt boulders have a diameter of approximately 22.9–45.7 cm (9–18 in) and are stacked 1.2 m (4 ft) high, extending along the entire length of the seawall and out into the ocean for 3 m (10 ft). Excavations will extend to approximately 5.2 m (17 ft) below the existing grade.

## The Natural Environment

Today's Kailua town proper is situated between the ocean on the east, by Kawainui Marsh and Puʻu O Ehu on the west, by Kaʻelepulu Stream on the south, and by Oneawa Hills, formerly called Mahinui Hills on the north. Lanikai is the section of Kailua between Alāla and Wailea Points on the southeast side of Kailua. About 3,500 years ago when the sea level was higher, this entire area was a submerged barrier reef with a huge sandbar. As the sea levels dropped, sand and alluvial sediments accumulated, forming the flatland foundation for Kailua town, and Kawainui, which no longer open to the ocean, was transformed from a pond into a marsh. Today the coral reef extends approximately a half mile outside of Lanikai, providing a protected sandy beach (Clark 2005:65). Two islands off of Lanikai are the Mokuluas (Moku Nui and Moku ʻIki), which are Hawaiʻi State Seabird Sanctuaries.

Because of the geological history of Kailua, soils of the current project area are classified as Beaches (BS), backed by Jaucas sand (JaC), and the project area lies entirely in Beaches (Foote et al. 1972) (Figure 3). The Beaches soil classification is described as follows:

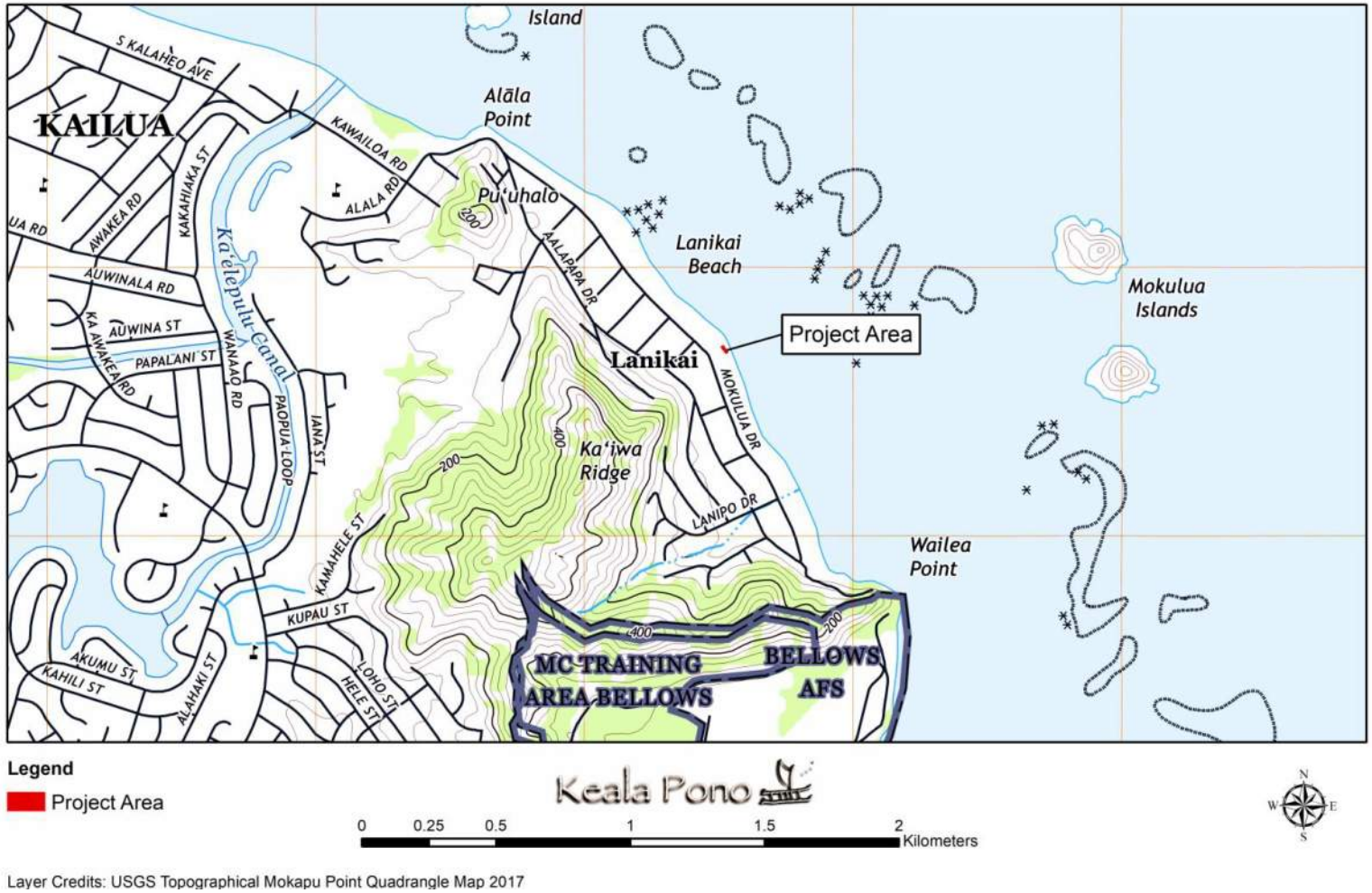
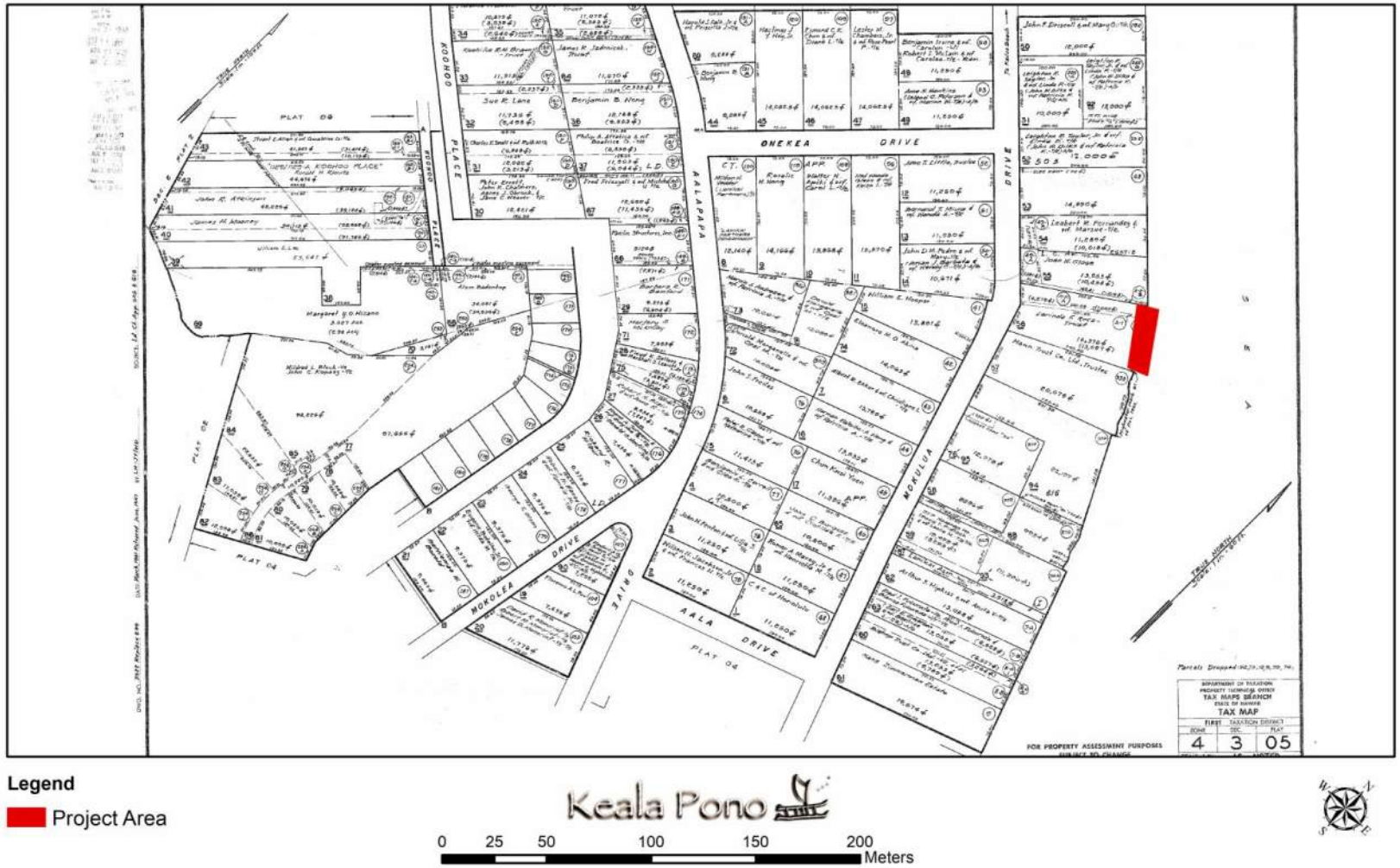



**Figure 1. Project area shown on a topographic map (USGS 2017).**




Legend

Project Area

Keala Pono

0 25 50 100 150 200 Meters

**Figure 2. Project area (in red) shown on a portion of TMK plat (1) 4-3-005.**


**Figure 3. Soils in the vicinity of the project area. Data from Foote et al. (1972).**

> Beaches (BS) occur as sandy, gravelly, or cobbly areas on all the islands… They are all washed and rewashed by ocean waves. The beaches consist mainly of light-colored sands derived from coral and seashells. A few of the beaches, however, are dark colored because their sands are from basalt and andesite. Beaches have no value for farming. Where accessible and free of cobblestones and stones, they are highly suitable for recreational uses and resort development. (Capability classification VIIIw, nonirrigated). (Foote et al. 1972:28)

Jaucas sands are described as "excessively drained soils that occur as narrow strips on coastal plains, adjacent to the ocean… developed in wind- and water-deposited sand from coral and seashells" (Foote et al. 1972:48). Jaucas sands are found from sea level to an elevation of 30 m (100 ft), and are further described as follows:

> Jaucas sand, 0 to 15 percent slopes (JaC) --- The slope range of this soil is 0 to 15 percent, but in most places the slope does not exceed 7 percent… In a representative profile the soil is single grain, pale brown to very pale brown, sandy, and more than 60 inches deep. In many places the surface layer is dark brown as a result of accumulation of organic matter and alluvium. The soil is neutral to moderately alkaline throughout the profile. Permeability is rapid, and runoff is very slow to slow. The hazard of water erosion is slight, but wind erosion is a severe hazard where vegetation has been removed. The available water capacity is 0.5 to 1.0 inch per foot of soil. In places roots penetrate to a depth of 5 feet or more. Workability is slightly difficult because the soil is loose and lacks stability for use of equipment. (Foote et al. 1972:48)

Topography of the project area is flat, with an approximately 3 m (10 ft) drop to the ocean on the east side. Rainfall in the project area averages 80 cm (31 in) per year (Giambelluca et al. 2013). The closest fresh water source to the project area is Mokulua Stream, a non-perennial watercourse which is approximately 640 m (.4 mi) away to the south.

## BACKGROUND

This section provides an overview of the cultural and historical characteristics of the project area, including moʻolelo, place names, ʻōlelo noʻeau, a discussion of land use through time, historic maps, Māhele land documents, and summaries of previous archaeological studies. Research was conducted at the Hawaiʻi State Library, the University of Hawaiʻi at Mānoa libraries, the SHPD library, and online on the Office of Hawaiian Affairs website and the Waihona Aina, Huapala, and Ulukau databases. Archaeological reports, historic maps, and historical reference books were among the materials examined.

### Kailua in the Pre-Contact Era

> Native traditions describe the formation (literally the birth) of the Hawaiian Islands and the presence of life on and around them, in the context of genealogical accounts… As this Hawaiian genealogical account continues, we find that these same god-beings, or creative forces of nature who gave birth to the islands, were also the parents of the first man (Hāloa), and from this ancestor, all Hawaiian people are descended. It was in this context of kinship, that the ancient Hawaiians addressed their environment. (Maly and Maly 2003)

The history of Kailua begins with the history of Oʻahu Island:

> Oʻahu is also a new name, given in memory of an ancestor of the people of Oʻahu. Lolo-imehani, Lalo-waia, and Lalo-oho-aniani were the ancient names of Oʻahu. Oʻahu was the child of Papa and Lua… and because Oʻahu was a good chief and the people lived harmoniously after the time of Wākea mā, Oʻahu's descendants gave the name of their good chief to the island --- Oʻahu-a-Lua. (Kamakau 1991:129)

### Inoa ʻĀina: Place Names

There are other means, besides chanted genealogies and their accompanied stories, by which Hawaiʻi's history has been preserved. One often overlooked source of history is the information embedded in the Hawaiian landscape. Hawaiian place names "usually have understandable meanings, and the stories illustrating many of the place names are well known and appreciated… The place names provide a living and largely intelligible history" (Pukui et al. 1974:xii). Lanikai is situated between Alāla and Wailea Points in the ahupuaʻa of Kailua. The meanings of these place names and others in the vicinity are delineated in *Place Names of Hawaii*:

> Alāla. High point between Kailua beach and Lanikai, Oʻahu. A tall stone at the point is used by fishermen as a landmark to locate a fishing station at sea. *Lit*., awakening. (Pukui et al. 1974:9)
>
> Kaʻiwa….Peak and Ridge above Lanikai, Oʻahu, where frigate birds (*ʻiwa*) are often seen. (Pukui et al. 1974:70)
>
> Kaʻōhao. Old name for Lanikai, Oʻahu. *Lit*., the tying (two women were tied together here with a loincloth after being beaten in a kōnane game…). (Pukui et al. 1974:85)
>
> Kapoho….Point, Mōkapu Peninsula, Oʻahu, where salt was formerly obtained by evaporation of seawater. *Lit*., the depression. (Pukui et al. 1974:89)

> Lanikai. Section of Kailua, surfing beach, and elementary school, Mōkapu qd., Oʻahu. Development here began in 1924; the name was changed from Kaʻōhao to Lanikai, in the belief held that it meant ʻheavenly seaʼ …This is English word order; in Hawaiian the qualifier commonly follows the noun, hence Lanikai means ʻsea heaven, marine heavenʼ. (Pukui et al. 1974:129)
>
> Mokulua. Two islets (24.1 acres, 225 feet elevation) off Lanikai, Oʻahu. *Lit*., two islands. (Pukui et al. 1974:155)
>
> Wailea….Point between Lanikai and Waimānalo, Oʻahu. *Lit*., Water of Lea (canoe makers' goddess; also the name of a fish god that stands on this point). (Pukui et al. 1974:224)

**Moʻolelo**

Kailua is mentioned in several moʻolelo. Perhaps one of the most revealing aspects of the moʻolelo of Kailua is that they attribute many of the earliest construction works of the area, such as Ulupō Heiau and the islands and reef off of Lanikai, to the Menehune (Sterling and Summers 1978). The Menehune are a legendary race of small people originally from Kahiki that were brought to Oʻahu as servants to build things in Kailua and Pūowaina (Punchbowl) (Fornander 1969). Regarding the construction of the Mokulua Islands and reef, it is said that the Menehune began to build these for protection of the people, but after only one night of work the construction was never finished (McAllister in Sterling and Summers 1978). It can be debated whether or not the Menehune were literally small people, and whether or not they were brought to live in Kailua by force or decided to live there by their own free will, but what is more significant is that since they are of the earliest migrations to Hawaiʻi, the fact that they are credited with building many structures in Kailua suggests that Kailua is one of the earlier places of Oʻahu to be settled in pre-history.

Another migration to Kailua is chronicled by Kamakau. Perhaps this migration occurred after the Menehune because the names of the travelers and the name of their ship are still remembered:

> ʻO nā haole mua i ʻōlelo ʻia, ua hiki mai ma Koʻolau o Oʻahu, aia ma Kāneʻohe a me Kailua. I ka wā o ʻAuanini, ke aliʻi e noho ana ma Kapalawai [Kalapawai], ma Kailua, a ʻo Kaomealani ke aliʻi me Muaokalani, kāna wahine; e noho ana lāua ma Kaʻōpūloha i Kāneʻohe. Ua kū mai kekahi moku ma kai o Mōkapu, ʻo Ulupana ka inoa o ua moku lā; ʻo Mololana ke kāpena, a ʻo Mālaea ka wahine. A ʻo ka inoa o nā kānaka, ʻo ia hoʻi ʻo Olomana, ʻo Aniani a me Holokamakani; aia nō ko lākou mau inoa i kapa ʻia ma kekahi mau ʻāina a me nā puʻu kaulana. Na kēlā mau aliʻi i kapa i ko lākou mau inoa a hiki i kēia lā (Kamakau 1996:41).
>
> *The first foreigners, it is said, arrived at Koʻolau, Oʻahu, there at Kāneʻohe and Kailua, in the time of ʻAuanini, the chief who was living at Kapalawai [Kalapawai], at Kailua, and Chief Kaomealani with his wife Muaokalani, who were living at Kaʻōpūloha in Kāneʻohe. A ship anchored offshore of Mōkapu, Ulupana was the name of that ship; Mololana was the captain, and Mālaea was the wife. And the name of the people, they were Olomana, Aniani, and Holokamakani. Their names were indeed given to some lands and famous hills. Those were the chiefs who have given their names until today. [translation by D. Duhaylonsod]*

Several of the Kailua moʻolelo center on Kawainui. This implies the great significance of this resource to the history of the region. Like other fishponds, Kawainui was the home of a guardian spirit, also called a moʻo kiaʻi or akua moʻo. These guardian spirits looked after the well-being of

the people, ensuring that the land and/or sea would provide for the populace as long as the people remained good stewards. The guardian of Kawainui was a moʻo named Hauwahine, and Hauwahine's companion was the moʻo who dwelled near Kaʻelepulu Stream (Kelly and Nakamura 1981).

In addition to getting the benevolent help of their guardian spirits, the Kailua people also were assisted by the mythological tree, Mākālei. This tree came up from the sea, intending to go to Nuʻuanu. However, the shouting from the Menehune and other ʻeʻepa people caused Mākālei to fall near Kawainui. It became rooted there, and its magical powers attracted fish from the neighboring waters to the area (Kelly and Nakamura 1981).

So sustaining was the fishpond of Kawainui that even its mud was edible. The mud of Kawainui, or lepo ʻai ʻia, was purposely brought from Kahiki and put into the fishpond. According to a report by the Bishop Museum, a moʻolelo states that this mud even nourished Kamehameha and his warriors in more recent times:

> [The lepo ʻai ʻia mud] is found only there [at Kawainui]. When there was a shortage of taro in Kailua during the time Kamehameha and his warriors stayed there, the men of Kailua went to Kawainui Pond to get the edible mud. A strict kapu had to be imposed during diving for the mud. No one was allowed to utter a word at that time. If the kapu were broken, the ordinary mud in the pond would rise, cover the diver and drown him. (Kelly and Nakamura 1981:5)

The old name for Lanikai was Kaʻōhao, which translates to 'the tying,' in relation to part of the epic tale, "Story of Lonoikamakahiki" in the *Fornander Collection of Hawaiian Antiquities and Folklore* (Fornander 1916). Hauna, prophet of Lonoikamakahiki left Hawaiʻi island to sail to Oʻahu, where he landed in Lanikai and saw women playing kōnane with their husbands. Noticing that the women were going to win the game, he decided to make a wager and challenge them, first covering the board with a piece of kapa:

> The women said to Hauna "We have nothing to offer on our side excepting ourselves. If you beat us in this present unfinished game, you can take us as your property." Hauna then said: "I have two double canoes filled with things that are valuable; the chief articles of value on the canoes, however, are a large number of feather cloaks. If you two beat me, you two shall have the goods in the canoes together with the men on board." The women replied: "It is a bet." Hauna then said: "Let me make the first move"...But when the kapa was removed in order to continue the game, Hauna caught up some of the stones which gave the women the best advantage with the kapa. Hauna then made the first move and after a few more moves, the women were beaten. At this he said: "I have won you two."...Hauna took the women and tied them together with a loincloth and led them to the place where the canoes were lying. Because these women were led by Hauna, the place where this act took place was given the name Kaohao [Kaʻōhao] and it so remains to this day. The place is in Kailua, Koʻolaupoko, Oʻahu. (Fornander 1916:312, 314)

Lanikai was also home to a beautiful chiefess, Kaʻiwa, of which a hill in the area is named. Ahiki fell madly in love with Kaʻiwa and began coming to Lanikai to see her. One day, Kaulekoa of Kāneʻohe (also known as Kana) stopped Ahiki on his journey and that is why the peak named Ahiki stands in front of the other two, Mount Olomana and Pākuʻi (Sterling and Summers 1978).

In Lanikai, it is said that a cave at Alāla Point extends underground all the way to Mid Pacific Country Club, and that the cave was once used as a place of refuge (Sterling and Summers 1978).

Near the location of the cave, are several basalt and coral rocks collectively known as Kanepolū. According to moʻolelo, King Kamehameha III was fishing in Lanikai and staying in the cave. The king sent for a man named Kanepolū, who "was born, grew up, and died in one day" (Nawelu in Sterling and Summers 1978:238). The stones were set up as guardians to keep watch for the arrival of Kanepolū. However, Kanepolū arrived at the cave as night was beginning to fall, and he tripped on the coral stone and was killed. This stone represented his leg; the location of the rest of his body is unknown (Nawelu in Sterling and Summers 1978:238).

There was also a heiau at Alāla Point (McAllister 1933). When Kūaliʻi made this heiau kapu, a vast fire could be seen burning in the distance on Molokaʻi. Kūaliʻi was worried that the bright glow of the fire would prevent having a successful procession to the heiau, but his kahuna replied that the fire would die down if only Kūaliʻi was to say that it should be so. At these words, the kahuna prayed, and the fire subsided so that the procession could continue (Kamakau in Sterling and Summers 1978:238).

### ʻŌlelo Noʻeau

Traditional proverbs and wise sayings, also known as ʻōlelo noʻeau, have been another means by which the history of Hawaiian locales have been recorded. In 1983, Mary Kawena Pukui published a volume of close to 3,000 ʻōlelo noʻeau or Hawaiian proverbs/wise sayings that she collected throughout the islands. The introductory chapter of that book reminds us that if we could understand these proverbs and wise sayings well, then we would understand Hawaiʻi well (Pukui 1983).

Only three ʻōlelo noʻeau concerning Kailua are recorded in Pukui's compilation. Two of these are suggested to commemorate Kamehameha's visits to Kailua after taking control of Oʻahu. The third ʻōlelo noʻeau does not pertain to any particular historical person, but rather, it points out the hau trees which grow at Kailua and the characteristics of the rope which can be made from its bark. Here are the sayings as they appear in Pukui's publication (1983:60, 193, 230).

> Hawaiʻi palu lāʻī.
>
> *Ti-leaf lickers of Hawaiʻi.*
>
> This saying originated after Kamehameha conquered the island of Oʻahu. The people of Kailua, Oʻahu, gave a great feast for him, not expecting him to bring such a crowd of people. The first to arrive ate up the meat, so the second group had to be content with licking and nibbling at the bits of meat that adhered to the ti leaves. In derision, the people of Oʻahu called them "ti-leaf lickers."
>
> Kini Kailua, mano Kāneʻohe.
>
> *Forty thousand in Kailua, four thousand in Kāneʻohe.*
>
> A great number. Said by a woman named Kawaihoʻolana whose grandson was ruthlessly murdered by someone from either Kailua or Kāneʻohe. She declared that this many would perish by sorcery to avenge him. Another version credits Keohokauouli, a kahuna in the time of Kamehameha, for this saying. He suggested sorcery as a means of destroying the conqueror's Oʻahu enemies.
>
> Mālama o ʻike i ke kaula ʻili hau o Kailua.
>
> *Take care lest you feel the hau-bark rope of Kailua.*
>
> Take care lest you get hurt. When braided into a rounded rope, hau bark is strong, and when used as a switch, it can be painful.

### Ka Makani a me Ka Ua: The Wind and the Rain

With their lives closely connected to the natural environment and physical surroundings, Hawaiian winds and rains were individually named and associated with a specific place, region, or island. In *Hānau Ka Ua*, Akana and Gonzales (2015:xv) explain that kūpuna "knew when a particular rain would fall, its color, duration, intensity, the path it would take, the sound it made on the trees, the scent it carried, and the effect it had on people." The following wind and rain names associated with the project region offer further insight on kūpuna perspectives of the project area.

While several winds and rains are noted for the greater Kailua area, only one name was found that is specifically associated with Kaʻōhao (Lanikai). This is a rain known as Hāʻao, and it was mentioned in mele:

| | |
|---|---|
| E nānā iho ana i Waipuʻilani | Gazing down on Waipuʻilani |
| E noho iho ana i Kaʻanaokāhinahina | Residing there at Kaʻanaokāhinahina |
| Eia au i ka ua a ka Hāʻao | Here am I in the Hāʻao rain |
| I walea ai i ke kui pua ʻāhihi | Delightedly stringing lehua ʻāhihi blossoms |
| He lei no Lea, wahine i ke kuahiwi | As a lei for Lea, woman of the mountain |

> From a mele by Kapauakanoa…Note: "Lea is both the name of a goddess of canoe makers and the name of a fish god who stands in Wailea ("Water of Lea") Point between Kaʻōhao in Kailua and Waimānalo, Oʻahu… (Akana and Gonzalez 2015:27–28)

Rains of other parts of Kailua are ʻĀpuakea, Kapuaʻikanaka, and Kuahine (Akana and Gonzalez 2015). A wind of Kailua is Malanai, described as a gentle tradewind breeze (Nakuina 2005).

### Traditional Land Use

In early Hawaiian history, Oʻahu's windward coast was noted for its "many attractive bays, beaches, and stream-watered lowlands and valleys all the way from Kailua to Laʻie" (Handy et al. 1991:268). Bays throughout Hawaiʻi, such as that at Kailua, "generally had a cluster of houses where the families of fishermen lived" (Handy et al. 1991:287). But the added abundant resources of Kailua's perennial streams and thriving fishponds clearly promoted a regional population that was greater than that of other areas. The ahupuaʻa of Kailua, along with Kāneʻohe, "was rich in fishponds and tillable lands, [and it] was the seat of the ruling chiefs of Koʻolaupoko (Short Koʻolau) which was the southern portion of the windward coast" (Handy et al. 1991:272). Handy et al. further illustrate why the Kailua area was a favorable place to live, citing not only the fishponds and streams but also the extensive wetlands, which were converted into agricultural terraces:

> Undoubtedly further reasons for the attractiveness of Kailua as a place of residence for an aliʻi nui with his large entourage were the great natural fishponds, Kaʻelepulu and Kawainui, and the complex of artificial salt-water ponds that are between Kailua and Kaneʻohe in the Mokapu area: Halelou, Nuʻupia, and Kaluapuhi. Kailua must formerly have been very rich agriculturally, having one of the most extensive continuous terrace areas on Oahu, extending inland one and a half miles from the margin of Kawainui Swamp. Terraces extended up into the various valleys that run back into the Koʻolau range. There were some terraces watered by springs and a small stream

> from Olomana mountain along the western slope of the ridge that lies southeast of Kawainui Swamp, and another system of terraces was east of the seaward end of the ridge, watered by the stream which joins Kawainui and Ka‘elepulu Ponds. There were also terraces north of the Kawainui Pond, and several terrace areas flanked Ka‘elepulu Pond at the base of the ridge to the eastward. (Handy et al. 1991:457)

From mountain to sea, the district of Kailua also had its fair share of religious structures to serve the needs of its large population. At the entrance of Lanikai, Alāla Heiau was thought to have been located on Alāla Point. McAllister (1933:190) states that “Tradition for ages past has credited the heiau of Alala...as having the distinction of being the temple where the ceremonies attending the royal birth of Kualii, about 1640, were performed, but of which no traces of any kind now remain...” According to McAllister (1933), no evidence or other features are present in that area. Charles Kamanu Sr., Solomon Mahoe Jr., and Nawelu also mention a cave used for refuge at Alāla Point, the entrances of which are now obstructed (Sterling and Summers 1978).

Furthermore, there were natural shrines on the hillsides named Alāla and Waile‘a. These were said to be used as lookouts by fishermen, as told in a 1939 account:

> The fishermen of old watched this big rock on the hill [Alāla] and Waile‘a another natural shrine a distance away at a place called Waile‘a, to locate the best fishing grounds in the sea. “It is too bad,” said Mrs. Ailona, “to deprive Alāla of an unobstructed view of the sea [speaking of a large house blocking the view], for Alāla is not only a shrine but a ‘fish’ god. So is Waile‘a.” (Charles in Sterling and Summers 1978:239)

Charles went on to say that the Waile‘a shrine was situated above “Hale Aloha,” where an old road was once located (Charles in Sterling and Summers 1978:239). Charles would use the road to participate in hukilau when she was young.

Between 1435 and 1508 Mokulua Drive, less than half a mile from the project area, it is said that there was once a stream which drained out into the sea, and the area was called Punawai (Mahoe in Sterling and Summers 1978). “In the olden days the women lived here at Punawai while their menfolk practiced spear-throwing at Ka‘ohao. The men were under kapu during these practice sessions, coming to their women only on weekends…” (Mahoe in Sterling and Summers 1978).

**Kailua in the Historic Era**

When the first Westerners arrived in the Hawaiian archipelago in 1778, the islands were not yet united under one sovereign. At that time, Kailua and the entire island of O‘ahu were under the rule of Chief Kahahana. In 1783, Chief Kahahana’s reign was ended with the invasion and victory of Chief Kahekili of Maui. This would forever be the end of O‘ahu’s independence as a separate island kingdom. When Chief Kahekili died in 1794, control of O‘ahu went to his son Kalanikūpule. The following year, Chief Kamehameha of Hawai’i Island invaded O‘ahu to engage Kalanikūpule in battle. Kamehameha overwhelmed Kalanikūpule’s warriors, effectively gaining control of all the islands from Hawai‘i to O‘ahu. Eventually, Kamehameha would make a peaceful agreement with Chief Kaumuali‘i of Kaua‘i, bringing that island and Ni‘ihau into the fold and thereby uniting the Hawaiian archipelago under one rule (Kamakau 1996, Kanahele 1995).

### Early Historical Accounts of Land Use in the Kailua Area

It is recorded that in 1778 James Cook became the first westerner to see the Hawaiian Islands. Following Cook, a wave of other western explorers landed on Hawai‘i’s shores. In 1779, William Bligh, the “sailing master of the HMS Resolution, and his fellow crewmembers, are the first Westerners to get a look at the shores and hills of Kailua ahupuaa” (Hall 1998:22). The midshipman George Gilbert remarked about the cultivation of the land and the relative lack of trees seen:

> The interior part is hilly, the shore low and exceeding(ly) well cultivated but very bare of wood. The Natives here don’t appear to be very numerous and as soon as we came near the land they ventured onboard, without any hesitation and were very friendly… and in the evening sailed from the island; which is called by the Natives Oowahoo. (Gilbert in Hall 1998:22)

Around the same time as the arrival of the first westerners to Hawai‘i, O‘ahu was experiencing major political changes. It was during this time, as mentioned above, that O‘ahu’s sovereignty ended with the invasion of the Maui chiefs, and the Maui rule was subsequently overcome by the invasion of the forces from Hawai‘i Island. Yet throughout this tumultuous period, Kailua remained an important seat of O‘ahu governance. Kailua retained its prominence after the invasion of Kahekili from Maui in 1783:

> In historic times Kahekili, the high chief of Maui, battled the O‘ahu chiefs and finally killed Kahahana, taking his place as high chief [of O‘ahu]… [Kahekili] chose… and settled in Kailua with several of his supporting chiefs. (Kelly and Nakamura 1981:6)

And a decade later, after the invasion of Kamehameha from Hawai‘i Island, Kailua again retained its significance as a place of rule. Kamehameha not only lived and ruled from there, but the new king himself also worked in the fishponds of Kailua as an encouragement to his chiefs and commoners to be productive and raise food:

> The last, and most notable, chief who had attachments to Kailua and to Kawainui was Kamehameha I. He conquered O‘ahu in 1795, and had the problem of feeding the members of his retinue, far away from their homes on the Island of Hawai‘i. Kamehameha I encouraged the development of the natural resources of O‘ahu to provide his chiefs and followers with sufficient food… While he [Kamehameha] lived on Oahu he encouraged the chiefs and commoners to raise food and he went fishing and would work himself at carrying rock or timber. They all saw that he labored himself with his own hands. He worked at the fishponds at Kawainui, [and] Ka‘elepulu. (Kelly and Nakamura 1981:7)

When Kamehameha died in 1819, his windward lands were divided between his sons Liholiho and Kauikeaouli. Kailua Ahupua‘a went to the younger son, Kauikeaouli, who would later become Kamehameha III (Hall 1998).

### Land Ownership and Māhele Land Tenure

The change in the traditional land tenure system in Hawai‘i began with the appointment of the Board of Commissioners to Quiet Land Titles by Kamehameha III in 1845. The Great Māhele took place during the first few months of 1848 when Kamehameha III and more than 240 of his chiefs

worked out their interests in the lands of the Kingdom. This division of land was recorded in the Māhele Book. The King retained roughly a million acres as his own as Crown Lands, while approximately a million and a half acres were designated as Government Lands. The Konohiki Awards amounted to about a million and a half acres, however title was not awarded until the konohiki presented the claim before the Land Commission.

In the fall of 1850 legislation was passed allowing citizens to present claims before the Land Commission for lands that they were cultivating within the Crown, Government, or Konohiki lands. By 1855 the Land Commission had made visits to all of the islands and had received testimony for about 12,000 land claims. This testimony is recorded in 50 volumes that have since been rendered on microfilm. Ultimately between 9,000 and 11,000 land claims were awarded to kamaʻāina totaling only about 30,000 acres and recorded in ten large volumes.

Although the Māhele had specifically set aside lands for the King, the government, and the chiefs, this did not necessarily alienate the makaʻāinana from their land. On the contrary, access to the land was fostered through the reciprocal relationships, which continued to exist between the commoners and the chiefs. Perhaps the chiefs were expected to better care for the commoners' rights than the commoners themselves who arguably might have been more ignorant of foreign land tenure systems. Indeed, the ahupuaʻa rights of the makaʻāinana were not extinguished with the advent of the Māhele, and Beamer points out that there are "numerous examples of hoaʻāina living on Government and Crown Lands Post-Mahele which indicate the government recognized their rights to do so" (Beamer 2008:274).

> Hoaʻāina who chose not to acquire allodial lands through the Kuleana Act continued to live on Government and Crown Lands as they had been doing as a class previously for generations. Since all titles were awarded, "subject to the rights of native tenants." The hoaʻāina possessed habitation and use rights over their lands. (Beamer 2008:274)

For those commoners who did seek their individual land titles, the process that they needed to follow consisted of filing a claim with the Land Commission; having their land claim surveyed; testifying in person on behalf of their claim; and submitting their final Land Commission Award to get a binding royal patent. However, in actuality, the vast majority of the native population never received any land commission awards recognizing their land holdings due to several reasons such as their unfamiliarity with the process, their distrust of the process, and/or their desire to cling to their traditional way of land tenure regardless of how they felt about the new system. In 1850, the king passed another law, this one allowing foreigners to buy land. This further hindered the process of natives securing lands for their families.

Hundreds of land claims up and down windward Oʻahu were awarded to commoners. In the Koʻolaupoko District, 199 awards were "granted in the Kailua and Waimanalo ahupuaʻa, each averaging roughly 10 acres" (Hall 1998:53). However, most of the windward Oʻahu lands went to Kamehameha III's queen, Kalama, and to several of the other high chiefs. Kailua in particular found Queen Kalama as its dominant landholder, followed by Princess Kamāmalu. Their land claims in Kailua are described as follows:

> Kamamalu submitted her claims for the ili of Kaelepulu and Keolu; while Kalama's claims included Kawainui and the ili of Mokapu, Oneawa, and Keahupuaanui. (Hall 1998:52)

There were few Land Commission Awards (LCAs) granted in Lanikai, however one is located near the project area. LCA 2657:2 is 0.44 acres and was awarded to Mahuia (Appendix A). The LCA included two ʻāpana in Kailua, the first is located in the ʻili of Kuailima, and the second is in

Ka‘ōhao adjacent to the project area to the north. The parcel is described in the Māhele Book as being located between the ocean to the east and the kula of the konohiki to the west. Usage of the parcel was not described.

**Historic Land Use**

Following the Resident-Alien Act in 1850 which allowed foreigners to “purchase (for the first time) fee simple lands in the islands… title to much of the land, which had only recently been made available to Hawaiian alii and commoners, is lost forever as it is passed into the hands of the newly arrived” (Hall 1998:54). The cultivation of both sugarcane and of pineapple, which would come after the turn of the century, would be attempted in Kailua but neither would be productive. Within a decade, the Chinese laborers moved off of Kāne‘ohe plantations and started rice-farming operations in Kailua.

> Chinese cane laborers from the Kaneohe plantations have been permitted to begin establishing rice paddies in Kailua’s Kaelepulu pond area and the Kawainui marshes… Wetland taro, which had been actively cultivated in the Kaelepulu and Kawainui marshes for nearly 500 years, will shortly be thoroughly displaced in the ponds and wetlands for the new cash crop. (Hall 1998:62)

Besides large-scale agricultural enterprises, Kailua also saw the imprint of the cattle industry. By the end of the 1800s, ranching operations found their foothold on the Kailua flatlands. J.P. Mendonca and C. Bolte partnered and approached the Kailua landowner D. Rice “to lease 15,000 acres of Kailua’s central landholdings to raise Angus beef cattle… [their future company] will come to own practically all of Kailua, except for the lands held by the Bishop Estate” (Hall 1998:91).

Two historic maps were found that date to this time period. The first one is dated 1899 (Figure 4). It shows the smaller divisions of land within the district of Kailua. The current project area is located within the subdivision labeled as Alaapapa, with an area called Mokulua adjacent to the southeast. The map shows that numerous Land Commission Awards recognized throughout Kailua, with Alaapapa labeled as Grant 967 S.P. Miki.

The second map dates to 1900 (Figure 5). Like the previous map, this one shows the traditional names of the many ‘ili throughout the ahupua‘a. The map confirms what other textual references say, that the ali‘i residents of Kailua, such as Queen Kalama and Princess Kamāmalu, held onto their Kailua landholdings. However, other Kailua parcels clearly show that they have been bought by foreigners by that time. The land division of Mokulua is not shown on this map, and it appears that Alaapapa covers the two land divisions shown on the earlier map. A road that leads into Lanikai just mauka of the current project area is labeled “Ala Aupuni.”

A historic map of an unknown date illustrates the fisheries of Ko‘olaupoko (Figure 6). This map focuses on the marine resources of the region and names the Alaapapa Fishery and Kailua (B) Fishery in Lanikai, with the project area just within the former. Inland is the Kaelepulu Fishpond, where the subdivision of Enchanted Lakes is today. The road that loops around Lanikai is in place at this time, although none of the connecting streets within the loop or surrounding streets are shown.

In the first decade of the 20th century, the copra industry was also started in Kailua, beginning with the planting of 10,000 coconut trees in 1908, where Kalaheo and Oneawa streets are today, in a

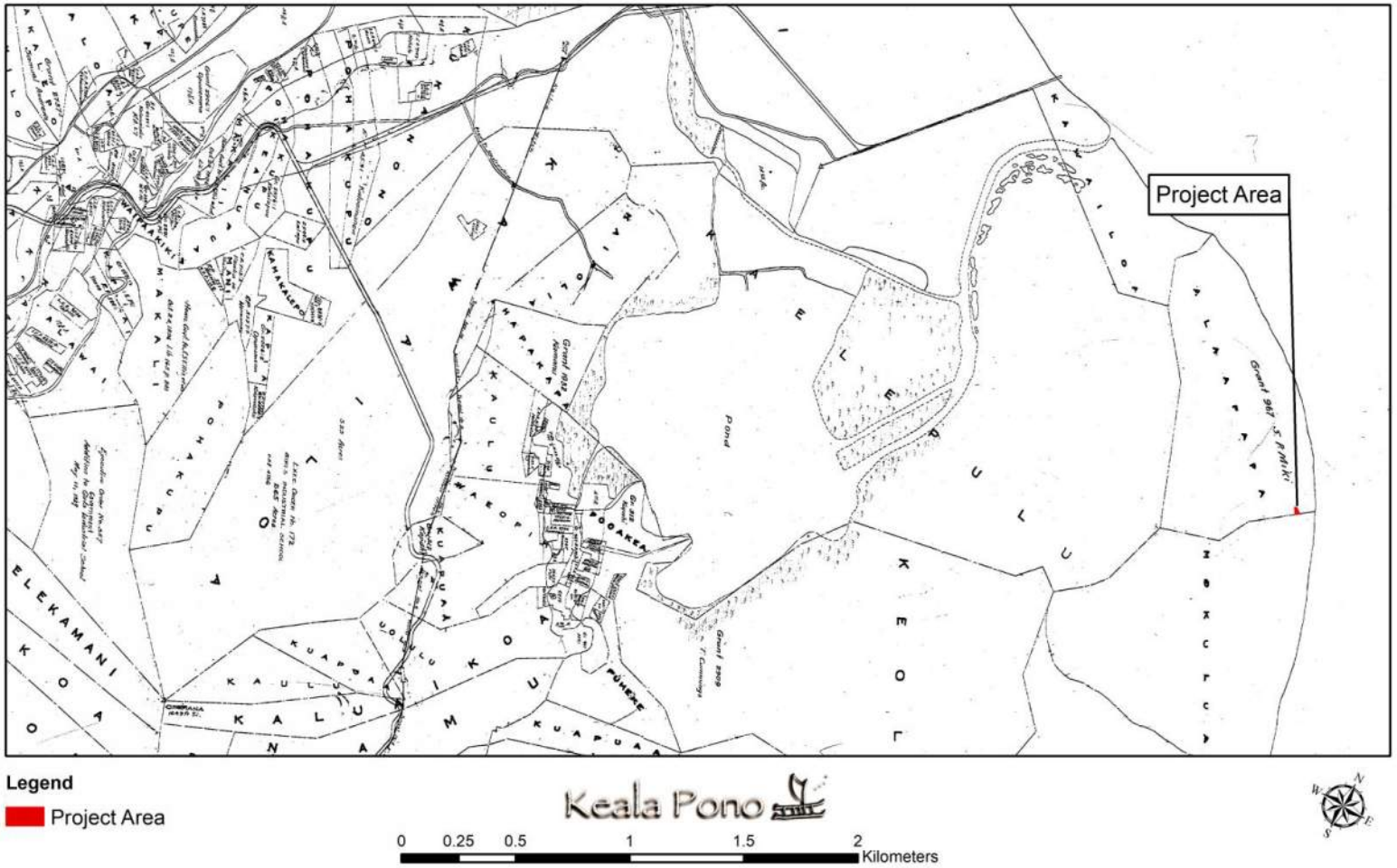



**Figure 4. Portion of an early Kailua map (Wall 1899).**

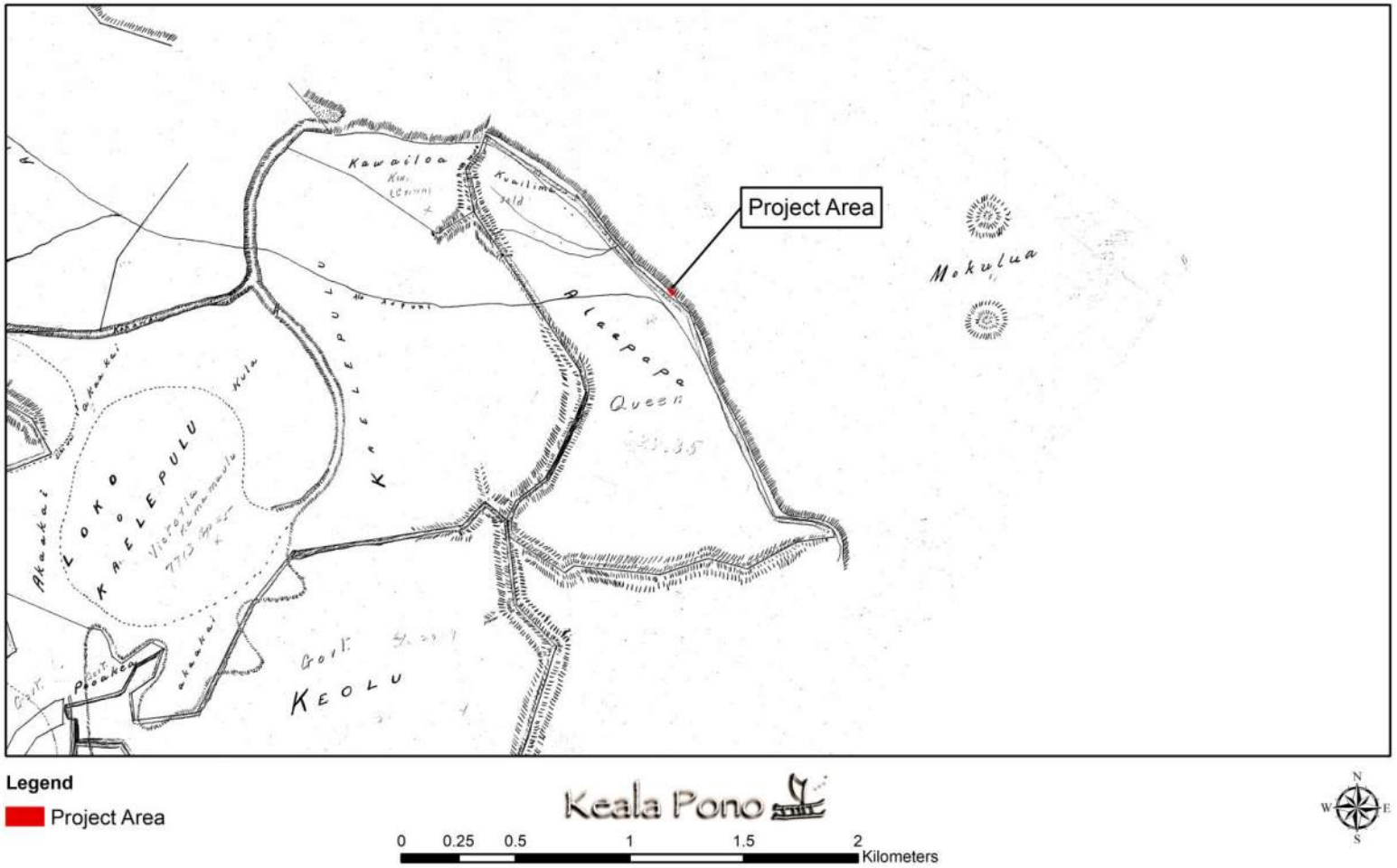



**Figure 5. Portion of an early Kailua map (King 1900).**

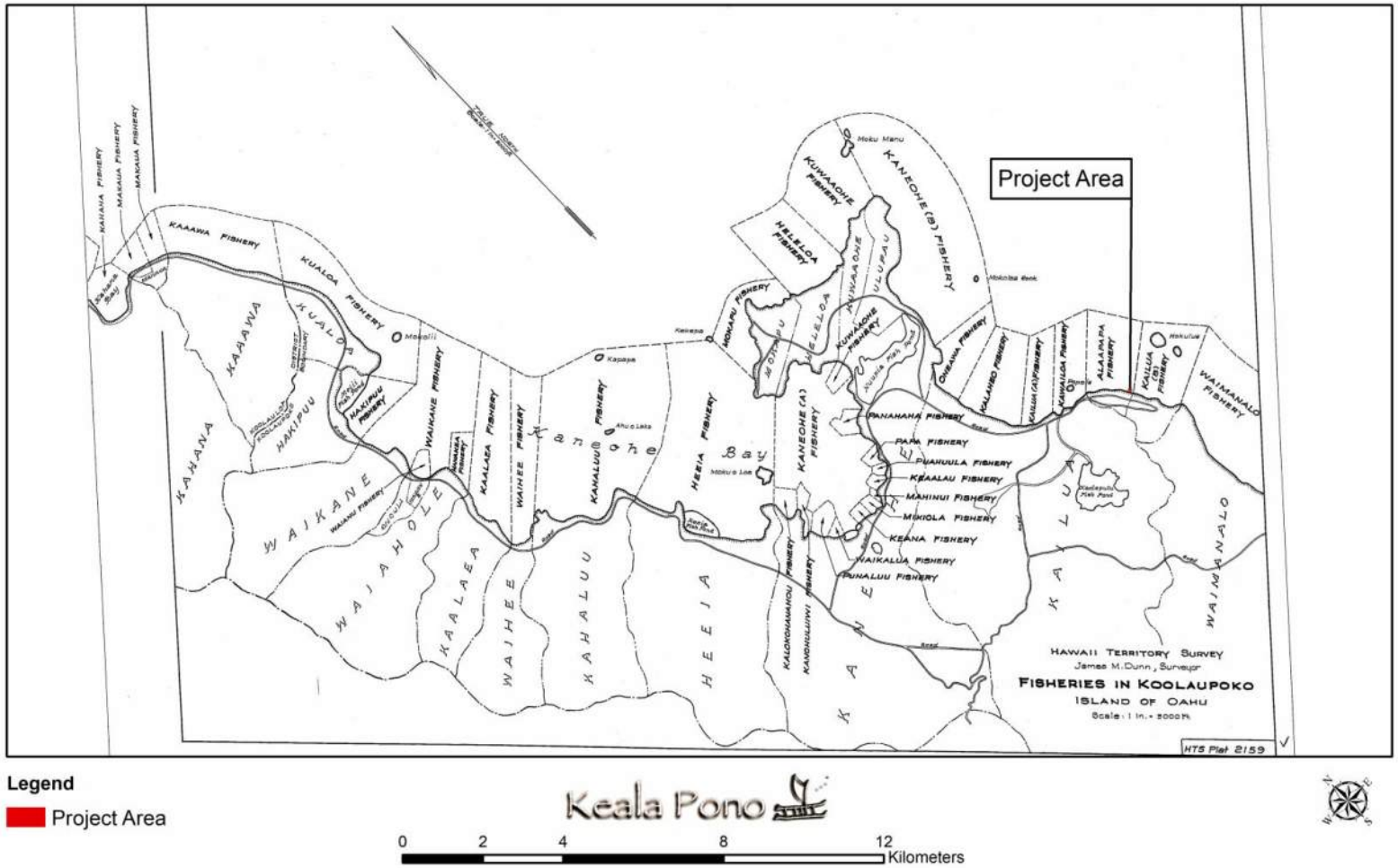



**Figure 6. Portion of a Ko‘olaupoko fisheries map (Dunn n.d.).**

grassy expanse of sand flats (Hall 1998:113). The next year, investors planted an additional 130,000 trees, many of which were imported from Samoa, and all of these coconut trees were "laid out on 320 acres behind the 4-mile stretch of Kailua's shoreline…The 140,000 plantings, each with a life span of 100 years, will shortly lend the area its name of Coconut Grove" (Hall 1998:113, 123).

Expanding out of the cattle ranching enterprises, Arthur Rice and Harold Castle established the earliest dairies in the coastal regions of Kailua. This occurred around 1910, with dairies located at today's Coconut Grove area noted above (Kailua Historical Society 2009:182). Later, in the 1920s, the Campos family added their family dairy to the operations in Kailua, leasing land from Ka'elepulu and Olomana all the way to Bellows Beach in Waimānalo. "Initially, they trucked their raw milk to Meadow Gold (Dairymen's) in Honolulu for processing, but in the early 1950s the Campos, Moanalua, and Rico dairies united to form the Honolulu-based Foremost Dairy (Kailua Historical Society 2009:183).

Interestingly, as early as 1910 there was speculation of turning Kailua into a dream vacation destination of sorts. That year, "thirty-three 1-acre beachfront Kailua properties along Kalaheo Road are advertised in Honolulu for lease to those who wish to build summer cottages for their families on Kailua Bay's secluded 4-mile stretch of beach" (Hall 1998:117). In 1917, after the demand for coconut oil declined causing a decrease in copra profits, Arthur Rice of the Hawaiian Copra Company "plans to develop subdivision of 'tract housing' in the flat open coconut orchards… He initiates the first steps that, over time, will see Kailua become a year-round residential town… [and he] will become recognized as the founding father of what will develop as residential Kailua" (Hall 1998:123–124).

In 1924, development began in Ka'ōhao by Charles R. Frazier, who urbanized 311 acres, creating the upscale beachfront community of Lanikai that we know today (Clark 2002). Frazier chose the name Lanikai, thinking that the word translated to 'heavenly sea,' although the literal translation is more like 'sea heaven' or 'marine heaven' (Pukui et al. 1974:85). In 1926 a faux lighthouse was erected at the entrance to Lanikai, at Alāla Point, as a monument. Although the structure resembles a lighthouse, it does not function as such. Designed by the famous local architect Hart Wood, the structure still stands today and has been nominated to the National Register of Historic Places (NRHP).

What are now known as the "Lanikai Pillboxes" were constructed in the 1940s as observation bunkers for Battery Wailea and the nearby Bellows Field (Young 2015). Battery Wailea, situated at Waile'a Point, was armed with two guns and was operational for only a few years, between 1942 and 1945. The observation bunkers, located on Ka'iwa Ridge, were referred to as Fire Control Station Podmore, named after a nearby triangulation station (Young 2015).

Intense real estate development in Kailua occurred in the 1950s when the Pali Highway was built, and tunnels were bored through the Ko'olau Mountains. This development soon displaced many of the agriculture and ranching enterprises of Kailua (Kailua Historical Society 2009:191–192).

**Previous Archaeology**

Several archaeological studies have been carried out in Lanikai, as summarized below. Each study is listed in Table 1 and illustrated in Figure 7. State Inventory of Historic Places (SIHP) numbers are prefixed by 50-80-11 (Figure 8).

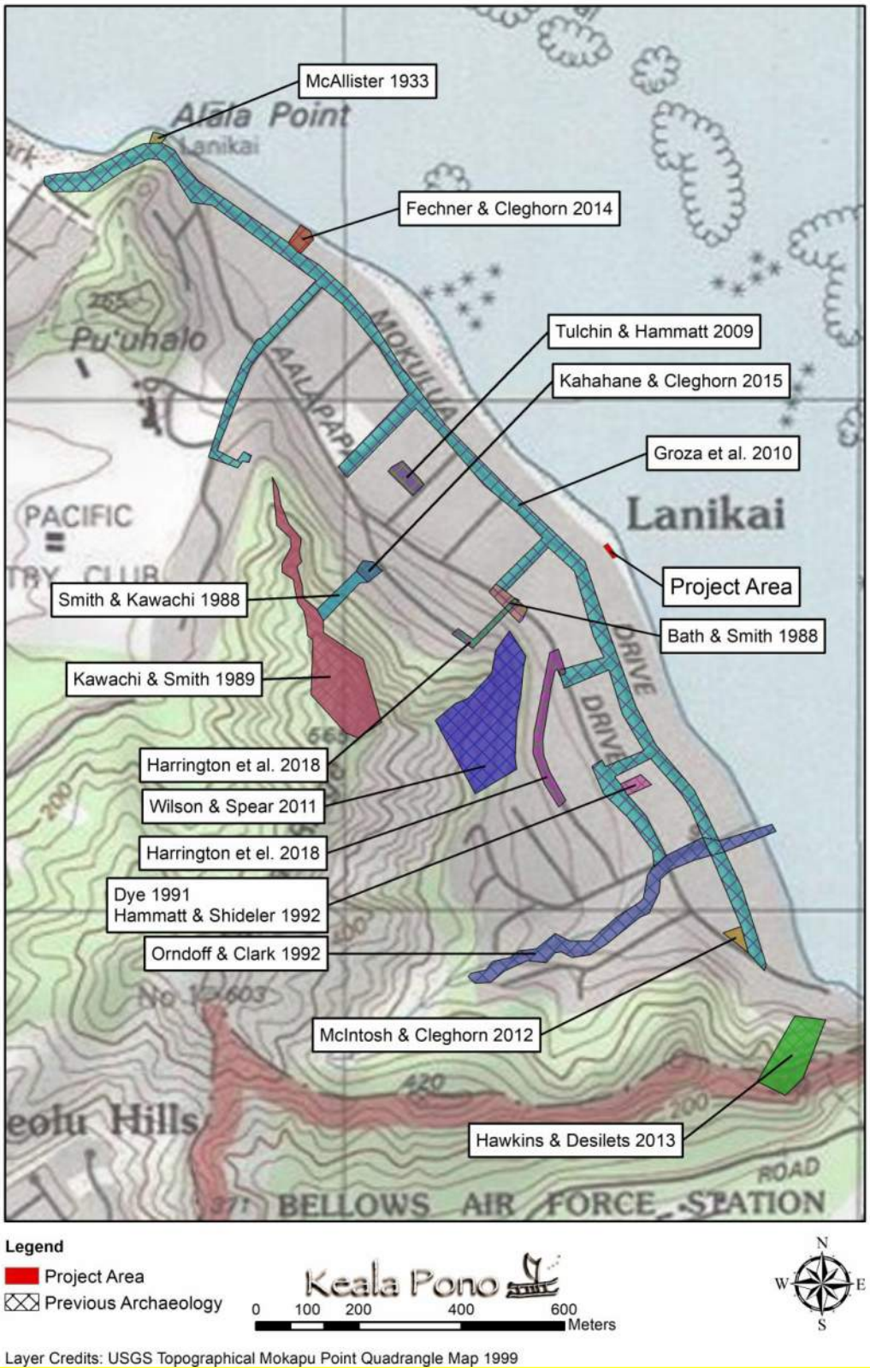



**Figure 7. Previous archaeology in the vicinity of the project area.**

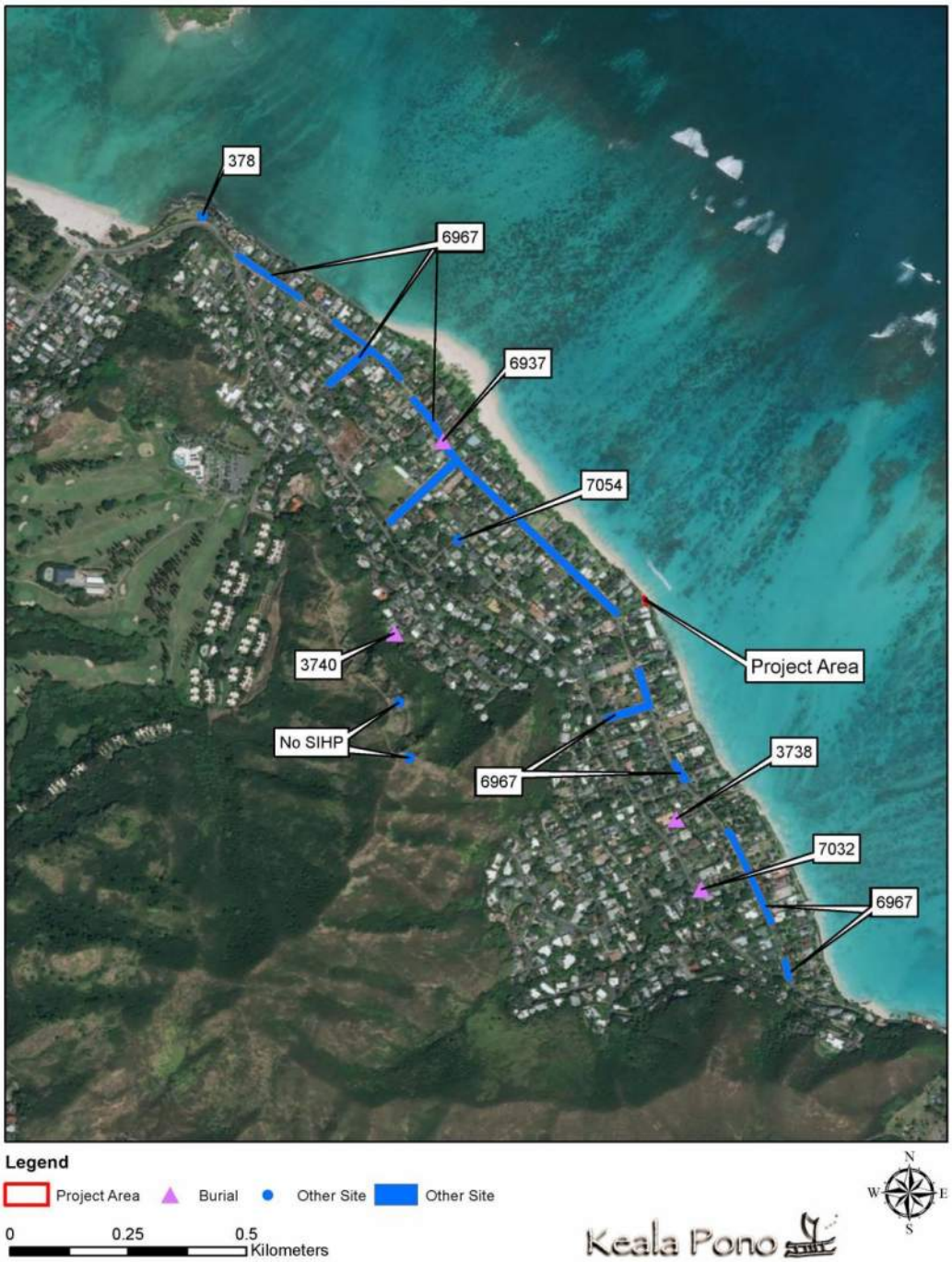



**Figure 8. Previously recorded sites in the vicinity of the project area.**

**Table 1. Previous Archaeology in Lanikai**

| Author | Location | Work Completed | Findings |
|---|---|---|---|
| McAllister 1933 | Island-Wide | Survey | Noted Alāla Heiau (Site 378) in Lanikai. |
| Bath & Smith 1988 | Koʻohoʻo Pl. | Burial Report | Reported on the inadvertent discovery of human remains, SIHP 3738. |
| Smith & Kawachi 1988 | 1063 Koʻohoʻo Pl. | Burial Report | Recorded the inadvertent discovery of human remains, SIHP 3740 |
| Kawachi & Smith 1989 | Kaiʻwa Ridge | Field Check | Noted WWII bunkers; no SIHP numbers were assigned. |
| Dye 1991 | 1414 Aʻalapapa Dr. | Burial Report | Reported on the disinterment of human burials, SIHP 3738. |
| Orndoff & Clark 1991 | Poʻopoʻo Gulch | Literature Review with Monitoring Findings | None. |
| Hammatt & Shideler 1992 | 1414 Aʻalapapa Dr. | Burial Report | Reported on the disinterment of human burials, SIHP 3738. |
| Tulchin & Hammatt 2009 | 136 Haokea Dr. | Archaeological Inventory Survey | Identified a pre-contact hearth, SIHP 7054. |
| Groza et al. 2010 | Mokulua Dr., Multiple TMK | Archaeological Monitoring | Identified two sets of human remains (SIHP 6937 and 7032) and a subsurface cultural layer (SIHP 6967). |
| Wilson & Spear 2011 | End of Kehaulani Dr. | Archaeological Inventory Survey | None. |
| Hawkins & Desilets 2013 | 1611 Mokulua Dr. | Archaeological Inventory Survey | None. |
| Fechner & Cleghorn 2014 | 860 Mokulua Dr. | Archaeological Inventory Survey | None. |
| McIntosh and Cleghorn 2014 | 1561 Mokulua Dr. | Archaeological Inventory Survey | None. |
| Kahahane and Cleghorn 2015 | 1055 Koʻohoʻō Pl. | Archaeological Inventory Survey | None. |
| Harrington et al. 2018 | Koʻohoʻō Pl. and Mōkōlea Dr. | Literature Review and Field Inspection | None. |

The earliest archaeological work in the vicinity of the project area is from an island-wide survey conducted by J.G. McAllister (1933). Some of this work was based on descriptions of heiau provided by T.G. Thrum in various articles published in *Thrum's Hawaiian Almanac and Annual*.

McAllister identified one archaeological site in Lanikai, Alala Heiau (Site 378), and quoted Thrum's description of the heiau, although both Thrum and McAllister did not find any physical evidence of the site (McAllister 1933:190):

> Site 378. Alala heiau, said to have been at Alala Point, Kailua. When the site was indicated by Solomon Mahoe, my reaction was similar to that already expressed by Thrum:
>
> > Tradition for ages past has credited the heiau of Alala…as having the distinction of being a temple where the ceremonies attending the royal birth of Kualii, about 1640, were performed, but of which no traces of any kind now remain…The site to which we were directed, while convenient and appropriate for a koʻa or fisher-folks' heiau, gave no evidence by stones of the vicinity, contour of the hill at the point shown, or other feature, of ever having been the location of a temple of the importance alleged.

In Hawaiʻi, sandy areas near the ocean are often related to traditional Hawaiian burials. Inadvertent discoveries of human remains have been documented in and around Lanikai and the current project area, making these findings of particular significance. A single burial at Koʻohoʻo Place was designated as SIHP 3740 and disinterred (Smith and Kawachi 1988). Another single burial was found at the base of the hill near the end of Koʻohoʻo Place and designated as SIHP 3738 (Bath and Smith 1988). Human burials encountered nearby at Aʻalapapa Drive were subsumed under the SIHP 3738 site number (Dye 1991, Hammatt and Shideler 1992). This latter find included the remains of at least three individuals, all of which were disinterred. Two sets of human remains found on Mokulua Drive were designated as SIHP 6937 and 7032, respectively (Groza et al. 2010).

Other archaeological resources known for Lanikai include a subsurface cultural layer, a hearth, and two WWII bunkers. The cultural layer was found during archaeological monitoring that identified the two sets of human remains on Mokulua Drive (Groza et al. 2010). It was designated as SIHP 6967. The hearth was recorded during an archaeological inventory survey at Haokea Drive (Tulchin and Hammatt 2009). It was designated as SIHP 7054. The two WWII bunkers were identified during a field check of Kaʻiwa Ridge, although no SIHP numbers were assigned (Kawachi and Smith 1989). They are known today as the Lanikai Pillboxes, the history of which is noted above.

Other studies in Lanikai did not yield any findings. These consist of a literature review that also presented archaeological monitoring findings for Poʻopoʻo Gulch (Orndoff and Clark 1991), a pedestrian survey at the end of Kehaulani Drive (Wilson and Spear 2011), a survey that excavated 11 backhoe trenches on Mokulua Drive (Hawkins and Desilets 2013), a survey that excavated two backhoe trenches also on Mokulua Drive (Fechner and Cleghorn 2014), a survey with subsurface testing across the entire area of a proposed pool on Mokulua Drive (McIntosh and Cleghorn 2014), a survey with subsurface testing at Koʻohoʻō Place (Kahahane and Cleghorn 2015), and a literature review and field check at two locations in Lanikai and two locations near Kailua Beach (Harrington et al. 2018).

**Summary of Background Information**

Place names, moʻolelo, historic maps, and previous archaeological reports are among the sources that provide information on the pre- and post-contact use of Lanikai. Kailua once supported a sizeable population and has been associated with aliʻi in times past. The ocean and coast provided marine food sources, which were a main part of the traditional diet. Although Lanikai is relatively dry today, a stream was once located near the project area. This provided fresh water and may have been used to water crops. A heiau once stood at Alāla Point, and fishing lookouts were situated on Alāla and Waileʻa Points, on either end of Lanikai. Human burials are known to occur in sandy areas along the coast and elsewhere.

**Anticipated Findings and Research Questions**

Because of the modern use of the project area as a seawall and landscaped lawn, it is not likely that surface archaeological resources remain. Although no previous archaeological fieldwork has been done specifically within the project area, studies conducted nearby can help inform on the kinds of subsurface archaeological resources that may be found. Previous archaeological research nearby has identified human burials, a subsurface cultural layer, and a hearth. These might be expected within the project area as well. Human burials may or may not be defined by a burial pit. They may be whole burials or fragmentary in nature. Cultural layers are characterized by darkened sediment, often with charcoal fragments, midden, and/or artifacts within the layer. Cultural layers might also contain features such as hearths. These are often bowl-shaped in cross-section and may contain fire-cracked rock in addition to darkened sediment and charcoal.

Research questions will broadly address the identification of the above archaeological resources and may become more narrowly focused based on the kinds of resources that are found. Initial research questions are as follows:

1. Are there subsurface cultural deposits or evidence of human burials within the survey area? Where are they located and what time period do they belong to?
2. Are there any vestiges of historic-era use of the project area, particularly subsurface remnants of military use of the coastline?

Once these basic questions are answered, additional research questions may be developed in consultation with SHPD, tailored to the specific kinds of archaeological resources that occur in the project area.

## METHODS

Pedestrian survey and subsurface testing were conducted on August 4, 2020 by Windy McElroy, PhD and Kālenalani McElroy, MA. Windy McElroy served as Principal Investigator, overseeing all aspects of the project.

For the pedestrian survey, the ground surface was visually inspected for surface archaeological remains, with transects walked for the entire area. Archaeologists were spaced approximately 2 m apart. Of the 380 $m^2$ (4,000 $ft^2$) survey area, 100% was covered on foot. Vegetation was very light, consisting of landscaped grass with a few large coconut trees and naupaka bushes, and did not affect visibility.

Test trenches (TR) were excavated in three locations throughout the project area. The excavation strategy was approved by SHPD beforehand via email but modified slightly on the day of the survey because of the presence of shearwater (*Puffinus pacificus*) burrows along the makai edge of the property. The SHPD-approved testing strategy called for three 5 foot (1.5 m)-long trenches to be excavated along the seawall. The three trenches were placed in a slightly different configuration to avoid the shearwater nesting burrows. Excavation was accomplished with a mini-excavator (Figure 9). Vertical provenience was measured from the surface, and trenches were excavated to as deep as safely possible. Profiles were drawn and photographed, and soils were described using the USDA *Soil Survey Manual* (Soil Science Division Staff 2017), Munsell soil color charts (Munsell 2010), and a sediment texture flowchart (Thien 1979). Test unit locations were recorded with a 3 m-accurate Garmin GPSmap 62st, and all units were backfilled after excavation.

The scale in all field photographs is marked in 10 cm increments. The north arrow on all maps points to magnetic north. Throughout this report rock sizes follow the conventions outlined in *Field Book for Describing and Sampling Soils*: Gravel <7 cm; Cobble 7–25 cm; Stone 25–60 cm; Boulder >60 cm (Schoeneberger et al. 2002:2–35). No materials were collected and no laboratory analyses were conducted.

**Figure 9. Excavation of TR 2. Orientation is to the southeast.**

## RESULTS

Pedestrian survey and subsurface testing were conducted in the 380 $m^2$ (4,000 $ft^2$) project area. No archaeological resources were found on the surface. Excavation of three trenches did not yield any evidence of subsurface archaeological deposits or features. Stratigraphy consisted mostly of topsoil above a natural beach deposit.

### Pedestrian Survey

The surface survey included 100% of the 380 $m^2$ (4,000 $ft^2$) project area. No surface archaeological remains were observed within any part of the project area; any archaeological features that may have once been present are no longer there because of the extensive modern use of these lands. The entire project area consists of a landscaped yard.

### Subsurface Testing

The three test units were placed within the project area to determine the presence or absence of subsurface archaeological deposits or material (Figures 10 and 11 and Table 2). No archaeological resources were found in any of the test units, and stratigraphy consisted mostly of topsoil above a natural beach deposit. Details of the three excavations are as follows:

TR 1 was located near the existing seawall (see Figure 10). The trench measured 1.71 x 1.29 m and was excavated to 155 cm below surface (cmbs). Stratigraphy consisted of fill for the seawall with a natural beach deposit toward the west side of the trench (Figures 12 and 13, see Table 2). Modern debris was observed throughout the fill deposit, including concrete rubble and discarded shoes No archaeological deposits or materials were identified.

TR 2 was placed on the north side of the project area (see Figure 10). This trench was offset from the existing seawall to avoid shearwater burrows. The trench measured 1.82 x .71 m and was excavated to 161 cmbs. Stratigraphy consisted of a layer of topsoil above a natural beach deposit (Figures 14 and 15, see Table 2). A buried sprinkler line was observed in the topsoil at 12 cmbs. No archaeological deposits or material were identified.

TR 3 was excavated on the south side of the project area (see Figure 10). This trench was also offset from the existing seawall to avoid shearwater burrows. The trench measured 1.79 x .71 m and extended to 1.52 cmbs. Stratigraphy was consistent with that of TR 2, with a layer of topsoil above a natural beach deposit (Figures 16 and 17, see Table 2). No archaeological deposits or material were identified.

### Summary of Findings

Pedestrian survey of 380 $m^2$ (4,000 $ft^2$) of a beachfront property in Lanikai yielded no findings. The entire project area has been disturbed by modern use, such as landscaping for the lawn and installation of a sea wall for erosion control. Subsurface testing, consisting of three trenches, did not identify any subsurface cultural deposits or features. Stratigraphy consisted mostly of topsoil above a natural beach deposit, although one trench placed against the sea wall identified the fill deposit for the sea wall.


**Figure 10. Location of test units on aerial imagery.**

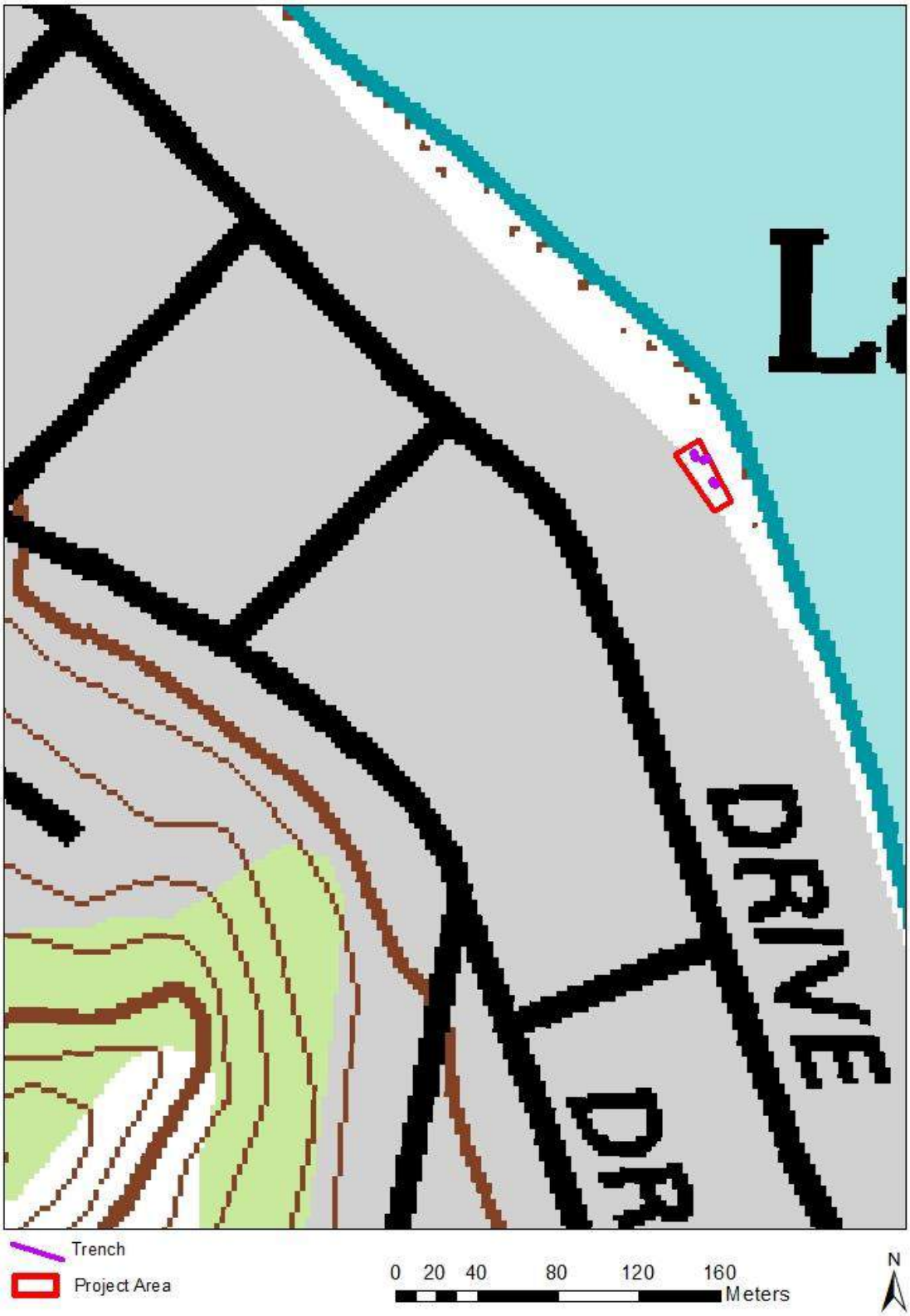



**Figure 11. Wider view of trench locations on a topographic map (USGS 1998).**

**Table 2. Soil Descriptions**

| Location | Layer | Depth (cmbs) | Color | Description | Interpretation |
|---|---|---|---|---|---|
| TR 1 | I | 0–150+ | 10YR 6/3 Pale Brown | Fine sand; 1% roots, 10% coral stones and cobbles; modern debris; broken, very abrupt boundary. | Fill for Existing Sea Wall |
| | II | 80–150+ | 10YR 8/4 Very Pale Brown | Fine sand; no roots; 1 coral cobbles; base of excavation. | Natural Beach Deposit |
| TR 2 | I | 0–26 | 10YR 5/3 Brown | Loamy sand; 80% roots, no rocks; sprinkler line; smooth, abrupt boundary. | Topsoil for Lawn |
| | II | 26–150+ | 10YR 8/3 Very Pale Brown | Fine sand; 7% roots, 1% coral cobbles; base of excavation. | Natural Beach Deposit |
| TR 3 | I | 0–24 | 10YR 5/3 Brown | Loamy sand; 80% roots, no rocks; sprinkler line; smooth, abrupt boundary. | Topsoil for Lawn |
| | II | 152+ | 10YR 8/3 Very Pale Brown | Fine sand; 3% roots, 1% coral cobbles; base of excavation. | Natural Beach Deposit |

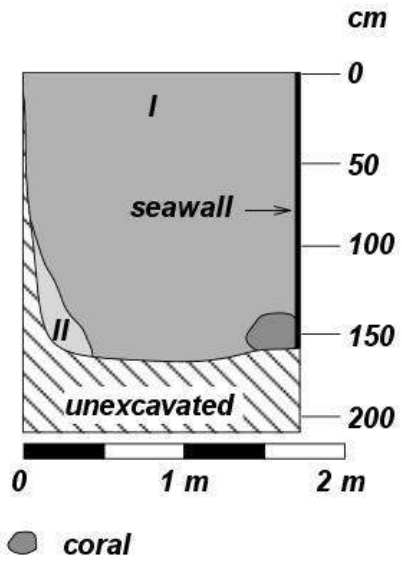



**Figure 12. TR 1 northwest face profile drawing.**

**Figure 13. TR 1 northwest face photo.**

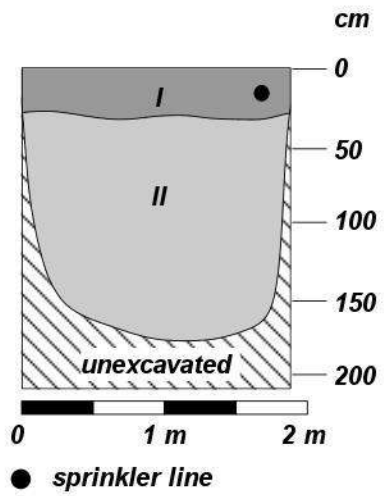



**Figure 14. TR 2 southwest face profile drawing.**

**Figure 15. TR 2 southwest face photo.**

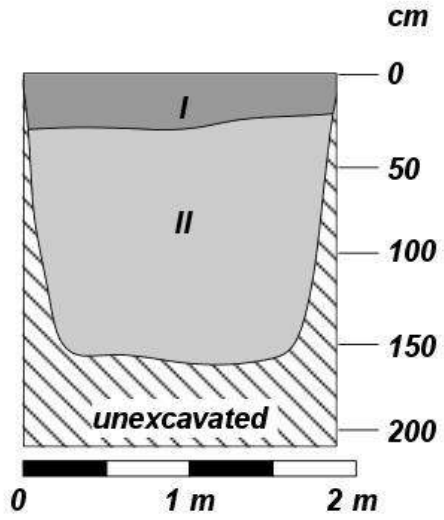



**Figure 16. TR 3 southwest face profile drawing.**

**Figure 17. TR 3 southwest face photo.**

## SUMMARY AND RECOMMENDATIONS

An archaeological inventory survey was conducted on the makai (east) side of TMK: (1) 4-3-005: 056 in Lanikai, Kailua Ahupuaʻa, Koʻolaupoko District, on the island of Oʻahu. Seawall repairs are proposed for the property to help curtail erosion. The archaeological work included pedestrian survey that covered 100% of the 380 $m^2$ (4,000 $ft^2$) project area, as well as test excavations consisting of three trenches.

No surface archaeological remains were found during pedestrian survey of the project area. The entire area has been disturbed by modern activity, particularly the landscaping of the lawn. Likewise, subsurface testing did not yield any evidence of subsurface archaeological features or deposits. Due to negative findings, the AIS results are presented as an archaeological assessment per HAR §13–275-5(b)(5)(A). No further work is recommended.

## GLOSSARY

| | |
|---|---|
| **ahupua‘a** | Traditional Hawaiian land division usually extending from the uplands to the sea. |
| **‘ai** | Food or food plant, especially vegetable food as distinguished from i‘a, meat or fleshy food. |
| **‘āina** | Land. |
| **akua** | God, goddess, spirit, ghost, devil, image. |
| **ali‘i** | Chief, chiefess, monarch. |
| **ali‘i nui** | High chief. |
| **boulder** | Rock 60 cm and greater**.** |
| **cobble** | Rock fragment ranging from 7 cm to 25 cm. |
| **‘e‘epa** | Extraordinary, incomprehensible, abnormal, peculiar. |
| **gravel** | Rock fragment less than 7 cm. |
| **hau** | The indigenous tree *Hibiscus tiliaceous*, which had many uses in traditional Hawai‘i. Sandals were fashioned from the bark and cordage was made from fibers. Wood was shaped into net floats, canoe booms, and various sports equipment and flowers were used medicinally. |
| **heiau** | Place of worship and ritual in traditional Hawai‘i. |
| **hoa‘āina** | Native tenants that worked the land. |
| **hukilau** | A net for fishing; to fish with a net. |
| **i‘a** | Fish or other marine animal. |
| **‘ili** | Traditional land division, usually a subdivision of an ahupua‘a. |
| **inoa** | Name, title, or namesake. |
| **‘iwa** | The frigate bird *Fregata minor palmerstoni*. |
| **Kahiki** | A far away land, sometimes refers to Tahiti. |
| **kahuna** | An expert in any profession, often referring to a priest, sorcerer, or magician. |
| **kama‘āina** | Native-born. |
| **kapa** | Tapa cloth. |
| **kapu** | Taboo, prohibited, forbidden. |
| **kia‘i** | Guard, caretaker; to watch or guard; to overlook, as a bluff. |
| **ko‘a** | Fishing shrine. |
| **kōnane** | A traditional Hawaiian game played with pebbles on a wooden or stone board. |
| **konohiki** | The overseer of an ahupua‘a ranked below a chief; land or fishing rights under control of the konohiki; such rights are sometimes called konohiki rights. |
| **kuleana** | Right, title, property, portion, responsibility, jurisdiction, authority, interest, claim, ownership. |
| **kupuna** | Grandparent, ancestor; kūpuna is the plural form. |

| | |
|---|---|
| **lepo** | Dirt, earth; dirty. |
| **Māhele** | The 1848 division of land. |
| **maka‘āinana** | Common people, or populace; translates to “people that attend the land.” |
| **makai** | Toward the sea. |
| **makani** | Wind, breeze. |
| **mele** | Song, chant, or poem. |
| **Menehune** | Small people of legend who worked at night to build structures such as fishponds, roads, and heiau. |
| **midden** | A heap or stratum of refuse normally found on the site of an ancient settlement. In Hawai‘i, the term generally refers to food remains, whether or not they appear as a heap or stratum. |
| **moku** | District, island. |
| **mo‘o** | Lizard, dragon, water spirit. |
| **mo‘olelo** | A story, myth, history, tradition, legend, or record. |
| **naupaka** | The native shrub *Scaevola* sp., varieties of which are found both in the uplands and by the sea. |
| **post-contact** | After A.D. 1778 and the first written records of the Hawaiian Islands made by Captain James Cook and his crew. |
| **pre-contact** | Prior to A.D. 1778 and the first written records of the Hawaiian Islands made by Captain James Cook and his crew. |
| **pu‘u** | Hill, mound, peak. |
| **stone** | Rock fragment ranging from 25 cm to 60 cm. |
| **ua** | Rain, rainy, to rain. |

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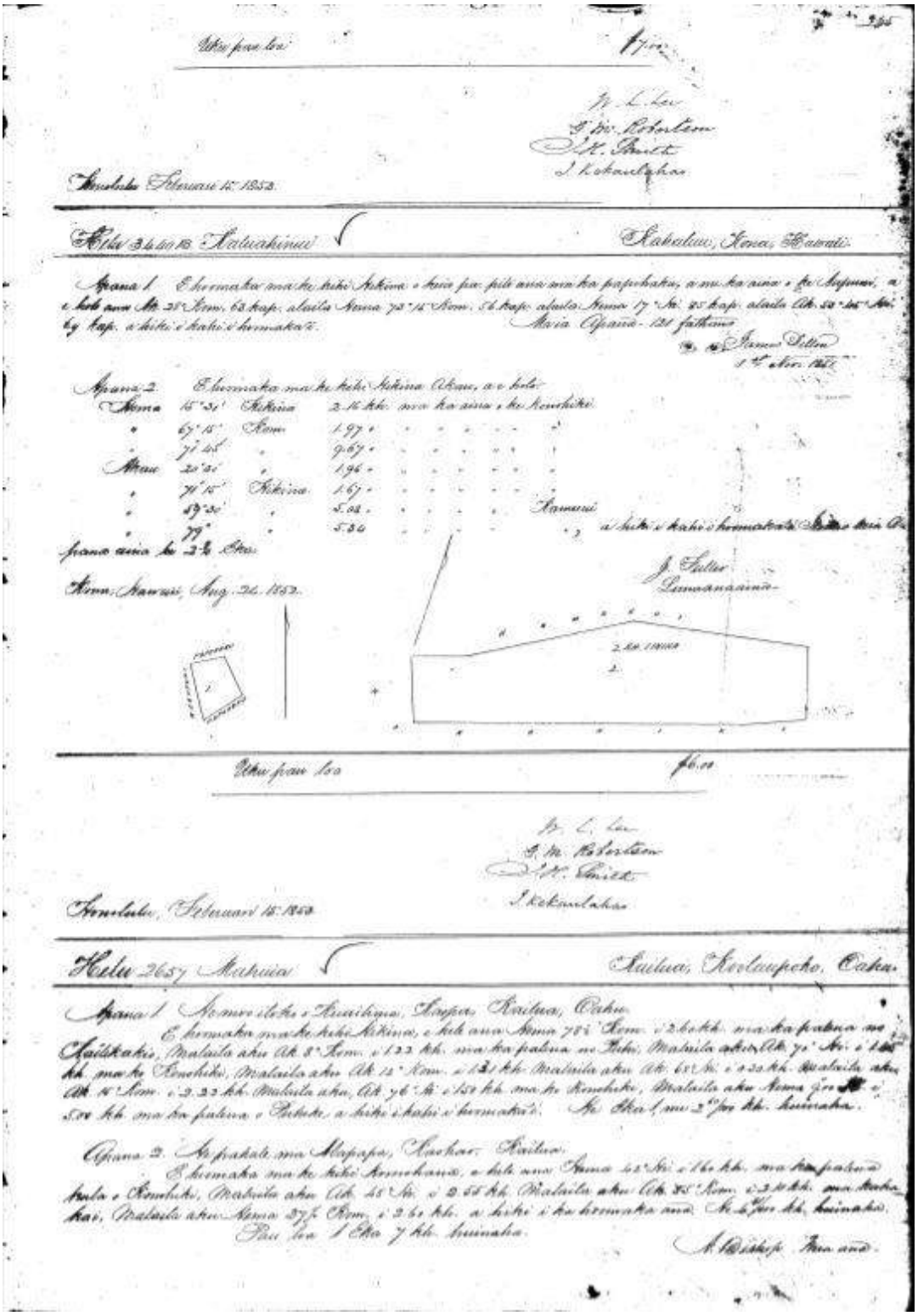
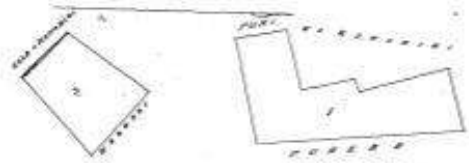
# APPENDIX A: LAND COMMISSION AWARDS

**Pages for LCA 2657 in the Māhele Book**



246



Ulu pau ka

P. L. Lee
G. M. Robertson
S. H. Smith
J. Kekaulahao

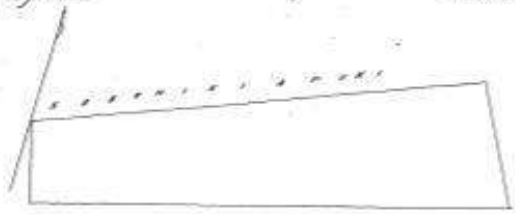
Honolulu February 23. 1852

Hila 5635 P. Maikiki — Kahalua, Kona, Hawaii.

E hormaka ma ka kihi Akau, a e holo
Kona 25° 45' Hikina 3.10 kh. ma ka aina o ke Konohiki.
" 74° 30' Kom. 11.60 " " " " " "
Akau 15° " 1.95 " " " " " "
" 65° 30' Hikina 11.10 " " " " " " a hiki i kahi i hormakai.
Moku o keia Apana Aina he 2 7/10 Eka.

J. Fuller
Luaanaaina

Kona, Hawaii Aug. 27. 1852



Ulu pau ka

P. L. Lee
G. M. Robertson
S. H. Smith
J. Kekaulahao

Honolulu February 23. 1852.

Hila 5635 E. Keanae — Kahalua, Kona, Hawaii

E hormaka ma ka kihi Komohana Kona, a e holo
Akau 58° Kom. 1.27 kh. ma ka aina o ke Konohiki.
" 67° 30' Hik. 7.17 " " " " " Naauhau.
" 65° 15' " 2.72 " " " " " "
" 81° " 8.26 " " " " " "
" 65° " 7.95 " " " " " "
Kona 21° " 1.45 " " " " " Konohiki
" 67° Kom. 8.00 " " " " " "
" 66° 20' " 2.95 " " " " " "
" 77° 15' " 2.90 " " " " " "
" 67° 30' " 6.50 " " " " " " a hiki i kahi i hormaka i Moku
o keia Apana Aina he 2 1/2 Eka.

J. Fuller
Luaanaaina

Kona, Hawaii, August 23. 1852

Appendix J

# Keala Pono Archaeological Consulting, LLC
# Consultation with Kumu Māpuana de Silva for Proposed Seawall Repairs at TMK: (1) 4-3-005:056
# March 21, 2021

# Consultation with Kumu Māpuana de Silva for Proposed Seawall Repairs at TMK: (1) 4-3-005:056

**Keala Pono Archaeological Consulting**

**March 21, 2021**

Keala Pono Archaeological Consulting conducted community consultation for proposed seawall repairs in Lanikai, Kailua Ahupuaʻa, Koʻolaupoko District, Oʻahu. Construction will take place on the makai (east) side of TMK: (1) 4-3-005:056 located at 1226a Mokulua Drive, where an existing seawall is in need of repair. Keala Pono initially contacted Mr. Alani Apio of Kamau, LLC to ask if he could share his thoughts. Mr. Apio recommended that Keala Pono speak with Nā Kumu Māpuana and Kīhei de Silva. Keala Pono then contacted Kumu Māpuana, who shared her thoughts regarding the proposed project.

Kumu Māpuana explained that the shoreline expands and narrows throughout the year as part of a natural process. The Native Hawaiian community gathers marine resources in harmony with this natural movement of the sea. However, seawalls are a foreign, unnatural attempt at controlling the shore's movement, and as a result, they destroy this natural process. Ideally, it would be best if the houses were not built so close to the sea. To help restore the natural shoreline, Kumu Māpuana recommends that this seawall should be dismantled.

Kumu Māpuana's interview is provided in full below, with her answers printed in blue. The interview was conducted by email, and Kumu Māpuana's responses to the questions are presented unedited. Note that the traditional name Kaʻōhao is used for what is now commonly referred to as Lanikai.

1) To start please tell us about yourself…Name? Where/When you were born? Where you grew up? Where you went to school?
Māpuana de Silva. 1949 in Honolulu at Queen's Hospital. Moved to Kaʻōhao, Kailua when I was 2. I do not remember living anywhere else so I consider myself born and raised in Kaʻōhao, where I still live with my daughter and her family including my moʻopuna. Schooling: Pre-school at Lanikai Private School (my Mom's pre-school at our home with about 20 students), Kailua Elementary School (K-6), Kamehameha Schools (7-10), Pūnāhou School (11-12), Pacific University in Forest Grove, Oregon (4 years, graduated in 1971 with a BS in Physical Education & Health), training under Maiki Aiu Lake 1972-75 (graduated in traditional ʻūniki ʻai lolo ceremony as a kumu hula in August of 1975).

2) Could you tell us about your ʻohana/family background?
I grew up with my maternal grandmother who lived with us for part of each year until she passed away in 1960 when I was 11. She was one of the most important influences in my life when I was young because when she stayed with us she slept in my room with me. Hawaiian was her first language, she never hesitated to speak to us in Hawaiian, and I listened to her read her Hawaiian Bible every night before she went to sleep. She was ¾ Hawaiian, my paternal grandmother was 100% Hawaiian raised in Hāna and Nahiku on Maui and spoke only Hawaiian. I was raised by our Hawaiian community in Kailua, and especially here in Kaʻōhao, surrounded and very much influenced by Auntys, Uncles, and cousins in everyday life – fishing, at the beach and in the water,

with music, food, and dance, with lei making, weaving, cooking, and more – immersed in being a Hawaiian kid in Hawaiʻi.

3) What is your association to the subject property (family land, work place, etc.)?
I live two blocks away from this property. As kids, the beach was our playground, from ʻAlāla to Wailea, we could walk, play, and swim from one lae (point) to the other.

4) What are the ways you have acquired special knowledge of this area (from your ʻohana, personal research, specific sources)?
From living and growing up here in a Hawaiian community when it was occupied by Hawaiian families, before they all sold and moved away. From personal and family research, Hawaiian language newspapers, and conversations with elders in the community through the years.

5) Could you share your manaʻo relevant to the Property area and the surrounding region (personal anecdotes, moʻolelo, mele, oli, place names, etc.)?
It should be enough for you to know that my family, the students in my hālau, and I know the moʻolelo, mele, oli, and many of the older, and perhaps original, place names for our ʻāina. It is for us to decide when and where to tell our own stories. We do not always share just because someone asks. Mahalo for understanding.

6) As far as you remember and your experiences, how has the area changed? Could you share how it was when you were young and how it's different now?
As I mentioned before, when I was growing up here in Kaʻōhao there were no sea walls. That phrase, sea walls, did not exist. There were no sandbags. There were right of ways and there were sandy beaches. The sand at different parts of the Kaʻōhao coastline would come and go with the tide from time to time, but we all knew and expected that to happen. And then settlers and inverstors started to buy the beautiful beachfront properties, and they had the money to put up sea walls when it was time for "their" part of the beach to go. We all know that if they just let the tides be, that "their" sand would return, but once they put up sea walls that part of the coastline and those of the adjacent properties would never be the same. They should have moved their houses further ma uka instead of taking away our beaches.

7) Do you know of any traditional sites or historically significant buildings which are or were located on the Property site--for example: cultural sites, archaeological sites, historic structures and/or burials? Please elaborate.
Any historical sites or significant structures that may have existed on any property in Kaʻōhao were destroyed long ago in 1927 when Mr. Fraser purchased and sold for profit the lots in Kaʻōhao. However, we (our family) know from our work with iwi kupuna that there are many burials here in Kaʻōhao – some have been disturbed already, but there are many others hoping that no one will

disturb them. We recently (in the last 6 months) disintered iwi from 5 separate kupuna, two of which were in situ, at a site across the street from this property.

8) Do you think the proposed development would affect any place of cultural significance or access to a place of cultural significance? Please elaborate.
The sea wall, whether it is being newly constructed or rebuilt, will definitely 100% affect our access to our beaches, which in turn restricts access to our fishing and gathering grounds, our beaches, and our oceans.

9) Are you aware of any traditional gathering practices at the Property area and/or within the surrounding areas both past and ongoing?
The ocean is part of our food basket. The sea wall will definitely have an affect on the ocean and in turn have an affect on us gathering our food from the ocean.

10) While development of the area continues, what could be done to lessen the adverse effects on any current cultural practices in the area?
Move the houses ma uka, away from the threat of destruction by the natural ebb and flow of the ocean and the waves that wash ashore, which will also allow the sand and the coastline to come and go naturally as it should.

11) Are you aware of any other cultural concerns the community might have related to cultural practices within or in the vicinity of the Property site and its surrounding areas?
Access to the ocean is critical to my daily cultural practices. A huge concern is that one sea wall will lead to the next sea wall, and the next sea wall, and the next sea wall, and gates, and locks, and denied access to our necessities as Native Hawaiians, in our daily lives and in all things we do to just be Hawaiian today and to keep from being smothered and erased by the settlers who have the money to purchase beach front property in Ka‘ōhao.

March 21, 2021
Kumu Hula Māpuana de Silva
1110 ‘A‘alapapa Drive
Ka‘ōhao, Kailua, Ko‘olaupoko, O‘ahu, Hawai‘i

Appendix K

# Early Consultation

# OFFICE OF PLANNING
# STATE OF HAWAII

DAVID Y. IGE
GOVERNOR

MARY ALICE EVANS
DIRECTOR
OFFICE OF PLANNING

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/


DTS 202006291151LI

July 9, 2020

Mr. Jeff Overton, Principal
Group 70 International, Inc.
111 S. King Street, Suite 170
Honolulu, Hawaii 96813

Dear Mr. Overton:

Subject: Early Consultation for Chapter 343, Hawaii Revised Statutes, Draft Environmental Assessment, Repair of Existing Shore Protection for 1226a Mokulua Drive, Kailua, Oahu, Hawaii; Tax Map Key: (1) 4-3-005: 056

The Office of Planning (OP) is in receipt of your Draft Environmental Assessment (Draft EA) early consultation request, received June 16, 2020, for the proposed repair of existing shore protection project located at 1226a Mokulua Drive, Kailua, Oahu.

According to the early consultation request, the proposed project is for "repair" of existing shore protection system, which is comprised of a seawall and revetment. The purpose of preparation of the subject EA is to support a shoreline setback variance for the proposed project.

At this time, the subject request did not provide sufficient information on the proposed project for review and comments. The OP looks forward to receiving the Draft EA when it is available for review.

If you have any questions regarding this letter, please contact Shichao Li of our office at (808) 587-2841.

Sincerely,

Mary Alice Evans

Mary Alice Evans
Director

**DEPARTMENT OF DESIGN AND CONSTRUCTION**
**CITY AND COUNTY OF HONOLULU**
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 768-4567
Web site: www.honolulu.gov

KIRK CALDWELL
MAYOR

MARK YONAMINE, P.E.
DIRECTOR

HAKU MILLES, P.E.
DEPUTY DIRECTOR

August 20, 2020

RECEIVED
AUG 3 1 2020
G70

G70
ATTN: Jeff Overton
111 S. King Street, Suite 170
Honolulu, HI 96813

Dear Mr. Overton,

Subject: Early Consultation for Chapter 343, Hawaii Revised Statutes (HRS)
Draft Environmental Assessment
Repair of Existing Shore Protection for 1226a Mokulua Drive
TMK: (1) 4-3-005:056

Thank you for the opportunity to review and comment. The Department of Design and Construction does not have any comments at this time.

Should you have any further questions, please contact me at 768-8480.

Sincerely,

Mark Yonamine, P.E
Director

MY:ms (815881)

DAVID Y. IGE
GOVERNOR OF
HAWAI'I

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

JEFFREY T. PEARSON, P.E.
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

**STATE OF HAWAI'I**
**DEPARTMENT OF LAND AND NATURAL RESOURCES**

OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAI'I 96809

REF:OCCL:SS

Correspondence: OA 20-179

JUL - 2 2020

G70 International
c/o Jeff Overton, Principal
111 S. King Street, Suite 170
Honolulu, HI 96813

**SUBJECT:** Environmental Assessment Pre-Consultation Regarding Shoreline Protection for 1226a Mokulua Drive, Lanikai, Kailua, Oahu; Tax Map Key (1) 4-3-005:056

Dear Mr. Overton:

Thank you for contacting the Department of Land and Natural Resources, Office of Conservation and Coastal Lands (OCCL) regarding the Environmental Assessment (EA) that is being prepared for the owners of the subject property. Your letter states that the owners are pursuing approval to repair their existing shoreline protection system that is comprised of a seawall and revetment. It was noted in the letter that the existing shore protection is covered by a non-exclusive easement.

The OCCL appreciates your notification of the proposed construction and will wait until the Draft Environmental Assessment (DEA) is received before making any comments, determinations, or decisions.

If you have further questions, please feel free to contact Salvatore Saluga in the Office of Conservation and Coastal Lands at 587-0399 or Salvatore.J.Saluga@hawaii.gov.

Sincerely,

Sam Lemmo

SAMUEL J. LEMMO, ADMINISTRATOR
OFFICE OF CONSERVATION AND COASTAL LANDS

DEPARTMENT OF PLANNING AND PERMITTING
**CITY AND COUNTY OF HONOLULU**
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov

KIRK CALDWELL
MAYOR

KATHY K. SOKUGAWA
ACTING DIRECTOR

TIMOTHY F. T. HIU
DEPUTY DIRECTOR

EUGENE H. TAKAHASHI
DEPUTY DIRECTOR

July 31, 2020

2020/ELOG-1103(ST)

RECEIVED
AUG 04 2020
G70

Mr. Jeff Overton, AICP
G70
111 South King Street, Suite 170
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

SUBJECT: Pre-Assessment Consultation
Draft Environmental Assessment (EA)
1226 Mokulua Drive - Lanikai
Tax Map Key 4-3-005: 056

This is in response to your letter, received June 10, 2020, requesting input regarding the preparation of a Draft EA for proposed repairs to existing seawall and revetment, at the above-referenced property.

We note that our records indicate that there were two previous inquires in 1999 regarding the potential consolidation of then accreted lands makai of this parcel, and on the status of possible buried walls built on the property prior to World War II (File Nos. 1999/CLOG-3593 and 4318). This correspondence should be retrieved from our Data Access and Imaging Branch (DAIB) to provide a regulatory context to the current shoreline situation and a discussion should be included in the Draft EA. We also note that our records indicate that there was action on this subject property, along with adjoining Parcels 57, 76 and 88 (File No. 68/VLOG-115), which relates to the requirements of the original 10-foot setback from the "zone of wave action", set forth in Ordinance Nos. 2837 and 2892 (1966). Because this record has not been scanned into the computer system, it will need to be retrieve from the microfiche records also found in DAIB. You may contact Ms. Jocelyn Godoy of DAIB, at (808) 768-8276 for assistance.

Furthermore, the site may be subject to flooding and increased risk of impact due to sea level rise (SLR). The Draft EA must disclose the impacts of the SLR to the property.

We will provide substantive comments when a complete Draft EA is submitted for our review. Should you have any questions, please contact Steve Tagawa, of our Land Use Approval Branch, at 768-8024.

Very truly yours,

FOR Kathy K. Sokugawa
Acting Director

## Noelle Besa Wright

**From:** 220017-01 1226 mokulua drive
**Sent:** Monday, June 15, 2020 2:42 PM
**To:** 'billhicksknb@gmail.com'
**Cc:** Jeff Overton
**Subject:** RE: Input on repairs

Aloha Chair Hicks,

Thank you for confirming receipt of the letter and for your input regarding the project. We understand the board has no objection to the repairs.

We will continue to keep you and the Kailua NB updated as the draft EA progresses.

Mahalo,

**Noelle Besa Wright**
Planner

t 808.523.5866
e noellew@g70.design

---

**From:** billhicksknb@gmail.com <billhicksknb@gmail.com>
**Sent:** Saturday, June 13, 2020 11:26 AM
**To:** 220017-01 1226 mokulua drive <1226mokulua@g70.design>
**Subject:** Input on repairs

Aloha Jeff…
I am in receipt of your letter dated June 9, 2020 and understand you are conducting a draft EA. We have no objection to the necessary repair of the required existing shoreline protection system. We look forward to future updates.
Aloha,
Bill Hicks
Chairman, Kailua Neighborhood Board

Appendix L

# Draft EA Comment Period Documentation

Appendix L-1

# Draft EA Comment Letters

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai‘i 96850


In Reply Refer To:
01EPIF00-2021-TA-0175

February 10, 2021

Mr. Jeff Overton
111 South King St
Suite 170
Honolulu, Hawai‘i 96813

Subject: Response to your Request for Technical Assistance for DEA Kreuger Seawall Modification Repair, Kailua, O‘ahu

Dear Mr. Overton,

Thank you for your recent correspondence requesting technical assistance on species biology, habitat, or life requisite requirements. The Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (Service) appreciates your efforts to avoid or minimize effects to protected species associated with your proposed actions. We provide the following information for your consideration under the authorities of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 *et seq*.), as amended.

Due to significant workload constraints, PIFWO is currently unable to specifically address your information request. The table below lists the protected species most likely to be encountered by projects implemented within the Hawaiian Islands. Based on your project location and description, we have noted the species most likely to occur within the vicinity of the project area, in the ‘**Occurs In or Near Project Area’** column. Please note this list is not comprehensive and should only be used for general guidance. We have added to the PIFWO website, located at https://www.fws.gov/pacificislands/promo.cfm?id=177175840 recommended conservation measures intended to avoid or minimize adverse effects to these federally protected species and best management practices to minimize and avoid sedimentation and erosion impacts to water quality.

If you are representing a federal action agency, please use the official species list on our web-site for your section 7 consultation. You can find out if your project occurs in or near designated critical habitat here: https://ecos.fws.gov/ipac/.

Under section 7 of the ESA, it is the Federal agency's (or their non-Federal designee) responsibility to make the determination of whether or not the proposed project "may affect" federally listed species or designated critical habitat. A "may affect, not likely to adversely affect" determination is appropriate when effects to federally listed species are expected to be discountable (*i.e.*, unlikely to occur), insignificant (minimal in size), or completely beneficial. This conclusion requires written concurrence from the Service. If a "may affect, likely to adversely affect" determination is made, then the Federal agency must initiate formal consultation with the Service. Projects that are determined to have "no effect" on federally listed species and/or critical habitat do not require additional coordination or consultation.

Implementing the avoidance, minimization, or conservation measures for the species that may occur in your project area will normally enable you to make a "may affect, not likely to adversely affect" determination for your project. If it is determined that the proposed project may affect federally listed species, we recommend you contact our office early in the planning process so that we may assist you with the ESA compliance. If the proposed project is funded, authorized, or permitted by a Federal agency, then that agency should consult with us pursuant to section 7(a)(2) of the ESA. If no Federal agency is involved with the proposed project, the applicant should apply for an incidental take permit under section 10(a)(1)(B) of the ESA. A section 10 permit application must include a habitat conservation plan that identifies the effects of the action on listed species and their habitats, and defines measures to minimize and mitigate those adverse effects.

We appreciate your efforts to conserve endangered species. We regret that we cannot provide you with more specific protected species information for your project site. If you have questions that are not answered by the information on our website, you can contact PIFWO at (808) 792-9400 and ask to speak to the lead biologist for the island where your project is located.

Sincerely,

Aaron Nadig

Digitally signed by Aaron Nadig
Date: 2021.02.10 09:35:14 -10'00'

Island Team Manager
Pacific islands Fish and Wildlife Office

The table below lists the protected species most likely to be encountered by projects implemented within the Hawaiian Islands. For your guidance, we‘ve marked species that may occur in the vicinity of your project, this list is not comprehensive and should only be used for general guidance.

| **Scientific Name** | **Common Name / Hawaiian Name** | **Federal Status** | **May Occur In Project Area** |
|---|---|---|---|
| **Mammals** | | | |
| *Lasiurus cinereus semotus* | Hawaiian hoary bat/‘ōpe‘ape‘a | E | ☒ |
| **Reptiles** | | | |
| *Chelonia mydas* | Green sea turtle/honu - Central North Pacific DPS | T | ☒ |
| *Erectmochelys imbricata* | Hawksbill sea turtle/honu ‘ea | E | ☐ |
| **Birds** | | | |
| *Anas wyvilliana* | Hawaiian duck/koloa | E | ☐ |
| *Branta sandvicensis* | Hawaiian goose/nēnē | T | ☐ |
| *Fulica alai* | Hawaiian coot/‘alae keo keo | E | ☐ |
| *Gallinula galeata sandvicensis* | Hawaiian gallinule/‘alae ‘ula | E | ☐ |
| *Himantopus mexicanus knudseni* | Hawaiian stilt/ae‘o | E | ☐ |
| *Oceanodroma castro* | Band-rumped storm-petrel/‘akē‘akē | E | ☐ |
| *Pterodroma sandwichensis* | Hawaiian petrel/‘ua‘u | E | ☐ |
| *Puffinus auricularis newelli* | Newell’s shearwater/‘a‘o | T | ☐ |
| *Ardenna pacificus* | Wedge-tailed Shearwater/‘ua‘u kani | MBTA | ☒ |
| *Gygis alba* | White Tern/manu-o-kū | MBTA | ☐ |
| *Buteo solitarius* | Hawaiian hawk/‘io | MBTA | ☐ |
| **Insects** | | | |
| *Manduca blackburni* | Blackburn’s sphinx moth | E | ☐ |
| *Megalagrion pacificum* | Pacific Hawaiian Damselfly | E | ☐ |
| *M. xanthomelas* | Orangeblack Hawaiian Damselfly | E | ☐ |
| *M. nigrohamatum nigrolineatum* | Blackline Hawaiian Damselfly | E | ☐ |

| **Plants** | | | | |
|---|---|---|---|---|
| **Scientific Name** | **Common Name or Hawaiian Name** | **Federal Status** | **Locations** | **May Occur In Project Area** |
| *Abutilon menziesii* | Ko‘oloa‘ula | E | O, L, M, H | ☐ |
| *Achyranthes splendens* var. *rotundata* | ‘Ewa hinahina | E | O | ☐ |
| *Bonamia menziesii* | No common name | E | K, O, L, M, H | ☐ |
| *Canavalia pubescens* | ‘Āwikiwiki | E | Ni, K, L, M | ☐ |
| *Colubrina oppositifolia* | Kauila | E | O, M, H | ☐ |
| *Cyperus trachysanthos* | Pu‘uka‘a | E | K, O | ☐ |
| *Gouania hillebrandii* | No common name | E | Mo, M | ☐ |
| *Hibiscus brackenridgei* | Ma‘o hau hele | E | O, Mo, L, M, H | ☐ |
| *Ischaemum byrone* | Hilo ischaemum | E | K, O, Mo, M, H | ☐ |
| *Isodendrion pyrifolium* | Wahine noho kula | E | O, H | ☐ |
| *Marsilea villosa* | ‘Ihi‘ihi | E | Ni, O, Mo | ☐ |
| *Mezoneuron kavaiense* | Uhiuhi | E | O, H | ☐ |
| *Nothocestrum breviflorum* | ‘Aiea | E | H | ☐ |
| *Panicum fauriei* var. *carteri* | Carter’s panicgrass | E | Molokini Islet (O), Mo | ☐ |
| *Panicum niihauense* | Lau‘ehu | E | K | ☐ |
| *Peucedanum sandwicense* | Makou | E | K, O, Mo, M | ☐ |
| *Pleomele (Chrysodracon) hawaiiensis* | Halapepe | E | H | ☐ |
| *Portulaca sclerocarpa* | ‘Ihi | E | L, H | ☐ |
| *Portulaca villosa* | ‘Ihi | E | Le, Ka, Ni, O, Mo, M, L, H, Nihoa | ☐ |
| *Pritchardia affinis (maideniana)* | Loulu | E | H | ☐ |
| *Pseudognaphalium sandwicensium* var. *molokaiense* | ‘Ena‘ena | E | Mo, M | ☐ |
| *Scaevola coriacea* | Dwarf naupaka | E | Mo, M | ☐ |
| *Schenkia* (*Centaurium*) *sebaeoides* | ‘Āwiwi | E | K, O, Mo, L, M | ☐ |
| *Sesbania tomentosa* | ‘Ōhai | E | Ni, Ka, K, O, Mo, M, L, H, Necker, Nihoa | ☐ |
| *Tetramolopium rockii* | No common name | T | Mo | ☐ |
| *Vigna o-wahuensis* | No common name | E | Mo, M, L, H, Ka | ☐ |

Location key: O=O‘ahu, K=Kaua‘i, M=Maui, H=Hawai‘i Island, L=Lāna‘i, Mo=Moloka‘i, Ka=Kaho‘olawe, Ni=Ni‘ihau, Le=Lehua

# OFFICE OF PLANNING
# STATE OF HAWAII

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

**DAVID Y. IGE**
GOVERNOR

**MARY ALICE EVANS**
DIRECTOR
**OFFICE OF PLANNING**

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/


DTS 202102170909LI

February 19, 2021

Mr. Dean Uchida, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Attention: Mr. Steve Tagawa

Dear Mr. Uchida:

Subject: Chapter 343, Hawaii Revised Statutes, Draft Environmental Assessment to Allow the Modification and Repair of a Nonconforming Concrete Seawall within the 40-foot Shoreline Setback, 1226A Mokulua Drive, Lanikai, Oahu, Hawaii; Tax Map Key: (1) 4-3-005: 056

Thank you for the opportunity to provide comments on the subject Draft Environmental Assessment (Draft EA), transmitted via letter, received February 3, 2021.

According to the Draft EA, the applicant proposes to modify the existing nonconforming concrete seawall located at the makai boundary of the 1836-square-foot shoreline parcel at 1226A Mokulua Drive in Lanikai. The existing seawall in front of the subject parcel is approximately 90 feet long and 6 to 8 feet tall. The project site is located along a predominantly armored shoreline characterized by a mix of seawalls, rock aprons, and revetments that extends approximately 4,000 linear feet from Wailea Point to the central portion of Lanikai Beach.

The purpose of the proposed project is to maintain the easement area and the improvements thereon in a safe condition pursuant to the non-exclusive easement S-6043.

The proposed project will conduct the following modifications to the existing seawall:

- Insertion of sheet piles in back (mauka) of the dilapidated seawall that extends along the 105-foot boundary of the site;
- The sheet piles will be driven into the hard substrate 9 feet below the existing seawall;
- The sheet piles will be capped with a concrete cap secured to the seawall with dowels; and

- The sheet pile cap will then be secured by 25-foot long steel tie rods spaced at 10-foot intervals anchored to the concrete deadman built further mauka and below the existing grade.

Implementing the sheet pile stabilization system will require excavation in the yard area, landward of the seawall. Construction will be accomplished from the upland areas with minimal disturbance to site topography.

The construction cost is anticipated to exceed $500,000, and work will be completed over a course of 90 to 120 days.

This EA is prepared in accordance with Hawaii Revised Statutes (HRS) Chapter 343 and Hawaii Administrative Rules (HAR) Chapter 11-200.1 given that the proposed project is located within the shoreline area as defined in HRS § 205A-41.

The Office of Planning (OP) has reviewed the subject Draft EA and has the following comments to offer:

1. The Draft EA, page 3-4, acknowledged that the long-term dynamics of Lanikai Beach's sands have changed with the gradual armoring of the shoreline. In addition, page 4-2, the seawall has been protecting the project site and the adjacent properties from erosion and wave overtopping for nearly half a century. For informational purposes, the Final EA may assess the long-term impacts of 3.2 feet sea level rise on the subject region and seawalls, and discuss a long-term plan to enhance the existing seawalls with justifications for the actions, or consider a long-term alternative in the region, such as retreat or relocation of the shorefront properties to restore dunes and the beach along the shoreline, with social and economic cost analysis.

2. The staging area for the proposed project shall be located outside of the shoreline area as defined in HRS § 205A-41. OP suggests that the Final EA discuss site-specific mitigation measures with a water quality monitoring plan if possible to prevent any runoff, sediment, soil and debris potentially resulting from the proposed construction, including excavation, grading and staging, from adversely impacting the marine water.

3. According to the Draft EA, page 3-21, Wedge-tailed Shearwaters usually fledge after approximately 100 to 115 days of egg laying, and fledging at the site may occur sometime between late October through the end of November. OP suggests that the Final EA discuss an appropriate schedule for the proposed project to avoid potential impacts on seabirds nesting and fledging.

4. Page 1-4, states that it is anticipated that Department of the Army permit authorization pursuant to the Clean Water Act, Section 404 or Rivers and Harbors Act of 1899, Section 10 is not required. If a U.S. Army Corps of Engineers permit is required, the applicant shall consult with OP on the policies and procedures that govern Coastal Zone Management (CZM) Act federal consistency reviews.

5. The Final EA should provide the determination of the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), regarding the project review under HRS § 6E-42. Should any archaeological or cultural resources, or burials be discovered during ground excavation, all construction shall be ceased immediately. Subsequent work shall proceed only upon an archaeological clearance from the SHPD.

6. OP concurs that the forthcoming City regulatory review of the proposed action will be made in the context of Act 16, Session Laws of Hawaii 2020. Prior to adoption of amendments to county SMA and shoreline setback rules or ordinances, the provisions of HRS Chapter 205A, as amended, shall prevail.

If you have any questions regarding this comment letter, please contact Shichao Li of our CZM Program at (808) 587-2841.

Sincerely,

Mary Alice Evans

Mary Alice Evans
Director

c: Mr. Jeff Overton, G70

DAVID Y. IGE
GOVERNOR

CURT T. OTAGURO
COMPTROLLER

AUDREY HIDANO
DEPUTY COMPTROLLER

**STATE OF HAWAII**
**DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES**
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P) 21.015

FEB 10 2021

RECEIVED
FEB 16 2021
G70

Jeff Overton, AICP, LEED AP
G70
111 South King Street, Suite 170
Honolulu, Hawaii 96813

Dear Mr. Overton:

Subject: Draft Environmental Assessment (DEA)
Chapter 343, Hawaii Revised Statutes (HRS)

| | |
|---|---|
| Project: | Krueger Residence Seawall Modification and Repair |
| Applicant: | David and Terri Krueger |
| Agent: | G70 (Jeff Overton) |
| Location: | 1226A Mokulua Drive - Lanikai |
| Tax Map Key: | 4-3-005:056 |
| Request: | Shoreline Setback Variance (SSV) and Special Management Area (SMA) Use Permit |
| Proposal: | To allow the modification and repair of a nonconforming concrete seawall within the 40-foot shoreline setback |

Thank you for the opportunity to provide comments on the Draft Environmental Assessment for the subject project. The subject project does not impact any of the Department of Accounting and General Services managed facilities or properties, and we have no comments to offer at this time.

If you have any questions, your staff may call Mr. Dennis Chen of the Planning Branch at 586-0491.

Sincerely,

CHRISTINE L. KINIMAKA
Public Works Administrator

DE:mo

**From:** 220017-01 1226 mokulua drive
**Sent:** Friday, February 26, 2021 8:23 AM
**To:** Kira Ramos
**Subject:** RE: OHA Comment Re: DEA for Krueger Residence Seawall

---

**From:** Kamakana Ferreira <kamakanaf@oha.org>
**Sent:** Monday, February 22, 2021 10:39 AM
**To:** stagawa@honolulu.gov
**Cc:** Jeff Overton <jeff@g70.design>
**Subject:** OHA Comment Re: DEA for Krueger Residence Seawall

Aloha Mr. Tagawa,

The Office of Hawaiian Affairs (OHA) is in receipt of your letter dated January 15, 2021, notifying us of the release of a draft environmental assessment (DEA) for the Krueger Residence Seawall Modification and Repair project in Lanikai, O'ahu, TMK (1) 4-3-005:056. Group 70 has prepared this DEA on behalf of the applicant, David and Terri Krueger, pursuant to Hawai'i Revised Statutes (HRS) Chapter 343. The applicant proposes to modify an existing non-conforming seawall by driving 9 feet long sheet piles into the ground behind the existing seawall and capping it with concrete secured via 25 feet long steel tie-rods. OHA provides the following comments regarding archaeological and cultural resources.

**Archaeological Resources**

The DEA indicates an archaeological inventory survey (AIS) was completed in August 2020, but presented as an archaeological assessment (AA) since no historic properties were found. The project area is described as mostly previously disturbed from modern activity and landscaped. The AA does mention though that human burials were found in other more mauka parcels with Jaucus sand. The current project area is comprised of beach sand.

Given that burials have been found in nearby lots with Jaucus sand and that it is not totally uncommon to also find burials in beach sand, OHA requests that archaeological monitoring be considered for the project during the HRS 6E review process. The DEA indicates that the AA is still under review by the State Historic Preservation (SHPD). OHA further kindly requests to be provided copies on any SHPD comment letters.

**Cultural Resources**

In review of the DEA portion on cultural resources, it does not appear an adequate level of analysis has been conducted. The DEA only describes an overview of existing historical documents, but does acknowledge that traditional fishing and throw nets may be occurring in the surrounding area. It is believed that these practices will not be impacted and that no cultural practices are occurring on the project site. OHA notes, however, that there is no mention of any kind cultural outreach or interview process.

Guidelines for assessing cultural impacts are provided by the Office of Environmental Quality Control (OEQC) in the *Guide to Implementation and Practice of the Hawaii Environmental Policy Act*, Exhibit 1-1,

2012 Edition. The process should involve an attempt to consult with community folks and cultural practitioners to ascertain ethnographic information on cultural resources and practices that occur on the site or in the broader area. As the DEA fails to mention any type of outreach specific to cultural related consultation, it is unclear if the project will effect cultural practices occurring nearby. We thus encourage the applicant to complete a cultural analysis or cultural impact assessment (CIA) that is compliant with these guidelines and minimally reach out to any recognized descendants from the area.

OHA would further like to remind the applicant that the lack of any formal methodology or explanation specifically targeted at traditional and customary practices could prevent the approving agency from assessing the identity and scope of valued cultural and natural resources in the area. Articles IX and XII of the State of Hawaiʻi Constitution requires that government agencies must "promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups." Article XII Section 7 of the State of Hawaiʻi Constitution states:

> "the State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupuaʻa tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778…"

In *Ka Paʻakai O Ka ʻAina v. Land Use Commission*, 94 Haw. 31 (2000), hereinafter Ka Paʻakai, the Hawaiʻi Supreme Court, reiterated the importance of Section 7 and reaffirmed that the State and its agencies are obligated to reasonably protect the traditional and customary rights of Hawaiians. The Supreme Court ruling States that agencies are obligated to make the assessment of cultural practices, independent of a developer or applicant. Typically, information gathered during a CIA or cultural impact study during HRS 343 can help to inform the approving agency during the Ka Paʻakai process. However, there is no apparent outreach methodology for how cultural impacts were assess within the DEA.

The Ka Paʻakai court decision set forth that a proper analysis of cultural impacts shall include: 1) the identity and scope of valued cultural, historical, or natural resources in the subject area, including the extent to which traditional and customary native Hawaiian rights are exercised; 2) the extent to which those resources – including traditional and customary native Hawaiian rights – will be affected or impaired by the proposed action; and, 3) the feasible action, if any, to be taken by the (agency) to reasonably protect native Hawaiian rights if they are found to exist. Generally, the "subject area" is not restricted to the project area as areas adjacent to the project area could be indirectly or directly impacted by actions within the project area. OHA recommends that the applicant work with the approving agency to carefully evaluate the Ka Pa'akai requirements and the OEQC guidelines for CIAs.

**Closing Remarks**

Mahalo for the opportunity to comment. We look forward to DEA revisions that addresses our concerns regarding cultural impacts and reviewing any SHPD comments. Please feel free to contact me should you have any questions.

Mahalo,

*Kamakana C. Ferreira, M.A.*
Lead Compliance Specialist
Office of Hawaiian Affairs
560 N. Nimitz Hwy
Honolulu, Hi. 96817

(808)594-0227

**DEPARTMENT OF DESIGN AND CONSTRUCTION**
**CITY AND COUNTY OF HONOLULU**
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 768-4567
Web site: www.honolulu.gov

RICK BLANGIARDI
MAYOR

ALEX KOZLOV, P.E.
DIRECTOR

HAKU MILLES, P.E.
DEPUTY DIRECTOR

February 22, 2021

SENT VIA EMAIL

Mr. Jeff Overton
1226mokulua@g70.design

Dear Mr. Overton,

Subject: Draft Environmental Assessment (DEA)
Chapter 343, Hawaii Revised Statutes (HRS)
Krueger Residence Seawall Modification and Repair
Tax Map Key: 4-3-005: 056

Thank you for the opportunity to review and comment. The Department of Design and Construction has no comments to offer at this time.

Should you have any further questions, please contact me at 768-8480.

Sincerely,

for Alex Kozlov, P.E.
Director

AK:cf (840010)

DEPARTMENT OF FACILITY MAINTENANCE

**CITY AND COUNTY OF HONOLULU**

1000 Ulu`ohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768-3381
Website: www.honolulu.gov

2021 FEB 16 AM 8:22

DEPT OF PLANNING AND PERMITTING CITY AND COUNTY OF HONOLULU

RICK BLANGIARDI
MAYOR

ROGER BABCOCK, JR., Ph.D., P.E.
DIRECTOR AND CHIEF ENGINEER DESIGNATE

TYLER K. SUGIHARA, P.E.
ACTING DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 21-56

February 11, 2021

**MEMORANDUM**

TO: Dean Uchida, Director Designate
Department of Planning and Permitting

ATTENTION: Steve Tagawa

FROM: Roger Babcock, Jr., Ph.D., P.E.
Director and Chief Engineer Designate
Department of Facility Maintenance

SUBJECT: DEA, Chapter 343, Krueger Residence Seawall Modification and Repair
1226A Mokulua Drive, Lanikai, TMK: 4-3-005:056

Thank you for the opportunity to review and comment on the subject project.

We have no comments at this time, as we do not have any facilities or easements on the subject property.

If you have any questions, please call Mr. Kyle Oyasato of the Division of Road Maintenance, at 768-3697.

Appendix L-2

# DPP Correspondence

DEPARTMENT OF PLANNING AND PERMITTING
**CITY AND COUNTY OF HONOLULU**
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov

RICK BLANGIARDI
MAYOR

DEAN UCHIDA
DIRECTOR

DAWN TAKEUCHI APUNA
DEPUTY DIRECTOR

EUGENE H. TAKAHASHI
DEPUTY DIRECTOR

March 3, 2021

2020/ED-12(ST)

Mr. Jeffrey Overton, AICP
G70
111 South King Street, Suite 170
Honolulu, Hawaii 96813

Dear Mr. Overton:

SUBJECT: Draft Environmental Assessment (EA)
Chapter 343, Hawaii Revised Statutes (HRS)
Krueger Residence Seawall Modification
and Repair (Project)
1226A Mokulua Drive - Lanikai
Tax Map Key 4-3-001: 056

The following are our comments on the Draft EA for the above Project:

1. Section 1.2 - Overview of the Planned Project: The title of the Final EA, as well as all references to the proposed Project, should be revised to "Modification" rather than *Repair* of Existing Shore Protection. The Project proposes numerous additions to an existing nonconforming concrete seawall, it exceeds the repairs allowable under Section 23-1.6, Revised Ordinances of Honolulu (ROH), and therefore requires that a Shoreline Setback Variance (SV) be obtained. The modifications proposed include:

   - Increasing the overall height of the seawall with the addition of a new concrete cap which includes a six-inch radius splash lip. The addition changes its height from five to seven feet above mean sea level (MSL) to six to eight feet above MSL;
   - Extending the seawall foundation by nine feet with the insertion of steel sheet piles on its mauka face, along the entire 90-foot length. The sheet piles will be secured to the seawall by the addition of a concrete cap, to be anchored to the seawall with dowels and adhesive. The sheet pile cap will more than double the seawall's current width of 16 to 17 inches;

- Bracing of the new concrete sheet pile-cap will be accomplished by multiple two-inch-diameter steel tie rods anchored to multiple 4- x 4-foot concrete dead men buried 25 feet further mauka and three feet below the existing grade; and
- Demolishing two existing concrete counterforts or perpendicular extensions.

2. Section 1.3 Project Background: The language used in this section and others throughout the Draft EA, implies that maintaining the seawall is somehow mandated as an obligation of the Non-Exclusive Easement (S-6043) granted by the State Board of Land and Natural Resources (BLNR) in 2013. However, we find that it is much more appropriate to emphasize other requirements of the Non-Exclusive Easement; to disclose more recent actions by the BLNR and the State Department of Land and Natural Resource (DLNR); and to emphasize the significant changes in City and State Laws which are much more relevant for the forthcoming applications for an SV and a Special Management Area (SMA) Use Permit:

   a. Non-Exclusive Easement: Although the State did renew and grant a small amendment (for a 40-square-foot increase due to the receding shoreline) of S-6043 for the encroachment of the existing shoreline protection structure onto the beach more than 50 years ago (1968), it did not do so to the exclusion of other State and City requirements. The more pertinent language in this Easement is found in both the "Assumptions" and "Assignment," which requires the Assignee to "comply with all applicable laws and ordinances," which includes Chapters 205A, HRS, and Chapter 23 and Chapter 25, ROH.

   b. State DLNR: Despite its 2013 renewal of the Non-Exclusive Easement, the State DLNR more recently determined in 2018 (Correspondence OA-19-29) that modifying the existing seawall with sheet piles was a major alteration to the existing structure, and therefore, required that a Conservation District Use Permit (CDUA) be obtained from the BLNR. They further stated that seawalls contradict "current policies and objectives for beach protection provided under HRS 205A-2(9)." Their determination is especially relevant since according to the certified shoreline survey, nearly half of the southern portion of the seawall (41.78 feet) is within the State Conservation District.

      Furthermore, in 2018 the BLNR also denied a request (CDUA: OA-3821) to allow a "scour apron" to be added makai of a previously modified concrete seawall which was part of the original four-parcel 1968 rock blanket (Parcel 94). That segment of the same nonconforming seawall, was the subject of an SV granted by the DPP on February 25, 2005

(No. 2004/SV-21), which also allowed its foundation to be modified (i.e., add a four-foot deep, 7.7-foot wide concrete rubble masonry base). What remained of the 1968 "rock blanket" makai of the seawall, was removed as a condition of SV No. 2004/SV-21.

c. Mayor's Directive 18-02: The Mayor's Directive issued on July 16, 2018, requires all City Departments and Agencies to conserve and enhance a natural, dynamic shoreline wherever possible. It also directs Departments to recognize climate change mitigation and adaptation as an urgent matter, use the Sea Level Rise (SLR) Guidance and Hawaii SLR Vulnerability and Adaptation Report in planning decisions. The proposed seawall modification generally conflicts with these objectives, and are considered a last resort, and only where there are significant public benefits and insignificant negative impacts to coastal resources and natural shoreline processes.

d. Act 16 (2020) State Legislature of Hawaii (SLH): On September 15, 2020, the State Legislature amended the Coastal Zone Management Statute, Chapter 205A, HRS, which among other changes, revised the language for granting a shoreline variance in areas with sandy beaches by requiring a demonstrable interest to the general public in addition to hardship to the Applicant. Section 205A-46(a)(9) now states:

> " *Private facilities or improvements that may artificially fix the shoreline; provided that the authority may consider hardship to the applicant if the facilities or improvements are not allowed within the shoreline area; provided further that a variance to artificially fix the shoreline shall not be granted in areas with sand beaches or where artificially fixing the shoreline may interfere with existing recreational and waterline activities unless the granting of the variance is clearly demonstrated to be in the interest of the general public;*"

3. Section 1.5 Permits and Approvals Required: Similarly, Act 16, also eliminated the single-family dwelling exemption in the SMA for all shoreline parcels, regardless of whether dwelling floor area is less than 7,500 square feet. Consequently, this section and other references to the SMA should clearly state that a Major SMA Use Permit will need to be obtained from the City Council for "development" in excess of $500,000 in value.

4. Section 2.4 Proposed Action: The Final EA should explain how the existing seawall can be realigned to allow the proper insertion of the interlocking steel sheet piles without first removing portions of the existing "rock blank" upon which it rests, at least temporarily (see Exhibit 2-5). In addition, we must emphasize that the forthcoming SV application requires construction plans which are stamped by a licensed professional structural engineer. As such, the

non-specific boulders of the "rock blank" and missing seawall foundation (i.e., floating) depicted on the Sheet Pile Wall Section, is not sufficient. The Final EA should include exhibits of the Project in Plan View, which illustrate the multiple dead men relative to the existing dwelling and all other improvements within the 40-foot shoreline setback.

5. Section 4.4 Alternative D - Alternative Designs: We strongly suggest that a more thorough and robust discussion be provided which explains how the engineered Rock Revetment and Hybrid Seawall-Revetment alternatives do not better meet the third hardship criteria required to grant an SV pursuant to Section 23-1.8(b)(3)(B)(iii), ROH.

   Specifically, how do these two practicable alternatives not provide a greater potential for the accumulation of sand along this and the adjacent sandy beach to the north. We note that since the original 1968 approval of the "rock blanket," and even as late as 2007, there was a considerable dry sand beach fronting this portion of Lanikai Beach (see attached photos). Given the presence of submerged sand in this littoral cell as is clearly shown in Figures 1-3, 2-1, and others, if the encroaching "rock blanket" were removed and an engineered revetment built seven to eight feet further mauka (on the Applicant's own property), how would lateral shoreline access for the general public not be improved (i.e., wet sand is more passible than a basalt rubble rip-rap).

   Additionally, the stated concern for this alternative's need for added flank protection of adjacent parcels, particularly to the north (Parcel 55), is diminished by the fact that its rip-rap and concrete rubble masonry seawall are unauthorized (i.e., illegal).

6. Zoning Adjustment: The proposed seawall modification increases the structure to more than six feet in height within the required five-foot rear yard, as defined by the Land Use Ordinance (LUO). Therefore, a Zoning Adjustment for retaining wall height will also be needed, should an SMA Use Permit be granted by the City Council. The Final EA should be revised to include a new section that addresses this permit requirement and the LUO criteria for its approval.

7. Section 5.3 Hawaii Coastal Zone Management (CZM): The discussion of CZM policies in this section, particularly with regard to Section 205A-2(c)(10) *Beach and Coastal Dune Protection,* must be significantly expanded. Specifically, how can allowing the fortification of a hardened structure which has likely accelerated beach migration to continue for another 50 years, be considered as consistent with these policies.

8. Section 5.6 Koolau Poko Sustainable Communities Plan (KSCP): The Final EA should also include a discussion of the *Guidelines for Shoreline Areas* which are contained in Section 3.1.3.2. In particular, on page 3-9 which explicitly states, *"Prohibit the use of shoreline armoring structures, considering alternative measures such as beach replenishment."* The KSCP also advises a "Beach Management Plan" may serve as a prototype for erosion-prone areas to incorporate the long-term effects of climate change and SLR and to address seasonal and long-term erosion and accretion.

9. Section 6.2 Reasons Supporting the Anticipated Determination: This section discusses the Significance Criteria set forth in determining whether an Environmental Impact Statement (EIS) is required pursuant to the EIS rules, Title 11-200.1-13.

   (2) *Curtail the range of beneficial uses of the environment.* We note that this section incorrectly states that HRS Chapter 91, rather than HRS Chapter 205A-44, which generally prohibits construction within the shoreline area.

   (3) *Conflict with the State's environmental policies or long-term environmental goals established by law.* As previously discussed, the Project (more so than the alternatives not preferred by the Applicant), does conflict with the State's environmental policies and long-term environmental goals. We reiterate that the Non-Exclusive Easement renewed seven years ago, speaks more the assignment and assumption of the Grantee's (State) obligations to comply with all applicable rules, laws and regulations, rather than an entitlement to maintain a failing structure allowed more than 50 years ago.

We are also forwarding copies of the comments we received so far which were not already sent directly or copied to you. Should you have any questions, please contact Steve Tagawa, of our staff, at 768-8024.

Very truly yours,

for Dean Uchida
Director

Attachments: Comment Letters
Receipt Nos. 129824, 129830, and 129831)

cc: DLNR-Office of Conservation and Coastal Land
Office of Environmental Quality Control

2018/ELOG -1898

DAVID Y. IGE
GOVERNOR OF
HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

JEFFREY T. PEARSON, P.E.
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

**STATE OF HAWAII**
**DEPARTMENT OF LAND AND NATURAL RESOURCES**
**OFFICE OF CONSERVATION AND COASTAL LANDS**

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

DLNR:OCCL:SH

Correspondence OA-19-29

SEP 21 2018

Andrew Wycklendt
Coastal Engineer
APTIM
1050 Queen Street, Suite 100
Honolulu, HI 96814

SEP 26 2018
DEPT. OF PLANNING AND PERMITTING

SUBJECT: Re: Shoreline Protection Repair Permit Determination Request for 1226 Mokulua Drive, Kailua, HI 96734, TMK: (1) 4-3-005:056

Dear Mr. Wycklendt,

The Department of Land and Natural Resources (DLNR) received your July 31, 2018 request to repair an existing shoreline protection system at 1226 Mokulua Drive, Kailua, HI 96734, TMK (1) 4-3-005:056. According to your request, the proposed repair would include 1) reinforcing the existing concrete seawall with sheet pile and associated anchor supports, 2) reworking armor stones in the existing rubble mound revetment, and 3) installing a concrete stairway.

Office of Conservation and Coastal Lands (OCCL) staff were unable to locate any construction permits or other land use authorization permits at the State for the seawall, and the applicant provided none. However, the applicant submitted a datable ground photograph and notarized statement that showed the seawall, in its current shape and location, present in 1953. It appears, from the evidence presented, that the structure remains intact and unaltered since prior to the inception of the Conservation District rules. The applicant provided both a City and County permit and a DLNR Right of Entry granted in 1968 for the placement of the rubble mound revetment located Makai of the seawall. Further, in September of 2008, representatives of the subject parcel requested to resolve the State land encroachment presented by the seawall and revetment. The encroachment was resolved and an easement granted by the DLNR Land Division (GL 6043) with the support of OCCL (DLNR Ref: OA-09-01).

The project being proposed includes the repair of seawall and revetment structures and the addition of a stairway as described below:

- The first component of the proposed repair would entail the installation of 138 linear feet of interlocking NZ 14 Steel Sheet Pile driven directly seaward of the existing seawall to a depth of approximately 11 feet until bedrock or hard substrate is encountered. The crest elevation of the repair would be 8 feet LMSL in which a uniform surface would be

provided to construct a 30 inch wide by 24 inch concrete cap. A tieback system would be installed for lateral support of the sheet pile, which would entail placement of concrete deadman anchors (4.5 feet x 4 feet x 1 foot) installed 22 feet landward of the seawall at a depth of 2 feet below existing grade and placed every 10 feet along the length of the seawall. The anchors would be connected to the sheet pile using 1.5 inch diameter stainless steel tie rods. Following completion of the seawall repair, the adjacent upland area would be backfilled to an elevation of 8 feet LMSL.

- The second component of the proposed repair would entail adjustment of armor stones in the rubble mound revetment to achieve a more uniform structure. Armor stones would likely need to be temporarily moved to allow installation of sheet pile as described above. Stones would either be repositioned within the existing easement or temporarily stockpiled on the subject parcel landward of the existing seawall. Following sheet pile installation, armor stones would be positioned and reworked such that it would have a crest elevation of 3 feet LMSL and a width of 2 feet, exhibit a 1V:2H slope, and include a toe stone for scour protection at the base. Smaller stones would be placed within the core of the structure and capped by larger stones. The finished structure would remain within the existing structure footprint and within the existing easement.

- The proposed project includes the addition of concrete stairs that would be constructed near the northern extent of the existing seawall such that it would lie partially outside of the current structure footprint. The stairs would have a width of 4 feet, extend 14 feet seaward of the seawall, and would exist within the existing easement.

The proposed restacking of armor stones within the rubble mound revetment is an identified land use pursuant to the Hawaii Administrative Rules (HAR) §13-5-22, P-8 STRUCTURES AND LAND USES, EXISTING (A-1) *Minor repair, maintenance, and operation to an existing structure, facility, use, land, and equipment, whether it is nonconforming or permitted, that involves mostly cosmetic work or like-to-like replacement of component parts, and that results in negligible change to or impact to land, or a natural and cultural resource.*

The proposed repair of the seawall using sheet pile is considered a major alteration owing to the inland construction component, and it does not employ like-to-like replacement parts in the repair. Further, the proposed installation of a concrete stairway would be considered a new structure, and thus could not be authorized as a repair of an existing structure. As such, these components of the proposed project would require a Conservation District Use Permit (CDUP) approved by the Board of Land and Natural Resources as established HAR §13-5-22 STRUCTURES AND LAND USES, EXISTING (D-1) *Major alteration of existing structures, facilities, uses, and equipment, or topographical features which are different from the original permit. When county permit(s) are required for the associated plan(s), the department's approval shall also be required.*

We would like to note that seawalls contradict our current policies and objectives for beach protection provided under Hawaii Revised Statues (HRS) 205A-2(9):

- HRS 205A-2(9)(A) – Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;

- HRS 205A-2(9)(B) – Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and

- HRS 205A-2(9)(C) – Minimize the construction of public erosion-protection structures seaward of the shoreline.

**The DLNR has no objections to the component of the proposed repair that entails reworking armor stones in the rubble mound revetment. However, the DLNR is unable to authorize the component involving repair of the existing seawall as described, or the construction of a stairway.**

**Terms and Conditions**

The DLNR has no objections the repair of the rubble mound revetment along the subject property, at TMK (1) 4-3-005:056 provided that the following general conditions are adhered to:

1. That in issuing this letter, the Department has relied on the information and data that has been provided in connection with the letter. If, subsequent to this letter, such information and data prove to be false, incomplete or inaccurate, enforcement proceedings may be initiated as necessary;

2. Typical Best Management Practices (BMP) shall be implemented while conducting any land use in the Conservation District. Unauthorized land uses such as the disposal of material within the Conservation District shall initiate enforcement proceedings;

3. Should historic remains such as artifacts, burials or concentration of charcoal be encountered during construction activities, work shall cease immediately in the vicinity of the find, and the find shall be protected from further damage. The contractor shall immediately contact the State Historic Preservation Division (692-8015), which will assess the significance of the find and recommend an appropriate mitigation measure, if necessary;

4. If the scope of the project changes or the cumulative natural resource impact is perceived to be moderate or major, the department may require authorizations or approvals for the proposed land use.

Should you have any questions pertaining to this letter, please contact the Office of Conservation and Coastal Lands at (808) 587-0377.

Sincerely,

SAMUEL J. LEMMO, ADMINISTRATOR
OFFICE OF CONSERVATION AND COASTAL LANDS

CC: ODLO
City & County of Honolulu
-DPP

I concur with the conditions of this letter:

_____ Date_____
Applicant

2018/ELOG-2201

DAVID Y. IGE
GOVERNOR OF
HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

JEFFREY T. PEARSON, P.E.
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF: OCCL: AJR

CDUA: OA-3821

NOV - 8 2018

David A. Smith
c/o Sea Engineering, Inc.
41-305 Kalanaianaole Hwy.
Waimanalo, HI 96795-1820

**SUBJECT: CONSERVATION DISTRICT USE APPLICATION (CDUA) NO. OA-3821 FOR THE GROSSMAN SCOUR APRON EROSION CONTROL PROJECT**
Kailua, Ko'olaupoko District, Island of Oahu
*TMK: Submerged lands seaward of (1) 4-3-005:094* Next door to south

This is to inform you that on **October 26, 2018** the Board of Land and Natural Resources **DENIED** Conservation District Use Application (CDUA) **OA-3821** for the *Grossman Scour Apron Erosion Control project* located in the Ko'olaupoko District, Island of Oahu, on submerged lands of the State seaward (*makai*) of *TMK: (1) 4-3-005:094* due to the following reasons:

1. *The proposed project is inconsistent with the objectives and policies related to Coastal Zone Management in the State of Hawaii pursuant to HRS 205A-2;*

2. *The project, as designed, will set an undesirable precedent for the armoring of the shoreline and the loss of a public trust resource;*

3. *The permittee has not provided enough site-specific evidence that the proposed project will improve the beach resource significantly;*

4. *The proposed project is not typical for shoreline erosion control projects that promote beach preservation; and*

5. *A mauka-side repair of the existing seawall would achieve the desired results of protecting the upland parcel.*

Should you have any questions on this letter, please contact Alex J. Roy, M.Sc. of our Office of Conservation and Coastal Lands staff at 808-587-0316 or via email at alex.j.roy@hawaii.gov

Sincerely,

Samuel J. Lemmo, Administrator
*Office of Conservation and Coastal Lands*

*CC: Chairperson*
*ODLO*
*CCH – DPP*
*DAR*

2018/ELOG-903

DAVID Y. IGE
GOVERNOR OF
HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

JEFFREY T. PEARSON, P.E.
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
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CONSERVATION AND COASTAL LANDS
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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

2018 MAY -4 PM 4:14
DEPT OF PLANNING AND PERMITTING
CITY & COUNTY OF HONOLULU

**STATE OF HAWAII**
**DEPARTMENT OF LAND AND NATURAL RESOURCES**
**OFFICE OF CONSERVATION AND COASTAL LANDS**
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF: OCCL: AJR

CDUA: OA-3821

**MEMORANDUM**

MAY - 3 2018

TO:

| | | |
|---|---|---|
| ___ SHPD | ___ DOFAW | ✓ CCH - DPP |
| ___ ODLO | ___ DOH – CWB | ___ CCH - ENV |
| ___ DAR | ___ OHA | ___ NOAA |
| ___ CWRM | ___ USACE – *Honolulu Branch* | |
| ___ DOBOR | ___ USNMFS | |

FROM: for **SAMUEL J. LEMMO, ADMINISTRATOR**
Office of Conservation and Coastal Lands

SUBJECT: **REQUEST FOR COMMENTS – CONSERVATION DISTRICT USE APPLICATION (CDUA) AND DRAFT ENVIRONMENTAL ASSESSMENT (DEA) OA-3821**
*Grossman Scour Apron*

LOCATION: **SUBMERGED LANDS OF THE STATE, KAILUA, KO'OLAUPOKO DISTRICT, ISLAND OF OAHU**

TMK: *Submerged lands seaward (makai) of (1) 4-3-005:094*

Please find Conservation District Use Application (CDUA) OA-3821 and Draft Environmental Assessment (DEA) for the proposed *Grossman Scour Apron Project* located in the Ko'olaupoko District, Island of Oahu. We would appreciate a review of the proposal and any comments your agency or office has on the application. A copy of the CDUA and DEA can be found here:

http://dlnr.hawaii.gov/occl/current-applications/ → CDUA: OA-3821

Please contact Alex J. Roy, M.Sc. of the Office of Conservation and Coastal Lands staff at 587-0316, should you have any questions on this proposal. If no response is received by the suspense date of **June 8, 2018**, we will assume there are no comments.

( ) Comments Attached

( ) No Comments

_____
*Signature*

DAVID Y. IGE
GOVERNOR OF
HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
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**STATE OF HAWAII**
**DEPARTMENT OF LAND AND NATURAL RESOURCES**

OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF: OCCL: AJR

CDUA OA-3821
*Acceptance Date: April 30, 2018*
*180-Day Exp. Date: October 27, 2018*

David A. Smith
c/o Sea Engineering, Inc.
41-305 Kalanianaole Hwy.
Waimanalo, HI 96795-1820

MAY - 1 2018

Dear Mr. Smith,

**NOTICE OF ACCEPTANCE AND PRELIMINARY ENVIRONMENTAL DETERMINATION**

*Conservation District Use Application (CDUA) File No. OA-3821*

**(BOARD PERMIT)**

This acknowledges the receipt and acceptance of your CDUA: OA-3821 on behalf of the applicant (Elizabeth Rice Grossman) for the proposed *Grossman Scour Apron Erosion Control Project*, located on submerged lands of the state, seaward of TMK: *(1) 4-3-005:094* in Kailua, Ko'olaupoko District, Island of Oahu. For reference the project area is located within the State Land Use (SLU) Conservation District *Resource* Subzone.

**EXISTING SITE CONDITIONS:**

The property (i.e., 1240 Mokulua Drive) consists of one (1) residential structure and one (1) garage structure, as well as landscaping, fencing, and other typical residential appurtenances. Along the seaward side of the parcel the property has a legally non-conforming, vertical concrete seawall that extends approximately seven (7) feet above mean sea level (msl). The south end of the seawall is abutted by a concrete boat ramp that runs from the property to the shoreline.

The property consists of an "L" shaped parcel with approximately 151-feet of shoreline frontage. The land of the property ranges from 6 to 8 ft. above msl., and it was stated by the applicant that the existing seawall is deteriorating and sinkholes are forming mauka (landward) of the seawall structure. Currently there is very little to no beach present seaward of the property except during lower than low tide events where sandy beach may be exposed. In the vicinity of the proposed project there are a number of shoreline erosion control structures such that this shoreline could be considered heavily armored and no-longer in a natural state. There is an overall trend towards erosion in this area as indicated by shoreline erosion maps and historical shoreline data.

**PROPOSED PROJECT:**

The applicant is proposing to install a 151-foot long by 13-foot wide riprap scour apron on the submerged lands of the state (i.e., public trust) in order to protect the existing seawall, and development on the parcel. The proposed Riprap Scour Apron (RSA) is designed to be approximately 6-feet across the top and slope down to the water approximately 13-feet from the seawall encompassing approximately 2,000 square feet of the submerged lands fronting the property. The proposed structure will be un-cemented and was stated by the applicant to be "built of wave resistant material"; the RSA is the preferred option for this property as it is considered (by the applicant) to be a long-term solution for protecting the property and seawall.

The overall dimension of the proposed RSA will be approximately 151-feet long by 13-feet wide and will be constructed of 50-500 lbs. stone totaling approximately 200-20 cubic yards of material. The RSA is proposed to overlay approximately 100-125 square yards of geotextile material along with up to 10 cubic feet of "grout-filled sandbags" are proposed to fill existing holes in the seawall structure.

The applicant states that due to the sandy bottom near the shoreline, the RSA is designed to settle into the sand. In order to achieve this design element, the RSA will be constructed in two (2) phases. Phase 1 includes the placement of riprap which will be pushed into the sandy substrate using mechanical means (i.e., excavator bucket). In Phase 2 the riprap will be placed approximately one (1) foot higher than the design height to accommodate future settling. All mechanical equipment will be operated from the property and no equipment is proposed to operate on the beach. The objective of this project is to protect private development, a seawall, and a private concrete boat ramp.

**ANALYSIS:**

After reviewing the application, we find that:

A. Your proposal to conduct the *Hawaii Kai Marina Entrance Channel Groin project* located in the Honolulu District, on the Island of Oahu is considered an identified land use within the Conservation District Resource Subzone pursuant to Hawaii Administrative Rules (HAR), §13-5-22, P-15, **SHORELINE EROSION CONTROL** (D-1), *Seawall, revetment, groin, or other coastal erosion control structure or device, including sand placement, to control erosion of land or inland areas by coastal waters, provided that the applicant shows that (1) the applicant would be deprived of all reasonable use of the land or building without the permit; (2) the use would not adversely affect beach processes or lateral public access along the shoreline, without adequately compensating the State for its loss; or (3) public facilities (e.g., public roads) critical to public health, safety, and welfare would be severely damaged or destroyed without a shoreline erosion control structure, and there are no reasonable alternatives (e.g., relocation). Requires a shoreline certification.* Please note that the final decision to approve or deny this application rests with the Board of Land and Natural Resources (BLNR);

B. Pursuant to HAR §13-5-40, Hearings, a public hearing *will not be* required;

C. A Draft Environmental Assessment with an Anticipated Finding of No Significant Impact (DEA-AFONSI) was submitted for publication in the Office of Environmental Quality Control (OEQC) publication, *The Environmental Notice* (EN), and

D. The proposed project *is not* located within the City and County of Honolulu - Special Management Area (SMA).

Should you have any questions regarding this process or correspondence, please contact Alex J. Roy, M.Sc. of our Office of Conservation and Coastal Lands staff at 808-587-0316 or via email at alex.j.roy@hawaii.gov

Sincerely,

**SUZANNE D. CASE, CHAIRPERSON**
*Board of Land and Natural Resources*

*CC: Oahu Board Member*
*DLNR – SHPD; ODLO; DAR; DOFAW; CWRM; DOBOR*
*SOH – DOH-CWB; OHA*
*City and County of Honolulu – DPP; CCH-ENV*
*NOAA, USNMFS, USACE – Honolulu*


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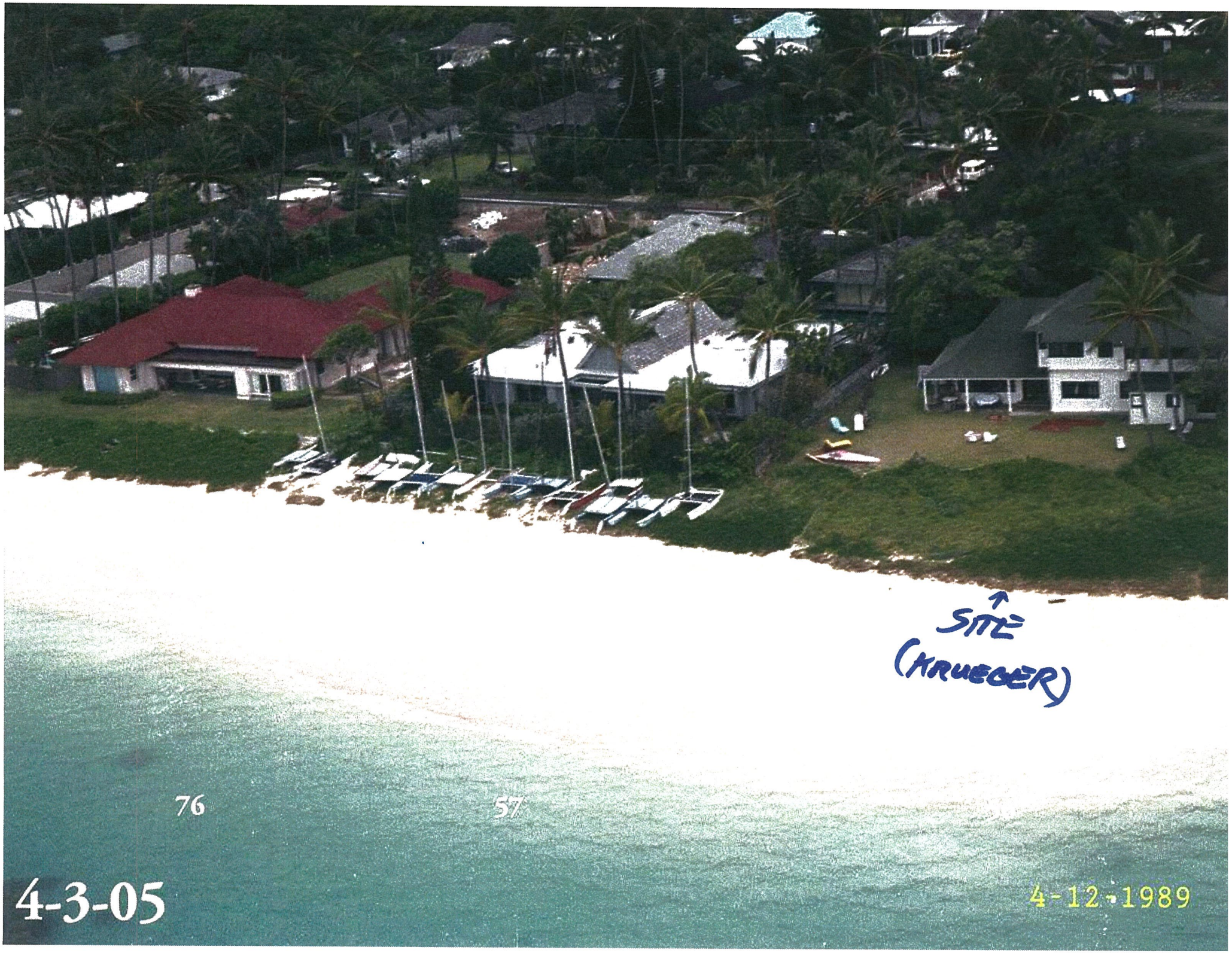
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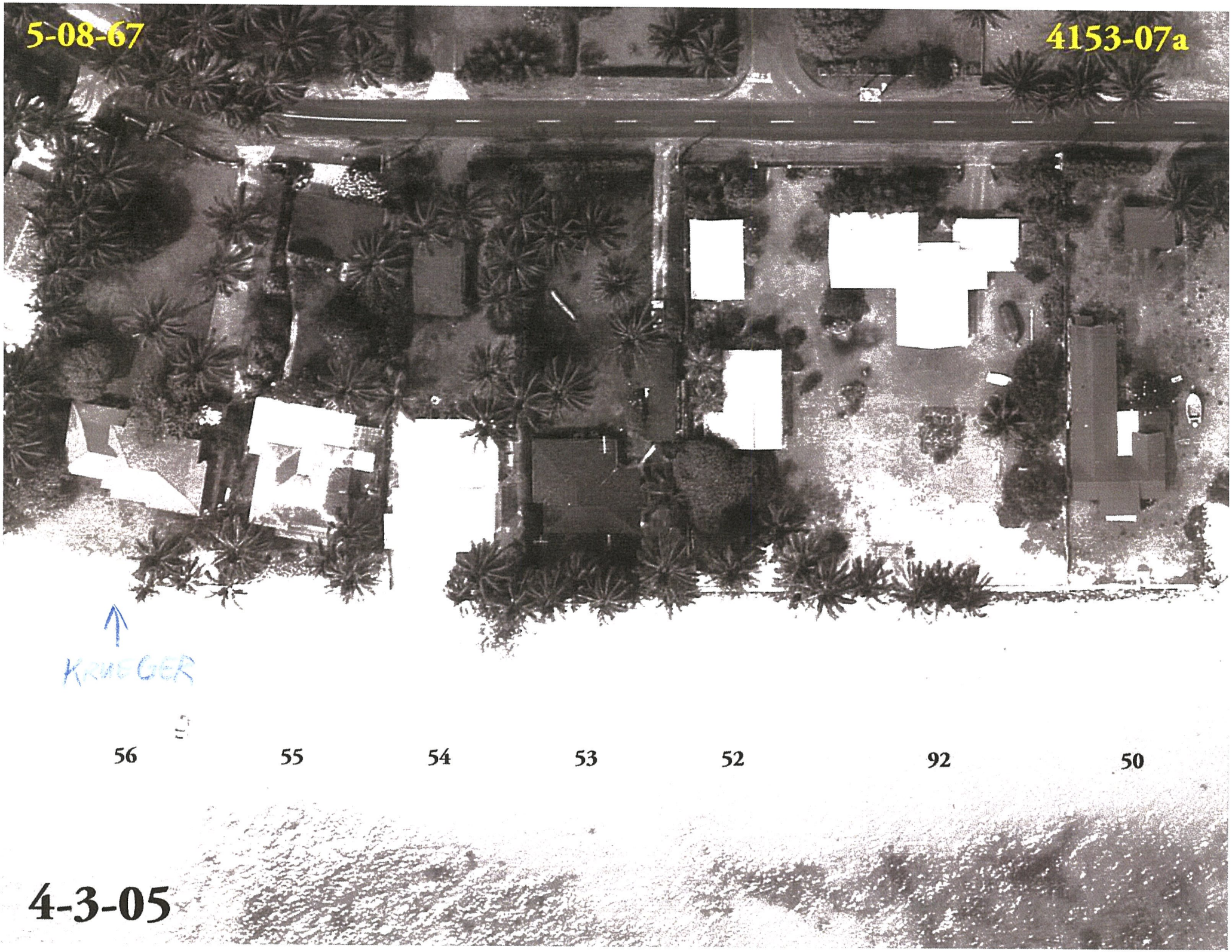
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DEPARTMENT OF FACILITY MAINTENANCE

**CITY AND COUNTY OF HONOLULU**

1000 Ulu`ohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768-3381
Website: www.honolulu.gov

2021 FEB 16 AM 8:22

DEPT OF PLANNING AND PERMITTING CITY AND COUNTY OF HONOLULU

RICK BLANGIARDI
MAYOR

ROGER BABCOCK, JR., Ph.D., P.E.
DIRECTOR AND CHIEF ENGINEER DESIGNATE

TYLER K. SUGIHARA, P.E.
ACTING DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 21-56

February 11, 2021

**MEMORANDUM**

TO: Dean Uchida, Director Designate
Department of Planning and Permitting

ATTENTION: Steve Tagawa

FROM: Roger Babcock, Jr., Ph.D., P.E.
Director and Chief Engineer Designate
Department of Facility Maintenance

SUBJECT: DEA, Chapter 343, Krueger Residence Seawall Modification and Repair
1226A Mokulua Drive, Lanikai, TMK: 4-3-005:056

Thank you for the opportunity to review and comment on the subject project.

We have no comments at this time, as we do not have any facilities or easements on the subject property.

If you have any questions, please call Mr. Kyle Oyasato of the Division of Road Maintenance, at 768-3697.

111 S. King Street
Suite 170
Honolulu, HI 96813
808.523.5866
www.g70.design

July 13, 2021

Mr. Dean Uchida
Director
City and County of Honolulu
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, Hawai'i 96813

**Subject:** Responses to Comments on Draft Environmental Assessment
Krueger Shore Protection Mitigative Improvements
TMK: (1) 4-3-005:056
Lanikai, Kailua, Island of O'ahu, Hawai'i

Dear Mr. Uchida,

Thank you for your letter dated March 3, 2021, concerning the Draft Environmental Assessment (EA) for the Krueger Shore Protection Mitigative Improvements, formerly referred to as Krueger Residence Seawall Modification and Repair. The Final EA was prepared pursuant to Hawai'i Revised Statutes Chapter 343, in support of permitting requests pursuant to Revised Ordinances of Honolulu (ROH), Chapter 23, Shoreline Setback Ordinance and Chapter 25, Special Management Area, and in accordance with Hawai'i Administrative Rules (HAR), Chapter 11-200.1. The following responses are offered to your comments.

1. The Final EA has been renamed Krueger Shore Protection Mitigative Improvements. After thorough analysis of alternative methods and designs to maintain the easement area in a safe condition, maintaining the existing shore protection system with mitigative improvements is the most feasible approach for the scale of the project. Additionally, maintaining the existing shore protection structure with mitigative improvements would be the least invasive alternative and reduce any adverse effects to the nearshore coastal environment and adjoining properties. Mitigative improvements to maintain the existing shore protection system in a safe condition would be completed landwards of the shoreline and existing seawall, and therefore would not alter current shoreline characteristics at the project site.

2. Non-Exclusive Easement (S-6043) was approved by the Hawai'i State Legislature and recorded in the State of Hawai'i Bureau of Conveyances on October 14, 2014. The easement is a legal contract between the Grantor (State of Hawai'i) and the Grantee (David and Terri Krueger). Therefore, the Grantee is legally and contractually obligated to adhere to all terms and conditions of the easement, as described below.

   The easement confers unto the Grantee the "right, privilege, and authority to use, maintain, repair, replace and remove the existing seawall and revetment". Repair is, therefore, a permissible activity.

Condition 1 states that the Grantee is required to "maintain the easement area in a safe condition". Further, Condition 6 states that the Grantee "shall keep the easement area and the improvements thereon in a safe, clean, sanitary, and orderly condition". Thus, the Grantee is legally and contractually obligated to maintain the structure in safe condition.

Condition 12 states that the "Grantor reserves the right to withdraw the easement for public use or purposes, at any time during the term of this easement". If the Grantor (State of Hawai'i) or the Department of Land and Natural Resources (DLNR)/Board of Land and Natural Resources (BLNR) have changed their policies or positions on the matter, we expect that they would notify the Grantee of such changes and seek resolution.

Condition 19 states that "the Grantee is prohibited from rebuilding or altering said seawall and revetment without first obtaining the appropriate permission from Grantor". This language was addressed by the BLNR for the Waimānalo Paradise Seawall Repairs project. The BLNR agreed that the Grantee had the right to alter the structure and the easement language was amended accordingly. Given the similarities between these two projects, and the fact that the Waimānalo Paradise easement was amended very recently (September 2019), we believe that this represents the current position of the DLNR and BLNR. See attached easement amendment (*Appendix L-3*).

Condition 24 states that "the Grantee shall maintain, repair and upkeep the existing seawall and revetment in a condition satisfactory to the Grantor" and that "any improvements to the existing seawall and revetment shall be subject to the prior written approval of the Board of Land and Natural Resources and any other appropriate permission". This condition clearly demonstrates that the Grantee is required to maintain the structures, and that improvements to the structures and permissible.

In 2020, the BLNR and City approved similar modifications (stabilizing structures, wall height increase, new structures) to a seawall in Waimānalo. See attached Board approval (*Appendix L-4*), FEA-FONSI (File No. 2020/ED-2(AB)) (*Appendix L-5*) and SSV approval (File No. 2019/SV-3(AB)) (*Appendix L-6*).

a. The proposed action is to maintain the existing shore protection system with mitigative improvements as described in the EA. The owner will comply with all applicable laws and ordinances, including obtaining a SSV and SMA Use Permit.

   The City recently issued an FEA-FONSI and SSV for the Waimānalo Paradise Seawall Repairs project, which is similar to the subject project (see *Appendices L-5 and L-6*). The DPP determined that the proposed repairs and modifications proposed under this project complied with all applicable laws and ordinances, which included HRS Chapter 205A and ROH Chapter 23 and Chapter 25.

b. Thank you for providing reference to Correspondence OA-19-29. To clarify, Correspondence OA-19-29 refers to an old design of the project that is not being considered. Correspondence OA-19-29 states that the proposed repairs "would entail the installation of 138 linear feet of interlocking steel sheet pile driven directly seaward of the existing seawall". The proposed repairs also included "adjustment of armor stones in the rock rubblemound revetment, which is seaward of the existing seawall". The proposed repairs also included "the addition of concrete stairs near the northern extent of the existing seawall such that it would lie partially outside of the current structure footprint".

   The proposed repairs discussed in Correspondence OA-19-29 would have involved construction of new structures seaward of the existing seawall, seaward of the shoreline, in the Conservation District.

   The Krueger Shore Protection Mitigative Improvements project proposed in this EA would be entirely landward of the existing seawall and landward of the shoreline. The proposed mitigative improvements are intended to stabilize the existing seawall and would not interact directly with the ocean. No repairs or modifications to the existing rock revetment are proposed under the proposed action.

   DLNR stated that "seawalls contradict the current policies and objectives for beach protection provided under HRS 205A-2(9)". The proposed mitigative improvements are intended to stabilize the existing shore protection system. This project does not involve construction of a new seawall.

   We acknowledge that a small portion of the existing seawall is located in the Conservation District. This portion of the seawall consists of 40 square feet, which is 3 percent of the total encroachment area (1,308 square feet). The proposed mitigative improvements must be approved by the BLNR. If the BLNR determines that a Conservation District Use Permit (CDUP) is required for this small portion of the existing seawall, the Applicant will submit a Conservation District Use Application (CDUA).

   The Applicant was not involved in this proceeding and is therefore not in a position to opine as to the reason(s) that DLNR made their determination. However, we note that there are significant differences between the referenced project and the proposed action.

   CDUA OA-3821 proposed new structures seaward of the shoreline in the Conservation District. As noted in comment letter, the rock blanket that previously existed was removed by the landowner, so there were no existing structures at the time of the application and no easement that would have obligated the landowner to perform any work or the DLNR to authorize any work seaward of the shoreline in the Conservation District. Furthermore, the proposed structure would have been located in the beach transit corridor and had the potential to negatively impact lateral shoreline access.

We also note that in Correspondence OA-19-29, DLNR stated that they had no objections to reworking armor stones in the existing rock revetment fronting the Krueger property. While mitigative improvements to the existing rock revetment are not being proposed, we believe that this is indicative of DLNR's position on the matter.

c. We reviewed Mayor's Directive 18-02, which is referenced in *Section 3.4* of the EA. It is our understanding that the Directive relates to new construction rather than existing structures. Furthermore, we note that the Directive also requires the City "to develop and implement land use policies, hazard mitigation actions, and design and construction standards that mitigate and adapt to the impacts of climate change and sea level rise".

   It is generally accepted that there are three major approaches to sea-level rise: accommodation, protection, and retreat. *Protection* is defined as "hardening of a system in its existing location to withstand impacts from changing conditions (e.g., shoreline hardening such as seawalls and revetments) (Codiga and Wager, 2011).

   The subject shoreline has been armored (protected) for over 50 years. The shoreline is already fixed by a legal, nonconforming structure covered by a non-exclusive easement. The proposed mitigative improvements are intended to protect the property and are therefore considered a valid method to adapt to climate change and sea level rise.

   Notably, the Directive was issued on July 16, 2018 by the previous Mayor Kirk Caldwell. We understand that the City's approach may be evolving under the present Mayor Rick Blangiardi.

d. Act 16 appears to relate to new construction rather than existing structures. The shoreline is already fixed by a legal, nonconforming structure covered by a non-exclusive easement. The proposed action will not change this condition. Furthermore, the improvements will be located landward of the existing seawall and therefore will not infringe on public access.

   Chapter 205A, Section 205A-46(a)(9) states that "The authority may consider hardship to the applicant if the facilities or improvements are not allowed within the shoreline area".

   On March 27, 2020, the DPP issued an SSV for construction of a new seawall in Lanikai, Oʻahu, approximately 900 feet south of the subject property (see *Appendix L-7*).

   On November 20, 2020, the DPP issued an SSV for repair and modification of an existing nonconforming seawall in Waimānalo, Oʻahu that was covered by a non-exclusive easement from the State of Hawaii (see *Appendix L-6*).

   While we acknowledge that these determinations were made prior to the adoption of Act 16, the rationale that the DPP provided in the variance determinations is relevant as it relates to the proposed action.

Chapter 205A, Section 205A-46(a)(9) states that "a variance to artificially fix the shoreline shall not be granted in areas with sand beaches or where artificially fixing the shoreline may interfere with existing recreational and waterline activities unless the granting of the variance is clearly demonstrated to be in the interest of the general public".

The subject shoreline is already fixed by a legal, nonconforming structure that is covered by a non-exclusive easement. The proposed action will not change this condition. Furthermore, the improvements will be located landward of the existing seawall and will have no impact on public access, nor will it alter current shoreline conditions fronting the project site.

3. *Section 1.5* of the EA has been revised to clarify that the applicant is seeking a SMA (Major) Use Permit to repair the seawall in alignment with the passing of Act 16.

4. Preliminary construction plans have been prepared by licensed professional structural engineers, MKE Associates, LLC. The design of the proposed action does not include the removal of the existing rock blanket, nor does it entail realignment of the existing seawall. The sheetpile stabilization system landwards of the existing seawall would mitigate any additional settling and rotation should undermining of the seawall continue. Figure 2-5 located in Chapter 2 of the Final EA provides a plan view of the proposed improvements to the existing shore protection system relative to the existing dwelling. The forthcoming SV application will provide stamped construction plans and details including drawings depicting the requested illustrations.

5. When compared with the proposed action, a rock revetment or hybrid seawall-revetment would be substantially more expensive, would have a substantially larger structural footprint, would require more extensive excavation and permanent removal of existing substrate, and would fundamentally alter the existing environment and configuration of the shoreline.

   Construction of a rock revetment or hybrid seawall revetment would require demolition and removal of the existing seawall and rock apron, and permanent removal of excavated material. Temporary shoring would be required to protect and stabilize the existing single-family home and the adjacent properties and structures during construction. Additional permanent structures (i.e., return walls) would be required to protect and stabilize the adjacent properties and structures after construction. The single-family home may also need to be modified to accommodate structures of this size.

   A rock revetment of hybrid seawall-revetment would also significantly expand the structural footprint within the property. A rock revetment would be 40.2 feet wide with a total area of 3,880 feet$^2$. The structure would occupy over 20 percent of the total area of the property and would be 30 percent larger than the existing single-family home. A hybrid seawall-revetment would be 32.9 feet wide with a total area of 3,225 feet$^2$. The structure would occupy about 17.5 percent of the parcel and would be 20 percent larger than the existing single-family home.

Based on these considerations, we feel that the proposed action is the most practicable alternative that best conforms with ROH Section 23-1.8(b)(3)(B)(iii).

The design team investigated the shoreline response to removing the seawall and rock apron and constructing a rock revetment entirely inshore of the present location of the seawall.

The existing shore protection system protects the backshore area and reduces incident wave energy and reflection. The rock apron also affords the opportunity to accrete sand against it, as evidenced by observations and measurements at neighboring locations where rock aprons also exist. The extent and stability of the sand accretion is dependent on factors such as the size of the apron, the reflective characteristics of the apron and wall, nearshore sand supply, currents, and wave conditions. At higher water levels and wave conditions, the apron would be less effective, as more wave energy would pass over the apron increasing reflectivity from the seawall, and flattening the beach profile.

Removing the seawall and rock apron and constructing a revetment would initially produce a small cove-type feature, where the waterline would move inshore along the face of the revetment, approximately 20 feet from its present location along the face of the seawall. The elevation of the sandy seafloor offshore of the existing seawall is approximately -4 feet mean lower low water (mllw). It is reasonable to expect that sand would fill in the cove up to at least elevation -4 feet mllw. Any further beach development, however, is dictated by the location of the beach toe in relation to the revetment.

The beach toe is the step in the beach profile located at the base of the beach face. The toe is a hydrodynamic and geomorphic feature that is developed by the interaction between the downrush of water from the previous wave and the dynamics of the next incoming wave. The beach toe is a profile feature that is commonly used, at least partially, to define the limits of the active beach. The existing beach toe through this region is immediately offshore of the rock aprons. Removal of the existing shore protection would provide space for potential sand accretion and beach development, although to a very limited extent. Given sufficient nearshore sand, a nominal amount of accretion would be expected to occur in front of the revetment. The resulting beach, however, is not expected to be very substantial. The furthest offshore the beach toe could develop is in its present location. From there, the beach face would slope upward toward shore at an expected slope of approximately 1V:10H (vertical to horizontal), based on nearby measurements. This would intersect the revetment at elevation +2 ft mllw. This indicates that the beach would be submerged by each incoming wave. Downrush of water from the revetment would be expected to depress the profile.

A natural beach profile requires a certain amount of space to develop and stabilize. A wider beach would therefore require movement of the beach toe further seaward. To achieve a beach with crest elevation of +6 ft mllw, the beach toe would have to be 100 feet offshore of the revetment, or 80 feet beyond where it currently exists. Attempts to nourish the beach on a property-by-property basis would produce a perturbation (i.e., bulge) in the shoreline that would be expected to be straightened out by wave action over the course of a few tidal cycles. The only way to move the beach toe seaward and produce a stable beach is through regional beach accretion over the entire littoral cell. There does not appear to be enough sand in the system for this to occur.

The other way to produce a wider beach would be to move the revetment further inland. To achieve the concept +6-foot crest, the revetment would have to be shifted inland by about 80 feet, which would put the revetment mauka of the existing single-family home.

The purpose of this project is to maintain the existing shore protection system in a safe condition and continue to protect the property from increasing coastal erosion. The design of the Seawall Repair and Improvement alternative does not include plans for the construction of flanking protection.

6. A Zoning Adjustment permit has been added to the list of permits and required approvals in *Section 1.5* and has been discussed in *Section 5.7* of the EA.

7. While we acknowledge the potential negative impacts associated with hardened shoreline structures, there is no definitive evidence to support the assumption that the existing structures "have likely accelerated beach migration". Shore protection structures are typically constructed in response to erosion, suggesting that the erosion was already occurring at the time of construction. The fact that the beach continued to erode after construction cannot necessarily be directly attributed to the presence of the structures.

   The existing seawall and rock apron were constructed in 1968. In your previous comment, you note that "even as late as 2007, there was a considerable dry sand beach fronting this portion of Lanikai Beach" and provided dateable photos. A dry beach was present nearly 40 years after the structures were constructed, which indicates that the structures themselves have not prevented the potential for sand accretion and beach formation in this area. This condition is observable along the central portion of Lanikai, where the shoreline is predominantly armored, but the structures are buried in sand and a dry beach is present. These conditions challenge the assumption that the relationship between shoreline armoring and beach erosion in Lanikai are directly correlated and that the shoreline armoring is the primary cause of the erosion.

   We acknowledge that removal of all the existing shore protection structures in Lanikai would allow for the natural migration of the shoreline and a beach would likely be present. However, removal of individual shore protection structures is unlikely to have an appreciable positive impact on the beach or lateral shoreline access.

The proposed action is consistent with the objectives of HRS Chapter 205A-2(c)(9) Beach and coastal dune protection.

*A. protect beaches and coastal dunes for:*

*i. Public use and recreation.*

The proposed action is located entirely landward of the shoreline on private property and will not infringe of public use and recreation seaward of the shoreline.

*i. The benefit of coastal ecosystems.*

The proposed action is located entirely landward of the shoreline and will have no impact on marine species, ecosystems, or habitat seaward of the shoreline. Furthermore, any ecosystem services currently provided landward of the existing seawall would be restored to their original condition after construction.

*ii. Use as natural buffers against coastal hazards.*

The subject shoreline has been armored for over 50 years. The only way to allow the dune to be used as a natural buffer against coastal hazards would be to remove the structure. The advantages and disadvantages of this option are discussed in *Section 4.5* of the EA. Removing the seawall would not achieve the project objectives and would expose the project site and adjacent properties to increased hazard risk. This would conflict with the objectives of HRS Chapter 205A-2(6)(A) to "reduce hazard to life and property from coastal hazards".

8. The EA and Coastal Assessment (*Appendix F*) provide considerable discussion of potential long-term alternatives for the Lanikai region, including managed retreat, beach nourishment, and various shore protection options. We have expanded these discussions with a level of discussion commensurate with the scope of the proposed action, as requested.

   The USACE evaluated regional beach nourishment for Lanikai as part of the Southeast Oʻahu Regional Sediment Management Demonstration Project. The report evaluated options for beach nourishment with or without stabilizing. Beach nourishment without stabilizing structures would require 182,000 cubic yards of sand with an initial cost of $33 million. Additional renourishment of the beach was projected to be necessary every 8.4 years, resulting in an estimated total cost over 50 years of $109 million. Beach nourishment with stabilizing structures would require construction of 12 groins and placement of 146,000 cy of sand with an initial cost of $33.4 million and a total cost of $41.6 million over 50 yrs. These options are clearly cost-prohibitive for a single landowner to consider.

Furthermore, the geographic scope of the projects would be disproportionate to the scope of the proposed action, which is limited to a single residential parcel. The Lanikai region spans approximately 8,000 linear feet (1.5 miles) of shoreline extending from Wailea Point to Alāla Point. There are 108 individual parcels along the Lanikai shoreline, most of which are armored by seawalls and revetments. The proposed mitigative improvements are limited to the subject property, which spans of approximately 120 linear feet of shoreline frontage, approximately 1.5 percent of the entire length of shoreline in Lanikai. It is realistically unfeasible for an individual landowner to evaluate or propose regional options that could affect the entire community of Lanikai. An effort of this magnitude would require a more substantial level of analysis.

The State of Hawaiʻi recently published a report entitled *Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawaiʻi* (Hawaiʻi Office of Planning, 2019). The report presented next steps for the State of Hawaiʻi to develop a managed retreat plan. The report states that "… to have a cogent and comprehensive retreat plan, it requires long-range planning, legal changes, funding, and some level of community agreement, understanding and support for retreat." The report also noted that retreat from chronic coastal hazards (e.g., erosion and sea level rise) can be incremental and may take decades to complete. Until managed retreat policies, regulations, tools, and programs are in place to implement on a State- or County-level, other appropriate solutions should be considered. Further, the geographic scale of managed retreat is disproportionately larger than the proposed action. It would be more appropriate to address managed retreat as part of the community development planning process. Please note that managed retreat is not identified as a priority in the Koʻolau Poko Sustainable Communities Plan.

The proposed action would not preclude the community from implementing managed retreat or beach nourishment at some point in the future.

9. Thank you for clarifying the applicable rules governing the shoreline setback area. *Section 6.2* has been revised to clarify that HRS Chapter 205A-44 generally prohibits construction activity within the shoreline area.

   Thank you for your comment. As discussed throughout the EA, there are various factors to consider in selecting the preferred design that meets the purpose of the project including the site history, neighboring property owners, promoting lateral shoreline access, and preserving the existing coastal and marine habitat. Alternative designs have been thoroughly analyzed in *Section 4.0* of the EA. There are currently no guidelines set forth by the State or the City outlining a regional approach for coastal areas to mitigate impacts of sea level rise, nor are there guidelines outlining measures private property owners may take to protect their properties from the impacts of sea level rise. Thorough analysis of the proposed action finds that this alternative is the least impactful to the surrounding environment as it does not include any demolition or removal, construction of a new seawall, and repair work will take place landwards of the existing seawall.

Thank you for your participation in the environmental review process, and please contact me if you require additional information.

Sincerely,

GROUP 70 INTERNATIONAL, INC., dba G70

Jeff Overton, AICP, LEED AP
Principal

Appendix L-3

# BLNR Easement Amendment No. S-6043 (File No. GL 6043)

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii 96813

June 13, 2014

Board of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii

GL 6043

OAHU

(1) Amendment of Grant of Non-Exclusive Easement S-6043 by Revising the Easement Area and Stipulating the Additional Consideration; and
(2) Consent to Assign and Assumption of Grantee's Rights and Obligations under Grant of Non-Exclusive Easement S-6043, James Hugh Duncan and Barbara-Jeann Duncan as Assignors to John Thomas King and Yvonne Geraldine King as Assignees, And Release of James Hugh Duncan and Barbara-Jeann Duncan from the Obligations under Grant of Non-Exclusive Easement S-6043; Kailua, Koolaupoko, Oahu, Tax Map Key: (1) 4-3-005: seaward of 056.

APPLICANT:

James Hugh Duncan and Barbara-Jeann Duncan, Assignors; and
John Thomas King and Yvonne Geraldine King, Assignees.

LEGAL REFERENCE:

Section 171-36(a)(5), Hawaii Revised Statutes, as amended.

LOCATION:

Portion of Government lands situated at Kailua, Koolaupoko, Oahu, identified by Tax Map Key: (1) 4-3-005:seaward of 056.

AREA:

1,308 square feet, more or less. See Remarks Section

TRUST LAND STATUS:

Section 5(b) lands of the Hawaii Admission Act

DHHL 30% entitlement lands pursuant to the Hawaii State Constitution: No

CHARACTER OF USE:

Right, privilege, and authority to use, maintain, repair, replace and remove existing seawall and revetment purposes.

TERM OF EASEMENT:

55 years, commencing on September 27, 2013 and expiring on September 26, 2068.

ANNUAL RENT & CONSIDERATION:

Not applicable.

RECOMMENDED PREMIUM:

Not applicable as the easement does not allow for a premium.

DCCA VERIFICATION:

Not applicable.

REMARKS:

On January 13, 2012, under agenda item D-17, the Board approved the issuance of a 55-year non-exclusive easement for revetment and seawall purposes to James and Barbara-Jeann Duncan. In September 2013, the easement (GL 6043) was issued, with an area of 1,268 square feet.

About the same time as GL 6043 was issued, the shoreline certification application submitted for the abutting property indicated the shoreline was further mauka, which resulted in an additional easement area of 40 square feet. After discussing with the applicants' agent, the Chairperson authorized a pro-rated additional consideration ($2,680) based on the greater encroachment area and would consider the encroachment resolved for the purpose of the shoreline certification. There was no amendment document to the easement. The grantees paid the additional consideration. Therefore, staff is recommending today that the Board authorize the amendment of GL 6043 by revising the easement area to 1,308 square feet and noting that the additional compensation for this area is/was $2,680 that has been fully paid.

More recently, through their attorney, the Duncans asked the Board give its consent to the assignment and assumption of grantees' rights and obligations under GL 6043, and sought to release the Duncans as the original holder of the easement from all obligations and conditions under the easement. Copies of the assignment and assumption document and the

consent are attached as **Exhibits 1** and **2**. For land documents generally, an assignment (such as for a lease or an easement) does not relieve the original lessee or grantee of an easement or lease from any of the obligations under the land document, unless specifically and expressly released. In this case, we're dealing with a shoreline encroachment easement, and not necessarily land leased for a particular purpose, such as for a gas station or other industrial use. Considering that the monetary compensation for the easement has already been fully paid, and because the new buyers of the private home and assignees of the easement will be fully responsible to comply with all of the terms and conditions of the easement (such as the procurement of the required liability insurance naming the State of Hawaii as an additional insured), staff has no objection to the Duncans' requested release from the easement obligations.

Staff notes that there is a standard condition allowing the easement to run with the abutting property. This condition removes, in effect, the necessity of seeking the Board's consent to any future assignment of the easement in the event the abutting private property is sold. Staff did not solicit comments from other agencies as the request does not involve a new disposition but is for housekeeping purposes only.

RECOMMENDATION: That the Board:

A. Amend the Grant of Non-Exclusive Easement S-6043 by revising the area to 1,308 square feet, and stipulating the additional consideration as $2,680 which the Duncans previously paid.

   1. The standard terms and conditions of the most current amendment document form, as may be amended from time to time;

   2. Review and approval by the Department of the Attorney General; and

   3. Such other terms and conditions as may be prescribed by the Chairperson to best serve the interests of the State.

B. Consent to the Assignment and Assumption of Grantees' rights and obligations under grant of Non-Exclusive Easement S-6043 from James Hugh Duncan and Barbara-Jeann Duncan, as Assignors to John Thomas King and Yvonne Geraldine King as Assignees, And Release of James Hugh Duncan and Barbara-Jeann Duncan from the Obligations under Grant of Non-Exclusive Easement S-6043, and subject to the following:

   1. Review and approval by the Department of the Attorney General; and

   2. Such other terms and conditions as may be prescribed by the Chairperson to best serve the interests of the State.

Respectfully Submitted,

Barry Cheung
Russell Y. Tsuji
Land Division

APPROVED FOR SUBMITTAL:

William J. Aila, Jr., Chairperson

**ASSIGNMENT AND ASSUMPTION OF GRANTEE'S RIGHTS AND OBLIGATIONS UNDER GRANT OF NON-EXCLUSIVE EASEMENT S-6043**

THIS INSTRUMENT ("Assignment") is made as of _____, 2014, by and between **JAMES HUGH DUNCAN and BARBARA-JEANN DUNCAN**, Individually and as Trustees of the Hugh and B.J. Duncan Family Trust dated July 22, 2013, whose address is _____ Malibu, California 90265 ("Assignors"), and **JOHN THOMAS KING and YVONNE GERALDINE KING**, husband and wife, as tenants in common, whose address is _____, Kailua, Hawaii 96734 ("Assignees") (collectively "Parties").

W I T N E S S E T H:

WHEREAS, the Assignors are parties to that certain Grant of Non-Exclusive Easement S-6043 between Assignors, as grantees, and the STATE OF HAWAII, by its Board of Land and Natural Resources as grantor, dated September 27, 2013 and recorded in the State of Hawaii Bureau of Conveyances on March 7, 2014 as Doc A-51790561 (the "Non-Exclusive Easement").

WHEREAS, as further described in the Non-Exclusive Easement attached hereto as Exhibit "A" and incorporated herein, the Non-Exclusive Easement grants Assignors the following non-exclusive and term easement rights for property located at Tax Map Key No. (1) 4-3-005:seaward of 056:

> Right, privilege, and authority to use, maintain, repair, replace and remove existing seawall and revetment, subject to the terms and conditions herein, in, over, under and across that certain parcel of land ("area"), also referred to as "premises," situate at Kailua, Koolaupoko, Oahu, Hawaii, being identified as "Non-Exclusive Seawall and Revetment Easement," containing an area of 1,268 square feet, more or less, more particularly described in Exhibit "A" and delineated on Exhibit "B," both of which are attached hereto and made parts hereof, said exhibits being respectively, a survey description and survey map prepared by the Survey Division, Department of Accounting and General Services, State of Hawaii, designated C.S.F. No. 25,194 and dated June 8, 2012, TOGETHER WITH the rights of ingress and egress to and from the easement area for all purposes in connection with the rights hereby granted.

Subject to the following terms, conditions and covenants:

1. The term of this easement shall be fifty-five (55) years, commencing on the 27th day of September, 2013, up to and including the 26th day of September, 2068, unless sooner terminated as hereinafter provided, the Grantor reserving and the Grantee yielding and paying to the Grantor at the Office of the Department of Land and Natural Resources, Honolulu, Oahu, State of Hawaii, a one time payment, payable in advance, without notice or demand of EIGHTY FIVE THOUSAND AND NO/100 DOLLARS ($85,000.00).

WHEREAS, Assignors desire to assign, and Assignees desire to acquire and assume, all of the rights, duties, obligations and liabilities of the Assignors under the Non-Exclusive

EXHIBIT "1"

Easement which runs with the land and inures to the benefit of the premises located at Kailua, Hawai`i 96734 TMK No. (1) 4-3-005:056.

NOW, THEREFORE, for and in consideration of the sum of TEN AND NO/100 DOLLARS ($10.00), the mutual covenants and promises contained herein, and of the covenants and promises contained in the Non-Exclusive Easement, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties do hereby agree as follows:

1. Assignment. Assignors, as of the date hereof, do hereby assign, transfer, and convey all of their right, title, and interest in, under, and to the Non-Exclusive Easement to Assignees, including, without limitation, all of Assignors' right, title and interest in and to all improvements thereon, to have and to hold the same unto Assignees, its successors and assigns.

2. Assumption. Assignees from and after the date hereof, hereby accepts from Assignors, the assignment, transfer, and conveyance of all of Assignors' right, title, and interest in, under, and to the Non-Exclusive Easement, and assumes all of the obligations and conditions of the Non-Exclusive Easement, including, without limitation, the obligation to perform timely all indemnification obligations, all maintenance and repair obligations, comply with all applicable laws and ordinances, procure and maintain all insurance obligations, and to perform timely, comply with and be bound by all other covenants, obligations, conditions and requirements contained in the Non-Exclusive Easement attached hereto as Exhibit "A".

3. Assignors Representations And Covenants. Assignors represent and warrant to Assignees, that as of the date of this Assignment, Assignors are not in breach, violation or default of the Non-Exclusive Easement.

4. Binding Effect. The rights and obligations of Assignors and Assignees shall be binding upon and inure to the benefit of their respective heirs, executors, personal representatives, successors and assigns.

5. Further Cooperation. The Parties agree to execute any and all other documents, agreements and instruments, and to take all other actions which may be reasonably necessary or desireable to effect the transactions contemplated hereunder.

6. Indemnity and Hold Harmless. Assignees agree to observe and perform all of the terms, covenants and conditions in the Non-Exclusive Easement contained and on the part of the grantee therein named to be observed and performed, and will indemnify, defend and hold harmless Assignors from and against any and all obligations, liabilities, claims, accounts and demands (including, without limitation, reasonable attorneys' fees) arising or accruing under the Non-Exclusive Easement out of Assignees' failure to observe and perform any of the terms, covenants and conditions in the Non-Exclusive Easement from and after the date that this Assignment is executed.

7. Governing Law. This Assignment, and the interpretation and enforcement of this Assignment, shall be governed by the laws of the State of Hawai`i.

8. Amendment. The terms, provisions, rights and obligations set forth in this Assignment may be amended at any time by the written approval of all Parties.

9. No Party Deemed Drafter. The Parties agree that neither shall be deemed to be the drafter of this Assignment, and that, in the event that this Assignment is ever construed by a court of law, such court shall not construe this instrument or any provision hereof against either party as the drafter hereof.

10. Severability. If any provision of this Assignment or the application thereof to any person or circumstance shall be invalid or unenforceable to any extent, the remainder of this Assignment and the application of its provisions shall not be affected thereby.

11. Counterparts. The Parties agree that this Assignment may be executed in counterparts, each of which shall be deemed an original, and the counterparts shall together constitute one and the same instrument, binding all Parties notwithstanding that all of the Parties are not signatory to the same counterparts. For all purposes, including, without limitation, filing and recording this Assignment, duplicate unexecuted and unacknowledged pages of the counterparts may be discarded and the remaining pages assembled as one document.

IN WITNESS WHEREOF, the parties hereto have executed this Assignment, as of the date first above written.

ASSIGNORS:

_____

JAMES HUGH DUNCAN
Individually and as Trustee of the Hugh and B.J. Duncan Family Trust dated July 22, 2013

_____

BARBARA-JEANN DUNCAN
Individually and as Trustee of the Hugh and B.J. Duncan Family Trust dated July 22, 2013

ASSIGNEES:

_____

JOHN THOMAS KING

_____

YVONNE GERALDINE KING

**CONSENT TO ASSIGNMENT AND ASSUMPTION OF GRANTEE'S RIGHTS AND OBLIGATIONS UNDER GRANT OF NON-EXCLUSIVE EASEMENT S-6043**

THIS CONSENT TO ASSIGNMENT AND ASSUMPTION OF GRANTEE'S RIGHTS AND OBLIGATIONS UNDER GRANT OF NON-EXCLUSIVE EASEMENT S-6043 (this "Agreement") is made as of _____, 2014 by and between **JAMES HUGH DUNCAN and BARBARA-JEANN DUNCAN**, Individually and as Trustees of the Hugh and B.J. Duncan Family Trust dated July 22, 2013, whose address is Malibu, California 90265 ("Assignors"), and **JOHN THOMAS KING and YVONNE GERALDINE KING**, husband and wife, as tenants in common, whose address is , Kailua, Hawaii 96734 ("Assignees").

W I T N E S S E T H:

WHEREAS, The State of Hawaii, by its Board of Land and Natural Resources ("Grantor") entered into that certain Grant of Non-Exclusive Easement S-6043 granting a Non-Exclusive Easement to Assignors in, over, under and across that certain parcel of land ("Area"), also referred to as "premises," situate at Kailua, Koolaupoko, Oahu, Hawaii, being identified as "Non-Exclusive Seawall and Revetment Easement," containing an area of 1,268 square feet, more or less, more particularly described in the Non-Exclusive Easement attached hereto and incorporated herein as Exhibit "1" (the "Non-Exclusive Easement").

WHEREAS, the Non-Exclusive Easement runs with the land and inures to the benefit of the premises located at Kailua, Hawai`i 96734, TMK No. (1) 4-3-005:056 ("Premises") and Assignors desire to convey the Premises to Assignees and desire to assign all of their right, title, and interest in, under, and to the Non-Exclusive Easement to Assignees; and

WHEREAS, Assignees desire to acquire all of Assignors' right, title, and interest in, under, and to the Non-Exclusive Easement and assume all the obligations of the Assignors under the Non-Exclusive Easement;

WHEREAS, to effectuate such assignment and assumption, Assignors and Assignees have entered into an Assignment and Assumption of Grantee's Rights and Obligations under Grant of Non-Exclusive Easement S-6043 dated _____ 2014 (the "Assignment") a copy of which is attached hereto as Exhibit "2".

WHEREAS, Grantor has agreed to consent to the Assignment and release Assignors of all obligations under the Non-Exclusive Easement subject to the terms and conditions of this Agreement.

NOW, THEREFORE, in consideration of the mutual covenants and promises contained herein, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto hereby agree as follows:

1. Assignment. Assignees hereby accept the Area in its "as is" condition as of the date hereof. Assignees acknowledge that they have received a copy of the Non-Exclusive

EXHIBIT "2"

Easement, has read the Non-Exclusive Easement and is familiar with its contents, and agrees to be bound thereby in place of Assignors. Assignees hereby agree, for the benefit of Grantor and Assignors, that he has assumed, and shall perform timely, comply with and be bound by, all of the obligations of Assignors under the Non-Exclusive Easement, from and after the date hereof, including but without limitation, the obligation to perform timely all indemnification obligations, all maintenance and repair obligations, comply with all applicable laws and ordinances, procure and maintain all insurance obligations, and to perform timely, comply with and be bound by all other covenants, obligations, conditions and requirements contained in the Non-Exclusive Easement attached hereto as Exhibit "1". Assignors confirm that they have assigned all of their rights and obligations under the Non-Exclusive Easement to Assignees.

2. Release. Grantor from and after the date hereof, hereby accepts the assignment, transfer, and conveyance of all of Assignors' right, title, and interest in, under, and to the Non-Exclusive Easement, and releases and discharges Assignors from all of the obligations and conditions of the Non-Exclusive Easement.

3. Grantor's Consent. Grantor has executed this Agreement for the sole purpose of evidencing its consent to the Assignment and its release and discharge of Assignors from the obligations of the Non-Exclusive Easement. Grantor's consent under this Agreement nor anything contained in the Assignment shall be construed to modify, waive, impair or affect any of the covenants, agreements, terms provisions, obligations or conditions contained in the Non-Exclusive Easement (except as herein expressly provide), or to, in any way, be construed as giving Assignees any greater rights than those possessed by the Assignors.

4. Binding Effect. This Agreement shall be binding upon and inure to the benefit of the parties, and their respective heirs, executors, administrators, successors and assigns.

IN WITNESS WHEREOF, the STATE OF HAWAII, by its Board of Land and Natural Resources, has caused the seal of the Department of Land and Natural Resources to be hereunto affixed and the parties hereto have caused this Agreement to be executed as of the date first above written.

GRANTOR:

STATE OF HAWAII

Approved by the Board of
Land and Natural Resources at
its meeting held on

_____
2014.

By_____
WILLIAM J. AILA, JR.
Chairperson
Board of Land and Natural Resources

APPROVED AS TO FORM:

_____
WILLIAM J. WYNHOFF
Deputy Attorney General
Dated: _____

APPROVED AND AGREED TO:

ASSIGNORS:

_____
JAMES HUGH DUNCAN
Individually and as Trustee
of the Hugh and B.J. Duncan Family Trust dated July 22, 2013

_____
BARBARA-JEANN DUNCAN
Individually and as Trustee
of the Hugh and B.J. Duncan Family Trust dated July 22, 2013

ASSIGNEES:

_____
JOHN THOMAS KING

_____
YVONNE GERALDINE KING

Appendix L-4

# Waimānalo Paradise Seawall BLNR Approval (Ref No. GL S-6083)

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii 96813

September 11, 2020

Board of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii

Ref No.: GL S-6083

OAHU

Approval of Proposed Repair and Modification of Existing Seawall and Steps Covered by Non-Exclusive Easement GL S-6083 to Waimanalo Paradise, LLC, a Delaware limited liability company, Waimanalo, Koolaupoko, Oahu, Tax Map Key: (1) 4-1-002:seaward of 007.

BACKGROUND:

At its meeting on November 14, 2014, under agenda item D-21, the Board approved the grant of a term, non-exclusive easement for seawall and steps purposes for the subject property. The easement received legislative approval during the 2015 legislative session and consideration for the easement at fair market value as determined by independent appraisal was paid to the Department. The easement was executed as GL S-6083 on October 29, 2015. GL S-6083 covers the seawall, steps and an area of fast land between the seawall and the seaward boundary of the property.

The benefitted property has since been subdivided into two parcels, Tax Map Keys (1) 4-1-002:021 and 022 owned by Nesbitt Holdings HI LLC and original easement grantee Waimanalo Paradise LLC, respectively (collectively referred to as "Grantee"). The Grantee has undertaken a project to repair the seawall. In the planning phase of the project, Grantee discovered potential conflicting language within the grant of easement document that may affect the Grantee's ability to proceed with the project. Grantee sought approval from the Board to amend GL S-6083 in order to resolve the potential conflicts. At its meeting on March 8, 2019, under agenda item D-8, the Board approved amendment of GL S-6083. A copy of the approved submittal is attached as **Exhibit A**. Additionally, the shoreline for the property was located at the base of the seawall and certified on June 5, 2018 and July 13, 2020. A copy of the most recent shoreline certification map identifying both the shoreline location and the easement area is attached as **Exhibit B**.

APPROVED BY THE BOARD OF LAND AND NATURAL RESOURCES AT ITS MEETING HELD ON September 11, 2020 GO

Section 19 of the easement document reads as follows:

> "The Grantee acknowledges and agrees that the existing seawall and steps described in Exhibit "A" and delineated on Exhibit "B" herein are nonconforming and, further, that the Grantee is prohibited from rebuilding or altering said existing seawall and steps without first obtaining the appropriate permission (e.g.,

conservation district use permit) from Grantor. In no event may Grantee extend the existing seawall and steps seaward of their present location. Furthermore, the Grantee shall keep the existing seawall and steps in good condition and repair; provided, however, if the existing seawall and steps are substantially (greater than fifty percent) or completely destroyed as determined by the Grantor, this easement and all rights granted herein shall cease and terminate automatically without any further action on the part of the Grantor."

At the time of its consideration of the easement amendment, the Board reviewed the conceptual repair plans. Staff noted that Grantee would return to the Board for approval of the proposed final project design. Grantee now comes before the Board requesting the aforementioned approval.

REMARKS:

The seawall is approximately 100 years old and is in a deteriorated condition. Deficiencies in the seawall include cracks, delamination, spalling, abrasion, undermining and sinkholes. Despite this, the seawall is currently in a serviceable condition and does not need to be removed. Grantee seeks to conduct a repair and modification project of the existing seawall, which will be located in the easement area but mauka of the certified shoreline. The objectives of the proposed project are to repair and modify the seawall to achieve adequate resistance to design soil loads, reduce wave overtopping under design wave conditions, and increase the resilience of the property to sea level rise.

The project proposes to repair delaminations and spalls from isolated small steel connections and random embedded steel at the front surface of the wall; patch vertical and diagonal cracks to mitigate potential loss of fines through cracks; fill and repair abraded and missing front surface mortar; increase scour resistance at the wall base by filling and replacing undermined areas at the toe of the wall with tremie concrete; and replace missing, settled and spalled concrete masonry unit (CMU) wall extensions with new reinforced concrete wall extensions. Proposed modifications include removal and replacement of delaminated areas of the top cap of the splash guard; removal of delaminated and spalled portions of the splash guard itself and replacement with a new reinforced concrete splash guard; installation of a 2-foot concrete width extension behind the existing seawall to provide adequate resistance to design overturning forces[1]; increase wall crest elevation; excavation to base of wall and installation geotextile fabric to fill sinkholes; and reconstruction of a 15-foot section of wall that was previously removed (now functioning as a boat ramp). Modifications to seawall height would result in the seawall having a minimum height of 9 feet along the entire structure. In the areas where the existing seawall height is currently 9 feet or higher, there will be no height increase. The 9-foot seawall height is in alignment with the adjacent parcel west of the subject property. Additionally, fronting the seawall for most of its length is a fishpond or turtle pond that has likely been in existence since kingdom times.

[1] A portion of the width extension is located outside the easement area on private land.

In addition to the proposed repairs and modifications, new structural elements include a new buttress wall constructed at the southeast end of the project site and a new ocean access constructed near the stairs at the makai property boundary[2]. The structural walls are intended to provide additional stability for the existing seawall. The buttress wall and ocean access and all associated construction work would occur landward of the existing seawall and shoreline. In accordance with the easement, there will be no improvements located seaward of the present location. A set of design plans are attached as **Exhibit C**. Pursuant to Chapter 343, Hawaii Revised Statutes (HRS), a Final Environmental Assessment with a Finding of No Significant Impact was accepted by the City and County of Honolulu, Department of Planning and Permitting, and published in the Office of Environmental Quality Control The Environmental Notice on July 8, 2020 and is linked below.

http://oeqc2.doh.hawaii.gov/Doc_Library/2020-07-08-OA-FEA-Waimanalo-Paradise-Seawall-Repair.pdf

As all work will take place mauka of the shoreline, no Conservation District Use Permit (CDUP) is required for this project. Pursuant to Section 28 of the easement, Grantee has conducted an Archaeological Inventory Survey (AIS). The State Historic Preservation Division (SHPD) has reviewed the AIS and determined that the requirements of Section 28 have been fulfilled, and the permitting issuance for the seawall modification work may proceed. A copy of SHPD's approval letter is attached as **Exhibit D**. Grantee has also consulted with the US Army Corps of Engineers (USACE), which determined that no permit is required. Even though a permit is not required, construction will be done in accordance with industry standard Best Management Practices to minimize potential environmental impacts. A copy of the USACE determination letter is attached as **Exhibit E**. Outstanding regulatory approvals include obtaining a shoreline setback variance and building permits from the City and County of Honolulu.

Staff recommends approval of this project as it is compliant with the executed easement previously reviewed and approved by the Board, Legislature and Governor, pursuant to Section 171-53, HRS. As this is a pre-existing, non-conforming seawall, the project will not impact coastal processes or public shoreline access beyond currently existing conditions. Finally, the project is conceptually consistent with what was presented to the Board when it previously approved the amendment of the easement that allowed the project planning to commence.

RECOMMENDATION: That the Board:

1) Approve the seawall repair and modification project as proposed by the Grantee.

[2] The buttress wall is located outside the easement area on private land.

Respectfully submitted,

Ian Hirokawa
Special Projects Coordinator

APPROVED FOR SUBMITTAL:

Suzanne D. Case, Chairperson

RT

# EXHIBIT A

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii 96813

March 8, 2019

Board of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii

Ref No.: GL S-6083

OAHU

Amendment of Grant of Non-Exclusive Easement S-6083 to Waimanalo Paradise, LLC, a Delaware limited liability company, for Seawall and Steps Purposes; Waimanalo, Koolaupoko, Oahu, Tax Map Key: (1) 4-1-002: seaward of 007. The purpose of the amendment is to modify an easement provision that is in conflict with the rights and privileges granted by the easement.

BACKGROUND:

At its meeting on November 14, 2014, under agenda item D-21, the Board approved the grant of a term, non-exclusive easement for seawall and steps purposes for the subject property. The easement received legislative approval during the 2015 legislative session and consideration for the easement at fair market value as determined by independent appraisal was paid to the Department. The easement was executed as GL S-6083 on October 29, 2015. GL S-6083 covers the seawall, steps and an area of fast land between the seawall and the seaward boundary of the property. A copy of the easement document is attached as exhibit A.

The current landowner of landward parcel, TMK (1) 4-1-002:007, and grantee of the easement, Waimanalo Paradise LLC, a Delaware limited liability company (Grantee) is now planning to undertake a project to repair the seawall. In planning the project, Grantee discovered potential conflicting language within the grant of easement document that may affect the Grantee's ability to proceed with the project. Grantee seeks approval from the Board to amend GL S-6083 in order to resolve the potential conflicts.

REMARKS:

The seawall is approximately 100 years old and is in a deteriorated condition. Deficiencies in the seawall include cracks, delamination, spalling, abrasion, undermining and sinkholes. After conducting preliminary engineering assessments, Grantee desires to install a supplemental structure landward of the existing seawall that would serve to reinforce and stabilize the existing seawall, with minimal modification to the existing structure. The shoreline for the property was located at the base of the seawall and certified on June 5, 2018. The supplemental structure would be located mauka of the

APPROVED BY THE BOARD OF
LAND AND NATURAL RESOURCES
AT ITS MEETING HELD ON
March 8, 2019 GO.

EXHIBIT A

certified shoreline but within the easement area.

Installation of the supplemental structure is preferred over the significant alteration or replacement of the existing seawall that would otherwise be required. This would allow the existing seawall to preserve its non-conforming status. Additionally, the easement prohibits the grantee from extending the seawall and steps seaward of their present location. The proposed project would ensure compliance with that requirement of the easement, as well as minimize impacts to the marine environment by avoiding any placement of structures in the shoreline area and conservation district.

Section 18 of easement states:

> "No building, structure or improvements other than the existing seawall and steps shall be placed or constructed within the easement area."

Narrowly construed, section 18 could be interpreted to prohibit any improvement to support the existing seawall and other steps beyond minor repair. However, the easement granting clauses bestow to the grantee the right, privilege and authority to use, maintain, repair, replace and remove existing seawall and steps. Additionally, the easement permits the existing seawall to be rebuilt and improved provided that approval is granted by the Board. Therefore, it appears that section 18 conflicts with the other provisions of the easement by prohibiting any structure other than the existing seawall and steps in the easement area.

The Board is requested to approve the amendment of section 18 in order to conform to the other provisions in the easement. If approval is granted by the Board, staff will work with the Grantee on appropriate language for the amendment, provided that the amendment is subject to acceptance by the Chairperson and the Attorney General. Finally, upon amendment of the easement, Grantee will work to finalize the project scope and proceed with regulatory approvals. As required by the easement, Grantee will also return to the Board to request approval for the project.

RECOMMENDATION: That the Board:

1) Approve the amendment of section 18 of GL S-6083 as described above, with the amendment subject to acceptance by the Chairperson and the Attorney General.

Respectfully submitted,

Ian Hirokawa
Special Projects Coordinator

APPROVED FOR SUBMITTAL:

Suzanne D. Case, Chairperson

LAND COURT SYSTEM | REGULAR SYSTEM

Return by Mail ( ) Pickup ( ) To:

Total Number of Pages:

Tax Map Key No. (1) 4-1-002:007 seaward

GRANT OF NON-EXCLUSIVE EASEMENT S-6083

THIS INDENTURE, made and entered into this 29th day of OCTOBER, 2015, by and between the STATE OF HAWAII, by its Board of Land and Natural Resources, hereinafter referred to as the "Grantor," and WAIMANALO PARADISE LLC, a Delaware limited liability company, whose address is 525 Monroe Street, Suite 1900, Chicago, Illinois 60661-3693, Attn Seth R. Madorsky, hereinafter referred to as the "Grantee."

WITNESSETH THAT:

The Grantor, pursuant to Sections 171-13 and 171-53(c), Hawaii Revised Statutes and Section 183C-5, Hawaii Revised Statutes, to the extent applicable, for and in consideration of the rent to be paid and of the terms, conditions, and covenants herein contained, all on the part of the Grantee to be kept, observed, and performed, does hereby grant unto the Grantee, the following non-exclusive and term easement rights:

Right, privilege, and authority to use, maintain, repair, replace and remove existing seawall and steps, subject to the terms and conditions herein,

601773_1.DOC

FORM. APPR'D. Department of the Attorney General

in, over, under and across that certain parcel of land ("area"), also referred to as "premises," situate at Pahonu, Waimanalo, Koolaupoko, Oahu, Hawaii, being identified as "Non-Exclusive Seawall and Steps Easement," containing an area of 4539 square feet, more or less, more particularly described in Exhibit "A" and delineated on Exhibit "B," both of which are attached hereto and made parts hereof, said exhibits being respectively, a survey description and survey map prepared by the Survey Division, Department of Accounting and General Services, State of Hawaii, designated C.S.F. No. 25,416 and dated February 17, 2015, TOGETHER WITH the rights of ingress and egress to and from the easement area for all purposes in connection with the rights hereby granted.

TO HAVE AND TO HOLD the easement rights unto the Grantee, its successors and assigns, SUBJECT, HOWEVER, to the following terms, conditions and covenants:

1. The term of this easement shall be fifty-five (55) years, commencing on the 29th day of OCTOBER, 2015, up to and including the 28th day of OCTOBER, 2070, unless sooner terminated as hereinafter provided, the Grantor reserving and the Grantee yielding and paying to the Grantor at the Office of the Department of Land and Natural Resources, Honolulu, Oahu, State of Hawaii, a one time payment, payable in advance, without notice or demand of SIXTY ONE THOUSAND FOUR HUNDRED AND NO/100 DOLLARS ($61,400.00).



PRELIM. APPR'D.
Department of the
Attorney General

THE GRANTOR AND THE GRANTEE COVENANT AND AGREE AS FOLLOWS:

1. The Grantee shall at all times with respect to the easement area use due care for public safety and agrees to indemnify, defend, and hold the Grantor harmless from and against any claim or demand for loss, liability, or damage, including claims for bodily injury, wrongful death, or property damage, arising out of or resulting from: 1) any act or omission on the part of the Grantee relating to the Grantee's use, occupancy, maintenance, or enjoyment of the easement area; 2) any failure on the part of the Grantee to maintain the easement area and sidewalks, roadways, and parking areas adjacent thereto in the Grantee's use and control, and including any accident, fire or nuisance, growing out of or caused by any failure on the part of the Grantee to maintain the easement area in a safe condition; and 3) from and against all actions, suits, damages, and claims by whomsoever brought or made by reason of the Grantee's non-observance or non-performance of any of the terms, covenants, and conditions of this grant of non-exclusive easement or the rules, regulations, ordinances, and laws of the federal, state, municipal or county governments.

2. The Grantor reserves unto itself, its successors and assigns, the full use and enjoyment of the easement area and the right to grant to others rights and privileges for any and all purposes affecting the easement area, provided, however, that the rights herein reserved shall not be exercised by the Grantor and similar grantee(s) in any manner which interferes unreasonably with the Grantee in the use of the easement area for the purposes for which this easement is granted.

3. The placement of all improvements in or upon the easement area by the Grantee shall be done without cost or expense to the Grantor and shall remain the property of the Grantee and subject to the terms of paragraphs 10 and 14 may be removed or otherwise disposed of by the Grantee at any time; provided, that the removal shall be accomplished with minimum disturbance to the easement area which shall be restored to its original condition, or as close thereto as possible, within a reasonable time after removal.

4. Upon completion of any work performed in or upon the easement area, the Grantee shall remove therefrom all equipment and unused or surplus materials, if any, and shall leave the easement area in a clean and sanitary condition satisfactory to the Grantor.

5. Throughout the term of this easement (unless sooner abandoned or otherwise terminated herein) this easement shall run with the land and shall inure to the benefit of the real property described as tax map key no. (1) 4-1-002:007, provided however, that the Grantee shall carry the required liability insurance covering the easement area and comply with all other terms and conditions as provided herein, and that the Grantee, or authorized representative of the Grantee's estate, shall notify the Grantor in writing when this easement is sold, assigned, conveyed, or otherwise transferred, and Grantee shall notify the Grantee's successors or assigns of the insurance requirement in writing, separate and apart from this easement document.

6. The Grantee shall keep the easement area and the improvements thereon in a safe, clean, sanitary, and orderly condition, and shall not make, permit or suffer, any waste, strip, spoil, nuisance or unlawful, improper, or offensive use of the easement area.

7. The Grantee covenants, for itself, its successors and assigns, that the use and enjoyment of the land herein granted shall not be in support of any policy which discriminates against anyone based upon race, creed, sex, color, national origin, religion, marital status, familial status, ancestry, physical handicap, disability, age or HIV (human immunodeficiency virus) infection.

8. The Grantee, in the exercise of the rights granted herein, shall comply with all of the requirements of the federal, state, and county authorities and shall observe all county ordinances and state and federal laws, rules and regulations, now in force or which may hereinafter be in force.

9. These easement rights shall cease and terminate, and the easement area shall automatically be forfeited to the Grantor, without any action on the part of the Grantor, in the event of non-use or abandonment by the Grantee of the easement area, or any portion thereof, for a consecutive period of one (1) year.

10. The Grantee shall, at the end of the term or other sooner termination of this easement, peaceably deliver unto the Grantor possession of the premises, together with all improvements existing or constructed thereon or Grantee shall remove such improvements and shall restore the premises to their original state, or as close thereto as possible, within a reasonable time and at the expense of the Grantee. If the

Grantee does not remove the improvements or restore the premises to the satisfaction of the Grantor, the Grantor may effect such action and the Grantee agrees to pay all costs and expenses for such action. Furthermore, upon the expiration, termination, or revocation of this easement, should the Grantee fail to remove any and all of Grantee's personal property from the premises, after notice thereof, the Grantor may remove any and all of Grantee's personal property from the premises, and either deem the property abandoned and dispose of the property or place the property in storage at the cost and expense of Grantee and the Grantee does agree to pay all costs and expenses for disposal, removal, or storage of the personal property. This provision shall survive the termination of the easement.

11. The Grantee shall procure and maintain, at its own cost and expense, in full force and effect throughout the term of this easement, comprehensive general liability insurance, or its equivalent, with an insurance company or companies licensed or authorized to do business in the State of Hawaii with an AM Best rating of not less than "A-" or other comparable and equivalent industry rating, in an amount of at least $1,000,000.00 for each occurrence and $2,000,000.00 aggregate, and with coverage terms acceptable to the Chairperson of the Board of Land and Natural Resources. The policy or policies of insurance shall name the State of Hawaii as an additional insured and a copy shall be filed with the State of Hawaii, Department of Land and Natural Resources. The insurance shall cover the entire easement area, including all buildings, improvements, and grounds and all roadways or sidewalks on or adjacent to the easement in the use or control of the Grantee.

The Grantee, prior to entry and use of the easement area or within fifteen (15) days after the effective date of this easement, whichever is sooner, shall furnish the Grantor with a certificate(s) showing the policy(s) to be initially in force, keep the certificate(s) on deposit during the entire easement term, and furnish a like certificate(s) upon each renewal of the policy(s). This insurance shall not be cancelled, limited in scope of coverage, or nonrenewed until after thirty (30) days written notice has been given to the Grantor. The Grantor may at any time require the Grantee to provide Grantor with copies of the insurance policy(s) that are or were in effect during the easement period.

The Grantor shall retain the right at any time to review the coverage, form, and amount of the insurance required by this easement. If, in the opinion of the Grantor, the insurance provisions in this easement do not provide adequate

protection for the Grantor, the Grantor may require Grantee to obtain insurance sufficient in coverage, form, and amount to provide adequate protection. The Grantor's requirements shall be reasonable but shall be designed to assure protection for and against the kind and extent of the risks which exist at the time a change in insurance is required. The Grantor shall notify Grantee in writing of changes in the insurance requirements and Grantee shall deposit copies of acceptable insurance policy(s) or certificate(s) thereof, with the Grantor incorporating the changes within thirty (30) days after receipt of the notice.

The procuring of the required policy(s) of insurance shall not be construed to limit Grantee's liability under this easement nor to release or relieve the Grantee of the indemnification provisions and requirements of this easement. Notwithstanding the policy(s) of insurance, Grantee shall be obligated for the full and total amount of any damage, injury, or loss caused by Grantee's negligence or neglect connected with this easement.

It is agreed that any insurance maintained by the Grantor will apply in excess of, and not contribute with, insurance provided by Grantee's policy.

12. Grantor reserves the right to withdraw the easement for public use or purposes, at any time during the term of this easement upon the giving of reasonable notice to Grantee. Upon withdrawal of the easement, Grantor shall return to Grantee a portion of the one-time payment described in paragraph 1. For purposes of determining the amount to be returned to the Grantee, the term "net payment" shall mean the one-time payment described in paragraph 1 reduced by any non-refundable portion of the one-time payment, if any, that Grantor was required by statute to pay to any other entity or body. The amount returned to Grantee shall be the net payment prorated for the unused term of the easement.

13. The Grantee shall not mortgage, hypothecate, or pledge the premises, any portion, or any interest in this easement without the prior written approval of the Chairperson of the Board of Land and Natural Resources and any mortgage, hypothecation, or pledge without the approval shall be null and void.

14. Time is of the essence in this agreement and if the Grantee shall abandon the premises, or if this easement and premises shall be attached or taken by operation of law, or if any assignment is made of the Grantee's property for the benefit

of creditors, or if Grantee shall fail to observe and perform any of the covenants, terms, and conditions contained in this easement and on its part to be observed and performed, and this failure shall continue for a period of more than sixty (60) calendar days after delivery by the Grantor of a written notice of breach or default, by personal service, registered mail or certified mail to the Grantee at its last known address and to each mortgagee or holder of record having a security interest in the premises, the Grantor may, subject to the provisions of section 171-21, Hawaii Revised Statutes, at once re-enter the premises, or any part, and upon or without the entry, at its option, terminate this easement without prejudice to any other remedy or right of action for any preceding or other breach of contract; and in the event of termination, at the option of Grantor, all improvements shall remain and become the property of the Grantor or shall be removed by Grantee.

15. In the event the Grantor seeks to forfeit the privilege, interest, or estate created by this easement, each recorded holder of a security interest may, at its option, cure or remedy the default or breach within sixty (60) calendar days, from the date of receipt of the Grantor's notice, or within an additional period allowed by Grantor for good cause, and add the cost to the mortgage debt and the lien of the mortgage. Upon failure of the holder to exercise its option, the Grantor may: (a) pay to the holder from any moneys at its disposal, including the special land and development fund, the amount of the mortgage debt, together with interest and penalties, and secure an assignment of the debt and mortgage from the holder or if ownership of the privilege, interest, or estate shall have vested in the holder by way of foreclosure, or action in lieu thereof, the Grantor shall be entitled to the conveyance of the privilege, interest, or estate upon payment to the holder of the amount of the mortgage debt, including interest and penalties, and all reasonable expenses incurred by the holder in connection with the foreclosure and preservation of its security interest, less appropriate credits, including income received from the privilege, interest, or estate subsequent to the foreclosure; or (b) if the property cannot be reasonably reassigned without loss to the State, then terminate the outstanding privilege, interest, or estate without prejudice to any other right or remedy for any preceding or other breach or default and use its best efforts to redispose of the affected land to a qualified and responsible person free and clear of the mortgage and the debt secured; provided that a reasonable delay by the Grantor in instituting or prosecuting its rights or remedies shall not operate as a waiver of these rights or to deprive it of a remedy when it may still otherwise hope to resolve the problems created by the breach or

default. The proceeds of any redisposition shall be applied, first, to reimburse the Grantor for costs and expenses in connection with the redisposition; second, to discharge in full any unpaid purchase price or other indebtedness owing the Grantor in connection with the privilege, interest, or estate terminated; third, to the mortgagee to the extent of the value received by the State upon redisposition which exceeds the fair market value of the land as previously determined by the State's appraiser; and fourth, to the owner of the privilege, interest, or estate.

16. In case the Grantor shall, without any fault on its part, be made a party to any litigation commenced by or against the Grantee as a result of this grant of non-exclusive easement (other than condemnation proceedings), the Grantee shall pay all costs, including reasonable attorney's fees and expenses incurred by or imposed on the Grantor; furthermore, the Grantee shall pay all costs, including reasonable attorney's fees and expenses, which may be incurred by or paid by the Grantor in enforcing the covenants and conditions of this grant of non-exclusive easement, or in the collection of delinquent rental, fees, taxes, and any and all other applicable charges attributed to said easement area.

17. The Grantee shall not cause or permit the escape, disposal or release of any hazardous materials except as permitted by law. Grantee shall not allow the storage or use of such materials in any manner not sanctioned by law or by the highest standards prevailing in the industry for the storage and use of such materials, nor allow to be brought onto the easement area any such materials except to use in the ordinary course of Grantee's business, and then only after written notice is given to Grantor of the identity of such materials and upon Grantor's consent which consent may be withheld at Grantor's sole and absolute discretion. If any lender or governmental agency shall ever require testing to ascertain whether or not there has been any release of hazardous materials by Grantee, then the Grantee shall be responsible for the reasonable costs thereof. In addition, Grantee shall execute affidavits, representations and the like from time to time at Grantor's request concerning Grantee's best knowledge and belief regarding the presence of hazardous materials on the easement area placed or released by Grantee.

The Grantee agrees to indemnify, defend, and hold Grantor harmless, from any damages and claims resulting from the release of hazardous materials on the easement area occurring while Grantee is in possession, or elsewhere if caused by Grantee or persons acting under Grantee. These covenants shall survive

the expiration or earlier termination of this easement.

For the purpose of this easement "hazardous material" shall mean any pollutant, toxic substance, hazardous waste, hazardous material, hazardous substance, or oil as defined in or pursuant to the Resource Conservation and Recovery Act, as amended, the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, the Federal Clean Water Act, or any other federal, state, or local environmental law, regulation, ordinance, rule, or bylaw, whether existing as of the date hereof, previously enforced, or subsequently enacted.

18. No building, structure or improvements other than the existing seawall and steps shall be placed or constructed within the easement area.

19. The Grantee acknowledges and agrees that the existing seawall and steps described in Exhibit "A" and delineated on Exhibit "B" herein are nonconforming and, further, that the Grantee is prohibited from rebuilding or altering said existing seawall and steps without first obtaining the appropriate permission (e.g., conservation district use permit) from Grantor. In no event may Grantee extend the existing seawall and steps seaward of their present location. Furthermore, the Grantee shall keep the existing seawall and steps in good condition and repair; provided, however, if the existing seawall and steps are substantially (greater than fifty percent) or completely destroyed as determined by the Grantor, this easement and all rights granted herein shall cease and terminate automatically without any further action on the part of the Grantor.

20. The public shall have access across the easement area at all times.

21. The Grantee shall hold harmless, defend, and indemnify the State of Hawaii, its boards, departments, agencies, and public and appointed officials from any and all claims for harm, taking, damages, loss of land, or specific performance that may arise out of or result from the existence and effect of the existing seawall and steps on the flow of ocean water that, in turn, may affect or cause lateral erosion of shoreline land in either direction along the shore from the existing seawall and steps.

22. The Grantee shall comply with all applicable federal and state environmental impact regulations.

23. The Grantee shall maintain and employ debris, pollution and contamination control measures, safeguards and techniques to prevent debris, pollution or contamination to the ocean waters, streams or waterways resulting from the Grantee's, its invitee's, or its agent's use, maintenance, repair and operation of the easement area, and shall take immediate corrective action in the event of such pollution or contamination to immediately remove the cause of such pollution or contamination, and shall immediately clean the easement area and its surrounding waters of such pollutant or contaminant and restore to the Grantor's satisfaction the areas affected by such pollution or contamination, all at the Grantee's own cost and expense.

24. The Grantee shall maintain, repair and upkeep the existing seawall and steps in a condition satisfactory to the Grantor, and in a manner that will enhance the public shoreline and access thereto. Any improvements to the existing seawall and steps shall be subject to the prior written approval of the Board of Land and Natural Resources and any other appropriate permission. Upon abandonment, expiration or termination of this easement, if desired by the Grantor, the Grantee, its successors and assigns, at its sole cost and expense, shall remove the existing seawall and steps and restore the area to a condition satisfactory to the Grantor.

25. Should future development necessitate a relocation of the easement granted herein, or any portion thereof, the relocation shall be accomplished at the Grantee's own cost and expense.

26. Section 171-53(c), Hawaii Revised Statutes, requires the prior approval of the Governor of the State of Hawaii to be obtained for this term easement. The Governor of the State of Hawaii's approval was obtained on May 29, 2015.

27. Section 171-53(c), Hawaii Revised Statutes, requires the prior authorization of the legislature by concurrent resolution to be obtained for this term easement. House Concurrent Resolution No. 34, H.D. 1 was adopted in final form on April 28, 2015.

28. The Grantee shall conduct an archaeological inventory survey, including assessment of the seawall, prior to the issuance of any future permit involving ground-disturbing activities.

29. This easement is subject to any shoreline

hardening policy that may be adopted by the Board of Land and Natural Resources prior to execution of the grant of easement.

IN WITNESS WHEREOF, the STATE OF HAWAII, by its Board of Land and Natural Resources, has caused the seal of the Department of Land and Natural Resources to be hereunto affixed and the parties hereto have caused this Indenture to be executed as of the day, month, and year first above written.

STATE OF HAWAII

Approved by the Board of Land and Natural Resources at its meeting held on November 14, 2014.

By _____
SUZANNE D. CASE
Chairperson
Board of Land and Natural Resources

GRANTOR

WAIMANALO PARADISE LLC, a Delaware limited liability company

By: _____
Judy Grimanis
Its Manager

By _____
Its _____

By _____
Its _____

GRANTEE

APPROVED AS TO FORM:

_____
AMANDA J. WESTON
Deputy Attorney General

Dated: June 22, 2015

601773_1.DOC



PRELIM. APPR'D.
Department of the Attorney General

STATE OF )
) SS.
COUNTY OF )

On this _____ day of _____, 20_____, before me personally appeared _____, to me personally known, who, being by me duly sworn or affirmed, did say that such person executed the foregoing instrument as the free act and deed of such person, and if applicable in the capacity shown, having been duly authorized to execute such instrument in such capacity.

_____
Notary Public, State of

_____

My commission expires: _____

STATE OF Illinois )
) SS.
COUNTY OF Cook )

On this 9th day of September, 20 15, before me personally appeared Judy Grimanis, to me personally known, who, being by me duly sworn or affirmed, did say that such person executed the foregoing instrument as the free act and deed of such person, and if applicable in the capacity shown, having been duly authorized to execute such instrument in such capacity.

Dorinda A Karom
Notary Public, State of
Illinois

OFFICIAL SEAL
DORINDA A KAROM
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES:09/11/18

My commission expires: 9-11-18

601773_1.DOC



PRELIM. APPR'D.
Department of the
Attorney General

STATE OF HAWAI'I
SURVEY DIVISION
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
HONOLULU

C.S.F. No. 25,416

February 17, 2015

NON-EXCLUSIVE SEAWALL AND STEPS EASEMENT
Fronting Land Court Application 997

Pahonu, Waimanalo, Koolaupoko, Oahu, Hawaii

Comprising the following:

A. Portion of the Government (Crown) Land of Waimanalo.

B. Portion of Grant 7618 to Nohokula.

Beginning at the southeast corner of this easement and at the northeast corner of Land Court Application 997, the coordinates of said point of beginning referred to Government Survey Triangulation Station "MAKAPUU" being 6023.18 feet North and 8944.61 feet West, thence running by azimuths measured clockwise from True South:-

| | | | |
|---|---|---|---|
| 1. | 132° 15' | 61.93 | feet along Land Court Application 997; |
| 2. | 203° 16' | 3.10 | feet along Land Court Application 997; |
| 3. | 119° 17' | 50.70 | feet along Land Court Application 997; |
| 4. | 37° 03' | 3.84 | feet along Land Court Application 997; |
| 5. | 123° 22' | 8.40 | feet along Land Court Application 997; |
| 6. | 116° 27' | 28.68 | feet along Land Court Application 997; |
| 7. | 106° 40' | 99.74 | feet along Land Court Application 997; |

PRELIM. APP'D.
Department of the Attorney General



EXHIBIT "A"

| | | | |
|---|---|---|---|
| 8. | 14° 59' | 19.45 | feet along Land Court Application 997; |
| 9. | 48° 39' | 11.43 | feet along Land Court Application 997; |
| 10. | 107° 35' | 1.05 | feet along Land Court Application 997; |
| 11. | 54° 20' | 23.90 | feet along Land Court Application 997; |
| 12. | 133° 40' | 42.50 | feet along Land Court Application 997; |
| 13. | 106° 56' | 93.50 | feet along Land Court Application 997; |
| 14. | 108° 30' | 103.50 | feet along Land Court Application 997; |
| 15. | 179° 35' | 16.90 | feet along Land Court Application 997; |

Thence along the seaward face of concrete and rock seawall for the next sixteen (16) courses, the direct azimuths and distances between points along said seaward face of concrete and rock seawall being:

| | | | |
|---|---|---|---|
| 16. | 197° 04' | 0.73 | of a foot; |
| 17. | 287° 41' | 110.97 | feet; |
| 18. | 351° 21' | 12.50 | feet; |
| 19. | 285° 56' | 81.75 | feet; |
| 20. | 286° 46' | 24.70 | feet; |
| 21. | 357° 42' | 8.00 | feet; |
| 22. | 285° 37' | 15.00 | feet; |
| 23. | 216° 57' | 6.00 | feet; |
| 24. | 278° 46' | 15.80 | feet; |
| 25. | 195° 32' | 23.50 | feet; |
| 26. | 286° 37' | 102.00 | feet; |
| 27. | 297° 44' | 34.00 | feet; |

PRELIM. APPR'D.
Department of the
Attorney General

| | | |
|---|---|---|
| 28. | 207° 02' | 5.00 feet; |
| 29. | 299° 40' | 61.30 feet; |
| 30. | 38° 37' | 4.50 feet; |
| 31. | 312° 22' | 58.05 feet; |
| 32. | 31° 42' | 3.68 feet along Grant 11,795 to Louis C. Brown to the point of beginning and containing an AREA OF 4539 SQUARE FEET, MORE OR LESS. |

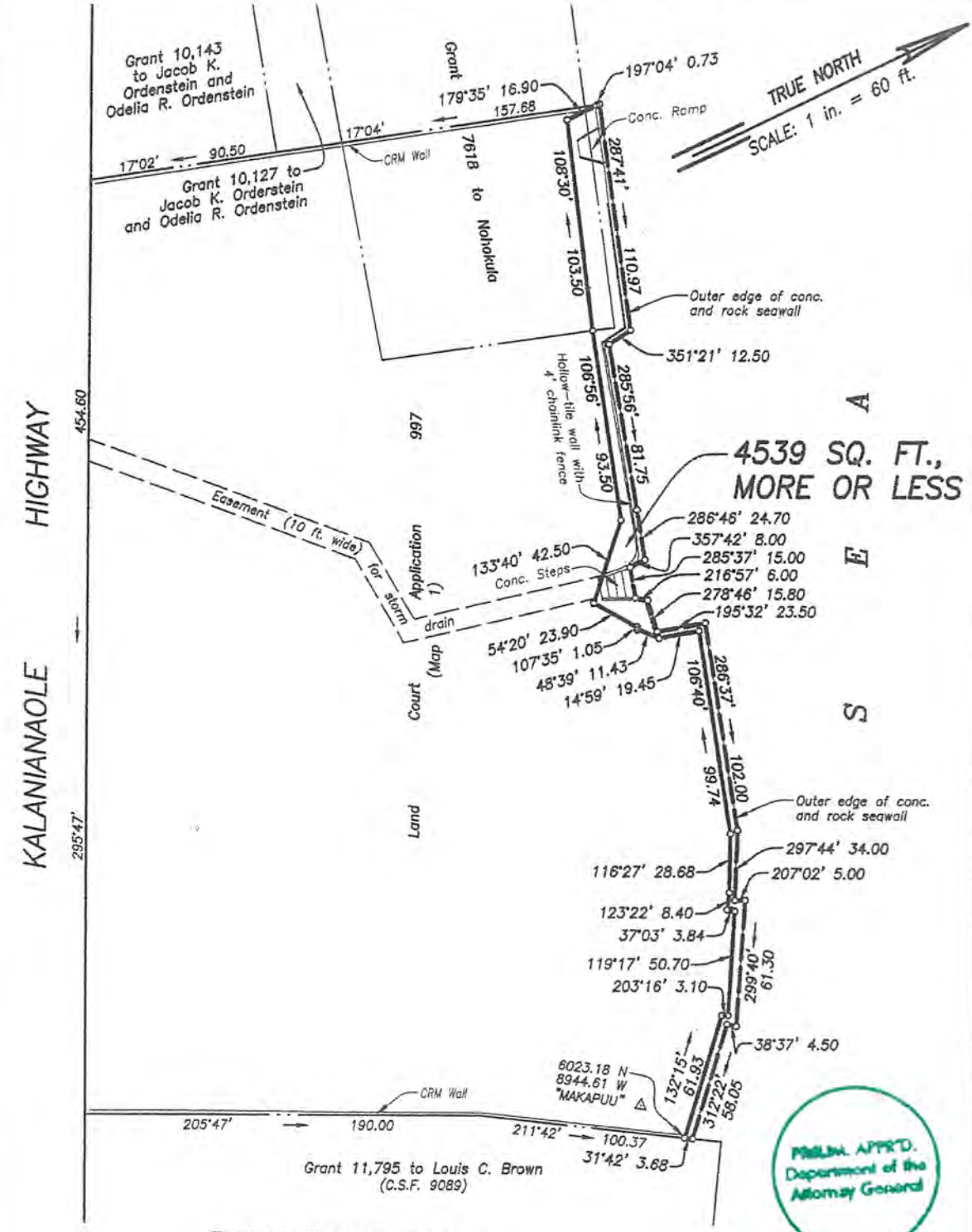
SURVEY DIVISION
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
STATE OF HAWAII

By: Gerald Z. Yonashiro
Land Surveyor

rm

Compiled from map and desc. furn. by Hawaii Land Consultants. Said map and desc. have been examined and checked as to form and mathematical correctness but not on the ground by the Survey Division.

PRELIM. APPR'D.
Department of the Attorney General




REDUCED NOT TO SCALE

# NON-EXCLUSIVE SEAWALL AND STEPS EASEMENT

Fronting Land Court Application 997

Pahonu, Waimanalo, Koolaupoko, Oahu, Hawaii

Job 0-008(15)

C. BK.

Scale: 1 inch = 60 feet

**EXHIBIT "B"**

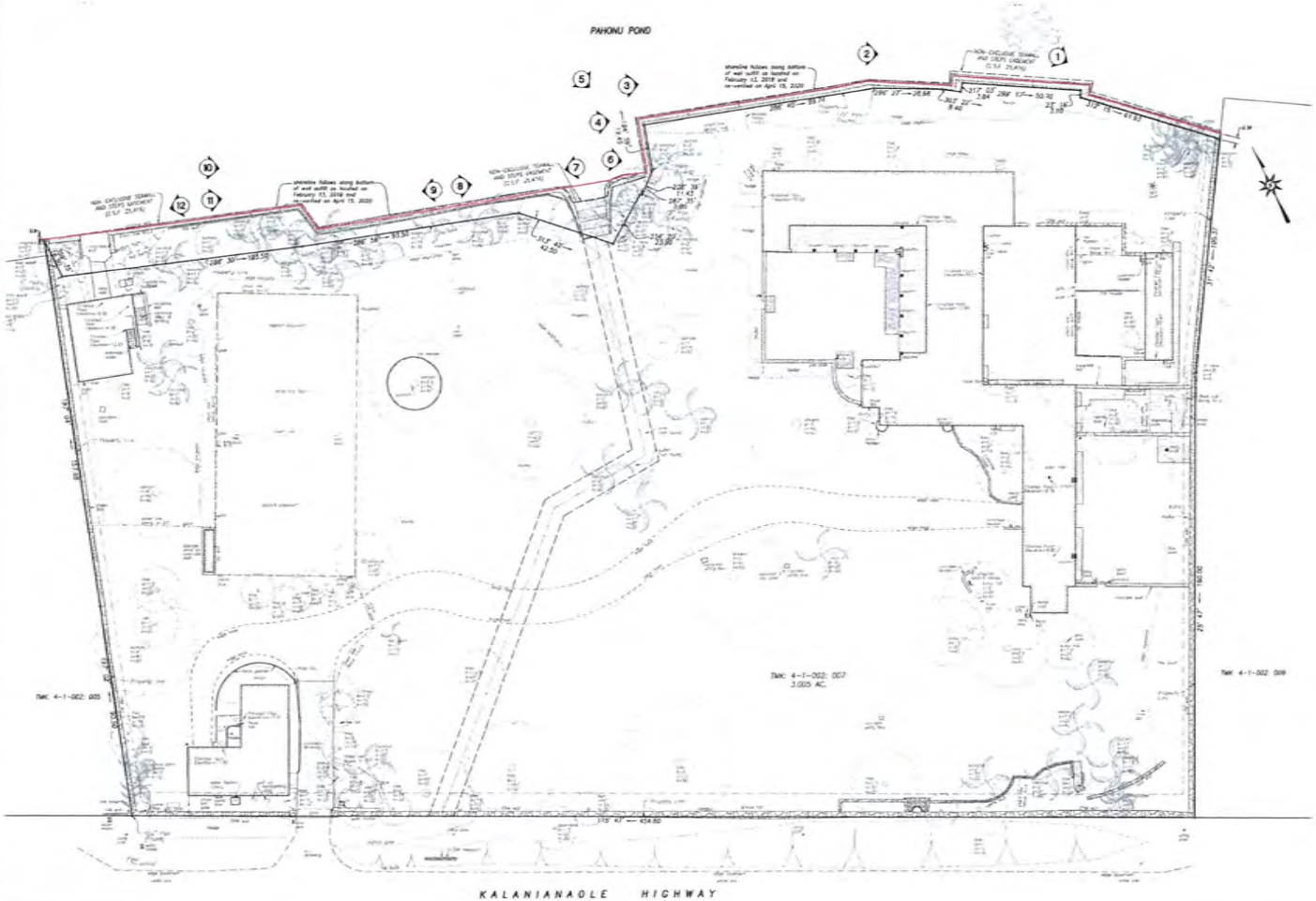
Fronting Parcel 7 of TMK: 4-1-02

SURVEY DIVISION
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
STATE OF HAWAII

C.S.F. NO. 25,416

RDM February 17, 2015

# EXHIBIT B


# EXHIBIT B

ABBREVIATIONS:

CRM Concrete Rubble Masonry

NOTES:

Azimuths are referred to Government Triangulation Station "Makapuu" △.

(1) Denotes approximate position and direction of shoreline photographs.

GRAPHIC SCALE 1"=20'

20 10 0 20 40 60


KN Surveying, LLC
500 ALAKAWEA STREET, #1004
HONOLULU, HAWAII 96817
PH. 524-7100


## SHORELINE SURVEY
## AT 41-505 KALANIANAOLE HIGHWAY

OWNER: WAIMANALO PARADISE LLC

PAHONU, WAIMANALO, KOOLAUPOKO, OAHU, HAWAII
AS SHOWN ON LAND COURT APPLICATION 997 MAP 1
TAX MAP KEY: 4-1-002: 007
SCALE: 1 IN. = 20 FT.

STATE OF HAWAII LICENSED PROFESSIONAL LAND SURVEYOR No. 9043

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

LICENSED PROFESSIONAL LAND SURVEYOR No. 9043

APRIL 15, 2020 FIELD BOOK NO. 153: 61

42" X 30"

# EXHIBIT C

EROSION CONTROL AND SILT CONTAINMENT:

1. SEAWALL MAINTENANCE SHALL NOT BE DONE DURING STORMS OR PERIODS OF HIGH WAVE CONDITIONS.
2. SILT CURTAINS AND/OR BOOMS WILL BE INDIVIDUALLY ANCHORED AND REGULARLY INSPECTED DURING MAINTENANCE OPERATIONS, AS NEEDED.
3. SILT CURTAINS AND/OR BOOMS WILL BE LEFT IN PLACE EACH NIGHT, AS NEEDED. ALL ANCHORS AND BOOMS WILL BE INSPECTED PRIOR TO SUNSET.
4. THE CONTRACTOR SHALL KEEP MAINTENANCE ACTIVITIES UNDER SURVEILLANCE, MANAGEMENT AND CONTROL TO AVOID POLLUTION OF SURFACE OR MARINE WATERS. DAILY VISUAL INSPECTION OF THE PROJECT SITE AND ITS ENVIRONS WILL BE CONDUCTED BY A DESIGNATED INDIVIDUAL, OR HIS REPRESENTATIVE, TO VERIFY THAT THE PERMITTED ACTIVITIES DO NOT RESULT IN UNCONTROLLED ADVERSE ENVIRONMENTAL IMPACTS.
5. VISUAL INSPECTIONS WILL INCLUDE MONITORING OF THE EFFECTIVENESS OF THE SILT CURTAINS AND/OR BOOMS TO ENSURE PROPER FUNCTION.
6. VISUAL INSPECTIONS WILL BE DOCUMENTED WITH PHOTOGRAPHS AND WRITTEN DESCRIPTIONS, IF NECESSARY.
7. VISUAL MONITORING WILL INCLUDE DIVING INSPECTIONS FOR TURBIDITY OUTSIDE OF THE CONFINES OF THE SILT CURTAINS AND/OR BOOMS. IN THE EVENT THAT TURBIDITY IS OBSERVED OUTSIDE OF THE SILT CURTAINS, WORK SHALL STOP AND THE SILT CURTAINS SHALL REMAIN IN PLACE UNTIL THE TURBIDITY DISSIPATES. SILT CURTAINS, BOOMS, AND ANCHORS SHALL BE INSPECTED AFTER DISSIPATION AND PRIOR TO RETURNING TO MAINTENANCE OPERATIONS.

REPAIR, RETROFIT AND NEW WALL CONCRETE:

1. CONCRETE CONSTRUCTION SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE ACI 318-05.
2. CONCRETE FOR NEW CONSTRUCTION SHALL BE REGULAR WEIGHT HARD ROCK CONCRETE WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
3. CONCRETE FOR TREMIE GROUT SHALL BE REGULAR WEIGHT HARD ROCK CONCRETE AND SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,000 PSI AND SHALL BE SELF-LEVELING, COHESIVE, NON-BLEEDING, NON-PLUME, NON-SEGREGATING WITH A SPREAD OF 22 IN. PROVIDE ANTI-PLUME ADMIXTURE FOR TREMIE CONCRETE. THE CONTRACTOR SHALL SUBMIT MIX DESIGN TO THE ENGINEER FOR APPROVAL. PROPOSED ALTERNATIVE GROUT MATERIALS AND PROCEDURES SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
4. MAXIMUM WATER TO CEMENTITIOUS MATERIALS RATIO SHALL BE 0.40.
5. CONCRETE DELIVERY TICKETS SHALL RECORD ALL FREE WATER IN THE MIX AT BATCHING BY PLANT, FOR CONSISTENCY BY DRIVER, AND ANY ADDITIONAL REQUEST BY CONTRACTOR IF PERMITTED BY THE MIX DESIGN.
6. REINFORCING BARS SHALL BE DUPLEX STAINLESS STEEL REBAR CONFORMING TO ASTM A276, A995, AND A959, GRADE 75.

GENERAL UNDERMINING REPAIR PROCEDURES:

1. THE CONTRACTOR SHALL HAVE A MINIMUM OF 5 YEARS PERFORMING SEAWALL/MARINE REPAIRS, AND PROVIDE A LIST TO THE ENGINEER OF 2 PROJECTS PERFORMED WITHIN THE LAST 10 YEARS WITH A SIMILAR REPAIR SCOPE.
2. DUE TO THE BASE OF PORTIONS OF THE WALL POSSIBLY BEING LOCATED BELOW WATER LEVEL EVEN AT LOW TIDES IT IS ASSUMED THAT WATER WILL BE PRESENT IN THE VOID SPACES. THEREFORE TREMIEING AND PUMPING OF CONCRETE OR REPAIR MATERIAL IS ANTICIPATED. THE CONTRACTOR SHALL TAKE INTO ACCOUNT THE VARIABLE WATER LEVEL AND WAVE CONDITIONS WHEN SCHEDULING AND COORDINATING THE WORK AND WHEN SECURING EQUIPMENT, SUPPLIES AND OTHER ITEMS AND PERSONNEL AT THE WORK SITE.
3. PRIOR TO FILLING THE VOIDS UNDER THE WALL FOOTING, LOOSE DEBRIS AND SOFT MATERIAL SHOULD BE CLEARED FROM THE VOID SPACE AS IS FEASIBLE. STONES LARGER THAN CAN BE DISLODGED AND LIFTED OUT BY HAND BY ONE MAN SHALL BE LEFT IN PLACE.
4. CONCRETE AND MORTAR SHALL BE PLACED ON SOUND SUBSTRATE SUCH AS CORAL IF POSSIBLE.
5. MATERIAL UNDER THE VOID SPACE AND EXCAVATIONS SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER.
6. AT SECTIONS WHERE VOIDS EXTEND MORE THAN 6 IN. IN FROM THE WALL FACE, THE WORK SHALL BE PERFORMED IN ALTERNATING SECTIONS OF MAXIMUM 10 FT LENGTHS WITH MINIMUM 10 FT LENGTH OF UNREPAIRED OR PREVIOUSLY REPAIRED SECTIONS ON EITHER END OF THE SECTION TO BE REPAIRED. CONCRETE SHALL BE ALLOWED TO CURE FOR A MINIMUM OF 2 DAYS AT A REPAIRED VOID SECTION PRIOR TO WORKING ON ADJACENT VOIDS.
7. CORED OR CHIPPED HOLES FOR CONCRETE PLACEMENT SHALL BE A MAXIMUM DIAMETER OF 6 IN. AND SPACED A MINIMUM OF 3 FT APART. HOLES SHALL BE PLACED SO AS TO ALLOW FOR PROPER PLACEMENT OF CONCRETE TO FILL THE VOID. HOLES SHALL BE FILLED WITH REPAIR MORTAR OR CONCRETE AFTER VOID FILLING.
8. DRILLED AIR HOLES SHALL BE A MAXIMUM DIAMETER OF 1 IN. AND SPACED A MINIMUM OF 1 FT APART. HOLES SHALL BE PLACED SO AS TO ALLOW FOR AIR RELEASE FOR PROPER PLACEMENT OF CONCRETE TO FILL THE VOID. AT A MINIMUM THE OUTER 6 IN. DEPTH OF THE HOLES SHALL BE FILLED WITH REPAIR MORTAR AFTER VOID FILLING.
9. CONCRETE MIX AND INSTALLATION METHOD MAY BE ADJUSTED DEPENDING ON ACCESS FOR EQUIPMENT, SIZE OF VOID SPACE TO BE FILLED, AND WEATHER CONDITIONS (TIDES, WATER LEVEL, GROUNDWATER, ETC.) INCLUDING USE OF ALTERNATE MATERIALS, UPON PRIOR APPROVAL OF THE ENGINEER.

DETERIORATED MORTAR REPOINTING AND PARGING:

1. REPAIR MORTAR FOR REPOINTING AND PARGING DETERIORATED MORTAR BETWEEN AND OVER STONES AND FILLING SMALL OR SHALLOW VERTICAL VOIDS SHALL BE MAPEI PLANITOP X, OR APPROVED EQUAL. INSTALL PER MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS.
2. DETERIORATED AND LOOSE MORTAR AND DEBRIS SHALL BE REMOVED PRIOR TO PLACEMENT OF NEW MORTAR, AND DISPOSED OF AT AN APPROVED LOCATION.
3. SLURRY COAT SHALL BE SCRUBBED INTO THE SUBSTRATE AND THE VOID FILLED WITH REPAIR MORTAR IN LIFTS.

SCOPE OF WORK:

SCOPE OF WORK INCLUDES THE RETROFIT OF AN EXISTING CRM SEAWALL.

BUILDING CODE

DESIGN IS BASED ON THE INTERNATIONAL BUILDING CODE, 2006 EDITION. CONSTRUCTION SHALL CONFORM WITH APPLICABLE SECTIONS OF THIS CODE.

REFERENCE STANDARDS SHALL BE THE EDITION NOTED IN THE CODE, UNLESS OTHERWISE INDICATED.

CONCRETE SPALL REPAIRS:

1. ANTI-CORROSION COATING APPLIED ON EXISTING CORRODED REINFORCING OR STRUCTURAL STEEL TO BE COVERED WITH CONCRETE OR REPAIR MORTAR SHALL BE MAPEFER 1K BY MAPEI CORPORATION, SIKA ARMATEC 110 EPOCEM BY SIKA CORPORATION, OR APPROVED EQUAL.
2. REPAIR MORTAR FOR TOP SURFACE REPAIRS SHALL BE MAPEI PLANITOP 18 BY MAPEI CORPORATION, SIKATOP 122 PLUS BY SIKA CORPORATION, OR APPROVED EQUAL. MAX 3/8" HARD ROCK AGGREGATE THAT IS CLEANED, WASHED, AND PREDAMPENED SHALL BE ADDED AT MANUFACTURER'S RECOMMENDED RATE TO PRODUCE REPAIR MATERIAL WITH COARSE AGGREGATE.
3. REPAIR MORTAR FOR VERTICAL OR UNDERSIDE SURFACES TO BE REPAIRED IN LIFTS SHALL BE MAPEI PLANITOP X BY MAPEI CORPORATION, SIKATOP 123 PLUS BY SIKA CORPORATION, OR APPROVED EQUAL.
4. ANTI-CORROSION COATING AND REPAIR MORTAR SHALL BE SUPPLIED BY THE SAME MANUFACTURER.
5. MANUFACTURER'S PROCEDURES SHALL BE FOLLOWED FOR INSTALLATION OF ALL PRODUCTS.

APPROXIMATE REPAIR QUANTITIES – EAST LOT

| ITEM | UNITS | WALL 1 | WALL 2 | WALL 3A | WALL 3B | WALL 3C | WALL 6 | WALL 7 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| REPAIR VERTICAL SPALLS AND DELAMINATIONS | SQ FT | 10 | 10 | 5 | 0 | 5 | 0 | 0 | 30 |
| PATCH VERTICAL AND DIAGONAL CRACKS > ⅛ IN. WITH REPAIR MORTAR | LIN FT | 0 | 0 | 10 | 10 | 20 | 0 | 0 | 40 |
| PARGE ABRADED/MISSING FRONT SURFACE MORTAR (⅛ IN. TO 1 IN. DEPTH) | SQ FT | 50 | 50 | 650 | 150 | 350 | 0 | 0 | 1250 |
| FILL ABRADED AND MISSING FRONT SURFACE MORTAR (1 IN. TO 6 IN. DEPTH) | SQ FT | 0 | 0 | 20 | 30 | 30 | 0 | 0 | 80 |
| FILL UNDERMINED/SOFT BASE WITH TREMIE CONCRETE/DRYPACK MORTAR (WALL LENGTH x WIDTH IN FROM FRONT FACE x AVG. DEPTH BELOW WALL) | FT | 0 | 0 | 80x1 x1 | 30x2 x2 | 80x2 x2 | 0 | 0 | |
| REPLACE DELAMINATED SPLASHGUARD TOP CAP (MAX 5 IN. DEEP) | LIN FT | 20 | 30 | 100 | 0 | 0 | 0 | 0 | 150 |
| REPLACE DELAMINATED/SPALLED SPLASHGUARD | LIN FT | 0 | 0 | 0 | 30 | 80 | 0 | 0 | 110 |
| ENCLOSE EXISTING BOAT RAMP | LIN FT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CONCRETE BUTTRESS WALL | LIN FT | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 |
| BEACH ACCESS WALL | LIN FT | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 30 |

NOTES:

1. REPAIR QUANTITIES ARE APPROXIMATE AND ARE TO BE VERIFIED BY VISUAL OBSERVATION, SOUNDING, AND ACTUAL PERFORMANCE OF THE REPAIRS.
2. UNDERMINING AND ASSOCIATED VOID LOCATION AND SIZES AS WELL AS THE SUITABILITY OF THE SUBSTRATE SHALL BE CONFIRMED DURING DEBRIS REMOVAL.

SHEET LIST



EXHIBIT C


Structural design for fine architecture™
ENGINEERS


CHRIS WILSON LICENSED PROFESSIONAL ENGINEER No. 14034-S HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.

EXP 4/30/22

Chris Wilson

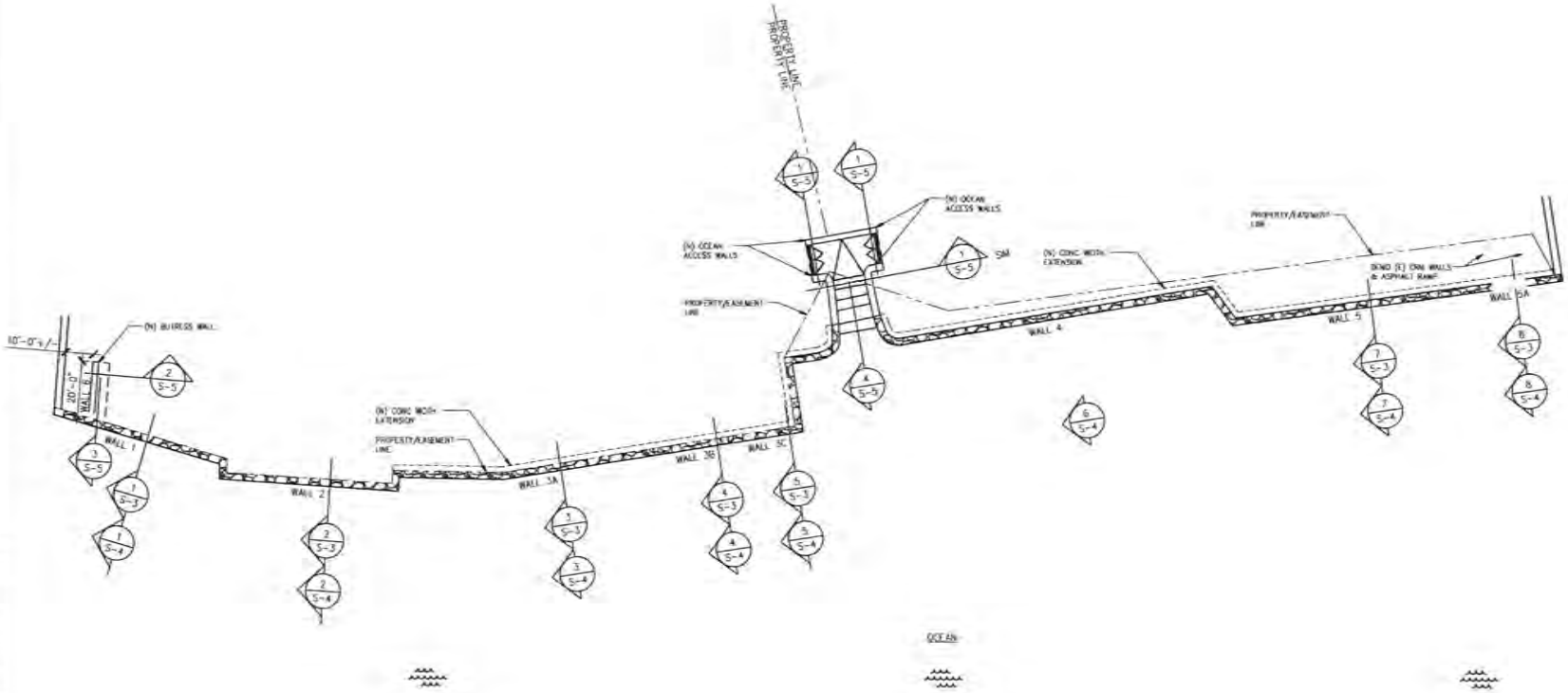
WAIMANALO PARADISE
EAST LOT
41-505 KALANIANA'OLE HWY
WAIMANALO, HI 96795
TMK: 4-1-002:007

| ISSUE: | DATE: |
|---|---|
| PERMIT SET | 08-24-20 |

JOB# 18067.H2

CONTENTS:
GENERAL NOTES

S-0




OVERALL SEAWALL PLAN

SCALE: 1" = 20'

NORTH

GRAPHIC SCALE

1" = 20'

20 0 20 40

SCALE IN FEET

Structural design for fine architecture™

ENGINEERS

CHRIS WILSON LICENSED PROFESSIONAL ENGINEER No. 14884-S HAWAII, U.S.A.

THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.

EXP 4/30/22

Chris Wilson

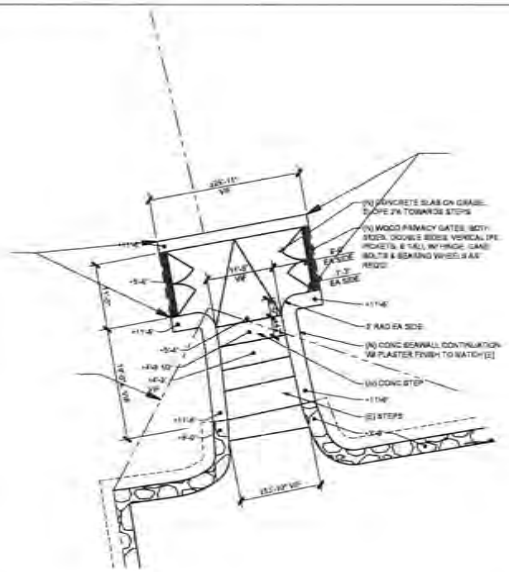
WAIMANALO PARADISE
EAST LOT
41-505 KALANIANA'OLE HWY
WAIMANALO, HI 96795
TMK: 4-1-002:007

| ISSUE: | DATE: |
|---|---|
| PERMIT SET | 08-24-20 |

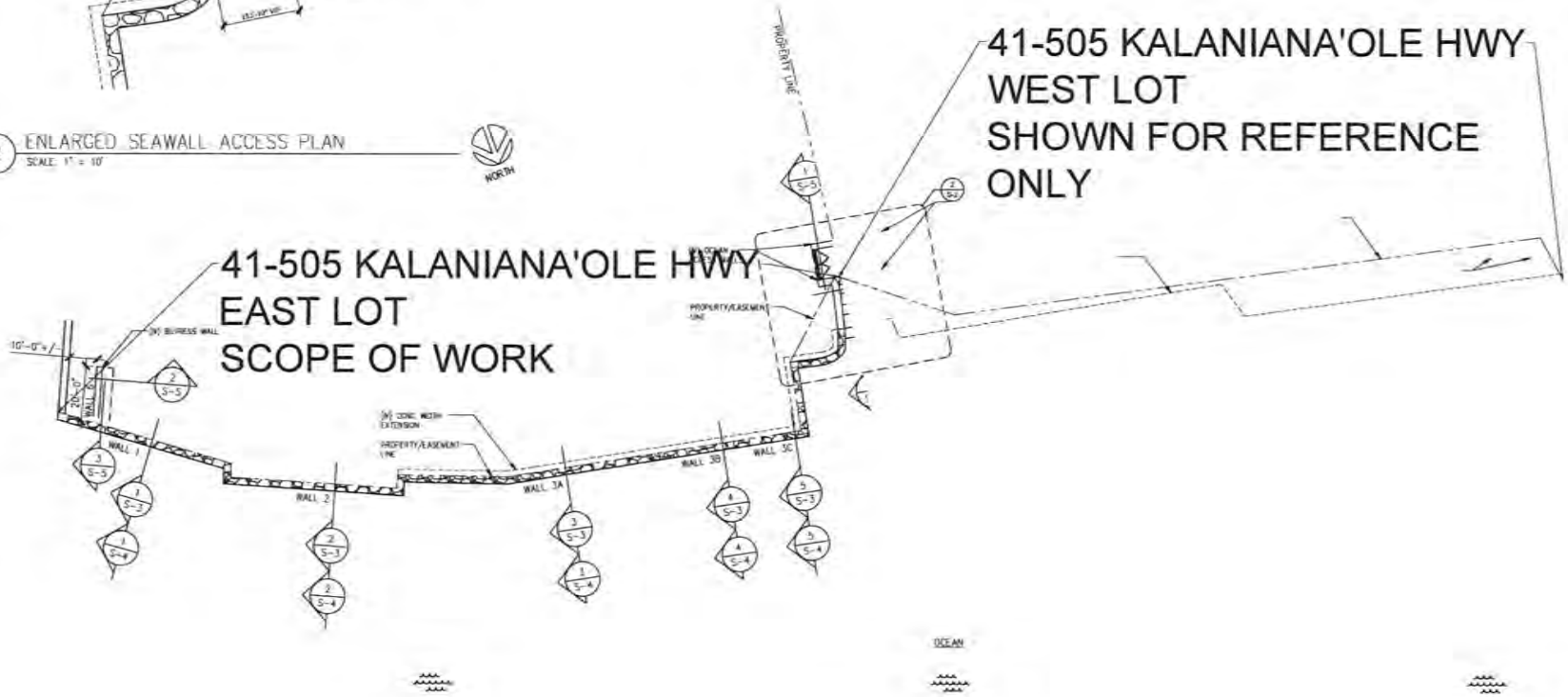
JOB# 18067.H2

CONTENTS:
OVERALL SEAWALL PLAN

S-1




2 ENLARGED SEAWALL ACCESS PLAN
SCALE: 1" = 10'




EAST LOT SEAWALL PLAN – SCOPE OF WORK
SCALE: 1" = 20'

GRAPHIC SCALE
1" = 20'
20' 0 20 40
SCALE IN FEET

Structural design for fine architecture.
ENGINEERS

CHRIS WILSON
LICENSED PROFESSIONAL ENGINEER
No. 14998-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.

CW 4/30/22
Chris Wilson

WAIMANALO PARADISE
EAST LOT
41-505 KALANIANA'OLE HWY
WAIMANALO, HI 96795
TMK: 4-1-002:007

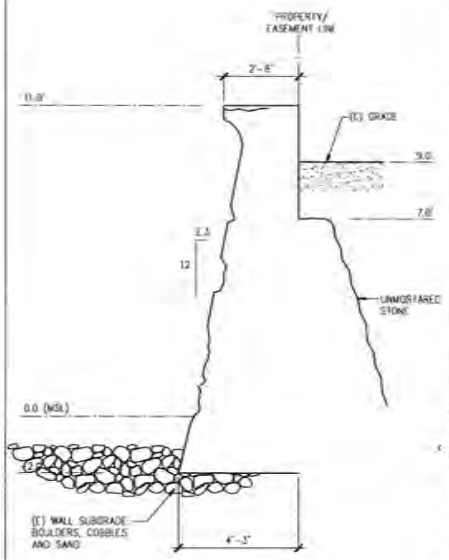
| ISSUE: | DATE: |
|---|---|
| PERMIT SET | 08-24-20 |

JOB# 18067.H2

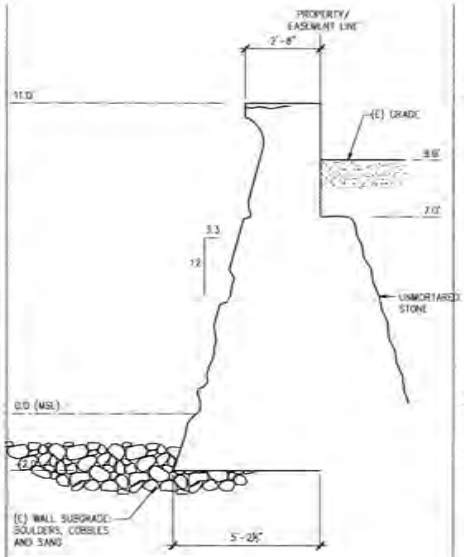
CONTENTS:
EAST LOT
SEAWALL PLAN -
SCOPE OF WORK

S-2

U:\PROJECTS\2014 FOLDERS\18067.H2 Waimanalo Paradise - East Lot Seawall.dwg\ AS1\S2.dwg, WAIS.PLOTTED ON 8/25/2020 9:11 AM BY DITOS




1 / S-2 EXISTING WALL 1 SECTION
SCALE: 1/2" = 1'-0"




2 / S-2 EXISTING WALL 2 SECTION
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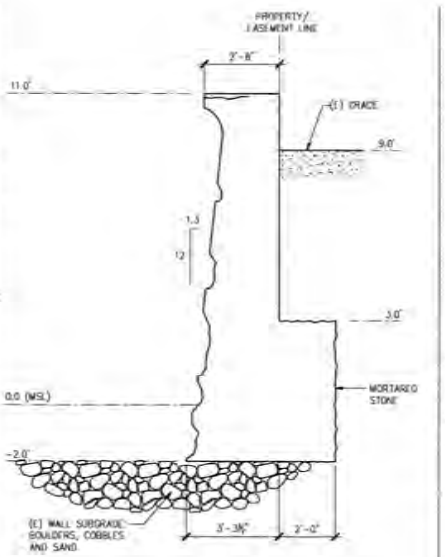
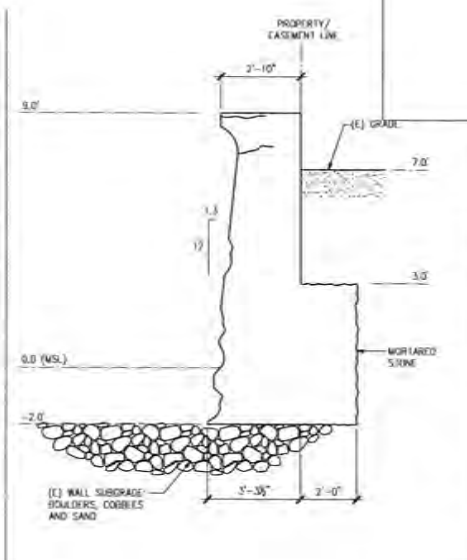
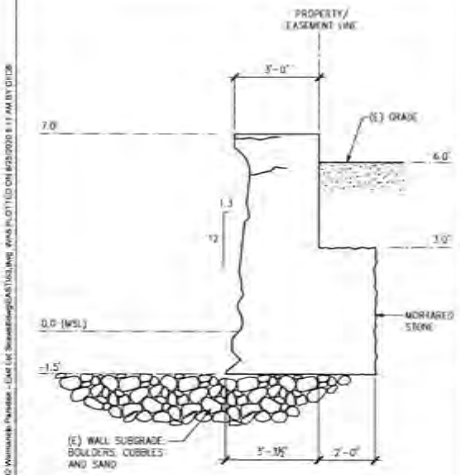


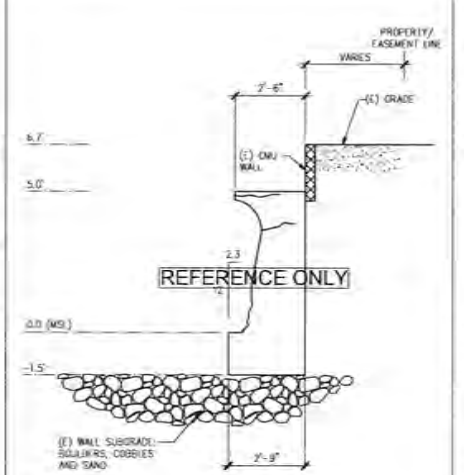

3 / S-2 EXISTING WALL 3A SECTION
SCALE: 1/2" = 1'-0"



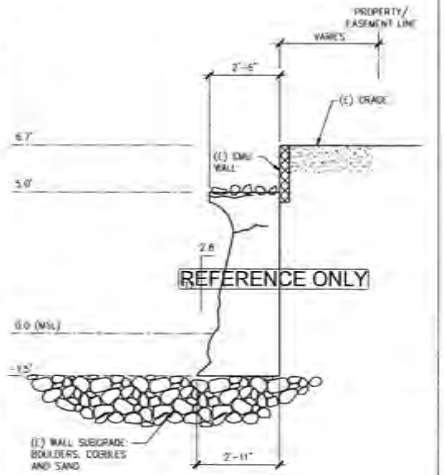

4 / S-2 EXISTING WALL 3B SECTION
SCALE: 1/2" = 1'-0"




5 / S-2 EXISTING WALL 3C SECTION
SCALE: 1/2" = 1'-0"




8 / S-2 EXISTING WALL 4 SECTION
SCALE: 1/2" = 1'-0"




7 / S-2 EXISTING WALL 5 SECTION
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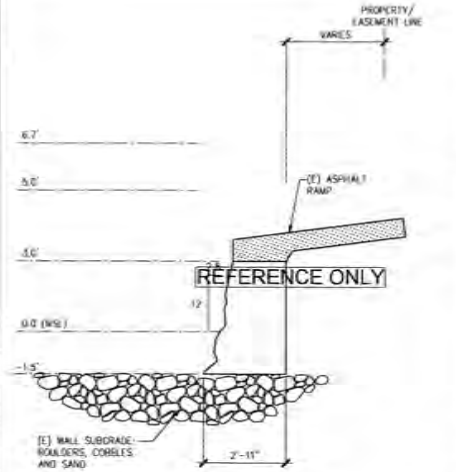


GRAPHIC SCALE
1/2"=1'-0" 0 1' 2' 4'
SCALE IN FEET

6 / S-2 EXISTING WALL 5A SECTION
SCALE: 1/2" = 1'-0"

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EXISTING SEAWALL SECTIONS

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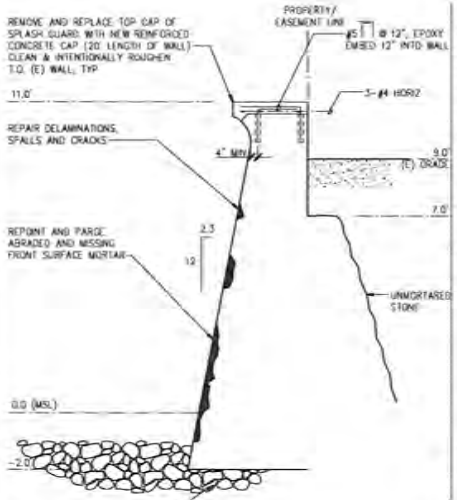
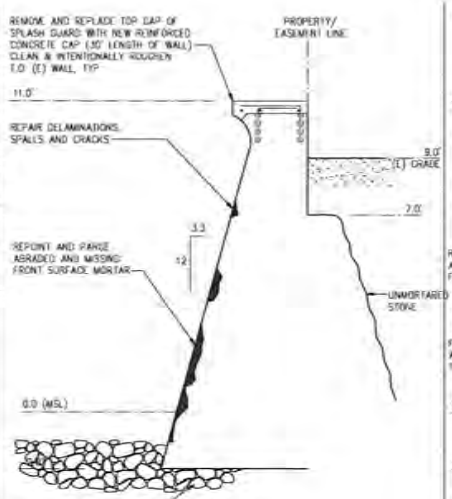
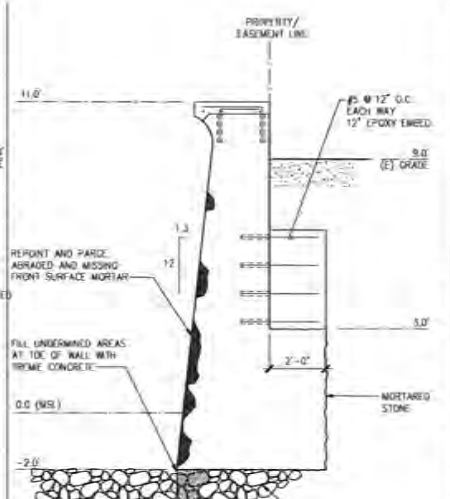


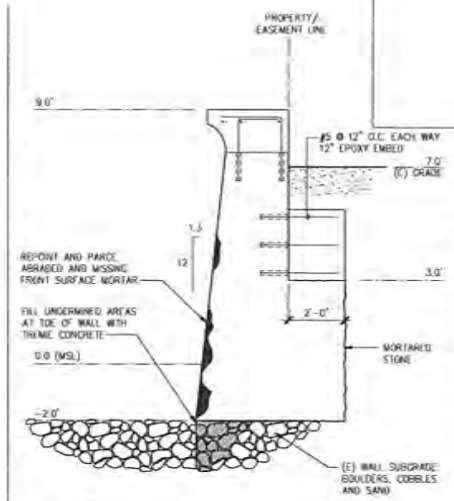

1 S-4 WALL 1 SECTION
SCALE: 1/2" = 1'-0"



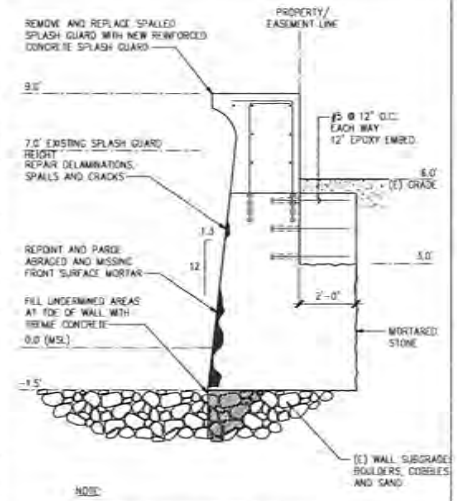

2 S-4 WALL 2 SECTION
SCALE: 1/2" = 1'-0"



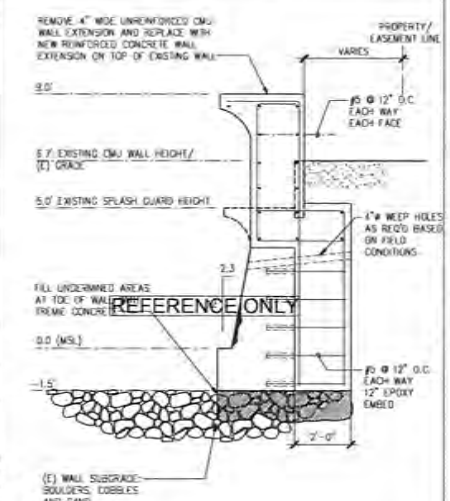

3 S-4 WALL 3A SECTION
SCALE: 1/2" = 1'-0"



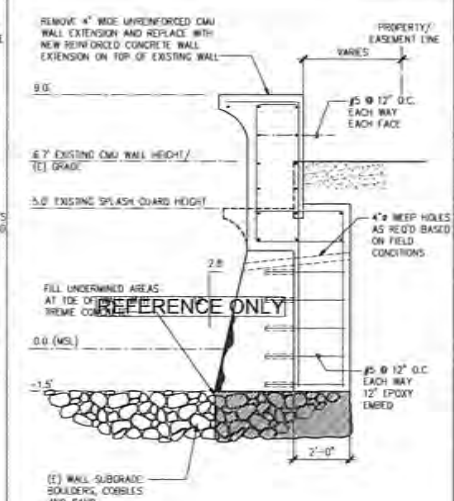

4 S-4 WALL 3B SECTION
SCALE: 1/2" = 1'-0"




5 S-4 WALL 3C SECTION
SCALE: 1/2" = 1'-0"

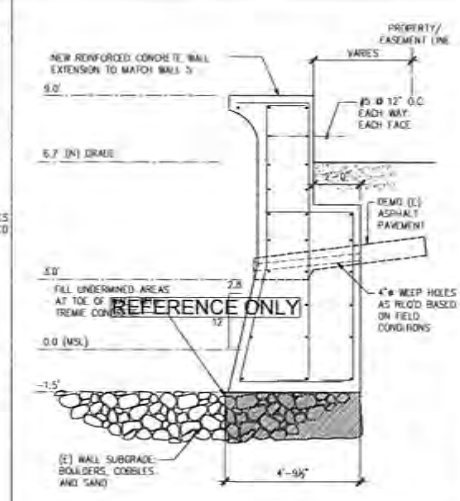



6 S-4 WALL 4 SECTION
SCALE: 1/2" = 1'-0"




7 S-4 WALL 5 SECTION
SCALE: 1/2" = 1'-0"

GRAPHIC SCALE
1/2"=1'-0" 0' 1' 2' 4'
SCALE IN FEET




8 S-4 WALL 5A SECTION
SCALE: 1/2" = 1'-0"

GRAPHIC SCALE
1/2"=1'-0" 0' 1' 2' 4'
SCALE IN FEET

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TMK: 4-1-002:007

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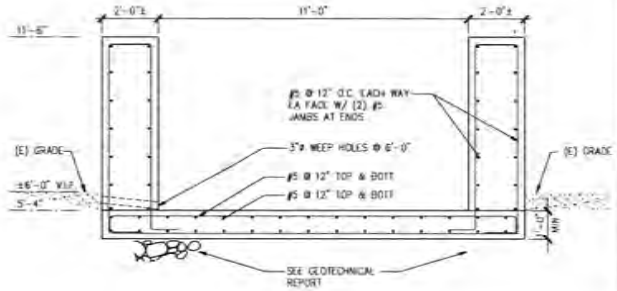
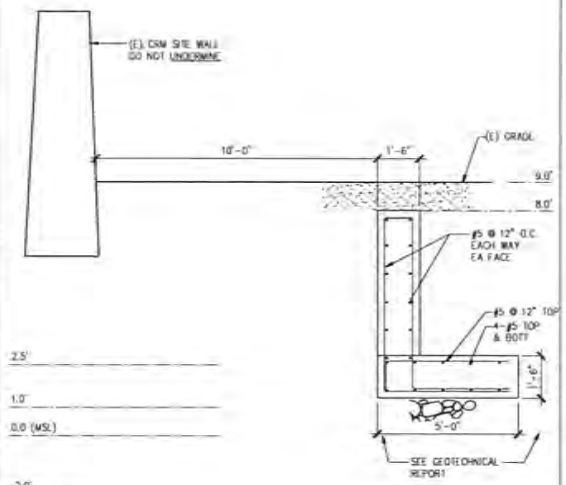



1 S-5 WALL 7 SECTION-BEACH ACCESS WALLS
SCALE: 1/2" = 1'-0"




2 S-5 WALL 6 SECTION-BUTTRESS WALL
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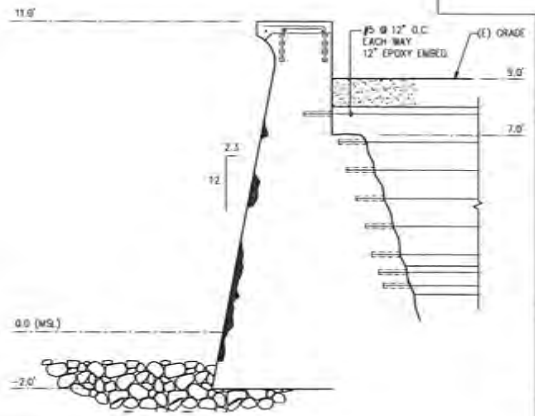
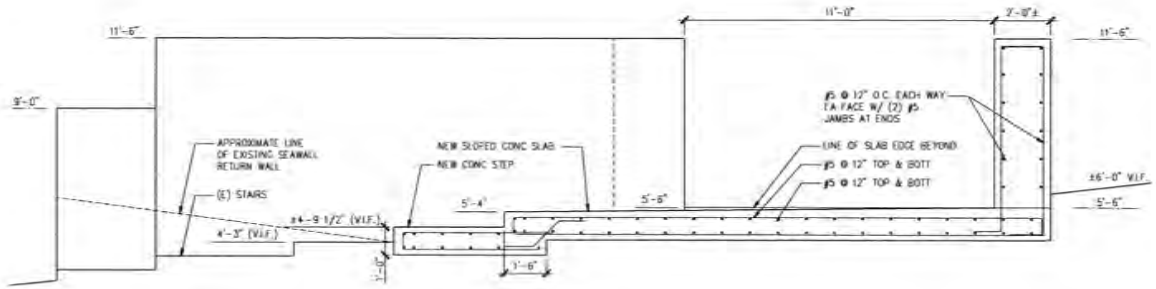



3 S-5 WALL 6 CONN TO WALL 1
SCALE: 1/2" = 1'-0"




4 S-5 WALL 7 SECTION-BEACH ACCESS WALLS
SCALE: 1/2" = 1'-0"

GRAPHIC SCALE
1/2"=1'-0" 0' 1' 2' 4'
SCALE IN FEET

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CONTENTS:
SEAWALL RETROFIT

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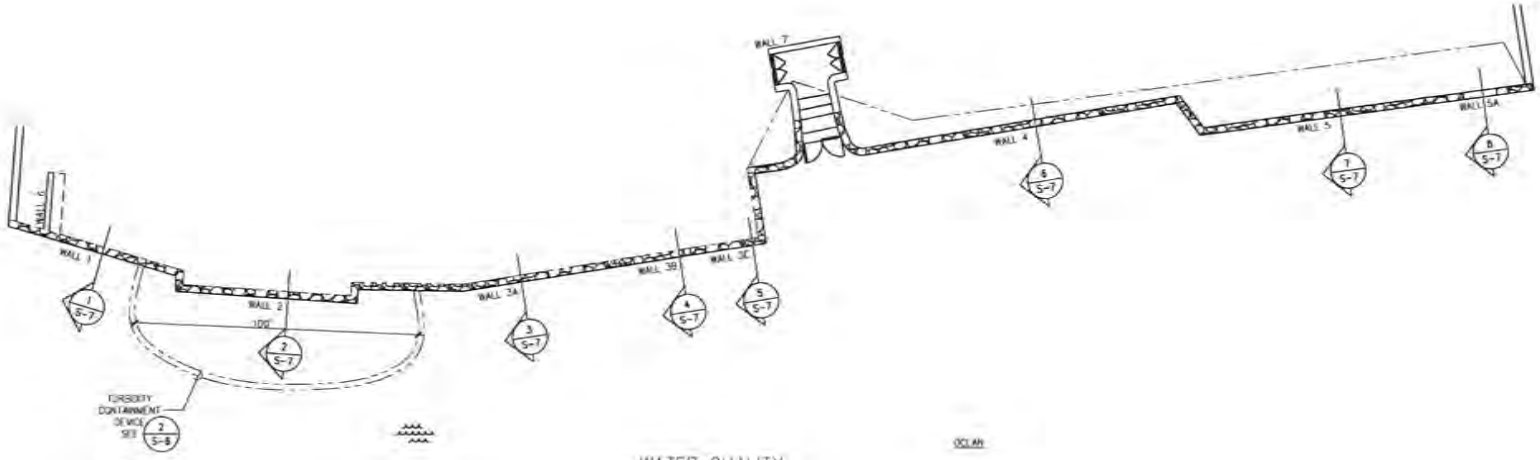



NOTE:
100' LONG TURBIDITY CONTAINMENT DEVICE SHALL BE DEPLOYED PARALLEL TO WALL CONSTRUCTION. AFTER WORK IS COMPLETE ON EACH WALL, EQUIPMENT AND BMPs WOULD BE MOVED TO THE NEXT WALL.

## WATER QUALITY PROTECTION LAYOUT

1/S-6 SCALE: 1" = 20'

NORTH

TURBIDITY CONTAINMENT DEVICE NOTES:

1. TURBIDITY CONTAINMENT DEVICES SHALL BE OF SUFFICIENT DESIGN, STRENGTH, AND SUITABILITY FOR THEIR INTENDED APPLICATION IN THE OCEAN ENVIRONMENT.
2. FLOATING TURBIDITY CONTAINMENT DEVICES SHALL GENERALLY BE COMPOSED OF A WATER SURFACE FLOTATION BOOM WITH A MINIMUM FREEBOARD OF 4 INCHES, A SKIRT HANGING VERTICALLY TO THE REQUIRED DEPTH, BALLAST WEIGHT AT THE SKIRT BOTTOM, AND SUFFICIENT ANCHORS TO MAINTAIN THE CURTAIN IN PLACE.
3. THE FLOATING TURBIDITY CONTAINMENT DEVICE SKIRT MATERIAL SHALL BE MONOFILAMENT WOVEN POLYPROPYLENE WITH THE FOLLOWING MINIMUM PHYSICAL REQUIREMENTS:

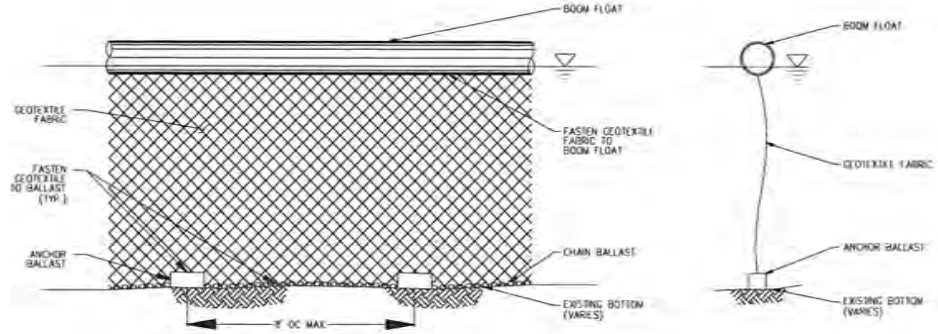
| PROPERTY | VALUE | TEST METHOD |
|---|---|---|
| GRAB STRENGTH | 200 LBS | ASTM D 4632 |
| PUNCTURE | 90 LBS | ASTM D 4833 |
| TRAPEZOID TEAR | 90 LBS | ASTM D 4533 |

PERVIOUS GEOTEXTILE SKIRT MATERIAL SHALL HAVE A MAXIMUM APPARENT OPENING SIZE (AOS) AND PERCENT OPEN AREA (POA) CAPABLE OF RETAINING FINE SUSPENDED SEDIMENTS 0.004 MM OR LARGER IN DIAMETER.

4. TURBIDITY CONTAINMENT DEVICES SHALL BE INSPECTED DAILY, AND IMMEDIATELY REPAIRED OR REPLACED AS NECESSARY TO ENSURE THEIR EFFECTIVENESS.
5. A TURBIDITY CONTAINMENT DEVICE SHALL BE DEPLOYED TO COMPLETELY SURROUND THE AREA OF ACTIVE IN-WATER CONSTRUCTION.
6. SHOULD WEATHER OR SEA CONDITIONS PROHIBIT PROPER PLACEMENT AND FUNCTION OF THE TURBIDITY CONTAINMENT DEVICE, CONSTRUCTION SHALL CEASE UNTIL CONDITIONS PERMIT PROPER DEPLOYMENT.

WOODEN FORMWORK NOTES:

1. WOODEN FORMWORK WILL BE INSTALLED AT LOW TIDE.
2. WOODEN FORMWORK WILL CONSIST OF UNTREATED WOOD.
3. HYDRAULIC CEMENT OR PUG DUCT SEAL WILL BE USED TO FILL ANY GAPS BETWEEN THE BOTTOM OF THE FORMWORK AND THE SEAFLOOR.
4. A FLEXIBLE PVC WATERSTOP BARRIER WILL BE INSTALLED BETWEEN THE WOODEN FORMWORK AND THE FACE OF THE SEAWALL TO ENSURE THAT ALL WATER AND CONCRETE IS CONTAINED WITHIN THE FORMWORK, AND NO OCEAN WATER CAN ENTER THE FORMWORK.
5. ALL MATERIALS, INCLUDING THE WOODEN FORMWORK, PVC WATERSTOP BARRIER, AND HYDRAULIC CEMENT OR PUG DUCT SEAL, WILL REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION AND WILL BE REMOVED WHEN CONSTRUCTION IS COMPLETED.




## TURBIDITY CONTAINMENT DEVICE DETAIL

2/S-6 SCALE: NTS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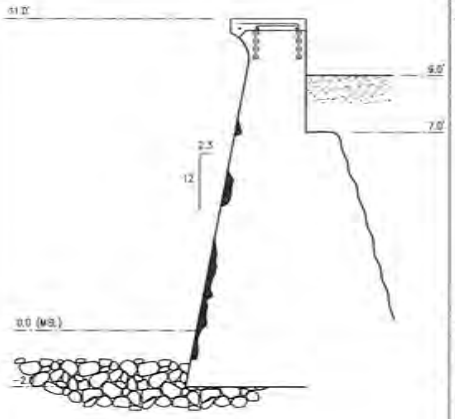
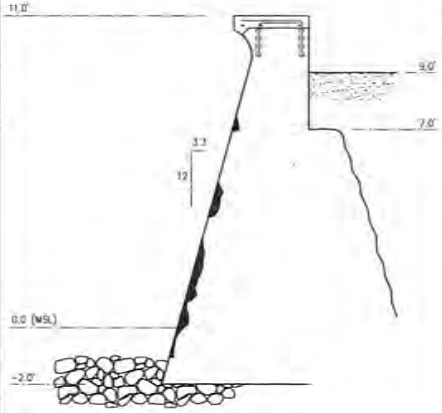
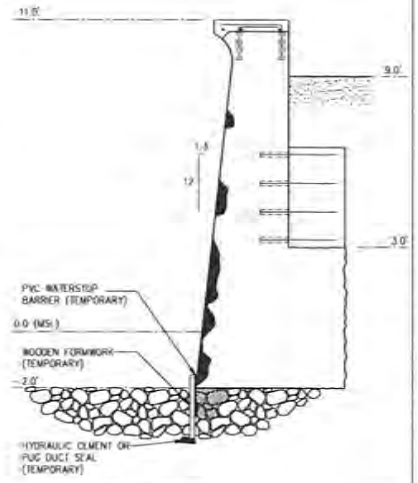


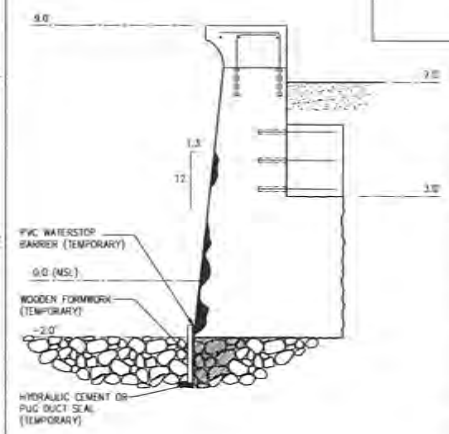

WALL 1 SECTION
NO WOODEN FORMWORK
CONTAINMENT BARRIER
1 / S-7 SCALE: 1/2" = 1'-0"



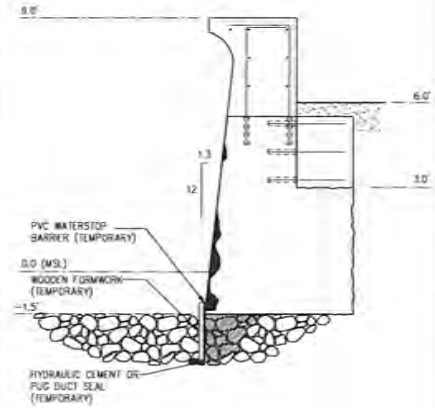

WALL 2 SECTION
NO WOODEN FORMWORK
CONTAINMENT BARRIER
2 / S-7 SCALE: 1/2" = 1'-0"



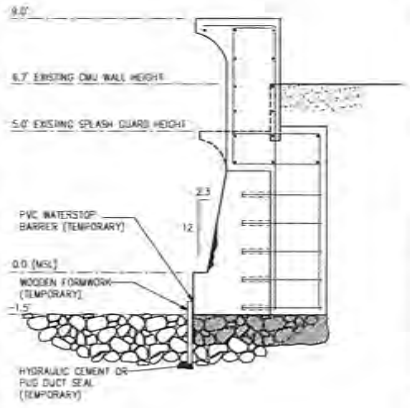

WALL 3A SECTION
WOODEN FORMWORK CONTAINMENT BARRIER
3 / S-7 SCALE: 1/2" = 1'-0"



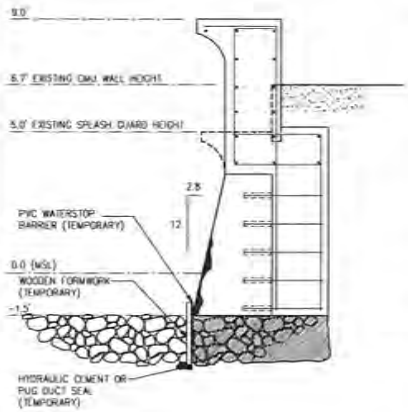

WALL 3B SECTION
WOODEN FORMWORK CONTAINMENT BARRIER
4 / S-7 SCALE: 1/2" = 1'-0"



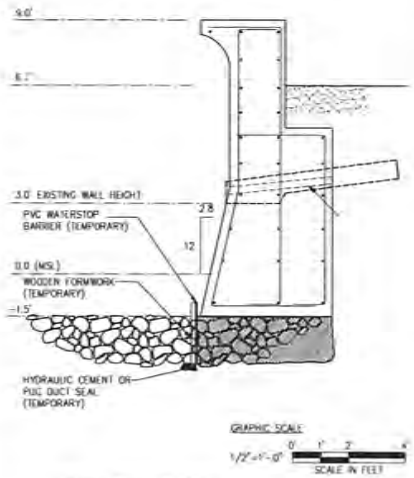

WALL 3C SECTION
WOODEN FORMWORK CONTAINMENT BARRIER
5 / S-7 SCALE: 1/2" = 1'-0"




WALL 4 SECTION
WOODEN FORMWORK CONTAINMENT BARRIER
6 / S-7 SCALE: 1/2" = 1'-0"




WALL 5 SECTION
WOODEN FORMWORK CONTAINMENT BARRIER
7 / S-7 SCALE: 1/2" = 1'-0"




WALL 5A SECTION
WOODEN FORMWORK CONTAINMENT BARRIER
8 / S-7 SCALE: 1/2" = 1'-0"

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EROSION CONTROL AND SILT CONTAINMENT:

1. SEAWALL MAINTENANCE SHALL NOT BE DONE DURING STORMS OR PERIODS OF HIGH WAVE CONDITIONS.
2. SILT CURTAINS AND/OR BOOMS WILL BE INDIVIDUALLY ANCHORED AND REGULARLY INSPECTED DURING MAINTENANCE OPERATIONS, AS NEEDED.
3. SILT CURTAINS AND/OR BOOMS WILL BE LEFT IN PLACE EACH NIGHT, AS NEEDED. ALL ANCHORS AND BOOMS WILL BE INSPECTED PRIOR TO SUNSET.
4. THE CONTRACTOR SHALL KEEP MAINTENANCE ACTIVITIES UNDER SURVEILLANCE, MANAGEMENT AND CONTROL TO AVOID POLLUTION OF SURFACE OR MARINE WATERS. DAILY VISUAL INSPECTION OF THE PROJECT SITE AND ITS ENVIRONS WILL BE CONDUCTED BY A DESIGNATED INDIVIDUAL, OR HIS REPRESENTATIVE, TO VERIFY THAT THE PERMITTED ACTIVITIES DO NOT RESULT IN UNCONTROLLED ADVERSE ENVIRONMENTAL IMPACTS.
5. VISUAL INSPECTIONS WILL INCLUDE MONITORING OF THE EFFECTIVENESS OF THE SILT CURTAINS AND/OR BOOMS TO ENSURE PROPER FUNCTION.
6. VISUAL INSPECTIONS WILL BE DOCUMENTED WITH PHOTOGRAPHS AND WRITTEN DESCRIPTIONS, IF NECESSARY.
7. VISUAL MONITORING WILL INCLUDE ONGOING INSPECTIONS FOR TURBIDITY OUTSIDE OF THE CONFINES OF THE SILT CURTAINS AND/OR BOOMS. IN THE EVENT THAT TURBIDITY IS OBSERVED OUTSIDE OF THE SILT CURTAINS, WORK SHALL STOP AND THE SILT CURTAINS SHALL REMAIN IN PLACE UNTIL THE TURBIDITY DISSIPATES. SILT CURTAINS, BOOMS, AND ANCHORS SHALL BE INSPECTED AFTER DISSIPATION AND PRIOR TO RETURNING TO MAINTENANCE OPERATIONS.

REPAIR, RETROFIT AND NEW WALL CONCRETE:

1. CONCRETE CONSTRUCTION SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE ACI 318-05.
2. CONCRETE FOR NEW CONSTRUCTION SHALL BE REGULAR WEIGHT HARD ROCK CONCRETE WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
3. CONCRETE FOR TREMIE GROUT SHALL BE REGULAR WEIGHT HARD ROCK CONCRETE AND SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,000 PSI AND SHALL BE SELF-LEVELING, COHESIVE, NON-BLEEDING, NON-PLUME, NON-SEGREGATING WITH A SPREAD OF 22 IN. PROVIDE ANTI-PLUME ADMIXTURE FOR TREMIE CONCRETE. THE CONTRACTOR SHALL SUBMIT MIX DESIGN TO THE ENGINEER FOR APPROVAL. PROPOSED ALTERNATIVE GROUT MATERIALS AND PROCEDURES SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
4. MAXIMUM WATER TO CEMENTITIOUS MATERIALS RATIO SHALL BE 0.40.
5. CONCRETE DELIVERY TICKETS SHALL RECORD ALL FREE WATER IN THE MIX AT BATCHING BY PLANT, FOR CONSISTENCY BY DRIVER, AND ANY ADDITIONAL REQUEST BY CONTRACTOR IF PERMITTED BY THE MIX DESIGN.
6. REINFORING BARS SHALL BE DUPLEX STAINLESS STEEL REBAR CONFORMING TO ASTM A276, A995, AND A959, GRADE 75.

GENERAL UNDERMINING REPAIR PROCEDURES:

1. THE CONTRACTOR SHALL HAVE A MINIMUM OF 5 YEARS PERFORMING SEAWALL/MARINE REPAIRS, AND PROVIDE A LIST TO THE ENGINEER OF 2 PROJECTS PERFORMED WITHIN THE LAST 10 YEARS WITH A SIMILAR REPAIR SCOPE.
2. DUE TO THE BASE OF PORTIONS OF THE WALL POSSIBLY BEING LOCATED BELOW WATER LEVEL EVEN AT LOW TIDES IT IS ASSUMED THAT WATER WILL BE PRESENT IN THE VOID SPACES. THEREFORE TREMIEING AND PUMPING OF CONCRETE OR REPAIR MATERIAL IS ANTICIPATED. THE CONTRACTOR SHALL TAKE INTO ACCOUNT THE VARIABLE WATER LEVEL AND WAVE CONDITIONS WHEN SCHEDULING AND COORDINATING THE WORK AND WHEN SECURING EQUIPMENT, SUPPLIES AND OTHER ITEMS AND PERSONNEL AT THE WORK SITE.
3. PRIOR TO FILLING THE VOIDS UNDER THE WALL FOOTING, LOOSE DEBRIS AND SOFT MATERIAL SHOULD BE CLEARED FROM THE VOID SPACE AS IS FEASIBLE. STONES LARGER THAN CAN BE DISLODGED AND LIFTED OUT BY HAND BY ONE MAN SHALL BE LEFT IN PLACE.
4. CONCRETE AND MORTAR SHALL BE PLACED ON SOUND SUBSTRATE SUCH AS CORAL IF POSSIBLE.
5. MATERIAL UNDER THE VOID SPACE AND EXCAVATIONS SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER.
6. AT SECTIONS WHERE VOIDS EXTEND MORE THAN 6 IN. IN FROM THE WALL FACE, THE WORK SHALL BE PERFORMED IN ALTERNATING SECTIONS OF MAXIMUM 10 FT LENGTHS WITH MINIMUM 10 FT LENGTH OF UNREPAIRED OR PREVIOUSLY REPAIRED SECTIONS ON EITHER END OF THE SECTION TO BE REPAIRED. CONCRETE SHALL BE ALLOWED TO CURE FOR A MINIMUM OF 2 DAYS AT A REPAIRED VOID SECTION PRIOR TO WORKING ON ADJACENT VOIDS.
7. CORED OR CHIPPED HOLES FOR CONCRETE PLACEMENT SHALL BE A MAXIMUM DIAMETER OF 6 IN. AND SPACED A MINIMUM OF 3 FT APART. HOLES SHALL BE PLACED SO AS TO ALLOW FOR PROPER PLACEMENT OF CONCRETE TO FILL THE VOID. HOLES SHALL BE FILLED WITH REPAIR MORTAR OR CONCRETE AFTER VOID FILLING.
8. DRILLED AIR HOLES SHALL BE A MAXIMUM DIAMETER OF 1 IN. AND SPACED A MINIMUM OF 1 FT APART. HOLES SHALL BE PLACED SO AS TO ALLOW FOR AIR RELEASE FOR PROPER PLACEMENT OF CONCRETE TO FILL THE VOID. AT A MINIMUM THE OUTER 6 IN. DEPTH OF THE HOLES SHALL BE FILLED WITH REPAIR MORTAR AFTER VOID FILLING.
9. CONCRETE MIX AND INSTALLATION METHOD MAY BE ADJUSTED DEPENDING ON ACCESS FOR EQUIPMENT, SIZE OF VOID SPACE TO BE FILLED, AND WEATHER CONDITIONS (TIDES, WATER LEVEL, GROUNDWATER ETC) INCLUDING USE OF ALTERNATE MATERIALS, UPON PRIOR APPROVAL OF THE ENGINEER.

DETERIORATED MORTAR REPOINTING AND PARGING:

1. REPAIR MORTAR FOR REPOINTING AND PARGING DETERIORATED MORTAR BETWEEN AND OVER STONES AND FILLING SMALL OR SHALLOW VERTICAL VOIDS SHALL BE MAPEI PLANITOP X, OR APPROVED EQUAL. INSTALL PER MANUFACURER'S PRINTED INSTALLATION INSTRUCTIONS.
2. DETERIORATED AND LOOSE MORTAR AND DEBRIS SHALL BE REMOVED PRIOR TO PLACEMENT OF NEW MORTAR, AND DISPOSED (IF AT AN APPROVED LOCATION).
3. SLURRY COAT SHALL BE SCRUBBED INTO THE SUBSTRATE AND THE VOID FILLED WITH REPAIR MORTAR IN LIFTS.

SCOPE OF WORK:

SCOPE OF WORK INCLUDES THE RETROFIT OF AN EXISTING CRM SEAWALL.

BUILDING CODE:

DESIGN IS BASED ON THE INTERNATIONAL BUILDING CODE, 2006 EDITION. CONSTRUCTION SHALL CONFORM WITH APPLICABLE SECTIONS OF THIS CODE.

REFERENCE STANDARDS SHALL BE THE EDITION NOTED IN THE CODE, UNLESS OTHERWISE INDICATED.

CONCRETE SPALL REPAIRS:

1. ANTI-CORROSION COATING APPLIED ON EXISTING CORRODED REINFORCING OR STRUCTURAL STEEL TO BE COVERED WITH CONCRETE OR REPAIR MORTAR SHALL BE MAPEFER 1K BY MAPEI CORPORATION, SIKA ARMATEC 110 EPOCEM BY SIKA CORPORATION, OR APPROVED EQUAL.
2. REPAIR MORTAR FOR TOP SURFACE REPAIRS SHALL BE MAPEI PLANITOP 18 BY MAPEI CORPORATION, SIKATOP 122 PLUS BY SIKA CORPORATION, OR APPROVED EQUAL. MAX 3/8" HARD ROCK AGGREGATE THAT IS CLEANED, WASHED, AND PREDAMPENED SHALL BE ADDED AT MANUFACTURER'S RECOMMENDED RATE TO PRODUCE REPAIR MATERIAL WITH COARSE AGGREGATE.
3. REPAIR MORTAR FOR VERTICAL OR UNDERSIDE SURFACES TO BE REPAIRED IN LIFTS SHALL BE MAPEI PLANITOP X BY MAPEI CORPORATION, SIKATOP 123 PLUS BY SIKA CORPORATION, OR APPROVED EQUAL.
4. ANTI-CORROSION COATING AND REPAIR MORTAR SHALL BE SUPPLIED BY THE SAME MANUFACTURER.
5. MANUFACURER'S PROCEDURES SHALL BE FOLLOWED FOR INSTALLATION OF ALL PRODUCTS.

APPROXIMATE REPAIR QUANTITIES – WEST LOT

| ITEM | UNITS | WALL 4 | WALL 5 | WALL 5A | WALL 7 | TOTAL |
|---|---|---|---|---|---|---|
| REPAIR VERTICAL SPALLS AND DELAMINATIONS | SQ FT | 0 | 20 | 0 | 0 | 20 |
| PATCH VERTICAL AND DIAGONAL CRACKS > ⅛ IN. WITH REPAIR MORTAR | LIN FT | 10 | 0 | 0 | 0 | 10 |
| PARGE ABRADED/MISSING FRONT SURFACE MORTAR (½ IN. TO 1 IN. DEPTH) | SQ FT | 200 | 250 | 0 | 0 | 450 |
| FILL ABRADED AND MISSING FRONT SURFACE MORTAR (1 IN. TO 6 IN. DEPTH) | SQ FT | 60 | 60 | 0 | 0 | 120 |
| FILL UNDERMINED/SOFT BASE WITH TREMIE CONCRETE/DRYPACK MORTAR (WALL LENGTH x WIDTH IN FROM FRONT FACE x AVG. DEPTH BELOW WALL) | FT | 140x1 x1 | 120x3 x1 | 0 | 0 | |
| REPLACE DELAMINATED SPLASHGUARD TOP CAP (MAX 5 IN. DEEP) | LIN FT | 0 | 0 | 0 | 0 | 0 |
| REPLACE DELAMINATED/SPALLED SPLASHGUARD | LIN FT | 120 | 110 | 0 | 0 | 230 |
| ENCLOSE EXISTING BOAT RAMP | LIN FT | 0 | 0 | 10 | 0 | 10 |
| CONCRETE BUTRESS WALL | LIN FT | 0 | 0 | 0 | 0 | 0 |
| BEACH ACCESS WALL | LIN FT | 0 | 0 | 0 | 40 | 40 |

NOTES:

1. REPAIR QUANTITIES ARE APPROXIMATE AND ARE TO BE VERIFIED BY VISUAL OBSERVATION, SOUNDING, AND ACTUAL PERFORMANCE OF THE REPAIRS.
2. UNDERMINING AND ASSOCIATED VOID LOCATION AND SIZES AS WELL AS THE SUITABILITY OF THE SUBSTRATE SHALL BE CONFIRMED DURING DEBRIS REMOVAL.
3. QUANTITIES ARE THE TOTALITY OF WORK FROM EAST AND WEST PROPERTIES.

SHEET LIST




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EXP 4/30/22
Chris Wilson


WAIMANALO PARADISE
WEST LOT
41-505 KALANIANA'OLE HWY
WAIMANALO, HI 96795
TMK: 4-1-002:007

| ISSUE: | DATE: |
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| PERMIT SET | 08-24-20 |

JOB# 18067.H3

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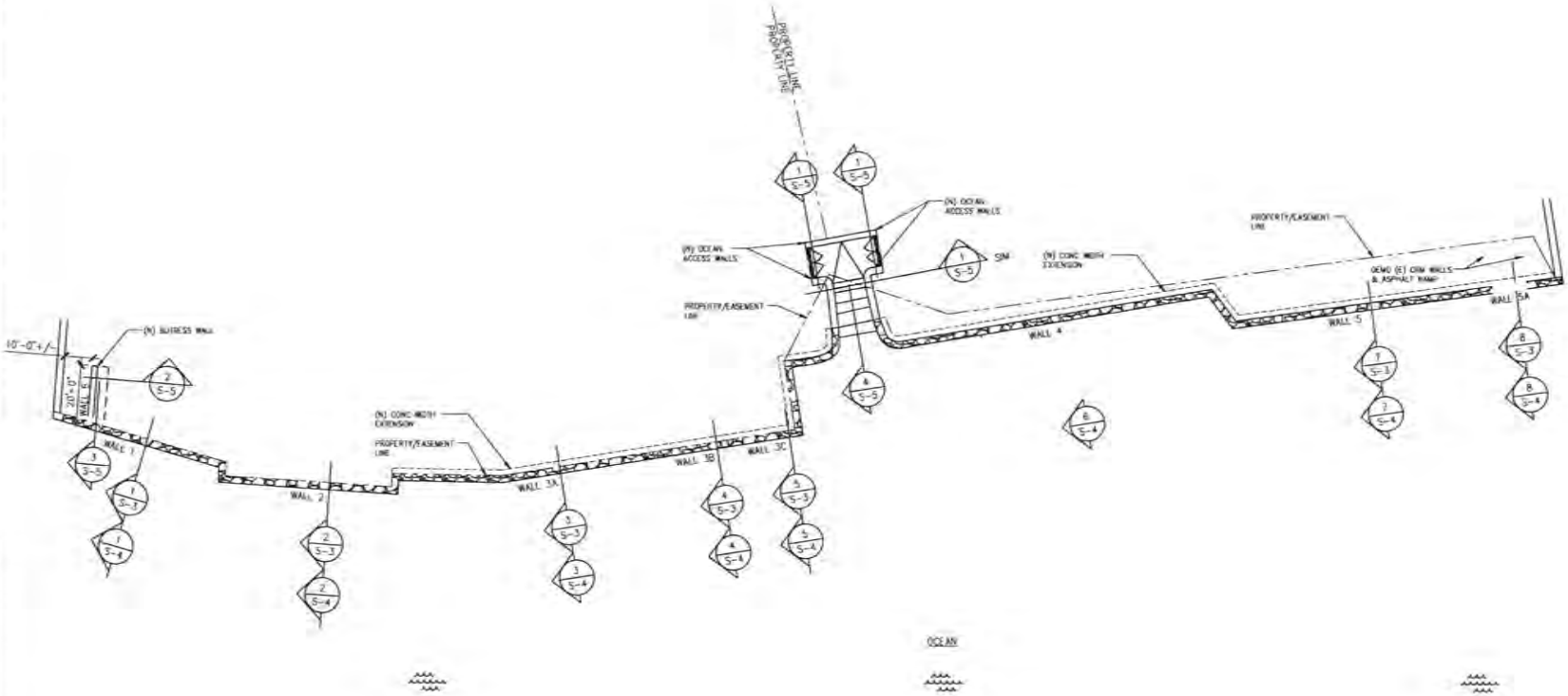


OVERALL SEAWALL PLAN

SCALE: 1" = 20'

NORTH

GRAPHIC SCALE

20 0 20 40

1" = 20'

SCALE IN FEET

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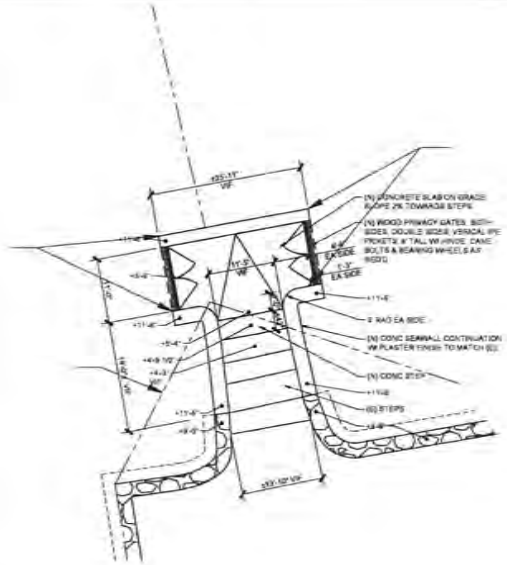
CONTENTS:
OVERALL SEAWALL PLAN

S-1



2 ENLARGED SEAWALL ACCESS PLAN
SCALE: 1" = 10'

NORTH

41-505 KALANIANA'OLE HWY
EAST LOT
SHOWN FOR REFERENCE
ONLY

41-505 KALANIANA'OLE HWY
WEST LOT
SCOPE OF WORK


WEST LOT SEAWALL PLAN - SCOPE OF WORK
SCALE: 1" = 20'

NORTH

GRAPHIC SCALE
1" = 20'
20 0 20 40
SCALE IN FEET

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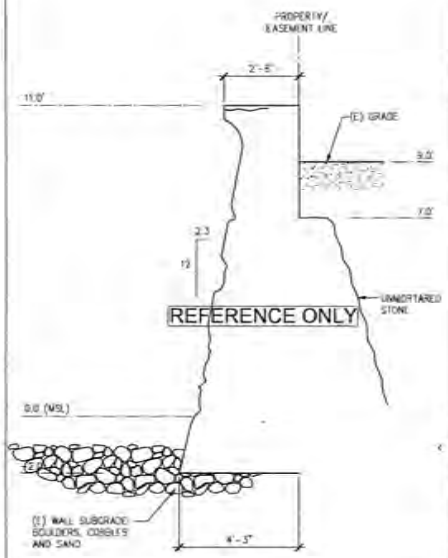
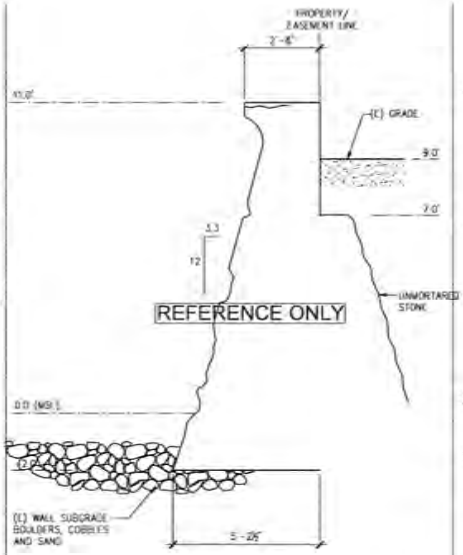
WEST LOT
SEAWALL PLAN -
SCOPE OF WORK

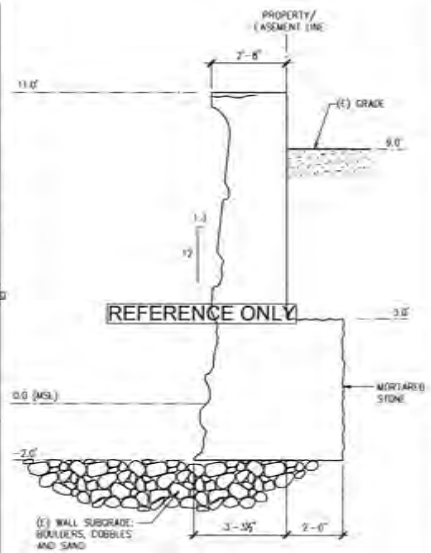
S-2



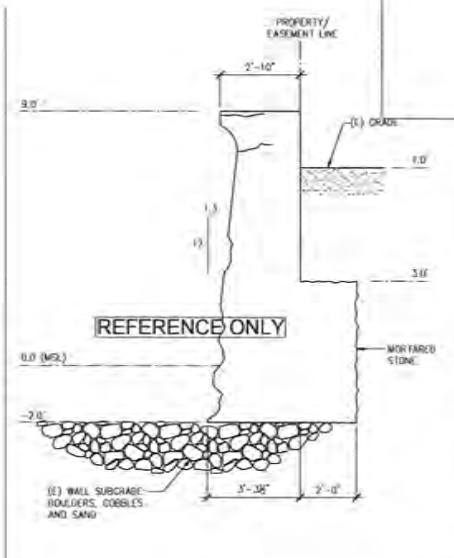

1 / S-2 EXISTING WALL 1 SECTION
SCALE: 1/2" = 1'-0"



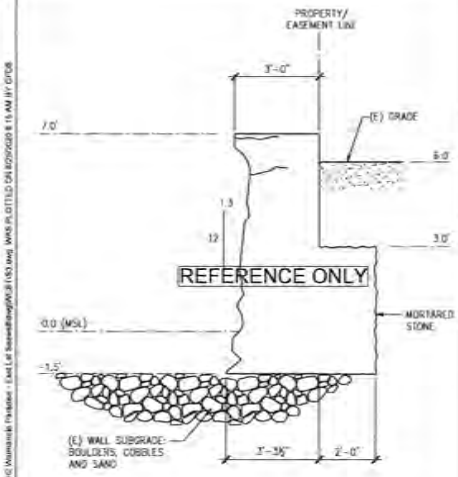

2 / S-2 EXISTING WALL 2 SECTION
SCALE: 1/2" = 1'-0"



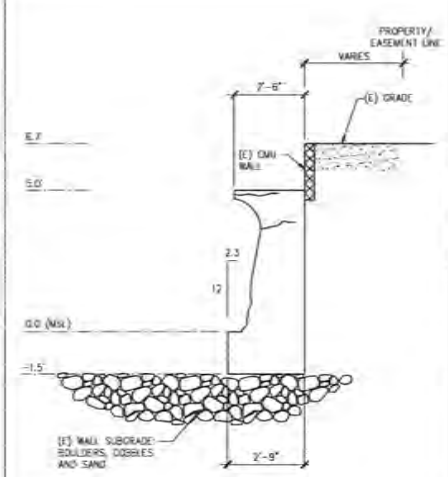

3 / S-2 EXISTING WALL 3A SECTION
SCALE: 1/2" = 1'-0"



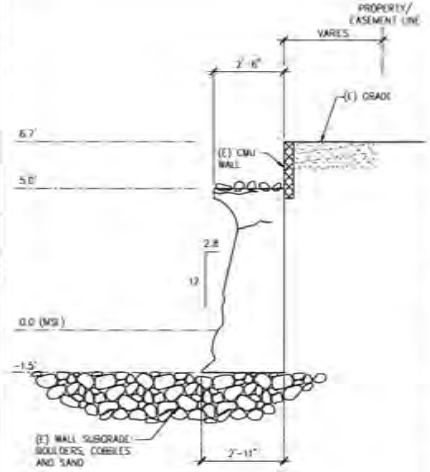

4 / S-2 EXISTING WALL 3B SECTION
SCALE: 1/2" = 1'-0"



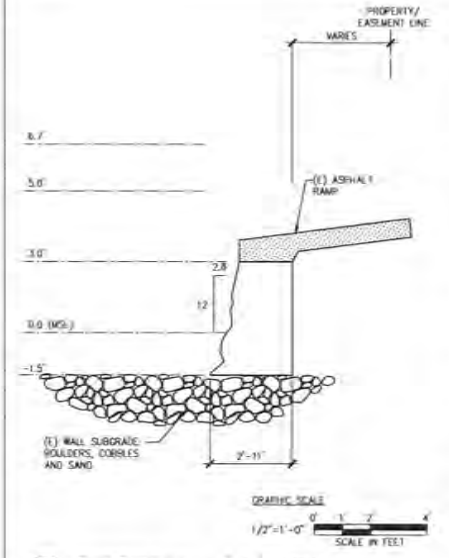

5 / S-2 EXISTING WALL 3C SECTION
SCALE: 1/2" = 1'-0"




6 / S-2 EXISTING WALL 4 SECTION
SCALE: 1/2" = 1'-0"




7 / S-2 EXISTING WALL 5 SECTION
SCALE: 1/2" = 1'-0"




8 / S-2 EXISTING WALL 5A SECTION
SCALE: 1/2" = 1'-0"

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TMK: 4-1-002:007

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SEAWALL
SECTIONS

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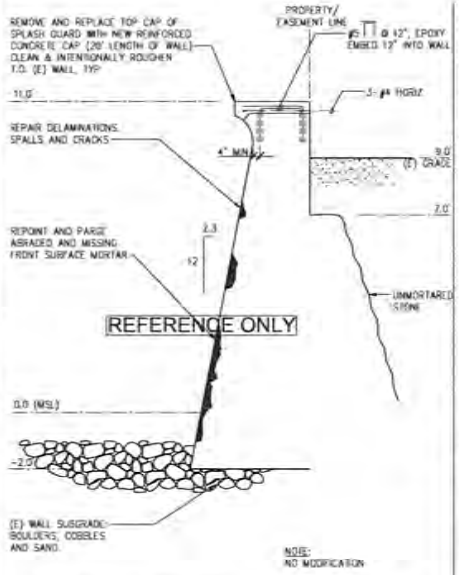
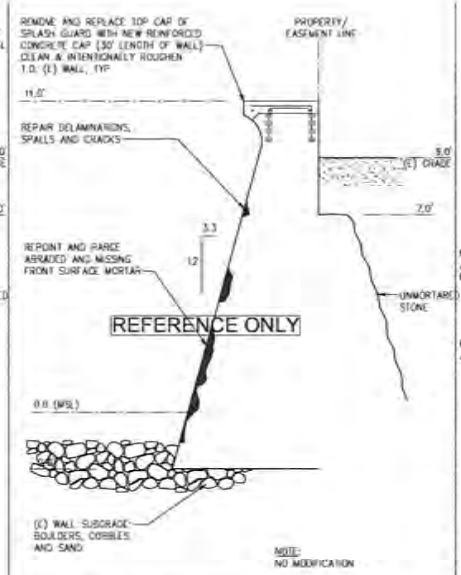
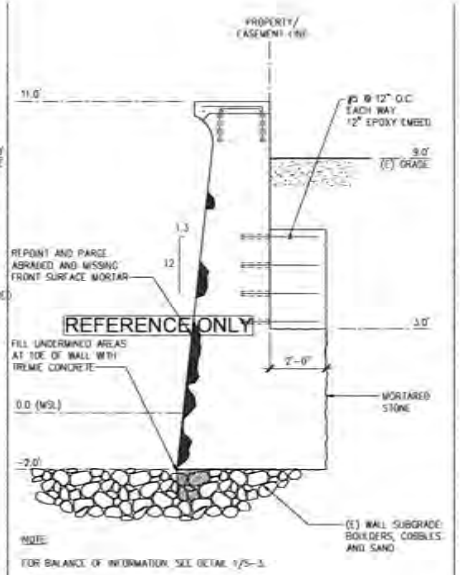


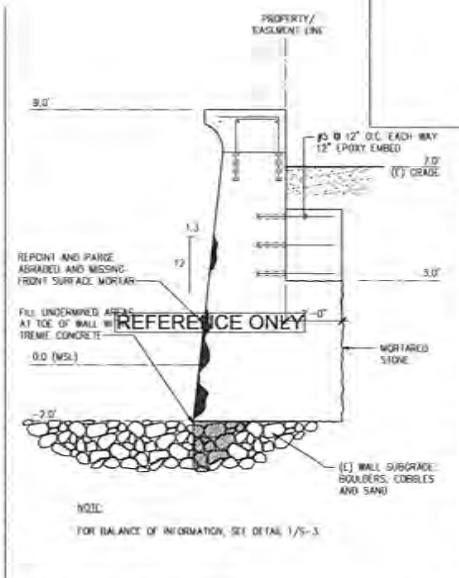

1 S-4 WALL 1 SECTION
SCALE: 1/2" = 1'-0"



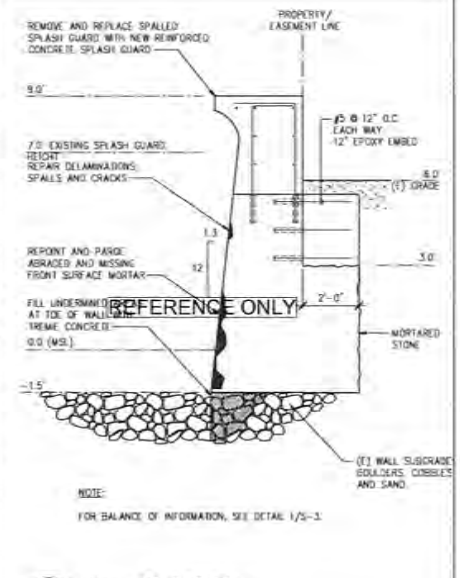

2 S-4 WALL 2 SECTION
SCALE: 1/2" = 1'-0"



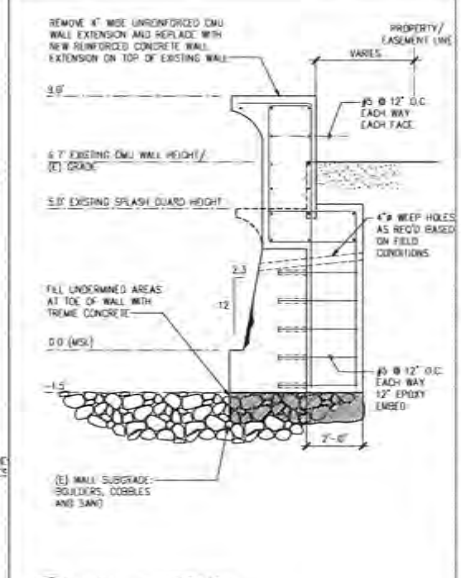

3 S-4 WALL 3A SECTION
SCALE: 1/2" = 1'-0"



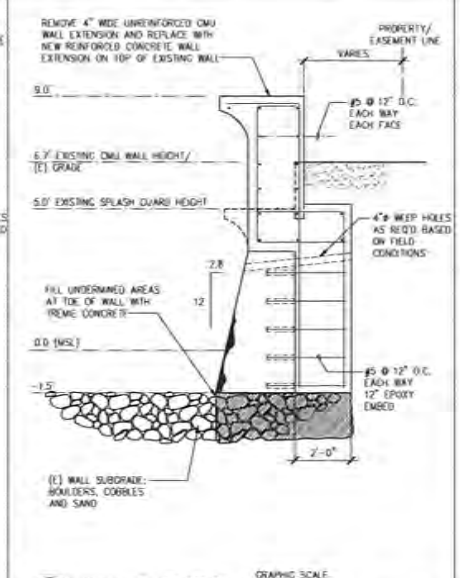

4 S-4 WALL 3B SECTION
SCALE: 1/2" = 1'-0"




5 S-4 WALL 3C SECTION
SCALE: 1/2" = 1'-0"

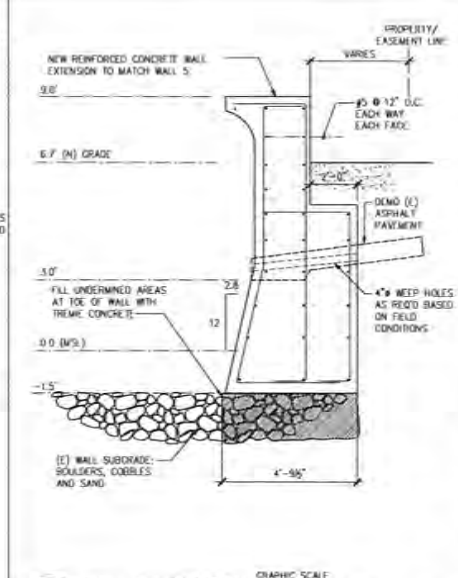



6 S-4 WALL 4 SECTION
SCALE: 1/2" = 1'-0"




7 S-4 WALL 5 SECTION
SCALE: 1/2" = 1'-0"

GRAPHIC SCALE
1/2"=1'-0" 0' 1' 2' 4'
SCALE IN FEET




8 S-4 WALL 5A SECTION
SCALE: 1/2" = 1'-0"

GRAPHIC SCALE
1/2"=1'-0" 0' 1' 2' 4'
SCALE IN FEET

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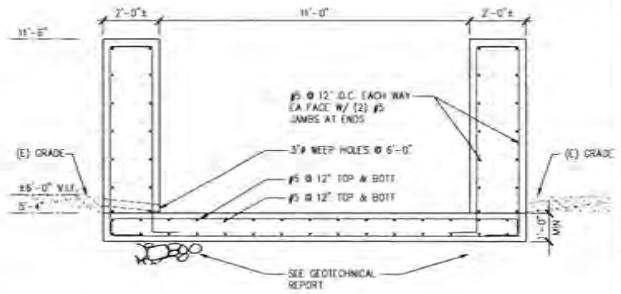
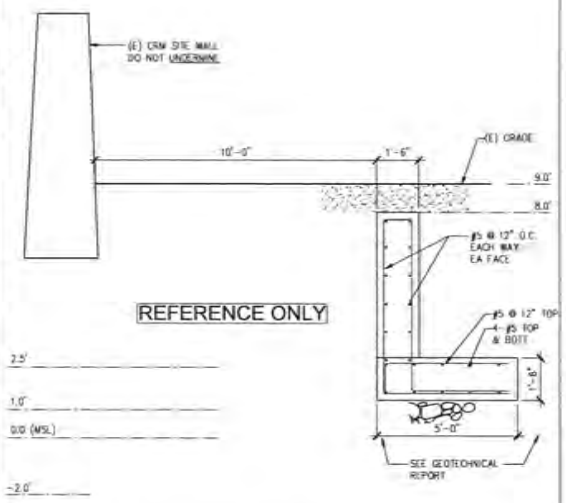
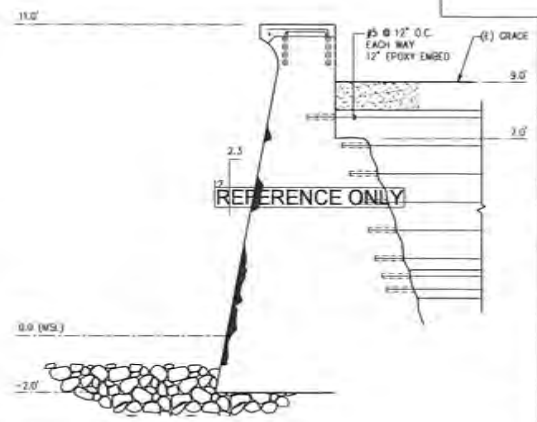


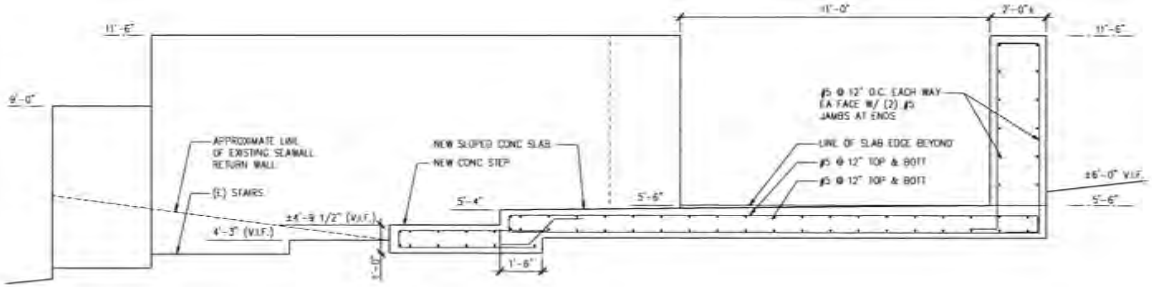

1 S-5 WALL 7 SECTION-BEACH ACCESS WALLS
SCALE: 1/2" = 1'-0"




2 S-5 WALL 6 SECTION-BUTTRESS WALL
SCALE: 1/2" = 1'-0"




3 S-5 WALL 6 CONN TO WALL 1
SCALE: 1/2" = 1'-0"




4 S-5 WALL 7 SECTION-BEACH ACCESS WALLS
SCALE: 1/2" = 1'-0"

GRAPHIC SCALE
1/2"=1'-0" 0 1' 2' 4'
SCALE IN FEET

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SEAWALL RETROFIT

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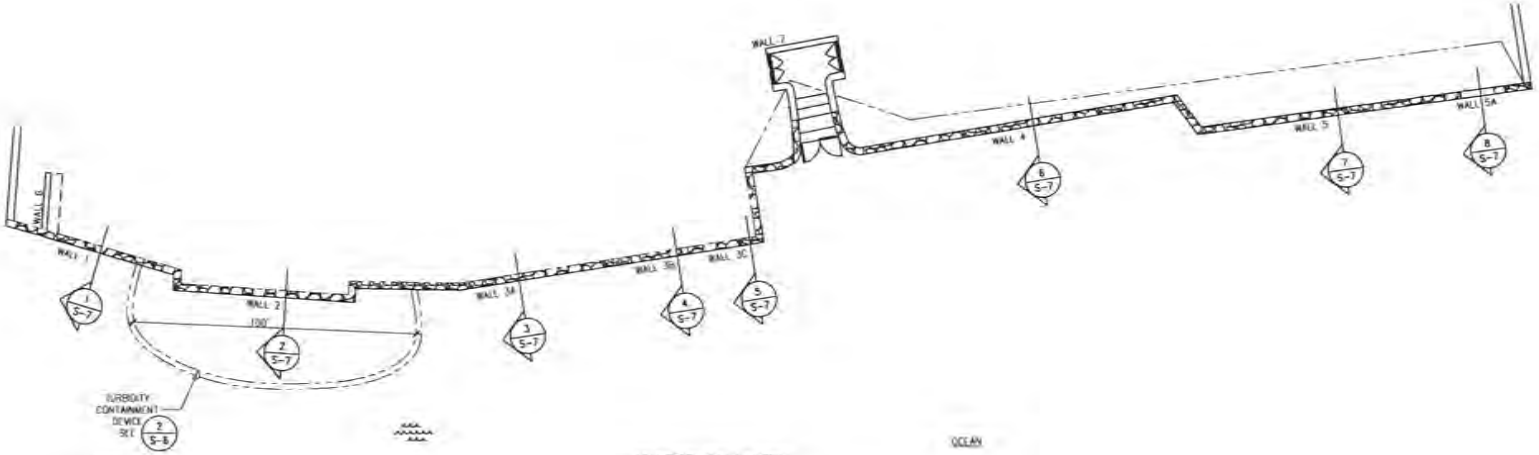



NOTE:
100' LONG TURBIDITY CONTAINMENT DEVICE SHALL BE DEPLOYED PARALLEL TO WALL CONSTRUCTION. AFTER WORK IS COMPLETE ON EACH WALL, EQUIPMENT AND BMPs WOULD BE MOVED TO THE NEXT WALL.

1 S-6 WATER QUALITY PROTECTION LAYOUT
SCALE: 1" = 20'

NORTH

TURBIDITY CONTAINMENT DEVICE NOTES:

1. TURBIDITY CONTAINMENT DEVICES SHALL BE OF SUFFICIENT DESIGN, STRENGTH, AND SUITABILITY FOR THEIR INTENDED APPLICATION IN THE OCEAN ENVIRONMENT.
2. FLOATING TURBIDITY CONTAINMENT DEVICES SHALL GENERALLY BE COMPOSED OF A WATER SURFACE FLOATATION BOOM WITH A MINIMUM FREEBOARD OF 4 INCHES, A SKIRT HANGING VERTICALLY TO THE REQUIRED DEPTH, BALLAST WEIGHT AT THE SKIRT BOTTOM, AND SUFFICIENT ANCHORS TO MAINTAIN THE CURTAIN IN PLACE.
3. THE FLOATING TURBIDITY CONTAINMENT DEVICE SKIRT MATERIAL SHALL BE MONOFILAMENT WOVEN POLYPROPYLENE WITH THE FOLLOWING MINIMUM PHYSICAL REQUIREMENTS:

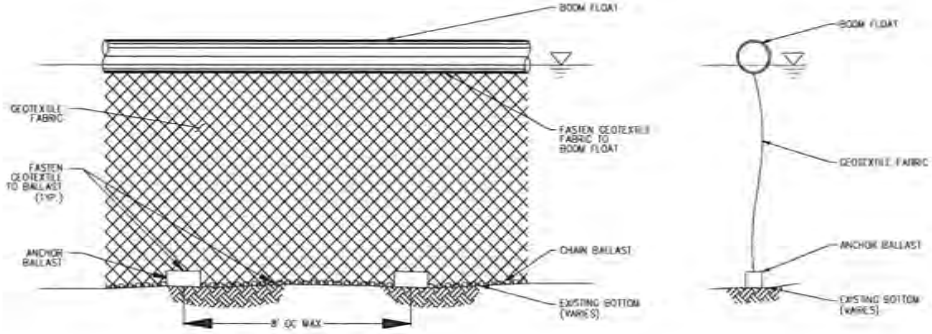
| PROPERTY | VALUE | TEST METHOD |
|---|---|---|
| GRAB STRENGTH | 200 LBS | ASTM D 4632 |
| PUNCTURE | 90 LBS | ASTM D 4833 |
| TRAPEZOID TEAR | 90 LBS | ASTM D 4533 |

POROUS GEOTEXTILE SKIRT MATERIAL SHALL HAVE A MAXIMUM APPARENT OPENING SIZE (AOS) AND PERCENT OPEN AREA (POA) CAPABLE OF RETAINING FINE SUSPENDED SEDIMENTS 0.004 MM OR LARGER IN DIAMETER.

4. TURBIDITY CONTAINMENT DEVICES SHALL BE INSPECTED DAILY, AND IMMEDIATELY REPAIRED OR REPLACED AS NECESSARY TO ENSURE THEIR EFFECTIVENESS.
5. A TURBIDITY CONTAINMENT DEVICE SHALL BE DEPLOYED TO COMPLETELY SURROUND THE AREA OF ACTIVE IN-WATER CONSTRUCTION.
6. SHOULD WEATHER OR SEA CONDITIONS PROHIBIT PROPER PLACEMENT AND FUNCTION OF THE TURBIDITY CONTAINMENT DEVICE, CONSTRUCTION SHALL CEASE UNTIL CONDITIONS PERMIT PROPER DEPLOYMENT.

WOODEN FORMWORK NOTES:

1. WOODEN FORMWORK WILL BE INSTALLED AT LOW TIDE.
2. WOODEN FORMWORK WILL CONSIST OF UNTREATED WOOD.
3. HYDRAULIC CEMENT OR PUG DUCT SEAL WILL BE USED TO FILL ANY GAPS BETWEEN THE BOTTOM OF THE FORMWORK AND THE SEAFLOOR.
4. A FLEXIBLE PVC WATERSTOP BARRIER WILL BE INSTALLED BETWEEN THE WOODEN FORMWORK AND THE FACE OF THE SEAWALL TO ENSURE THAT ALL WATER AND CONCRETE IS CONTAINED WITHIN THE FORMWORK, AND NO OCEAN WATER CAN ENTER THE FORMWORK.
5. ALL MATERIALS, INCLUDING THE WOODEN FORMWORK, PVC WATERSTOP BARRIER, AND HYDRAULIC CEMENT OR PUG DUCT SEAL, WILL REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION AND WILL BE REMOVED WHEN CONSTRUCTION IS COMPLETED.




2 S-8 TURBIDITY CONTAINMENT DEVICE DETAIL
SCALE: NTS

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TMK: 4-1-002:007

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CONTENTS:
WATER PROTECTION PLAN AND DETAILS

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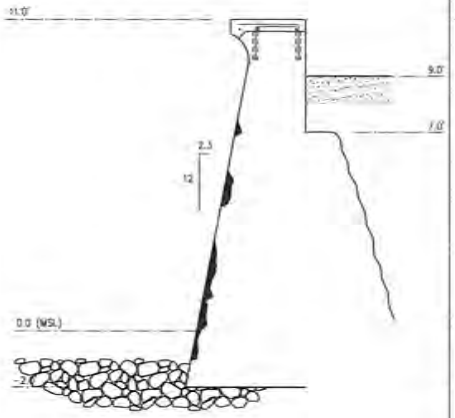
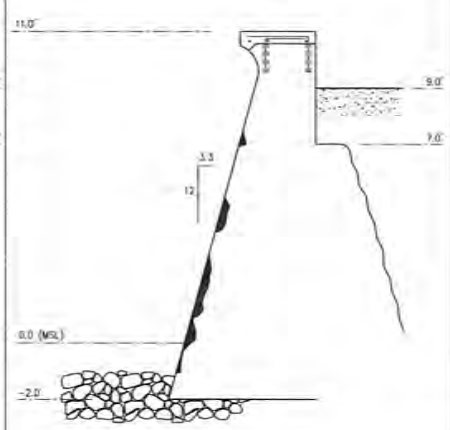
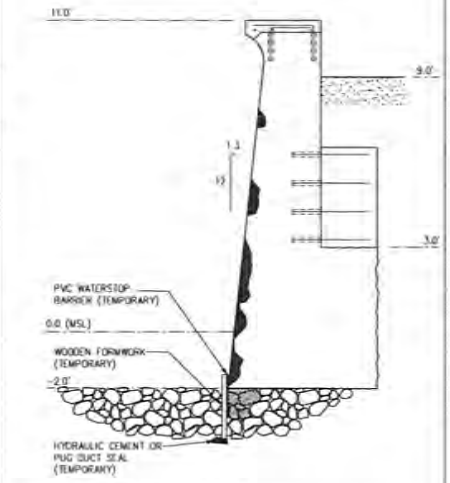
U:\PROJECTS\2018 FOLDERS\18067-1\5\Waimanalo Paradise - East Lot Seawall\dwg\WQP\18067.dwg, WAIMANALO PARADISE, 8/24/2020 8:15 AM, BY: DPDS



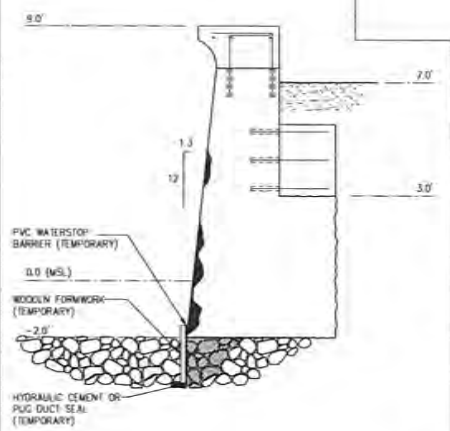

WALL 1 SECTION
NO WOODEN FORMWORK
CONTAINMENT BARRIER
1 / S-7 SCALE: 1/2" = 1'-0"



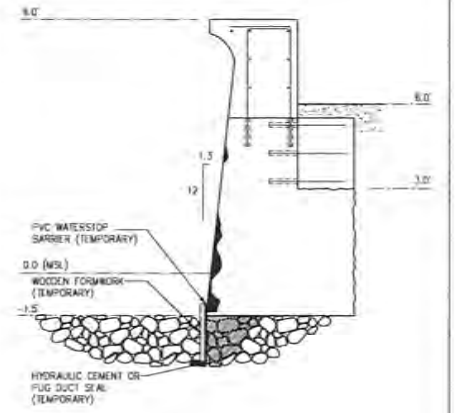

WALL 2 SECTION
NO WOODEN FORMWORK
CONTAINMENT BARRIER
2 / S-7 SCALE: 1/2" = 1'-0"



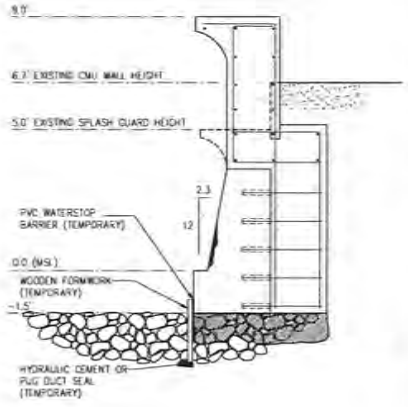

WALL 3A SECTION
3 / S-7 WOODEN FORMWORK CONTAINMENT BARRIER
SCALE: 1/2" = 1'-0"




WALL 3B SECTION
4 / S-7 WOODEN FORMWORK CONTAINMENT BARRIER
SCALE: 1/2" = 1'-0"




WALL 3C SECTION
5 / S-7 WOODEN FORMWORK CONTAINMENT BARRIER
SCALE: 1/2" = 1'-0"




WALL 4 SECTION
6 / S-7 WOODEN FORMWORK CONTAINMENT BARRIER
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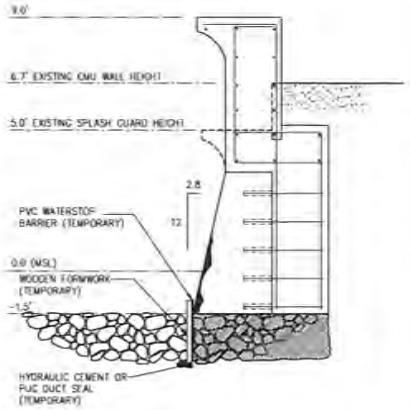


WALL 5 SECTION
7 / S-7 WOODEN FORMWORK CONTAINMENT BARRIER
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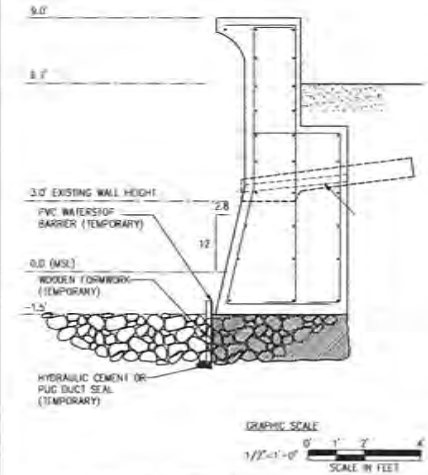



WALL 5A SECTION
8 / S-7 WOODEN FORMWORK CONTAINMENT BARRIER
SCALE: 1/2" = 1'-0"

Structural design for fine architecture™
ENGINEERS

CHRIS WILSON
LICENSED PROFESSIONAL ENGINEER
No. 14694-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.

Chris Wilson 4/30/22

WAIMANALO PARADISE
WEST LOT
41-505 KALANIANA'OLE HWY
WAIMANALO, HI 96795
TMK: 4-1-002:007

| ISSUE: | DATE: |
|---|---|
| PERMIT SET | 08-24-20 |

JOB# 18067-H3

CONTENTS:
DETAILS

S-7

# EXHIBIT D

DAVID Y. IGE
GOVERNOR OF
HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

**STATE OF HAWAII**
**DEPARTMENT OF LAND AND NATURAL RESOURCES**

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD., STE 555
KAPOLEI, HI 96707

December 20, 2019

IN REPLY REFER TO:
Log No.: 2019.00876
Doc. No.: 1912SCH07
Archaeology

Kathy K. Sokugawa
City and County of Honolulu
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, HI 96813
c/o [redacted]

Ms. Sharon Nishiura, Planner
Subdivision Branch
City and County of Honolulu
650 South King Street, 8th Floor
Honolulu, HI 96813
c/o [redacted]

Dear Ms. Sokugawa and Ms. Nishiura:

SUBJECT: **Chapter 6E-42 Historic Preservation Review –**
**Subdivision Application No. 2018/SUB-112**
**Non-Exclusive Easement S-6083**
**Archaeological Inventory Survey Report for the Waimānalo Paradise Seawall Project**
**Waimānalo Ahupua'a, Ko'olaupoko District, Island of O'ahu**
**TMK: (1) 4-1-002:007 and State of Hawai'i coastal lands**

This letter updates the State Historic Preservation Division's (SHPD's) comments concerning the subject application and non-exclusive easement and provides the SHPD's review of the draft archaeological report titled, *Draft Archaeological Inventory Survey Report for the Proposed Waimānalo Paradise Seawall Project, Waimānalo Ahupua'a, Ko'olaupoko District, O'ahu TMK: (1) 4-1-002:007 and State of Hawai'i Coastal Lands* (Enanoria et al., December 2019). SHPD received the draft archaeological inventory survey (AIS) report on April 22, 2019. SHPD requested revisions via email (Samantha Hemenway [SHPD] to David Shideler [Cultural Surveys Hawai'i, Inc.]) on December 19, 2019 and received the revised draft AIS on December 20, 2019.

Cultural Surveys Hawai'i, Inc. (CSH) conducted the AIS at the request of the private landowner, Waimanalo Paradise LLC (landowner). The 0.17-acre (0.06-hectare) project area is located in the northern portion of 41-505 Kalaniana'ole Highway, Waimānalo. The project area is between the coast and Kalaniana'ole Highway and is approximately 160 m southwest of Kaiona Beach Park and 1,100 m northeast of Kaupō Beach Park and the Makai Research Pier. The proposed scope of work consists of Sea Engineering, Inc. (SEI) conducting subsurface investigations to confirm the wall dimensions and geotechnical soil parameters to accurately determine the feasibility and cost estimates for conceptual wall repair and replacement options.

In a letter dated March 29, 2019 (Log No. 2018.01746, Doc. No. 1903SL06), SHPD requested an AIS be conducted for the Waimānalo Paradise Seawall Project as specified by Stipulation 28 in the Grant of Non-Exclusive Easement S-6083 between the State of Hawaii, Board of Land and Natural Resources (Grantor) and Waimanalo Paradise LLC (Grantee), dated October 25, 2015. "The Grantee shall conduct an archaeological inventory survey, including assessment of the seawall, prior to the issuance of any future permits involving ground-disturbing activates." SHPD also approved the AIS research design in the March 29, 2019 letter.

EXHIBIT D



The AIS field work was conducted on April 2 and April 3, 2019. A 100% pedestrian inspection was completed for the entire project area, along with GPS data collection, photographic documentation, and the recording of stratigraphic profiles and soil descriptions. A total of four backhoe test trenches (T-1 through T-4) were excavated at designated locations on the makai side of the seawall. The AIS identifies two previously identified historic properties, State Inventory of Historic Places (SHIP) Site 50-80-15-8748 and 50-80-15-8747.

**SHIP Site 50-80-15-8747** Feature 5 was previously identified in the Crowell et al. (2019) AIS as a remnant portion of the former Anderson Estate-Pahonu seawall. Construction of the Estate was completed in 1933. Site 8747 Feature 5 was identified in all 4 test excavations. Crowell (et al. 2019) indicates that Site 8747 lacks sufficient integrity to be considered a significant historic property. The current AIS supports this previous assessment for both Site 8747 and specifically Feature 5.

**SHIP # 50-80-15-8748** is a culturally expressed A horizon previously identified in the Crowell et al. (2019) AIS. Site -8748 is located in the makai section of the parcel. The current AIS documented Site 8748 in two test excavations (T-3 and T-4). In these trenches, Site 8748 likely represents a portion of the cultural deposit which was impacted by the construction of the seawall. The current AIS supports the Crowell et al. (2019) AIS assessment of Site 8748 as significant pursuant to HAR §13-284-6 under Criterion d for information it has yielded and still has potential to yield about former traditional Hawaiian and historic land use activities.

The integrity and significance assessments of each site are explained well. The effect determination for the proposed project is "Effect, with agreed on mitigation commitments." The recommended mitigation commitment is archaeological monitoring during all ground disturbances. On-site archaeological monitoring will be conducted in accordance with the SHPD-accepted archaeological monitoring plan (Bellsomini et al. 2019 (March 29, 2019; Log No. 2019.00246, Doc. No. 1903SL08).

The revised AIS report reviews well the available environmental, historical, and cultural background information, and previous archaeological investigations. It provides a detailed discussion of the AIS field and laboratory methods and findings, and adequately assesses the integrity and significance of the historic properties identified. The revisions adequately address our earlier correspondence. This AIS report satisfies the requirements of HAR §13-276-5. **It is accepted.** Please send one hard copy of the document, clearly marked FINAL, along with a copy of this letter and a text-searchable PDF version of the report, to the Kapolei SHPD office, attention SHPD Library.

Pursuant to HAR §13-284-3, Steps (1) through (4) of the historic preservation review process are complete. The SHPD concurs that the survey identification efforts were adequate, agrees with the significance assessments, agrees with the project effect determination, and accepts the agreed upon mitigation in the form of archaeological monitoring for the subject project, including all ground disturbing activities and all work associated with the modification of the seawall (Site 50-80-15-8747 Feature 5).

**SHPD hereby notifies** the County that Stipulation 28 in the Grant of Non-Exclusive Easement S-6083 has been fulfilled and that the permitting issuance for the seawall modification work may proceed.

**SHPD requests written notification at the start of archaeological monitoring.** Within 60 days of completion of archaeological monitoring fieldwork, SHPD looks forward to receiving for review and acceptance an archaeological monitoring report meeting the requirements of HAR §13-279-5.

Please contact Samantha C. Hemenway at (808) 692-8011 or by email at Samantha.Cragen@hawaii.gov if you have any questions or if we can be of assistance in any way.

Aloha,

*Susan A. Lebo*

Signed For
Alan S. Downer, PhD
Administrator, State Historic Preservation Division
Deputy State Historic Preservation Officer

cc: Judy Grimanis, Waimanalo Paradise, [redacted]
David Shideler, CSH, [redacted]
Deputy Robert Masuda, DLNR, [redacted]

# EXHIBIT E

**DEPARTMENT OF THE ARMY**
**U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT**
**FORT SHAFTER, HAWAII 96858-5440**

January 24, 2020

SUBJECT: Determination of No Permit Required, Waimanalo Paradise Seawall Repairs, Oahu, HI, Department of the Army File No. POH-2019-00189

Nesbitt HI Holdings LLC
c/o Mr. Martin H. Nesbitt
Vistria Group
300 East Randolph Street, Suite 3850
Chicago, IL 60601

And

Waimanalo Paradise LLC
c/o Mr. John Kevin Poorman
PSP Partners
444 West Lake Street Suite 3500
Chicago, IL 60606

Dear Mr. Nesbitt and Mr. Poorman:

The Honolulu District, U.S. Army Corps of Engineers (Corps), Regulatory Branch has received your request for a determination whether a Department of the Army (DA) permit is required for the repair of spalling and voids along the seaward face of and beneath 585 linear feet of seawall along the shoreline of the Pacific Ocean, including a landward expansion of the seawall, height extension in the existing seawall footprint, and use of a turbidity curtain, all located at 21. 325322, -157. 680110, approximately 430 feet east of Kaiana Beach Park and 1400 feet west of Kaupo Beach Park, on TMKs (1) 4-1-002:021 and 022 in Waimanalo, Island of Oahu, Hawaii in accordance with the project plans (Enclosure 1). Your request has been assigned Department of the Army (DA) file number POH-2019-00189. Please reference this number in all future correspondence with our office relating to this action.

We have reviewed your submittal pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344; "Section 404") and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403; "Section 10"). Section 404 requires DA authorization for the discharge (placement) of dredged and/or fill material into waters of the U.S., including wetlands. Section 10 requires DA authorization for the placement of structures in, under or over navigable waters of the U.S. and/or other work affecting the course, location, condition or navigable capacity of such waters. To determine if a DA permit is required for a proposed action, the Corps must first determine whether the proposed project is located

EXHIBIT E

within the Corps' geographic jurisdiction (i.e., whether the activity is located within a water of the U.S.). If the activity is within a water of the U.S., the Corps must then determine whether the proposed activity is a regulated activity under Section 10 and/or Section 404, or if the activity is exempt under Section 404(f) and is not recaptured. The determination provided in this letter pertains to whether your proposed project is an activity we regulate as well as whether the project falls within the Corps geographic jurisdiction.

Based on the information you provided, we have determined that the proposed in-kind maintenance repairs to the seaward face and area beneath the existing seawall are activities that are exempted under Section 404(f) of the Clean Water Act and therefore, do not require DA authorization under Section 404. Additionally, the proposed in-kind maintenance repairs to the seaward face and area beneath the existing seawall as well as the associated temporary installation of wooden formwork, PVC water-stop barrier, and hydraulic concrete water-stop barrier are not considered the installation of a "structure" as defined by 33 CFR 322.2 nor work subject to the regulatory jurisdiction of the Corps. Furthermore, we determined the proposed expansion of the seawall would not be regulated under Section 404 and Section 10 because the proposed height and landward width expansions of the seawall would occur shoreward of the High Tide Line and mean high water mark, respectively, and therefore, outside the geographic limits of the Corps jurisdiction. Lastly, the temporary deployment of a turbidity curtain in a navigable water of the U.S. is not considered a "structure" as defined by 33 CFR 322.2 nor work subject to the regulatory jurisdiction of the Corps.

While a DA permit is not required for your proposed project, you are responsible for obtaining all other applicable Federal, state, or local authorizations required by law. Be advised, a DA permit may be required if you alter the method, scope, or location of your proposed work. You should contact our office if you are considering modifying your project.

Thank you for your cooperation with the Honolulu District Regulatory Program. If you have any questions related to this determination, please contact me at 808-835-4310 or via e-mail at Vera.B.Koskelo@usace.army.mil. You are encouraged to provide comments on your experience with the Honolulu District Regulatory Office by accessing our web-based customer survey form at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey.

For additional information about our Regulatory Program, please visit our web site at http://www.poh.usace.army.mil/Missions/Regulatory.aspx.

Sincerely,

KOSKELO.VERA.B.1370139110

Digitally signed by KOSKELO.VERA.B.1370139110
Date: 2020.01.24 13:27:31 -10'00'

Vera B. Koskelo
Project Manager, Regulatory Office

Enclosure

Appendix L-5

# Waimānalo Paradise Seawall FEA-FONSI (File No. 2020/ED-2(AB))

DEPARTMENT OF PLANNING AND PERMITTING
**CITY AND COUNTY OF HONOLULU**
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov



KIRK CALDWELL
MAYOR

KATHY K. SOKUGAWA
ACTING DIRECTOR

TIMOTHY F. T. HIU
DEPUTY DIRECTOR

EUGENE H. TAKAHASHI
DEPUTY DIRECTOR

June 30, 2020

2020/ED-2(AB)

Mr. Keith Kawaoka, Acting Director
State of Hawaii
Department of Health
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Mr. Kawaoka:

| | |
|---|---|
| SUBJECT: | Chapter 343, Hawaii Revised Statutes<br>Environmental Assessment Determination |
| Project: | Waimanalo Paradise Seawall Repair |
| Applicant: | Waimanalo Paradise LLC; Nesbitt HI Holdings, LLC |
| Agent: | HHF Planners |
| Location: | 41-505 Kalanianaole Highway - Waimanalo |
| Tax Map Keys: | 4-1-002: 021 and 022 |
| Proposal: | Repair and modify an existing 585-foot-long seawall |
| Determination: | Finding of No Significant Impact (FONSI) |

With this letter, the Department of Planning and Permitting hereby transmits the Final Environmental Assessment and Finding of No Significant Impact (FEA-FONSI) for the Waimanalo Paradise Seawall Repair Project located at the subject site, in the Koolaupoko District on the island of Oahu, for publication in the next edition of "*The Environmental Notice*" on **July 8, 2020.**

The Applicant has included copies of comments and responses that it received during the 30-day public comment period on the Draft Environmental Assessment and Anticipated FONSI.

20-299

Enclosed is a hard copy of the Final Environmental Assessment (FEA), a copy of the Publication Form, and a compact disc including a copy of the FEA-FONSI and Publication Form. Should you have any questions, please contact Alex Beatty, of our staff, at 768-8032.

Very truly yours,

Kathy K. Sokugawa
Acting Director

Enclosures

cc: Scott Ezer, HHF Planners

Appendix L-6

# Waimānalo Paradise Seawall SSV Approval (File No. 2020/SV-3(AB))

DEPARTMENT OF PLANNING AND PERMITTING
**CITY AND COUNTY OF HONOLULU**
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov

FILE

KIRK CALDWELL
MAYOR

KATHY K. SOKUGAWA
ACTING DIRECTOR

TIMOTHY F. T. HIU
DEPUTY DIRECTOR

EUGENE H. TAKAHASHI
DEPUTY DIRECTOR

November 20, 2020 2020/SV-3(AB)

Mr. Scott Ezer
HHF Planners
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Mr. Ezer:

| | |
|---|---|
| SUBJECT: | Shoreline Setback Variance File No. 2020/SV-3 |
| Project: | Waimanalo Paradise Seawall |
| Owner/ | Nesbitt HI Holdings, LLC; |
| Applicant: | Waimanalo Paradise LLC |
| Agent: | HHF Planners (Scott Ezer) |
| Location: | 41-505 Kalanianaole Highway |
| Tax Map Keys: | 4-1-002: 021 and 022 |

This letter supersedes and replaces the Department of Planning and Permitting (DPP) letter dated November 16, 2020 ("Letter"), informing you of the partial approval of Shoreline Setback Variance No. 2020/SV-3. Our prior Letter transmitted incorrectly stated that the Director's Findings of Fact, Conclusions of Law, and Decision and Order partially approving the above-referenced Shoreline Setback Variance ("SSV") could be appealed to the City and County of Honolulu Zoning Board of Appeals. This letter is a correction to our prior Letter and informs you that appeals regarding the SSV must be filed with DPP in accordance with the DPP Rules Relating to Shoreline Setbacks and the Special Management Area. A request for an appeal of the SSV must be filed within 30 days of the date of mailing of the Director's action.

Should you have any questions or need additional information concerning this SSV, please contact Alex Beatty, of our staff, at 768-8032.

Very truly yours,

Kathy K. Sokugawa
Acting Director

DEPARTMENT OF PLANNING AND PERMITTING
OF THE CITY AND COUNTY OF HONOLULU

STATE OF HAWAII

| | | |
|---|---|---|
| IN THE MATTER OF THE<br><br>APPLICATION OF<br><br>WAIMANALO PARADISE LLC AND<br>NESBITT HI HOLDINGS, LLC<br><br>FOR A<br><br>SHORELINE SETBACK VARIANCE | )<br>)<br>)<br>)<br>)<br>)<br>)<br>)<br>)<br>)<br>) | FILE NO. 2020/SV-3(AB) |

FINDINGS OF FACT, CONCLUSIONS OF LAW
AND DECISION AND ORDER

## I. APPLICATION

A. Basic Information:

| | |
|---|---|
| LANDOWNERS/ APPLICANTS: | Waimanalo Paradise LLC and Nesbitt HI Holdings, LLC and State of Hawaii |
| AGENT: | HHF Planners, Scott Ezer |
| LOCATION: | 41-505 Kalanianaole Highway - Waimanalo |
| TAX MAP KEYS: | 4-1-002: 021 and 022 (Exhibit A) |
| LAND AREA: | 1.344 and 1.659 acres |
| STATE LAND USE: | Urban District |
| ZONING: | R-10 Residential District |
| EXISTING/PROPOSED USE: | Single-family dwellings and accessory structures |
| SURROUNDING LAND USES: | Single-family dwellings, Shriner's Beach Club, Pahonu (Hawaiian turtle pond), Kaiona and Kaupo Beach Parks. |

B. Proposal: The Applicant seeks to repair, modify, and expand an existing, nonconforming seawall on State-owned land makai of the subject properties. The seawall is a retaining wall that was constructed prior to 1931, is about 572 linear feet in length, and ranges in height from five to 11 feet above mean sea level (MSL). The Project site also features ocean access stairs and a boat ramp. The Applicant proposes to repair the entire length of the seawall and increase the

height of about 320 linear feet of the seawall up to nine feet above MSL in areas where it is currently below that height (see Table 1 below). New structural components are proposed, including a below-grade buttress wall near the western edge of the property, new concrete platform and walls to enclose the existing ocean access stairs, new wall width extensions providing counterweight to reduce the risk of overturning forces, a new section of wall to fill in the gap where the boat ramp is, and new splash guard caps along the top of the wall.

| Table 1 | | | |
|---|---|---|---|
| Wall Section (Exhibit E) | Approximate average elevation of area mauka of the wall, Feet above MSL | Existing Height, Feet above MSL | Proposed Height, Feet above MSL |
| 1 | 9 | 11 | 11 |
| 2 | 9 | 11 | 11 |
| 3A<br>3B<br>3C | 9<br>7<br>6 | 11<br>9<br>7 | 11<br>9<br>9 |
| 4 | 7 | 5 | 9 |
| 5<br>5a (boat ramp) | 7<br>3.5 | 5 | 9 |
| 6 (buttress) | 9 | No wall | 8 |
| 7 (top of stairs) | 6 | No wall | 11.5 |

The toe of the wall and all improvements will be landward of the certified shoreline, and entirely within the 60-foot shoreline setback area (see Exhibits B through L). The value of the repairs of the nonconforming wall will exceed 50 percent of the replacement value of the nonconforming structure. Therefore, a Shoreline Setback Variance (SSV) is needed.

C. Background: The majority of the seawall is located on a narrow sliver of land in the State Land Use Urban District, but outside of the platted land of the City and County of Honolulu and is unzoned (has no County zoning designation). This land, which is about 4,539 square feet in area, is owned by the State of Hawaii. The Applicants have a 55-year easement over the area, which expires on October 28, 2070. The easement affords the Applicants the right to maintain, repair, remove, or replace the existing seawall and ensure the seawall does not impinge upon the safety of the adjacent area. On September 11, 2020, the Applicant obtained approval from the Board of Land and Natural Resources to make proposed improvements via a decision on Agenda Item D-11. Being mauka of the shoreline, this request is subject to approval of a SSV by the Department of Planning and Permitting (DPP).

D. Applicant's Justification: The Applicant's justification statements are part of the file.

## II. FINDINGS OF FACT

On the basis of the evidence presented, the Director has found:

A. Description of Site: The site is in the Waimanalo area on the windward coast of Oahu, between Kaupo Beach Park and Kaiona Beach Park. The seawall retains the soil materials of the property. On the makai side of the seawall, the wall height ranges from five to 11 feet above the sandy beach and water of the shoreline. The subgrade boulders, cobbles, and sand are about 1.5 to two feet below MSL. On the mauka face of the wall, the grade ranges from about six to nine feet above MSL. When looking from the mauka side, the wall appears to range from two feet above grade on the eastern side, to less than grade on the western side of the wall. Where the crown of the wall is only five feet above MSL, the grade behind it is higher, at approximately 6.7 feet above MSL, and is retained by concrete masonry unit pavers vertically placed between the wall and soil (see Exhibit H, Wall Sections 4 and 5).

A shoreline survey was conducted on April 15, 2020, and certified by the State of Hawaii on July 13, 2020. The survey indicates that the shoreline follows along the bottom of the wall, continuing straight across the shoreline access area and boat ramp (see Exhibit B). The wall is nonconforming, as it was previously lawful but is located within the shoreline setback as a result of changes in the law relating to the shoreline setback. The retaining wall was constructed long before the establishment of the shoreline setback requirements of Hawaii Revised Statutes (HRS) Chapter 205A and Revised Ordinances of Honolulu (ROH) Chapter 23.

The Project area consists of two residential subdivision lots and a small portion of State-owned land (see Exhibits A and B). The entire existing seawall is on State-owned land, although portions of the proposed structures (buttress wall and ocean access) are partially on State-owned land and partially on the residential subdivision lots. The site ranges from about 250 to 290 feet deep, and 450 to 540 feet wide. The site is about three acres, with the west lot being 1.344 acres, and the east lot being about 1.659 acres. The residential lots slope gently from the side property lines down towards the middle of the two lots and ranges in elevation within the buildable area boundary from about 12 feet above MSL to about five feet above MSL near the shared property line (see Exhibit E).

The residential lots are in the R-10 Residential District and are presently being redeveloped with new single-family dwellings. Building Permit (BP) No. 840172 approved the construction of one new single-family dwelling on the west lot, and BP Nos. 840348 and 840348 approved the construction of two new single-family dwellings on the east lot. These dwellings were under construction during the site visit made by DPP staff on September 25, 2020. The site is presently developed with a caretaker dwelling on the west lot near Kalanianaole Highway, and an accessory boat house also on the west lot.

According to the U.S. Department of Agriculture Web Soil Survey, the soils at the site include Jaucus sand and Kawaihapai very stony clay loam. The DPP staff also observed beach sand at the makai edge of the site. Permeability of these soils is rapid, and runoff is very slow to slow. The Applicant also states that they found large volumes of clay fill material and basalt boulders immediately mauka of the seawall.

B. Description of the Surrounding Uses: The nearby parcels makai of Kalanianaole Highway are also in the R-10 Residential District. The adjacent parcel to the west is developed with the Shriner's Beach Club and a seawall. The four parcels between the Project site and Kaiona Beach Park to the west have seawalls. The parcels to the east of the site are predominantly developed with residences. The adjacent parcel to the east does not have a shoreline protection structure. Beyond the adjacent parcel to the east continuing to Kaupo Beach Park, some properties have seawalls, some do not. Also, some parcels are protected with temporary sandbag structures. There are 24 lots between Kaiona Beach Park and Kaupo Beach Park.

Just makai of the seawall is a large and actively-managed turtle pond, known as the Pahonu. The Pahonu consists of stacked-rock walls, generally shaped as a rectangle spanning from the east edge of the subject site to about 540 feet west (in front of the Shriner's property). The structure extends about 160 feet out into the ocean and contains several openings to allow water, fish, turtles, and sand in and out of the enclosed area. The Waimanalo Limu Hui, a local community organization, uses the Pahonu for Limu cultivation and cultural education.

C. Shoreline Access: The shoreline area is accessed primarily by foot from Kaiona Beach Park, about 600 feet west of the site. Lateral access along the shoreline is through shallow water or sandy beach areas makai of the certified shoreline, and over portions of the Pahonu rocks. The public commonly swims in the waters within and around the Pahonu and uses the sandy area on the eastern side of the Pahonu. There is no public access through or across the two residential lots.

D. Environmental Compliance: The Project is subject to the requirements of the Environmental Impact Statement (EIS) Law, Chapter 343, HRS, because the Project is considered development within the shoreline setback area. In compliance with Chapter 343, HRS, and Title 11, Chapter 200, Hawaii Administrative Rules, the anticipated environmental impacts of the proposed Project were disclosed in an Environmental Assessment (EA). The DPP determined that the preparation of an EIS was not required and issued a Finding of No Significant Impact (FONSI) on February 13, 2020. The Final EA and FONSI were published in The Environmental Notice on February 23, 2020.

During the EA process, comments were received from the following public agencies: State Office of Planning, Department of Land and Natural Resources (DLNR), and the City Office of Climate Change, Sustainability, and Resiliency.

Additionally, the Sierra Club, the Surfrider Foundation, the Waimanalo Limu Hui, and several citizens provided comments on the Draft EA. The Applicant's responses to these comments are in the Final EA.

The Final EA considered four alternative actions including complete removal or natural failure of the wall, beach nourishment, construction of a secondary wall outside of the 60-foot setback, and substantive repairs to and expansion of the existing wall. The Final EA concluded that the preferred alternative involved the repairs and expansion included in the current proposal.

E. Shoreline Characteristics: Hawaii Shoreline Study Coastal Erosion Maps generated by the University of Hawaii School of Ocean and Earth Science and Technology (SOEST) in 2010, describes the coastal area from Waimanalo to Kaiona Beach Park as being exposed to consistent easterly tradewind waves year-round and a refracted northerly swell during the winter months. The inner shelf and shoreline are protected from the full energy of open ocean waves by a wide fringing reef platform.

1. Shoreline Erosion: The SOEST Maps reveal historic erosion at the subject site. The rates of erosion, which are based on historical shorelines between 1911 and 2005, range from about 0.4 to 0.8 feet per year. In general, the Maps reveal that prior to 1975, the shoreline may have been somewhat makai of the seawall, but since about that time the shoreline has been at or near the base of the seawall and has seen limited changes.

2. Sea Level Rise (SLR): According to the Pacific Island Ocean Observing System (PACIOOS), significant portions of the Project site will be inundated under a scenario with 3.2 feet of SLR by the end of the 21st century. Inundation in the lower-lying areas toward the middle of the site will reach almost three quarters of the way into the site. Further, the PACIOOS SLR Viewer shows the site will also be subject to erosion under 3.2 feet of SLR.

3. Coastal and Flood Hazard: The Flood Insurance Rate Map, Panel 15003C0385G (November 5, 2014) shows that the makai portion of the site is in Flood Zone VE with a base flood elevation of 13 feet above MSL and Flood Zone AE with a base flood elevation of 13 feet above MSL (see Exhibit C). Flood Zone VE is the coastal high hazard area subject to high velocity wave action from storms and seismic sources. The AE Zone corresponds with areas determined to be within the 100-year flood limits where base flood elevations have been determined. The new dwelling on the west lot is entirely within the VE and AE Zones. The new dwellings on the east lot are partially in the VE and AE zones. The entire seawall and boat house are in the VE Zone. Structures within these flood zones, including the seawall, are subject to the provisions and Flood Hazard requirements of Chapter 21A, ROH.

4. Shoreline Views: The 1987 Coastal View Study designates the site as being within the Waimanalo viewshed area. Within this section of the Waimanalo area, Kalanianaole Highway is designated as a coastal roadway, although no specific coastal views are recognized adjacent to this site.

5. Shoreline Processes: Sea Engineering, Inc., provided a Coastal Assessment (CA) as part of the EA. The CA reviewed the existing conditions and analyzed the impact of the existing seawall and proposed improvements on shoreline processes. Shoreline processes are already impacted by the Pahonu and the existing seawall. The Pahonu, which is not part of this Project, is modified occasionally by the community organizations maintaining the structure. These modifications can change the way sand accrues and erodes. Older imagery from the area shows a wider sandy beach at the western edge of the subject property as recently as 2008. The CA found that the proposed improvements to the existing seawall are the least environmentally impactful approach, and therefore are the preferred alternative action. The CA can be found in the Final EA.

F. Special Management Area (SMA) Ordinance: The site is within the SMA. The seawall is accessory to existing and proposed single-family dwellings that are each less than 7,500 square feet in floor area, so it is not considered development pursuant to Section 25-1.3(2)(N), ROH. Therefore, it is exempt from the permitting requirements of the SMA Ordinance.

The State Legislature adopted Act 16, signed by the Governor on September 15, 2020, which specifies that under HRS Chapter 205A, dwellings, and their accessories, on shoreline lots will now be considered development for purposes of the SMA. However, because this application was received and accepted prior to September 15, 2020, the provisions of Act 16 do not apply to this Project.

G. Chapter 205A Part III, HRS, Shoreline Setbacks: Section 205A-44, HRS, establishes the prohibition of structures within the shoreline unless a variance is obtained. Section 205A-46 establishes the criteria for granting a variance, which Chapter 23, ROH is intended to administer.

H. Mayor's Directive 18-2 Related to Climate Change and SLR: Directive 18-2 requires that all City departments and agencies use the Hawaii SLR Viewer as a resource for reviewing permitting requests, and to work to conserve natural, dynamic shorelines wherever possible. According to the Directive, permitting permanent shoreline armoring is generally inconsistent with the Directive, and should only be considered as a last resort where it supports significant public benefits.

I. Public Hearing: In accordance with the requirements of Section 23-1.11, ROH, the DPP held a public hearing on October 2, 2020, at the Mission Memorial Auditorium and using WebEx. The Applicant, the agent, and about 17 people attended virtually, and 10 individuals attended in person. Nobody testified in support of the Project. The testifiers included representatives from Surfrider Foundation, the Sierra Club, and several individuals who opposed the Project. About 17 neighbors submitted a jointly signed letter seeking denial of the request unless the owners of the subject site participate in the beach restoration Project being coordinated with the neighbors, the DLNR, and Oceanit, a private consulting firm.

The testifiers expressed:

1. Concerns about a domino effect related to the expansions and adjacent landowners' expectations for new seawalls.

2. Concerns related to community process and lack of community input.

3. Concerns about the potential impact to natural spring water and the Pahonu if the reinforced seawall prevents fresh water from percolating into the near-shore environment.

4. Desires to have a community-wide effort for coastal resiliency in the region.

5. A missed opportunity to remove a seawall and allow natural sand dunes to reform.

6. Concern about the lack of consideration for the public when making decisions about public trust lands (i.e., State-owned coastal lands).

7. A lack of hardship necessary to approve the SSV.

8. Concerns that the SSV could have been approved to protect the old structures and dwellings, but the new development should not qualify for such protections as the Applicant was aware of risks when choosing to redevelop.

9. Impacts to cultural resources, including iwi kupuna and the Pahonu.

The DPP staff planner asked several questions of the Agent. The Agent confirmed that the Project would result in no impact to beach process or groundwater. The Agent also confirmed that there should be no concern related to flanking from the east side because the proposed buttress wall will be designed to limit the impact from scouring and storm surges. The Agent stated that the location of the buttress was selected to mitigate possible impacts to the adjacent lot.

Additionally, the DPP received a number of letters and emails from the public regarding the subject Project. This included a letter from Councilmember Heidi Tsuneyoshi. The Councilmember requested the Project obtain an SMA permit, which, as discussed earlier, is not required. She further requested that the Project be limited to just repairs, and that new structures in this area could be detrimental to the Pahonu. The issues raised in the other correspondences are reflected in the comments received at the public hearing, as documented above. These correspondences are all part of the file.

## III. ANALYSIS

Criteria for Granting an SSV: An SSV may be granted for a private improvement that artificially fixes the shoreline only if hardship is likely to be caused by shoreline erosion. Hardship, as defined in Section 23-1.8(b)(3)(A), ROH, is demonstrated only if the record shows that the proposal meets the following three tests:

- Test One: Deprivation of Reasonable Use: The Applicant would be deprived of reasonable use of the land if required to comply fully with the Shoreline Setback Ordinance and the shoreline setback rules.

- Test Two: Unique Circumstance: The Applicant's proposal must be due to unique circumstances and may not draw into question the reasonableness of Chapter 23, ROH, and the shoreline setback rules.

- Test Three: Practicable Alternative: The proposal must be the practical alternative which best conforms to the purpose of Chapter 23, ROH, and the shoreline setback rules.

The analysis of these three tests follows:

1. The Applicant would be deprived of reasonable use of the land if not allowed to repair and expand the seawall because without significant repair, catastrophic failure of the retaining wall is likely. The subsequent sudden erosion event would significantly damage both the residential lots and the historically significant Pahonu. Furthermore, improvements necessary to prevent an unsafe situation on public property due to wall failure provide a significant public benefit considering the recreational and cultural value of the Pahonu area.

   Historic erosion data shows that the shoreline has experienced erosion throughout the 20th Century and SLR projection data suggests the site would experience additional erosion by the end of the 21st Century. In addition, if the wall failed, additional scouring or flanking resulting from the large Shriner's wall to the west could exacerbate the erosion impact to the site and the Pahonu.

Restrictive covenants have been recorded for both residential lots to limit the number of dwellings on each lot to two, so additional dwellings (up to the maximum allowed by the zoning code) will not be proposed in this sensitive coastal area in the future. Also, the proposed dwellings and all new construction are outside of the 60-foot shoreline setback. The distance provides them a measure of protection from coastal wave action, but should the 100-year-old wall collapse, the resulting erosion may be so sudden and extreme that damage to the residential uses could result. In that scenario, damage to the public beach and Pahonu would also be extreme, and the destabilized wall on State land could create a public health hazard. Therefore, based on the facts of the case, we find the Applicant would be denied reasonable use of the land if not allowed to repair and expand the retaining seawall.

The Applicant asserted that impacts from inundation after 3.2 feet of SLR contributes to hardship on the site. However, this was not accepted by the Department because it is not a present condition or a unique circumstance. Impacts from inundation and wave action after 3.2 feet of SLR may indeed affect the property in the future, but those impacts are neither ripe for review at the time of this application, nor are they likely to create a level of erosion that would deny the owners reasonable use of the site. In other words, the retaining seawall gives a certain measure of protection against erosion. Additional wall height to protect the property from periodic wave overtopping and inundation is unlikely to create hazards so extreme that the dwellings would be threatened. Furthermore, impacts from SLR are not unique to this property. Every lot in this area will experience impacts from SLR based on the Hawaii SLR Viewer. As Directive 18-2 points out, about 9,400 acres of land around Oahu are expected to be chronically impacted by SLR. Half of that land is in the Urban District, including about 3,880 structures. Therefore, we have concluded SLR does not justify the extensions of the wall height in areas where the additional wall height is not needed to prevent erosion (i.e., the areas where existing grade is higher than the wall height).

We note that the presence of Jaucus sands increases the likelihood that the Applicant will encounter archeological finds, including iwi kupuna, during construction of the Project. Therefore, in the event that any burials or archaeological or historic sites are discovered during the course of construction of the Project, all construction activity in the vicinity of the discovery must stop until the issuance of an archaeological clearance from the State Historic Preservation Division that mitigation measures have been implemented to its satisfaction. This is imposed as a condition of approval.

2. The Applicant's proposal is due to unique circumstances and does not draw into question the reasonableness of Chapter 23, ROH, and the shoreline setback rules. The unique circumstance associated with this request is derived from the existence of the nearly 100-year-old seawall and the Pahonu, which is, in part, reliant on the seawall retaining the mass of soil on the subject lots. The existence of a nearly 100-year-old seawall that has not been substantially

repaired during that time is a unique circumstance not common to shoreline lots. Continued protection of the Pahonu and adjacent areas presents a significant public benefit for recreation and cultural resources and is also a unique situation not generally shared by the neighbors. Thus, the approval of the proposal, as modified by the conditions, will not call into question the reasonableness of Chapter 23, ROH, as this situation is not common nearby, or elsewhere throughout the City and County of Honolulu.

3. The proposal is the practical alternative which best conforms to the purpose of Chapter 23, ROH, and the shoreline setback rules, provided certain modifications are made to the wall, as discussed below.

   Given the unique nature of the site, if the seawall was removed or left to fail and natural erosion took place (i.e., the first alternative explored in the EA), it would be detrimental to the landowner and to the Pahonu. While the release of Jaucus sands may eventually result in the re-creation of coastal dunes, as suggested by some of the testifiers at the public hearing, the clay and other non-sandy soils released in an uncontrolled erosion event would create detrimental near-shore environmental impacts.

   The second alternative explored in the EA involved a new compliant shoreline protection structure outside of the 60-foot shoreline setback area. This alternative would be similarly problematic because it would result in a loss of about 46,000 square feet of land makai of the new shoreline structure to erosion over time and adversely impact the Pahonu and near-shore environment.

   A third alternative explored in the EA involved beach nourishment. According to the public testimony, 17 of the 24 neighbors have signed onto an agreement seeking a beach nourishment solution along the coastline to the east of the site. Beach nourishment focused on the Project site alone would negatively impact the Pahonu, however, and is not sufficiently regional in scale to provide a long-term solution. This alternative also does not address the existence of this longstanding seawall and the fact that its failure will create a public safety hazard.

   Therefore, maintenance and expansion of the wall, including the addition of new wall segments to shore up its structural integrity is the most practicable alternative. The design provides long-term protection to the site until 2070, while avoiding development in the State Land Use Conservation District and minimizing the impact to the near shore environment. However, certain elements of the current proposal are not the most practicable alternative. The application suggests the additional wall height and new walls are necessary to protect the property from wave overtopping, particularly after the impacts of SLR are felt. However, as previously stated, an SSV may be granted for a private improvement that artificially fixes the shoreline only if hardship is likely to be caused by shoreline erosion. The wall itself will provide substantial protection from erosion. Although periodic waves overtopping the wall may be inconvenient

and unwanted, the proposed additional height above grade will increase the bulk of the structure within the shoreline setback without contributing meaningfully to the protection of the site from erosion, or providing additional immediate protection of the Pahonu and the public beach.

4. To summarize the above analysis, we find that most of the proposed improvements 1) will prevent erosion and provide a significant public benefit, which ensures reasonable use, 2) are due to unique circumstances, and 3) are the most practicable alternative, except where they involve increases in the wall height well over the level of existing grade mauka of the wall.

   Those improvements necessary to protect the property from erosion and that provide a significant public benefit include: Repairs to the existing structure, the new concrete buttress wall, modifications to incorporate splash guard top caps, concrete wall width extensions to provide resistance to overturning, additional wall height sufficient to retain the soils behind the wall, and new wall sections to fill in the boat ramp area and the stairs area to create some consistent erosion protection. The new walls sections, including the infill wall at the boat ramp, the wall at the top of the access stairs, and the buttress wall, are necessary to protect against erosion, flanking and wall failure, which, in addition to impacting the reasonable use of the site, would create near-shore environmental and safety impacts.

   However, we find the additional wall height that exceeds the approximate nearby landward grade by more than one foot will not provide additional protection from erosion, will not provide a significant public benefit, and is unnecessary to preserve reasonable use of the site. Therefore, considering the approximate elevations shown in the drawings provided (see Exhibit E), a reasonably consistent wall height that is about one foot above the highest grade near the individual wall sections should be permitted, as shown in Table 2 below:

**Table 2**

| Wall Section (Exhibit E) | Approximate average elevation of land mauka of the wall, Feet above MSL | Proposed Height, Feet above MSL | Height necessary to protect against erosion, Feet above MSL |
|---|---|---|---|
| 1 | 9 | 11 | 11, existing |
| 2 | 9 | 11 | 11, existing |
| 3A<br>3B<br>3C | 9<br>7<br>6 | 11<br>9<br>9 | 11, existing<br>9, existing<br>8 |
| 4 | 7 | 9 | 8 |
| 5<br>5a (boat ramp) | 7<br>3.5 | 9 | 8<br>8 |
| 6 (buttress) | 9 | 8 | 8 |

| Wall Section (Exhibit E) | Approximate average elevation of land mauka of the wall, Feet above MSL | Proposed Height, Feet above MSL | Permitted height necessary to protect against erosion, Feet above MSL |
|---|---|---|---|
| 7 (top of stairs) | 6 | 11.5 | 8 |

The Applicant is proposing to retain the existing wall heights for sections 1, 2, 3A, and 3B, so this will comply with the condition of this approval. New wall Section 6 is proposed to meet this maximum height. Wall Sections 3C, 4, 5, and 5a, however, must be reduced in height to a maximum of eight feet above MSL. Wall Section 7 must also be reduced to no more than eight feet above MSL in order to help retain runoff and sediment from erosion of the surrounding higher-elevation areas. Prior to submitting building permit plans, the Applicant must submit for review and approval modified plans that comply with the above conditions. We also find that the concrete pad at the top of the ocean access stairs is necessary to protect against erosion, although the design may be modified in order to comply with the above conditions.

In addition, the Applicant should be required to coordinate with the DLNR, the managers of the Pahonu, and the adjacent property owners to establish a long-term plan that involves beach nourishment and eventual decommissioning of the seawall after the end of the 55-year easement. Proof of such coordination should be required as a condition of approval before any future repair of the seawall is proposed after this initial action, or within two years of this approval, whichever comes first.

## III. CONCLUSIONS OF LAW

A. There is evidence to indicate that the Applicant would be deprived of reasonable use of the property if not allowed to repair and expand the existing seawall in the 60-foot shoreline setback area.

B. The request to repair and expand the existing seawall is due to unique circumstances and does not draw into question the reasonableness of ROH, Chapter 23, or the shoreline setback rules.

C. The request to repair and expand the existing seawall is the best practical alternative that conforms to the purpose and intent of ROH Chapter 23 and the shoreline setback rules, provided the proposal is modified to reduce the proposed wall height in certain areas.

## IV. DECISION AND ORDER

Pursuant to the foregoing Findings of Fact and Conclusions of Law, the Department of Planning and Permitting (DPP) hereby **APPROVES** the request for a Shoreline Setback Variance (SSV) to allow the repair and expansion of the existing seawall within the shoreline setback area, subject to the following conditions:

1. Prior to submitting building permit applications, the Applicant must submit updated plans showing reduced wall heights as described in the Analysis section of this Report.

2. The Applicant must coordinate with the State Department of Land and Resources and the adjacent property owners to establish a long-term plan that involves beach nourishment. Proof of such coordination will be required prior to submitting any future building permits to repair the seawall after this initial action, or within two years, whichever comes first.

3. In the event that any burials or archaeological or historic sites are discovered during the course of construction of the Project, all construction activity in the vicinity of the discovery must stop until the issuance of an archaeological clearance from the State Historic Preservation Division that mitigation measures have been implemented to its satisfaction.

4. Approval of this permit does not constitute compliance with other governmental requirements which are subject to separate review and approval. The Applicant shall be responsible for ensuring that the final plans for the Project approved under this permit comply with all other applicable governmental agencies' provisions and requirements.

5. The Applicant and/or landowner shall notify the Director of the DPP of any transfer in ownership of the property. In the event of a change of ownership, the Director of the DPP will notify the new owner (by copy of this permit report) that the site is governed by this approval, and that compliance with all the conditions of approval is required.

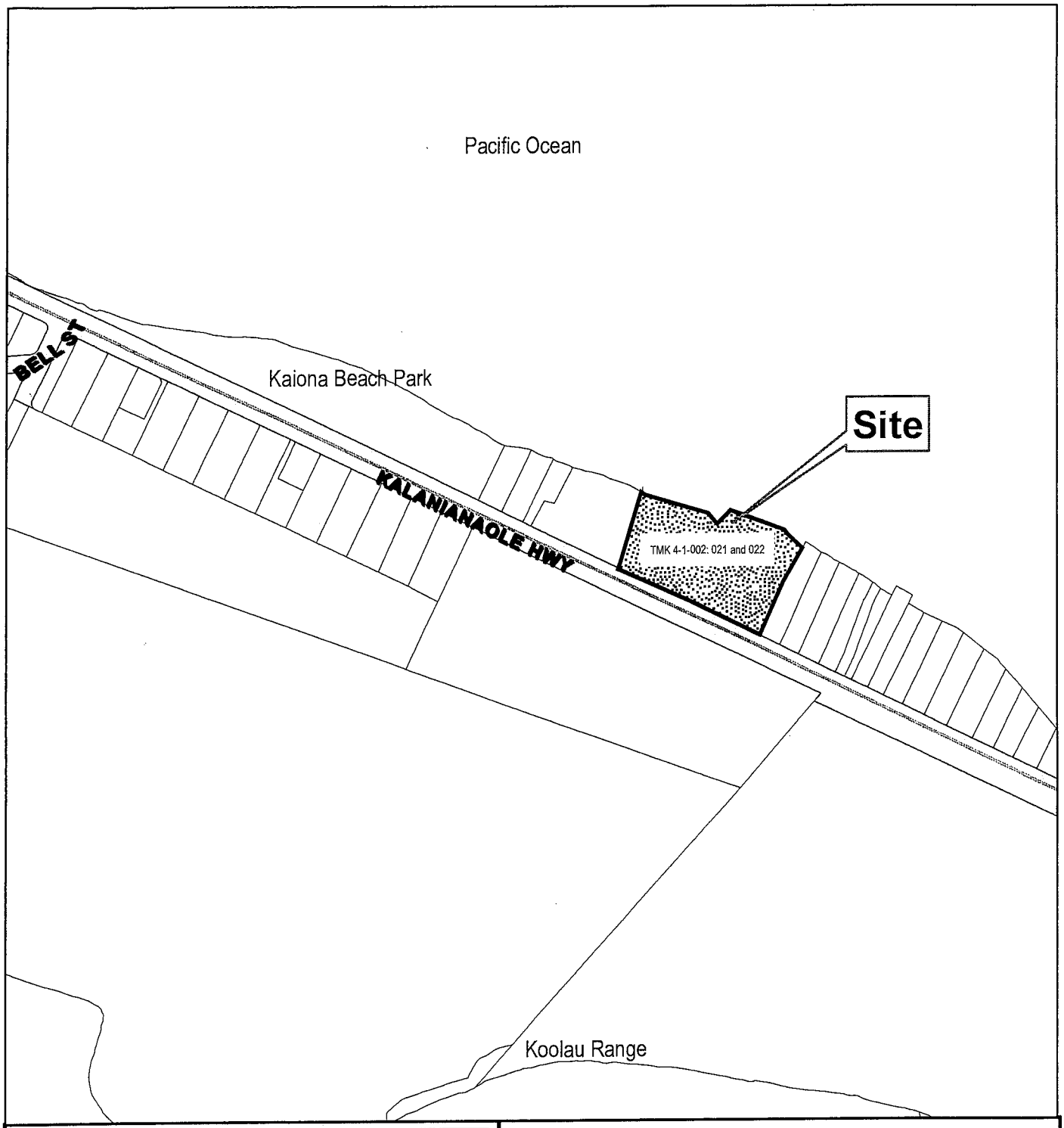
6. This SSV may be revoked by the Director of the DPP when, due to a material change in circumstances, one or more of the three findings of hardship can no longer be made; or when there is a breach of any of the conditions above stated; provided that, for good cause, the Director may amend the above conditions.

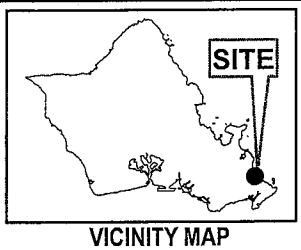
Dated at Honolulu, Hawaii, this 16th day of November, 2020.

Department of Planning and Permitting
City and County of Honolulu
State of Hawaii

By _____
Kathy K. Sokugawa
Acting Director

Attachments




VICINITY MAP

0 260 520 1,040 Feet

# LOCATION MAP Exhibit A

## Waimanalo

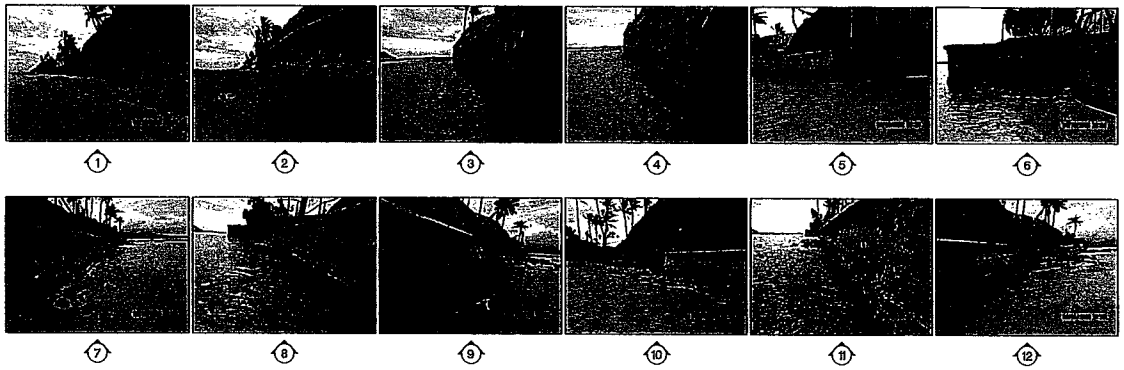
**FILE NO.: 2020/SV-3**
**Shoreline Setback Variance**
**Waimanalo Paradise Seawall**
**Repair and Expansion**

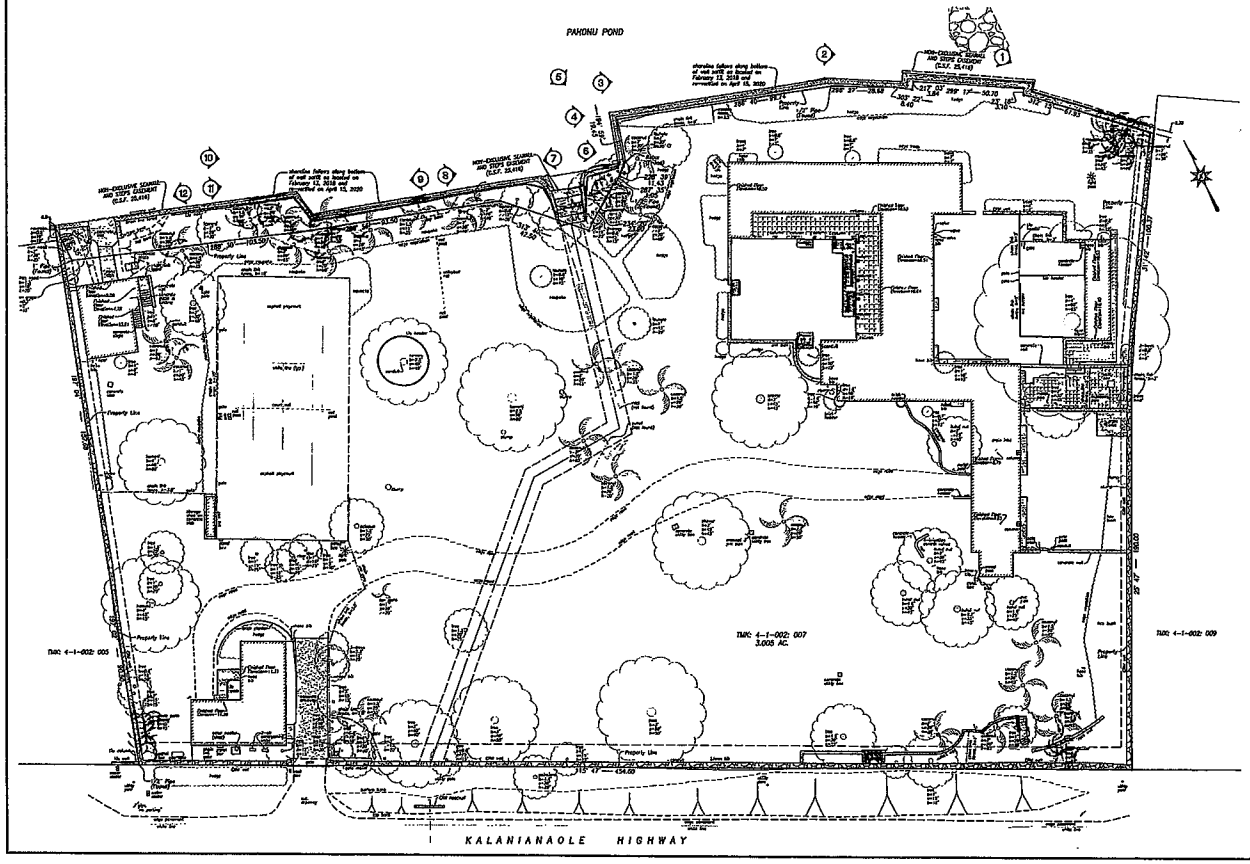
**TAX MAP KEY(S): 4-1-002: 021 and 022**

Prepared by: Department of Planning & Permitting
City and County of Honolulu

Date Prepared: September 1, 2020

# Exhibit B




the shoreline as delineated in red is hereby certified as the shoreline as of

JUL 13 2020

Chairperson, Board of Land and Natural Resources

**ABBREVIATIONS:**

CRM Concrete Rubble Masonry

**NOTES:**

Azimuths are referred to Government Triangulation Station "Makapuu" △.

(1) Denotes approximate position and direction of shoreline photographs.

GRAPHIC SCALE 1"=20'

20 10 0 20 40 60

ALAN S. NISHIOKA LICENSED PROFESSIONAL LAND SURVEYOR No. 9043 HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

LICENSED PROFESSIONAL LAND SURVEYOR No. 9043

KN Surveying, LLC
500 ALAKAWA STREET, #160A
HONOLULU, HAWAII 96817
PH. 524-7100

SHORELINE SURVEY
AT 41-505 KALANIANAOLE HIGHWAY
OWNER: WAIMANALO PARADISE LLC
PAHONU, WAIMANALO, KOOLAUPOKO, OAHU, HAWAII
AS SHOWN ON LAND COURT APPLICATION 997 MAP 1
TAX MAP KEY: 4-1-002: 007
SCALE: 1 IN. = 20 FT.

APRIL 15, 2020 FIELD BOOK NO. 159: 01

42" X 36"


# Flood Hazard Assessment Report

www.hawaiinfip.org

Exhibit C

## Property Information

| | |
|---|---|
| COUNTY: | HONOLULU |
| TMK NO: | (1) 4-1-002:021 |
| WATERSHED: | MAKAPUU |
| PARCEL ADDRESS: | ADDRESS NOT DETERMINED<br>WAIMANALO, HI 9679S |

## Notes:

## Flood Hazard Information

| | |
|---|---|
| FIRM INDEX DATE: | NOVEMBER 05, 2014 |
| LETTER OF MAP CHANGE(S): | NONE |
| FEMA FIRM PANEL: | 1S003C038SG |
| PANEL EFFECTIVE DATE: | JANUARY 19, 2011 |

THIS PROPERTY IS WITHIN A TSUNAMI EVACUTION ZONE: YES
FOR MORE INFO, VISIT: http://www.scd.hawaii.gov/

THIS PROPERTY IS WITHIN A DAM EVACUATION ZONE: NO
FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 100 200 ft

*Disclaimer: The Hawaii Department of Land and Natural Resources (DLNR) assumes no responsibility arising from the use, accuracy, completeness, and timeliness of any information contained in this report. Viewers/Users are responsible for verifying the accuracy of the information and agree to indemnify the DLNR, its officers, and employees from any liability which may arise from its use of its data or information.*

*If this map has been identified as 'PRELIMINARY', please note that it is being provided for informational purposes and is not to be used for flood insurance rating. Contact your county floodplain manager for flood zone determinations to be used for compliance with local floodplain management regulations.*

**FLOOD HAZARD ASSESSMENT TOOL LAYER LEGEND**
*(Note: legend does not correspond with NFHL)*

**SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD** - The 1% annual chance flood (100-year), also know as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. SFHAs include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

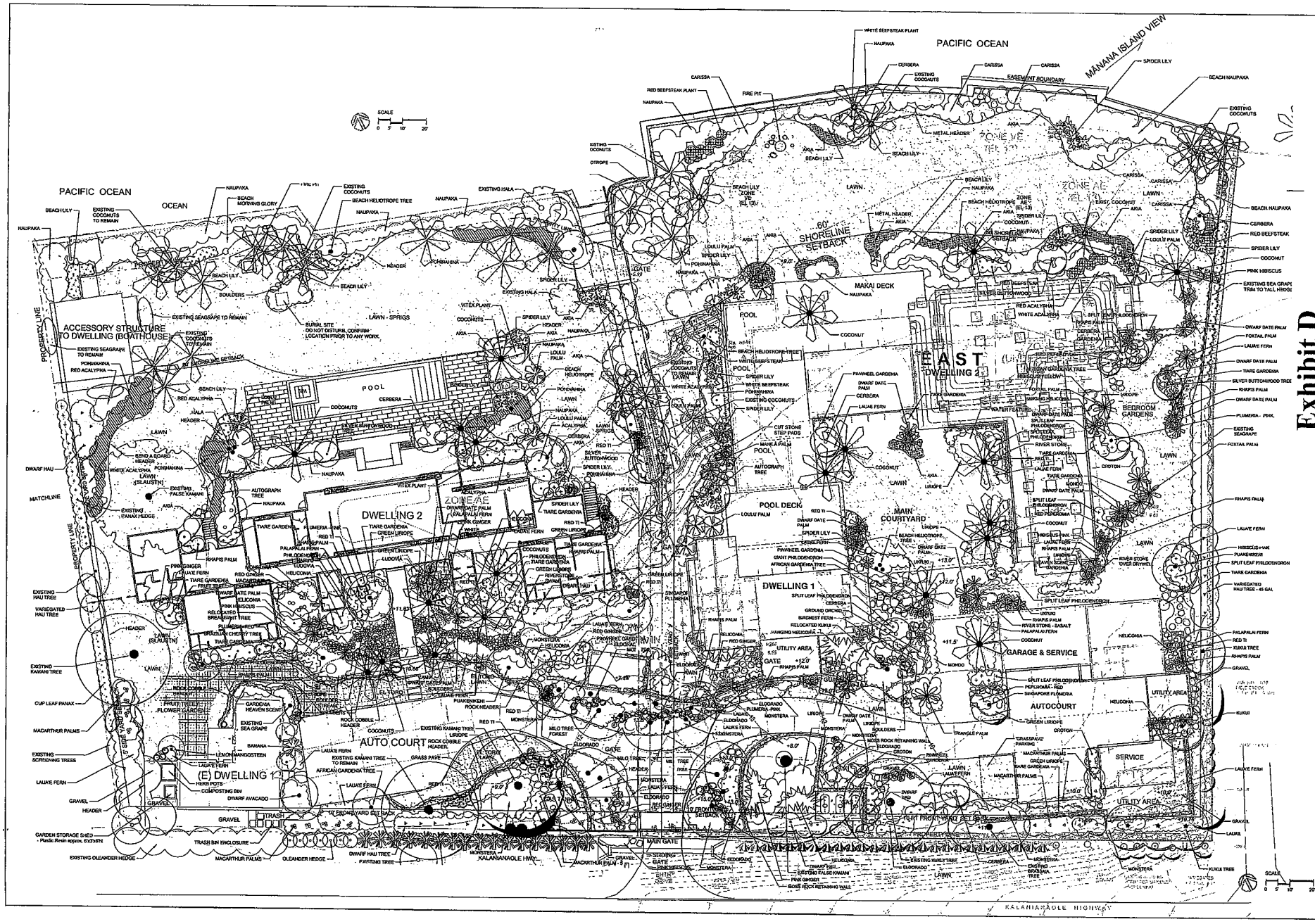
| | |
|---|---|
| | **Zone A**: No BFE determined. |
| | **Zone AE**: BFE determined. |
| | **Zone AH**: Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined. |
| | **Zone AO**: Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. |
| | **Zone V**: Coastal flood zone with velocity hazard (wave action); no BFE determined. |
| | **Zone VE**: Coastal flood zone with velocity hazard (wave action); BFE determined. |
| | **Zone AEF**: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE. |

**NON-SPECIAL FLOOD HAZARD AREA** - An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

| | |
|---|---|
| | **Zone XS (X shaded)**: Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood. |
| | **Zone X**: Areas determined to be outside the 0.2% annual chance floodplain. |

**OTHER FLOOD AREAS**

| | |
|---|---|
| | **Zone D**: Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase apply, but coverage is available in participating communities. |




# Exhibit D

HEF PLANNERS

733 BISHOP STREET, SUITE 2580
HONOLULU, HAWAII 96813
PHONE: (808) 545-2055
FAX: (808) 545-2050

REVISIONS

# WAIMANALO PARADISE

41-505 KALANIANAOLE HWY, WAIMANALO, HI 96795
TMK: 4-1-002:021 TMK: 4-1-002:022

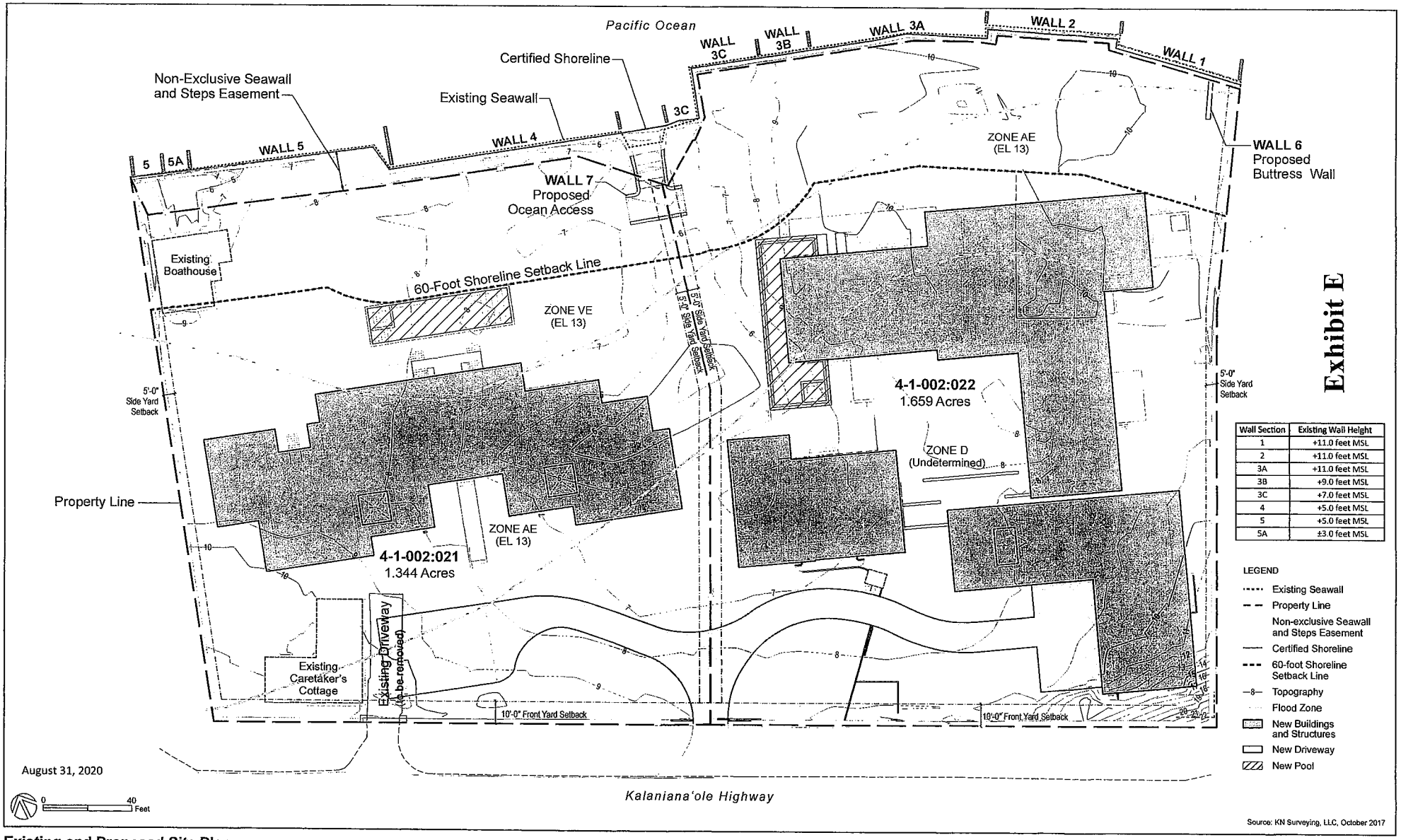
## LANDSCAPE PLANTING PLAN

RICHARD L. QUINN
LICENSED PROFESSIONAL LANDSCAPE ARCHITECT
No. 6028
HAWAII, U.S.A.

LICENSE EXPIRES ON APRIL 30,2

This work was prepared by me or under my supervision.

| | |
|---|---|
| ISSUE: CD SET | |
| Date: | 2020-09-14 |
| Scale: | |
| Design: | RQ/TN |
| Drawn: | RQ/TN |
| Sheet | L100 |
| | of - Sheets |




| Wall Section | Existing Wall Height |
|---|---|
| 1 | +11.0 feet MSL |
| 2 | +11.0 feet MSL |
| 3A | +11.0 feet MSL |
| 3B | +9.0 feet MSL |
| 3C | +7.0 feet MSL |
| 4 | +5.0 feet MSL |
| 5 | +5.0 feet MSL |
| 5A | ±3.0 feet MSL |

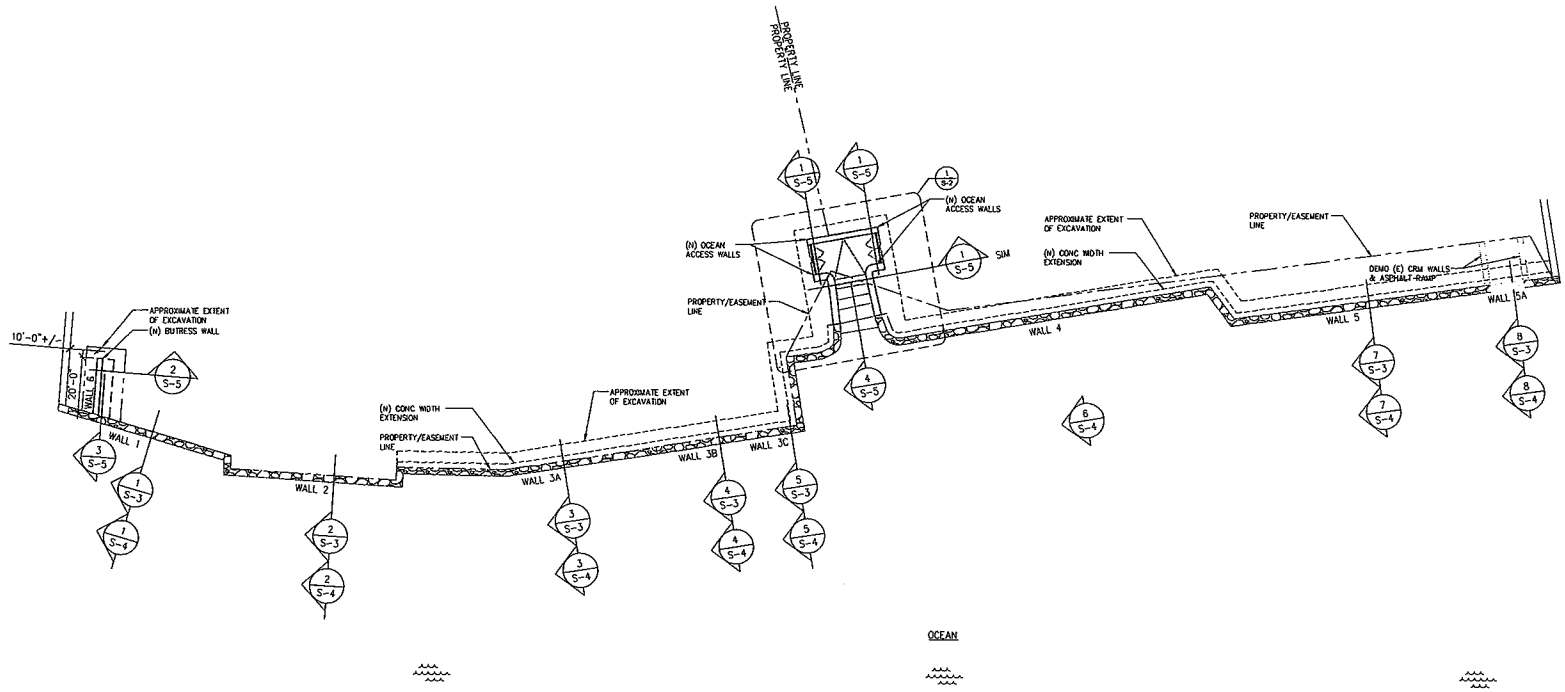
Source: KN Surveying, LLC, October 2017

**Existing and Proposed Site Plan**

**Waimānalo Paradise Seawall Repair**

Application for Shoreline Setback Variance

**Figure 2**




OVERALL SEAWALL PLAN

SCALE: 1" = 20'

NORTH

GRAPHIC SCALE

1" = 20'

20 0 20 40

SCALE IN FEET

# Exhibit F

GFDS ENGINEERS

Structural design for fine architecture™

45-1791 Kamehameha Road E, Ste 102
Kaneohe, Hawaii 96744
808 887 6250

CHRIS WILSON
LICENSED PROFESSIONAL ENGINEER
No. 14056-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.

EXP 4/30/22

Chris Wilson

WAIMANALO PARADISE
41-505 KALANIANA'OLE HWY
WAIMANALO, HI 96795
TMK: 4-1-002:007

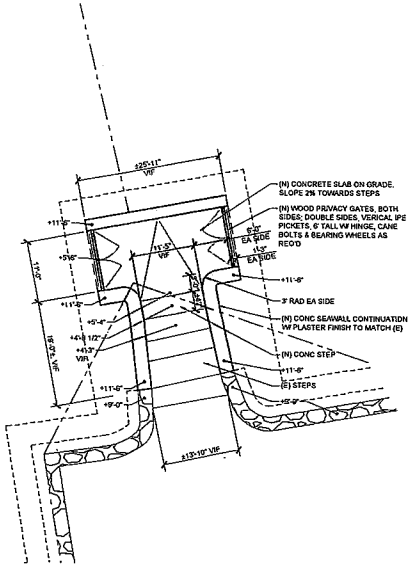
| ISSUE: | DATE: |
|---|---|
| VARIANCE SUBMITTAL | 08-31-20 |

JOB# 18067.H2

CONTENTS:
OVERALL SEAWALL PLAN

S-1

U:\PROJECTS\2018 FOLDER\18067.H2 Waimanalo Paradise - East Lot Seawall\dwg\COMP_SITE\S1.dwg V&S PLOTTED ON 08/26/2020 5:30 AM BY GFDS




1 ENLARGED SEAWALL ACCESS PLAN
SCALE: 1" = 10'

NORTH

# Exhibit G


GFDS ENGINEERS: Structural design for fine architecture™
85-1281 Coconut Road, Ste 102
Kailua-Kona, Hawaii 96740
808 887 6250


CHRIS WILSON
LICENSED PROFESSIONAL ENGINEER
No. 14856-S
HAWAII, U.S.A.

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EXP 4/30/22
Chris Wilson

WAIMANALO PARADISE
41-505 KALANIANA'OLE HWY
WAIMANALO, HI 96795
TMK: 4-1-002:007

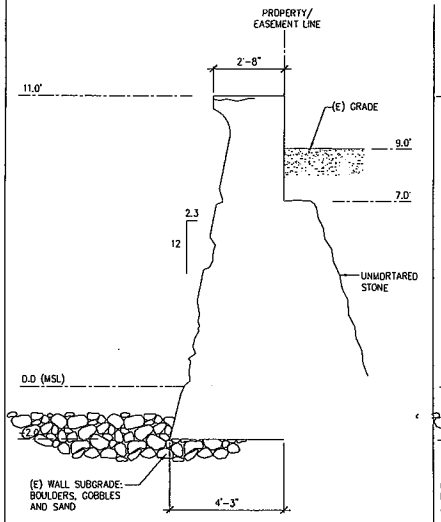
| ISSUE: | DATE: |
|---|---|
| VARIANCE SUBMITTAL | 08-31-20 |

JOB# 18067.H2

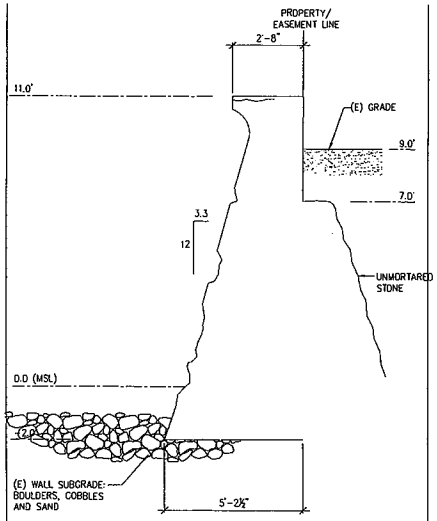
CONTENTS:
ENLARGED SEAWALL ACCESS PLAN

S-2

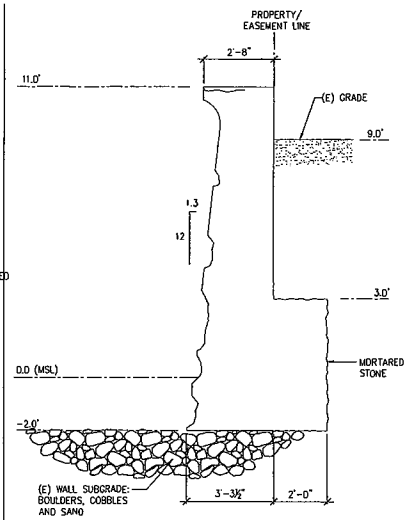
U:\PROJECTS\2018 FOLDERS\18067.H2 Waimanalo Paradise - East Lot Seawall\dwg\COMPLETE\S2.dwg 1W48 PLOTTED ON 8/6/2020 5:30 AM BY GFDS



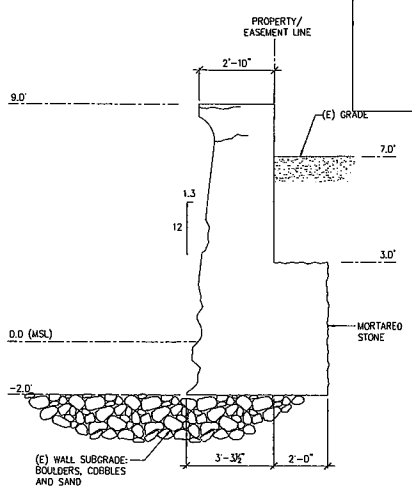

1 S-2 EXISTING WALL 1 SECTION
SCALE: 1/2" = 1'-0"



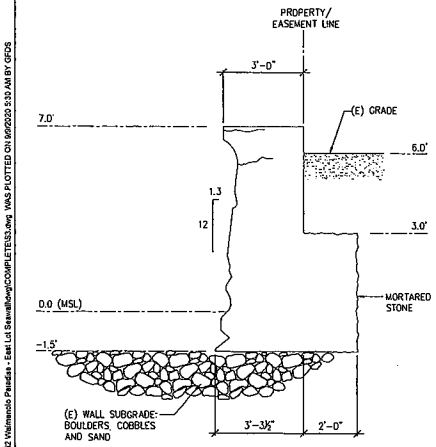

2 S-2 EXISTING WALL 2 SECTION
SCALE: 1/2" = 1'-0"



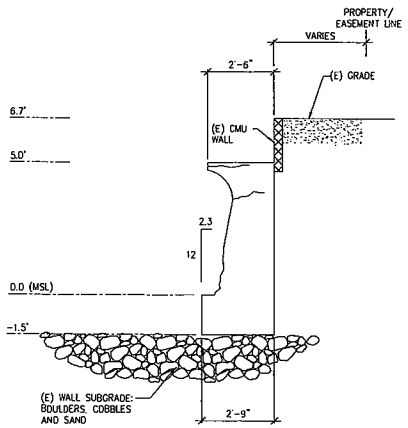

3 S-2 EXISTING WALL 3A SECTION
SCALE: 1/2" = 1'-0"



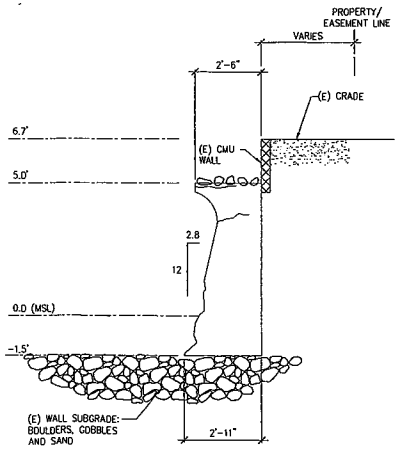

4 S-2 EXISTING WALL 3B SECTION
SCALE: 1/2" = 1'-0"



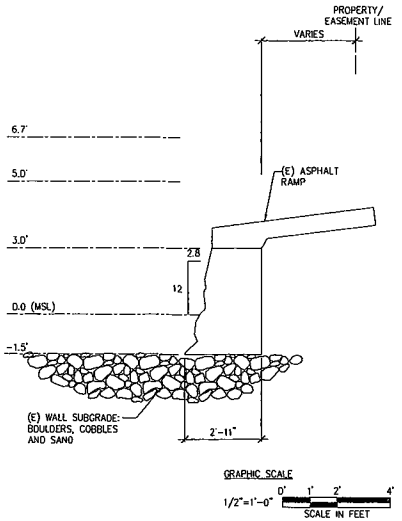

5 S-2 EXISTING WALL 3C SECTION
SCALE: 1/2" = 1'-0"




6 S-2 EXISTING WALL 4 SECTION
SCALE: 1/2" = 1'-0"




7 S-2 EXISTING WALL 5 SECTION
SCALE: 1/2" = 1'-0"




8 S-2 EXISTING WALL 5A SECTION
SCALE: 1/2" = 1'-0"

Exhibit H

GFDS ENGINEERS
Structural design for fine architecture™
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Kamuela, Hawaii 96743
808 887 6260

CHRIS WILSON
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No. 14056-S
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EXP 4/30/22
Chris Wilson

WAIMANALO PARADISE
41-505 KALANIANA'OLE HWY
WAIMANALO, HI 96795
TMK: 4-1-002:007

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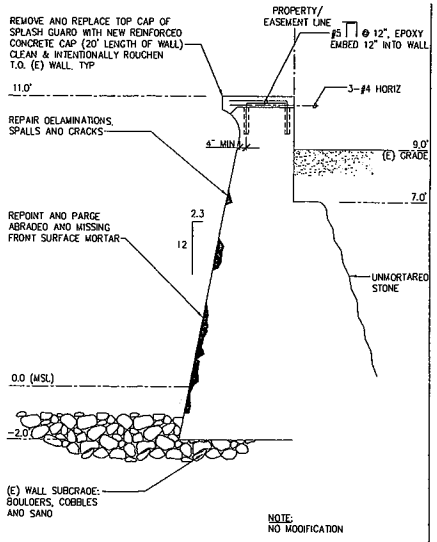
|---|---|
| VARIANCE | 08-31-20 |
| SUBMITTAL | |

JOB# 18067.H2

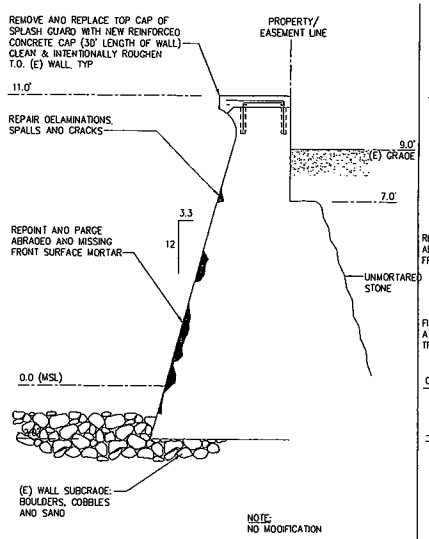
CONTENTS:
EXISTING SEAWALL SECTIONS

S-3

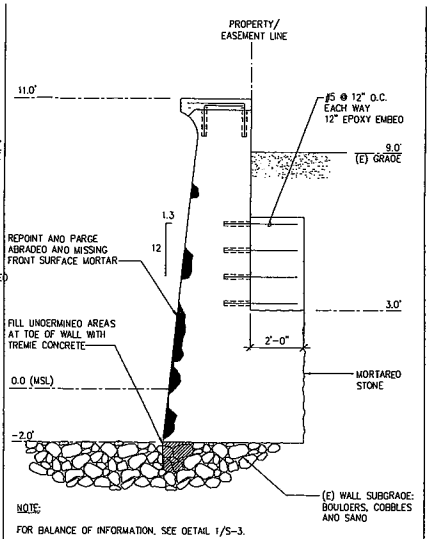
U:\PROJECTS\2018 FOLDERS\18067.H2 Waimanalo Paradise - East Lot Seawall\dwg\COMPLETES\S3.dwg WAS PLOTTED ON 9/09/2020 5:33 AM BY GFDS



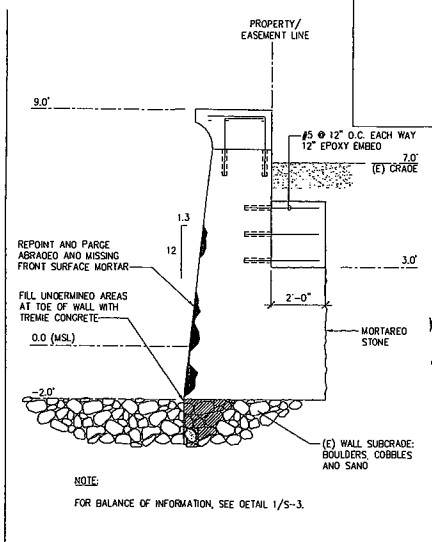

1 S-4 WALL 1 SECTION
SCALE: 1/2" = 1'-0"



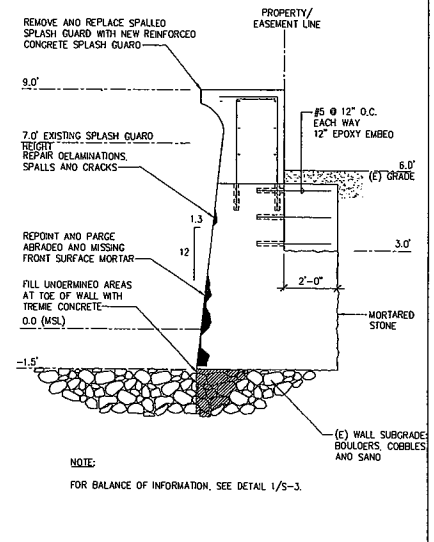

2 S-4 WALL 2 SECTION
SCALE: 1/2" = 1'-0"



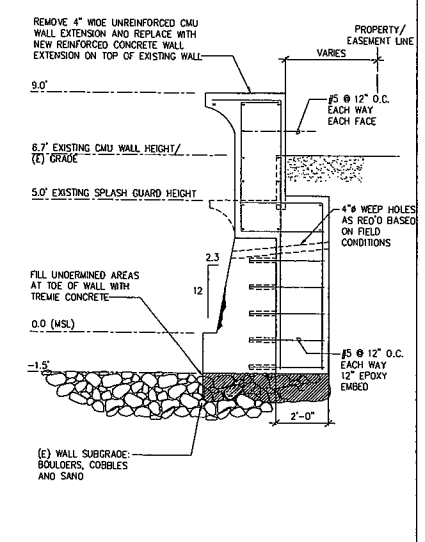

3 S-4 WALL 3A SECTION
SCALE: 1/2" = 1'-0"



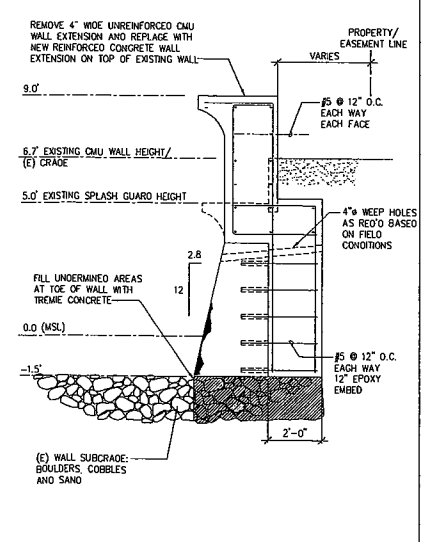

4 S-4 WALL 3B SECTION
SCALE: 1/2" = 1'-0"




5 S-4 WALL 3C SECTION
SCALE: 1/2" = 1'-0"

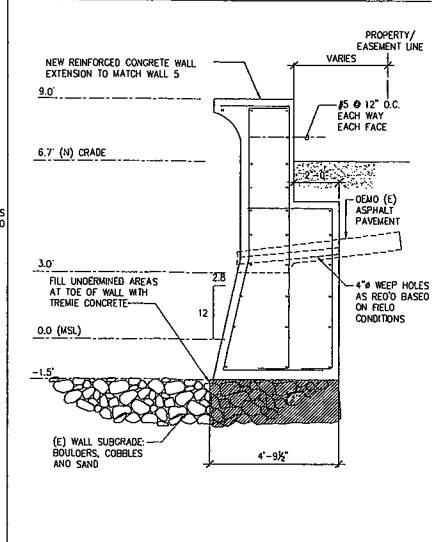



6 S-4 WALL 4 SECTION
SCALE: 1/2" = 1'-0"




7 S-4 WALL 5 SECTION
SCALE: 1/2" = 1'-0"

GRAPHIC SCALE
1/2"=1'-0" 0' 1' 2' 4'
SCALE IN FEET




8 S-4 WALL 5A SECTION
SCALE: 1/2" = 1'-0"

GRAPHIC SCALE
1/2"=1'-0" 0' 1' 2' 4'
SCALE IN FEET

Exhibit I

GFDS ENGINEERS
Structural design for fine architecture™
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CHRIS WILSON
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EXP 4/30/22
Chris Wilson

WAIMANALO PARADISE
41-505 KALANIANA'OLE HWY
WAIMANALO, HI 96795
TMK: 4-1-002:007

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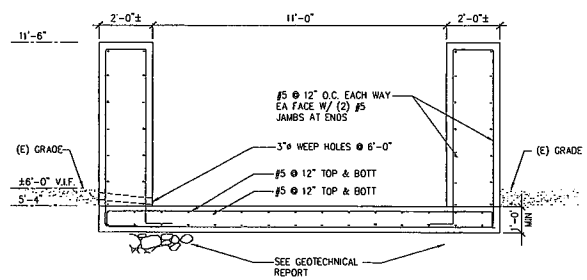
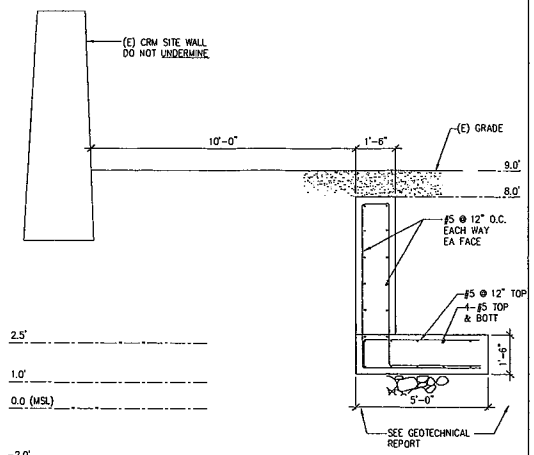
JOB# 18067.H2

CONTENTS:
SEAWALL RETROFIT

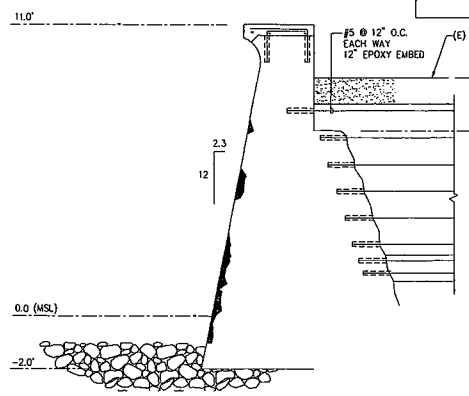
S-4



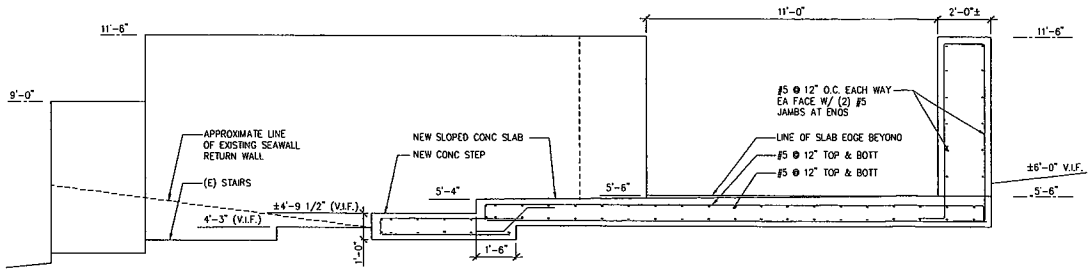

1 S-5 WALL 7 SECTION–BEACH ACCESS WALLS
SCALE: 1/2" = 1'-0"




2 S-5 WALL 6 SECTION–BUTTRESS WALL
SCALE: 1/2" = 1'-0"




3 S-5 WALL 6 CONN TO WALL 1
SCALE: 1/2" = 1'-0"




4 S-5 WALL 7 SECTION–BEACH ACCESS WALLS
SCALE: 1/2" = 1'-0"

GRAPHIC SCALE
1/2"=1'-0" 0' 1' 2' 4'
SCALE IN FEET

Exhibit J

GFDS ENGINEERS
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Kamuela, Hawaii 96743
808 887 6760

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TMK: 4-1-002:007

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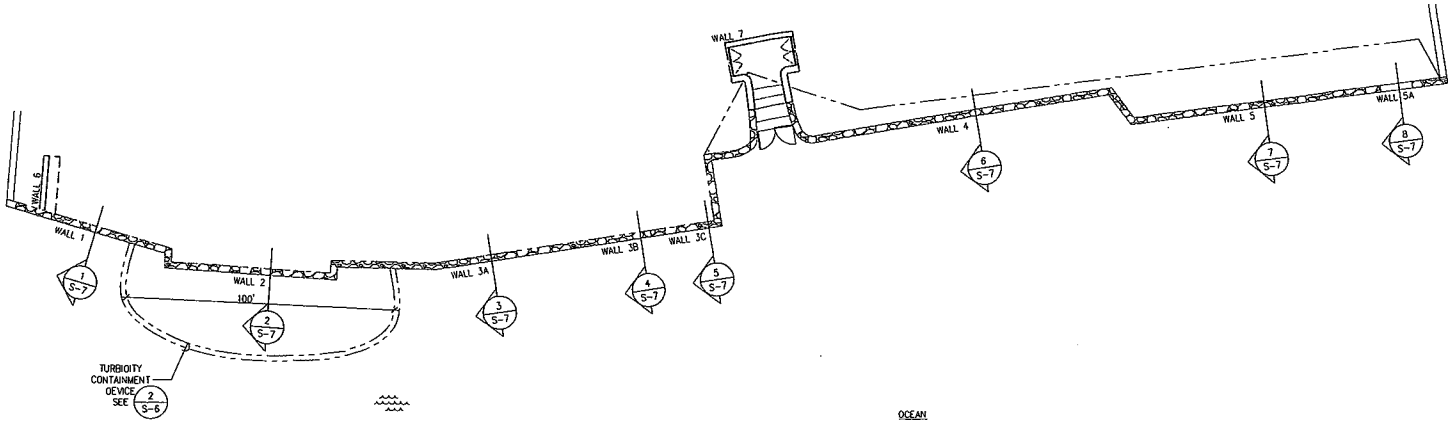
CONTENTS:
SEAWALL
RETROFIT

S-5




NOTE:
100' LONG TURBIDITY CONTAINMENT DEVICE SHALL BE DEPLOYED PARALLEL TO WALL CONSTRUCTION. AFTER WORK IS COMPLETE ON EACH WALL, EQUIPMENT AND BMPs WOULD BE MOVED TO THE NEXT WALL.

## 1 / S-6 WATER QUALITY PROTECTION LAYOUT

SCALE: 1" = 20'

NORTH

TURBIDITY CONTAINMENT DEVICE NOTES:

1. TURBIDITY CONTAINMENT DEVICES SHALL BE OF SUFFICIENT DESIGN, STRENGTH, AND SUITABILITY FOR THEIR INTENDED APPLICATION IN THE OCEAN ENVIRONMENT.
2. FLOATING TURBIDITY CONTAINMENT DEVICES SHALL GENERALLY BE COMPOSED OF A WATER SURFACE FLOATATION BOOM WITH A MINIMUM FREEBOARD OF 4 INCHES, A SKIRT HANGING VERTICALLY TO THE REQUIRED DEPTH, BALLAST WEIGHT AT THE SKIRT BOTTOM, AND SUFFICIENT ANCHORS TO MAINTAIN THE CURTAIN IN PLACE.
3. THE FLOATING TURBIDITY CONTAINMENT DEVICE SKIRT MATERIAL SHALL BE MONOFILAMENT WOVEN POLYPROPYLENE WITH THE FOLLOWING MINIMUM PHYSICAL REQUIREMENTS:

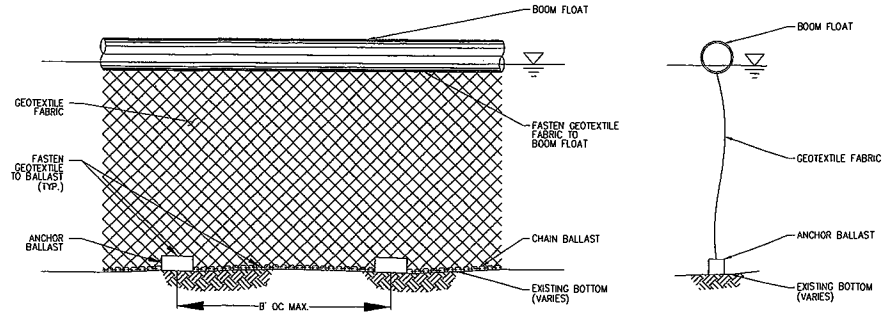
| PROPERTY | VALUE | TEST METHOD |
|---|---|---|
| GRAB STRENGTH | 200 LBS | ASTM D 4632 |
| PUNCTURE | 90 LBS | ASTM D 4833 |
| TRAPEZOID TEAR | 90 LBS | ASTM D 4533 |

PERVIOUS GEOTEXTILE SKIRT MATERIAL SHALL HAVE A MAXIMUM APPARENT OPENING SIZE (AOS) AND PERCENT OPEN AREA (POA) CAPABLE OF RETAINING FINE SUSPENDED SEDIMENTS 0.004 MM OR LARGER IN DIAMETER.

4. TURBIDITY CONTAINMENT DEVICES SHALL BE INSPECTED DAILY, AND IMMEDIATELY REPAIRED OR REPLACED AS NECESSARY TO ENSURE THEIR EFFECTIVENESS.
5. A TURBIDITY CONTAINMENT DEVICE SHALL BE DEPLOYED TO COMPLETELY SURROUND THE AREA OF ACTIVE IN-WATER CONSTRUCTION.
6. SHOULD WEATHER OR SEA CONDITIONS PROHIBIT PROPER PLACEMENT AND FUNCTION OF THE TURBIDITY CONTAINMENT DEVICE, CONSTRUCTION SHALL CEASE UNTIL CONDITIONS PERMIT PROPER DEPLOYMENT.

WOODEN FORMWORK NOTES:

1. WOODEN FORMWORK WILL BE INSTALLED AT LOW TIDE.
2. WOODEN FORMWORK WILL CONSIST OF UNTREATED WOOD.
3. HYDRAULIC CEMENT OR PUG DUCT SEAL WILL BE USED TO FILL ANY GAPS BETWEEN THE BOTTOM OF THE FORMWORK AND THE SEAFLOOR.
4. A FLEXIBLE PVC WATERSTOP BARRIER WILL BE INSTALLED BETWEEN THE WOODEN FORMWORK AND THE FACE OF THE SEAWALL TO ENSURE THAT ALL WATER AND CONCRETE IS CONTAINED WITHIN THE FORMWORK, AND NO OCEAN WATER CAN ENTER THE FORMWORK.
5. ALL MATERIALS, INCLUDING THE WOODEN FORMWORK, PVC WATERSTOP BARRIER, AND HYDRAULIC CEMENT OR PUG DUCT SEAL, WILL REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION AND WILL BE REMOVED WHEN CONSTRUCTION IS COMPLETED.




## 2 / S-6 TURBIDITY CONTAINMENT DEVICE DETAIL

SCALE: NTS

Exhibit K

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Kamuela, Hawaii 96743
808 887 0260

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41-505 KALANIANA'OLE HWY
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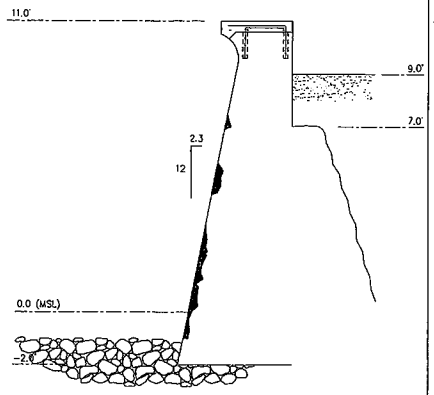
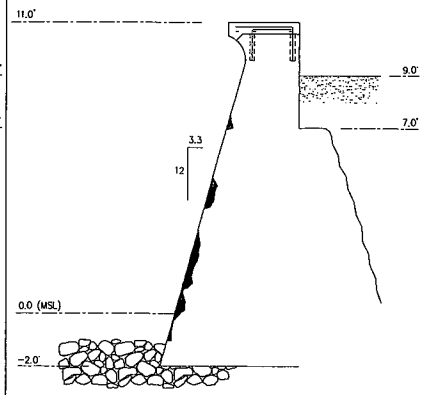
JOB# 18067.H2

CONTENTS:
WATER PROTECTION PLAN AND DETAILS

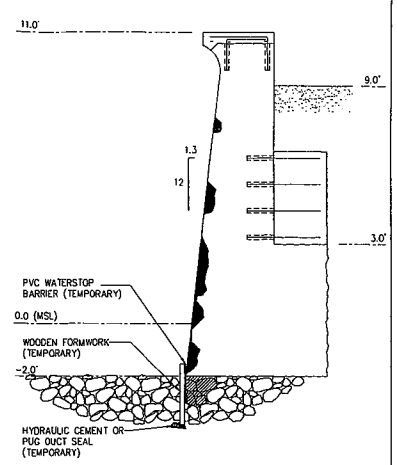
S-6



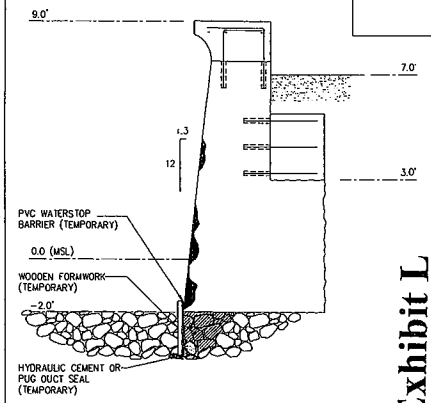

WALL 1 SECTION
NO WOODEN FORMWORK
CONTAINMENT BARRIER
1 / S-7
SCALE: 1/2" = 1'-0"




WALL 2 SECTION
NO WOODEN FORMWORK
CONTAINMENT BARRIER
2 / S-7
SCALE: 1/2" = 1'-0"

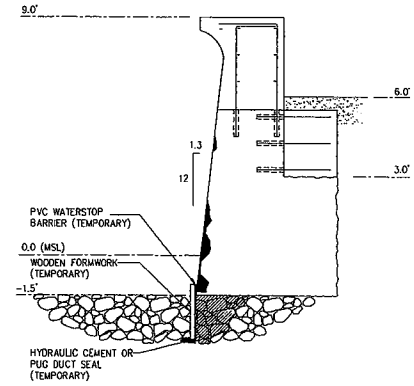



WALL 3A SECTION
WOODEN FORMWORK CONTAINMENT BARRIER
3 / S-7
SCALE: 1/2" = 1'-0"

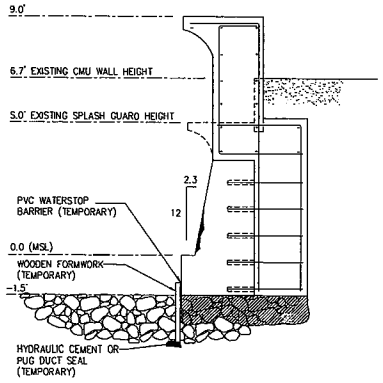



WALL 3B SECTION
WOODEN FORMWORK CONTAINMENT BARRIER
4 / S-7
SCALE: 1/2" = 1'-0"

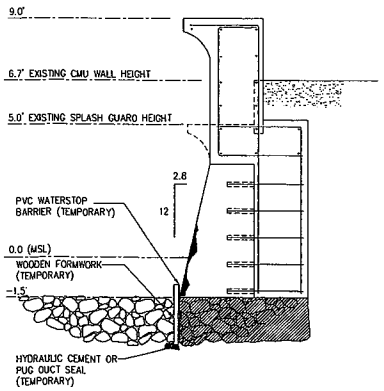
Exhibit L



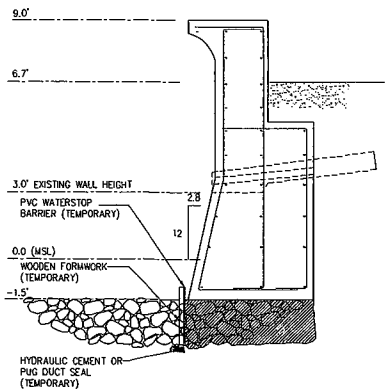

WALL 3C SECTION
WOODEN FORMWORK CONTAINMENT BARRIER
5 / S-7
SCALE: 1/2" = 1'-0"




WALL 4 SECTION
WOODEN FORMWORK CONTAINMENT BARRIER
6 / S-7
SCALE: 1/2" = 1'-0"




WALL 5 SECTION
WOODEN FORMWORK CONTAINMENT BARRIER
7 / S-7
SCALE: 1/2" = 1'-0"




GRAPHIC SCALE
1/2"=1'-0"
0' 1' 2' 4'
SCALE IN FEET

WALL 5A SECTION
WOODEN FORMWORK CONTAINMENT BARRIER
8 / S-7
SCALE: 1/2" = 1'-0"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JOB# 18067.H2

CONTENTS:
DETAILS

S-7

U:\PROJECTS\2018 FOLDER\18067.H2 Waimanalo Paradise - East Lot Sewer\Dwg\COMPLETE\S7.dwg WAS PLOTTED ON 8/6/2020 5:30 AM BY GFDS

DEPARTMENT OF PLANNING AND PERMITTING
**CITY AND COUNTY OF HONOLULU**
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov

FILE

KIRK CALDWELL
MAYOR

KATHY K. SOKUGAWA
ACTING DIRECTOR

TIMOTHY F. T. HIU
DEPUTY DIRECTOR

EUGENE H. TAKAHASHI
DEPUTY DIRECTOR

November 16, 2020

2020/SV-3(AB)

Mr. Scott Ezer
HHF Planners
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Mr. Ezer:

| | |
|---|---|
| SUBJECT: | Shoreline Setback Variance File No 2020/SV-3 |
| Project: | Waimanalo Paradise Seawall |
| Owner/ | Nesbitt HI Holdings, LLC; |
| Applicant: | Waimanalo Paradise LLC |
| Agent: | HHF Planners (Scott Ezer) |
| Location: | 41-505 Kalanianaole Highway |
| Tax Map Keys: | 4-1-002: 021 and 022 |

The above application for a Shoreline Setback Variance (SSV) has been **PARTIALLY APPROVED**, subject to conditions contained in the attached Findings of Fact, Conclusions of Law, and Decision and Order.

Any party (to the case) wishing to appeal the Director's action must submit a written petition to the Zoning Board of Appeals (ZBA) within 30 calendar days from the date of mailing or personal service of the Director's written decision (ZBA Rules Relating to Procedure for Appeals, Rule 22-2, Mandatory Appeal Filing Deadline). Essentially, the ZBA Rules require that a petitioner show that the Director based his/her action on an erroneous finding of a material fact, and/or that the Director acted in an arbitrary or capricious manner, or manifestly abused his/her discretion. Generally, the ZBA can only consider the evidence previously presented to the Director of the Department of Planning and Permitting (DPP). The filing fee for appeals to the ZBA is $400 (payable to the City and County of Honolulu).

Failure to comply with ZBA Rules Chapter 22, Procedure for Appeals, may result in the dismissal of the appeal. Copies of the ZBA Rules are available at the DPP. Appeals should be addressed to:

Zoning Board of Appeals
c/o Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Should you have any questions or need additional information concerning this SSV, please contact Alex Beatty, of our staff, at 768-8032.

Very truly yours,

Kathy K. Sokugawa
Acting Director

Attachment

Appendix L-7

# 1326 Mokulua Drive SSV Approval (File No. 2019/SV-3(AB))

DEPARTMENT OF PLANNING AND PERMITTING
**CITY AND COUNTY OF HONOLULU**
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov

KIRK CALDWELL
MAYOR

KATHY K. SOKUGAWA
ACTING DIRECTOR

TIMOTHY F. T. HIU
DEPUTY DIRECTOR

EUGENE H. TAKAHASHI
DEPUTY DIRECTOR

March 27, 2020

2019/SV-3(AB)

Mr. Jeffery Overton
G70
111 South King Street, Suite 170
Honolulu, Hawaii 96813

Dear Mr. Overton:

| | |
|---|---|
| SUBJECT: | Shoreline Setback Variance File No 2019/SV-3 |
| Project: | 1326 Mokulua Drive Seawall and Scour Apron |
| Applicant: | Nadir Safai, Angela Zupan, Chris Furie |
| Agent: | G70 (Jeffery Overton) |
| Location: | 1326 Mokulua Drive - Lanikai |
| Tax Map Key: | 4-3-004: 077 |

The above application for a Shoreline Setback Variance has been **APPROVED**, subject to conditions contained in the enclosed Findings of Fact, Conclusions of Law, and Decision and Order.

Any party (to the case) wishing to appeal the Director's action must submit a written petition to the Zoning Board of Appeals (ZBA) within 30 calendar days from the date of mailing or personal service of the Director's written decision (ZBA Rules Relating to Procedure for Appeals, Rule 22-2, Mandatory Appeal Filing Deadline). Essentially, the ZBA Rules require that a petitioner show that the Director based his/her action on an erroneous finding of a material fact, and/or that the Director acted in an arbitrary or capricious manner, or manifestly abused his/her discretion. Generally, the ZBA can only consider the evidence previously presented to the Director of the Department of Planning and Permitting (DPP). The filing fee for appeals to the ZBA is $400 (payable to the City and County of Honolulu).

Failure to comply with ZBA Rules Chapter 22, Procedure for Appeals, may result in the dismissal of the appeal. Copies of the ZBA Rules are available at the DPP. Appeals should be addressed to:

Zoning Board of Appeals
c/o Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Should you have any questions or need additional information concerning this Shoreline Setback Variance, please contact Alex Beatty, of our staff, at 768-8032.

Very truly yours,

Kathy K. Sokugawa
Acting Director

Enclosure

cc w/o enclosure: Mollie and John Foti

DEPARTMENT OF PLANNING AND PERMITTING
OF THE CITY AND COUNTY OF HONOLULU

STATE OF HAWAII

| | | |
|---|---|---|
| IN THE MATTER OF THE<br><br>APPLICATION OF<br><br>NADIR SAFAI, ANGELA ZUPAN,<br>AND CHRIS FURIE<br><br>FOR A<br><br>SHORELINE SETBACK VARIANCE | )<br>)<br>)<br>)<br>)<br>)<br>)<br>)<br>)<br>)<br>) | FILE NO. 2019/SV-3(AB) |

FINDINGS OF FACT, CONCLUSIONS OF LAW
AND DECISION AND ORDER

## I. APPLICATION

A. Basic Information:

| | |
|---|---|
| APPLICANT: | Nadir Safai, Angela Zupan, and Chris Furie |
| LANDOWNER: | Sandbags LLC and Fairwater Hawaii LLC |
| AGENT: | G70 (Jeffery Overton) |
| LOCATION: | 1326 Mokulua Drive - Lanikai (Exhibit A) |
| TAX MAP KEY: | 4-3-004: 077 |
| LAND AREA: | 12,380 square feet |
| STATE LAND USE: | Urban District |
| ZONING: | R-10 Residential District |
| EXISTING USE: | Single-family dwelling |
| SURROUNDING LAND USES: | Single-family and two-family dwellings, beach access right-of-way |

B. Proposal: The Applicant is requesting to construct a shoreline protection structure (SPS) consisting of a vertical seawall and sloped boulder scour apron within the 40-foot shoreline setback area. The proposed SPS will replace an existing temporary structure consisting of several sandbags, which covers an area of about 75 by 20 feet. The new SPS will also extend across the entire 75-foot width of the site, and its scour apron will vary in width less than one foot at the north end of the SPS to about 13 feet near the southern end of the SPS. The toe of the scour apron will follow the certified shoreline, and the slope will

vary from nearly vertical on the north side of the property to 1 vertical and 1.5 horizontal (1V: 1.5H) on the south side of the property (see Exhibits B through D).

The elevation of the backyard of the site is approximately 10 feet above mean sea level (MSL) and the substrate is approximately eight feet below MSL. Therefore, the wall portion of the proposed SPS will be about 18 feet in height from the bottom of the footing on the hard substrate to the top of the wall. It will appear to be essentially flush with the existing grade mauka of the SPS, and will appear to be about 10 feet above sand level on its makai side. The scour apron will extend approximately three feet below MSL, with about two feet above MSL, so the wall will be about eight feet in height from the top of the scour apron to the top of the wall (see Exhibits C and D).

B. Shoreline Setback Variance (SV): Section 23-1.5(b), Revised Ordinances of Honolulu (ROH), prohibits structures and activities within the shoreline setback area. The Applicant is proposing to construct the above described SPS within the shoreline setback area. Therefore, a SV is required.

C. Background: The property is the subject of a settlement agreement (December 1994) that was the result of a violation issued to the previous property owner (Davis) for illegally constructing a rock revetment along the shoreline (Settlement). The Settlement allowed Davis to replace the illegal structure with a temporary sandbag structure until such a time that the owner submitted and the City approved a design for a permanent structure through a SV. The Settlement further stipulated that Davis agreed to contribute $5,000 towards the cost of a beach stabilization study. With the submittal of the Coastal Assessment (CA) from Sea Engineering, the DPP considers this condition met. After the completion of the SPS, the Settlement should be dismissed pursuant to Section 8 of the Settlement. The dismissal should be recorded, along with this Report, at the Bureau of Conveyances. After dismissal, the new SPS will be regulated by the SV and Chapter 23, ROH.

D. Applicant's Justification: The Applicant's justification statements are part of the file.

## II. FINDINGS OF FACT

On the basis of the evidence presented, the Director has found:

A. Description of Site: The site is in the Lanikai neighborhood on the windward coast of Oahu between Kailua and Waimanalo. The site is a relatively flat flag lot consisting of a 12-foot-wide, 150-foot-long "stem," and a relatively square "flag," about 75 feet by 75 feet, based on the current location of the regulatory shoreline (see Exhibit E). The site has a recorded lot area of 12,380 square feet. However, a significant amount of land was lost due to erosion prior to the

placement of the temporary sandbag revetment. The soils at the site are beach sand and Jaucus sand, which are highly susceptible to erosion.

The most recent shoreline survey for the site was conducted on August 18, 2018, and certified by the State of Hawaii on December 19, 2018. Although the survey is over one year old, the Applicant submitted a completed application prior to the survey expiring. Therefore, the survey's expiration date has been extended to December 19, 2020.

The survey indicates that the shoreline in the area had been eroding up until the construction of the temporary sandbag revetment approved by the Settlement. The current certified shoreline survey labels the high water mark from 1964, the certified shoreline from 1982, and the shoreline surveyed on August 18, 2018 (certified on December 19, 2018 at the mauka edge of the sandbags). When the site was unprotected, between 1964 and 1993, the shoreline receded about 60 feet, at a rate of about 1.9 feet per year. It appears to have eroded about 28 feet from 1964 to 1982, and between 25 and 40 feet from 1982 until the erosion was halted by the construction of an unauthorized rock revetment in 1993 or 1994. A previous owner was required to remove the unauthorized revetment, but was allowed to replace it with the temporary sandbag structure in 1995. The area of erosion between 1964 and today is estimated to be about 4,223 square feet (see Exhibits E and F).

The site is developed with a two-story single-family dwelling that is also within the shoreline setback area, making it a nonconforming structure. A majority of the site is paved, including areas around the dwelling. A narrow crescent-shaped landscaped area exists between the paved dwelling area and the top of the sandbags (see Exhibit F).

B. Description of the Surrounding Uses: The surrounding lots are also in the R-10 Residential District. The adjacent parcel to the north is undeveloped, except for a vertical seawall. The adjacent parcel to the west (mauka) is also undeveloped. The parcel to the south, Parcel 96, is a right of way (ROW) beach access lot owned by the Lanikai Community Association. Other nearby parcels are developed with single- or two-family dwellings. Shoreline parcels to the north, for about 1,050 linear feet, are protected with some type of permanent shoreline structure. Shoreline parcels to the south, for about 2,100 linear feet, are also protected with permanent shoreline structures.

C. Shoreline Access: The 10-foot wide ROW (Parcel 96) provides access to the beach. It is privately owned, but the City Department of Facility Maintenance (DFM) has an easement over it for drainage purposes. The ROW elevation is somewhat lower than the adjacent parcels, and the assumed shoreline is farther inland than on the adjacent parcels, based on observations during a site visit. This SV request is limited to development on Parcel 77.

Lateral access across the makai side of the Project site is currently inhibited by the temporary sandbag revetment, which is about 20 feet wide and extends seaward of the shoreline. The toe of the proposed SPS would be about 20 feet inland of the toe of the current sandbag revetment, increasing the likelihood that sand will accumulate, thereby improving lateral access across the site.

D. Shoreline Characteristics

1. Coastal and Flood Hazard: The Flood Insurance Rate Map (FIRM), Panel 15003C0295F (September 30, 2004) shows that the makai portion of the site is in Flood Zone AE with base flood elevation of 6 feet above MSL. The AE Zone corresponds with areas determined to be within the 100-year flood. The dwelling and proposed SPS are in the AE Zone; therefore, the new structures, including the SPS, must comply with the Flood Hazard requirements of Chapter 21A.

2. Shoreline Views: The 1987 Coastal View Study designates the site as being within the Kailua Viewshed. Within this section, Mokulua Drive is designated as a coastal roadway, although no specific coastal views are recognized.

3. Shoreline Processes: Sea Engineering, Inc., provided a CA as part of the Environmental Assessment (EA). The CA reviewed the existing conditions and analyzed the impact of the proposed SPS on shoreline processes. The CA also analyzed alternative designs and actions, and concluded this proposal to be the most practicable alternative.

4. Sea Level Rise (SLR): Mayor's Directive 18-2 (the Directive) establishes policies that discourage shoreline hardening, and mandate consideration of SLR when reviewing discretionary projects. The entire flag portion of the lot is shown as being in the area exposed to SLR impacts (SLR-XA) at the 3.2 feet scenario. The Directive says that permanent shoreline armoring should only be considered as a last resort where it supports public benefits and will have insignificant impacts to coastal resources and natural shoreline processes. The environmental impacts are discussed below. The proposed SPS is designed to protect the property assuming up to 2.3 feet of SLR. The CA and EA state that 2.3 feet of SLR is the most likely scenario for this property over the next 50 years, and that the SPS will require maintenance and repairs over time. The need for protection due to greater SLR can be addressed during structural review of the SPS over its functional life. Additional discussion of the practicalities of this design, and other, are in the Analysis Section of this Report.

E. Other Permits and Approvals:

1. Environmental Compliance: The Project is subject to the requirements of the Environmental Impact Statement (EIS) Law, Chapter 343, Hawaii Revised Statutes (HRS), because the SPS is considered development within the shoreline setback area. In compliance with Chapter 343, HRS, and Title 11, Chapter 200, Hawaii Administrative Rules (HAR), the anticipated environmental impacts of the proposed Project were disclosed in an EA. The DPP determined that the preparation of an EIS was not required, and issued a Finding of No Significant Impact (FONSI) on October 25, 2019. The Final EA and FONSI were published in The Environmental Notice on November 8, 2019.

   During the EA process, comments were received from the following public agencies: U.S. Army Corps of Engineers (COE), U.S. Fish and Wildlife Service, Office of Planning, Office of Conservation and Coastal Lands of the Department of Land and Natural Resources (DLNR), Department of Design and Construction, Department of Facilities Maintenance, and the Office of Climate Change, Sustainability, and Resiliency (OCCSR). Additionally, the Sierra Club provided comments on the Draft EA.

   The public agency comments do not preclude the approval of this SV. The DLNR recognizes the dilemma of balancing the protection of natural coastlines with the protection of the last unhardened lot in this area of Lanikai. The OCCSR expressed concerns with lateral access to the coastal area, and protecting the functionality of the adjacent ROW. The Applicant adequately responded to these comments are in the Final EA.

   The Sierra Club opposes the new SPS, but also acknowledges that the property is surrounded by hardened shorelines. The Sierra Club recommends a large-scale solution to protect Oahu's shoreline, and opposes temporary solutions that benefit individual landowners. The practicality of such a large-scale solution is discussed in the Analysis Section of this Report.

2. Special Management Area (SMA) Ordinance: The site is within the SMA. The SPS is accessory to an existing single-family dwelling that is less than 7,500 square feet in floor area, so it is not considered development pursuant to Section 25-1.3(2)(N), ROH. Therefore, it is exempt from the requirements of the SMA Ordinance.

3. Building Permit: The Applicant will need a Building Permit (BP) to construct the SPS. Best Management Practices (BMPs) must be observed during construction.

4. Other Agency Approvals: Authorized structures located makai (seaward) of the regulatory shoreline may require a Conservation District Use Permit (CDUP) and/or non-exclusive easement in the future. The proposed SPS is entirely mauka (landward) of the existing shoreline, but it is anticipated that a portion of the sloping boulder scour apron may have wave run-up and therefore may be makai of the future shoreline. This cannot be confirmed until the Project is completed, however. Thus, DLNR action may be necessary after the BP has been issued if a new certified shoreline survey shows the improvements are makai of the shoreline.

   The Applicant has also submitted an Archeological Inventory Survey (AIS) and report to the DLNR Historic Preservation Division (SHPD) for review under HRS 6E. Compliance with HRS 6E is mandatory. Standard conditions related to accidental discovery of cultural resources or artifacts apply, particularly considering the soil profile of the site.

5. Construction activities which extend seaward of the mean higher high water (MHHW) tide line or involve placement of dredged and/or fill material seaward of the MHHW line require a permit from the COE. It is not clear whether the scour apron or other portions of the structure will require a Department of Army (DA) Permit. To ensure COE requirements are met, and in accordance with the COE recommendation included in the EA, the DPP will route the BP application to COE for review and approval prior to issuance of the BP.

F. Public Hearing: Pursuant to Section 23-1.11, ROH, the DPP held a public hearing on February 11, 2020, at the Mission Memorial Conference Room. The Applicant, the agent, and two other interested persons, who were Lanikai residents, attended the hearing. The two Lanikai residents testified in support of the Project, but expressed reservations about additional wave exposure that could affect the ROW.

   DPP Staff asked several questions regarding the life of the structure and impacts to the ROW. In response to these questions and to public testimony, the Agent stated that there was no "decommissioning" plan for the structure, and that the structure is designed to withstand a fifty-year storm wave (i.e., a strong storm wave predicted to strike once in 50 years). Periodic maintenance of the SPS will increase its functional life. Regarding the ROW, the Agent responded that the ROW will be nestled between two SPSs, and that the long-term function of the ROW was considered when designing this SPS. The SPS should not negatively affect the ROW, according to the Agent.

## III. ANALYSIS

A SV may be granted upon a demonstration of hardship, as defined in Chapter 23, ROH, if the record shows that the proposal meets the following three tests:

1. Deprivation of Reasonable Use - Section 23-1.8(b)(3)(B)(i): The Applicant would be deprived of reasonable use of the land if required to comply fully with the Shoreline Setback Ordinance and the Shoreline Setback Rules, which prohibit construction of structures within the 40-foot shoreline setback area.

   The buildable depth of the flag lot currently ranges from about 23 feet to 40 feet when accounting for the current 40-foot shoreline setback, which leaves a buildable lot area of about 2,000 square feet after removing the side yards and flag stem. This area is expected to shrink more after the Project is completed. Between 1964 and 1995 (when the shoreline was unprotected), the shoreline retreated about 60 feet at a rate of about 1.9 feet per year and it is reasonable to assume erosion would have continued without the 20-foot-wide by 75-foot-long sandbag structure. The face of the proposed seawall is between one and 12 feet inland of the current sandbag structure's crest (high point), which corresponds to the location of the current certified shoreline.

   Upon completion, wave run-up on the sloped portion of the scour apron is expected during high tide and periods of higher wave action. Thus, the future regulatory shoreline is expected to be at the face of the seawall, between one and 12 feet farther inland than the current regulatory shoreline. Under this expected scenario, the buildable area would be reduced to between 22 and 28 feet deep. This is shown on Exhibit G, where the green dotted line shows a 40-foot setback measured from the face of the proposed seawall. The DPP can administratively reduce the shoreline setback to no less than 20 feet in order to establish a minimum lot depth of 30 feet, per Section 23-1.4(b), ROH. Given that the entire width of the lot could be subject to such an adjustment, with some areas requiring about 8 feet of adjustment to reach 30 feet of depth, it is reasonable to consider the buildable area preserved by the proposed SPS as the minimum necessary for reasonable use of the lot.

   Without the SPS and with the removal of the temporary sandbag structure, the lot would likely become entirely undevelopable after the shoreline reaches a new equilibrium after 27 years of protection. As mentioned before, the Project site is a sandy lot about five feet above the undeveloped and less protected adjacent ROW parcel, and 10 feet above MSL. Anticipated scouring from seawalls directly to the north and south would quickly change the grade the ocean moves soil and material previously protected and retained by the sandbag revetment. Under this scenario, even the maximum amount of shoreline setback adjustment is unlikely to create a viable buildable area on the lot.

It should also be noted that about one-third of the existing dwelling is in the shoreline setback area, and is a nonconforming structure. After the proposed SPS is installed and the shoreline settles to its new location, over half of the dwelling will be in the shoreline setback area. The location and type of SPS proposed will preserve the immediate use of the dwelling; however, as discussed above, it does not preserve any more of the buildable lot area than is minimally necessary for a reasonable use; i.e., a single-family dwelling on a lot with a buildable depth no greater than 30 feet if the shoreline setback area is adjusted. The reasonable use of the lot is thus preserved, independent of the nonconforming structure. As discussed later, designs that did not preserve the existing dwelling and preserved less buildable area were assessed in the CA, and were deemed to be impractical due to impacts to the ROW and adjacent parcels.

2. Unique Circumstances - Section 23-1.8(b)(3)(A)(ii): The Applicant's proposal is due to unique circumstances and does not draw into question the reasonableness of Chapter 23, ROH, and the Shoreline Setback Rules.

As indicated above, the flag lot has a very shallow and small developable area due to a long history of shoreline erosion and the long flag stem. While there are other flag lots in the area, they are already protected by permanent. Furthermore, lots on either side of the site, for over 1,000 feet in either direction, have permanent SPSs of various designs. This would be the last lot to harden the shoreline across this section of Lanikai beach. Denying this request would render this the only shoreline lot along this beach that could not be developed with a dwelling because of the lack of reasonable buildable area.

Additionally, the subject lot is adjacent to the partially protected beach access ROW. Without the SPS on the subject lot, wave action and severe flanking could undermine the ROW and the adjacent parcel on the other side of the ROW. The Lanikai Community Association (owner) and the City (holder of the easement) do not have any immediate plans to improve the ROW. The subject lot is about five feet higher in elevation than the ROW parcel, so impact to the ROW from flanking without an SPS is likely to be significant. The design of the new proposed SPS includes a seawall and wing wall intended to limit the impact of flanking from the ROW to the subject lot. The scour apron is designed to reduce the risk from flanking by limiting the impact of wave action on the ROW and surrounding area. The scour apron design may help capture and accrete sand, creating new sandy beach area, which would improve the lateral access and access to the coastal area from the ROW. In the event that the proposed SPS does negatively impact the ROW or access to the coastal areas from the ROW, the Applicant must be responsible for making necessary improvements to maintain safe access from the ROW to the coastal areas. This is a condition of approval.

3. Practicable Alternative - Section 23-1.8(b)(3)(A)(iii): The proposal is the practical alternative which best conforms to the purpose of Chapter 23, ROH, and the Shoreline Setback Rules.

Given the history of the shoreline and the character of the lot, the Applicant's proposal is the alternative that best balances the purpose of the chapter with the preservation of a reasonably developable lot within the highly developed shoreline neighborhood characterized by many seawalls. The application included analyses for a number of alternative solutions, including vertical seawall, revetment, seawall with scour apron at a location slightly farther inland, beach nourishment, and removal of the sandbags without a replacement structure. The proposed seawall and scour apron was found to be the most practicable solution because the existing dwelling remains habitable, but no more than a minimum developable area is preserved for future reasonable development outside of the shoreline setback area. The design provides long-term protection to the site, while avoiding development in the State Land Use Conservation District and providing a functional amount of scour apron to minimize the impact of wave action from the seawall on the near shore environment.

The other options were determined to be infeasible, ineffective, or less practicable. The Applicant showed that a larger scour apron or revetment, which would require a larger footprint to create a lower slope in compliance with the design discussed in the Settlement, is not feasible without destroying the existing dwelling, further reducing the developable lot area beyond a reasonable minimum, and/or encroaching into the State Land Use Conservation District. A seawall and scour apron similar to the one proposed but somewhat farther inland was considered and found to be impractical due to impacts to the ROW and nearby parcels. A vertical seawall without a scour apron is not desirable because the impacts this design has on natural beach processes and near shore environments would be more extreme with such a design. Removal of the sandbags without a replacement structure is not practical, as the structural integrity of the dwelling would be compromised, the residents of the dwelling would immediately be placed in harm's way, and the neighboring properties would also be impacted due to severe flanking.

Beach nourishment was also considered and found to be potentially effective, but not the most practicable as they would demand regional implementation. A large-scale collective effort including multiple owners and agencies is necessary to plan, evaluate, and implement a beach nourishment project. Considering that the neighbors in either direction are protected with SPSs, there is little incentive for them to participate in a collective solution, particularly if it means abandoning their own seawalls. It is also uncertain, at this time, whether other agencies, such as the DLNR and COE, would support such efforts for structures seaward of the shoreline. Therefore, we find that the proposal for a seawall with scour apron is the practicable alternative which best conforms to the purpose of this chapter and the shoreline setback rules. If in the future there is a collective effort

among adjacent property owners and the relevant City and State agencies, beach nourishment or groins should be considered as a holistic solution.

## III. CONCLUSIONS OF LAW

A. There is evidence to indicate that the Applicant would be deprived of reasonable use of the property if not allowed to construct the proposed SPS in the 40-foot shoreline setback area.

B. The request to construct the new SPS is due to unique circumstances and does not draw into question the reasonableness of Chapter 23, ROH or the Shoreline Setback Rules.

C. The request to construct the new SPS is the best practical alternative that conforms to the purpose and intent of Chapter 23, ROH, and the Shoreline Setback Rules.

## IV. DECISION AND ORDER

Pursuant to the foregoing Findings of Fact and Conclusions of Law, the Department of Planning and Permitting (DPP) hereby **APPROVES** the request for a Shoreline Setback Variance (SV) to allow a new shoreline protection structure consisting of a seawall and scour apron within shoreline setback area, subject to the following conditions:

1. The Applicant shall obtain a Building Permit (BP) for the proposed Shoreline Protection Structure (SPS). Prior to approval of the BP, the Applicant shall receive approval from the Army Corps of Engineers and the State Historic Preservation Division (SHPD) to proceed, if necessary. Best management practices related to light and construction must be observed.

2. In the event that any burials or archaeological or historic sites are discovered during the course of construction of the Project, all construction activity in the vicinity of the discovery must stop until the issuance of an archaeological clearance from SHPD that mitigation measures have been implemented to its satisfaction.

3. Approval of this permit does not constitute compliance with other governmental requirements which are subject to separate review and approval. The Applicant shall be responsible for insuring that the final plans for the Project approved under this permit comply with all other applicable governmental agencies' provisions and requirements.

4. In the event that the proposed SPS does negatively impact the ROW or access to the coastal areas from the ROW, the Applicant must be responsible for making necessary improvements to maintain safe access from the ROW to the coastal areas.

5. The Applicant and/or landowner shall notify the Director of the DPP of any transfer in ownership of the property. In the event of a change of ownership, the Director of the DPP shall notify the new owner (by copy of this permit report) that the site is governed by this approval, and that compliance with all the conditions of approval is required.

6. After construction of the SPS is complete, the Applicant must submit for review, approval, and execution, a request to dismiss the 1994 Settlement, pursuant to Section 8 of the Settlement. The executed document, along with this Report, must then be recorded with the Bureau of Conveyances.

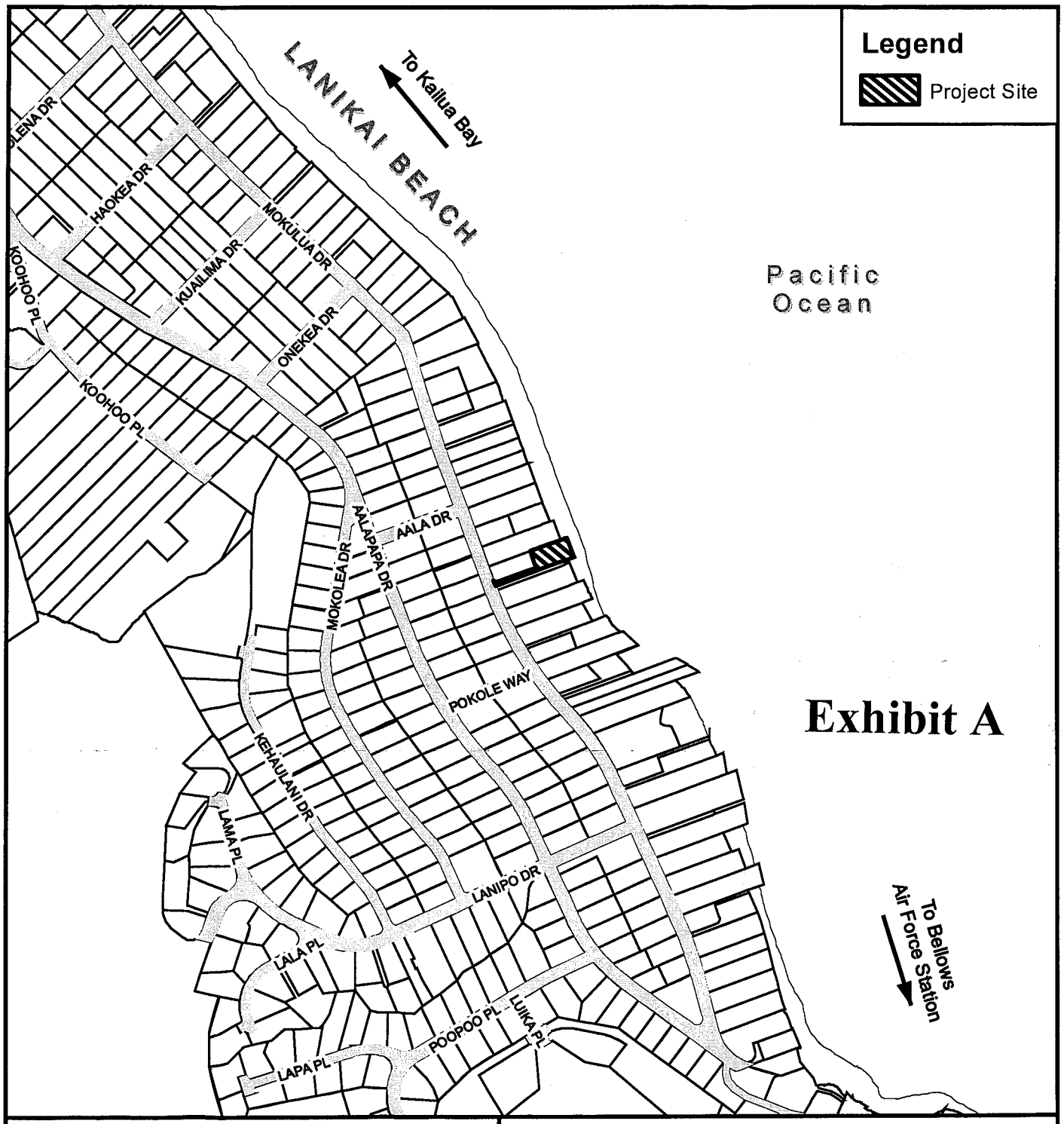
7. This SV may be revoked by the Director of the DPP when, due to a material change in circumstances, one or more of the three findings of hardship can no longer be made; or when there is a breach of any of the conditions above stated; provided that, for good cause, the Director may amend the above conditions.

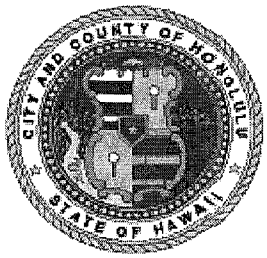
Dated at Honolulu, Hawaii, this 27th day of March, 2020.

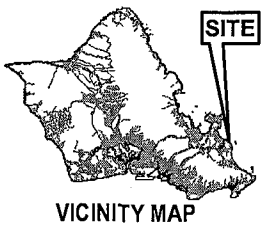
Department of Planning and Permitting
City and County of Honolulu
State of Hawaii

By _____
Kathy K. Sokugawa
Acting Director

Enclosure




VICINITY MAP

0 250 500 1,000

Scale in Feet

# LOCATION MAP

POR. MOKULUA DRIVE - LANIKAI

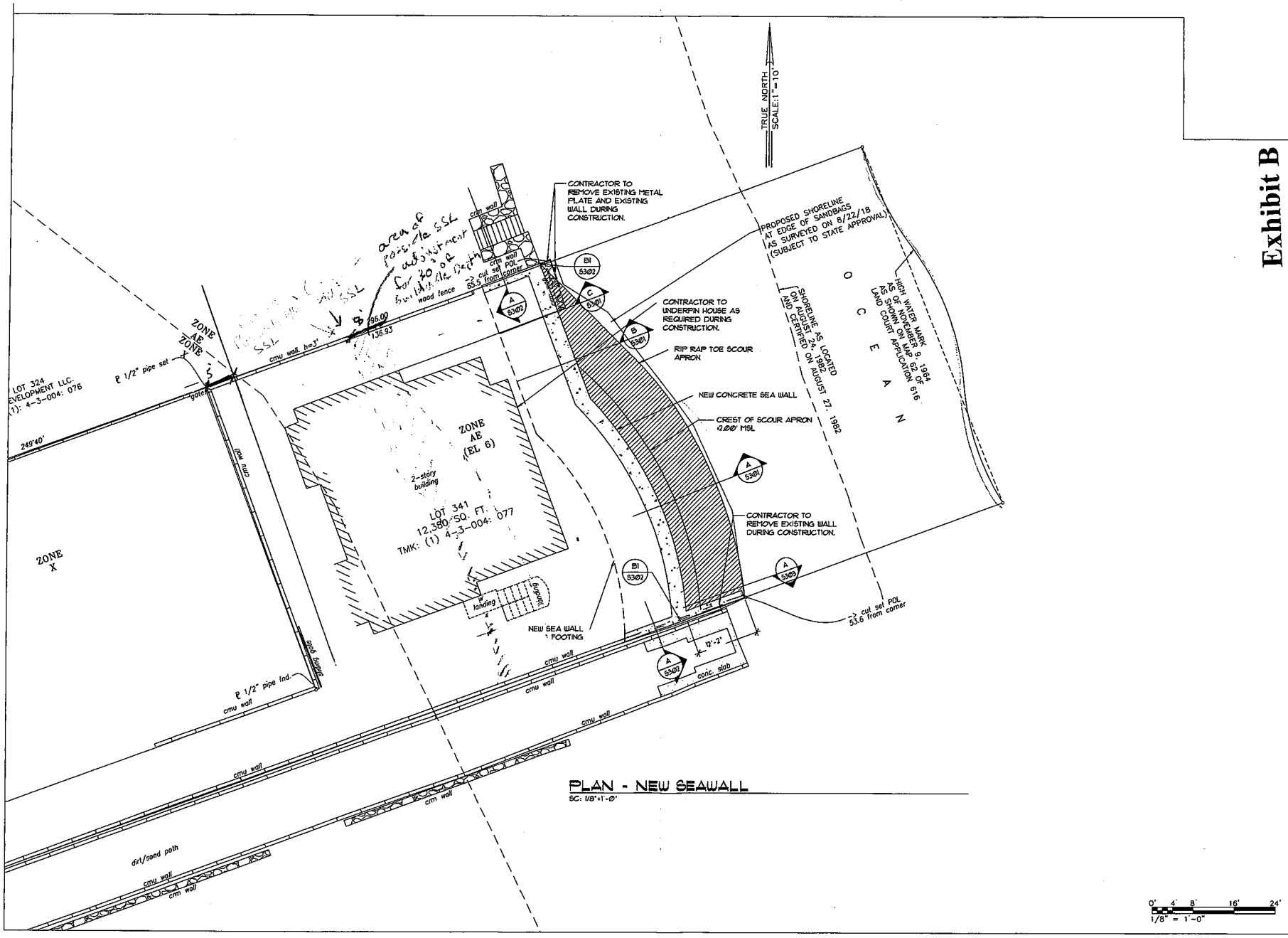
**TAX MAP KEY(S): 4-3-004:077**

**FOLDER NO.: 2019/SV-3**

Prepared by: Department of Planning and Permitting
City and County of Honolulu

Date Prepared: December 2019

# Exhibit B




## PLAN - NEW SEAWALL

SC: 1/8"=1'-0"

0' 4' 8' 16' 24'
1/8" = 1'-0"

| REVISIONS | BY |
|---|---|
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| | |
| | |


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CONSULTING STRUCTURAL ENGINEERS
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Honolulu, Hawaii 96813
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email adrian@t3engineering.com


ADRIAN C. W. LEE
LICENSED PROFESSIONAL ENGINEER
No. 9164-S
HAWAII, U.S.A.

Adrian Lee
04/30/20
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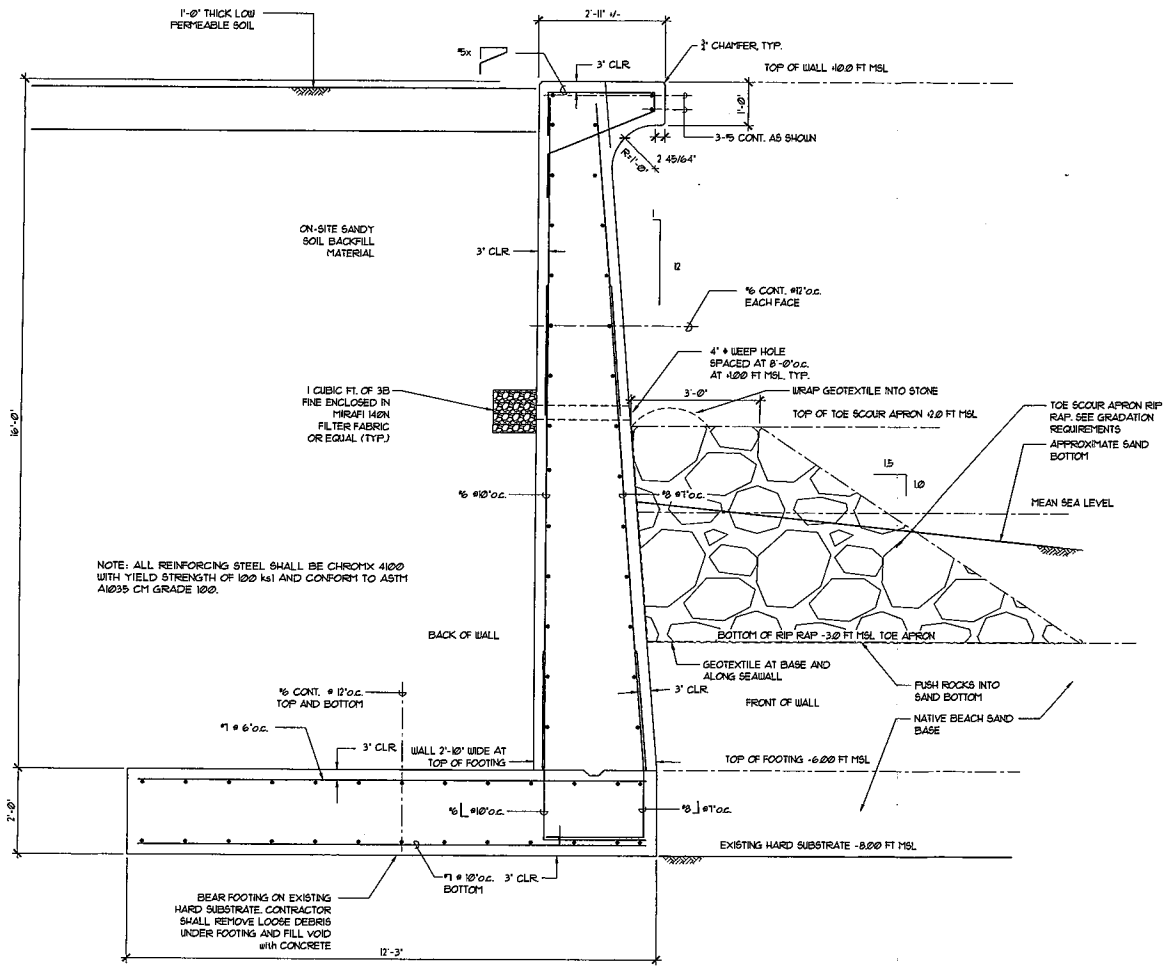
1326 MOKULUA DRIVE

1326 MOKULUA DRIVE
KAILUA, OAHU, HAWAII
TMK:

PLAN

| | |
|---|---|
| DATE | JAN 2020 |
| SCALE | AS NOTED |
| DRAWN BY | AL |
| JOB NO. | |
| SHEET | S201 |
| OF | SHEETS |




## SEA WALL SECTION

SC: 3/4"=1'-0"

A S301

RIP RAP SCOUR APRON NOTES:

1. RIP RAP STONE SHALL HAVE A MINIMUM SPECIFIC GRAVITY OF 2.5, SHALL BE WELL GRADED BETWEEN WEIGHTS AND SHALL CONFORM TO THE FOLLOWING GRADATION:

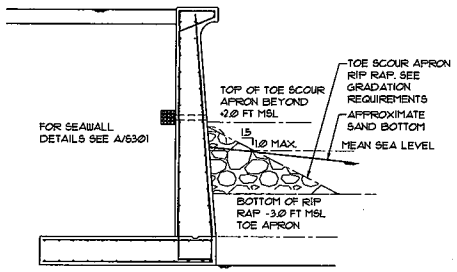
| PERCENTILE | MINIMUM WEIGHT (LB) | MAXIMUM WEIGHT(LB) |
|---|---|---|
| 15 | 150 | 375 |
| 50 | 375 | 625 |
| 100 | 750 | 1500 |

2. GEOTEXTILE FABRIC WHALL BE MIRAFI FW404 OR EQUIVALENT. FILTER FABRIC SHALL BE PLACED ALONG THE FACE OF THE SEAWALL. EXCESS MATERIAL SHALL BE TRIMMED AND WRAPPED INTO THE RIP RAP.
3. RIP RAP SCOUR APRON SHALL BE CONSTRUCTED IN TWO PHASES.
4. PHASE 1: RIP RAP SHALL BE CONSTRUCTED TO THE LINES AND GRADES AS SHOWN IN DETAIL A/S301. RIP RAP SHALL BE PUSHED INTO THE SAND BOTTOM AT APPROXIMATELY ONE FOOT.
5. THE RIP RAP PLACE IN PHASE 1 SHALL BE ALLOWED TO SETTLE FOR NOT LESS THAN 72 HOURS.
6. PHASE 2: PLACE RIP RAP TO THE LINES AND GRADES SHOWN IN DETAIL A/S301.
7. RIP RAP SHALL CONTACT FIRMLY AND ABUT SEA WALL WITH NO GAPS OR VOIDS
8. RIP RAP STONES ARE DRY STACKED WITHOUT THE USE OF GROUT. THE SCOUR APRON NEEDS TO BE FLEXIBLE AND NEEDS TO BE ABLE TO SHIFT AND SETTLE. MAINTENANCE WILL BE REQUIRED OVER THE LIFE OF THE STRUCTURE. THE INITIAL MAINTENANCE IS EXPECTED TO BE 20 OR 30 YEARS AFTER CONSTRUCTION OR EARLIER IF THE APRON IS HIT BY A MAJOR STORM OR TSUNAMI.

# Exhibit C

0' 2' 4' 8' 12'
1/4" = 1'-0"

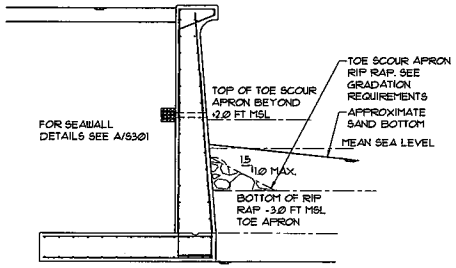
0' 1' 2' 3' 4'
3/4" = 1'-0"




## SEA WALL SECTION

SC: 1/4"=1'-0"

B S301




## SEA WALL SECTION

SC: 1/4"=1'-0"

C S301

| REVISIONS | BY |
|---|---|
| | |
| | |
| | |
| | |
| | |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ADRIAN C.W. LEE LICENSED PROFESSIONAL ENGINEER No. 9164-S HAWAII, U.S.A.

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04/30/20
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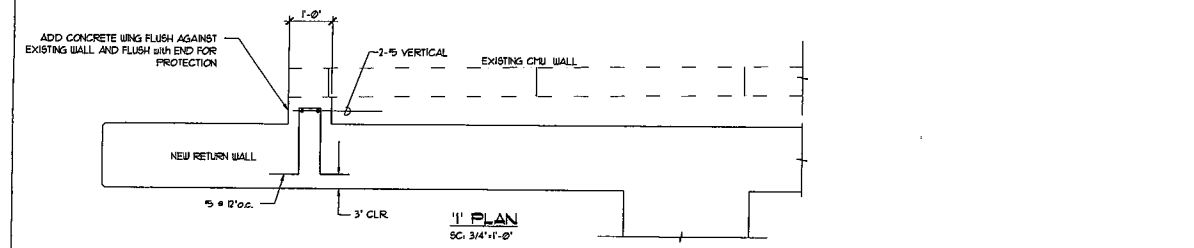
SECTION THROUGH SEA WALL

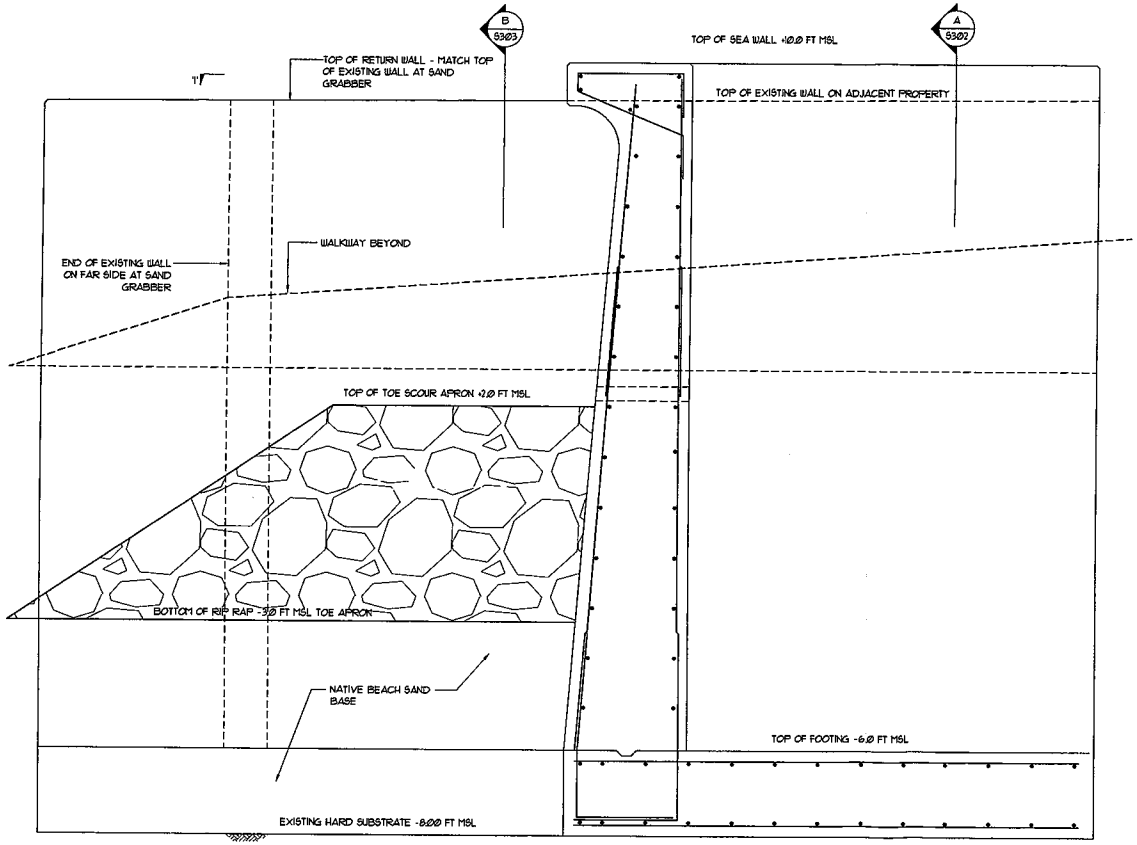
1326 MOKULUA DRIVE

1326 MOKULUA DRIVE
KAILUA, OAHU, HAWAII
TMK:

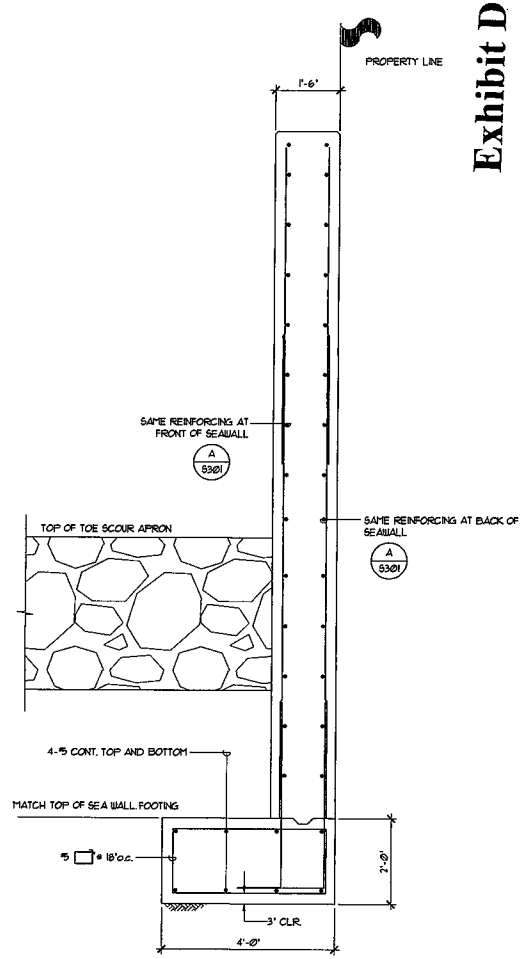
| | |
|---|---|
| DATE | JAN 2020 |
| SCALE | AS NOTED |
| DRAWN BY | AL |
| JOB NO. | |
| SHEET | S301 |
| OF | SHEETS |




'1' PLAN
SC: 3/4"=1'-0"




SEA WALL ELEVATION AT MAKAI RETURN WALL
SC: 3/4"=1'-0"
A S303




SECTION - MAKAI RETURN WALL
SC: 3/4"=1'-0"
B S303

0' 1' 2' 3' 4'
3/4" = 1'-0"

# Exhibit D

| REVISIONS | BY |
|---|---|
| | |
| | |
| | |
| | |
| | |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HAWAII, U.S.A.

Adrian Lee
04/30/20
Expiration Date of the License

This work was prepared by me or under my supervision. Construction of this project will be under my supervision.

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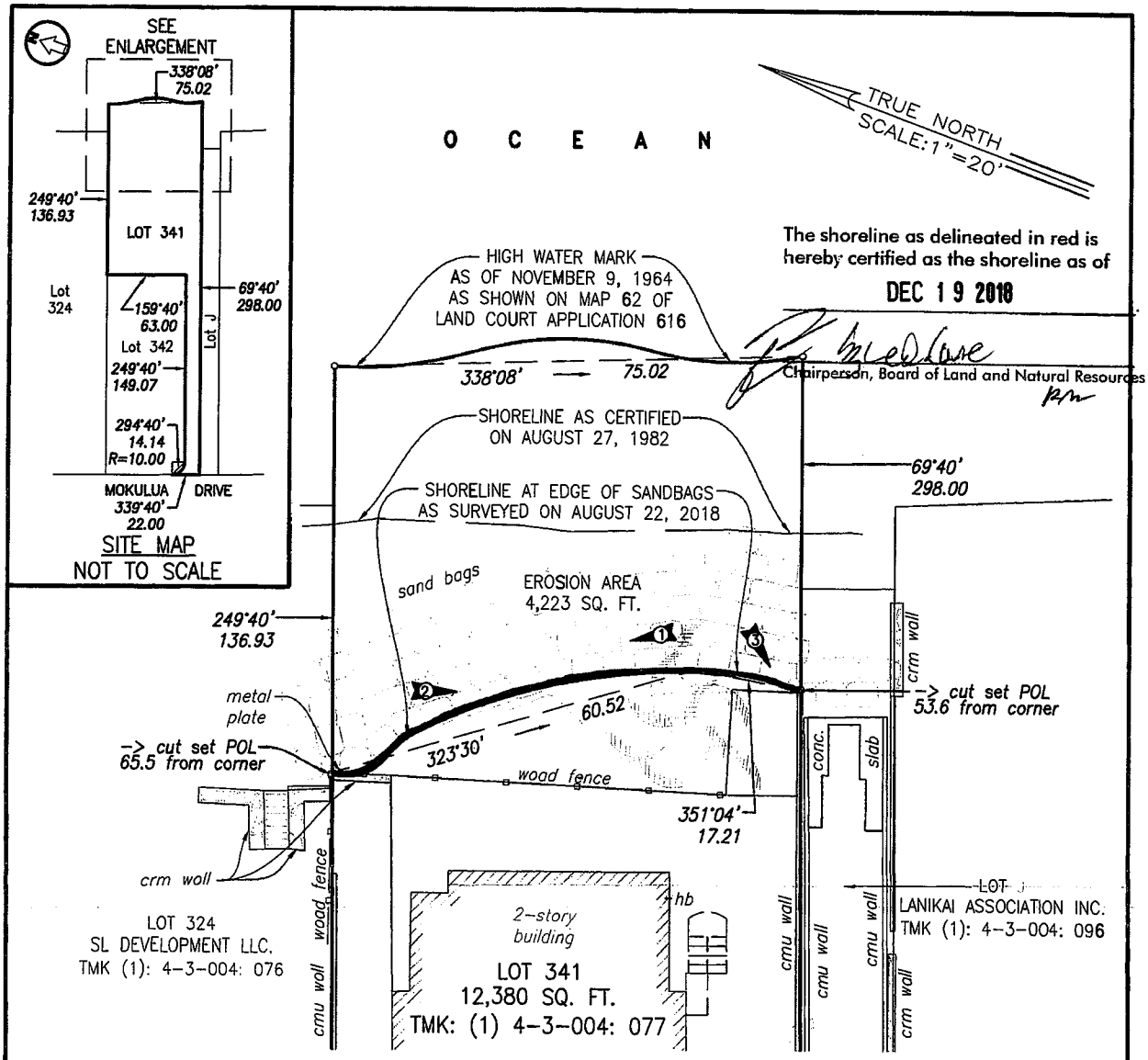
ELEVATION AND SECTION

1326 MOKULUA DRIVE

1326 MOKULUA DRIVE
KAILUA, OAHU, HAWAII
TMK:

| | |
|---|---|
| DATE | JAN 2020 |
| SCALE | AS NOTED |
| DRAWN BY | AL |
| JOB NO. | |
| SHEET | S303 |
| OF | SHEETS |




The shoreline as delineated in red is hereby certified as the shoreline as of

DEC 19 2018

Chairperson, Board of Land and Natural Resources

# SHORELINE CERTIFICATION MAP

## OF 1326 MOKULUA DRIVE

BEING LOT 341 (MAP 62) OF
LAND COURT APPLICATION 616
AT KAILUA, KOOLAUPOKO, OAHU, HAWAII
TMK: (1) 4-3-004: 077

SITE ADDRESS: 1326 MOKULUA DRIVE
KAILUA, HAWAII 96734

OWNER: FAIRWATER HAWAII LLC
SANDBAGS LLC

ERIK S. KANESHIRO
LICENSED PROFESSIONAL LAND SURVEYOR
No. 9826
HAWAII, U.S.A.

AUSTIN, TSUTSUMI, & ASSOCIATES INC.
501 SUMNER STREET, SUITE 521
HONOLULU, HI 96817, (808) 533-3646

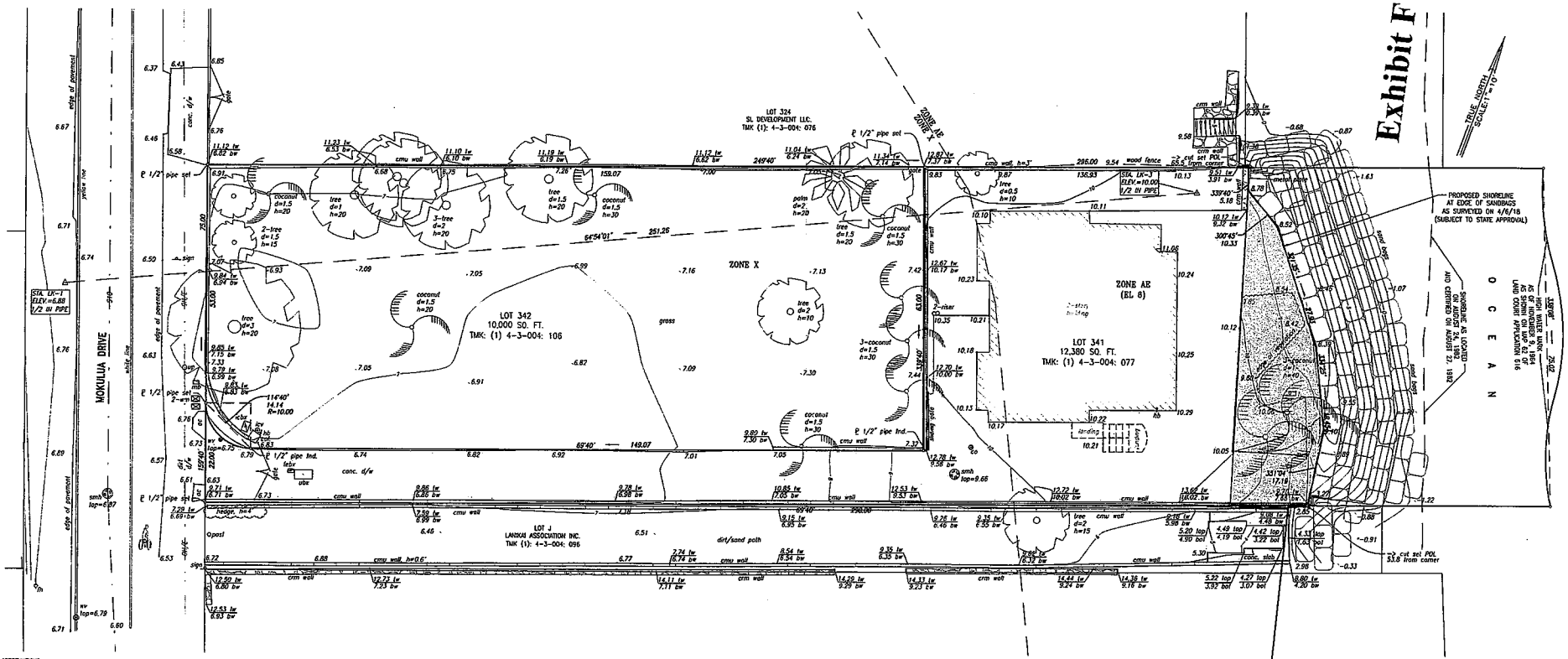
THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION.

ERIK S. KANESHIRO
LICENSED PROFESSIONAL LAND SURVEYOR
CERTIFICATE No. 9826
EXP. 04/20

NOTES

1. Azimuths and record coordinates shown on this map are referred to Government Survey Triangulation Station "MOKAPU" △.
2. Names of adjoining property owners were taken from Tax Map Key Records.
3. Shoreline certification is for permitting purposes.
4. ◄1 Denotes photo number and direction.
5. Map is based on a field survey on August 22, 2018.

**Exhibit E**




Area of Disturbance (n = 75 SF.) to be Restored at Existing Grade

ABBREVIATIONS:

| | |
|---|---|
| bw | bottom wall |
| bot | bottom |
| cmu | concrete masonry unit |
| co | clean out |
| crm | concrete rubble masonry |
| d | diameter |
| elev | elevation |
| fh | fire hydrant |
| fnd | found |
| h | height |
| hb | hose bib |
| icbx | irrigation box |
| icv | irrigation control valve |
| mb | mail box |
| smh | sewer manhole |
| sta. | station |
| tebx | telephone box |
| tw | top wall |
| ubx | utility box |
| up | utility pole |
| wm | water meter |
| wv | water valve |

**Grading Plan**