

1991-01-23-0A-FAA-Pohlsen Shore Protection LU 4/90 2392



Oceanit Coastal Corporation

coastal engineering services

A subsidiary of Oceanit Laboratories, Inc.

**ENVIRONMENTAL ASSESSMENT FOR A
SHORE PROTECTION STRUCTURE AT
57-521 KAMEHAMEHA HIGHWAY
TMK 5-7-05: 10**

submitted to:
**THE DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU**

MARCH 1990

Century Square 1188 Bishop Street, Suite 2512, Honolulu, Hawaii 96813
TELEX: 7431404 MCI: OCEANIT Ph: (808) 531-3017 FAX: (808) 526-1519

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 DEPT OF LAND UTILIZATION
 COUNTY OF HONOLULU

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I. GENERAL INFORMATION

A. APPLICANT: Elizabeth C. Pohlson, M.D.
Kapiolani Medical Center for
Women and Children
1319 Punahou Street, Suite 1140
Honolulu, HI 96826
Phone: 942-9595

B. RECORDED FEE OWNER: Same as applicant.

C. AGENT: Oceanit Coastal Corporation
1188 Bishop Street, Suite 2512
Honolulu, HI 96813
Phone: 531-3017

D. TAX MAP KEY: 5-7-05:10

E. LOT AREA: 12,589 square feet

F. AGENCIES CONSULTED IN MAKING ASSESSMENT:

Mr. Bennett Mark of the Department of Land Utilization (DLU), City and County of Honolulu, has been contacted several times by phone. Copies of written correspondence with DLU are attached as Appendix A.

II. DESCRIPTION OF THE PROPOSED ACTION

A. GENERAL DESCRIPTION

The project described herein evaluates an existing revetment for suitability as a shore protection structure and determines whether the revetment should (1) remain as is, (2) be removed, or (3) be removed and replaced. An application for a Shoreline Setback Variance (SSV) including an environmental assessment based on the results of this evaluation is submitted.

Oceanit Coastal Corporation (OCC) evaluated the engineering design and construction of the existing structure to determine whether it was designed according to accepted engineering standards and whether it was suitable for expected environmental conditions. We found that the position of the revetment and the size of the armor layer stones are sufficient for the expected environmental conditions; however, we were unable to verify the design and construction of a bed layer or filter layer beneath the armor. Also the armor layer stones have been randomly placed on the revetment; we do not consider this method of construction to be adequate for both functional and safety reasons.

Our recommended approach is to remove the existing, unauthorized revetment and replace it with a properly designed revetment that will prevent erosion of this seafront property during periods of high water such as very high tide or high waves.

The seaward side of the property ends at the shoreline in an abrupt escarpment running the entire length of the property. This escarpment is extremely vulnerable to erosion, and severe erosion had occurred prior to installing the existing revetment. The revetment also serves as a retaining wall to prevent soil from sliding into the ocean. The upper portion of the lot is level with the road (Kam Highway). The bottom of the escarpment coincides with the high water line; therefore, the entire escarpment and proposed revetment fall within the 40 foot shoreline setback area. In order to build a shore protection structure, a Shoreline Setback Variance is required. We anticipate that grading, grubbing, and building permits will also be required. The location of the property is shown in Figure 1. Presently there are no buildings on the property; however, the owner plans to construct a single family residence after the revetment is completed.

100 90 80 70 60 50 40 30 20 10

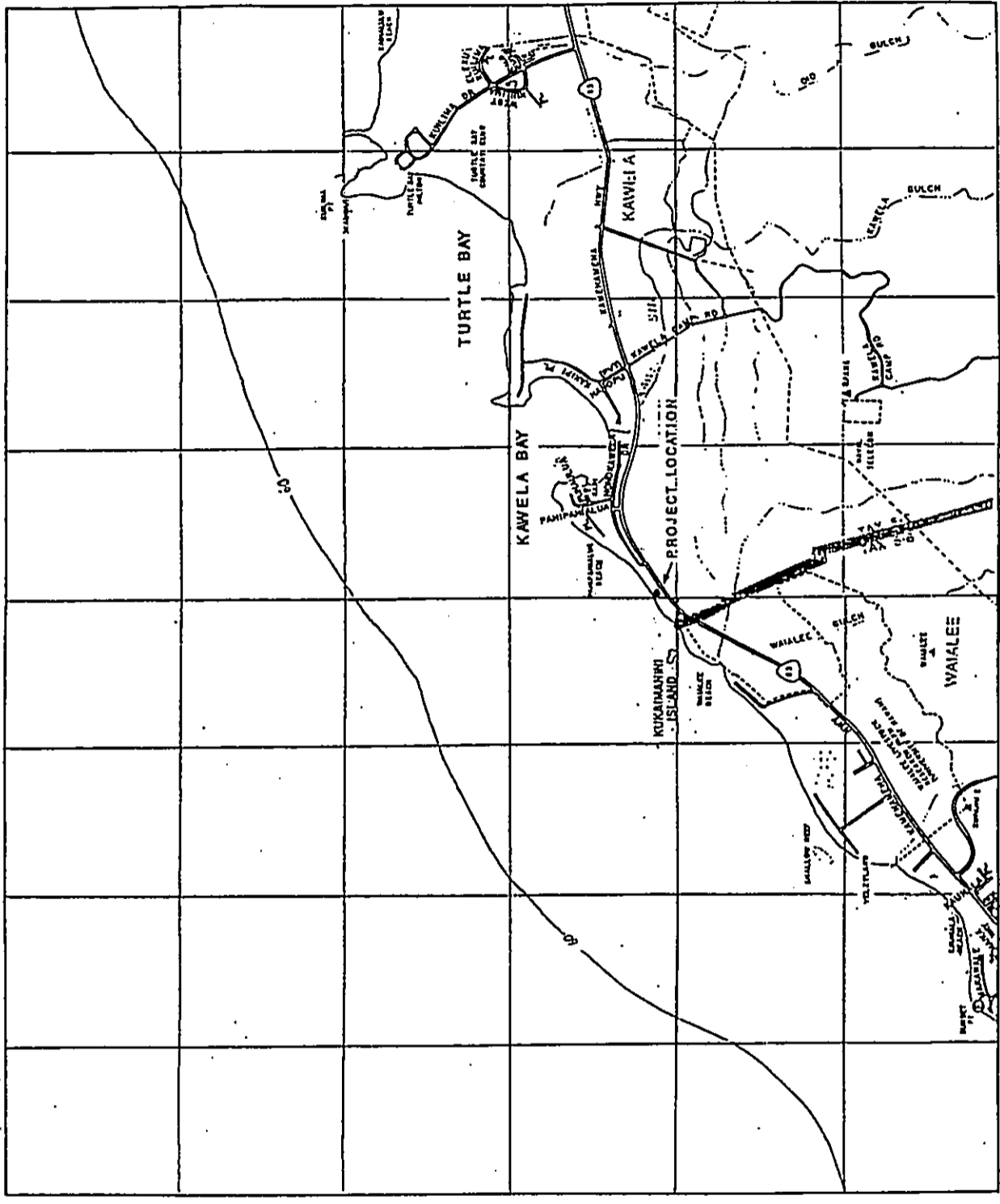


FIGURE 1. VICINITY MAP

B. TECHNICAL CHARACTERISTICS

Use Characteristics

The proposed revetment will replace an existing rubble structure that was constructed previously. Its use, as described above, is to mitigate erosion caused by a combination of high water levels and waves.

Physical Characteristics

A shoreline survey is included as Appendix B. Photographs taken in 1986 prior to installation of the existing revetment are shown in Figure 2. Photographs of the existing rubble structure are shown in Figure 3.

Shoreline Conditions

The rocky portion of the escarpment rises sharply to a height of approximately 8-10 feet; a grass covered earth embankment continues at a slightly lower slope to a height of 16-17 feet above sea level. A level sandy area extends approximately 12-14 feet seaward from the base of the escarpment. A level area of combined reef rock and beach rock continues approximately 44 feet farther seaward to the mean waterline. This rocky area forms a natural revetment fronting the property. Offshore, a fairly large sand channel moves directly seaward. This channel reaches a depth of 18 feet within 500 feet of the shoreline and drops to 30 feet about 1300 feet offshore. On either side of the channel, the depth is about 6 feet for a distance of 1500 feet offshore. The offshore bottom is primarily consolidated limestone with some coral, sand, and rubble.

This coastline has a history of erosion. Between 1949-1978 the vegetation line to the east of the property receded a net 4 feet and the waterline receded 2 feet. To the west at Waialeale Beach Park, the water line receded 27 feet and the vegetation 35 feet. Although the beach rock shoreline is by its nature resistant to erosion, the land behind the escarpment is mostly sand, and therefore subject to erosion. Severe erosion occurred prior to 1985 on the neighboring land parcels, and emergency shore protection was constructed.

Sediment transport occurs in two areas. In the narrow beach between the escarpment and the beach rock, sand is transported to the east parallel to the shoreline by water from wave runup over the beach rock. This transport is periodic and depends on high tide and wave conditions. Our investigations found that there is no beach that extends into the ocean at this location; the shoreline maintains a similar configuration in all seasons. In



NEIGHBORING PROPERTY ON THE EAST



NEIGHBORING PROPERTY ON THE WEST

FIGURE 2 SHORELINE CONDITION AT 57-521 KAM HIGHWAY
IN 1986 PRIOR TO CONSTRUCTION OF EXISTING REVETMENT



REVETMENT AND EMBANKMENT



VIEW OF COASTLINE TO THE EAST

FIGURE 3 EXISTING REVETMENT AT 57-521 KAM HIGHWAY
IN OCTOBER 1989

the offshore area, sediment appears to move seaward in the sand channel.

The water level depends on tide, wave setup, and storm surge due to wind and atmospheric pressure accompanying storms. Mean sea level is approximately two feet below the top of the reef rock fronting the property. The tidal range is about 2.2 feet. Wave setup for a 100-year hurricane is approximately 3.8 feet. Storm surge is estimated at 1-2 feet. A combination of high tide, storm surge, and setup from the 100-year maximum expected hurricane waves will raise the water level 4.8 feet above the reef rock shelf.

Runup on the existing shoreline is difficult to estimate because of the configuration of the shoreline and nearshore area. Calculations made using the methods presented in the Shore Protection Manual (SPM, 1984) give runup of about 7 feet for average significant wave height of 4.8 feet and over 20 feet for the maximum expected wave height of 28 feet. We believe that these numbers are somewhat high because the existing rubble escarpment is fronted by a flat area of sand and reef rock 56 feet wide. Some of the incident wave energy will be expended while traversing this area.

Structure Description

The proposed shore protection structure is a rubble revetment constructed of basalt or other dense rock. The revetment will occupy approximately the same space as the existing randomly placed rubble structure, but will incorporate filter layers, toe protection, and flank protection as appropriate to provide a more stable and effective structure. Two layers of armor stone will be placed (not randomly dumped) over a bedding layer of smaller stones on top of a layer of geotextile filter. A cross section design of the revetment is shown in Figure 4. The design specifications are given in Table 1. A plan view of the revetment and its position on the property is shown in Figure 5. A blueprint of construction plans stamped by a registered professional structural engineer is attached as Appendix C. The design parameters are discussed in the following paragraphs. The design calculations were made using procedures given by the Corps of Engineers' SPM.

The selected design wave is the 100-year maximum expected significant hurricane wave. The deep water wave height and period are 28 feet and 11.5 seconds respectively. This wave height and period are also similar to those of a 100-year trade wind wave. A 100-year wave has a probability of occurrence of once in 100 years.

The rise in water level at the site due to combined high tide, atmospheric pressure, and wave setup is 6.8 feet above MSL. The tidal range was determined from tide calendars. The wave setup was determined using procedures in the SPM. The water level becomes approximately 4.8 feet above the flat area fronting the revetment under high water conditions. The maximum sized wave that would break directly on the revetment in this water depth is 3.7 feet high.

The slope of the revetment is 1 vertical to 1.5 horizontal (1:1.5). This slope was selected because it meets the minimum recommended by the Corps of Engineers, and it fits the existing embankment on the property. A 1:2 slope would result in the loss of approximately seven feet of a lot that already is very narrow. We believe the 1:1.5 slope will be satisfactory because the revetment is located about 60 feet back from the waterline, which adds additional protection.

Hudson's formula (from SPM) is used with the 3.7 foot wave height to calculate the size of the armor layer stones. The size of the individual stones depends on the specific weight of the material. Table 1 gives the stone size that results from the calculations. Stone available in Hawaii is typically about 165 lbs/cu ft. Table 1 also shows the thickness of each layer and the approximate weight. The armor layer is two stones thick and weighs about 580 tons. The toe of the armor layer will be constructed of 2-3 ton stones that are part of the existing structure. Stones of this size will be stable on the reef rock foundation found at the site and should not move under design wave conditions. The bedding layer consists of graded stones with median weight greater than one-tenth of the armor layer stones. The bedding layer is at least two stones thick and weighs approximately 270 tons. Stones already in use at the site will be used to construct part of the revetment; however, additional material will have to be supplied. Approximately 200-250 tons of armor stone are available in the existing revetment.

A geotextile filter will be placed beneath the bedding layer to prevent the underlying material, mostly sand, from piping out through the structure. The toe of the filter will be held in place by a concrete "sandwich" (shown in Figure 4). This will prevent sand from moving under the filter out onto the reef rock shelf. The filter material must be strong enough to prevent puncture by the rocks. It also must have an equivalent mesh size small enough to prevent sand grains from leaking through even if the material is stretched. A nonwoven fabric, which is available from several manufacturers, is recommended.

Flank protection for the revetment is provided by butting against a similar structure on the neighbor's property on both sides. This will prevent erosion of materials around the ends of the revetment. Because the neighbors on both sides have revetments on their property, no erosion of these properties is expected to result from the proposed new revetment. Since this is a rubble structure that dissipates incident wave energy and is set back over 50 feet from the mean waterline, the structure is expected to have minimal adverse effect on sediment transport and shoreline configuration.

Wave runup under design 100-year storm conditions can be over 20 feet. The top of the embankment protected by the revetment is about 17 feet above MSL; therefore, this runup will overtop the proposed revetment. To mitigate damage from overtopping and from runoff resulting from spray or rain, a concrete apron is proposed for the top of the revetment. The apron will help to prevent scouring on the back side of the revetment. We do not anticipate that overtopping will be a problem under other than severe storm or high water conditions. Runup from the maximum expected average significant wave (4.8 feet wave height in deep water) will not reach the top of the revetment.

A stairway over the revetment is proposed to provide access to the beach for residents. (See Figure 6. and Appendix C) The design presented herein is preliminary and should not be used for construction. No structural analysis of this design has been done. This stairway should be redesigned and constructed only after the revetment is completed and the armor stones have had time to settle. It is not an integral part of the revetment structure. A steel structure with wood steps appears to be practical; however, this type of stairway will require periodic maintenance for corrosion. Other types of materials such as aluminum or wood may also be feasible.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

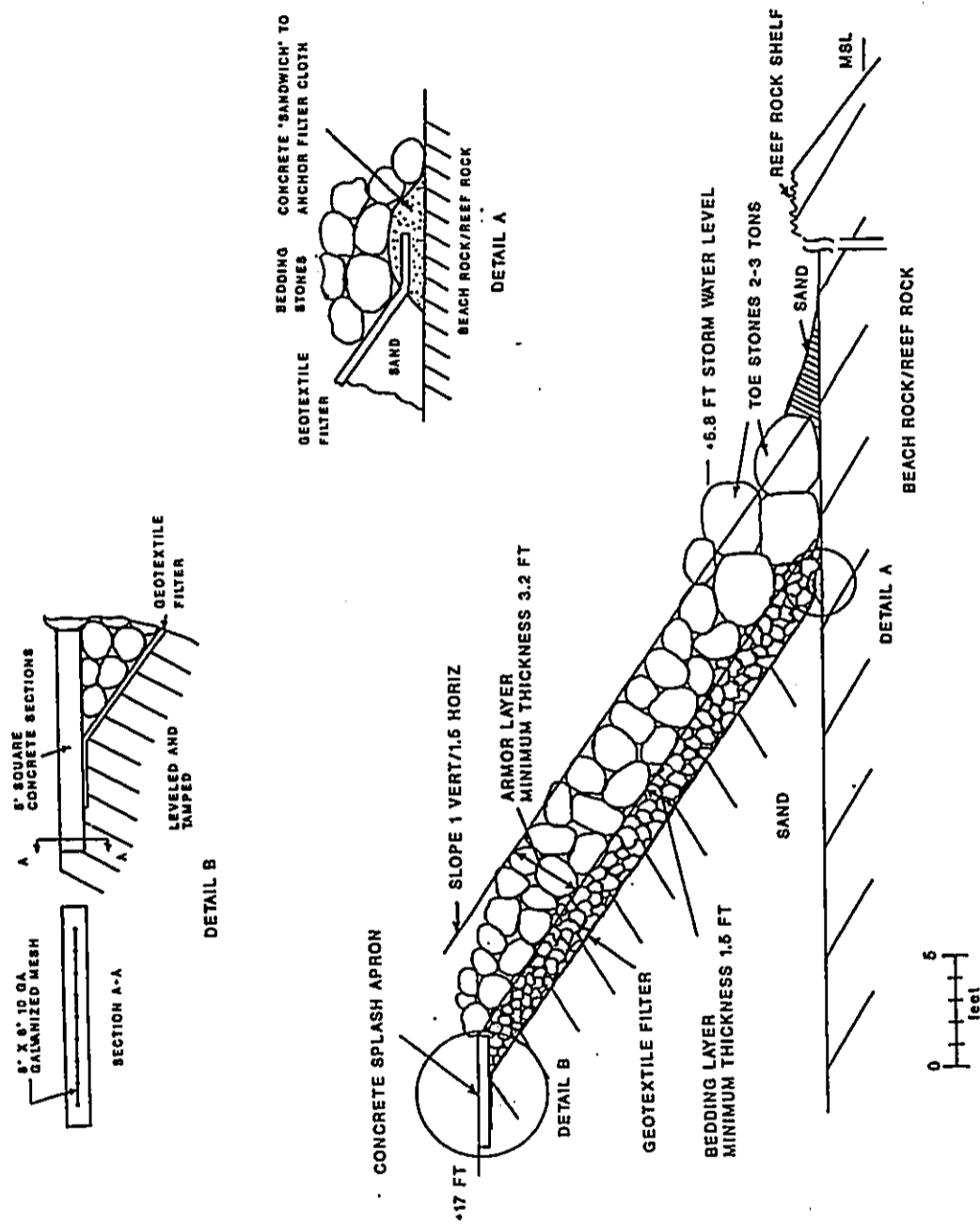


FIGURE 4. TYPICAL REVETMENT CROSS SECTION DESIGN

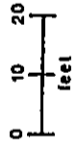
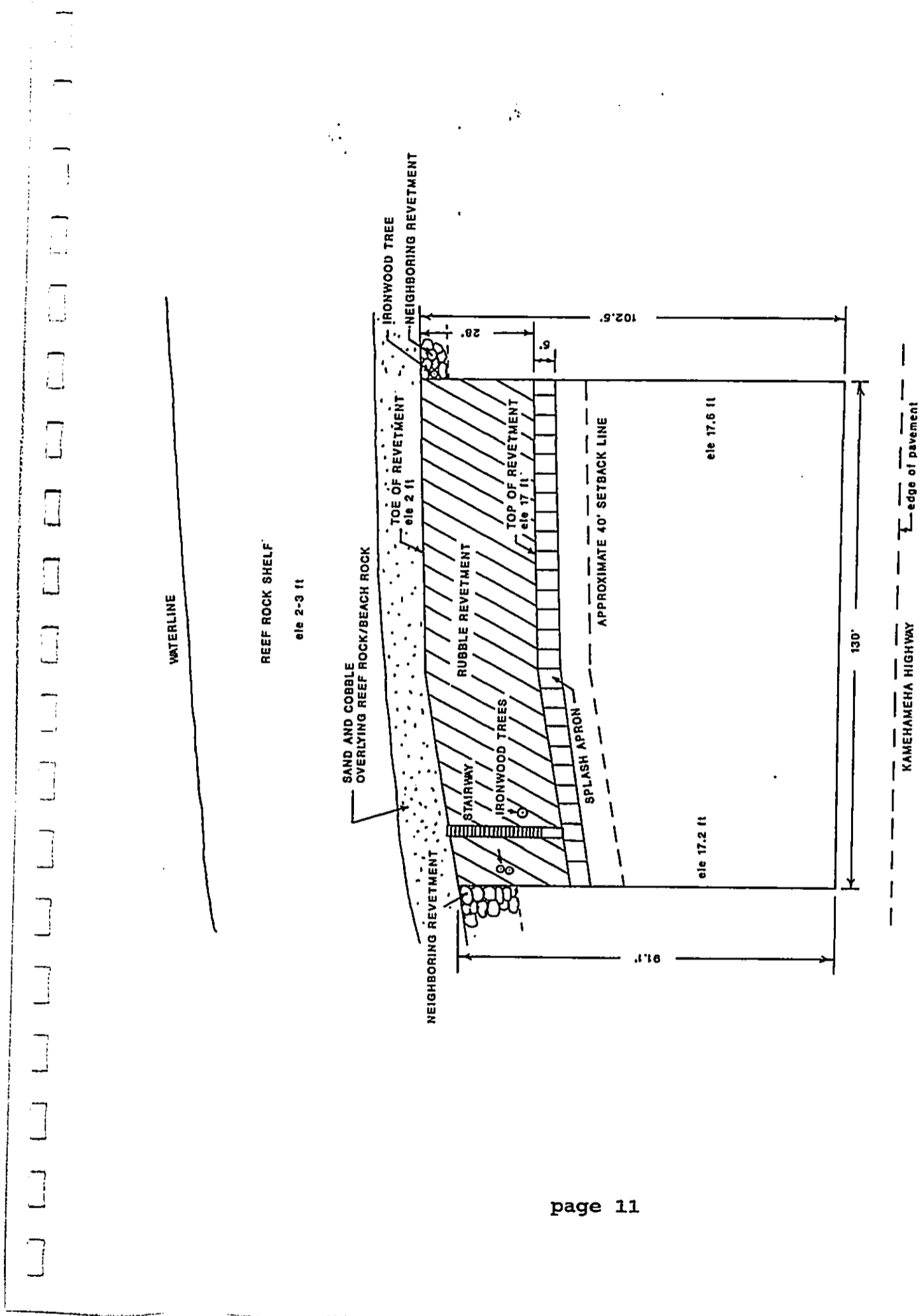


FIGURE 5. SITE AND REVETMENT PLAN VIEW

TABLE 1
REVETMENT DESIGN SPECIFICATIONS

TYPE: Rubble

SLOPE: 1 vertical to 1.5 horizontal

ARMOR LAYER:

Individual Stone Weight: 500-900 lbs
50% greater than 700 lbs
Toe Stones: 2-3 tons (existing at site)
Weight Density of Stone: 165 lbs/cu ft
Stone Type: Quarried or field stones
Minimum Layer Thickness: 3.2 feet
Approximate Layer Weight: 580 tons

BEDDING LAYER:

Stone Size: Spalls to 90 lbs
50% greater than 70 lbs
Not more than 10% greater than 90 lbs
Weight Density of Stone: 165 lbs/cu ft
Stone Type: Quarried or field stones
Minimum Layer Thickness: 1.5 feet
Approximate Layer Weight: 270 tons

FILTER:

Type: Nonwoven geotextile fabric
Minimum Unit Weight: 3.5 oz/sq yd
Maximum Equivalent Sieve Size: 0.2 mm
Toe Anchor System: Concrete sandwich at the toe (Fig. 4)
Strength: Must be resistant to abrasion, puncture, or burst
from loading of bedding layer stones

SPLASH APRON:

Material: Concrete, 2500 psi commercial mix
Dimensions: Five feet square by 6 inches thick slabs along
entire length of revetment
Reinforcing: Galvanized mesh, 6 inch x 6 inch/10 GA x 10 GA

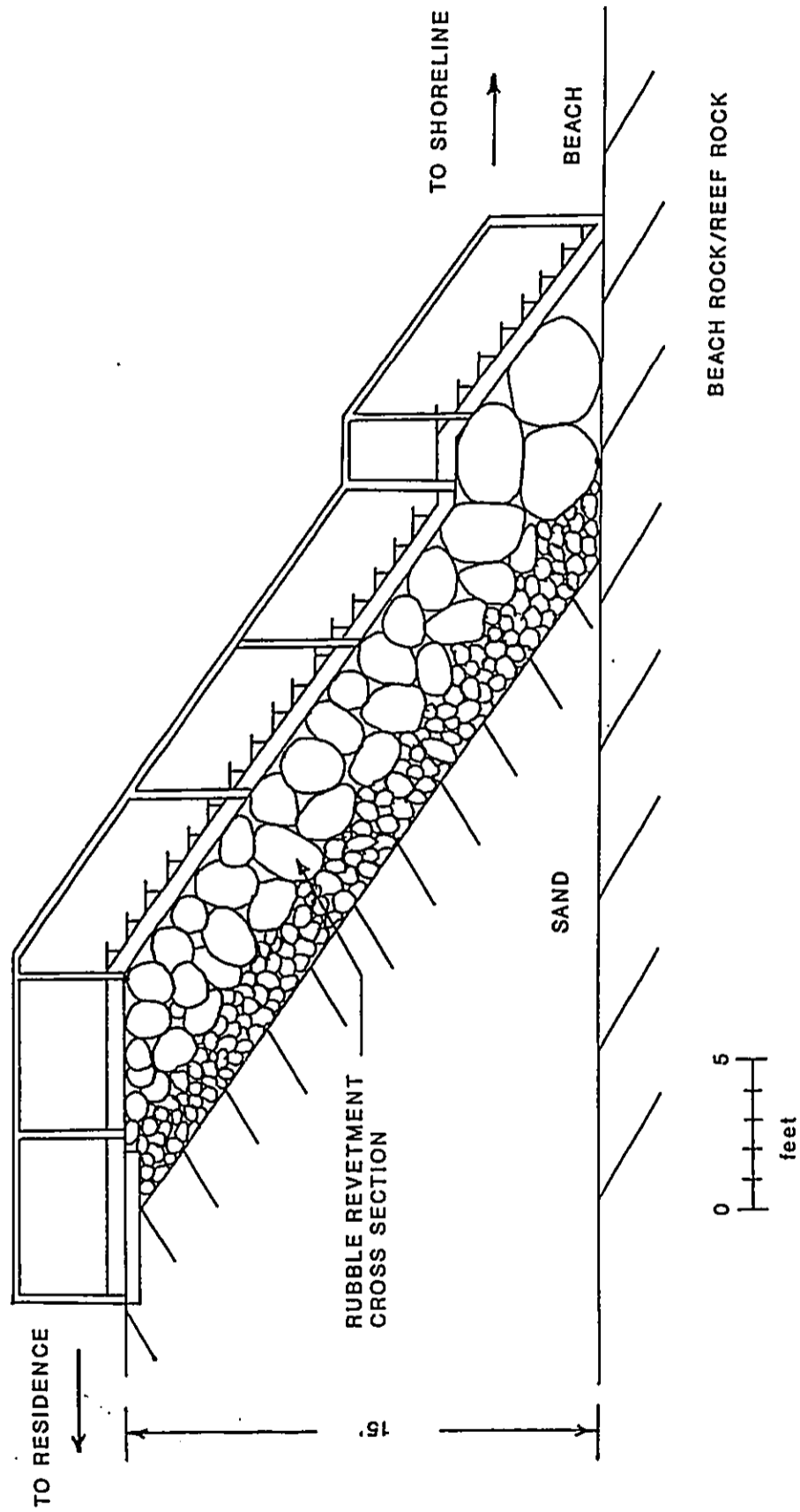


FIGURE 6. PRELIMINARY DESIGN OF STAIRWAY

III. AFFECTED ENVIRONMENT

A. AREA DESCRIPTION

The project is located on the north shore of Oahu just to the west of Kawela Bay on a strip of land approximately 100 feet wide between Kamehameha Highway and the shoreline. This area is zoned agriculture 2 (Ag 2) by the City and County of Honolulu. Private residences presently exist on either side of the site. The inland area is agricultural.

B. TSUNAMI AND FLOOD HAZARD

This area of the coastline is subject to tsunami inundation. The predicted tsunami water levels at a point 200 feet inland are given in Table 2. The flood elevation for a 100 year tsunami is high enough to flood the subject property. A tsunami inundation map is shown in Figure 7. Tsunami runup to an elevation of 10 feet was measured in 1952 at Waiale'e Beach west of the project site.

TABLE 2
PREDICTED WATER LEVEL FROM A TSUNAMI
AT A POINT 200 FEET INLAND

<u>RECURRENCE TIME, YEARS</u>	<u>HEIGHT, FT</u>
10	3.5
50	12.8
100	17.6

Ref: "Manual for Determining Tsunami Runup Profiles on Coastal Areas of Hawaii," U.S. Army Corps of Engineers, 1978.

C. OTHER ENVIRONMENTAL CONCERNS

The project site is located about 1500 feet east of Waiale'e Beach Park. The proposed revetment is not expected to have any affect on environmental conditions at the park. The shoreline in front of the revetment is presently accessible to people who walk from the park. This will not change. Since the revetment is below the level areas on the property, it will not block coastline views from the property or from surrounding areas.

The waters offshore are a habitat for the endangered green sea turtle (Chelonia mydas). These turtles are known to feed in neighboring Kawela Bay. We expect no adverse impact on the offshore environment or turtle habitat from the project.

No adverse impact is anticipated on the offshore reef, its inhabitants, its water quality, or fisheries.

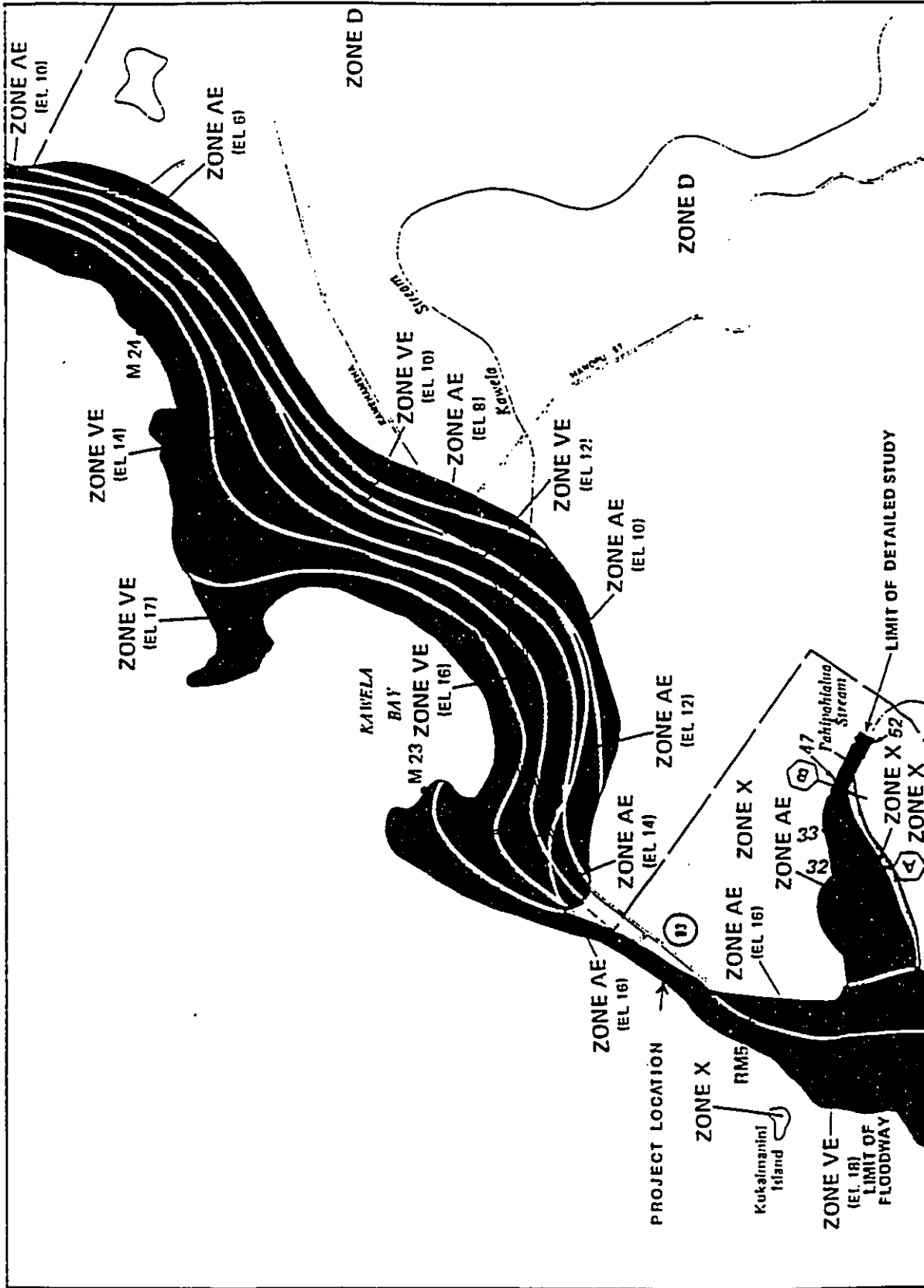


FIGURE 7. TSUNAMI INUNDATION MAP
(from FEMA Flood Insurance Rate Map)

IV. IMPACTS AND ALTERNATIVES

Although we foresee no negative impacts from removing the existing revetment and constructing a new one that is properly designed, there are two alternatives that were considered: (1) keep the existing structure, and (2) remove the existing structure and leave the property without shore protection.

Keep the Existing Structure

If the existing rubble revetment is left in place, an after-the-fact Shoreline Setback Variance is required. The existing revetment may satisfactorily prevent further erosion to the property; however, we do not know its design details and therefore cannot judge its stability under high water and high wave conditions. If the structure has been built with an insufficient filter system, material behind the rubble can be washed out causing the structure to collapse. Loss of property and a safety hazard would result. Unless the design can be verified and be proven adequate, we believe that keeping the existing revetment is not a viable alternative for the property owner. The property owner intends to build a private residence on the lot and desires a well designed, well constructed structure in which she has confidence.

Remove the Existing Structure

If the existing revetment is removed without replacement, the property would be subject to erosion as it was in the past. Substantial quantities of material would be washed into the ocean making the property unsuitable for constructing a residence. In addition the neighboring properties have revetments that would be subject to flanking erosion. We believe that this option would be viable only if no construction was permitted along the entire coastline between Kawela Bay and Waiale'e, and the shoreline could exist in a more natural configuration. Since the shoreline in this area has a continuous revetment fronting several properties, removal of one section of this revetment is considered unacceptable.

APPENDIX A
COPIES OF CORRESPONDENCE WITH DLU

Oceanit Coastal Corporation

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU

430 SOUTH KING STREET
 HONOLULU, HAWAII 96813 • (808) 523-4433



FRANK P. FASI
 MAYOR

JOHN P. WHALEN
 DIRECTOR

BENJAMIN B. LEE
 DEPUTY DIRECTOR

89/SV-1 (BWM)
 CERTIFIED MAIL

January 20, 1989

Mr. Kristopher Horvath
 1920 Ala Moana Boulevard #909
 Honolulu, Hawaii 96815

Dear Mr. Horvath:

Illegal Shoreline Protection Structure
 At Pahipahialua Beach, Oahu
57-521 Kamehameha Highway, Tax Map Key 5-7-05; 10

We have reviewed your July 8, 1988 request for an after-the fact emergency authorization for a shoreline protection structure built within the shoreline setback area on your property. Your request for an after-the-fact emergency authorization is DENIED. You are therefore ordered to remove the illegal seawall or apply for an after-the-fact Shoreline Setback Variance for the seawall on the shoreline portion of your property within six months of the date of this letter or face enforcement action by this department.

The response to your request was complicated by our investigation of the Kawela Kai Homeowner's Association and Mr. Richard A. McMahon's construction of a revetment adjacent to and in conjunction to the illegal work done on your property.

A review of your case reveals the following:

1. On February 11, 1985, the State Department of Land and Natural Resources (DLNR) issued an Emergency Authorization for a portion of your parcel (identified as Tax Map Key 5-7-5: 10 portion) "to replace soil and sand to the roots of ironwood trees," "to shield the area of refill with armor stones." and "to recover the stones with beach sand to preserve the appearance of the beach." However, DLNR's Emergency Authorization was directed primarily to Mr. Richard A. McMahon's property (Tax Map Key 5-7-91: 23 portion), with your property only peripherally involved.

Mr. Kristopher Horvath
Page 2
January 20, 1989

Photographs taken by the Department of Land Utilization (DLU) on February 27, 1987 reveal that this emergency work was done only on about one-sixth of the portion of your shoreline boundary adjacent to the McMahon property.

2. On June 12, 1986, the DLU issued you an emergency authorization to refill the washed out areas on your parcel (Tax Map Key 5-7-05: 10) within the shoreline setback area with imported sand.
3. The State Department of Land and Natural Resources (DLNR) issued an Emergency Authorization to the Kawela Kai Homeowner's Association on September 11, 1986 for the "placement of loose armor stone and sand seaward (makai) of the existing trees and vegetation," and to "fill/cover the exposed roots of the trees with sand." Your parcel, identified by Tax Map Key 5-7-05: 10 was included.
4. The DLU's Emergency Authorization issued upon the request of the Kawela Kai Homeowner's Association on November 19, 1986 covered only the parcels identified by Tax Map Keys 5-7-03: 62 and 5-7-05: 1-9. Your property was not included in this Emergency Authorization.
5. On September 23, 1987, Building Permits were issued for the construction of the emergency shoreline protection structures for the parcels identified by Tax Map Keys 5-7-05: 6, 7, 8, and 9. No Building Permit was issued for your parcel. Apparently, the work on your property was done illegally with the work on these adjacent parcels.
6. On April 13, 1988, a notice of violation was issued by the City Building Department for the construction of a seawall on your parcel without a Building Permit.
7. On-site inspection by the DLU on June 24, 1988 indicates that the shoreline protection structure on your parcel was not built to the standards specified in the Building Permits issued for the adjacent parcels identified by Tax Map Keys 5-7-05: 6, 7, 8, and 9. Further, the shoreline protection structure on your parcel does not appear to meet the minimum requirements for boulder size, slope, and underlayment required for a shoreline protection structure at Pahipahialua Beach as recommended by the U.S. Army Corps of Engineers. (See attachment.)

Mr. Kristopher Horvath
Page 3
January 20, 1989

Based on the foregoing, the Director of Land Utilization, in the consideration of your after-the-fact request for emergency authorization for the shoreline protection structure, has determined that your request for after-the-fact emergency authorization for a shoreline protection structure built on your property is not justifiable because of the following:

1. The Emergency Authorization issued by the State DLNR on February 11, 1985 was: a) clearly incidental to your parcel, b) involved only one-sixth of your shoreline frontage, and c) was substantially completed prior to the Kawela Kai Homeowner's Association request for emergency authorization to construct a shoreline protection structure on the parcels identified by Tax Map Keys 6, 7, 8, and 9.
2. The Emergency Authorization issued by the State DLNR on September 11, 1986 would only be valid for those parcels with a concurrent Emergency Authorization from the DLU. Your parcel was clearly not included with the Kawela Kai Homeowner's Association's request and was therefore consciously and purposely not included with DLU's Emergency Authorization.

You are therefore ordered to either (a) remove the illegal seawall within six (6) months of the date of this letter, or (b) submit an acceptable application for an after-the-fact Shoreline Setback Variance within six (6) months of the date of this letter. If you fail to remove the seawall or if you fail to file a Shoreline Setback Variance application within the specified time period, the City will take appropriate enforcement action.

A Shoreline Setback Variance application shall be considered acceptable only if it includes a complete application form, a full and complete Environmental Assessment, a hardship statement, a Certified Shoreline Survey, plan and cross-sectional drawings of the proposed structure, and the application filing fee. A Shoreline Setback Variance is not guaranteed, nor is it automatic; it may be granted only upon a finding of hardship or public interest and the structure's effect on natural shoreline processes.

You must declare your intention to either remove the illegal seawall or to apply for an after-the-fact Shoreline Setback Variance within thirty (30) days. Failure to respond within this time period will be interpreted as your intent not to agree to these conditions, and will result in enforcement action by this department.

04/18/89 17

Z 888 949 6862

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HN-31-89 TUE 14:48 Stanton Clayton Norma P. 05

Mr. Kristopher Horvath
Page 4
January 20, 1989

If you decide to submit an after-the-fact Shoreline Setback Variance application, the DLU staff is available to discuss with you the content requirements for the Environmental Assessment and the Shoreline Setback Variance application. Please call Bennett Mark of our staff at 527-5038.

Very truly yours,


JOHN P. WHALEN
Director of Land Utilization

JPW:fm
0324N

Attach: Exhibit "A", COE Design for Revetment

cc: DLNR
U.S. Army COE,
Operations Branch
Building Dept.
Ray W. Keuning, P.E.
Ray Spickler & Assoc.

Lu '06- 6430



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

November 6, 1986

REPLY TO
ATTENTION OF

Operations Branch

Mr. John P. Whalen
Director of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Reference is made to your letter to Colonel Jenks, whom I have replaced, concerning the proposed revetment of Pahipahialua Beach, Koolauloa, Oahu, of October 10, 1986. Comments are keyed to your questions on page 2 of your letter.

a. The proposal, sketched by the contractor, may result in failure of the rock structure due to migration of sand particles through the rocks placed along the shoreline when exposed to annual winter storms. We made a cursory analysis for possible alternative rock revetment, sloping at a 1 vertical to 1.5 horizontal slope using assumed conditions based on information contained in your attachments. This is shown on enclosure 1.

The 1946 tsunami height of about 19 feet occurred near Kawela Bay. As such, any stone protection works would not generally withstand wave forces of the magnitude that can be generated by tsunamis.

b. Effect on the beach, should the proposed steep rock placement be constructed, would be loss of sand over a very short period of wave activity due to the reflective nature of the "sea-wall". A flatter revetment slope may be less likely to affect the beach under normal sea conditions, especially where excavated sand is replaced along the seaward slope of the revetment, as depicted on the enclosed sketch.

Effects on the littoral process are unknown. Extensive, long-term monitoring studies would be required to determine littoral process effects.

Note:

Via form
necessarily
support a
design with a
slope of 1.5(H):1(V)
and would prefer
a lower slope
like 2:1. But,
as a minimum,
the COE's design
of a 1.5:1 slope
will be considered.

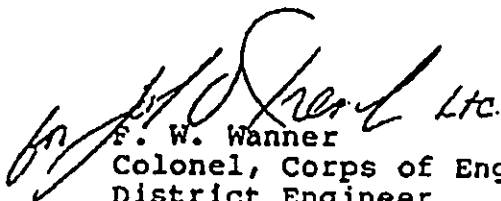
-2-

Public access along the beach would be affected should loss of beach sand result due to the steep revetment. A more gentle slope of say 2:1 (H to V) may mitigate this adversity.

c. The Corps of Engineers would not expend public funds for the construction of the revetment design as proposed by the private landowners. If the toe of the revetment is constructed above the mean high water elevation, a Department of the Army permit is not required. The design proposed by the private landowners would be at their own risk and its associated maintenance and repair costs. A modified revetment design with a slope of 1.5:1 or 2:1 may be less adverse on utility as well as functionality. Further, as presented in our "Help Yourself" publication (page 12) many structures along our shorelines have failed or continue to present maintenance problems (and costs) due to inadequate treatment of the structure toe and attention to prevent loss of fine materials through the revetment structure.

We highly recommend that competent professional services be retained to provide for shoreline protection measures adapted to this specific location.

Sincerely,


F. W. Wanner
Colonel, Corps of Engineers
District Engineer
Deputy

Enclosure

Copy Furnished: (w/Enclosure)

Mr. S. E. Cole
Rohm an IBM Company
1240 Ala Moana Boulevard
Honolulu, Hawaii 96814.

U. S. ARMY ENGINEER DIVISION, PACIFIC OCEAN
CORPS OF ENGINEERS

PROJECT TITLE	<i>Pahipahialua Beach</i>	BH NO.	<i>1</i>	OF	<i>2</i>	SHS
LOCATION	<i>Koolauloa, Oahu</i>	SECTION				
DRAWING(S) NO.	<i>TAK-5-7-03 & 5-7-05</i>					
COMPUTED BY	<i>HN</i>	DATE	<i>10/6/86</i>	CHECKED BY		
<small>HENRY NAKASHIMA 43F-1907</small>						

DESIGN ANALYSIS

Reference: *Edo letter Oct 10, 1986 "Proposed Piled Boulder Retention" with enclosure and surveys attached.*

ASSUMPTIONS: *Surveys @ MSL DATUM
Coral reef rock @ 0 MSL (indicated in ref)
Sandy existing shoreline (" " " ")
" Eroded stable bottom @ 0 MSL*

CURSORY ANALYSIS:

Exposure is N-NW - LARGE WINTER STORMS

USE Estimated tide 2 feet

*Surge of 3 feet up
Still water level 5 feet above 0 MSL.*

USE $m = 0.0$ - flat reef seaward of proposed

*$H_b = 0.78 d_s$ with $d_b = 5$ @ 0 reef elev. ^{retention}
 $= 3.8$ feet - wave height @ structure toe.
*USE 4 feet.**

Armor Stone Size USING CERC Stone Protection Manual.

Assume: rock @ 150 lb/cft

$K_D = 2.0$ 2 layer rock.

$C_{dr} = 1.5$ (recta shape)

$W = 4500$ lbs. -

USE 1.5 tons to 2 tons

2 stones thick - 6 ft

*Underlayer assume 24 to 100 # to percent
Use of Filter cloth for
"bedding"*

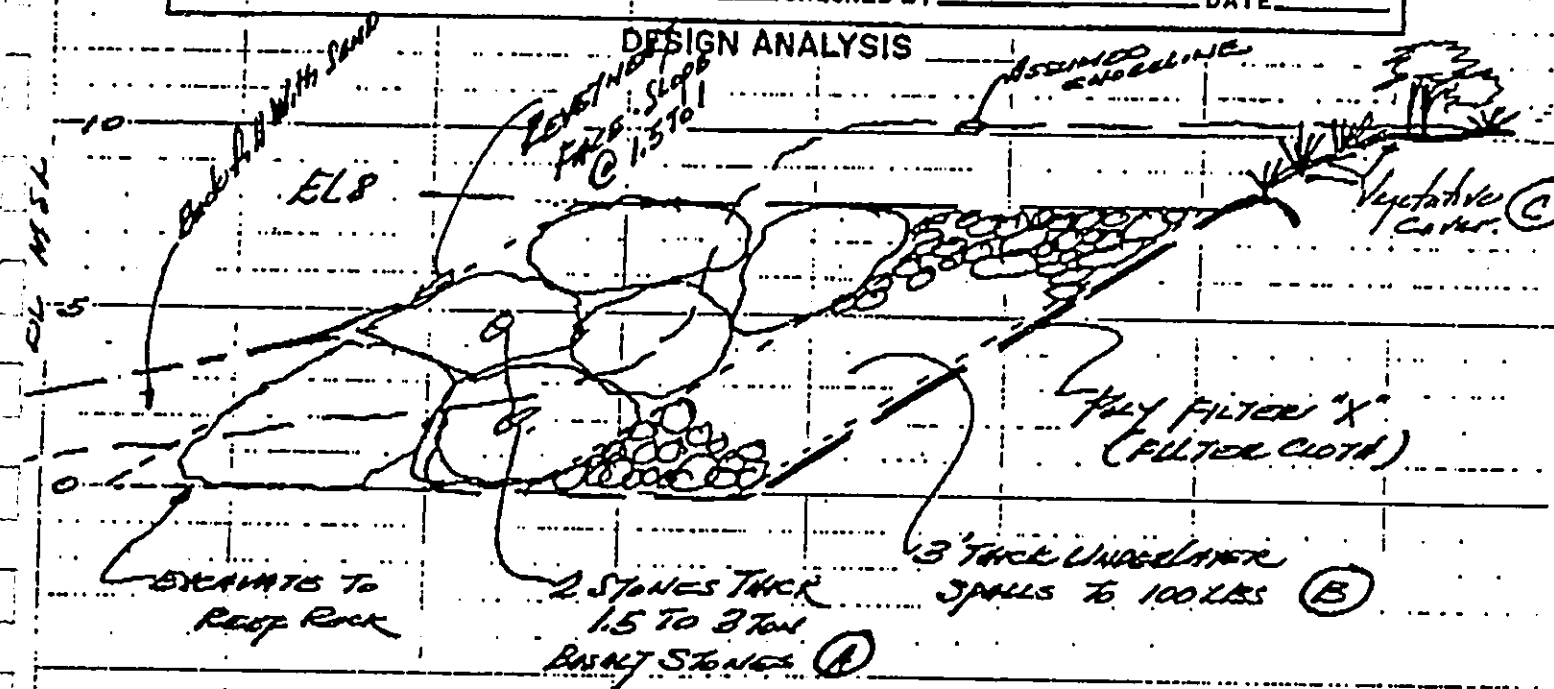
ASSUME e/H_b (even wave height) = 1.2

Computed crest elev = $R + SWL = 10$ ELEV

U.S. ARMY ENGINEER DIVISION, PACIFIC OCEAN
CORPS OF ENGINEERS

PROJECT TITLE <u>PANIPANIALLA BEACH</u>	SH NO. <u>2</u>	OF <u>2</u>	SHS
LOCATION <u>Koolauloa, Oahu</u>	SECTION _____		
DRAWING(S) NO. _____	DATE _____		
COMPUTED BY <u>DM</u>	DATE <u>10/16/86</u>	CHECKED BY _____	DATE _____

DESIGN ANALYSIS



APPROXIMATE VOLUMES PER 100 FEET OF SLOPELINE

- (A) 1.5 TO 3 TON STONES
 $(8' \times 12') \times 6' \times \frac{100'}{27} = 320 \text{ c.y.}$
- (B) UNDERLAYER $\frac{1}{2}$ OF A = 160 c.y.
- (C) VEGETATIVE COVER ~ SALT TOLERANT VINES, SHRUBS, etc.



Oceanit Coastal Corporation
coastal engineering services

A subsidiary of Oceanit Laboratories, Inc.

July 11, 1989

Attn: Mr. Bennett Mark
Mr. John P. Whalen
Director of Land Utilization
Department of Land Utilization
City and County of Honolulu
Honolulu, HI 96813

Subject: 57-521 Kamehameha Hwy
Tax Map Key 5-7-05:10
Illegal Shoreline Protection Structure
at Pahipahialua Beach, Oahu

Dear Mr. Whalen,

The owner of the waterfront property at 57-521 Kamehameha Hwy (Tax Map Key 5-7-05:10) has engaged us to provide shoreline setback variance (SSV) and environmental assessment (EA) services to assist in rectifying permit violations and to obtain permits to construct a shore protection structure.

As a result, we request that you postpone processing any action regarding violations of the land owner (January 20, 1989 letter) until we complete our studies. We should be finished by the end of this year.

Please call me if you have any questions or concerns.

Thank you.

Sincerely,

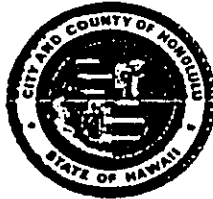
Patrick K. Sullivan, Ph.D.
President

PKS:cm
32/10711bm.dlu

cc: Dr. Pohlson, Property Owner

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432



FRANK F. FASI
MAYOR

JOHN P. WHALEN
DIRECTOR

BENJAMIN B. LEE
DEPUTY DIRECTOR

89/SV-1 (BWM)

August 21, 1989

Mr. Patrick K. Sullivan, Ph.D
President
Oceanit Coastal Corporation
Century Square
1188 Bishop Square, Suite 2512
Honolulu, Hawaii 96813

Dear Dr. Sullivan:

Illegal Shoreline Protection Structure
at Pahipahialua Beach
57-521 Kamehameha Highway, Kawela, Koolauloa
Tax Map Key 5-7-05: 10

Thank you for your letter of July 11, 1989. You have indicated that the new owner of the property has (1) hired you to prepare the Environmental Assessment (EA) and the Shoreline Setback Variance (SV) application for a shoreline protection structure on the property in question, and (2) requested an extension to the time limit in which compliance to the Department of Land Utilization (DLU) Order of January 20, 1989 is required. As you are aware, DLU's January 20, 1989 Order required the owner to either (a) remove the illegal seawall by July 20, 1989, or (b) submit an acceptable SV application by July 20, 1989.

Your request for an extension to this deadline to the end of this year is granted. The DLU's Order of January 20, 1989 is hereby modified to read as follows:

"You are therefore ordered to either (a) remove the illegal seawall by December 29, 1989, or (b) submit an acceptable application for an after-the-fact Shoreline Setback Variance by December 29, 1989. If you fail to remove the seawall or if you fail to file a Shoreline Setback Variance application by December 29, 1989, the City will take appropriate enforcement action."

Mr. Patrick K. Sullivan, Ph.D
Page 2

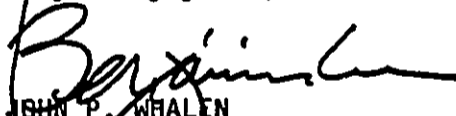
"A Shoreline Setback Variance application shall be considered acceptable only if it includes a complete application form, a full and complete Environmental Assessment, a hardship statement, a Certified Shoreline Survey, plan and cross-sectional drawings of the proposed structure, and the application filing fee. A Shoreline Setback Variance is not guaranteed, nor is it automatic; it may be granted only upon a finding of hardship or public interest and the structure's effect on natural shoreline processes.

"You must declare your intention to either remove the illegal seawall or to apply for an after-the-fact Shoreline Setback Variance within thirty (30) days of the modified Order. Failure to respond within this time period will be interpreted as your intent not to agree to these conditions, and will result in enforcement action by this department."

This extension to the time deadline is based on our assumption that you are authorized to act as agent on behalf of the owner. For this modification to be valid, you must provide documentation that this is so. Our staff's discussion with you indicated that your role may be limited to only preparing the EA and SV application. If this is the case, please have the owner submit the request for the extension.

If you have any questions regarding this letter, or with the processing of an after-the-fact Shoreline Setback Variance, please call Bennett Mark of our staff at 527-5038.

Very truly yours,


JOHN P. WHALEN
Director of Land Utilization

JPW:s1
0335N/14-15

cc: DLNR
COE
Building Dept.,
Attn: Michael Bird
Ray W. Keuning
Ray Spickler & Associates
Check F. Yu
Steven M. Cohen, Caldwell Banker



Oceanit Coastal Corporation

coastal engineering services

A subsidiary of Oceanit Laboratories, Inc.

September 8, 1989

Attn: Mr. Bennett Mark
Mr. John P. Whalen
Director of Land Utilization
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Subject: 57-521 Kamehameha Hwy, Tax Map Key 5-7-05:10
Illegal shoreline protection structure
at Pahipahialua Beach, Oahu
Response to DLU letter dated August 21, 1989

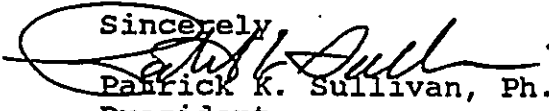
Dear Mr. Whalen,

As the authorized agent of Dr. Pohlson, owner of the property at Tax Map Key 5-7-05:10, for coastal engineering matters at the referenced property; we would like to respond to your letter dated August 21, 1989 requesting that we declare our intention with regard to the referenced illegal shoreline protection structure.

We are presently preparing an environmental assessment (EA) for the referenced structure. Our intention is that the EA and other documentation will be used in application for an after-the-fact Shoreline Setback Variance (SSV). Until we complete our investigations we cannot commit to any specific action. However, depending on the results of our investigations and subsequent design criteria we may need to modify the existing shoreline protection structure (including total or partial removal/replacement).

Please call me if you have any questions or concerns.

Sincerely,


Patrick K. Sullivan, Ph.D.
President

PKS:hk

cc: Dr. Pohlson, Property Owner

Century Square 1188 Bishop Street, Suite 2512, Honolulu, Hawaii 96813
TELEX: 7431404 MCI: OCEANIT Ph: (808) 531-3017 FAX: (808) 526-1519

DR. ELIZABETH C. POHLSON
C/O KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
1319 Punahoe Street, Suite 1140
Honolulu, Hawaii 96826

September 8, 1989

Attn: Mr. Bennett Mark
Mr. John P. Whalen
Director of Land Utilization
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Subject: 57-521 Kamehameha Hwy, Tax Map Key 5-7-05:10
Illegal shoreline protection structure
at Pahipahialua Beach, Oahu
Authorization to act as agent

Dear Mr. Whalen,

As the owner of property at 57-521 Kamehameha Hwy, Tax Map Key 5-7-05:10 at Pahipahialua Beach, Oahu, I hereby authorize Oceanit Coastal Corporation to act as agent for coastal engineering matters concerning the illegal shoreline protection structure.

If you have any questions, please call me at 942-9595.

Thanks.

Sincerely,



Elizabeth C. Pohlson, M.D.
Property Owner

cc: Dr. Sullivan, OCC



Oceanit Coastal Corporation

coastal engineering services

A subsidiary of Oceanit Laboratories, Inc.

December 21, 1989

Mr. John Whalen, Director
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Subject: Shoreline Setback Variance for a Shore Protection
Structure at 57-521 Kamehameha Highway, TMK
5-7-05: 10

Dear Mr. Whalen,

Oceanit Coastal Corporation (OCC), as agent for Elizabeth Pohlson, M.D., is applying for a Shoreline Setback Variance (SSV) to construct a shore protection structure on property at 57-521 Kamehameha Highway on the North Shore of Oahu. The property contains a pre-existing, nonconforming revetment, and the previous owner was directed to either remove the structure or apply for an after-the-fact SSV by December 29, 1989.


For various reasons discussed in the attached Environmental Assessment, we have recommended to Dr. Pohlson that she remove the existing, nonconforming revetment and replace it with a properly designed and constructed revetment. To this end we have made a preliminary design of a revetment and an environmental assessment of the project. At this time we are arranging to have the shoreline surveyed, and we are having our structural engineer review the revetment design. When these two tasks are finished, a completed SSV application will be submitted to your department. We estimate these two tasks will require 2-3 more months. As a result we request a three month extension of the submission deadline to March 31, 1990.

We are requesting a variance from Rule 13.3 Structure Not Permitted of the "Shoreline Setback Rules and Regulations of the City and County of Honolulu." We believe that if our client is not permitted to construct a shore protection structure, her property will be subject to severe erosion and will not be suitable for constructing a single family residence, as she plans to do.

Century Square 1188 Bishop Street, Suite 2512, Honolulu, Hawaii 96813
TELEX: 7431404 MCI: OCEANIT Ph: (808) 531-3017 FAX: (808) 526-1519

Per our telephone conversations with Mr. Bennett Mark, we have enclosed our environmental assessment and preliminary revetment design for your review. These documents show our progress on the application. We would appreciate any comments from staff. Please feel free to contact me or Dr. Warren Bucher at any time to discuss our application further. Thank you for your assistance.

Sincerely,

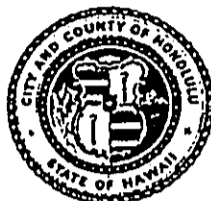


Patrick K. Sullivan, Ph.D.
President

Enclosure

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432



FRANK F. FASI
MAYOR

DONALD A. CLEGG

XXXXXXXXXXXX

DIRECTOR

LORETTA K.C. Chee

XXXXXXXXXXXX

DEPUTY DIRECTOR

89/SV-1

January 16, 1990

Mr. Patrick K. Sullivan, Ph.D
President
Oceanit Coastal Corporation
Century Square
1188 Bishop Street, Suite 2512
Honolulu, Hawaii 96813

Dear Dr. Sullivan:

Illegal Shoreline Protection Structure
at Pahipahialua Beach
57-521 Kamehameha Highway
Kawela, Koolauloa; Tax Map Key 5-7-05: 10

Thank you for your letter of December 21, 1989, with which you have included a preliminary design of a revetment and an environmental assessment for the project. We have made a cursory review of your preliminary design and environmental assessment. These documents appear to be generally acceptable for the purpose of applying for a shoreline setback variance. We may have further comments for you once you submit your final design and environmental assessments.

You have requested an extension of the deadline to March 31, 1990 for you to submit a shoreline setback variance application. You have requested this in order for you to have the shoreline surveyed, and to have a structural engineer review the revetment design. Your request for an extension to March 31, 1990 is GRANTED. The DLU's order of January 20, 1989, as modified on August 21, 1989, is hereby modified to read as follows:

"You are therefore ordered to either (a) remove the illegal seawall by March 31, 1990, or (b) submit an acceptable application for an after-the-fact Shoreline Setback Variance by March 31, 1990. If you fail to remove the seawall or if you fail to file a Shoreline Setback Variance application by March 31, 1990, the City will take appropriate enforcement action.

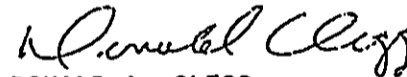
Mr. Patrick K. Sullivan, Ph.D
Page 2

"A Shoreline Setback Variance application shall be considered acceptable only if it includes a complete application form, a full and complete Environmental Assessment, a hardship statement, a Shoreline Survey, plan and cross-sectional drawings of the proposed structure, and the application filing fee. A Shoreline Setback Variance is not guaranteed, nor is it automatic; it may be granted only upon a finding of hardship or public interest and the structure's effect on natural shoreline processes.

This extension is being made because you have demonstrated (by your submittals to date) that you and your client are working diligently toward rectifying this situation by applying for a shoreline setback variance. You will note that we are not requiring a Department of Land and Natural Resources (DLNR) Certified Shoreline Survey as a prerequisite to our acceptance of your shoreline variance application. It is the DLU's policy to request that the DLNR withhold issuance of shoreline certifications whenever the shoreline area contains illegal structures. However, we do recommend that you consult with the DLNR to ascertain if the DLNR would be willing to certify the shoreline at the toe of your proposed revetment.

If you have any questions regarding this letter, or with the processing of your Shoreline Setback Variance, please call Bennett Mark of our staff at 527-5038.

Very truly yours,



DONALD A. CLEGG
Director of Land Utilization

DAC:s1
0335N/5-6

cc: DLNR
COE
Bldg Dept, Attn: Gary Sukita

APPENDIX B
SHORELINE SURVEY

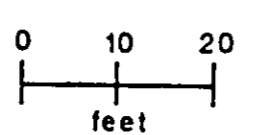
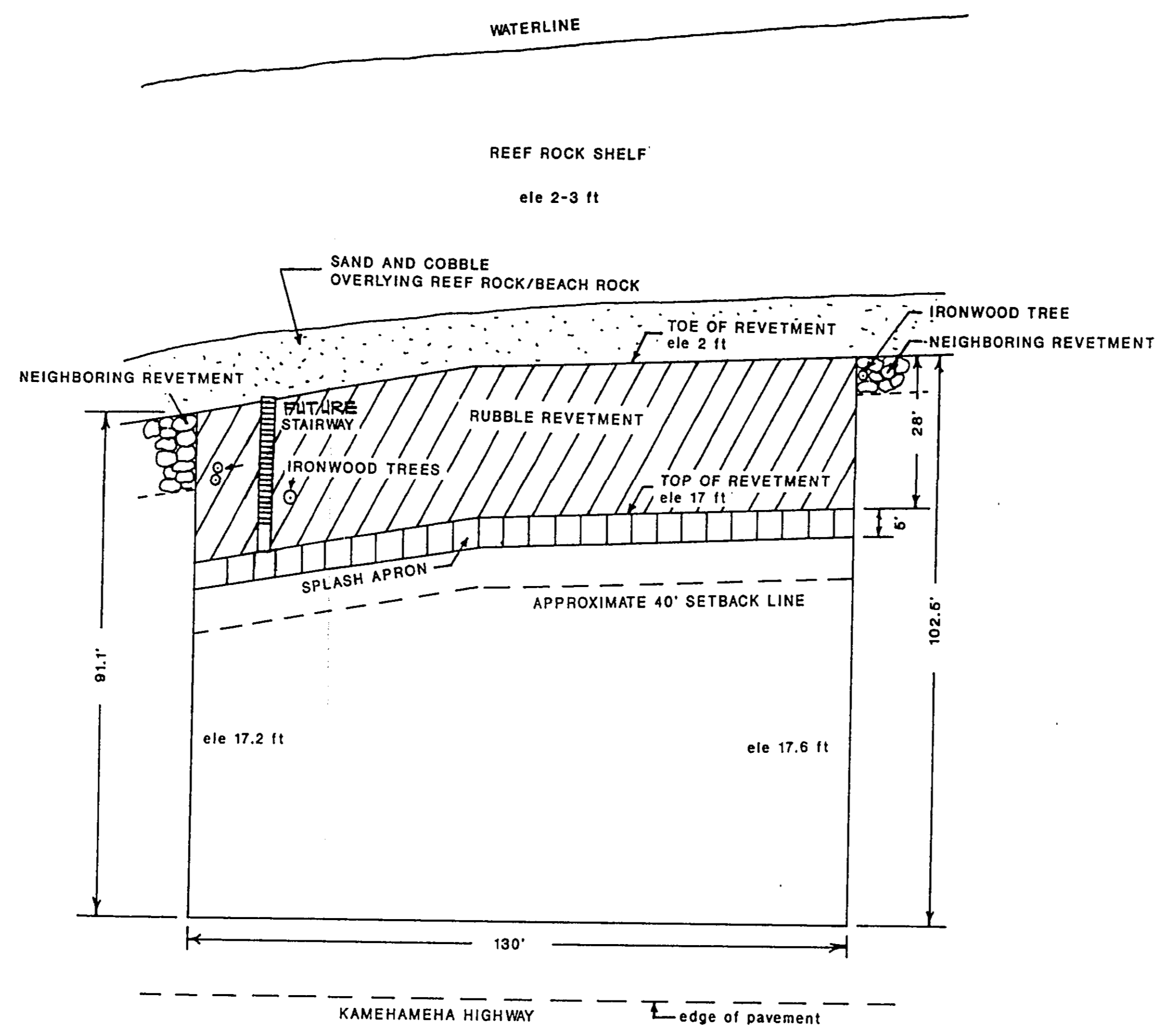
APPENDIX C
DESIGN DRAWINGS

Oceanit Coastal Corporation

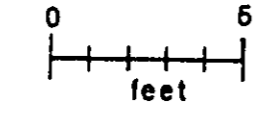
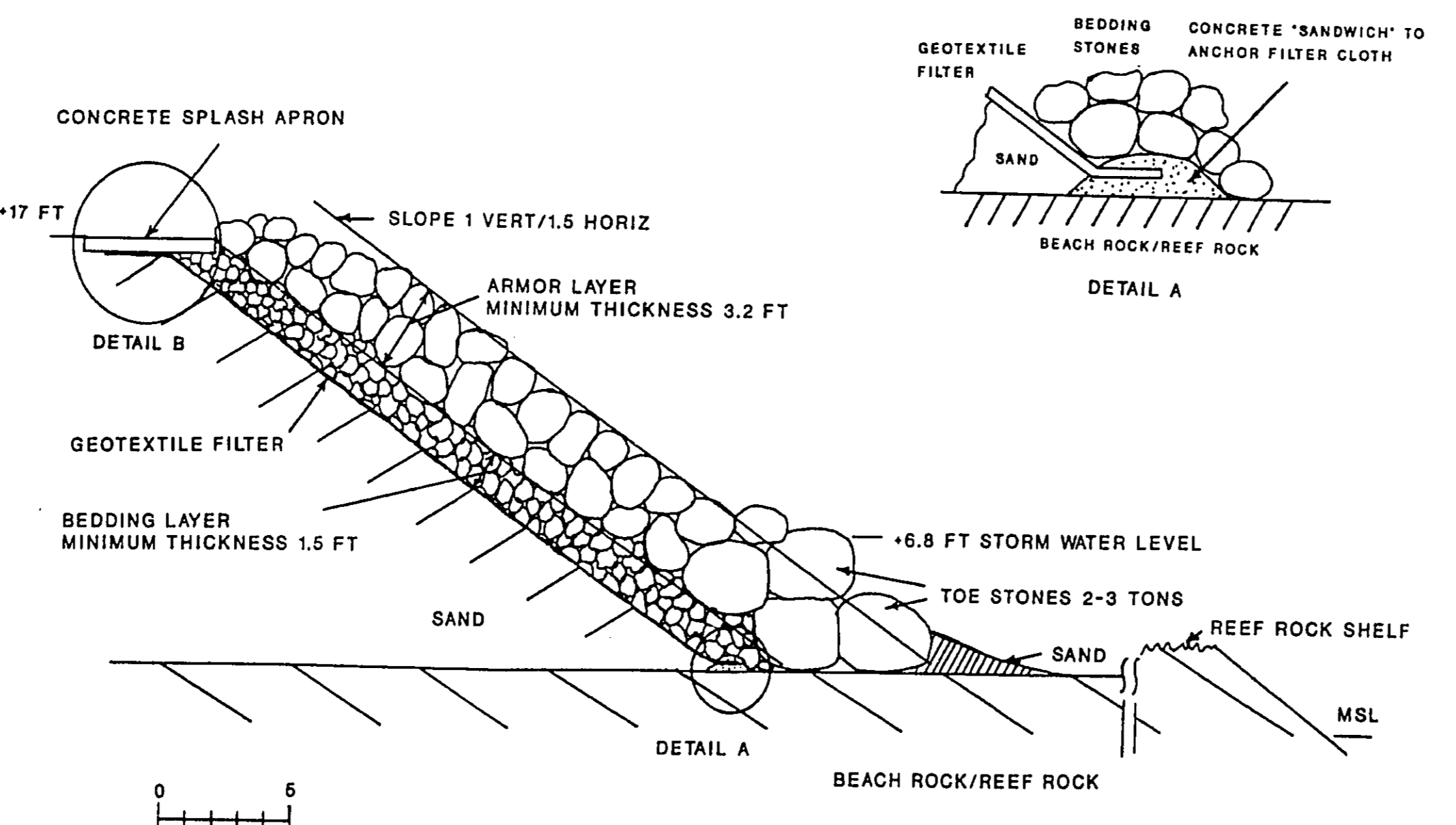
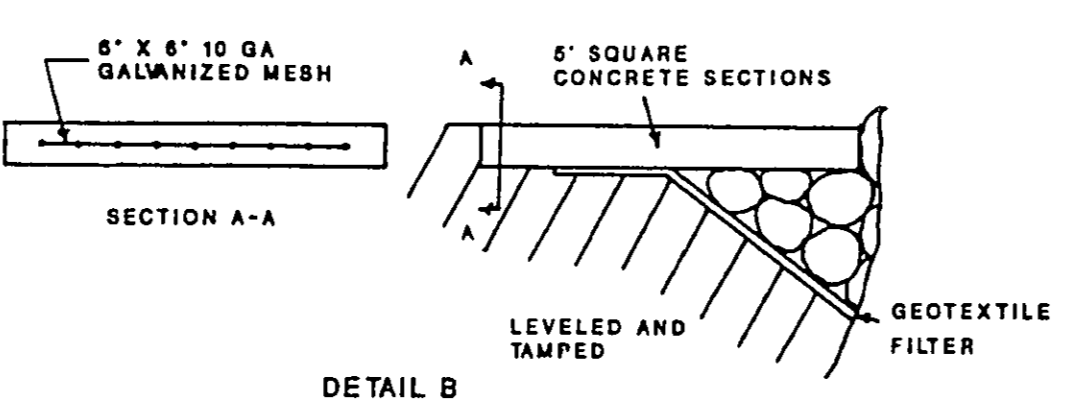
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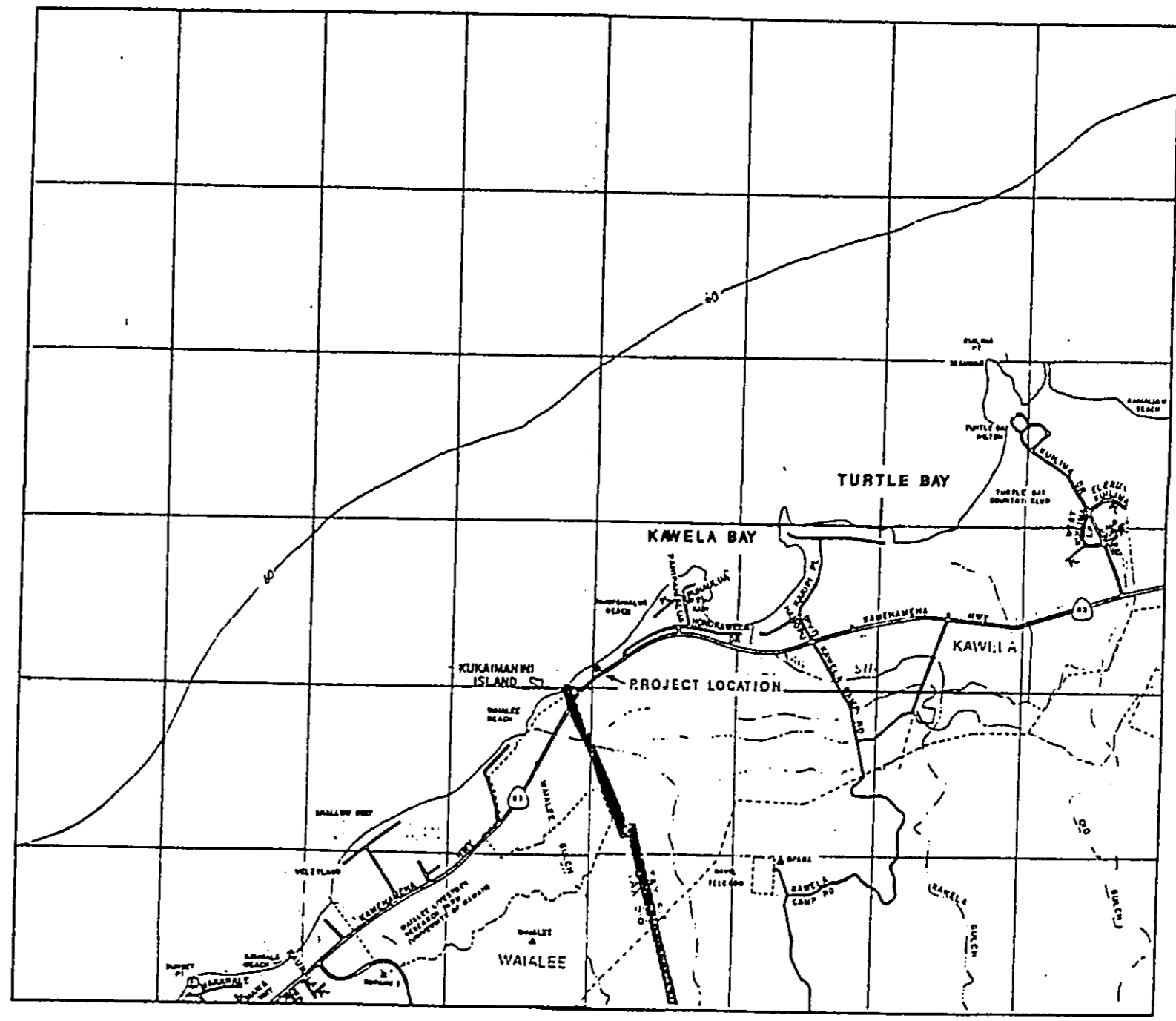
'90 APR 10 PM 2 56
 STATE OF HAWAII
 DEPARTMENT OF LAND AND NATURAL RESOURCES



SITE PLAN



TYPICAL CROSS SECTION

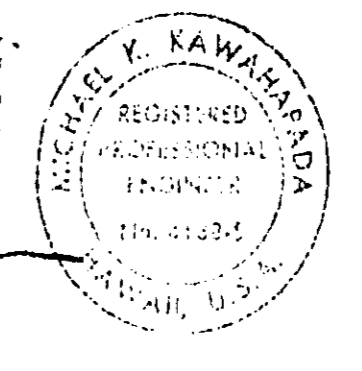


VICINITY MAP

NOTES:

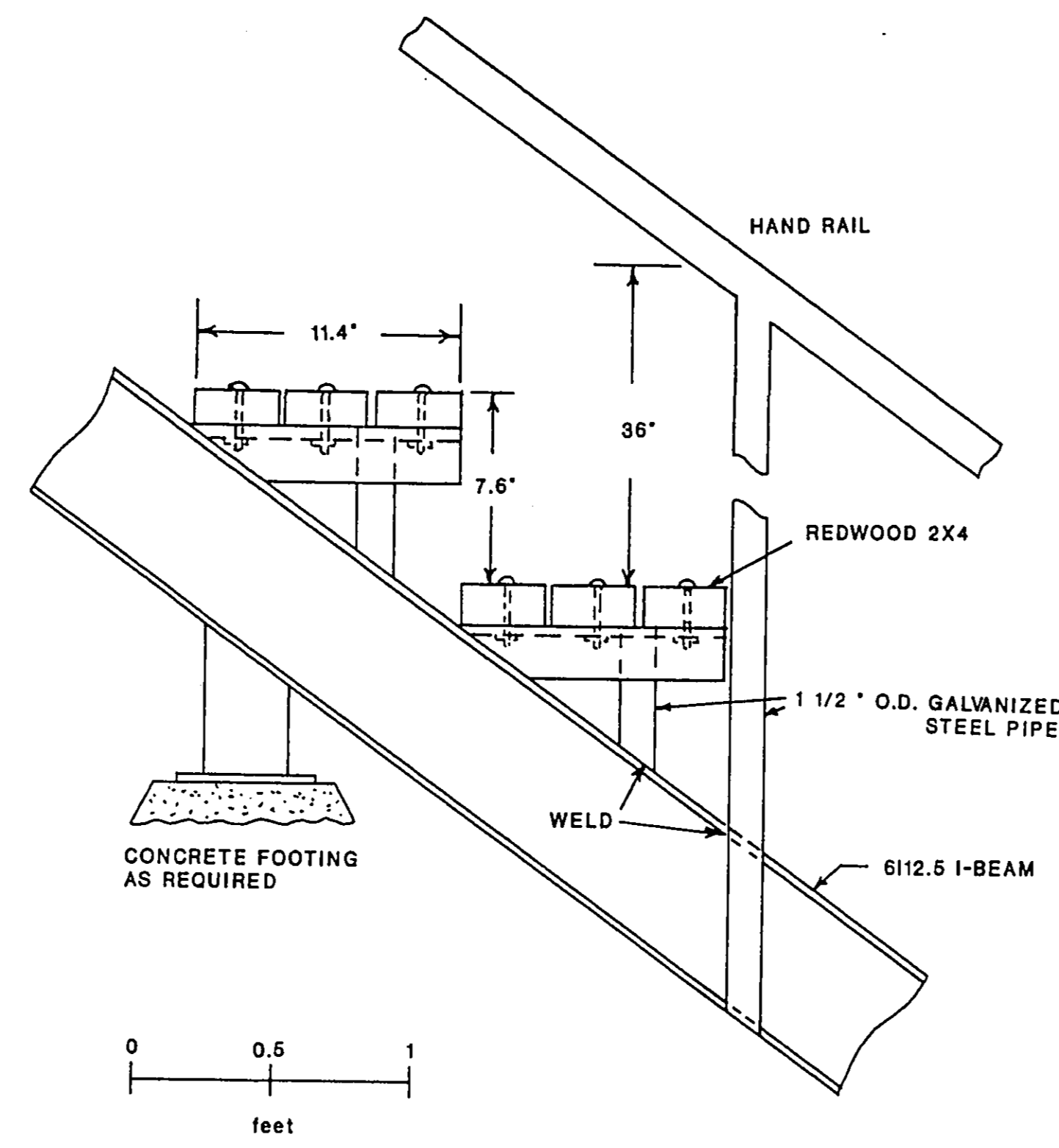
1. REVETMENT SPECIFICATIONS GIVEN ON SEPARATE SHEET.
2. SPLASH APRON SPECIFICATIONS GIVEN ON SEPARATE SHEET.
3. GEOTEXTILE FILTER SPECIFICATIONS GIVEN ON SEPARATE SHEET.
4. TOE STONES REST ON HARD BEACH ROCK SUBSTRATE.
5. IRONWOOD TREES WILL BE PRESERVED.
6. ELEVATIONS APPROXIMATE AND REFERRED TO MEAN SEA LEVEL.
7. LOCATION OF STAIRWAY IS OPTIONAL. STAIRWAY WILL BE CONSTRUCTED OF WOOD AND STEEL AND WILL BE INSTALLED AFTER REVETMENT IS CONSTRUCTED.

This work was prepared for me or under my supervision and control and I am a duly licensed Professional Engineer in the State of Hawaii. I am a member of the State Board of Professional Engineers, Architects and Surveyors of the State of Hawaii.

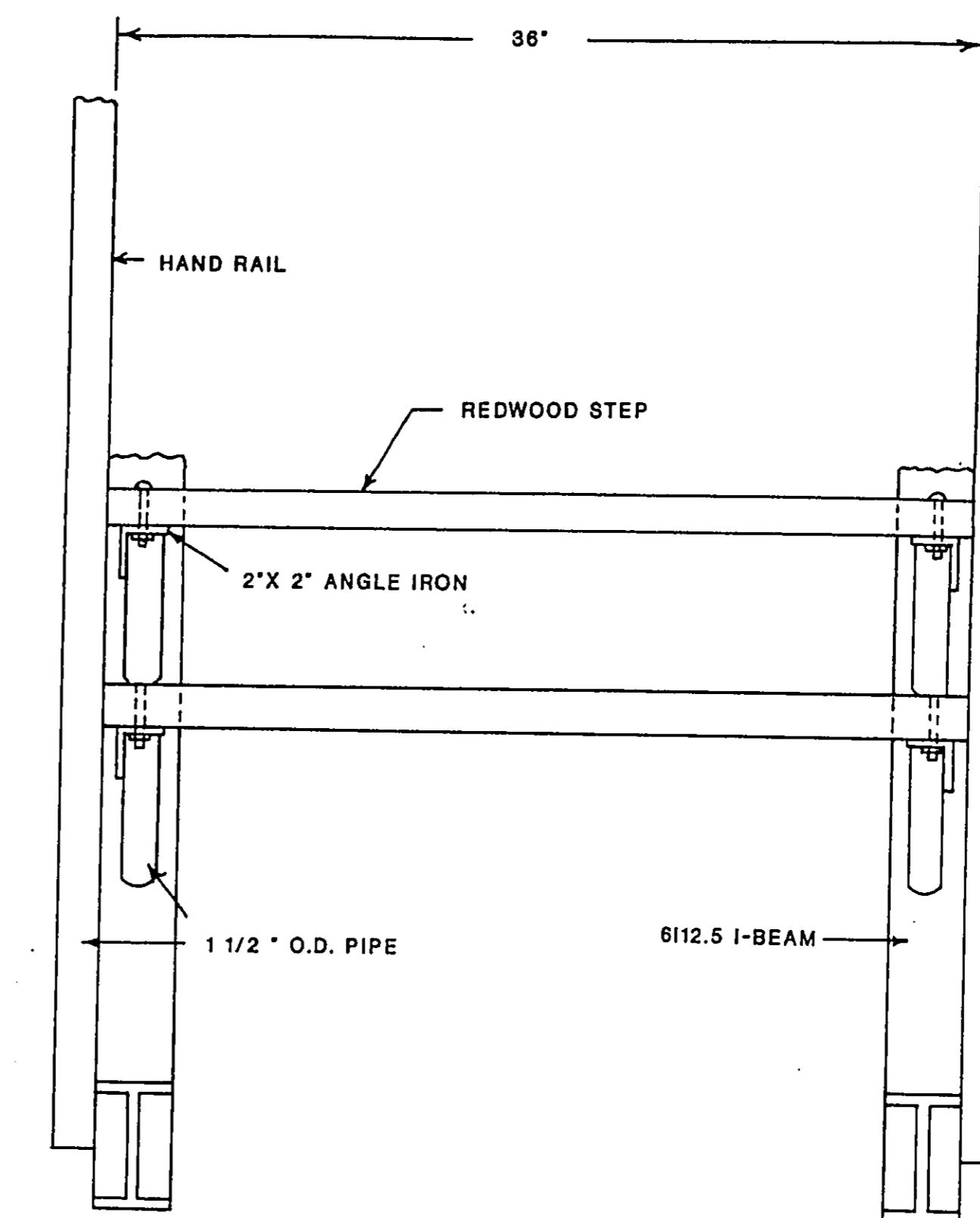


Oceanit Coastal Corporation coastal engineering services	
<small>A subsidiary of Oceanit Laboratories, Inc.</small>	
<small>Century Square 1188 Bishop Street, Suite 2512, Honolulu, Hawaii 96813</small>	
<small>TELEX: 7431404 MCI; OCEANIT Ph: (808) 531-3017 FAX: (808) 526-1519</small>	
SCALE:	APPROVED BY:
DATE: 2/16/90	REVISION:
REVETMENT DESIGN - POHLSON RESIDENCE	
67-521 KAMEHAMEHA HIGHWAY	DRAWING NUMBER
TMK 6-7-0510	

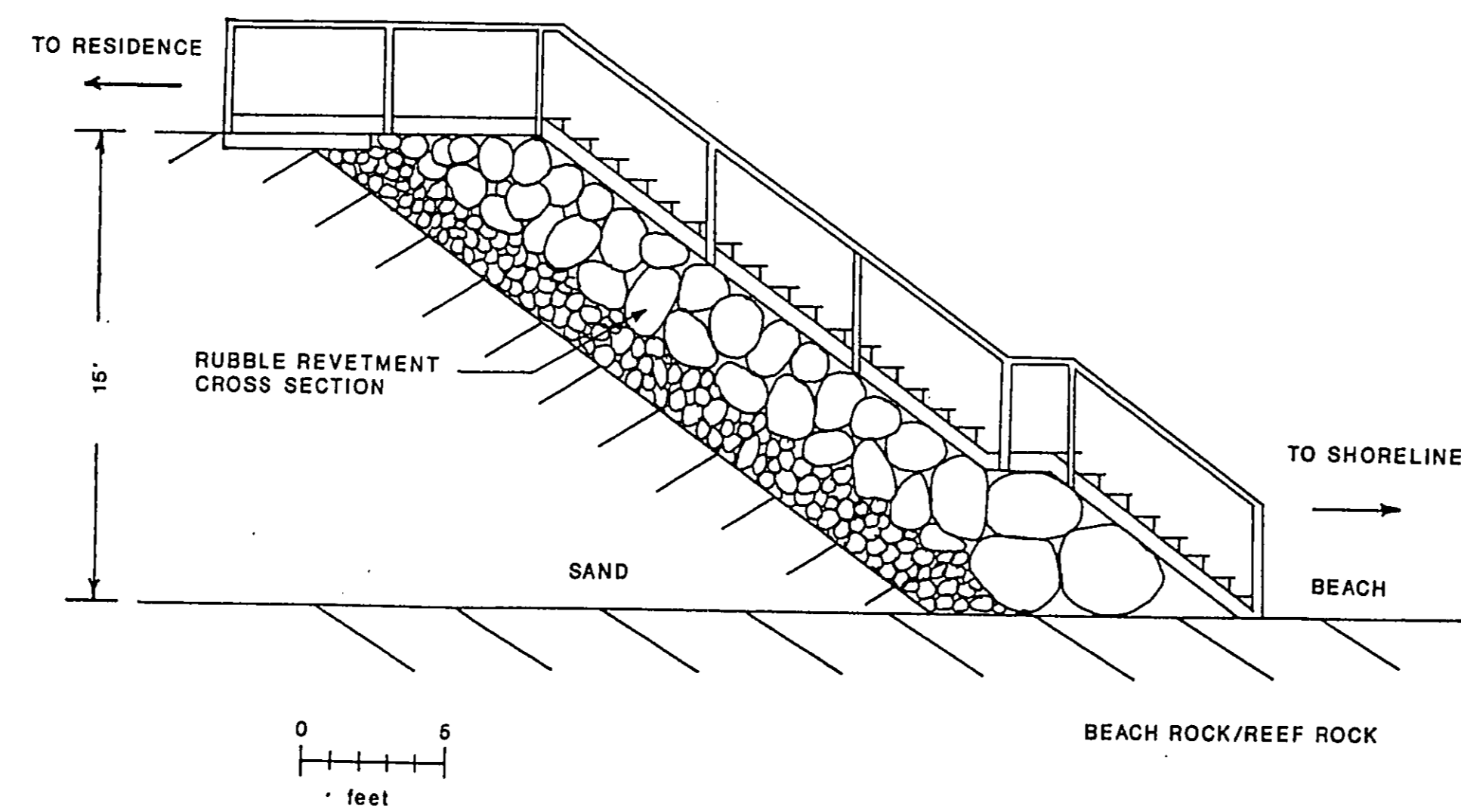
0089A



TYPICAL SECTION
SIDE VIEW



TYPICAL SECTION
FRONT VIEW




STAIRWAY AND REVETMENT SIDE VIEW

NOTES

1. THIS IS A PRELIMINARY CONCEPTUAL DESIGN OF A STAIRWAY OVER THE REVETMENT. THIS DESIGN HAS NOT BEEN STRUCTURALLY ANALYZED AND SHOULD NOT BE USED AS A CONSTRUCTION DRAWING.
2. THE STAIRWAY WOULD BE ANCHORED AT THE TOP AND BOTTOM AND WOULD REST ON CONCRETE FOOTINGS ON THE REVETMENT.
3. THE STAIRWAY WOULD BE CONSTRUCTED OF STEEL WITH WOOD STEPS. THIS TYPE OF CONSTRUCTION WILL REQUIRE REGULAR MAINTENANCE FOR CORROSION AND WEATHERING.
4. THIS TYPE OF STAIRWAY SHOULD NOT BE INSTALLED UNTIL SEVERAL MONTHS AFTER THE REVETMENT HAS BEEN CONSTRUCTED TO GIVE THE ARMOR STONES TIME TO SETTLE IN PLACE.

PRELIMINARY

 Oceanit Coastal Corporation coastal engineering services <small>A subsidiary of Oceanit Laboratories, Inc.</small>	
<small>Century Square 1188 Bishop Street, Suite 2512, Honolulu, Hawaii 96813 TELEX: 7831-004 OCEANIT HI (808) 531-3017 FAX: (808) 526-1519</small>	
SCALE:	APPROVED BY:
DATE: 3/30/80	DRAWN BY: WEB REVISED:
PRELIMINARY DESIGN REVETMENT STAIRWAY	