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2010/ED-8(AA)

October 28, 2010

The Honorable Katherine Kealoha, Director
Office of Environmental Quality Control
State of Hawaii
State Office Tower, Room 702
235 South Beretania Street
Honolulu, Hawaii 96813

Dear Ms. Kealoha:

Subject: Chapter 343, Hawaii Revised Statutes
Draft Environmental Assessment (EA)

Applicant/ Landowner:	William and Margaret O'Connell
Agent:	Thomas C. Zizzi, Esq.
Location:	84-709 Upena Street - Waianae
Tax Map Key:	8-4-7: 1
Request:	Shoreline Setback Variance
Proposal:	To retain a modified vertical seawall structure and other structures within the shoreline setback.

Attached, please find four copies of the above-referenced Draft EA submitted pursuant to Chapter 343, Hawaii Revised Statutes. We request publication of a notice of this document in The Environmental Notice. The Department of Planning and Permitting anticipates a Finding of No Significant Impact determination.

If you have any questions, please call Ann Asaumi of our staff at 768-8020.

Very truly yours,

David K. Tanoue, Acting Director
Department of Planning and Permitting

DKT:cs
Attachments
cc: Thomas C. Zizzi
William and Margaret O'Connell

Thomas C. Zizzi, Esq.

Draft Environmental Assessment

TMK:(1) 8-4-007-001; 84-709 Upena Street, Waianae, Oahu

Thomas C. Zizzi, Esq.
8/4/2010

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1 GENERAL INFORMATION

An after-the-fact approval for the construction of a modified vertical seawall structure, constructed across the shoreline frontage of the subject property sometime between 1986 and 1988, is sought. The approval also includes other miscellaneous structures located within the shoreline setback area. The structures contemplated were built without City approvals, including a Shoreline Setback Variance (ROH 1992 Chapter 23) and a Building Permit (ROH 1990 Chapter 18). Pursuant to the Revised Ordinances of Honolulu Chapter 23, Shoreline Setbacks, a Shoreline Setback Variance will be required and will be submitted pending issuance of a Finding of No Significant Impact (FONSI). The Environmental Assessment has been prepared in compliance with the Environmental Impact Statement (EIS) regulations of Chapter 343, Hawaii Revised Statutes.

1.1 Project: Shoreline Setback Variance

1.2 Owner/Applicant
Mailing Address: William and Margaret O'Connell
84-709 Upena Street
Waianae, Hawaii 96792

1.3 Accepting Agency: City and County of Honolulu
Department of Planning and Permitting

1.4 **Agent:** Thomas C. Zizzi, L.L.L.C.
Thomas C. Zizzi, Esq.
P.O. Box 4220
Waianae, Hawaii 96792
Phone: (808) 696-2200 Fax: (808) 696-2203
Email: tzizzi@leewardlegal.com

1.5 Property Profile

Location:	84-709 Upena Street
TMK:	(1) 8-4-007-001
Land Area:	Total – 15,510
Present Use:	Single Family Residential
State Land Use District:	Urban
Zoning:	R-10 Residential
Special District:	NO
Special Management Area:	YES
Flood Zone	FIRM Zone VE & X

1.6 Agencies Consulted:

- City and County of Honolulu, Department of Planning and Permitting/Design and Construction
- State Bureau of Conveyances

- State Department of Accounting and General Services (Survey Divisions)
- State Department of Land and Natural Resources/ State Historic Preservation Division

1.7 **Anticipated Determination** Finding of No Significant Impact (FONSI)

2 LOCATION AND GENERAL DESCRIPTION OF THE SUBJECT PROPERTY

2.1 Site Description and Background

TMK (1) 8-4-007-001, is an approximately 1/3 acre lot located at 84-709 Upena Street. The site is improved with a single family residence, a permitted in-ground pool and permitted view tower/gazebo structure located approximately 62 feet from the seaward property boundary and outside of the shoreline setback area. The site is sandwiched between single family residences on either side. Upena Street is a mature community of developed residential homes. A general location map is shown in Figure 1 and a Tax Map Key identifying the parcels is depicted in Figure 2.

The subject property is located near Aki's beach to the south (a small pocket beach) and Makaha Beach to the north. The project site faces west and is subject to seasonal storm damage associated with large winter surf and summer swells. This particular stretch of shoreline consists of mainly reef and volcanic rock. Since the late 1960's a number of shoreline structures have been constructed along the ocean frontage of the adjoining properties to the north and south to help prevent erosion, deter property damage and improve beach access.

The subject property was purchased in 1991 by the applicants and is owned in Fee Simple. The recorded lot area for the subject property is 15,510 square feet. The shoreline is defined by a single continuous seawall located about ten feet inland of the seaward property boundary. Behind the continuous seawall are a set of secondary structures staggered between approximately 17 to 25 feet inland from the seaward property boundary. The seawall structures were not installed by the applicants and existed at the property prior to the time of purchase. A review of historical records places the installation of the wall sometime in the mid to late 1980's. Vegetation consists of predominately yard grass and various residential landscaping materials. The topography of the lot is flat as evidenced on Appendix - Photo Page 1.

The existing house, gazebo (covered seating area) and garage were constructed in 1993 per Building Permit No. 345892 dated, December 13, 1993. A pool was also added to the site in 1993 under Building Permit No. 344673. Other than the seawall structure, there is a barbeque pit encroaching approximately 5 feet into the 40-foot setback area where the existing seawall defines the present shoreline.

The aerial photographs from 1967 show undeveloped property and a smattering of seawalls along the shoreline. As properties were purchased or resold, subsequent seawalls along the shore were constructed. Every developed lot between Aki Beach and southern end of Makaha Beach now has a seawall being either a conforming or non-conforming structure.

2.2 Proposed Action

The applicant received a Notice of Violation in September 2009 for a CRM Seawall constructed in the Shoreline Setback area without a variance. The applicant now wishes to seek approval for an after-the-fact Shoreline Setback Variance. Upon receiving approval for the variance, an after-the-fact building permit will be applied for all seawall structures located within the setback area and side property lines. The seawall structure spans the entire frontage of the subject property for approximately 70 feet and the associated staggered structures located behind the continuous seawall cover the same area. The applicant is requesting that the additional non-permitted structures located within the 40-foot shoreline setback be included in the variance or that these structures be approved as "minor structures" under Chapter 23, Section 1.5(b)(1), which includes a barbeque pit.

This application does not require a zoning adjustment or a height variance as the wall conforms to the maximum permitted height for safety and topological standards.

Without the seawall across the property, a significant impact to the shoreline frontage would likely occur thereby threatening the existing permitted structures on the property. Erosion damage within about 50% of the property area would diminish, instead of enhance, public access. According to the Coastal Engineering Assessment ("CEA") by EKNA Services, Inc., there would be a significant loss from erosion and potential undermining of permitted structures and dwellings due to wave run-up damage. The water mass from breaking waves would wash up into the backshore area, causing scouring and erosion of unconsolidated materials. This erosion would be further aggravated by the "funneling" action of water due to the existing walls that flank the property. In fact, based on the CEA, the current unpermitted structures provide the necessary protection from erosion and wave damage that, without said structure, could result in loss of beneficial use of the seaward half of the property. Further, the Hawaii Shoreline Erosion Management Study published in June 1989 states that vertical seawalls are the appropriate method of protection along this rocky shoreline. The hard limestone platform provides a good foundation for the structure and vertical walls are the most cost-effective and space-saving measure. See Appendix for the CEA.

There is a recorded and approved certified shoreline survey issued for the subject property in 1993. Prior to obtaining the after-the-fact building permits for the structures located within the shoreline setback area, the applicant will obtain an updated certified shoreline from the State of Hawaii Department of Land and Natural Resources. As per Section 13-222-7(b)(14) of the Hawaii Administrative Rules, an application for shoreline certification cannot be accepted by the State of Hawaii Department of Land and Natural Resources until the illegal shoreline structure has been approved by the appropriate governmental agencies; said approval being the granting of a Shoreline Setback Variance. This Environmental Assessment is the first step in obtaining this approval. The Department of Accounting and General Services Survey Division in their review of the shoreline survey will determine placement of the certified shoreline. To the extent there are any encroachments, it will be determined during the submittal process for the certification. The existing seawall resides mauka of the 1993 certified shoreline. The previously issued

Shoreline certification survey and updated uncertified survey for the subject property are in Appendix - Figure 3 and Topographical Survey.

2.3 Technical Characteristics

The existing seawall is a concrete and rubble masonry (CRM) wall with a top elevation of about 15 feet above mean sea level (MSL). According to the June 2010 topo survey and as-built drawings , the elevation at the base of the seawall is about +12 feet MSL. The continuous portion of the seawall spans 69.93 feet across the subject parcel. A site plan, elevation, section and typical wall detail drawings were provided by Don's Ohana Drafting Services. Backfill is estimated at 48 to 50 cubic yards and the life expectancy for the wall is estimated at 25 years and could last another 25 years if maintained properly. (See Appendix - Plot Plan, Section and Cross Section)

2.4 Economic and Social Characteristics

There is no economic or social impact anticipated as there is no new construction being proposed.

2.5 Cultural and Historic Characteristics.

The property has, since prior to 1967, been disturbed by a single family residence and related improvements that were initially constructed. No disturbance to the property is proposed as there is no new construction anticipated.

2.6 Environmental Characteristics

The applicant purchased the property in 1991 with the existing seawalls already in place. The subject walls tie into concrete seawalls on both sides of the subject property and is part of a continuing sea wall that stretches the shoreline northward to Makaha beach and southward to Aki's beach (a small pocket beach) to the south. The wall serves not only to protect the subject property from seasonal wave activity, but improves coastal access to the public against the jagged and dangerous volcanic reef.

The subject property does not contain unique or endangered plant or animal species. There are no known rare, threatened or endangered species nor their habitats located in or near the subject property. The seawall has no effect on either Makaha Beach Park (located about ½ mile north of the site) or Mauna Lahilahi Beach Park (located about 1 mile south of the site.) The seawall also has no effect on the small pocket beach (Aki's Beach) located just south of the subject property.

3 ENVIRONMENTAL SETTING

3.1 General Description

The subject property is located within a residential development consisting of single-family homes along the makai side of Farrington Road. The development was not planned, but evolved into a community of single-family residences located on the loop roads made up of Upena Street and Wideman Street. The State's Land Use designation is Urban District and the City and County of Honolulu's Zoning is R-10 Residential. All of the developed lots located along the shoreline in the vicinity of the subject property have existing seawalls to provide shoreline protection from wave erosion, scouring and run-up.

3.2 Soils

The soils for the subject property, according to the USDA Natural Resources Conservation Services, are of the Mamala stony silty clay loam series. Slopes range from 0 to 12 percent and the permeability is moderately low to high.

3.3 Flood Characteristics

The Federal Emergency Management Agency (FEMA) and Flood Insurance Rate Maps (FIRM), label the shoreline in the project area as Zone VE with regulatory base flood elevation (BFE) of 14 feet above MSL. The Zone VE designation indicates that the site is subject to high velocity tsunami flow. The seawall will have a mitigating effect on the flood characteristics since the 3 foot high seawall's crest elevation is higher than the BFE. The remainder of the site is located within Zone X. The project site is also located within the tsunami evacuation zone as determined by the Oahu Civil Defense.

3.4 Marine Flora and Fauna

There are no known endangered species, either land or aquatic flora or fauna, in the vicinity of the subject property.

3.5 Water Quality

Near shore waters are classified as "A" by the Department of Health. Aki's beach has a known tributary which feeds from mountain run-off during extreme rains and flash flooding, but remains dry otherwise. Coastal waters are also subject to turbidity following periods of heavy rain when sediments are washed from the land. . No other point sources are noted.

3.6 Public Access, Coastal Use and Recreational Resources.

A public right-of-way owned by the City and County of Honolulu is located approximately 10 parcels to the north of the subject property (TMK:(1) 8-4-007-012) and Aki's beach is located 3 parcels to the south. The shoreline along this area is lightly used by anglers to pole fish and occasionally throw netting.

3.7 Archaeological and Cultural Resources

The subject property is located in the Mākaha ahupua`a. The Hawaiian land division, known as a ahupua`a, generally consists of vertical landscape segments from the mountains to the near-shore ocean environment, and into the ocean as deep as a person could stand in the water. The proposed action will have no effect on traditional cultural practices. On-shore and off-shore fishing along the shoreline occurs now and will continue to take place if the proposed action is approved. If additional construction or renovation plans should be considered in the future, and should significant archaeological features be uncovered, the applicant will be responsible for contacting the Department of Land and Natural Resources, State Historic Preservation Division in accordance with applicable regulations.

3.8 Land Use Considerations

The State Land Use Law is defined in Chapter 205 of the Hawaii Revised Statutes and is broken down into four distinct categories; Urban, Conservation, Agricultural and Rural. The subject property is located within the Urban District comprised of approximately 15,020 square feet based on the May 1993 certified shoreline survey. Section 13-222(b)(14) of the Hawaii Administrative Rules requires approval by the controlling government agency for manmade structures located at the shoreline. The applicant will be required to obtain a shoreline certification from the Department of Land and Natural Resources when they apply for an after-the-fact building permit. The placement of the certified shoreline will be determined by the Department of Land and Natural Resources Accounting and General Services Survey Division while any possible foundation encroachments from the structure will be determined by the Office of Conservation and Coastal Lands as part of their review. There was a previous shoreline certification conducted in 1993 and approved as part of a building permit application for a gazebo and is attached in Appendix Figure 4.

Chapter 205A of the Hawaii Revised Statutes directs the Coastal Zone Management Program. The program requires each county to establish Special Management Areas and Shoreline Setbacks. The subject property does fall within an SMA, is an accessory to a single-family dwelling and will not require any new construction. As such, the application for an after-the-fact variance will not require a Special Management Area Use Permit for the existing seawall structure.

According to the Coastal Engineering Report, the existing seawalls do not alter seasonal erosion/accretion patterns. The area is not specifically recognized as an area of scenic value or high recreational use. Nevertheless, the seawall is not a barrier to lateral access along the shore and is located on private property.

4 COASTAL SETTING

According to the Coastal Engineering Report conducted by EKNA Services, the existing seawall does not alter seasonal erosion/accretion patterns along this area of shoreline. These seawalls are also not a barrier to lateral access. The following information was taken from EKNA Services Inc.'s Coastal Engineering report, commissioned by the applicant and completed in 2010:

4.1 Shoreline Description and Characteristics

The Makaha coastline on the west coast of Oahu is a rocky, limestone terraced shoreline, with pocket beaches separated by rocky headlands. In an idealized setting, there is very little or no exchange of sediment between the pocket beach and the adjacent shorelines (i.e. no longshore transport). For the rocky Makaha coastline, the pocket beaches are also similar to "perched" beaches, where sand is deposited on the rocky limestone shoreline by cross-shore transport (onshore-offshore transport) rather than longshore transport. The seasonal wave climate determines the profile and planform changes.

A study by the University of Hawaii mapped historical shoreline changes using orthorectified and georeferenced aerial photographs and National Ocean Survey topographic survey charts. Shoreline change rates are not calculated for rocky shorelines (such as in the vicinity of the subject property). Historical shorelines at Makaha Beach indicate a seasonal variability, similar to Papaoneone Beach located north of Lahilahi Point (south of the project site). Aki's Beach is a very small pocket beach located just three parcels to the south of the subject property, and has remained approximately stable since 1928 according to this study.

There is no shallow offshore fringing reef along this Makaha coastline. The geomorphological structure fronting this Makaha coastline is classified as Pavement, which is flat, low-relief, solid carbonate rock with coverage of macroalgae, hard coral, zoanthids, and other sessile invertebrates that are dense enough to begin to obscure the underlying surface. Large sand channels at Makaha Beach and Pokai Bay are the only features that are differentiated from the nearshore Pavement bottom type. These shore-perpendicular sand channels lead to sand bottom areas beyond the approximate 30-foot depth contour. The biological cover type on the hard bottom is classified as Macroalgae (<50%) and Turf algae (50% - <90%), the latter being low lying species of marine algae lacking upright fleshy macroalgal thali.

4.2 Existing Shoreline Structures

Existing shoreline structures populate the entire shore in this section of the coast. In particular, there exist similar low seawalls on either side of the subject property. A portion of these structures existed prior to the enactment of Shoreline Setback Rules of the City and County of

Honolulu in 1971 while others appear during the mid to late 1980's; many in response to the impact of coastal flooding (likely from Hurricane Iwa in 1982). Almost all of the structures were created over 25 years ago, only one property cited has applied for, and received, a shoreline variance, which was granted in 1989 according to information provided by the City and County of Honolulu.. The remaining properties are either grandfathered as installed prior to 1971 or have not yet been cited.

4.3 Coastal Processes

The subject property is located on the rocky limestone shoreline south of Makaha Beach. This 3,000 foot-long stretch of rocky coast serves as a "headland" between Makaha Beach to the north and Papaoneone Beach to the south. The rocky limestone shoreline terrace can be seen clearly in the Figure 5 aerial photo and in the ground photos at the site (Photo page-1 and Photo page-2) contained in EKNA's Coastal Report. The elevation along the top of the rocky terrace is about 10 to 12 feet above MSL. The jagged edge of the rocky terrace drops off near vertically to the ocean, and in some areas the terrace is undercut. The limestone terrace fronting the subject property has a very irregular surface with sharp dissolution cavities, and there is a notch near the center of the property shore frontage that allows waves to break nearly directly on the wall. At the time of EKNA's site visit, the tide was low and there was very little swell activity (1 foot or less). However, spray from breaking waves reached the top of the terrace through this notch. A tide pool near the base of the wall at this location (located about 8 feet above tide levels) harbored goby-type fish, indicating that breaking wave activity regularly refreshed the tide pool waters.

This wave-cut limestone terrace is exposed to high wave energy due to the 10-12 foot water depths near the base of the shoreline cliff. Large winter northerly swell waves and also large summer south swell can attack the shoreline, breaking directly on the rocky shore and causing wave uprush and scouring of the backshore. This shoreline is also subject to wave attack from infrequent Kona storms and hurricanes passing the islands to the south and west. The seawalls that line this shoreline were constructed by the property owners to prevent wave runup damage to their dwellings. Without the protection from the seawalls, the water mass from breaking waves would wash up into the backshore area, causing scouring and erosion of unconsolidated materials. Large rocks and other debris were reported to have been deposited in homes during Hurricane Iwa. In the case where an unprotected parcel is flanked on both sides by walls, the problem can be aggravated by the "funneling" action of water between the walls.

The ground elevation along the base of the wall is about +12 feet MSL, and the wall height is about 3 feet. Therefore, the crest elevation of the seawall is about +15 feet MSL. A metal fence about 2 feet high runs along the top of the seawall. There is a secondary rock wall on the mauka side of the seawall that is about 1.8 feet high. The ground elevation on the mauka side of this secondary wall is about +13 feet MSL. This secondary wall forms a containment for water from wave overtopping of the seawall. This dual wall system is apparently very effective in mitigating wave erosion damage to the property. The scouring of the cobbles and rocks within the containment area is an indication of the force of the overtopping waves (see Photo page-1). Brown spots in the lawn area just landward of the wall system indicates that wave overtopping

damage can still continue to occur during high wave events. While the dual wall system prevents significant wave runup and overtopping damage during seasonal high swell, hurricane-generated waves can likely cause overtopping and scouring damage mauka of the wall system, albeit much less severe than if the dual wall system were not in place. Strong onshore winds also have the potential to carry overtopping water landward of the dual wall system.

4.4 Potential Littoral Impacts

The existing seawall has no adverse effect on existing coastal processes, and is functionally consistent with existing seawalls along this coastal reach. The shoreline is a rocky limestone terrace and there is no long shore sand transport within the littoral zone. The seawall is situated on top of the rocky limestone shoreline, about 12 feet above mean sea level.

The seawall and a portion of the subject property are located within a coastal flood hazard zone designated Zone VE (BFE 14 feet). The seawall will have a mitigating effect on the flood characteristics since the 3-foot high seawall's crest elevation is about 1 foot higher than the BFE.

There are no known rare, threatened, or endangered species nor their habitats located in or near the project site. The seawall has no effect on either Makaha Beach Park (located about ½ mile north of the site) or Mauna Lahilahi Beach Park (located about 1 mile south of the site). The seawall also has no effect on the small pocket beach (Aki's Beach) located just south of the subject property.

4.5 Coastal Hazards

The Overall Hazard Assessment (OHA) from Makaha to Maili Point is high (6) for stream flooding, tsunami and storms according to The *Atlas of Natural Hazards in the Hawaiian Coastal Zone (2002)* due largely to the low-lying, gradually sloping coastal plain. The hazards of high wave action throughout the Leeward Coast are rated high and are subject to North Pacific swells, Kona Storm waves, Southern Swells and hurricane storm energy. Erosion is also ranked high in and around Makaha Beach Park, where the subject property is located.

5 CONSIDERATION OF ALTERNATIVES

5.1 Removal

Removal of the existing seawall is not a viable alternative, since the improvements presently existing on the parcel and erosion to the lot itself would be susceptible to wave damage and the "funneling" effect. The existing seawall is consistent with adjacent walls along this coastal reach. Seawalls are vertical structures, typically concrete or grouted rock masonry walls. The Hawaii Shoreline Erosion Management Study published in June 1989 states that vertical seawalls are the appropriate method of protection along this rocky shoreline. The adjacent lot to the south of the subject property has an existing 'grandfathered' wall that has been in existence since prior to 1967. The adjacent property to the north has an existing non-conforming wall that, if removed, would clearly result in the water infiltration into the home, which is located approximately at the

40 foot setback line. If applicant is required to remove the seawall structures, it would incur a more profound "funneling effect" due to the development of the neighboring properties resulting in a more exaggerated impact from water infiltration, scouring and erosion due to wave attack. Removal of said walls would result in significant damage and hardship to the property.

5.2 Revetments

Revetments are sloping structures typically constructed using rock of sufficient size to remain stable under design wave attack. . Revetments are likely more effective than seawalls in dissipating wave energy, thus reducing wave overtopping and scouring in front of the structure if situated on a sandy shoreline. The disadvantages are the requirement for heavy equipment and special skills to place the large stones used for the armor layer, in addition to the cost to quarry and haul the large stones to the site. Also, the currently developed site makes it almost impossible to bring in the necessary equipment and material to install a rock revetment. For shorelines of the type located at the subject property, the most cost-effective alternative is a seawall

5.3 Other types of material

Other types of material which can be used for revetments include gabions, grout-filled bags or mattresses, or interlocking concrete blocks. These have the advantages of being easily constructed without the need for heavy equipment, however, they are less durable than large rock (requiring frequent maintenance) and are aesthetically less acceptable. For rocky shorelines such as the subject site, the most cost-effective alternative is a seawall.

5.4 No Action

A lack of action is not a viable alternative, as it would imply a continued violation for an unpermitted seawall. The applicant would likely incur civil fees for maintaining a known violation.

6 PROJECT IMPACTS

Administrative Rules of the State Department of Health establishes criteria for determining whether an action may have a significant impact on the environment, under Title 11, Chapter 200, Section 12. There are thirteen criteria outlined within the Administrative rules

§ 11-200-12. Significance Criteria.

A. In considering the significance of potential environmental effects, agencies shall consider the sum of effects on the quality of the environment, and shall evaluate the overall and cumulative effects of an action.

B. In determining whether an action may have a significant effect on the environment, the agency shall consider every phase of a proposed action, the expected consequences, both

primary and secondary, and the cumulative as well as the short-term and long-term effects of the action. In most instances, an action shall be determined to have a significant effect on the environment if it:

a. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource

The after-the-fact shoreline set back variance for the subject property does not contemplate any new construction, contains no significant flora or fauna and has no known cultural resources located within the property.

b. Curtails the range of beneficial uses of the environment

There is no impact on public access to this section of shoreline. A City owned public right-of-way is located approximately 10 lots to the north of the subject property. There will be no significant impact to ocean use or fishing for this proposed action as the current configuration and related improvements do not curtail the beneficial use of the environment.

The residential zoning and private use do not conflict with the proposed structures. The existing seawall of the subject property, along with the adjacent properties, has no effect on the littoral processes at this site. The existing seawall provides protection to the property from erosion and scarring, while maintaining the owner's beneficial use of the property. Removal of the seawall would result in loss of up to 50% of the beneficial use of the property, while potentially undermining existing structures.

c. Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders

The existing seawall is consistent with the longstanding history of government decisions that approved shore protection structures along the coastline in order to protect not only the property rights of homeowners, but balance the access and use for the public of the coastal area.

d. **Substantially affects the economic welfare, social welfare, and cultural practices of the community or State**

The economic, social and cultural welfare of the community are not affected by the existing seawall and related improvement, nor are they impacted by the retroactive approval of these structures as no new construction is contemplated.

e. **Substantially affects public health**

With no new construction contemplated, there are no public health concerns associated with the existing seawall and related improvements.

f. Involves substantial secondary impacts, such as population changes or effects on public facilities

No secondary impacts to population or public facilities are anticipated by leaving the existing seawall and related structures in place as no new construction is contemplated.

g. Involves a substantial degradation of environmental quality

The existing seawall structure has no substantial degradation of environmental quality along this coastline of Oahu.

h. Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions

No new construction is proposed. The adjacent properties are residential lots.

i. Substantially affects a rare, threatened, or endangered species, or its habitat

There are no known rare, threatened or endangered species of plants or animals within the general radius of the property, nor any habitat which would be impacted by the continued placement of the seawall.

j. Detrimentally affects air or water quality or ambient noise levels

The existing seawall and related improvements do not detrimentally affect air or water quality or ambient noise levels as no new construction is contemplated.

k. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters

The subject property is located in Flood Hazard Zone VE with a base flood elevation of 14 feet, and in the tsunami evacuation zone. The seawall structures protect the home from wave energy, wave run-up and overtopping. The existing seawall is not anticipated to increase the flood hazard for the surrounding area. However, the wall will likely have no impact in curtailing the effects of a tsunami hitting the coast.

l. Substantially affects scenic vistas and view planes identified in county or state plans or studies

All of the residential lots along this coastal region have similar protective structures rendering the subject property consistent with the appearance of the remaining coastal area.

m. Requires substantial energy consumption

There is no substantial energy consumption associated with the seawall.

6.1 Summary of Unavoidable Adverse Environmental Impact

Maintaining the current seawall structures at the subject property is not expected to create any new significant adverse impact on littoral processes along the shoreline. These structures have been in place since the mid to late 1980's and were installed by the previous owner of the property.

6.2 Support of Anticipated Determination

The approval of the proposed after-the-fact shoreline setback variance for the seawall structure and related improvements at the subject property will not have a significant effect on the immediate or surrounding environment and that an Environmental Impact Statement will not be required. Based upon this Environmental Assessment document and the evaluation of the determination, it is recommended that a Finding of No Significant Impact (FONSI) be issued for the proposed action.

7 MITIGATION MEASURES

No mitigation measures are proposed. The proposed action would cause no significant short-term or long-term impacts to recreational, biological or scenic resources. The Coastal Engineering Assessment states that the existing seawall has no effect on the existing littoral processes at this site and does not alter seasonal erosion/accretion patterns on beaches to the north and south of the project site.

8 APPROVALS, AGENCY AND PUBLIC REVIEW

8.1 Required Approvals

The project will require the following:

- Pursuant to Revised Ordinances of Honolulu, Chapter 23, a Shoreline Setback Variance
- State of Hawaii Department of Land and Natural Resources Shoreline Certification
- City and County of Honolulu after-the-fact Building Permit
- Minor Shoreline Structures Permit for those minor structures not included in the Shoreline Setback Variance, if any.

8.2 Shoreline Setback Variance

The applicant will need to submit an application for an after-the-fact Shoreline Setback Variance for the seawall and secondary structures that span across the applicants property and tie into adjacent seawalls on either side of the property. The applicant is also requesting that the non-permitted structure (barbeque pit) located within the 40 foot shoreline setback be included in the variance or that the structure be approved as "minor structures" under Chapter 23 section 15-1(b)(8).

The Revised Ordinances of Honolulu Section 23-1.8(b)(3) established three tests for hardship that the landowner will incur if he is not allowed to retain the structures.

(1) The applicant will be deprived of reasonable use of the land.

The removal of the shoreline protection structure will result in significant wave run-up and the funneling effect resulting in substantial erosion, scouring and potential wave damage to permitted structures. It is a well known engineering phenomenon that the funneling effect will provide increased wave related damage to the property in 'open' coastal environment. This is the result of the existing seawalls on either side of the property. It is reasonable to assume that a substantial amount of property loss will occur if the applicant is required to remove the existing seawall structures that have been in place for almost a quarter of a century. Granting the Shoreline Setback Variance is the proper mechanism for legitimizing the existing seawall under the current Honolulu Ordinances. This would allow for the owners to repair the wall legally should a severe storm event occur that may undermine and cause the wall to collapse, which would result in a public hazard along the shore. Any other action would result in the applicant being deprived of reasonable use of the property.

(2) The applicant's proposal is due to unique circumstances and does not draw into question the reasonableness of Revised Ordinances of Honolulu Chapter 23 and the shoreline setback rules.

Every developed beach fronting property in this neighborhood has a seawall structure fronting the shoreline. The Hawaii Shoreline Erosion Management Study published in June 1989 states that vertical seawalls are the appropriate method of protection along this rocky shoreline. The seawall, installed sometime in the late 1980's, meets the criteria established in Chapter 23 for shoreline protection structures that do not adversely affect beach processes, public access along the shoreline or shoreline open space. The public can travel the shoreline area for recreational purposes and the open space and view planes are not impacted by the existence of the seawall. It is the policy of Chapter 23 to reduce hazards to property from coastal flooding and erosion and, as the seawall is connected to a series of seawalls protecting residential properties along this shoreline and has been in place for almost 25 years, it is reasonable to allow the wall to remain and to allow it to be repaired as needed in accordance with government regulations.

In addition, the adjacent lot to the south of the subject property has an existing 'grandfathered' wall that has been in existence since prior to 1967. The adjacent property to the north has an existing non-conforming wall that, if removed, would clearly result in the water infiltration into the home, which is located approximately at the 40 foot setback line. Therefore, the subject property is in a unique position such that if it was required to remove the seawall structures, it would incur a more profound "funneling effect" due to the development of the neighboring properties resulting in a more exaggerated impact from water infiltration, scouring and erosion due to wave attack.

(3) The proposal is the practical alternative which conforms to the purpose of the shoreline setback regulations

The existing seawall is consistent with the recommendations for shoreline protection for this type of coastline in the Hawaii Shoreline Management Study. The best alternative given the history and make-up of this coastline, which is entirely comprised of seawalls, would allow for the existing shoreline structure to be permitted and, therefore it can be properly maintained. Near-vertical seawalls also occupy less space along the shore, thus maximizing use of the backshore areas as well as preserving the open space public shorefront seaward of the structure, which is consistent with the policy intent regulating shorelines.

These criteria and any specific engineering solutions will be expanded on in the application for the shoreline Setback Variance and will include a request and justification to retain other minor structures.

8.3 Preparation of the Final Environmental Assessment

Upon receipt of comments from the appropriate governmental agencies, the comments will be incorporated into the final Environmental Assessment.

9 APPENDIX

9.1 Costal Engineering Assessment report - EKNA Services, Inc.

9.2 Topographical Survey – Gil Surveying Services, Inc.

9.3 Plot Plan, Sections and Cross Section – Don's Ohana Drafting Services

9.1 Costal Engineering Assessment report - EKNA Services, Inc.

Coastal Engineering Assessment
for Seawall at Makaha, Oahu, Hawaii

TMK: (1)8-4-07:001

Prepared for:

Thomas C. Zizzi, LLLC
P.O. Box 4220
Waianae, Hawaii 96792

Prepared by:

EKNA Services, Inc.
615 Piikoi Street, Suite 300
Honolulu, Hawaii 96814

(EKNA Control No. 2689-00F#)

July 2010

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1 Location and Problem Identification 1
2 Shoreline Characteristics and Coastal Processes 2
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2.2 Project Site Coastal Processes
3 Potential Littoral Impacts 5
4 Consideration of Alternatives 5

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1 Location Map
2 2008 Aerial Photo with TMK Overlay
3 1993 Certified Shoreline Map
4 Topographic Survey Map dated June 8, 2010
5 2004 Aerial Photo
6 Special Management Area Map
7 FEMA Flood Zones
8 Shoreline Change Rates for Makaha (UH Coastal Geology website)
9 Shallow-water Benthic Habitat Offshore Makaha (NOAA)
10 Existing Seawall Typical Section

PHOTOS
Photo page-1 O'Connell seawall - photos taken June 30, 2010
Photo page-2 O'Connell seawall - photos taken June 30, 2010

Coastal Engineering Assessment
for Seawall at Makaha, Oahu, Hawaii
TMK:(1)8-4-07:001

1. LOCATION AND PROBLEM IDENTIFICATION

The subject property is located at 84-709 Upena Street, about 1/2 mile south of Makaha Beach Park, on the west coast of Oahu. Figure 1 shows the site location and Figure 2 shows the Tax Map Key overlaid on a 2008 aerial photo.

The property is owned by William O'Connell et al, and is situated at the shoreline within the Special Management Area (SMA). The property is protected by a seawall that is situated mauka of the seaward property boundary. Figure 3 is a 1993 certified shoreline map that identifies the shoreline as being located along the toe of the seawall as of March 22, 1993. Figure 4 is a June 2010 topographic survey[1] of the seaward portion of the property showing the present ground elevations and height of the walls. There is no record that the subject seawall was permitted for construction. Therefore, in accordance with the Shoreline Setback Rules and Regulations of the City and County of Honolulu, this coastal engineering assessment is prepared in support of an application for an after-the-fact Shoreline Setback Variance for the existing seawall at the subject parcel.

The property is situated on a rocky coastline that is exposed to summer south swell and winter North Pacific swell that create popular surfing waves at Makaha Beach. This coast also is exposed to local Kona storm waves and infrequent hurricane waves. Figure 5 is a 2004 aerial photo that shows the condition of the rocky shoreline in the vicinity of the property, and the seawalls that exist on the subject property and adjacent parcels. The seaward half of the subject property is situated within the 100-year coastal flood zone designed as Zone VE by the Federal Emergency Management Agency (FEMA), having a

[1]Topographic Survey Map dated June 8, 2010, prepared by Gil Surveying Services, Inc.

base flood elevation (BFE) of 14 feet above MSL (Figure 7). The elevation along the base of the seawall is about 12 feet above MSL, and the height of the seawall is 3 feet. Therefore, the seawall protects the property from significant wave damage and coastal flooding.

2. SHORELINE CHARACTERISTICS AND COASTAL PROCESSES

2.1 General

The Makaha coastline on the west coast of Oahu is a rocky, limestone terraced shoreline, with pocket beaches separated by rocky headlands. In an idealized setting, there is very little or no exchange of sediment between the pocket beach and the adjacent shorelines (i.e. no longshore transport). For the rocky Makaha coastline, the pocket beaches are also similar to "perched" beaches, where sand is deposited on the rocky limestone shoreline by cross-shore transport (onshore-offshore transport) rather than longshore transport. The seasonal wave climate determines the profile and planform changes.

Figure 8 is excerpted from a study by the University of Hawaii[2] which mapped historical shoreline changes using orthorectified and georeferenced aerial photographs and National Ocean Survey topographic survey charts. The low water mark was used as the historical shoreline, or shoreline change reference feature (SCRF). Movement of the SCRF along shore-normal transects (spaced every 66 feet) was used to calculate rates of erosion and accretion. Shoreline change rates are not calculated for rocky shorelines (such as in the vicinity of the subject property). Historical shorelines at Makaha Beach indicate a seasonal variability, similar to Papaoneone Beach located north of Lahilahi Point (south of the project site). Aki's Beach is a very small pocket beach located just three parcels to the south of the subject property, and has remained approximately stable since 1928 according to this study.

[2]Maps showing historical shoreline positions and shoreline change rates, produced by the Coastal Geology Group, School of Ocean and Earth Science and Technology (SOEST), University of Hawaii at Manoa.

There is no shallow offshore fringing reef along this Makaha coastline. Figure 9 is excerpted from a study by NOAA[3] which mapped the shallow-water benthic habitats of the main Hawaiian Islands. The geomorphological structure fronting this Makaha coastline is classified as *Pavement*, which is flat, low-relief, solid carbonate rock with coverage of macroalgae, hard coral, zoanthids, and other sessile invertebrates that are dense enough to begin to obscure the underlying surface. Large sand channels at Makaha Beach and Pokai Bay are the only features that are differentiated from the nearshore *Pavement* bottom type. These shore-perpendicular sand channels lead to sand bottom areas beyond the approximate 30-foot depth contour. The biological cover type on the hard bottom nearshore area is classified as *Macroalgae* (<50%) and *Turf algae* (50%-<90%), the latter being low lying species of marine algae lacking upright fleshy macroalgal thali.

2.2 Project Site Coastal Processes

The subject property is located on the rocky limestone shoreline south of Makaha Beach. This 3,000 foot-long stretch of rocky coast serves as a "headland" between Makaha Beach to the north and Papaoneone Beach to the south. The rocky limestone shoreline terrace can be seen clearly in the Figure 5 aerial photo and in the ground photos at the site (Photo page-1 and Photo page-2). The elevation along the top of the rocky terrace is about 10 to 12 feet above MSL. The jagged edge of the rocky terrace drops off near vertically to the ocean, and in some areas the terrace is undercut. The limestone terrace fronting the subject property has a very irregular surface with sharp dissolution cavities, and there is a notch near the center of the property shore frontage that allows waves to break nearly directly on the wall. At the time of the site visit, the tide was low and there was very little swell activity (1 foot or less). However, spray from breaking waves reached the top of the terrace through this notch. A tide pool near the base of the wall at this location (located about 8 feet above tide levels) harbored goby-type fish, indicating that breaking wave

[3]"Atlas of the Shallow-Water Benthic Habitats of the Main Hawaiian Islands", U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, National Centers for Coastal Ocean Science, Center for Coastal Monitoring and Assessment, Biogeography Branch, NOAA Technical Memorandum NOS NCCOS 61, September 2007.

activity regularly refreshed the tide pool waters.

This wave-cut limestone terrace is exposed to high wave energy due to the 10-12 foot water depths near the base of the shoreline cliff. Large winter northerly swell waves and also large summer south swell can attack the shoreline, breaking directly on the rocky shore and causing wave uprush and scouring of the backshore. This shoreline is also subject to wave attack from infrequent Kona storms and hurricanes passing the islands to the south and west. The seawalls that line this shoreline were constructed by the property owners to prevent wave runup damage to their dwellings. Without the protection from the seawalls, the water mass from breaking waves would wash up into the backshore area, causing scouring and erosion of unconsolidated materials. Large rocks and other debris were reported to have been deposited in homes during Hurricane Iwa. In the case where an unprotected parcel is flanked on both sides by walls, the problem can be aggravated by the "funneling" action of water between the walls.

Figure 10 depicts a typical section for the existing seawall on the subject property. The ground elevation along the base of the wall is about +12 feet MSL, and the wall height is about 3 feet. Therefore, the crest elevation of the seawall is about +15 feet MSL. A metal fence about 2 feet high runs along the top of the seawall. There is a secondary rock wall on the mauka side of the seawall that is about 1.8 feet high. The ground elevation on the mauka side of this secondary wall is about +13 feet MSL. This secondary wall forms a containment for water from wave overtopping of the seawall. This dual wall system is apparently very effective in mitigating wave erosion damage to the property. The scouring of the cobbles and rocks within the containment area is an indication of the force of the overtopping waves (see Photo page-1). Brown spots in the lawn area just landward of the wall system indicates that wave overtopping damage can still continue to occur during high wave events. While the dual wall system prevents significant wave runup and overtopping damage during seasonal high swell, hurricane-generated waves can likely cause overtopping and scouring damage mauka of the wall system, albeit much less severe than if the dual wall system were not in place. Strong onshore winds also have the potential to

carry overtopping water landward of the dual wall system.

3. POTENTIAL LITTORAL IMPACTS

The existing seawall has no adverse effect on existing coastal processes, and is functionally consistent with existing seawalls along this coastal reach. The shoreline is a rocky limestone terrace and there is no longshore sand transport within the littoral zone. The seawall is situated on top of the rocky limestone shoreline, about 12 feet above the mean higher high water (MHHW) tide elevation.

The seawall and a portion of the subject property are located within a coastal flood hazard zone designated Zone VE (BFE 14 feet). The seawall will have a mitigating effect on the flood characteristics since the 3-foot high seawall's crest elevation is about 1 foot higher than the BFE.

There are no known rare, threatened, or endangered species nor their habitats located in or near the project site. The seawall has no effect on either Makaha Beach Park (located about ½ mile north of the site) or Mauna Lahilahi Beach Park (located about 1 mile south of the site). The seawall also has no effect on the small pocket beach (Aki's Beach) located just south of the subject property.

4. CONSIDERATION OF ALTERNATIVES

Removal of the existing seawall is not a viable alternative, since the improvements presently existing on the parcel would be susceptible to wave damage. Wave runup/overtopping of the limestone terrace would render the seaward half of the subject property unsafe for development and use. The limestone terrace fronting the subject property is also unsafe to traverse during high wave activity. The existing seawall provides safety from high wave activity for the property owners and is consistent with adjacent walls along this coastal reach.

The nature of this rocky terrace shoreline precludes shore protection measures other than seawalls and revetments. There are a variety of materials and methods which can be used depending on desired durability, availability of materials and constructability considerations at the site. Seawalls are vertical structures, typically concrete or grouted rock masonry walls. Revetments are sloping structures typically constructed using rock of sufficient size to remain stable under design wave attack.

Seawalls are generally less costly to construct than revetments since they can be constructed using smaller building materials than rock revetments. Near-vertical seawalls also occupy less space along the shore, thus maximizing use of the backshore areas as well as preserving the open space public shorefront seaward of the structure.

Revetments are more effective than seawalls in dissipating wave energy, thus reducing wave overtopping and scouring in front of the structure if situated on a sandy shoreline. The disadvantages are the requirement for heavy equipment and special skills to place the large stones used for the armor layer, in addition to the cost to quarry and haul the large stones to the site. Other types of material which can be used for revetments include gabions, grout-filled bags or mattresses, or interlocking concrete blocks. These have the advantages of being easily constructed without the need for heavy equipment, however, are less durable than large rock (requiring frequent maintenance) and are aesthetically less acceptable.

For rocky shorelines such as the subject site, and for low-height structures, the most cost-effective alternative is a seawall.

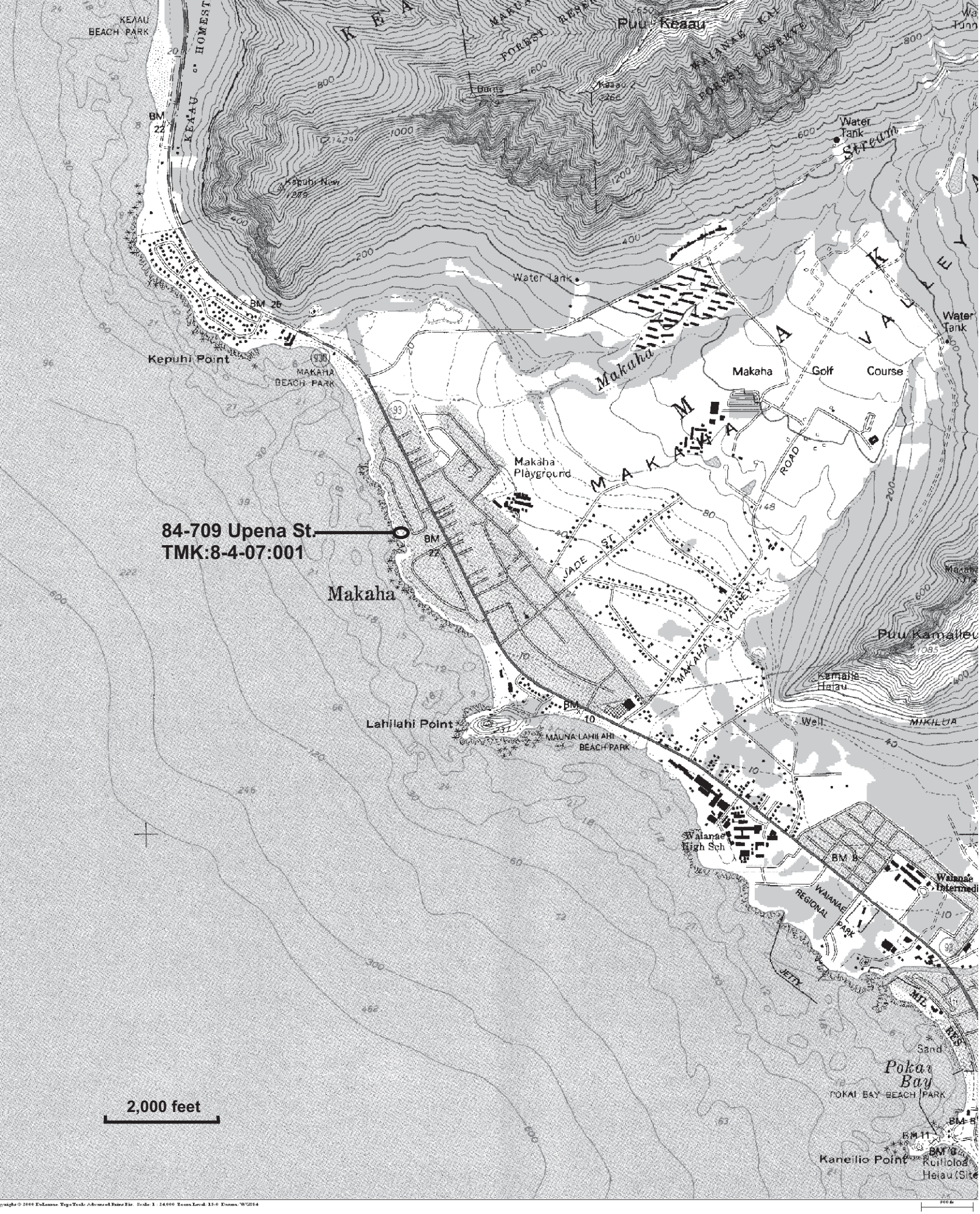
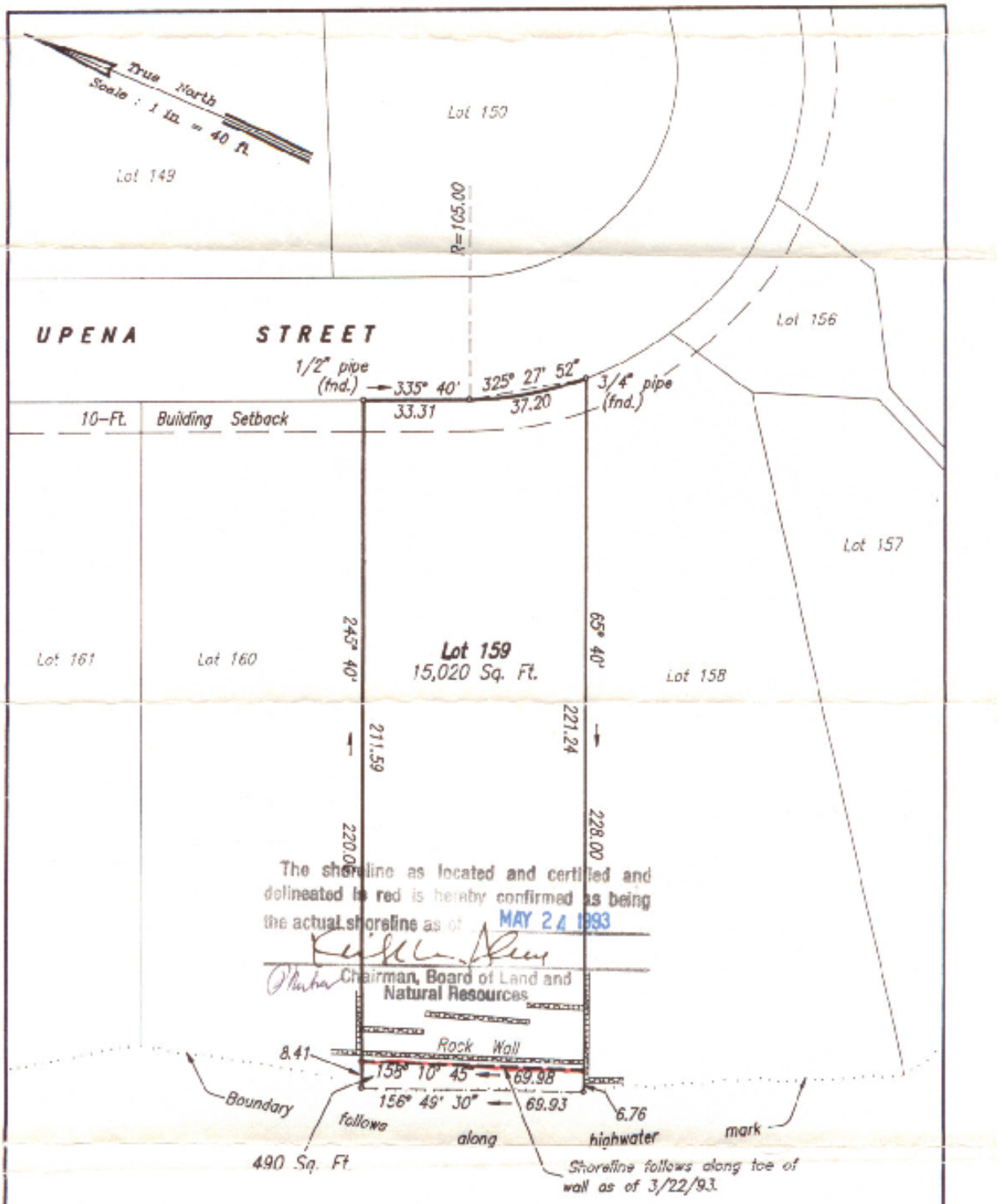

84-709 Upena St.
TMK:8-4-07:001
Makaha
Kepuhi Point
Lahilahi Point
Puu Keaau
Puu Kamaileu
Makaha Golf Course
Makaha Playground
Makaha Valley
Pokai Bay
Kaneilio Point
Waianae High Sch
Water Tank
2,000 feet

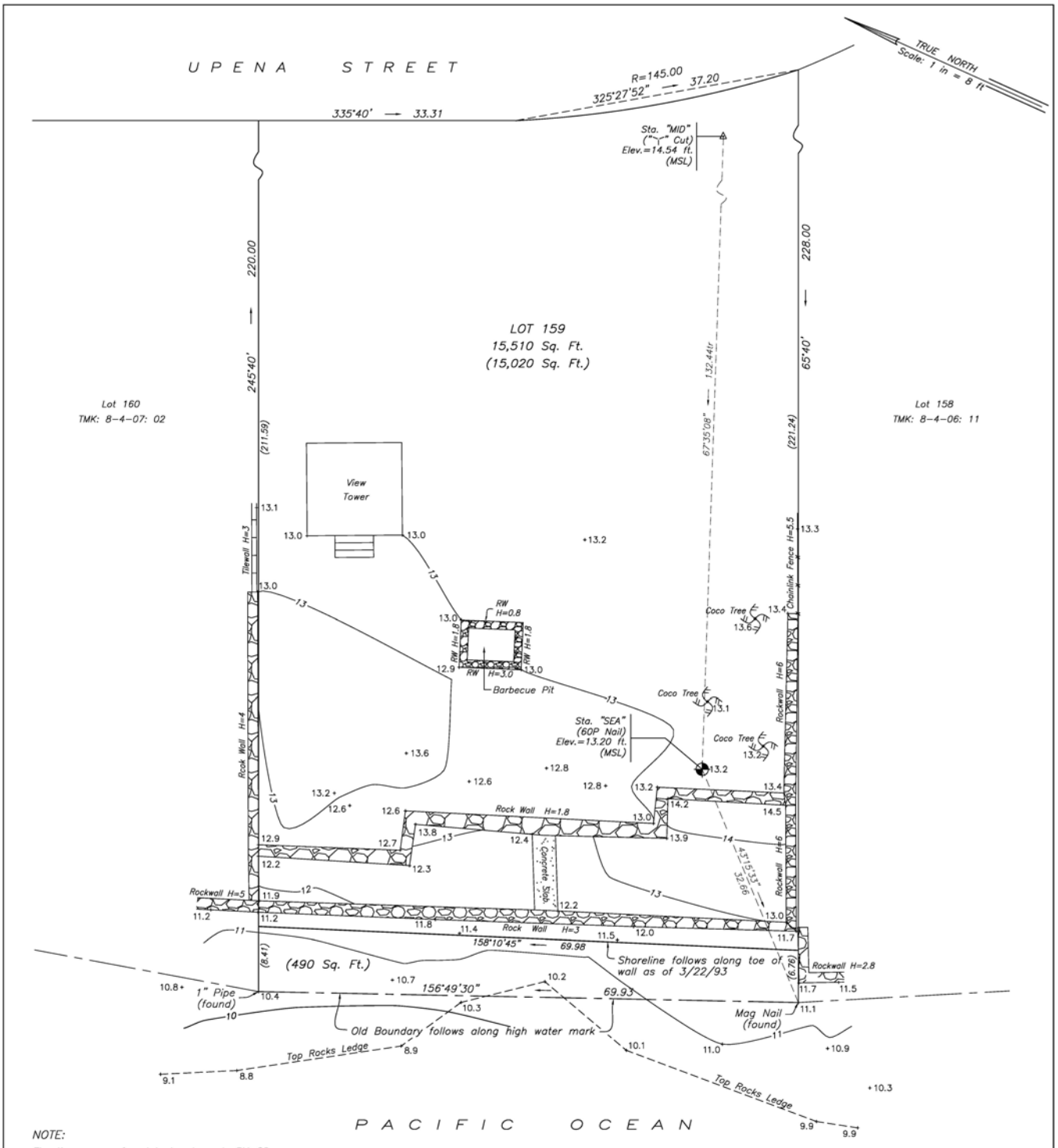
Figure 1


84-709 Upena St.
William O'Connell
SUBJECT TO CHANGE
Upena St
Farrington Hwy
Moua St
Fricke St
Figure 2
500 ft
Image USGS
© 2010 Google
© 2010 Europa Technologies
©2008 Google
Imagery Date: Mar 4, 2008
21°28'09.09" N
158°13'03.49" W
elev 13 ft
Eye alt 1723 ft



Approx. Scale: 1" = 50'

Figure 3



NOTE:

Elevations were referred to bench mark, RM-66, with an elevation of 21.601 (Mean Sea Level).

TOPOGRAPHIC SURVEY MAP

LOT 159 (Por.) OF MAP 5
LAND COURT APPLICATION 1052

Tax Map Key: (1) 8-4-07: 01 (Por.)

AT MAKAHA, WAIANAE, OAHU, HAWAII

This work was prepared by me or under my supervision

GIL P. BUMANGLAG
Licensed Professional Land Surveyor
Certificate Number 8948

GIL P. BUMANGLAG LICENSED PROFESSIONAL LAND SURVEYOR No. 8948 HAWAII, U.S.A.

Date: June 8, 2010
FB No. G-315: 54
c:\sdsk\proj\topo\upena60810

GIL SURVEYING SERVICES, Inc.
1442 UILA STREET HONOLULU HAWAII 96818

18" x 24" = 3.0 Sq. Ft.

Approx. Scale: 1" = 20'

Figure 4


Aug 30, 2004
84-709 Upena St.
TMK:8-4-07:001
Image U.S. Geological Survey
© 2010 Europa Technologies
© 2010 Google
Google
Imagery Date: Jul 31, 2004
21°28'09.66" N
158°13'04.61" W
elev 1 ft
Eye alt 548 ft

Figure 5

Figure 6 - Special Management Area (hatched)

Figure 7 - FEMA Flood Zones

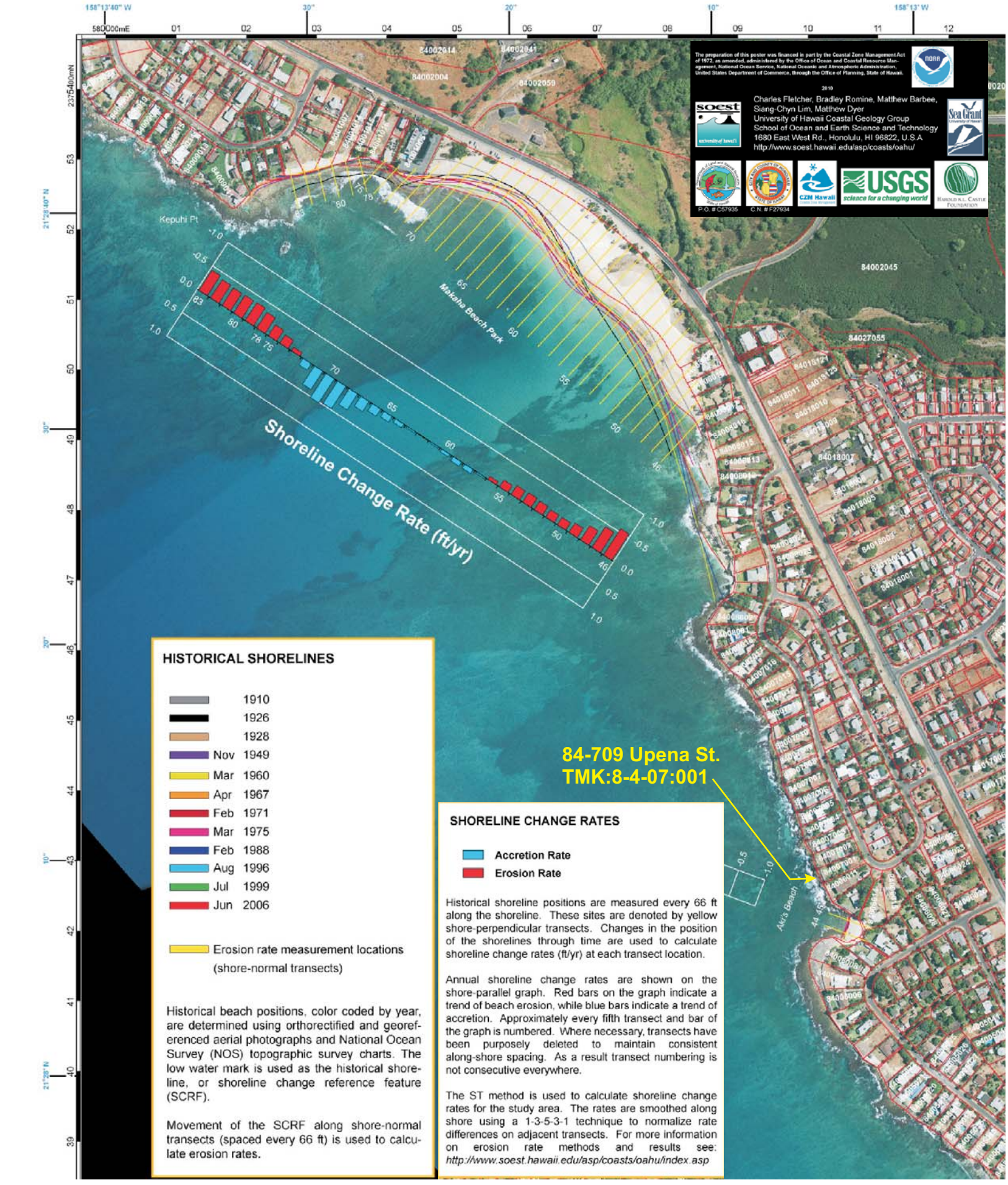
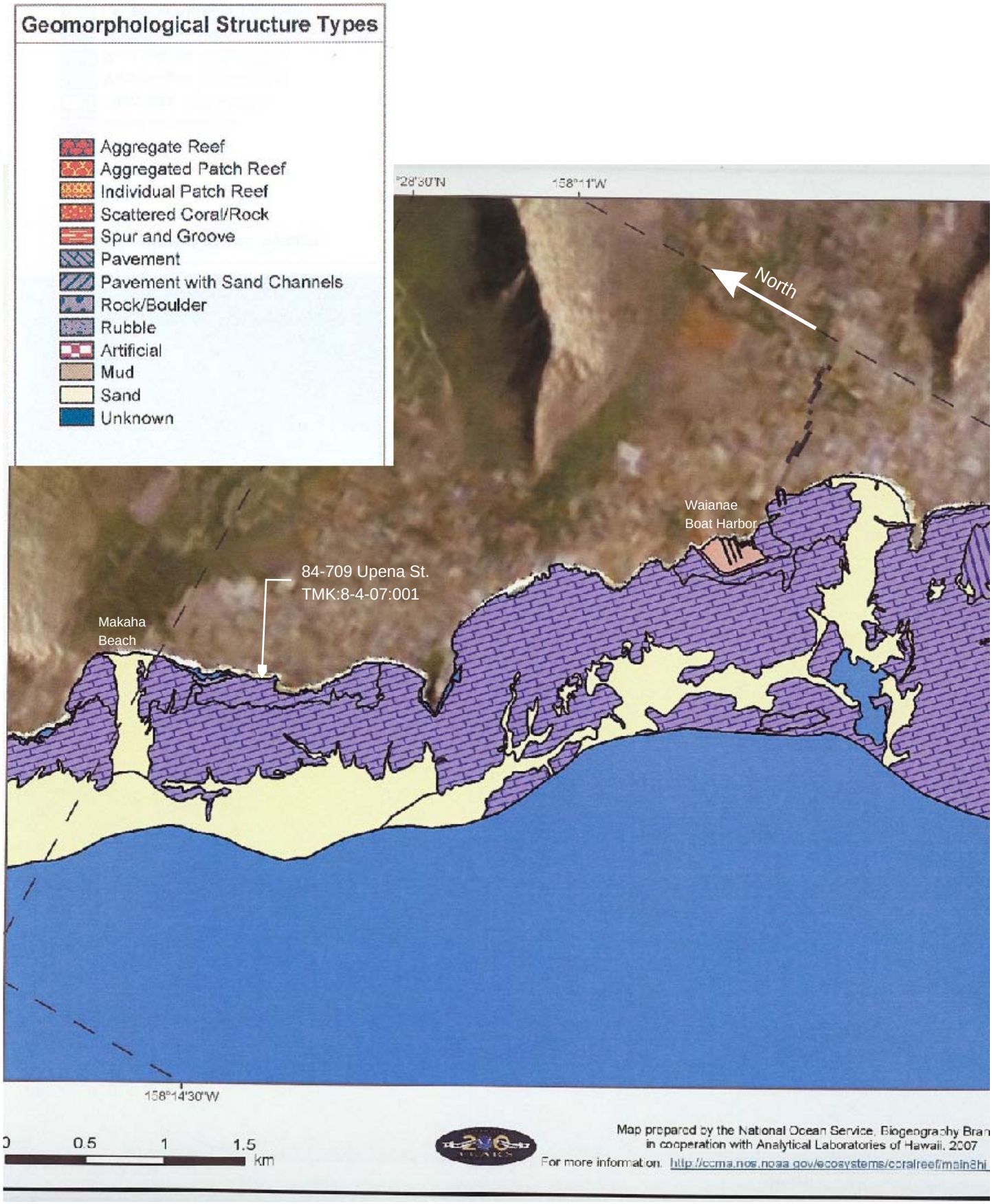
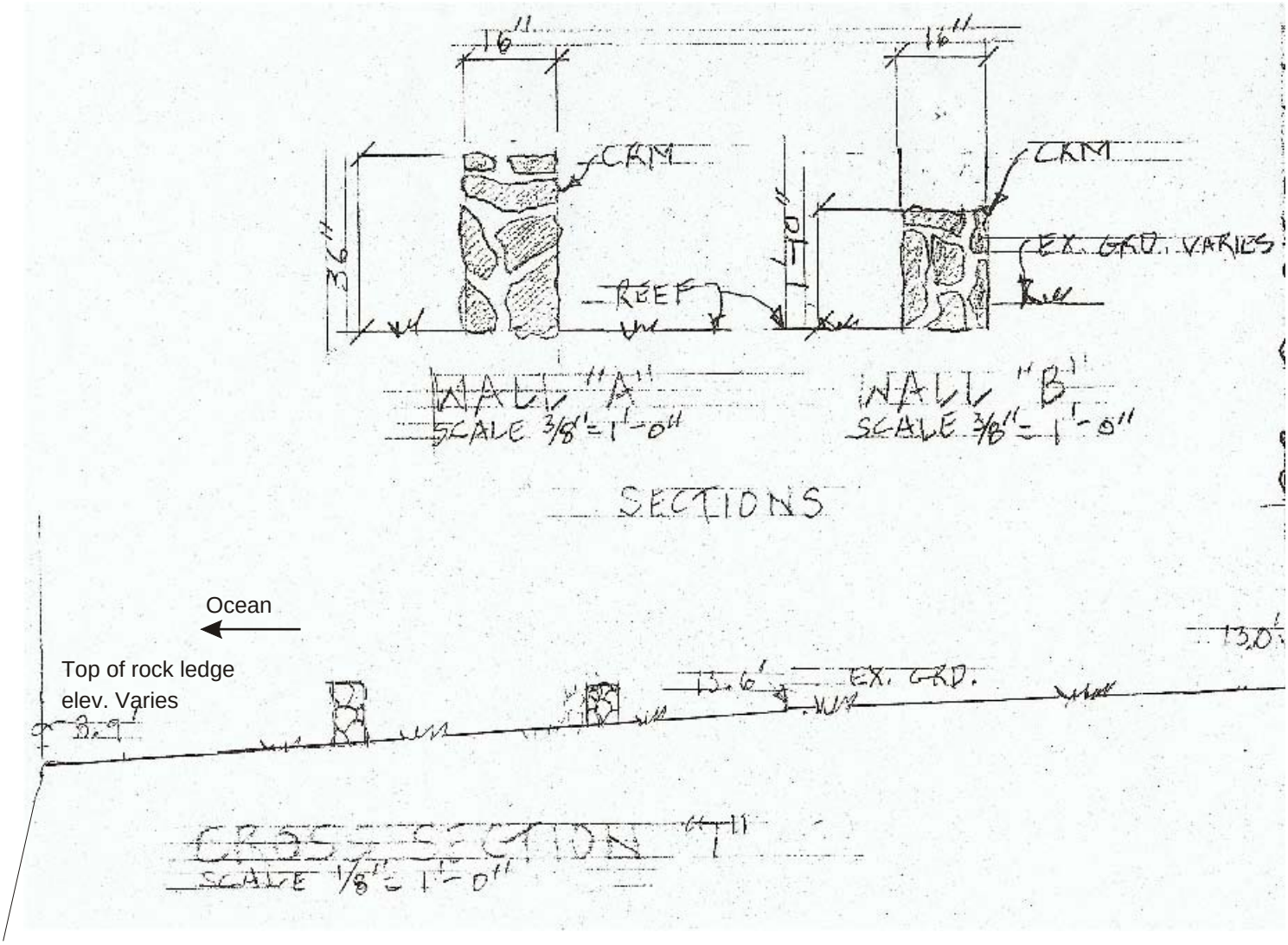

158°13'40" W
580000mE
158°13' W
Kepuhi Pt
Makaha Beach Park
Shoreline Change Rate (ft/yr)
84002014
84002041
84002004
84002059
84002045
84027055
84018007
84018001
84-709 Upena St.
TMK:8-4-07:001
Ava's Beach
HISTORICAL SHORELINES
1910
1926
1928
Nov 1949
Mar 1960
Apr 1967
Feb 1971
Mar 1975
Feb 1988
Aug 1996
Jul 1999
Jun 2006
Erosion rate measurement locations
(shore-normal transects)
Historical beach positions, color coded by year, are determined using orthorectified and georeferenced aerial photographs and National Ocean Survey (NOS) topographic survey charts. The low water mark is used as the historical shoreline, or shoreline change reference feature (SCRF).
Movement of the SCRF along shore-normal transects (spaced every 66 ft) is used to calculate erosion rates.
SHORELINE CHANGE RATES
Accretion Rate
Erosion Rate
Historical shoreline positions are measured every 66 ft along the shoreline. These sites are denoted by yellow shore-perpendicular transects. Changes in the position of the shorelines through time are used to calculate shoreline change rates (ft/yr) at each transect location.
Annual shoreline change rates are shown on the shore-parallel graph. Red bars on the graph indicate a trend of beach erosion, while blue bars indicate a trend of accretion. Approximately every fifth transect and bar of the graph is numbered. Where necessary, transects have been purposely deleted to maintain consistent along-shore spacing. As a result transect numbering is not consecutive everywhere.
The ST method is used to calculate shoreline change rates for the study area. The rates are smoothed along shore using a 1-3-5-3-1 technique to normalize rate differences on adjacent transects. For more information on erosion rate methods and results see: http://www.soest.hawaii.edu/asp/coasts/oahu/index.asp
The preparation of this poster was financed in part by the Coastal Zone Management Act of 1972, as amended, administered by the Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration, United States Department of Commerce, through the Office of Planning, State of Hawaii.
2010
Charles Fletcher, Bradley Romine, Matthew Barbee, Siang-Chyn Lim, Matthew Dyer
University of Hawaii Coastal Geology Group
School of Ocean and Earth Science and Technology
1680 East West Rd., Honolulu, HI 96822, U.S.A.
http://www.soest.hawaii.edu/asp/coasts/oahu/
soest
Sea Grant
USGS
science for a changing world
CZM Hawaii
Harold K.L. Castle Foundation
P.O. # C57935
C.N. # F27934

Figure 8



From "Atlas of the Shallow-Water Benthic Habitats of the Main Hawaiian Islands"
U.S. Dept. Of Commerce, NOAA, National Ocean Service, National Centers for Coastal Ocean Science, Center for Coastal Monitoring and Assessment, Biogeography Branch, NOAA Technical Memorandum NOS NCCOS 61, September 2007

Figure 9



Prepared by: Don's Ohana Drafting Service

EXISTING SEAWALL AND SHORELINE TYPICAL SECTION

Figure 10

View of shoreline from observation tower on the property. Brown areas mauka of the secondary wall indicate scouring damage from wave overtopping.

View southward along the top of the seawall. The seaward wall is topped with a metal fence (brown stains are from rusting of the fence). The landward wall contains the water from wave overtopping of the seaward wall. Brown spots in the lawn area just landward of this wall indicates that wave overtopping damage can still continue to occur during high wave events.

O'Connell Seawall @ Makaha, Oahu
TMK:8-4-07:01
June 30, 2010, 11:00-11:30 am
Tide approx. 0.3' MLLW

View southward of shoreline fronting the subject property seawall. The shoreline is an eroded limestone cliff face with very sharp dissolution cavities.

View northward of shoreline fronting the adjacent property seawall (TMK:8-4-07:02).

View southward of shoreline fronting the adjacent property seawall (TMK:8-4-06:11).

O'Connell Seawall @ Makaha, Oahu
TMK:8-4-07:01
June 30, 2010, 11:00-11:30 am
Tide approx. 0.3' MLLW

9.2 Topographical Survey – Gil Surveying Services, Inc.

U P E N A S T R E E T

TRUE NORTH
Scale: 1 in = 8 ft

335°40' → 33.31

R=145.00
325°27'52" → 37.20

0 5 10 15 20 25
GRAPHIC SCALE
1 inch = 8 feet

Sta. "MID"
("+" Cut)
Elev.=14.54 ft.
(MSL)

220.00
245°40'

228.00
65°40'

LOT 159
15,510 Sq. Ft.
(15,020 Sq. Ft.)

132.44tr
67°35'08"

Lot 160
TMK: 8-4-07: 02

Lot 158
TMK: 8-4-06: 11

(211.59)

(221.24)

View Tower

Tilewall H=3

Rcok Wall H=4

Barbecue Pit

RW H=0.8
RW H=1.8
RW H=3.0

Coco Tree

Chainlink Fence H=5.5

Rockwall H=6

Sta. "SEA"
(60P Nail)
Elev.=13.20 ft.
(MSL)

Rock Wall H=1.8

Concrete Slab.

43°15'33"
32.66

Rockwall H=5

Rock Wall H=3

158°10'45" ← 69.98

Shoreline follows along toe of wall as of 3/22/93

(8.41)

(490 Sq. Ft.)

(6.76)

Rockwall H=2.8

1" Pipe
(found)

156°49'30"

69.93

Mag Nail
(found)

Old Boundary follows along high water mark

Top Rocks Ledge

Top Rocks Ledge

P A C I F I C O C E A N

NOTE:

Elevations were referred to bench mark, RM-66, with an elevation of 21.601 (Mean Sea Level).

This work was prepared by me or under my supervision

GIL P. BUMANGLAG
Licensed Professional Land Surveyor
Certificate Number 8948

GIL P. BUMANGLAG
LICENSED PROFESSIONAL LAND SURVEYOR
No. 8948
HAWAII, U.S.A.

TOPOGRAPHIC SURVEY MAP

LOT 159 (Por.) OF MAP 5
LAND COURT APPLICATION 1052

Tax Map Key: (1) 8-4-07: 01 (Por.)

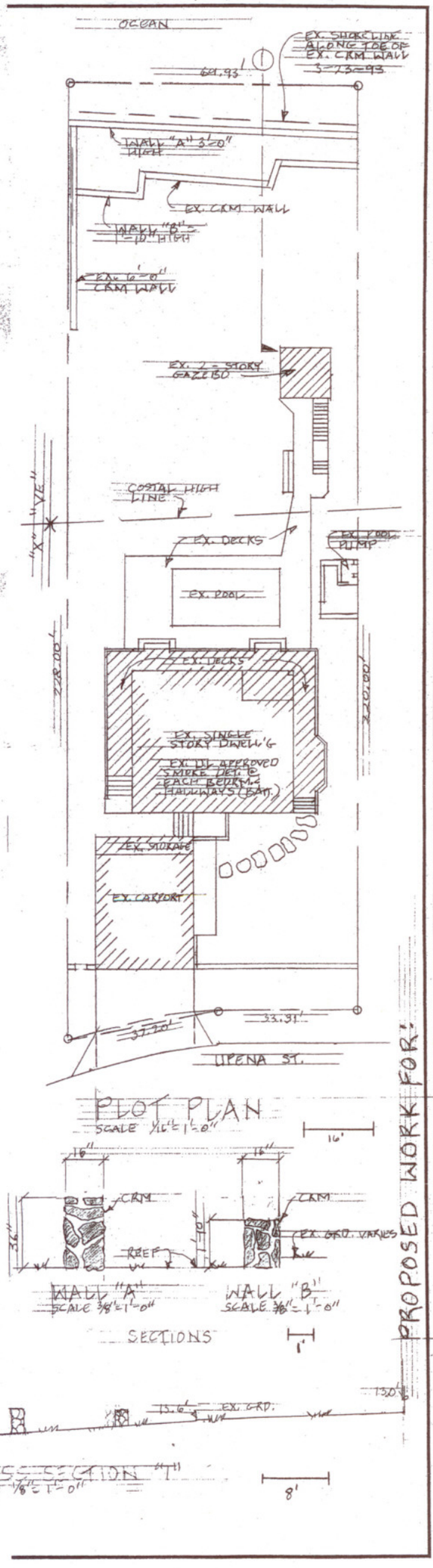
AT MAKAHA, WAIANAE, OAHU, HAWAII

Date: June 8, 2010
FB No. G-315: 54
c:\sdsk\proj\topo\upena60810

GIL SURVEYING SERVICES, inc.
1442 UILA STREET HONOLULU HAWAII 96818

18" x 24' = 3.0 Sq. Ft.

9.3 Plot Plan, Sections and Cross Section – Don's Ohana Drafting Services



PROPOSED WORK FOR:

MR./MRS. WILLIAM O'CONNELL

ADDRESS: 84-709 UPENA ST.

T.M.K. 8-4-007: 001

REVISIONS	BY

Don's Ohana Drafting Service
Phone: 640-2156
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Drawn	
Job	
Sheet	1
Of	1 Sheets