Zane Seawall

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 523-4414 • FAX: (808) 527-6743

JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

97/SV-003 (ST)

December 11, 1997

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

Dear Mr. Gill:

CHAPTER 343, HRS
Environmental Assessment (EA)/Determination
Finding of No Significant Impact ✓

Recorded Owner	:	H & RZ, Inc.
Applicants	:	Henry and Rosaline Zane
Agent	:	Group 70 International, Inc.
Location	:	68-695 Farrington Highway, Mokuleia, Oahu
Tax Map Key	:	6-8-10: 23
Request	:	Shoreline Setback Variance
Proposal	:	Replacement of an existing deteriorated vertical concrete masonry unit (CMU) seawall with a modified vertical seawall structure
Determination	:	A Finding of No Significant Impact is Issued

Attached and incorporated by reference is the Final EA prepared by the applicant for the project. Based on the significance criteria outlined in Chapter 200, State Administrative Rules, we have determined that preparation of an Environmental Impact Statement is not required.

134

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the Final EA. If you have any questions, please contact Steve Tagawa of our staff at 523-4817.

Very truly yours,

JAN NAOE SULLIVAN
Director of Land Utilization

JNS:am
Encls.

g:ppd\fea97sv3.sht

1997-12-23-OA-FEA - Zane Seawall

APPLICATION FOR SHORELINE SETBACK VARIANCE AND FINAL ENVIRONMENTAL ASSESSMENT

Reconstruction of Seawall

Zane Property, TMK (1) 6-8-10:23 (Lot 14)
68-695 Farrington Highway, Mokuleia, Oahu, Hawaii

Applicant:

Henry and Rosaline Zane
3027 Herman Street
Honolulu, HI 96816

Applicant's Agent:

Group 70 International, Inc.
Architecture • Planning • Interiors • Environmental Services
925 Bethel Street, Fifth Floor
Honolulu, HI 96813

December 1997

APPLICATION FOR SHORELINE SETBACK VARIANCE AND FINAL ENVIRONMENTAL ASSESSMENT

Reconstruction of Seawall at 68-695 Farrington Highway, Mokuleia

TABLE OF CONTENTS

APPLICATION FOR SHORELINE SETBACK VARIANCE AND FINAL ENVIRONMENTAL ASSESSMENT

December 1997

Reconstruction of Existing Seawall Structure
Zane Property, TMK (1) 6-8-10:23 (Lot 14)
68-695 Farrington Highway, Mokuleia, Oahu, Hawaii

Overview. *Approval is being sought for construction of a modified* vertical seawall structure, to replace an existing deteriorated vertical concrete masonry unit (CMU) seawall that was originally constructed across the shoreline frontage of the subject property between 1961 and 1967. The original structure was reconstructed between 1982 and 1984 under a Building Permit. This application and environmental assessment provides a description of the action and addresses the potential impacts of the proposed shoreline structure to the coastal environment.

(1) Applicant

Henry and Rosaline Zane
3027 Herman Street
Honolulu, HI 96816
Contact: Patricia Bain (808) 623-9530

(1a) Applicant's Agent

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813-4307
Jeffrey Overton, Chief Environmental Planner
(808) 523-5866 ext. 111

(2) Approving Agency

City and County of Honolulu, Department of Land Utilization
650 South King Street, 7th Floor
Honolulu, HI 96813
Art Challacombe, Environmental Review Branch
(808) 523-4107

(3) Agencies Consulted

City and County of Honolulu, Department of Land Utilization
City and County of Honolulu, Building Department
State of Hawaii, Department of Land and Natural Resources
North Shore Neighborhood Board No. 27

(4) General Description of the Action's Technical, Economic, Social and Environmental Characteristics

Technical Characteristics. The proposed action involves approval for construction of a modified vertical seawall made of concrete rubble masonry (CRM) material. The new structure will replace an existing deteriorated concrete masonry unit (CMU) structure at the shoreline frontage of this lot on Farrington Highway in Mokuleia. The general location of the subject property is shown in Figure 1 and the TMK map (Figure 2). The site is directly across from the entrance road to the eastern end of Dillingham Airfield.

The subject seawall structure is located along the 61.63 ft. shoreline frontage of the Zane property which is 8,250 sq. ft. in area. The parcel is relatively level and improved with a single-family residence.

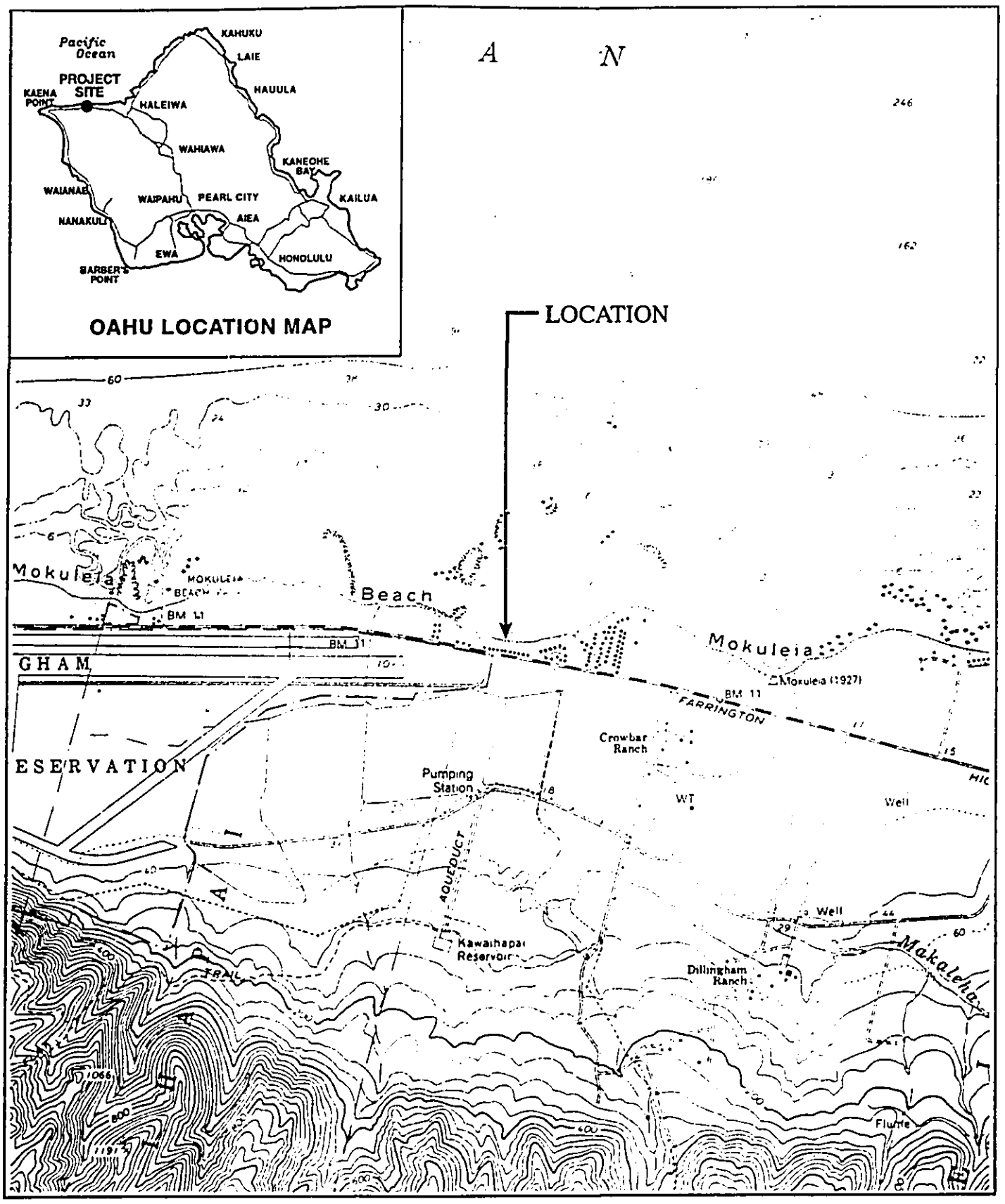
Based on historical aerial photographs of the Mokuleia coastline taken over the past 47 years (1949-1996), there has been a significant loss of shoreline at this location due to erosion activity since the lots were first subdivided. The subject property has lost between 40 to 50 feet of land along the makai edge, totaling approximately 3,000 sq. ft.

Since the 1950's, shoreline structures have been constructed along the ocean frontage of the adjoining properties to the east and west to help stabilize the retreating shoreline. There are 16 residential properties in a row that are all protected by vertical seawalls at this location. These walls were built between 1961 and 1981. Lots that do not have structural protection along the eastern portion of this coastal section are experiencing some shoreline erosion and storm wave damage.

Figure 3 shows the Shoreline Survey Map currently being processed for certification by the DLNR (also refer to Exhibit A). The Certification request was submitted to DLNR by Engineers Surveyors Hawaii in April 1997. Certified maps will be forwarded to the DLU upon receipt. This figure provides site specific details of the shoreline structure, showing location and elevation relative to the makai side and neighboring residential lots.

Figures 4, 5 and 6 are photographs of the subject property and existing shoreline structure. The seawall spans the entire shoreline frontage of the Zane property.

Figure 7 shows a cross section of the proposed modified vertical seawall structure composed of concrete rubble masonry (CRM). The height of the new structure will be approximately 9.5 ft. The seawall will be rebuilt with an appropriately designed foundation to avoid the undermining effect that has caused the failure of the existing wall. Design of the wall will be based on the maximum wave height that can break on the structure and to retain the bearing load on the inland side of the wall. The seaward side of the seawall foundation will be placed at the certified shoreline.

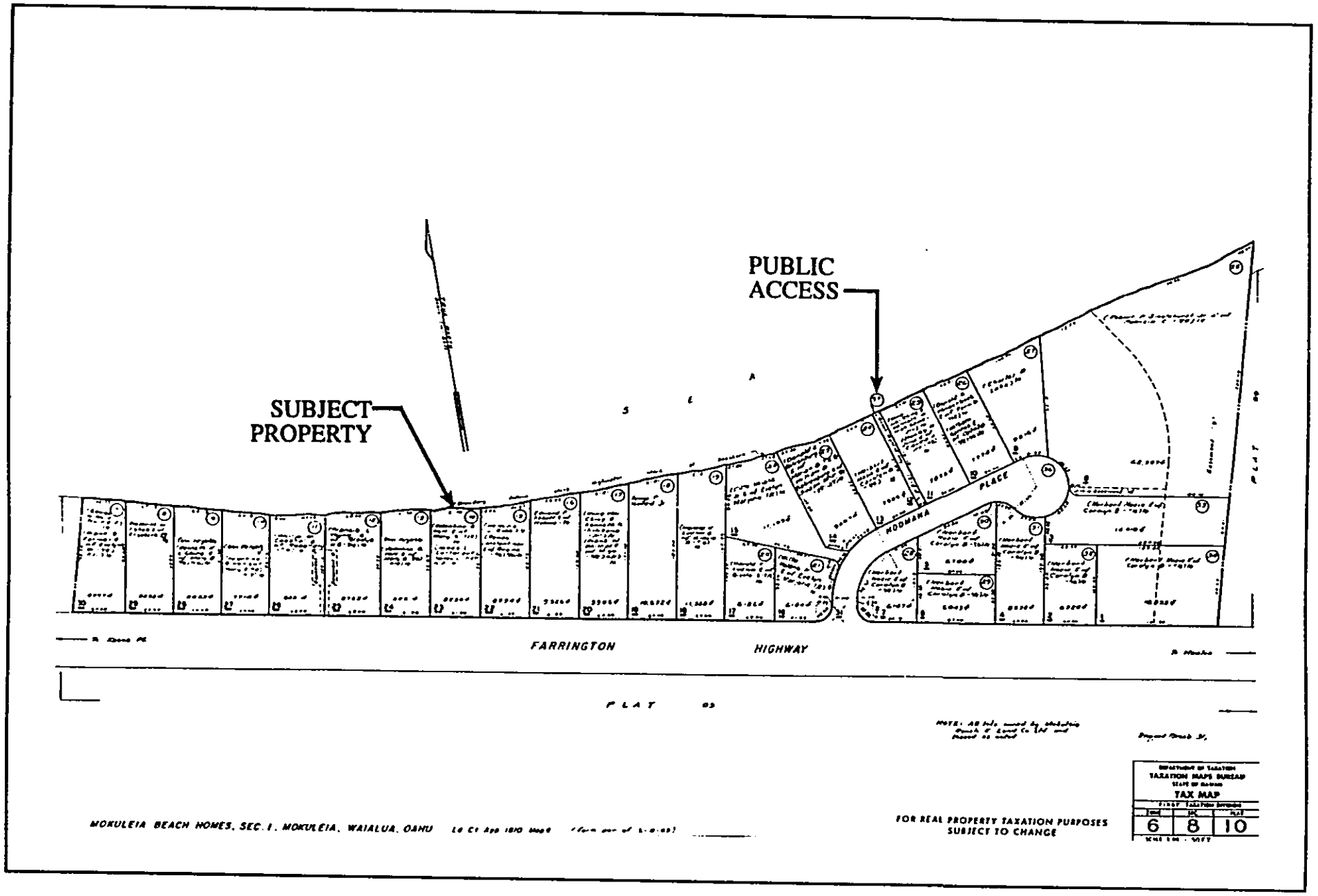


Source: USGS 1983

Location Map

Shoreline Setback Variance

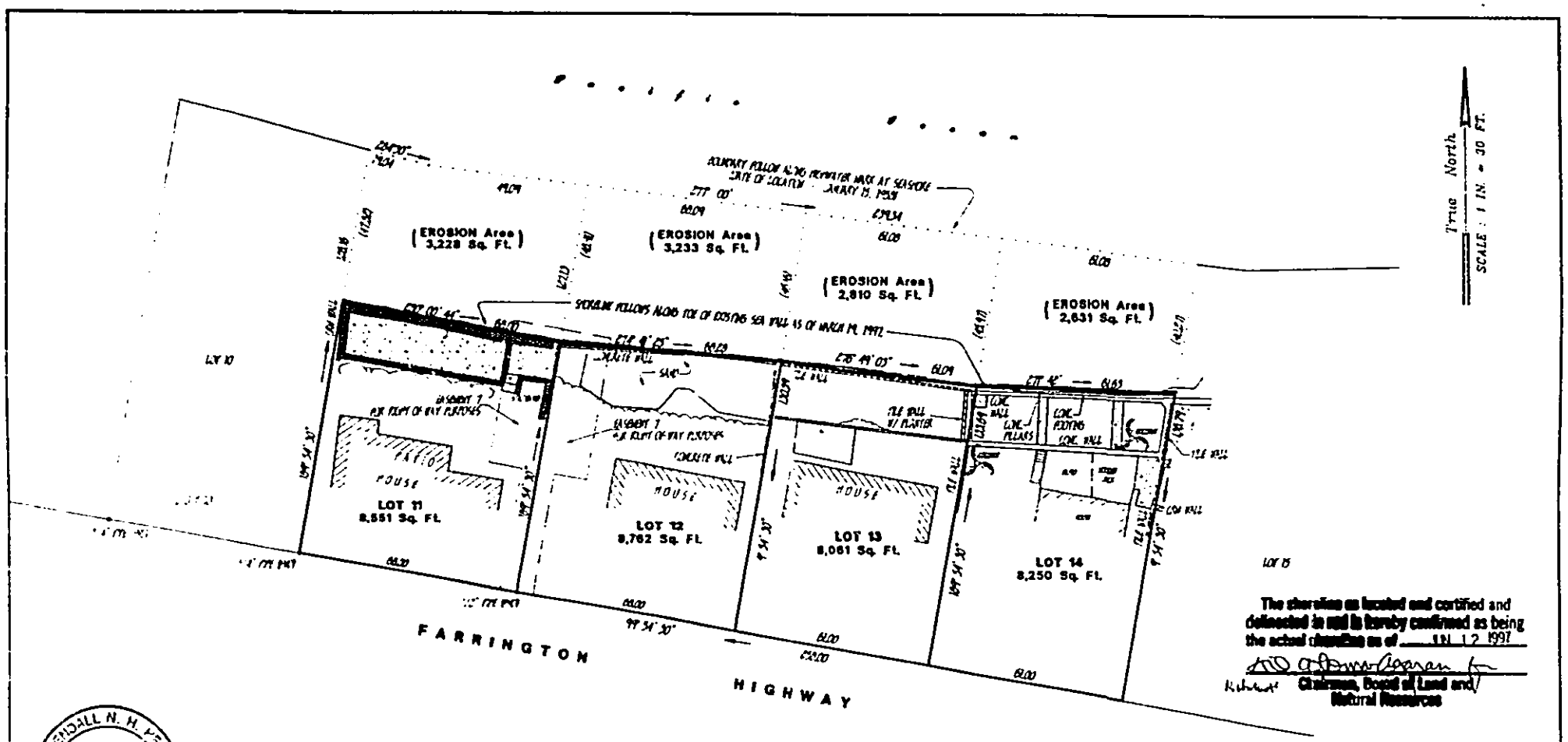
Figure 1



TMK 6-8-10:23

Shoreline Setback Variance

Figure 2



The shoreline as located and certified and delineated in red is hereby confirmed as being the actual shoreline as of JUN 12 1997

Chairman, Board of Land and Natural Resources

KENDALL N. H. PEE
LICENSED PROFESSIONAL LAND SURVEYOR
No. 5749
HAWAII, U.S.A.

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

Kendall N. H. Pee
Licensed Professional Land Surveyor
Certificate Number 5749

Shoreline Survey

Lots 11 thru 14
of Land Court Application 1810 (Map 4)
"Mokuleia Beach Homes, Sec. 1"
at Mokuleia, Waialua, Oahu, Hawaii
T.M.K. : 6-8-10 : parcels 23-26

Client: Roger Compton, Pat Baines, Jack Frost and Harold Masunaga

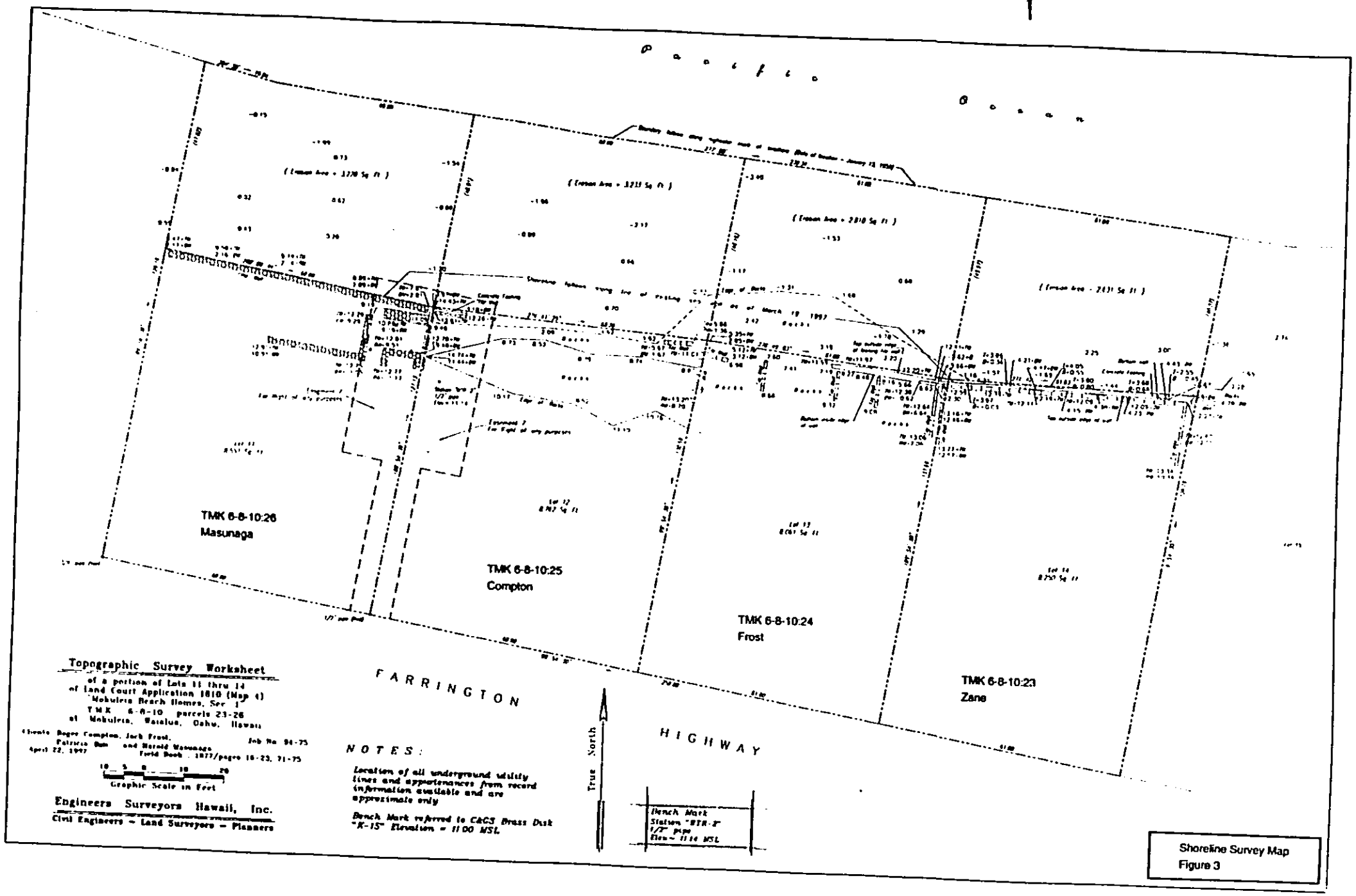
Property Address: 68-695 thru 68-705 Farrington Highway

Purpose: For Wall Construction

Honolulu, Hawaii
File 1977 / pages 16-83

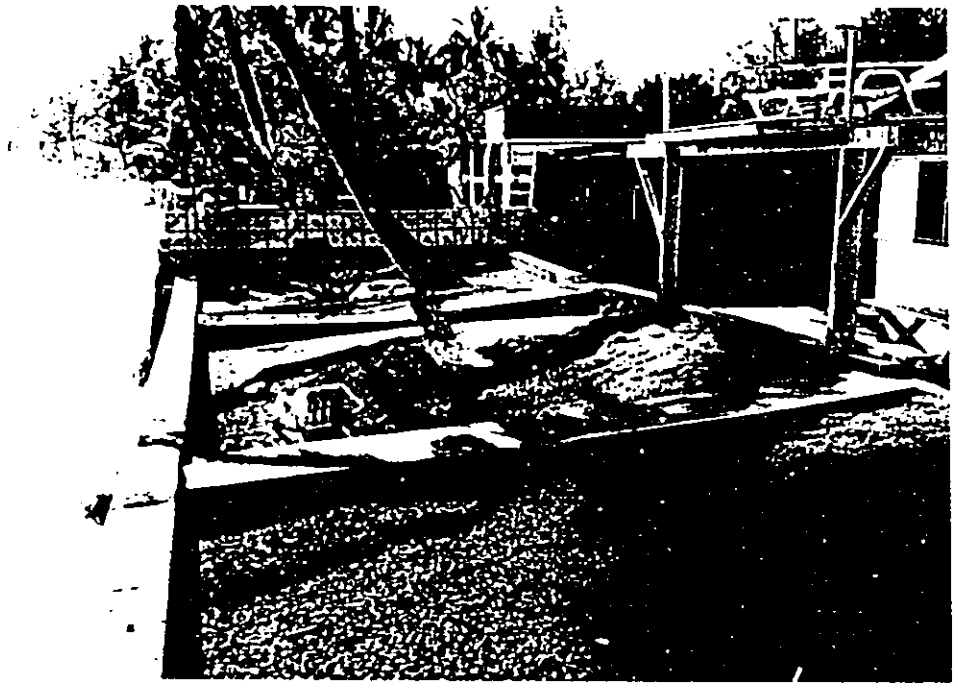
ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ PLANNERS

1020 Auahi Street
March 19, 1997

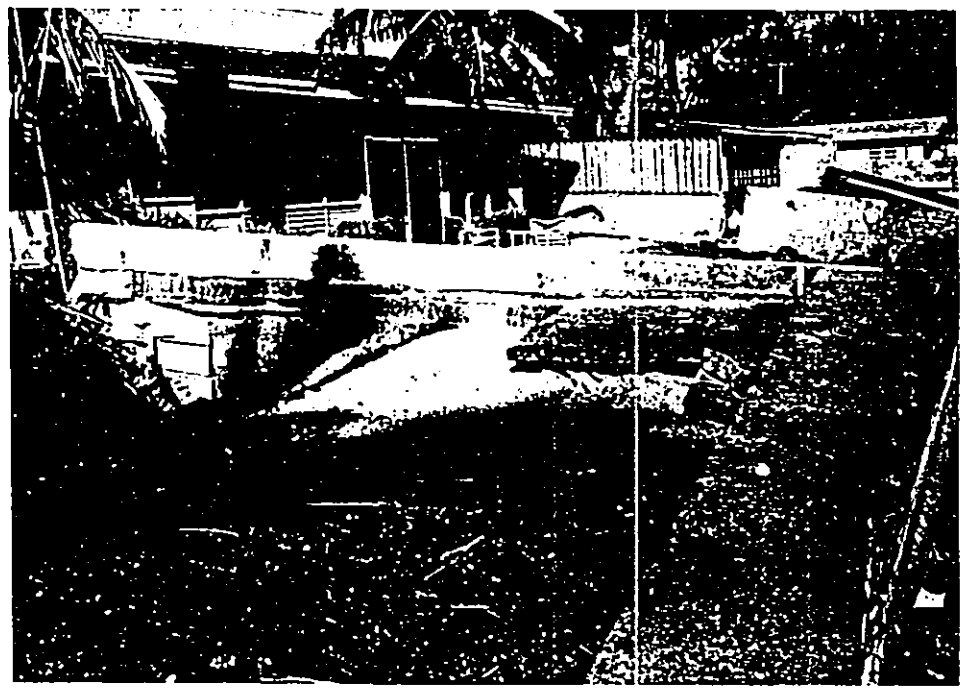


Shoreline Survey Map
Figure 3

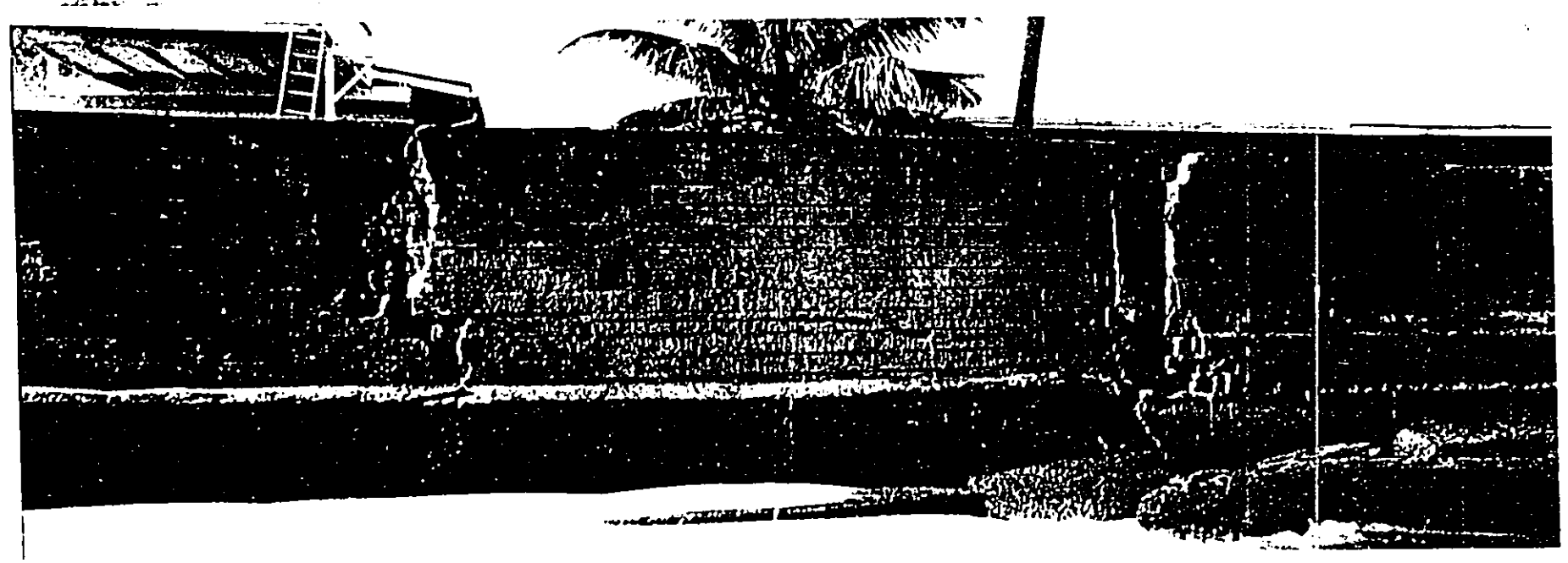
View toward Kaena of Zane Rear Yard and Shoreline Structure



Zane: View toward Haleiwa



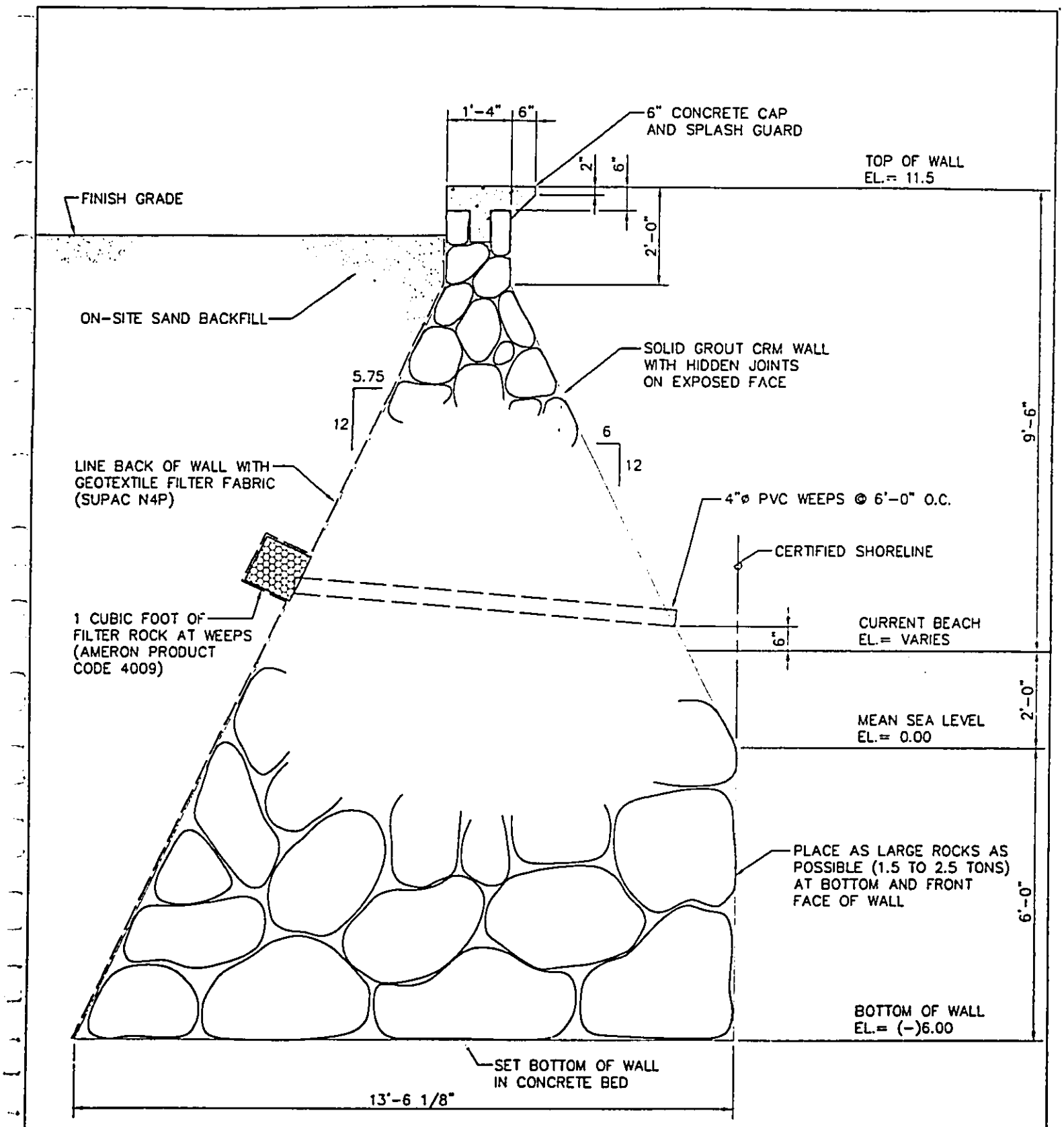
Zane: View toward Kaena



Zane: The seawall fronting TMK 6-8-10:23 has a large vertical crack at mid-length and another at its joint with the wall for TMK 6-8-10:24. Undermining is most obvious at the west end (right-hand side of Photo No. 2).

(Source: TNWRE, July 1997)

Figure 6



Typical CRM
Modified Seawall Section
Source: TNWRE, 1997
Figure 7

Borings at the site reached a depth of 31 feet without encountering bedrock. Coralline sand extends to a depth of 23 feet. The wall foundation will be placed at a depth of 6 feet below sea level (approximately 14 ft. below grade) in a bed of concrete placed on coralline sand. The results of this boring were similar to two boreholes done previously for the reconstruction of the seawall at TMK 6-8-10:29.

The seawall cross section is similar to the recently completed adjacent seawalls to the west on TMK 6-8-10:27, 28 and 29. The design combines a sloped lower half and a vertical upper half, which is a compromise between reducing wave reflection and retaining a small yard space between the houses and the wall. Void spaces in the wall material on the ocean side will not be grouted to allow for added energy dissipation and to minimize wave run-up. The new wall will replace the existing vertical structure.

Present Condition of the Shoreline Structure. The hollow tile wall along the shoreline frontage of this lot has a prominent vertical crack located about midway across the property and another vertical crack at its western boundary. The wall's shallow footing is the cause of the crack at mid-property. The failure of the wall to the west appears to have caused the crack at the west end. Wave action at these locations has pulled material from behind the wall seaward, creating sink holes that the owner has repeatedly filled. This undermining on the inland side of the wall show in Exhibit C. Although the owner has backfilled with gravel and grout, these stop-gap measures are not long-term remedies for the wall's inadequate footing.

Exhibit C includes a report completed by Tom Nance Water Resources Engineering (TNWRE)(July 1997). This report provides an oceanographic evaluation of the shoreline revetment and color photographs. An evaluation of the new modified vertical seawall materials and structural stability is also included with the TNWRE report.

Socio-Economic Characteristics. The total construction cost value for the new seawall is estimated at $65,000. The construction will cause no economic impacts to the immediate community or the community at large.

Without the shoreline structure, further erosion of the shoreline frontage during high surf events could ultimately resulting in damage to the existing residential structure. The property owner could potentially lose the value of their land and improvements if the shoreline structure is not constructed. The proposed action will be undertaken to protect these assets.

Environmental Characteristics. The original shoreline structure was constructed sometime between 1961 and 1967. The oceanographic study completed by TNWRE (Exhibit C) evaluates the potential for erosion caused by the shoreline structure. The study of historical aerial photographs shows that erosion of the adjacent beach areas has not been accelerated by the presence of this structure. Without the seawall, erosion along the seaward frontage of the subject property would have continued unchecked, and probably would have threatened the existing residential structure.

Construction activities associated with the new seawall are not anticipated to cause significant adverse effects to ocean water quality. Boulder placement and construction activities will be limited to areas inland of the certified shoreline. No long-term effects to water quality will result.

(5) Summary Description of the Affected Environment.

Soils on this parcel are sandy and well-drained. Excavation along the wall found the subsurface material to be mixed character, with coarse-grained calcareous beach sand and other buried fill material (limestone cobbles and boulders). Vegetation on this site primarily consists of introduced landscaping including Bermuda grass and naupaka. There are no known significant habitat areas for either terrestrial or aquatic flora or fauna directly found at the project site.

Beach and offshore conditions are summarized in this section, based on the detailed assessment provided in TNWRE (July 1997)(Exhibit C).

The property is situated near the center of an unnamed shoreline embayment defined by rock outcrops on the western end (Camp Mokuleia) and a sandy headland on the east side. The sandy headland appears to have been formed by the wave protection by rock outcrops and the generally shallower bathymetry directly offshore. The embayment, which faces directly to the north, is about 2,500 feet across and the indentation of the shoreline is a maximum of 500 feet at its center.

Nearshore bathymetry is generally flat, although there are a number of boulders, some of which protrude above water at low tide. The bottom is comprised of dead corals, coralline algae and shallow pockets of sand in depressions, all indicative of a high wave energy environment. Depths are generally six to eight feet for distances of 1,500 to 2,00 feet offshore. At that point, a series of ledges create a relatively steep drop-off to depths of more than 100 feet within 4,000 feet of the shoreline. There is a significant submarine channel located just to the east of the embayment.

This north-facing shoreline is directly exposed to waves from the northwest to the northeast. The wave energy reaching the shoreline is much greater during the winter months when waves from these directions are most frequent. Depths of the nearshore shelf control the breaking of waves and the amount of energy reaching the beach. At low tide, the wave energy at the shoreline is far less than at high tide, simply due to the different water depths at the tidal extremes.

Despite the fact that only moderate-sized waves can translate across the nearshore shelf and break on the beach, all of the lot owners along this embayment from Camp Mokuleia on the west to the beach access easement at Ho'omana Place have had to resort to seawall construction to stop the progressive loss of their beach frontage and damage to structures. Seawalls protecting three lots to the west of the subject property

(TMK 6-8-10:27, 28 & 29) were recently reconstructed with a modified vertical seawall design. Of the remaining 12 lots to the east, the next four lots (Masunaga, Compton, Frost and Zane) have walls that are most in need of reconstruction. Their deteriorated condition results from inadequate foundations, and also due to their position at the center of the bay where the beach is narrow and the highest waves strike the shore.

There have been significant shoreline changes along this section of the Mokuleia shoreline. Review of historical aerial photographs from 1949 to 1995 verify the shoreline changes during this period. Exhibit C presents a series of these photographs are presented with overlays showing the past and present shoreline positions.

There has been a diminishing width of beach sand over the 1949 to 1996 period. The width of beach sand is now 18 to 25 feet, which is less than one-third the width that prevailed in 1949. This loss of beach sand width explains the recent failure of a number of seawalls along this embayment shore. In all cases, the walls were built with their foundations above sea level. At the time of their construction, there was a substantial beach sand deposit between these footings and the shoreline. Much of the sand has been eroded, with waves that continually wash beneath the footings to the inland side of the wall. A chronology of house and seawall construction, movement of the vegetation line and approximate beach widths based on aerial photographs are presented in Exhibits C and D (aerial photos).

(6) Identification and Summary of Major Impacts and Alternatives Considered

Potential Short-term Impacts. The reconstruction of the seawall along the frontage of this lot will create some minor short-term effects on vegetation, water quality and noise conditions. A small amount of landscaping vegetation (grass and low shrubs) will be removed by the construction activity. During construction, there is always the potential for soils to erode from the upland area and cause silt runoff to ocean waters. Measures will be taken during construction to protect soils. Lastly, construction noise will be noticeable to residents at the neighboring properties. Construction activity will occur during allowed daytime periods and will not cause excessive noise levels off-site.

Potential Long-term Impacts.

Shoreline Processes. The effect of the seawall on shoreline processes at this location is considered, given that there are existing walls on adjacent properties to the east and west. The subject seawall structure has been in place for over 25 years. The impact on shoreline processes of the seawall has been negligible due to the presence of a series of shoreline structures on adjoining lots.

For more than a 3,000 foot stretch of the Mokuleia shoreline in this area, nearly all of the lots are protected by seawalls. Lots toward the eastern end of this coastal cell remain unprotected. All other lots in this stretch are protected by vertical seawalls. Shoreline retreat of the remaining unprotected lot frontages is definitely occurring.

Over a record period of 38 years, the Oahu Shoreline Study (Sea Engineering, 1989) found a shoreline retreat of in this sector of the Laie coastline where there are no protective structures. The study identifies the area from the Episcopal Camp to Mokuleia Beach Colony as Mokuleia - transect 11. Excerpts from the study discussion of this portion of the Mokuleia coast are included below.

> *This is a small embayment, 3000 feet long, that is completely developed. Polipoli Stream discharges in the center of the embayment. The shoreline from the Episcopal Camp to the stream is lined with shore protection structures, except for the four lots just west of the stream. The unprotected houses have only a few feet of vegetation between them and the beach.*
>
> *The structures are generally vertical seawalls of varying heights and types. At the west end, particularly, the walls protrude varying distances out onto the beach.*
>
> *Given the extent of the existing seawalls and the proximity of the unprotected houses to the waterline, shore protection should be allowed throughout this area. The shore protection structure of choice will probably be a vertical seawall, since there is little room for sloping revetments. The DLU should ensure that the design is adequate and that the alignment matches the surrounding areas.*
>
> *At present, there is lateral access along this beach, at least during some seasons, but if erosion continues, this will be lost.*

The Oahu Shoreline Study presents shoreline retreat rates for Mokuleia at transects 10 and 12, which are located on either side of the subject coastal section. Shoreline retreat in the 38-year period evaluated at these nearby transect areas ranged from 12 to 14 feet.

This description and management recommendation is consistent with the findings of this specific ocean engineering assessment for the subject property. With the pattern of shoreline protection which has been established, an individual lot owner has little choice but to protect their property with a structure similar to the one existing along the frontage of the subject property.

Aesthetics. The existing seawall at the subject property is similar in aesthetic condition to the surrounding lots with shoreline structures. The vertical seawall planned for this property is concrete rubble masonry (CRM) which contains significant amount of exposed rock material on the seawall face. The rock material provides a more natural appearance to the vertical seawall.

(7) Proposed Mitigative Measures

Several mitigative measures have been taken and are proposed to reduce or eliminate the potential impacts of the seawall reconstruction at the subject lot.

Best Management Practices. Water quality will be protected during reconstruction of the seawall structure. Measures will be taken during the construction activities to avoid erosion and silt runoff to surface water in the ocean. Soils on the mauka side of the structure will be stabilized to prevent silt runoff to the beach and ocean water. Work will be done during the drier summer months, with an expected duration of six to eight weeks. Foundation work will take about two weeks, and water will be directed away from the construction by the use of a temporary berm or sheet piles installed makai of the wall. Lands mauka of the wall will be planted in grass at the end of construction, however, the potential for erosion is remote since the new wall will contain the material placed mauka of the wall.

Aesthetic Effects. The owner will construct a more natural appearing rock wall face to this seawall structure. This will be an aesthetic improvement in comparison to the existing wall.

(8) Alternatives to the Proposed Action & Evaluation of Hardship

There are several issues which must be considered in the evaluation of hardship for the application for Shoreline Setback Variance at the subject property. Three alternative approaches are considered possible at this time, including:

(a) No-action alternative - require removal of the seawall,
(b) Construct a sloping rock revetment in place of the seawall, and
(c) Attempt a non-structural approach to protect this property.

These options are discussed individually in terms of their potential impacts, including hardship to the applicant.

(a) No action - Remove seawall structure

The no-action scenario would involve removal of the seawall and leave the shoreline frontage of the lot unprotected. This action would expose the property to storm wave erosion, causing the makai 20 to 30 feet of the property to erode. The residence on the subject property would potentially be exposed to storm wave run-up and damage.

Shoreline structures fronting parcels on either side of the subject lot could also potentially be back-cut by the erosional activity. The no-action alternative would potentially cause damage and property loss to the subject lot, and is not considered feasible. The historical trend of this stretch of shoreline is steady erosion on the order of 0.5 feet per year.

(b) Construct a sloping rock revetment in place of the vertical seawall

A sloping boulder revetment at this location could be constructed to provide additional structural strength and provide a greater slope for wave energy dissipation. As compared to vertical seawall, revetments generally cause less energy reflection to the nearshore shallow water area, creating less erosional force. This would require removal of the existing seawall structure and construction of a sloping revetment with corresponding short-term environmental effects.

This option is not practical in this situation, however, because there is no space to accommodate a sloping boulder revetment. A properly constructed revetment would take up all of the owner's usable lot area in rock slope extending to the edge of the home. In addition, a revetment at this location would not match the structures on the adjoining properties. There are no other revetments existing along this stretch of Mokuleia, where the lots are protected with vertical seawalls for 16 properties in a row. Deviations in the shoreline structure design from seawall to revetment would create an uneven visual setting. The mix of structure types would likely causes changes to the wave energy distribution along the shoreline, and possibly affecting the flank area of adjoining properties which are currently protected by vertical seawalls.

(c) Attempt "soft structure" and non-structural solutions along this property

There are a number of non-structural approaches to curbing shoreline erosion that have been suggested for the shoreline of Oahu. These options include the use of sand-filled sea bags, offshore sand mining for beach replenishment, and moving structural improvements further mauka to avoid ocean wave damage.

Sand-filled sea bags have shown to provide some effectiveness in temporarily curbing shoreline property loss to erosion at some locations. In this situation, the sea bags would interfere with lateral access in front of the subject property. The sea bags would temporarily take the place of the seawall, and would be a short-term solution to an obviously long-term erosion problem at this location. The owner would need to continually maintain the bags and periodically replace them at continuing cost. There would be no real environmental benefit from this option.

Offshore sand mining and beach replenishment has been proposed for a number of locations in Hawaii. The intent of beach replenishment is to offset erosion activity along a coastline by providing sand material from offshore sand reserves or other nearby sources. Sand replenishment can be used in an attempt to re-create the beach and dune structure. This alternative could be potentially feasible in areas where offshore sand reserves exist (not known to be present at this location) and a government agency or large private entity can fund this activity. This type of area-wide massive beach replenishment project would not be a practical solution for a small single property owner. Formation of an improvement district would be a possible long-term approach to solving erosion problems along this coastal section. This solution would take

extensive time to plan the program and assemble the government approvals and resources to complete the project. In the current situation at the subject property, this would not be a practical way to satisfy an urgent need to protect against imminent property loss and damage.

Another alternative to the shoreline structure would be to move the structural improvement (residence) further mauka placing it outside of the erosion and ocean wave hazard. At this location, moving the residence mauka to avoid erosion activities would not be practical, since there is no space on the lot to shift the building.

(9) Consistency with Coastal Management Objectives and Policies.

The objectives of the Hawaii Coastal Zone Management Program, Section 205A-2, HRS, are to protect valuable and vulnerable coastal resources such as coastal ecosystems, special scenic and cultural values and recreational opportunities. The objectives of the program are also to reduce coastal hazards and to improve the review process for activities proposed within the coastal zone. Described below are the ten objectives and policies of the Hawaii Coastal Zone Management Program and an assessment of the project impacts relative to the CZM objectives and policies.

(1) ***Recreational Objective.*** *"Provide coastal recreational opportunities accessible to the public."*

(A) Improve coordination and funding of coastal recreation planning and management.
(B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:
- *(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;*
- *(ii) Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites and sandy beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;*
- *(iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;*
- *(iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;*
- *(v) Encouraging expanded public recreational use of county, State, and federally owned or controlled shoreline lands and waters having recreational value;*
- *(vi) Adopting water quality standards and regulating point and nonpoint sources of pollution to protect and where feasible, restore the recreational value of coastal waters;*
- *(vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, artificial reefs for surfing and fishing;*

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

Discussion: Public access to the beach fronting the property is not affected by the shoreline structure. The seawall on this property has been in place for over 25 years. There is a very narrow beach extending along the shore which is affected by wave run-up during high tides, particularly during high surf events. There is lateral access along this shoreline and its recreational use will not be diminished by the proposed action.

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

(A) Identify and analyze significant archaeological resources.
(B) Maximize information retention through preservation of remains and artifacts or salvage operations.
(C) Support State goals for protection, restoration, interpretation and display of historic resources.

Discussion: Archaeological resources are not affected by the shoreline structure at this property. The action to stem erosion of the shoreline at this location could actually avoid exposure of any unknown buried cultural deposits and remains.

3) ***Scenic and Open Space Resources Objective***. *"Protect, preserve and, where desirable, restore or improve the quality of coastal scenic and open space resources."*

(A) Identify valued scenic resources in the coastal zone management area.
(B) Insure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline.
(C) Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources.
(D) Encourage those developments which are not coastal dependent to locate in inland areas.

Discussion: The shoreline structure at the subject property is built of lava rock material which has a natural appearance. The rock material provides visual relief which "softens" the appearance of the structure. The shoreline transition provided by the rock material is more visually appealing than the standard CMU wall or concrete-faced seawall structure.

(4) ***Coastal Ecosystems Objective***. *"Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems."*

(A) Improve the technical basis for natural resource management.

(B) Preserve valuable coastal ecosystems of significant biological or economic importance.
(C) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs.
(D) Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.

Discussion: The project will have no significant adverse effect on coastal ecosystems. Runoff will be controlled at the project site. Mitigative measures to reduce runoff for the short-term construction and long-term use of the site are planned. Best management practices will be applied in site construction activities.

(5) *Economic Uses Objective. "Provide public or private facilities and improvements important to the State's economy in suitable locations."*

(A) Concentrate in appropriate areas the location of coastal dependent development necessary to the state's economy.
(B) Insure that coastal dependent development such as harbors and ports, visitor industry facilities, and energy generating facilities are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area.
(C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:
(i) Utilization of presently designated locations is not feasible;
(ii) Adverse environmental effects are minimized;
(iii) Important to the State's economy.

Discussion: The subject property has no economic activity at present. The proposed action will generate short-term economic benefits from construction activity.

(6) *Coastal Hazards Objective. "Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion and subsidence."*

(A) Develop and communicate adequate information on storm wave, tsunami, flood, erosion, and subsidence hazard.
(B) Control development in areas subject to storm wave, tsunami, flood, erosion, and subsidence hazard.
(C) Ensure that developments comply with requirements of the Federal Flood Insurance Program.
(D) Prevent coastal flooding from inland projects.

Discussion: The subject property is located in the flood hazard area and complies with the Federal Flood Insurance Program. The shoreline structure at this property serves to stem erosion along the shoreline frontage, which protects the residence on this property, adjoining properties and inland areas.

(7) Managing Development Objective. "Improve the development review process, communication, and public participation in the management of coastal resources and hazards."

(A) Effectively utilize and implement existing law to the maximum extent possible in managing present and future coastal zone development.
(B) Facilitate timely processing of application for development permits and resolve overlapping or conflicting permit requirements.
(C) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the general public to facilitate public participation in the planning and review process.

Discussion: The landowner has commissioned the preparation of this Shoreline Setback Variance Application and Environmental Assessment in part to provide the public with details about their shoreline structure and shoreline conditions. The applicant has been in contact with the City Department of Land Utilization and State Department of Land and Natural Resources. Agencies, organizations and individuals will be notified of this proposed action in the Environmental Notice published by the Office of Environmental Quality Control. A public hearing will be held by the Department of Land Utilization, unless a public hearing waiver is granted.

(8) Public Participation Objective. "Stimulate public awareness, education, and participation in coastal management."
(A) Maintain a public advisory body to identify coastal management problems and to provide policy advice and assistance to the coastal zone management program;
(B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal-related issues, developments, and government activities; and
(C) Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Discussion: Refer to discussion for Objective 7.

(9) Beach Protection Objective. "Protect beaches for public use and recreation."
(A) Locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion;
(B) Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and
(C) Minimize the construction of public erosion-protection structures seaward of the shoreline.

Discussion: The shoreline structure at this property is located inland of the certified shoreline. There is no loss of public recreation space and open space as a result of this

structure. Erosion of property and improvements is minimized by this shoreline structure. There are few viable options remaining for this property owners except to properly reconstruct the existing vertical seawall structure.

(10) *Marine Resources Objective.* *"Implement the State's ocean resources management plan."*

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

(B) Assure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

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

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

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

(F) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources. [L 1977, c 188, pt of §3; am L 1993, c 258, §1; am L 1994, c 3, §1; am L 1995, c 104 §5]

Discussion: The landowner will follow the most environmentally sound approach to reconstructing their seawall by utilizing rock material for natural appearance, using a modified seawall design to disperse wave energy, and placement following the alignment of the adjoining shoreline structures.

CONCLUSION. The findings of this Environmental Assessment indicate that the proposed action is found to create minimal environmental impact and appears to be reasonable, when considering other possible alternative actions at this location. In terms of oceanographic processes, the modified seawall structure does not cause adverse effects to the beach at the adjoining and nearby properties. The preparers of this assessment recommend that a Finding of No Significant Impact (FONSI) be issued.

The modified seawall structure will be properly designed to withstand seasonal ocean wave wash at this location. There is a very well-documented recent history (past 50 years) of shoreline retreat along this portion of the Mokuleia coast. The landowner would necessarily experience hardship if the seawall was not reconstructed, with a likely loss of property and potential damage to residential structure. For these reasons, and based on the documentation provided, this landowner requests after-the-fact approval of a variance from the shoreline setback ordinance.

Other permits will be obtained as necessary to complete the project, including a Department of Army Nationwide Permit and coordination with the State Department of Health regarding requirements for a Section 404 Water Quality Certification. A City Building Permit will be required for construction to proceed.

APPLICATION FOR SHORELINE SETBACK VARIANCE AND
FINAL ENVIRONMENTAL ASSESSMENT

Reconstruction of Seawall at 68-695 Farrington Highway, Mokuleia

COMMENTS AND RESPONSES ON
THE DRAFT ENVIRONMENTAL ASSESSMENT

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 523-4414 • FAX: (808) 527-6743

JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

97/SV-003 (ST)
97/SV-004 (ST)
97/SV-005 (ST)
97/SV-006 (ST)

October 7, 1997

Mr. Jeffrey Overton
Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, Hawaii 96813

Dear Mr. Overton:

Project Names: Zane Seawall Reconstruction (97/SV-3)
Frost Seawall Reconstruction (97/SV-4)
Compton Seawall Reconstruction (97/SV-5)
Masunaga Seawall Reconstruction (97/SV-6)
Location: 68-695, 68-697, 68-701 and 68-705 Farrington Highway, Mokuleia, Oahu
Tax Map Keys: 6-8-10: 23, 24, 25, 26

We are forwarding copies of all comments we have received relating to the Draft Environmental Assessments (DEAs) for the above-referenced projects.

In accordance with the provisions of Chapter 343, Hawaii Revised Statutes (HRS), you must respond in writing to these and any other comments which were received during the 30-day comment period which began with the publication of the notice of availability of the DEAs in The Environmental Notice on August 23, 1997. The final Environmental Assessments must include these comments and responses, as well as revised text, if appropriate.

Should you have any questions, please contact Steve Tagawa of our staff at 523-4817.

Very truly yours,

For JAN NAOE SULLIVAN
Director of Land Utilization

JNS:am
Encls.

cc: Henry and Rosaline Zane (w/o encls.)
Jack Frost (w/o encls.)
Roger and Jean Compton (w/o encls.)
Harold and Pauline Masunaga (w/o encls.)

g:ppd\97sv3-6.sht

GROUP 70
INTERNATIONAL

5 December 1997

Jan Naoe Sullivan, Director
Department of Land Utilization
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, HI 96813

Dear Ms. Sullivan:

Subject: **Shore Setback Variances for Reconstruction of Seawalls**
Zane, Frost, Compton & Masunaga Properties, Mokuleia, Oahu
TMK (1) 6-8-10:23, 24, 25 and 26
Responses to Comments on Draft Environmental Assessments

We have received your letter dated October 8, 1997 transmitting the comments provided on the Draft Environmental Assessments for the subject properties. Group 70 has prepared written responses to comments received during the 30-day comment period. The Final Environmental Assessments will include these comments and responses, as well as revised text, as appropriate. Based on the EA process, we recommend a Finding of No Significant Impact (FONSI).

The owners are anxious for the Shoreline Setback Variance application to be processed. On September 23, 1997, the North Shore Neighborhood Board No. 27 voted to recommend DLU approval of the four variance requests.

Thank you from providing your comments on the Draft EA. Please contact me if you have questions or require additional information.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP
Chief Environmental Planner

P:\Planning\97011-11 Compton SSV\EA RESPONSES\ljns001jo_mo:sw12037_DLUresp.rtf

97-06151

BENJAMIN J. CAYETA
GOVERNOR
SEIJI F. NAYA
DIRECTOR
BRADLEY J. MOSSM
DEPUTY DIRECT
RICK EGGED
DIRECTOR, OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING
235 South Beretania Street, 6th Flr., Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Tel.: (808) 587-28
Fax: (808) 587-28

Ref. No. P-6892

August 14, 1997

Ms. Jan Naoe Sullivan
Director
Department of Land Utilization
City and County of Honolulu
650 S. King Street, 7th Floor
Honolulu. Hawaii 96813

Dear Ms. Sullivan:

Subject: Draft Environmental Assessments for Reconstruction of Seawall on Zane, Compton and Masunaga Properties in Mokuleia

This is in response to your letter of August 12, 1997, requesting review and comment on the subject draft environmental assessments. We have reviewed the assessments and have no comments to offer at this time.

If there are any questions, please contact Jeffrey Walters of our CZM Program at 587-2883.

Sincerely

Rick Egged
Director
Office of Planning

97-6004

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

REPLY TO
ATTENTION OF

August 19, 1997

1997 AUG 20 AM 10: 27

DEPT. OF LAND UTILIZATION
CITY & COUNTY OF HONOLULU

Planning and Operations Division

Ms. Jan Naoe Sullivan, Director
City and County of Honolulu
Department of Land Utilization
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Ms. Sullivan:

Thank you for the opportunity to review and comment on the Environmental Assessments (Eas) for Projects Within the Shoreline Setback (Zane, Frost, Compton, and Masunaga Seawall Reconstruction), Mokuleia, Oahu (TMK 6-8-10: 23-26). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. Under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, the Corps has regulatory jurisdiction in waters of the U.S., including navigable waters. Based on the information provided, the seawall reconstruction project will require a DA permit. Please contact Mr. Alan Everson of our Regulatory Section at 438-9258 for further information.

b. The flood hazard information provided on page 11 of each EA submitted is correct.

Sincerely,

Paul Mizue, P.E.
Acting Chief, Planning
and Operations Division

GROUP 70
INTERNATIONAL

5 December 1997

Paul Mizue, P.E.
Acting Chief, Planning and Operations Division
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Mizue:

Subject: **Shore Setback Variances for Reconstruction of Seawalls**
Zane, Frost, Compton & Masunaga Properties, Mokuleia, Oahu
TMK (1) 6-8-10:23, 24, 25 and 26
Responses to Comments on Draft Environmental Assessments

We have received a copy of your letter to the Department of Land Utilization dated August 19, 1997. The following letter responds to the comments provided on the Draft Environmental Assessments for the subject properties.

We recognize that the seawall reconstruction will require a DA permit, and hereby request general permit coverage under Nationwide Permit 13. The four seawalls have portions of their foundations that will be placed within the mean high water limit. The total amount of fill to be placed within the jurisdictional area is approximately 285 cu. yd. Please refer to the attached exhibit and the Final EA for further detailed information.

Thank you from providing your comments on the Draft EA. Please contact me if you have questions or require additional information regarding our request for Nationwide Permit coverage.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP
Chief Environmental Planner

P:\Planning\97011-11 Compton SSV\EA RESPONSES\ldh001o_moksw11207_ARMYresp.rtf

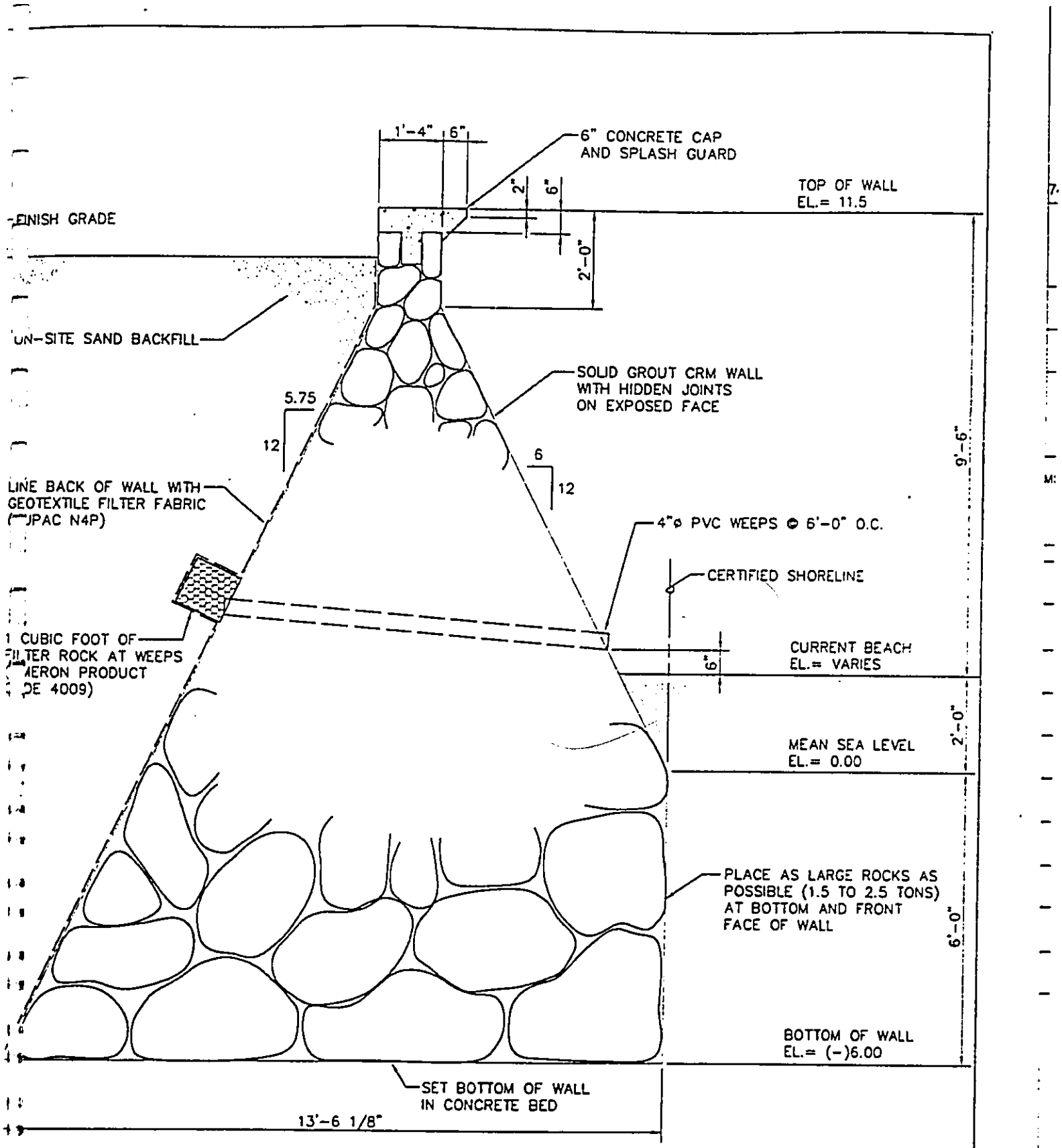


FIGURE 4
TYPICAL CRM SEAWALL DETAIL

97-0647

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

1997 SEP -8 AM 9:56

DEPT. OF LAND UTILIZATION
CITY & COUNTY OF HONOLULU

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
Gilbert Coloma-Agaran

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

September 4, 1997

Jan Naoe Sullivan, Director
Department of Land Utilization
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

LOG NO: 19977
DOC NO: 9708EJ41

Dear Ms. Sullivan:

SUBJECT: Chapter 6E-42 Historic Preservation Review -- Environmental Assessments, Sea Wall Reconstruction for Zane (97/SV-003), Frost (97/SV-004), Compton (97/SV-005), Masunaga (97/SV-006)
68-695, 68-697, 68-701, 68-705 Farrington Hwy
Mokuleia, Waialua, O'ahu
TMK: 6-8-10:23-26

A review of our records shows that there are no known historic sites at these parcels. The proposed project will repair existing seawalls on the individual parcels. Since any historic sites present at these parcels would have been disturbed by construction of the original seawall we believe that this repair project will have "no effect" on historic sites.

In the unlikely event that historic sites, including human burials, are uncovered during routine construction activities, all work in the vicinity must stop and the State Historic Preservation Division must be contacted at 587-0047.

Aloha,

DON HIBBARD, Administration
State Historic Preservation Division

EJ:jk

GROUP 70
INTERNATIONAL

Francis S. Oda, AIA, AICP
Norman G.Y. Hong, AIA
Sheryl B. Seaman, AIA, ASID
Hitoshi Hida, AIA
Roy H. Nihei, AIA, CSI
James I. Nishimoto, AIA
Ralph E. Portmore, AICP
Stephen H. Yuen, AIA
Linda L. Chung, AIA

Paul P. Chorney, AIA
Dean H. Kitamura, AIA
Norma J. Scott, AIA
Stephen E. Callo, CPA
George I. Atta, AICP
Jeffrey H. Overton, AICP
Kathryn A. Nam
Roy A. Inouye
Mary J. O'Leary

5 December 1997

Mr. Don Hibbard, Administrator
State Historic Preservation Division
Department of Land and Natural Resources
33 South King Street, 6th Floor
Honolulu, HI 96813

Dear Mr. Hibbard:

Subject: **Shore Setback Variances for Reconstruction of Seawalls**
Zane, Frost, Compton & Masunaga Properties, Mokuleia, Oahu
TMK (1) 6-8-10:23, 24, 25 and 26
Responses to Comments on Draft Environmental Assessments

We have received a copy of your letter to the Department of Land Utilization dated August 19, 1997. The following letter responds to the comments provided on the Draft Environmental Assessments for the subject properties.

In the unlikely event that historic sites, including human burials, are uncovered during routine construction activities, all work in the vicinity will stop and the State Historic Preservation Division will be contacted.

Thank you from providing your comments on the Draft EA. Please contact me if you have questions or require additional information.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP
Chief Environmental Planner

P:\Planning\97011-11 Compton SSV\EA RESPONSES\ldh001p_moksw11207_SHPDrespWD6.rtf

97-06611

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

1997 SEP 11 PM 12:07
DEPT. OF LAND UTILIZATION
CITY & COUNTY OF HONOLULU

LAWRENCE MIIKE
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:

September 8, 1997

97-170/epo

Ms. Jan Naoe Sullivan, Director
Department of Land Utilization
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Ms. Sullivan:

Subject: ENVIRONMENTAL ASSESSMENTS FOR THE RECONSTRUCTION OF FOUR (4) SEAWALLS WITHIN THE SHORELINE SETBACK MOKULEIA, OAHU, HAWAII

Zane Property, Lot 14
(97/SV-003)
68-695 Farrington Highway
TMK: (1) 6-8-10: 23

Frost Property, Lot 13
(97/SV-004)
68-697 Farrington Highway
TMK: (1) 6-8-10: 24

Compton Property, Lot 12
(97/SV-005)
68-701 Farrington Highway
TMK: (1) 6-8-10: 25

Masunaga Property, Lot 11
(97/SV-006)
68-705 Farrington Highway
TMK: (1) 6-8-10: 26

Thank you for allowing us to review and comment on the subject projects. We have the following comments to offer:

Water Pollution

1. The applicant should contact the Army Corps of Engineers to identify whether a federal permit (including a Department of Army permit) is required for this project. If a federal permit is required, then a Section 401 Water Quality Certification is required from the State Department of Health, Clean Water Branch.

2. A National Pollutant Discharge Elimination System (NPDES) general permit is required for the following discharges to waters of the State:

   a. Storm water discharges relating to construction activities, such as clearing, grading, and excavation, for projects equal to or greater than five acres;

   b. Storm water discharges from industrial activities;

c. Construction dewatering activities;

d. Noncontact cooling water discharges less than one million gallons per day;

e. Treated groundwater from underground storage tank remedial activities; and

f. Hydrotesting water.

Any person requesting to be covered by a NPDES general permit for any of the above activities should file a Notice of Intent with the Department's Clean Water Branch at least 30 days prior to commencement of any discharge to waters of the State.

3. After construction of the proposed facility is completed, an NPDES individual permit will be required if the operation of the facility involves any wastewater discharge into State waters.

Any questions regarding these comments should be directed to Mr. Denis Lau, Branch Chief, Clean Water Branch at 586-4309.

Noise Concerns

Construction activities must comply with the provisions of Hawaii Administrative Rules, Chapter 11-46, "Community Noise Control."

a. The contractor must obtain a noise permit if the noise levels from the construction activities are expected to exceed the allowable levels of the regulations as stated in Section 11-46-6(a).

b. The contractor must comply with the conditional use of the permit as specified in the regulations and the conditions issued with the permit as stated in Section 11-46-7(d)(4).

Should there be any questions regarding these comments, please contact Mr. Jerry Haruno, Environmental Health Program Manager of the Noise, Radiation & Indoor Air Quality Branch at 586-4701.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Deputy Director for Environmental Health

c: CWB
NR&IAQB

GROUP 70
INTERNATIONAL

Francis S. Oda, AIA, AICP
Norman G.Y. Hong, AIA
Sheryl B. Seaman, AIA, ASID
Hitoshi Hida, AIA
Roy H. Nihei, AIA, CSI
James I. Nishimoto, AIA
Ralph E. Portmore, AICP
Stephen H. Yuen, AIA
Linda L. Chung, AIA

Paul P. Chorney, AIA
Dean H. Kitamura, AIA
Norma J. Scott, AIA
Stephen E. Callo, CPA
George I. Atta, AICP
Jeffrey H. Overton, AICP
Kathryn A. Nam
Roy A. Inouye
Mary J. O'Leary

5 December 1997

Bruce S. Anderson, Ph.D.
Deputy Director for Environmental Health
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, HI 96801

Dear Dr. Anderson:

Subject: **Shore Setback Variances for Reconstruction of Seawalls**
Zane, Frost, Compton & Masunaga Properties, Mokuleia, Oahu
TMK (1) 6-8-10:23, 24, 25 and 26
Responses to Comments on Draft Environmental Assessments

We have received a copy of your letter to the Department of Land Utilization dated September 8, 1997. The following letter responds to the comments provided on the Draft Environmental Assessments for the subject properties.

1. **U.S. Army Corps of Engineers.** We have received comments from the Army Corps stating that the four subject properties will require a Department of Army permit for fill within the mean high water line, jurisdictional waters of the United States. It is anticipated that a DA General Permit will be obtained for these properties sometime early next year. We will concurrently request a Section 401 Water Quality Certification from the State Department of Health, Clean Water Branch.

2. **National Pollutant Discharge Elimination System (NPDES).** The project will not involve an area of five acres, therefore, the construction stormwater permit will not be applicable. Industrial activities, cooling waters, underground storage tank and hydrotesting are not involved with the proposed project. There may be the need for dewatering during the construction period, and we will consult with the Clean Water Branch to determine the applicability of this permit to the construction process planned for these shoreline structures. There will be no ongoing discharge of wastewater to State waters following construction.

3. *Noise Levels. Noise from construction activities is not expected to* exceed the allowable levels of the regulations stated in Section 11-46-6(a). Should a noise permit be required, the contractor will be responsible for obtaining a noise permit and for compliance with the conditional use of the permit as specified.

Thank you from providing your comments on the Draft EA. Please contact me if you have questions or require additional information.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP
Chief Environmental Planner

P:\Planning\97011-11 Compton SSV\EA RESPONSES\lbaa001jo_mokaw11207_DOHresp.rtf

97-0699

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT
WATER RESOURCE MANAGEMENT

September 22, 1997

LD-NAV
REF.: 97SV003.RCM

Honorable Jan Naoe Sullivan
Director of Land Utilization
City and County of Honolulu
650 S. King Street 7th Floor
Honolulu, Hawaii 96813

Dear Ms. Sullivan:

SUBJECT: Review : Environmental Assessment(s)
File No. : 97/SV-003, 97/SV-004, 97/SV-005 and 97/SV-006
Project : Reconstruction of Seawall (s)
Applicants: Zane, Frost, Compton & Masunaga
Location : 68-695, 68-697, 68-701 & 68-705 Farrington Highway, Mokuleia, Island of Oahu, Hawaii
TMKs : 1st/ 6-8-10: 23, 24, 25 and 26

Thank you for the opportunity to review and comment on the subject Environmental Assessment for the proposed project.

Our Land Division Planning and Technical Services reviewed the documentation submitted to substantiate the subject request for the Shoreline Setback Variances from the City and County of Honolulu, and have the following comments.

We note that the project consists of removing four deteriorated vertical seawalls built to protect four homes on adjacent parcels on an eroding section of beach, and then rebuilding a properly designed, massive vertical seawall at the same location on the four parcels.

The existing walls were built over a period of years during the 1960s and 70s, for the most part without the benefit of any engineering or building permit review or any land use approvals, as is now evidenced by their catastrophic failure.

Further, the entire project will occur on private, residential-zoned land mauka of the shoreline.

Given the circumstances of the current condition of the existing walls, and the advanced state of erosion and deterioration of the beach, as well as the lack of feasible options in this area, we do not object to the project. However, we would like to see any approvals conditioned such that all the remnants of the collapsed walls be removed from the area seaward of the shoreline to provide a maximum amount of safe, useable open space along the beach.

Finally, although the submitted documentation was generally well-written and provided useful information, we wish to make some comments on certain points:

1) From the information included in the discussions and tables on shoreline retreat based on movement of the vegetation line and diminishing width of beach sand, it seems fairly obvious that when the seawalls were built (primarily in the '67 to '69 period, as the beach was re-accreting from the pre-'67 erosion period), they were all located too far makai onto the unstable, recently-accreted portion of the beach. Had they instead been located at the mauka extent of the erosion/vegetation line, there would have been more open beach space for the natural littoral processes to occur, and perhaps there would have been much less interaction between the wash of the waves and the (poorly-designed) walls. This may have resulted in less beach loss, and less damage to the walls. Hopefully a lesson can be learned from this.

2) Unpermitted walls are often poorly-designed walls, and when they ultimately fail, the public trust resources suffer.

3) Although the claim is made in the draft environmental assessment (DEA) that the attached oceanographic study by TNWRE "shows that erosion of the adjacent beach area is not being accelerated by the presence of the subject existing walls," we find this claim to be unsubstantiated. No where does the study indicate that the beach erosion problem has not been accelerated by the presence of the walls; in fact, it suggests the opposite may be true.

The study indicates substantial beach loss occurred after the subject walls were initially constructed, even though the beach was generally accreting at the time. Further, it claims that three other recently reconstructed walls immediately to the west of these parcels has put these four parcels in imminent need of protection, apparently because of how seawalls generally do exacerbate neighboring beach erosion/beach loss problems; if the neighboring walls are putting these lots in imminent peril due to exacerbated beach erosion, then these subject walls certainly can cause beach erosion and loss too.

4) We wonder why the DEA concludes by requesting an after-the-fact variance, when we understand that it is the proposed new wall for which approval is sought.

The Department of Land and Natural Resources has no other comments to offer on the subject matter at this time.

Should you have any questions, please contact Nicholas Vaccaro of our Land Division's Support Services Branch at 587-0438 or Tom Eisen of the Planning and Technical Services Branch at 587-0386.

HAWAII: Earth's best!

Aloha,

for MICHAEL D. WILSON

c: Oahu Land Board Member
At Large Land Board Member
Oahu District Land Office

GROUP 70
INTERNATIONAL

Francis S. Oda, AIA, AICP
Norman G.Y. Hong, AIA
Sheryl B. Seaman, AIA, ASID
Hitoshi Hida, AIA
Roy H. Nihei, AIA, CSI
James I. Nishimoto, AIA
Ralph E. Portmore, AICP
Stephen H. Yuen, AIA
Linda L. Chung, AIA

Paul P. Chorney, AIA
Dean H. Kitamura, AIA
Norma J. Scott, AIA
Stephen E. Callo, CPA
George I. Atta, AICP
Jeffrey H. Overton, AICP
Kathryn A. Nam
Roy A. Inouye
Mary J. O'Leary

5 December 1997

Mr. Michael D. Wilson, Director
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Wilson:

Subject: **Shore Setback Variances for Reconstruction of Seawalls**
Zane, Frost, Compton & Masunaga Properties, Mokuleia, Oahu
TMK (1) 6-8-10:23, 24, 25 and 26
Responses to Comments on Draft Environmental Assessments

We have received a copy of your letter to the Department of Land Utilization dated September 22, 1997. The following letter responds to the comments provided on the Draft Environmental Assessments for the subject properties.

1) **Locations for New Seawalls.** The new seawalls will be built at the location of the current seawalls, and cannot be moved further inland due to the proximity of the improvements and shallow lot depth of each property.

2) **Seawall Design.** The four new walls will be built with a modified vertical seawall design to include a sloped boulder base section. This design will aid by providing energy dissipation and better aesthetics than the vertical CMU walls being replaced. The footing for the new walls will be placed six feet below sea level to minimize undermining which has caused the existing walls to fail.

3) **Beach Loss for the Past 40 Years.** The aerial photograph history shows the inland progression of the beach at the rate of approximately one foot per year. This rate of retreat can be shown for the 20-year period preceding the construction of seawalls. Measurements of the inland progression over the past 20 years do not indicate the walls to have accelerated this retreat.

The study does not find that the recently reconstructed walls to the west are a threat to the four subject walls. The modified vertical seawall design has been

shown to be effective, and a narrow beach exists along the frontage at these walls where no beach existed previously.

4) **Permit for Seawall Reconstruction.** We appreciate your correction of our error stating that the shoreline setback variance is an after-the-fact permit. A new variance and building permit will be obtained for each seawall. One exception is that the Zane family had previously obtained a building permit for their existing seawall.

Thank you from providing your comments on the Draft EA. Please contact me if you have questions or require additional information.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP
Chief Environmental Planner

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813-5249
PHONE (808) 594-1888
FAX (808) 594-1865

September 11, 1997

Jeffrey Overton
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813

Re: Draft Environmental Assessments and Applications for Shoreline Setback Variance for Reconstruction of Seawalls at TMK's: 6- 8-10:26(Lot 11), 6-8-10:25(Lot 12), 6-8-10:24(Lot 13), and 6-8-10:23(Lot 14).

Dear Mr. Overton:

Thank you very much for the opportunity to review the four above-referenced Shoreline Setback Variance Applications and Draft Environmental Assessments (DEA).

The applicants Masunaga (Lot 11), Compton (Lot 12), Frost (Lot 13), and Zane (Lot) 14 are proposing to construct 9.5 foot modified seawall structures of grouted rocks and boulders to protect their shoreline properties. All of the subject properties are situated adjacent to one another and are located on Farrington Highway in Mokuleia directly across the eastern entrance of Dillingham Airfield.

The Office of Hawaiian Affairs (OHA) understands the imminent threat to the residential structures on the subject parcels, and that the construction of these seawalls may be the most feasible alternative for the applicants at this time.

However, OHA does have several concerns regarding the proposed type of development and with some of the information presented in the DEA. OHA's main concerns with the proposed seawalls relate to shoreline access, safety hazards, longterm shoreline processes, and increased erosion to adjacent shoreline areas.

First, The preparers of the DEA conclude that the Oceanographic and Structural Evaluation (Exhibit C) "shows that the erosion of the adjacent beach areas is not being accelerated by the presence of this structure" (page 3).

We agree that without the seawall structures erosion along the seaward frontage of the subject properties would likely occur. However, it is not accurate to conclude that the erosion of beach areas are not being "accelerated" by such structures. The net effect of armoring structures (especially seawalls) is the reflection of wave energy, which causes increased sand scouring and beach loss. It is highly probable that shoreline retreat is indeed accelerated in the process.

Second, the preparers conclude that "the impact on shoreline processes of the seawall has been negligible due to the presence of shoreline structures on adjoining lots" (page 5).

This determination of "negligible impact" by the seawalls is based upon the existence of similar shoreline structures on adjoining lots. This conclusion is not only unfounded and inaccurate, but it is contrary to the data presented in the Oceanographic and Structural Evaluation (Exhibit C, pp. 7-8).

It is clear that the impacts of seawalls on shoreline processes are adverse and by no means "negligible". In fact, the armoring of the shoreline has a <u>major</u> impact on the natural littoral processes of erosion and accretion.

The continued construction of revetments and seawalls results in even greater erosion, and the transfer of erosion problems to adjacent shoreline properties. This leads to further construction of erosion-control structures and the eventual "hardening" of the shoreline.

Third, OHA has concerns about the restriction of lateral shoreline access as a result of seawall construction. The DEAs state that "public access to the beach fronting the properties will not be affected". In the same paragraph it is stated that the beaches fronting these properties are "very narrow...(and) are affected by wave run-up during high tides, particularly during high surf events" (page 9).

OHA believes that lateral shoreline access will be affected by these seawalls because of the continued erosion of the fronting beaches. Furthermore, any access by the public to these "very narrow" beaches could be extremely dangerous presenting a serious safety hazard.

Figure 7 in the DEAs illustrate the design of the proposed seawall structures. The tops of the proposed seawalls are only 1' 10" wide. This hardly seems adequate to allow "safe" lateral access to the shoreline especially during times of high surf events. The proposed seawalls should be designed to allow shoreline access without presenting a safety hazard to the public.

The conflict between the protection of private property and the preservation of public beaches in the context of coastal zone management in Hawaii is an unresolved issue which needs to be addressed. The preparers of the DEA are not expected to address this issue directly. However, it should not be glossed over in the DEA by the presentation of inconclusive evidence and broad-based assumptions.

OHA would appreciate the applicant's cooperation by providing our office with a written response to the above concerns. If you have any questions or need additional information, please contact Lynn Lee, Acting Land and Natural Resources Division Officer or Richard Stook, EIS Planner at (594-1888).

Sincerely yours,

Randall Ogata
Administrator

Lynn Lee, Acting Officer,
Land & Natural Resources

RS:rs
cc: Trustee Clayton Hee, Board Chair
Trustee Rowena Akana, Land & Sovereignty Chair
Trustee Abraham Aiona, Board Vice-Chair
Trustee Haunani Apoliona
Trustee Billie Beamer
Trustee Frenchy DeSoto
Trustee Moses Keale
Trustee Collette Machado
Trustee Hannah Springer

GROUP 70
INTERNATIONAL

5 December 1997

Mr. Randall Ogata, Administrator
Ms. Lynn Lee, Acting Officer, Land & Natural Resources
Office of Hawaiian Affairs
State of Hawai'i
711 Kapi'olani Boulevard, Suite 500
Honolulu, Hawai'i 96813-5249

Dear Mr. Ogata and Ms. Lee:

Subject: **Shore Setback Variances for Reconstruction of Seawalls**
Zane, Frost, Compton & Masunaga Properties, Mokuleia, Oahu
TMK (1) 6-8-10:23, 24, 25 and 26
Responses to Comments on Draft Environmental Assessments

Thank you for your letter to the Department of Land Utilization dated September 11, 1997. The following letter responds to the comments provided on the Draft Environmental Assessments for the subject properties.

1. **Erosion of Adjacent Beach Area/Impact on Shoreline Processes.** We have obtained aerial photography for this section of the coastline dating back to 1949. The presence of the four vertical seawalls does not indicate direct evidence of accelerated shoreline retreat due to the seawall structures on these properties. The beach has retreated at an average rate of one foot per year since 1949. This rate of retreat applies to the 20-30 years before the subject seawalls were built. It is clear that the current situation is a constant reflection of energy and scouring of sand from the area fronting the seawalls.

Your comments are well taken from a pure academic examination of vertical structures on sand beaches. It is important to understand that each and every shoreline situation is unique. However, if the trend of shoreline retreat was allowed to continue at these properties, the beach would have continued to retreat at a rate of approximately one foot per year, and these four house lots would now be eliminated. Of note, if these four lot owners did not armor their shoreline sections, Farrington Highway would have become threatened by

shoreline erosion, and armoring of the road by the State would likely have been undertaken.

2. **Lateral Shoreline Access.** The four seawalls are aligned together and match the adjoining properties on either side. At this location, there are 16 properties in a row that are all protected by vertical seawalls. The beach along this entire section of the Mokuleia coast could be considered very narrow. Lateral passage along this shoreline in front of the seawalls will be improved by the proposed action, which will remove loose rock debris and deteriorated wall sections, and replace these with an engineered modified vertical seawall structure. With the lower sloped portion consisting of large rock material, there will be a return of a slightly wider beach for lateral passage. At the three lots to the west where modified vertical seawalls were recently built with the hybrid wall design, there has been a recent return of a narrow strip of beach sand along a section where there was no beach sand for lateral passage in the recent past.

It was never intended for people to walk along the top of the 9-foot high walls, as this would be hazardous. People who like to walk this portion of the beach for fishing, gathering or other recreation will be able to continue this practice without interruption. The new walls will not diminish lateral access and are likely to improve it through the new hybrid wall design, as shown by the trend of the beach fronting the three lots to the west.

Thank you from providing your comments on the Draft EA. Please contact me if you have questions or require additional information.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP
Chief Environmental Planner

P:\Planning\97011-11 Compton SSV\EA RESPONSES\lro001jo_mokasw11207_OHArespWD6.rtf

97-06-199

BENJAMIN J. CAYETANO
GOVERNOR

'97 SEP 18 AM 8:17

CITY & COUNTY OF HONOLULU

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

September 15, 1997

Ms. Jan Naoe Sullivan
Director of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Ms. Sullivan:

Subject: Compton Seawall Reconstruction, Mokuleia, Oahu

It is the policy of the State of Hawaii under HRS Chapter 205A to discourage all shoreline hardening that may affect access to, or the configuration of, our island beaches.

Any EA prepared in conjunction with an application to construct a seawall, revetment or similar structure should be accompanied by appropriate justification and detailed studies including, but not limited to, the following:

1. A Historical Shoreline Analysis of coastal erosion and accretion rates. This should include a description of all movements of the neighboring shoreline over at least the past 30 years. This analysis should be based, at least in part, on aerial photographs available through government agencies and private vendors. The analysis should provide a detailed history of erosion and accretion patterns using all available evidence.

2. A description of the nature of the affected shoreline, whether sandy, rocky, mud flats or any other configuration. The history and characteristics of adjoining sand dunes and reefs should be included.

3. Site maps that clearly show the current certified shoreline, previous certified shorelines, the private property line and the location of the proposed structure. **Any nearby public access right-of-way should also be depicted.**

4. Beach profiles that extend off shore at appropriate intervals along the beach indicating the width and slope of both the submerged and dry portions of the beach.

5. An analysis of any existing nearby walls or revetments and their cumulative impacts on the shoreline.

6. A description of structures and improvements (such as homes or swimming pools) on the subject property, their distance from the property line and shoreline, and how they may be affected by the construction of the proposed hardening project.

7. A wave and storm frequency analysis for the area in question. This should include any relevant coastal processes such as longshore currents and seasonal wave patterns.

8. **An analysis that predicts the location of future shorelines with and without the proposed wall at least 30 years into the future or over the expected life of the hardening project.**

9. Photos of the site that illustrate past and present conditions and locate the proposed structure.

10. **All alternatives to shoreline hardening should be thoroughly researched and analyzed. These alternatives should include beach replenishment, dune-scaping, retreat from the shoreline by moving existing structures inland, and a no action alternative.**

The inclusion of this information will help make an Environmental Assessment complete and meet the requirements of Chapter 343, HRS. **Our review of the draft environmental assessment indicates that many of these points have been addressed. Please answer the remaining questions (highlighted in bold text) in the final environmental assessment.** Only after thorough study and analysis should any permit for shoreline hardening be considered.

Should you have any questions please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Gary Gill
Director

c: Roger and Jean Compton

GROUP 70
INTERNATIONAL

Francis S. Oda, AIA, AICP
Norman G.Y. Hong, AIA
Sheryl B. Seaman, AIA, ASID
Hitoshi Hida, AIA
Roy H. Nihei, AIA, CSI
James I. Nishimoto, AIA
Ralph E. Portmore, AICP
Stephen H. Yuen, AIA
Linda L. Chung, AIA

Paul P. Chorney, AIA
Dean H. Kitamura, AIA
Norma J. Scott, AIA
Stephen E. Callo, CPA
George I. Atta, AICP
Jeffrey H. Overton, AICP
Kathryn A. Nam
Roy A. Inouye
Mary J. O'Leary

5 December 1997

Mr. Gary Gill, Director
Office of Environmental Quality Control
State of Hawai'i
236 South Beretania Street, Suite 702
Honolulu, HI 96813

Dear Mr. Gill:

Subject: **Shore Setback Variances for Reconstruction of Seawalls**
Zane, Frost, Compton & Masunaga Properties, Mokuleia, Oahu
TMK (1) 6-8-10:23, 24, 25 and 26
Responses to Comments on Draft Environmental Assessments

We have received a copy of your letter to the Department of Land Utilization dated September 15, 1997. The following letter responds to the comments provided on the Draft Environmental Assessments for the subject properties, and these are incorporated into the Final EA in accordance with your request.

1) **Pubic Access.** The closest public access right-of-way is depicted in the TMK map shown in Figure 2. An access easement is found approximately 500 feet to the east off Ho'omana Street.

2) **Future Shoreline Prediction.** The predicted location of the shoreline with and without the proposed improvement is discussed indirectly in the Draft EA. The current shoreline is found at the toe of the existing wall, and is anticipated to remain at this location with the new modified vertical seawall. Without the reconstructed wall, the rate of shoreline retreat at this location over the past 50 years will likely continue at one foot per year. With a lot depth of approximately 80 feet, the new shoreline in 30 years without a structure would likely occur at least 30 feet inland. Unless the inland progression of the shoreline slowed at this location, the shoreline would eventually be found at the toe of a new shoreline structure that would need to be built by the State Department of Transportation to protect Farrington Highway.

3) **Dune Scaping and Moving Existing Structures.** The alternatives to the proposed action for creating artificial dunes or moving the existing home further mauka are not practical. There is no room to move the homes further mauka. This shoreline is a high-energy environment that could possibly be stabilized temporarily by sand replenishment and dune creation. The quantity of sand fill material would be tremendous – to provide a 100 foot wide beach with a single dune across the entire 1,800-foot coastal cell would require depositing over 40,000 cu. yd. of sand. At a unit cost of anywhere from $125 to $250/cu. yd., the estimated cost for such a project would be $5.0 to 10.0 million, which is prohibitively expensive for these 16 homeowners. Further, the creation of a new beach would have little chance of remaining given the existing energy regime along this coast, without structural containment measures such as a groin field. The added sand would most likely be carried off this shore and could pose a risk to the nearshore reef ecosystem.

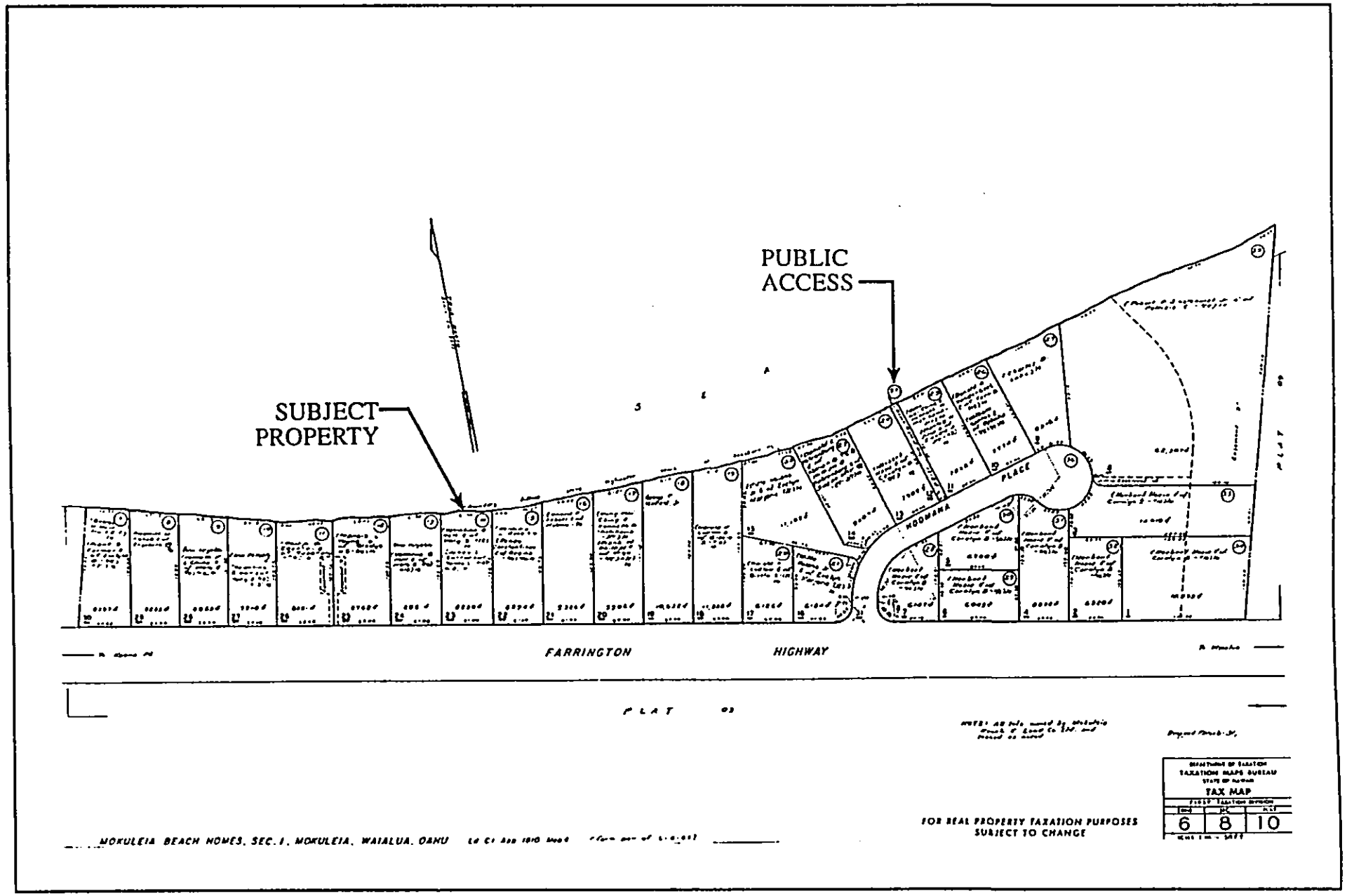
Thank you from providing your comments on the Draft EA. Please contact me if you have questions or require additional information.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP
Chief Environmental Planner

P:\Planning\97011-11 Compton SSV\EA RESPONSES\lgg001jo_mokaw11207_OEQCrespWD6.rtf



TMK 6-8-10:23

Shoreline Setback Variance

Figure 2

97-06913

DEPARTMENT OF PARKS AND RECREATION

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

JEREMY HARRIS
MAYOR

WILLIAM D. BALFOUR, JR.
ACTING DIRECTOR

MICHAEL T. AHII
DEPUTY DIRECTOR

CITY & COUNTY OF HONOLULU
1997 SEP 22 AM 9:49

September 18, 1997

TO: JAN NAOE SULLIVAN, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: WILLIAM D. BALFOUR, JR., ACTING DIRECTOR

SUBJECT: ENVIRONMENTAL ASSESSMENTS, CHAPTER 343, HRS
PROJECTS WITHIN THE SHORELINE SETBACK
SEAWALL RECONSTRUCTION
ZANE (97/SV-003), FROST (97/SV-004),
COMPTON (97/SV-005) and MASUNAGA (97/SV-006)
68-695, 68-697, 68-701, & 68-705 FARRINGTON HIGHWAY
MOKULEIA, OAHU, HAWAII
TAX MAP KEYS 6-8-10: 23, 24, 25, & 26

Thank you for the opportunity to review and comment on the draft environmental assessment for the above-mentioned projects.

Of the three options proposed for the protection of the above properties, Option b, "Construct a sloping rock revetment in place of the vertical seawall" is preferred. A gentle sloping boulder revetment would provide greater wave energy dissipation and allow for lateral access along the shoreline.

The proposed seawall will probably lead to further beach narrowing and loss. The loss of the beach would mean a loss of lateral access and curtail recreational use.

Please have your staff contact Mr. Carl Emura, Planner, of our Advance Planning Branch, at extension 6301 if you need further information.

W. D. Balfour, Jr.

WILLIAM D. BALFOUR, JR.
Acting Director

WDB:ei

GROUP 70
INTERNATIONAL

Francis S. Oda, AIA, AICP
Norman G.Y. Hong, AIA
Sheryl B. Seaman, AIA, ASID
Hitoshi Hida, AIA
Roy H. Nihei, AIA, CSI
James I. Nishimoto, AIA
Ralph E. Portmore, AICP
Stephen H. Yuen, AIA
Linda L. Chung, AIA

Paul P. Chorney, AIA
Dean H. Kitamura, AIA
Norma J. Scott, AIA
Stephen E. Callo, CPA
George I. Atta, AICP
Jeffrey H. Overton, AICP
Kathryn A. Nam
Roy A. Inouye
Mary J. O'Leary

5 December 1997

Mr. William D. Balfour, Jr., Acting Director
Department of Parks and Recreation
City and County of Honolulu
650 South King Street, 5th Floor
Honolulu, HI 96813

Dear Mr. Mizue:

Subject: **Shore Setback Variances for Reconstruction of Seawalls**
Zane, Frost, Compton & Masunaga Properties, Mokuleia, Oahu
TMK (1) 6-8-10:23, 24, 25 and 26
Responses to Comments on Draft Environmental Assessments

We have received a copy of your letter to the Department of Land Utilization dated September 18, 1997. The following letter responds to the comments provided on the Draft Environmental Assessments for the subject properties.

1) **Sloping Rock Revetment Alternative.** We recognize that the revetment structure would provide additional energy dissipation, however, the physical limitations of the four lots studied do not allow for the construction of sloping rock revetments. The revetment structure would extend to the existing residences, entirely eliminating the makai-side yards of these properties. The revetment would be added potential for wave run-up during very high surf conditions as compared to a vertical seawall. The proposed design of a modified vertical seawall, with a sloping lower half consisting of boulders, will provide some revetment style while retaining a yard.

2) **Beach Narrowing and Lateral Access.** The beach fronting the four seawalls is currently very narrow, and there is very little beach to be narrowed along the front of these walls. People can now transit the area fronting these walls for recreational purposes, and the new seawalls will not reduce lateral access. The proposed modified vertical seawall will allow for improved lateral access, and we anticipate some sand to return due to the change in structure type. The same design was used for the three lots to the west, and there has been a return of a narrow sand beach in that area.

Thank you from providing your comments on the Draft EA. Please contact me if you have questions or require additional information.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP
Chief Environmental Planner

P:\Planning\97011-11 Compton SSV\EA RESPONSES\lwb001jo_moksw11207_UPRrespWD6.rtf

97-06775

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 523-4341 • FAX: (808) 527-5857

JEREMY HARRIS
MAYOR

JONATHAN K. SHIMADA, PhD
DIRECTOR AND CHIEF ENGINEER
ROLAND D. LIBBY, JR.
DEPUTY DIRECTOR

ENV 97-188

September 15, 1997

MEMORANDUM:

TO: JAN NAOE SULLIVAN, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: JONATHAN K. SHIMADA, PhD
DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL ASSESSMENT (EA)
PROJECTS WITHIN SHORELINE SETBACK
TMK: VARIOUS

We have reviewed the subject EA and have the following comments:

1. We recommend the seawall construction by using lowest tide elevation of (-)2.01.

2. The EA should describe mitigative measures in more specific detail. For example, what time of the year (wet and dry season) be considered in the construction? What is the anticipated duration of construction? Will water be directed from shoreline during construction of the seawall? Will immediate planting be made to mitigate erosion of silt and sediment?

If you have any questions, please contact Alex Ho at Local 4150.

GROUP 70
INTERNATIONAL

5 December 1997

Dr. Jonathan K. Shimada, Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, HI 96813

Dear Dr. Shimada:

Subject: **Shore Setback Variances for Reconstruction of Seawalls**
Zane, Frost, Compton & Masunaga Properties, Mokuleia, Oahu
TMK (1) 6-8-10:23, 24, 25 and 26
Responses to Comments on Draft Environmental Assessments

We have received a copy of your memo to the Department of Land Utilization dated September 15, 1997. The following letter responds to the comments provided on the Draft Environmental Assessments for the subject properties.

1) **Seawall Construction.** The design for the new seawalls will set the foundation at six feet below the mean sea level. The foundation is planned to rest approximately four feet below the lowest tide elevation of –2.01.

2) **Mitigating Measures.** Construction is planned for next year during the low surf season, which occurs generally from May to August. This time frame also tends to be the drier time of the year. The construction will require approximately six to eight weeks to complete. There will be a need to deflect water from the work area during the construction of the foundation and lower section of the walls. This will be accomplished by constructing a small berm on the beach or using temporary sheet piles.

There is no possibility to establish plants on the makai side of the wall due to the narrow width of the beach. The introduction of suspended sediments to coastal waters will be minimized, following conditions imposed under the Army Corps of Engineers Permit and State Water Quality Certification.

Thank you from providing your comments on the Draft EA. Please contact me if you have questions or require additional information.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP
Chief Environmental Planner

97-06827

O'AHU GROUP
SIERRA CLUB, HAWAI'I CHAPTER
P.O. Box 2577, Honolulu, Hawaii 96803
Phone: (808) 538-6616

September 10, 1997

Jan Sullivan
Director
Department of Land Utilization
650 S. King St 7th Floor
Honolulu, HI 96813

Dear Ms. Sullivan,

RE: WAIALUA SEAWALL VARIANCE APPLICATIONS

The O'ahu Group of the Sierra Club has concerns regarding the four applications for shoreline setback variances in Waialua. Please include this in the public record for both the variance application and the environmental assessment for all four applications.

Shoreline Setback Variances must be consistent with the objectives and policies of HRS 205A-2. 205A-4(b) These objectives and policies include:

- providing recreational opportunities accessible to the public;
- protecting the quality of coastal scenic and open space resources;
- protecting beaches for public use and recreation;
- providing and managing adequate public access to and along shorelines with recreational values; and
- prohibiting construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities.

No variance may be granted unless safe lateral access to and along the shoreline is provided. 205A-46(c)(1) No variance may be granted unless conditions are imposed to minimize adverse impacts to beach processes. 205A-46(c)(2). No variance may be granted unless conditions are imposed to minimize loose rocks from impacting public property. 205A-46(c)(3). No variance may be granted unless conditions are imposed to minimize adverse impacts on public views. 205A-46(c)(4).

We know that 25% -- about 10 miles -- of Oahu's beaches have eroded thanks to coastal armoring. Studies done by the Army Corps of Engineers, the University of Hawai'i and the Coastal Zone Management Program (all of which DLU has in its records and all of which are incorporated into the record by reference) demonstrate that if a shoreline is undergoing long-term retreat,

beach narrowing and loss can be expected if the beach is armored. See, e.g., Hwang and Fletcher, Beach Management Plan with Beach Management Districts (June 1992).

The loose boulders along the shoreline placed by the applicants make lateral access almost impossible. The existing seawalls along the coastline appear to have caused extensive beach erosion.

What kind of assurance do the applicants provide that recreational resources of the beach will be able to be enjoyed by the public? What kind of lateral access is provided?

If DLU imprudently grants the variance, at the very least, it should have an expiration date to ensure that no vested right is granted.

Sincerely,

Philip Bogetto
Chair

GROUP 70
INTERNATIONAL

Francis S. Oda, AIA, AICP
Norman G.Y. Hong, AIA
Sheryl B. Seaman, AIA, ASID
Hitoshi Hida, AIA
Roy H. Nihei, AIA, CSI
James I. Nishimoto, AIA
Ralph E. Portmore, AICP
Stephen H. Yuen, AIA
Linda L. Chung, AIA

Paul P. Chorney, AIA
Dean H. Kitamura, AIA
Norma J. Scott, AIA
Stephen E. Callo, CPA
George I. Atta, AICP
Jeffrey H. Overton, AICP
Kathryn A. Nam
Roy A. Inouye
Mary J. O'Leary

5 December 1997

Mr. Philip Bogetto, Chair
Sierra Club, Hawai'i Chapter, O'ahu Group
P.O. Box 2577
Honolulu, HI 96803

Dear Mr. Bogetto:

Subject: **Shore Setback Variances for Reconstruction of Seawalls**
Zane, Frost, Compton & Masunaga Properties, Mokuleia, Oahu
TMK (1) 6-8-10:23, 24, 25 and 26
Responses to Comments on Draft Environmental Assessments

We have received a copy of your letter to the Department of Land Utilization dated September 10, 1997. The following letter responds to the comments provided on the Draft Environmental Assessments for the subject properties.

We appreciate your information regarding objectives and policies of HRS 205A-2 and 205 A-4. The owners are addressing these objectives and policies in the manner they have proposed to reconstruct their existing walls using a structural design that maximizes the lateral access options, is an aesthetic improvement, and minimizes erosional forces due to the structure.

The four seawalls are aligned together and match the adjoining properties on either side. At this location, there are 16 properties in a row that are all protected by vertical seawalls. The beach along this entire section of the Mokuleia coast could be considered very narrow. Lateral passage along this shoreline in front of the seawalls will be improved by the proposed action, which will remove loose rock debris and deteriorated wall sections, and replace these with an engineered modified vertical seawall structure. With the lower sloped portion consisting of large rock material, there will be a return of a slightly wider beach for lateral passage. At the three lots to the west where modified vertical seawalls were recently built with the hybrid wall design, there has been a recent return of a narrow strip of beach sand along a section where there was no beach sand for lateral passage in the recent past.

It was never intended for people to walk along the top of the 9-foot high walls, as this would be hazardous. People who like to walk this portion of the beach for fishing, gathering or other recreation will be able to continue this practice without interruption. The new walls will not diminish lateral access and are likely to improve it through the new hybrid wall design, as shown by the trend of the beach fronting the three lots to the west.

Thank you from providing your comments on the Draft EA. Please contact me if you have questions or require additional information regarding our request for Nationwide Permit coverage.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP
Chief Environmental Planner

Wednesday, October 1, 1997

Roger and Jean Compton
312 Ilimalia Look
Kailua, HI 96734

Dear Mr. and Mrs. Compton,

In yesterday's Honolulu Advertiser I saw that the Army Corps of Engineers are granting a permit to clear the Makaleha Stream. I also noticed that you have applied for a Seawall Reconstruction in The Environmental Notice of 8/23/1997.

I am concerned with shoreline erosion and have been for a number of years. We live on the beach front on Maui, and I should like to share with you the three approaches we took (that failed) as well as the approach that led to success in curbing beach erosion.

We here at Sugar Cove sandbagged a part of our shoreline in 1988 and again in 1989. The bags broke up. We built a tire revetment in 1990. It also fell apart. In 1993 we built a boulder revetment that started to disintegrate during the next winter's storms. By 1995 the boulders had fallen seriously in three areas. (There is 500 feet of our shoreline and 100 feet of our adjoining neighbor's.)

We started in the fall of 1995 with minor sand feeding that helped us through the following winter. In June of 1996 we instigated a large sand feeding operation. This immediately moved the water (wave action) offshore and returned the beach to us. We are committed to ongoing sand feeding.

I know you are saying, "But sand feeding is so expensive." We spent over $600,000 on the failed approaches (over $300,000 on the boulders alone), and we have spent only $95,000 to date on the sand feeding. Granted we have sand sources here on Maui, but you may have some on Oahu that haven't been discovered yet. More of that later.

Beach erosion happens for many reasons. In our case the culprit was mining sand from our shoreline for a hundred years. The sugar industry used sand to make lime to process sugar, and sand was also used to make roads and filter water. But that was done before we came, and we were faced with continuing erosion.

Beach erosion occurs when there is no longer shallow water far enough offshore to cause the waves to break away from the shoreline.

Let's put it another way. Waves break when they hit shallow water, whether on a reef, a breakwater, or best and more naturally they break on a gradually tapering beach. A wall to protect one's property is no different than a breakwater out in the ocean, and a sudden breaking of a wave or waves has a lot of force. Breakwaters are notorious for requiring maintenance because of the huge forces that impinge on them during storms when waves are big.

So how do you protect your property <u>without</u> the heavy duty rocks you are proposing to install?

You put in sediment to move the shoreline farther from your door by creating shallow water farther offshore.

How do you accomplish this?

By added fill. The fill can be anything the ocean can move around, and this can be cobbles, broken concrete (as from building construction debris), coral rubble (if it were available), gravel, broken rocks, or of course sand. But the sand can veneer the fill after the filling of the offshore is completed.

And why does this work?

Because nature wants to hold back the sea, and it tries very hard to even when its beach or buffer zone is deprived of the movable sediment it needs to keep this natural system functioning properly.

What is this natural system or buffer zone that holds back the sea?

It is comprised of three parts:

(1) The offshore sediment that creates shallow water when necessary to move wave action away from the shore.
(2) The swash zone where the waves run up and down or back and forth on the wet and dry sand.
(3) The reservoir of sand or sand bank that forms a dune or dry sand on a healthy beach.

Why are our beaches in Hawaii in trouble?

The diminishing of Part (3) is most often the culprit. This reservoir is deprived of sand that needs to be in the bank for times of big surf, most often by people who want to protect their property. They build walls or fortification of some sort. These walls then cut off part of the reservoir, so that their neighbor's sand is called upon to supply the beach's natural system with what it needs. Nature doesn't know whose beach front is whose. It uses sand that is available.

The first person to recognize danger builds a wall without understanding that the whole beach needs sand. He saves his lawn (that was built on sand in the first place), but the other neighbors' yards will now be called upon to replenish the supply that is cut off when storm waves come along.

When storm waves come along, the beach knows that it needs to move sediment offshore so that the larger waves will break farther away from the land and run up the swash slowly rather than hitting the shore with great force.

So what can you do about this?

Gather your neighbors that are complaining about **your wall** and explain that they were in a large part responsible for the more recently deteriorated beach. Until now **you** were contributing **your sand** to maintain the natural beach system, but finally there is no money (sand) left in your bank account. Now it is time for everyone along your beach to contribute to the restoration of the protective beach system that nature intended for all these properties.

How can this be accomplished?

(1) By everyone in your neighborhood cooperating.
(2) By seeking sources of sediment to apply to the beach system.
(3) By hauling or dredging or shoveling sediment that the ocean can (and will) move into the cavities that have developed offshore.

Why is this of imminent importance?

Because until the offshore slope on your shoreline is made gradual, the beach will continue to erode. Regardless of the size and strength of the wall you put up, you will be faced with continual maintenance of it until the beach is restored with sand or movable sediment.

My parting shot is this, and it is from the age old wisdom of Jeremiah

5:21,22

> " Hear now this, O foolish people, and without understanding; which have eyes, and see not; which have ears, and hear not: Fear ye not me? saith the Lord: will ye not tremble at my presence, which have placed the sand for the bound of the sea by a perpetual decree, that it cannot pass it: and though the waves thereof toss themselves, yet can they not prevail; though they roar, yet can they not pass over it?"

This means that the sand binds the sea providing the protection needed. Man needs to understand that this binding cannot be broken and hold the sea in its place. The binding is the buffer zone of the beach system. The dune and the offshore are an integral part of this buffer zone, and to put up a wall without providing sediment in front of it is asking for trouble.

Call on your neighbors. Let them know that it is sediment in front of their walls that is needed. The whole area needs to cooperate with a greater sense of community.

I invite you to call or write to me. I am a private homeowner who is also interested in saving beach front property as well as saving the beach so everyone can enjoy it.

Yours sincerely,

Barbara Guild

Barbara Guild
320 Paani Place 1A
Paia, Maui, HI 96779
808-877-3109
808-877-3524 fax

cc:

Jeffrey Overton (523-5899 x 111)
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813

Steve Tagawa (523-4817) 527-6743fax
City & County of Honolulu Deptartment of Land Utilization
650 South King Street, 7th Floor
Honolulu, HI 96813

GROUP 70
INTERNATIONAL

Francis S. Oda, AIA, AICP
Norman G.Y. Hong, AIA
Sheryl B. Seaman, AIA, ASID
Hitoshi Hida, AIA
Roy H. Nihei, AIA, CSI
James I. Nishimoto, AIA
Ralph E. Portmore, AICP
Stephen H. Yuen, AIA
Linda L. Chung, AIA

Paul P. Chorney, AIA
Dean H. Kitamura, AIA
Norma J. Scott, AIA
Stephen E. Callo, CPA
George I. Atta, AICP
Jeffrey H. Overton, AICP
Kathryn A. Nam
Roy A. Inouye
Mary J. O'Leary

5 December 1997

Ms. Barbara Guild
320 Pa'ani Place 1A
Pa'ia, Maui, HI 96779

Dear Ms. Guild:

Subject: **Shore Setback Variances for Reconstruction of Seawalls**
Zane, Frost, Compton & Masunaga Properties, Mokuleia, Oahu
TMK (1) 6-8-10:23, 24, 25 and 26
Responses to Comments on Draft Environmental Assessments

We have received a copy of your letter to the Department of Land Utilization dated October 1, 1997. The following letter responds to the comments provided on the Draft Environmental Assessments for the subject properties.

We truly appreciate the comments you have provided, as it provides a testament to the struggle that many other fellow shoreline property owners face in protecting their investment and human safety. You have obviously become deeply familiar with the dynamics of your coastline, and have accumulated a knowledge base of erosion problems on Maui. Your suggestion to discuss the options with our neighbors and seek a common solution is a very good approach. Mr. Compton has been spearheading an effort to get his neighbors together over the past two years to seek a solution.

At the four properties in Mokuleia, the owners are faced with a similar problem of a retreating shoreline and failing structures. Shoreline retreat along this stretch of coast has been at the rate of one foot per year for the time period 1949-1996, including the 20 years prior to the first wall built in this area. With shallow lots, the owners have little choice but to protect their homes with a shoreline structure.

The four owners of the subject properties are reconstructing their CMU seawalls with a modified vertical seawall design. This design includes a sloping lower section of boulders on a footing six feet below sea level. The strong foundation and grouted rock of these walls will not allow for boulders to slip away. The

energy of waves striking the structure is reduced by the sloped lower section and spaces between the boulders.

Sand replenishment and other soft structure options have been considered by the owners. The cost to pump or truck sand to this beach is prohibitive. There would be long time delays due to an uncertain federal, state and county permitting process and the possibility of community controversy. The North Shore of O'ahu has a famous high ocean energy regime that directly affects these properties, and it is unlikely that placed sand would remain without additional structural containment such as a groin field. Offshore transport of placed sand from the beach could also cause smothering of nearshore benthic habitats.

Offshore fill material placement could reduce the energy striking this coast, and a breakwater structure could provide a reduction in wave energy at the four properties. However, placement of offshore fill or construction of a breakwater would be a costly and controversial use of the ocean and public underwater lands. The owners do not have years to save their property – they could lose everything this winter. They need to reconstruct next summer with a well designed structure and continue to discuss the long-term options with their neighbors and government.

Thank you from providing your comments on the Draft EA. Please contact me if you have questions or require additional information.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP
Chief Environmental Planner

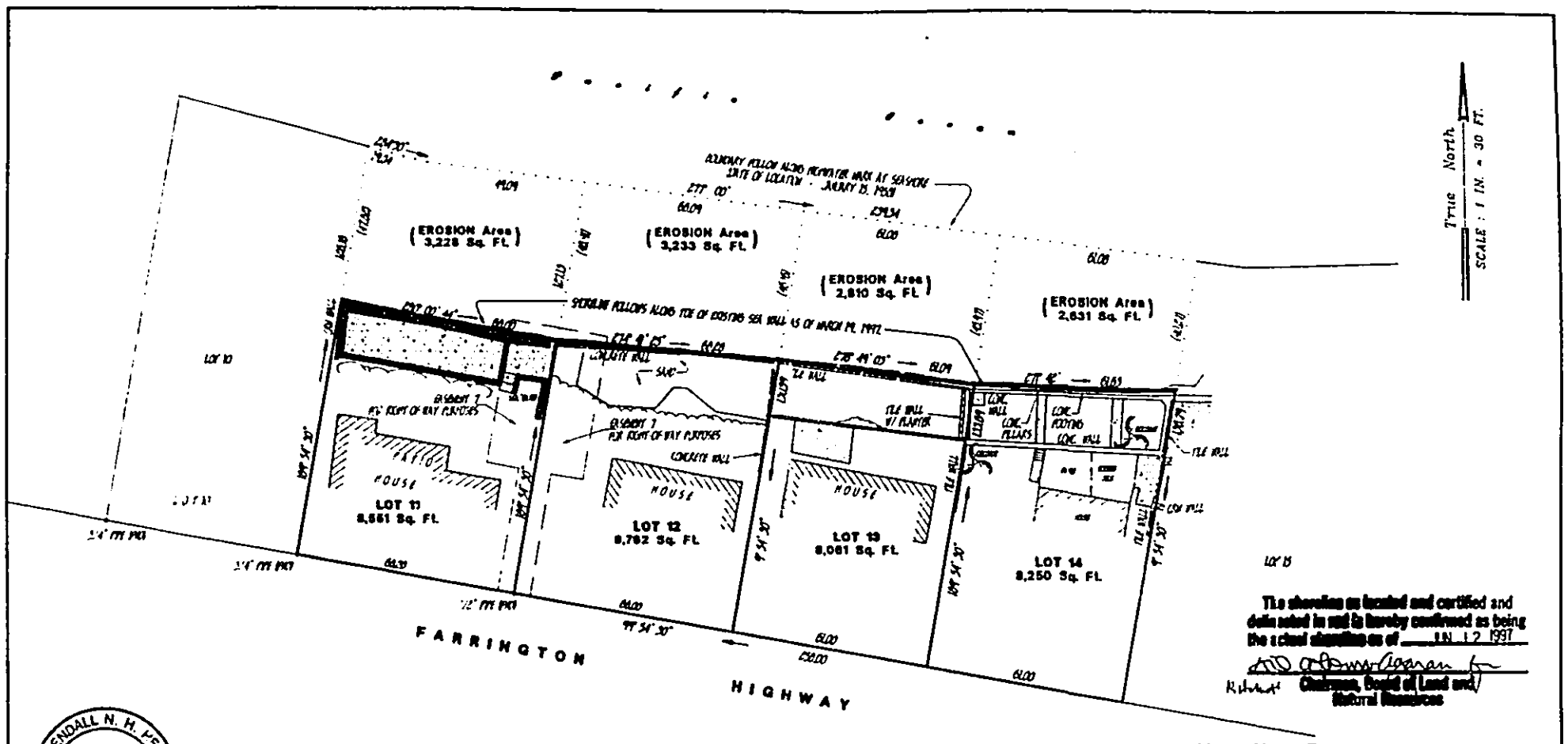
P:\Planning\97011-11 Compton SSV\EA RESPONSES\lbg001jo_mokaw11207_GUILDresp.rtf

APPLICATION FOR SHORELINE SETBACK VARIANCE AND
FINAL ENVIRONMENTAL ASSESSMENT

Reconstruction of Seawall at 68-695 Farrington Highway, Mokuleia

EXHIBIT A

SHORELINE SURVEY MAP



Shoreline Survey

Lots 11 thru 14
of Land Court Application 1810 (Map 4)
"Mokuleia Beach Homes, Sec. 1"
at Mokuleia, Waialua, Oahu, Hawaii
T.M.K. : 6-8-10 : parcels 23-26

Client: Roger Compton, Pat Baines, Jack Frost and Harold Masunaga

Property Address: 68-695 thru 68-705 Farrington Highway

Purpose: For Wall Construction

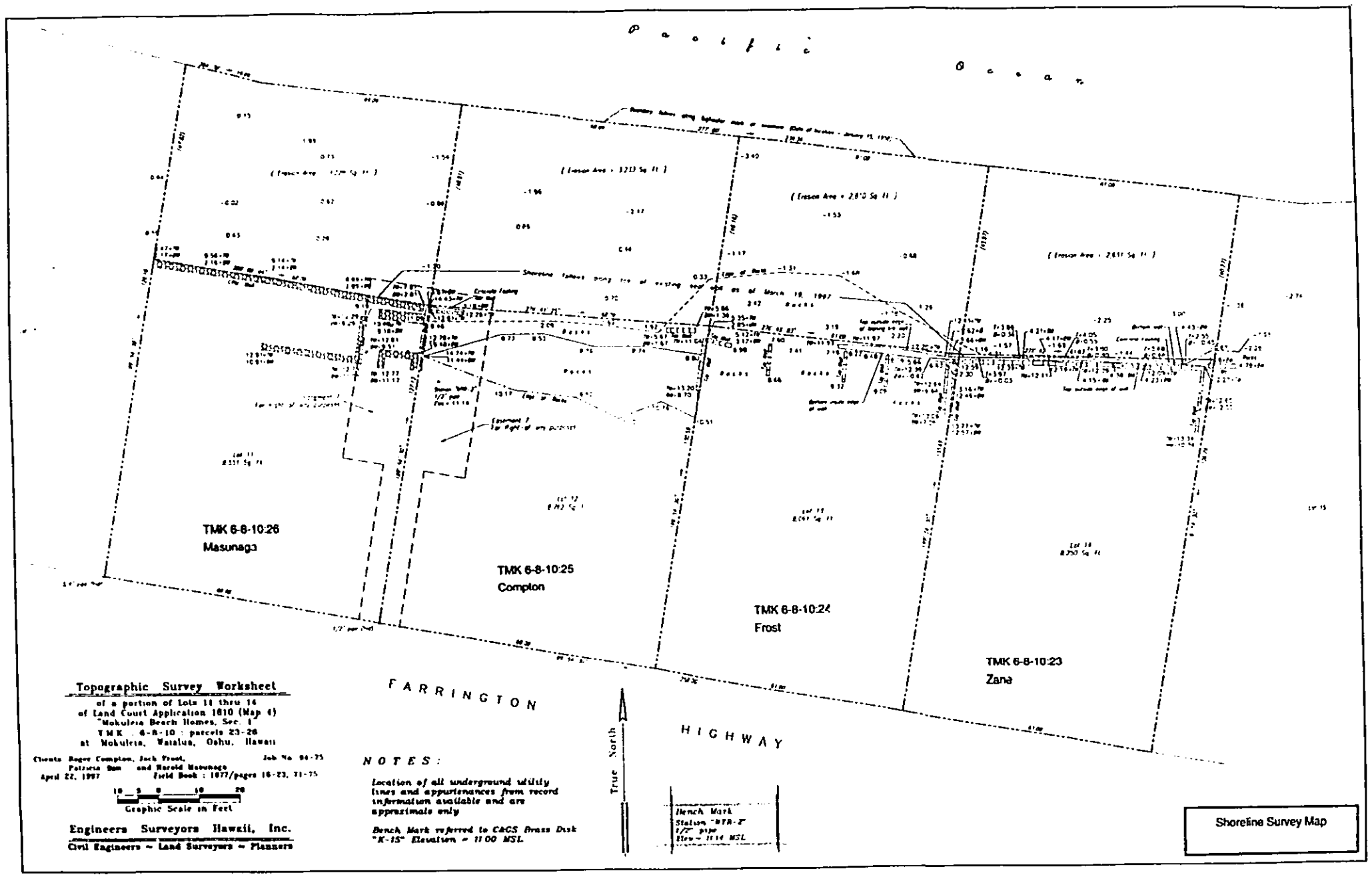
This work was prepared by me or under my direct supervision.

Kendall N. H. Yee
Licensed Professional Land Surveyor
Certificate Number 5049

Honolulu, Hawaii
FB: 1077 / pages 16-23
94-75

ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ PLANNERS

1020 Auahi Street
March 19, 1997

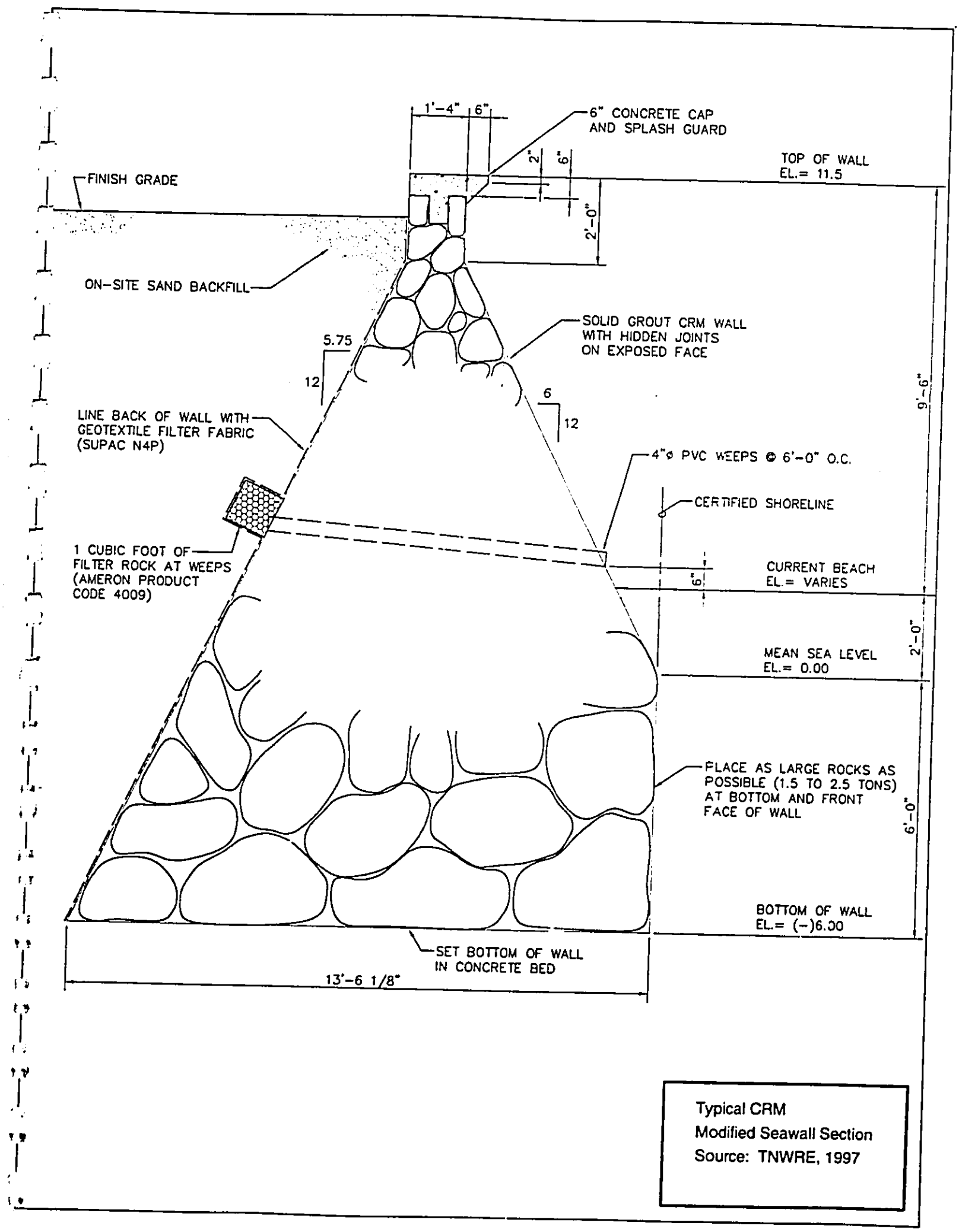

Pacific Ocean
TMK 6-8-10:26
Masunaga
TMK 6-8-10:25
Compton
TMK 6-8-10:24
Frost
TMK 6-8-10:23
Zana
FARRINGTON HIGHWAY
True North
Topographic Survey Worksheet
of a portion of Lots 11 thru 14
of Land Court Application 1810 (Map 4)
"Mokuleia Beach Homes, Sec. 1"
TMK : 6-8-10 : parcels 23-26
at Mokuleia, Waialua, Oahu, Hawaii
Clients: Roger Compton, Jack Frost, Patricia Dunn and Harold Masunaga
Job No. 96-75
April 22, 1997
Field Book : 1077/pages 16-23, 71-75
Graphic Scale in Feet
Engineers Surveyors Hawaii, Inc.
Civil Engineers ~ Land Surveyors ~ Planners
NOTES:
Location of all underground utility lines and appurtenances from record information available and are approximate only
Bench Mark referred to C&GS Brass Disk "K-15" Elevation = 11.00 MSL
Bench Mark
Station "HTR-3"
1/2" pipe
Elev = 11.14 MSL
Shoreline Survey Map

APPLICATION FOR SHORELINE SETBACK VARIANCE AND
FINAL ENVIRONMENTAL ASSESSMENT

Reconstruction of Seawall at 68-695 Farrington Highway, Mokuleia

EXHIBIT B

PRELIMINARY CONSTRUCTION DRAWINGS



Typical CRM
Modified Seawall Section
Source: TNWRE, 1997

APPLICATION FOR SHORELINE SETBACK VARIANCE AND
FINAL ENVIRONMENTAL ASSESSMENT
Reconstruction of Seawall at 68-695 Farrington Highway, Mokuleia

EXHIBIT C

OCEANOGRAPHIC AND STRUCTURAL EVALUATION

EVALUATION OF THE
EXISTING SHORELINE AND SEAWALL STRUCTURE
AT TMK 6-8-10:24 (Lot 14)
Mokuleia, Oahu, Hawaii

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

APPLICATION FOR SHORELINE SETBACK VARIANCE AND
FINAL ENVIRONMENTAL ASSESSMENT

Reconstruction of Seawall at 68-695 Farrington Highway, Mokuleia

EXHIBIT C

OCEANOGRAPHIC AND STRUCTURAL EVALUATION

EVALUATION OF THE
EXISTING SHORELINE AND SEAWALL STRUCTURE
AT TMK 6-8-10:24 (Lot 14)
Mokuleia, Oahu, Hawaii

Proposed Seawall Reconstruction For TMKs 6-8-10:23 Through 26 at Mokuleia, Oahu, Hawaii

Prepared for

Group 70 International, Inc.
925 Bethel Street
Honolulu, Hawaii 96813-4398

Prepared by

Tom Nance Water Resource Engineering
680 Ala Moana Boulevard - Suite 406
Honolulu, Hawaii 96813

July 1997

Table of Contents

List of Figures

List of Tables

Introduction

This report has been prepared to provide technical and environmental information to support a Shoreline Setback Variance application for the construction of seawalls across the shoreline frontage of four contiguous house lots in Mokuleia, Oahu. Moving from east to west, the four lots are identified as follows:

TMK	Address	Area of the Lot (Ft^2)*	Length of Shoreline Frontage (Feet)
6-8-10:23	68-695 Farrington Highway	8250	61.63
6-8-10:24	68-697 Farrington Highway	8061	61.09
6-8-10:25	68-701 Farrington Highway	8762	68.28
6-8-10:26	68-705 Farrington Highway	8551	68.00

* These lot areas extend substantially beyond the present shoreline. Actual usable lot areas on the landward side of the present shoreline are 2631 to 3233 square feet less than this.

Information on which this report is based includes: discussions with the four lot owners; a topographic survey dated March 19, 1997 by Engineers Surveyors Hawaii, Inc.; a series of seven aerial photos for the 47 years from 1949 to 1996; borings done by Geolabs Hawaii to probe the depth to basement rock; and field investigation over a period of several months.

Project Location

The four lots which are the subject of this report are located along Farrington Highway, just east of the entrance to Dillingham Airfield in Mokuleia. Their location is shown on the portion of the USGS Kaena quadrangle map reproduced as Figure 1 and the tax map reproduced as Figure 2.

Shoreline Setting

The four lots are situated near the center of an unnamed shoreline embayment which is defined by rock outcrops on the west side (directly offshore of Camp Mokuleia) and a sandy headland on the east side. The sandy headland appears to have been formed by the wave protection of rock outcrops offshore and the generally shallower bathymetry directly offshore. The embayment, which faces directly to the north, is about 2500 feet across. The indentation of the shoreline is a maximum of 500

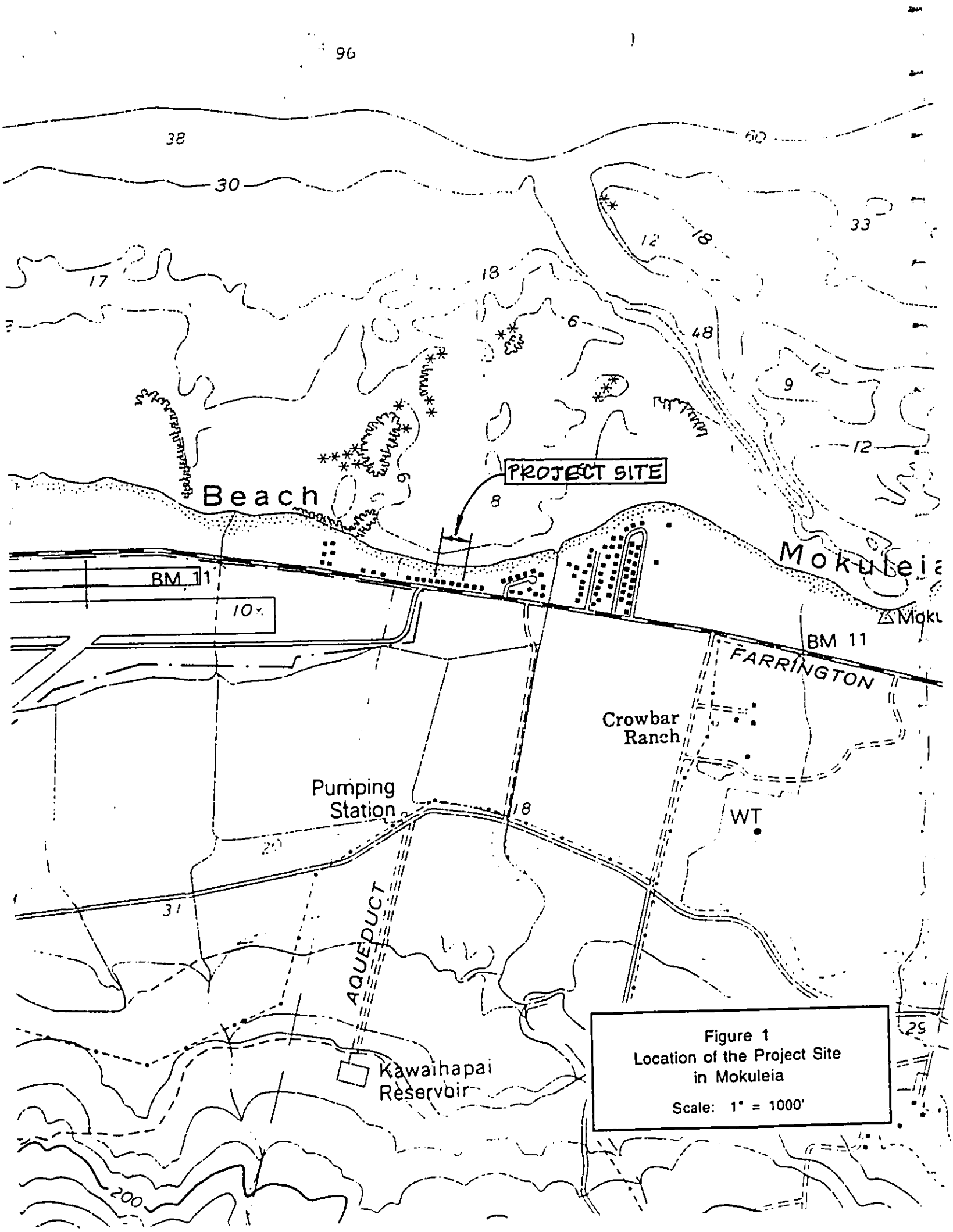


Figure 1
Location of the Project Site
in Mokuleia

Scale: 1" = 1000'

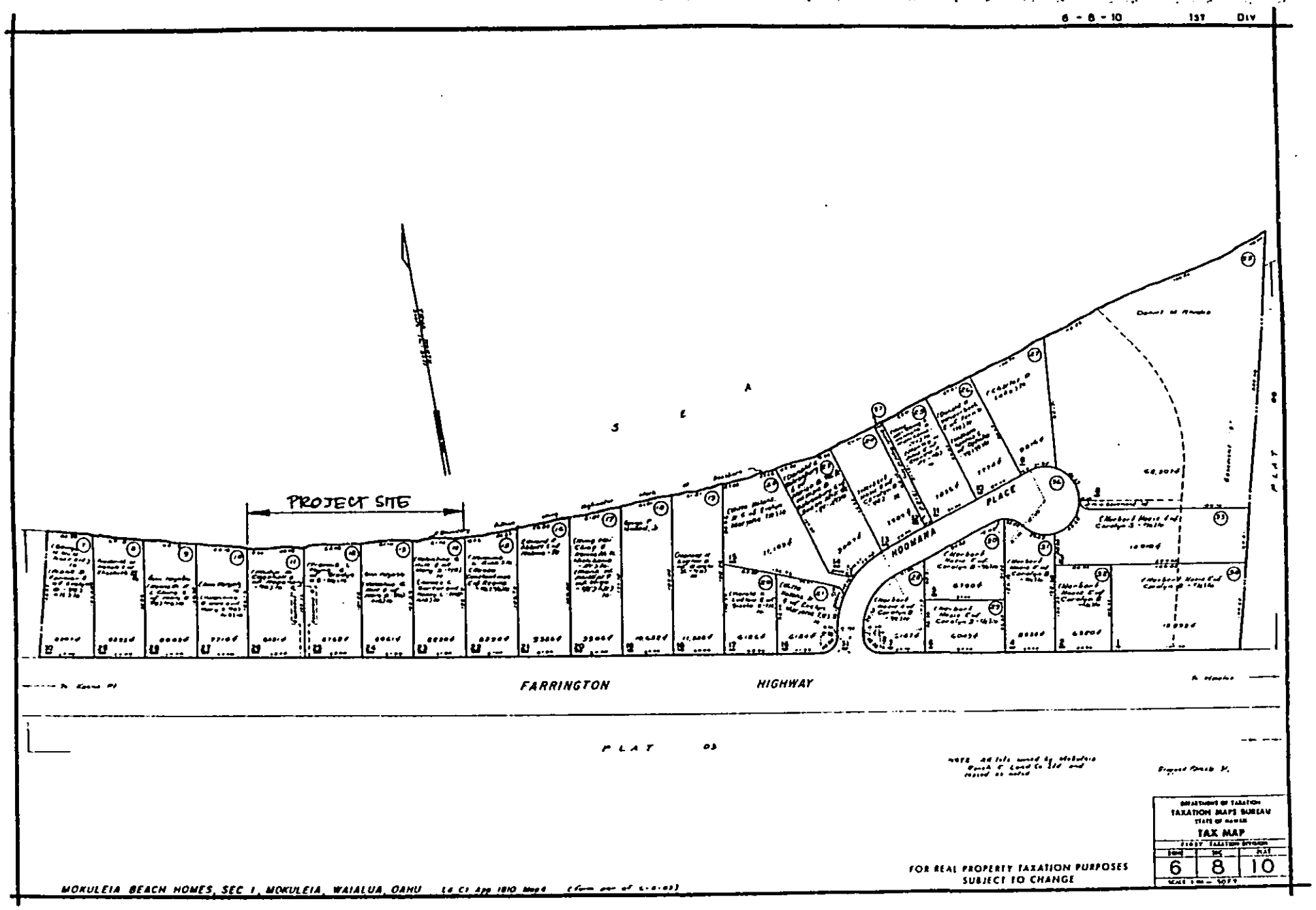


Figure 2
Locations of TMK 6-8-10:23 to 26
Along the Mokuleia Shoreline

feet at its center. Nearshore bathymetry is generally flat, although there are a number of coral encrusted boulders, some of which protrude above water at low tide. The bottom is comprised of dead corals, coralline algae, and shallow pockets of sand in depressions, all indicative of substantial wave energy. Water depths are generally six to eight feet for distances of 1500 to 2000 feet offshore. At that point, a series of ledges create a relatively steep drop-off to depths of more than 100 feet within 4000 feet of the shoreline. It might also be noted that there is a significant submarine channel located just to the east of the embayment and nearshore bathymetry described above (the channel is delineated by the bathymetric contours on Figure 1).

The north facing shoreline is directly exposed to waves from the northwest to the northeast, meaning that the wave energy reaching the shoreline is much greater during the winter months when waves from these directions are most frequent. Depths of the nearshore shelf control the breaking of waves and the amount of energy which reaches the beach. At low tide, the wave energy at the shoreline is far less than at high tide simply due to the different water depths at the tidal extremes.

Despite the fact that only moderate-sized waves can translate across the nearshore shelf and break on the beach, all of the lot owners along this embayment from Camp Mokuleia on the west end (TMK 6-8-03:8) to the beach access easement at Hoomana Place on the east end (TMK 6-8-10:13) have had to resort to seawall construction to stop the progressive loss of beach frontage and to prevent damage to structures behind the beach. Seawalls for the three lots immediately to the west of the four which are the subject of this report (TMKs 6-8-10:27, 28, & 29) were recently reconstructed. That construction has left the four lots in question with the most imminent need of shoreline protection.

Present Condition of the Shoreline Structures Fronting TMKs 6-8-10:23 Through 26

The photographs in Appendix A, which were taken at low tide on the morning of April 18, 1997, depict the present condition of the seawalls at the four lots. Each is described in the paragraphs following.

TMK 6-8-10:23 (Refer to Photo Nos. 1, 2, 3, and 4). The hollow tile wall along the shoreline frontage of this lot has a prominent vertical crack located about midway across the property and another vertical crack at its western boundary with TMK 6-8-10:24. It appears that the wall's shallow footing is the cause of the crack at mid-property. The catastrophic failure of the wall at TMK 6-8-10:24 appears to have caused the crack at the west end. Wave action at these locations has pulled material from behind the wall seaward, creating sink holes that the Owner has had to repeatedly fill.

This undermining on the landward side of the wall is shown in Photo Nos. 3 and 4. Although the Owner has backfilled with gravel and grout, these stop-gap measures are not long-term remedies for the wall's inadequate footing.

TMK 6-8-10:24 (Refer to Photo Nos. 5, 6, 7, and 8). As shown on Photo No. 5, only a 27-foot long section of the hollow tile seawall on the east end of this lot's shoreline frontage remains in place. However, it is tilting precariously seaward and is in danger of collapsing on the beach. The remaining 36 feet of the lot's frontage is strewn with boulders and pieces of concrete, some of which have been placed as an emergency shoreline protection measure (Photo No. 6). The bottom of the wall's foundation ends several feet above mean sea level, allowing it to be completely undermined as the beach in front of the wall eroded (Photo No. 7). The undermining has resulted in a substantial loss of material on the landward side of the wall (Photo No. 8). As is typical for all the older walls along this beach, an inadequate foundation appears to have been the cause of the wall's failure.

TMK 6-8-10:25 (Refer to Photo Nos. 9, 10, 11, and 12). Except for 5- and 8-foot long sections at the east and west ends of this property, the hollow tile seawall has completely collapsed. The balance of the shoreline frontage is now comprised of basalt boulders which were placed this past winter as an emergency measure to protect the house from wave damage. As with the other walls, the foundation was placed above sea level. Undermining by wave action caused the wall's failure.

TMK 6-8-10:26 (Refer to Photo Nos. 13, 14, 15, and 16). Unlike the hollow tile walls of the other three lots, this seawall is made of grouted rock and boulders (Photo Nos. 13 and 14). However, since its foundation stops above sea level, it has also experienced significant undermining. There has also been a collapse of a rock stairs structure at the east end (left side of Photo No. 13). To stop the proliferation of sink holes caused by waves washing underneath the foundation, a substantial volume of concrete was installed on the landward side of the wall (Photo No. 15). Since the seawall is relatively low and subject to relatively frequent overtopping, a second, interior wall was constructed (also visible in Photo No. 15). It is set back 14 feet from the first wall and is about three and a half feet higher.

Shoreline Changes, 1949 to 1996

Seven vertical aerial photographs were used to delineate shoreline changes over the 47-year period from 1949 to 1996. The dates of the seven photographs, all at approximately 1-inch equals 100-foot scale, are as follows: May 7, 1949; July 24, 1961; April 22, 1967; December 5, 1969; 1975; November 24, 1983; and 1996. The 1975 and 1996 photos were obtained from Air Survey

Hawaii and do not show the month and day they were taken. The other five aerial photos are from RM Towill Corporation. Only the 1996 photo is in color; all the others are black and white.

House and Seawall Construction. Using these seven aerial photos, Table 1 identifies the time periods for the construction of houses and seawalls. On all four lots, installation of the seawalls followed house construction by several to a number of years. The earliest seawall was installed some time between July 1961 and April 1967 at TMK 6-8-10:23, although it appears to have been realigned to conform to the crescent shape of the beach prior to the December 1969 photo. This seawall was among the first along the entire section of the shoreline from Camp Mokuleia to Hoomana Place, a distance of 3,000 feet.

The last of the four seawalls was done in the 1975 to 1983 time period at TMK 6-8-10:25. In the 1975 aerial photo, it is the last remaining residential lot among this coastal segment without a seawall (Camp Mokuleia, which was constructed several years later in 1980-81, also did not have a seawall at this time). By 1983, all lots in this coastal segment, including Camp Mokuleia, had seawall protection.

Shoreline Retreat Based on Movement of the Vegetation Line. Distances of the vegetation line from the painted centerline of Farrington Highway for each of the seven aerial photographs are listed on Table 2. The rather modest changes of the vegetation line may be a little surprising, given the threat posed by waves that gave rise to the construction of seawalls along this entire coastal segment. However, most of the shoreline change has been in the continuously diminishing width of the beach rather than in the movement of the vegetation line.

Diminishing Width of Beach Sand. Table 3 documents the diminishing width of beach sand over the 1949 to 1996 period. Because it is impossible to determine the location of the mean sea level shoreline in the photographs, the width of beach sand has been taken as the distance from the vegetation line (or seawall) to the seaward extent of sand visible in the nearshore waters. Widths defined in this manner declined from May 1949 to April 1967. However, the widths recovered almost completely in the short period from April 1967 to December 1969. Following this, the width of sand has gotten progressively narrower, particularly in the most recent years. Beach sand widths are now 18 to 25 feet, a third or less of the widths that prevailed in 1949 and again in December 1969. Most of the loss of beach width occurred from 1983 to 1996. This explains the recent failure of number of seawalls, including the four which are the subject of this report. In all cases, the walls were built with their foundations above sea level. At the time of their construction, there was a substantial amount of beach

Table 1

Chronology of House and Seawall Construction Based on Aerial Photographs

Time Interval	TMK 6-8-10:23 (Bain/Zane)	TMK 6-8-10:24 (Frost)	TMK 6-8-10:25 (Compton)	TMK 6-8-10:26 (Masunaga)
Up to May 1949	Vacant Lot	Vacant Lot	Vacant Lot	Vacant Lot
May 1949 - July 1961	House Constructed	House Constructed		
July 1961 - April 1967	Seawall Constructed			House Constructed
April 1967 - December 1969	Seawall Reconstructed With Different Alignment	Seawall Constructed		Seawall Constructed
December 1969 - 1975			House Constructed	Seawall Reconstructed Further Seaward
1975 - November 1983			Seawall Constructed	
November 1983 - 1996		Seawall Collapsed	Seawall Collapsed	

Notes:

1. A railroad track on the makai side of Farrington Highway crossing all four lots is visible in the 1949 photograph.
2. Reconstruction of the seawall at TMK 6-8-10:23 in the 1967 to 1969 period realigned the wall parallel to the beach present.
3. The seawall reconstructed at TMK 6-8-10:26 in the 1969 to 1975 period was moved 7 to 10 feet seaward. The pre-existing seawall appears to be where the interior wall is today.
4. Collapse of the seawalls at TMKs 6-8-10:24 and 25 occurred in the 1995-1996 period.

Table 2

Movement of the Vegetation Line Based on Aerial Photographs

Date of Aerial Photograph	Distance From Center Line of Farrington Highway to Vegetation Line (Feet)			
	TMK 6-8-10:23	TMK 6-8-10:24	TMK 6-8-10:25	TMK 6-8-10:26
May 1949	106	100	87	85
July 1961	100	95	90	75
April 1967	105 (to 1st Seawall)	92	90	90
December 1969	102 (to 2nd Seawall)	100 (to Seawall)	90	93 (to Seawall)
1975	102 (to 2nd Seawall)	100 (to Seawall)	83	93 (to Seawall)
November 1983	102 (to 2nd Seawall)	100 (to Seawall)	95 (to Seawall)	93 (to Seawall)
1996	102 (to 2nd Seawall)	100 (to Seawall)	95 (to Seawall)	93 (to Seawall)

Table 3

Approximate Widths of Beach Sand (in Feet) Based on Aerial Photographs

Date of the Aerial Photograph	TMK 6-8-10:23	TMK 6-8-10:24	TMK 6-8-10:25	TMK 6-8-10:26
May 1949	74	72	73	75
July 1961	55	60	55	65
April 1967	55	62	65	62
December 1969	72	75	70	68
1975	58	58	70	60
November 1983	52	45	51	47
1996	24	18	25	24

Note: Width of sand is the distance from the vegetation line (or seawall) to the end of the sand deposit in nearshore waters.

sand between the walls' footings and the shoreline. Now that much of the sand has been eroded, waves continually wash beneath the footings, creating sinkholes on the landward side of the walls.

Proposed Seawall Construction

A decision has been made to completely rebuild all four seawalls with appropriately designed foundations to avoid the undermining that has been the downfall of the present walls. Design of the walls will be based on the depth-limited, maximum wave height that can break on the structure and to retain the bearing load on the landward side of the structure.

Seawall Alignment. The seaward side of the seawall foundation will be placed at the certified shoreline as determined by a survey by Engineers Surveyors Hawaii. This location is indicated on Figure 3. This is also the same alignment of the pre-existing seawalls and it generally conforms to the arcuate shape of the beach.

Foundation Conditions. Due to constraints of access, detailed foundation investigation was limited to a single boring on TMK 6-8-10:25. Since the results of this boring were similar to two boreholes done previously for the reconstruction of the seawall at TMK 6-8-10:29, they seem generally representative of conditions along this shoreline segment. The foundation investigation was conducted by Geolabs-Hawaii and its report can be found in Appendix B. Ground elevation at the borehole site was 8± feet (msl) and the boring reached a depth of 31 feet (23 feet below MSL) without encountering basement rock. Coralline sand extended to a depth of 23 feet. This was followed by six feet of very stiff silty clay and then coral sand for the last two feet of drilling. The depth of the basement rock makes it necessary to construct the wall's foundation in the coral sand. This will be done at a depth of six feet below mean sea level. Design recommendations for bearing pressures, lateral earth loading, and coefficient of friction are contained in the Geolabs-Hawaii report.

Wall Section. The proposed cross section of the seawall, which is shown on Figure 4, will be identical across all four lots. It is generally similar to the recently completed seawalls on TMK 6-8-10:27, 28, and 29 (Photo No. 17). The face of the wall is a compromise between reducing wave reflection (with the slope on the lower half of the wall) and keeping some yard space between the wall and houses (the vertical upper half of the section). Void spaces in the seaward side of the seawall will not be grouted in order to provide energy dissipation and minimize wave runup. It should also be noted that the proposed wall will replace entirely vertical (fully reflecting) seawalls on all four lots. The analysis of the wall as a retaining structure was done by Structural Analysis Group (SAG) using the design recommendations of Geolabs-Hawaii. SAG's analysis is contained in Appendix C.

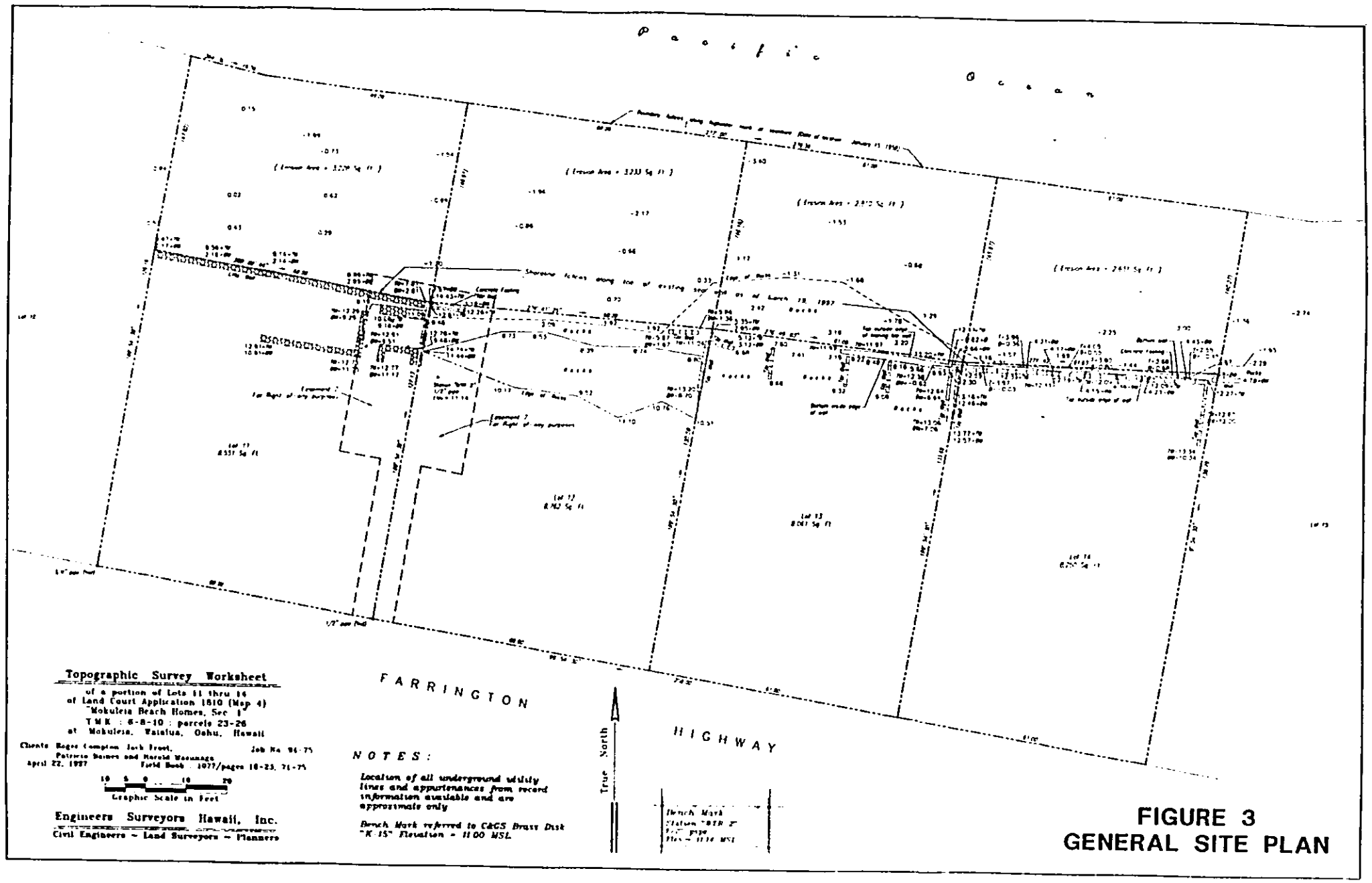


FIGURE 3
GENERAL SITE PLAN

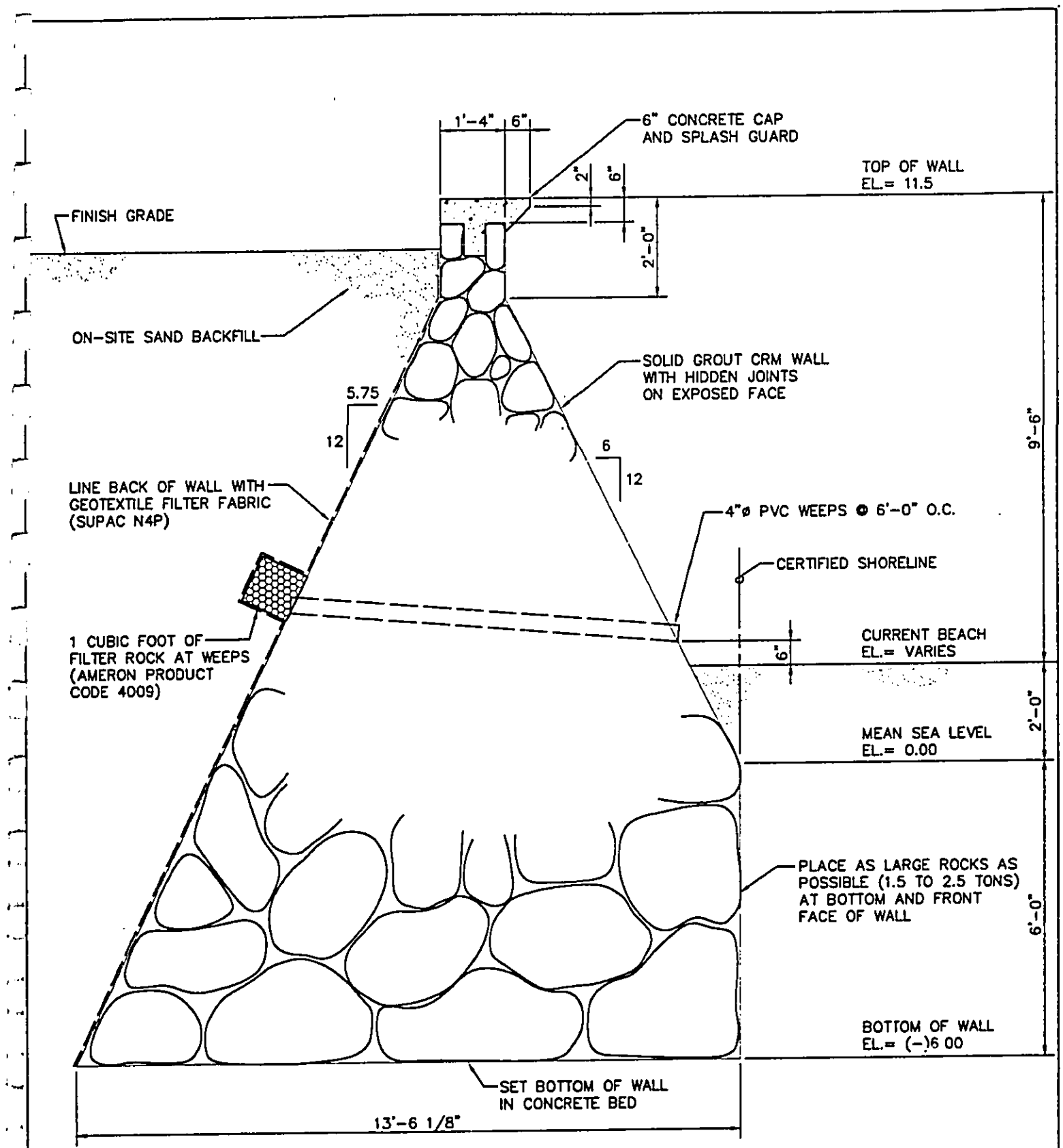


FIGURE 4
TYPICAL CRM SEAWALL DETAIL

Analysis of the Seawall to Withstand Breaking Waves. The stability of the proposed wall to resist breaking waves is based on the following assumptions:

1. The design wave is the highest, depth-limited wave which can break by plunging on the shoreline structure.

2. Sand at the foot of the seawall is eroded to a depth of -2 feet (msl). At present, sand heights vary between +2.8 feet (msl) at TMK 6-8-10:26 to -0.45 feet (msl) at TMK 6-8-10:23.

3. The nearshore bathymetric slope is 20 (horizontal) to 1 (vertical) based on the ESH survey (Figure 3).

4. The maximum breaking wave occurs at high tide (+1 feet msl) with an additional wave setup of one foot.

5. Wave periods will range from 8 to 15 seconds.

6. The wall is considered to be a stand-alone rubble mound structure with no credit for grouting of the boulders or the lateral soil support behind it.

Using the Corps of Engineers Shore Protection Manual (Volume II) and these nearshore conditions, the maximum height of a wave plunging on the seawall is 5.5 to 6.6 feet for wave periods of 8 to 15 seconds, respectively. Applying the Hudson formula to determine the weight of boulder required (without the additional strength of cement grout), armor stones would need to be 4100 pounds or about 2 tons (refer to equation and values below). The primary stones in the lower section of the wall will be 0.75W to 1.25W (3075 to 4920 pounds) in size. For basalt rock, this will be stones of 3 to 4 feet in size. It is important to note that the use of cement grout (except on the seaward face) will add considerably to structural stability.

$$W = \frac{WrH^3}{K_D (Sr^{-1})^3 \cot\varnothing} = \frac{(167)\ (6.6)^3}{5.8\ (2.593\ -\ 1)^3\ (0.5)} = 4095 \text{ lbs.}$$

Wr = unit weight of stone (167 lbs/ft^3 for basalt rock)

H = design wave height in feet

K_D = stability coefficient (5.8 for structure trunk and stone placement with the long axis placed perpendicular to the structure face)

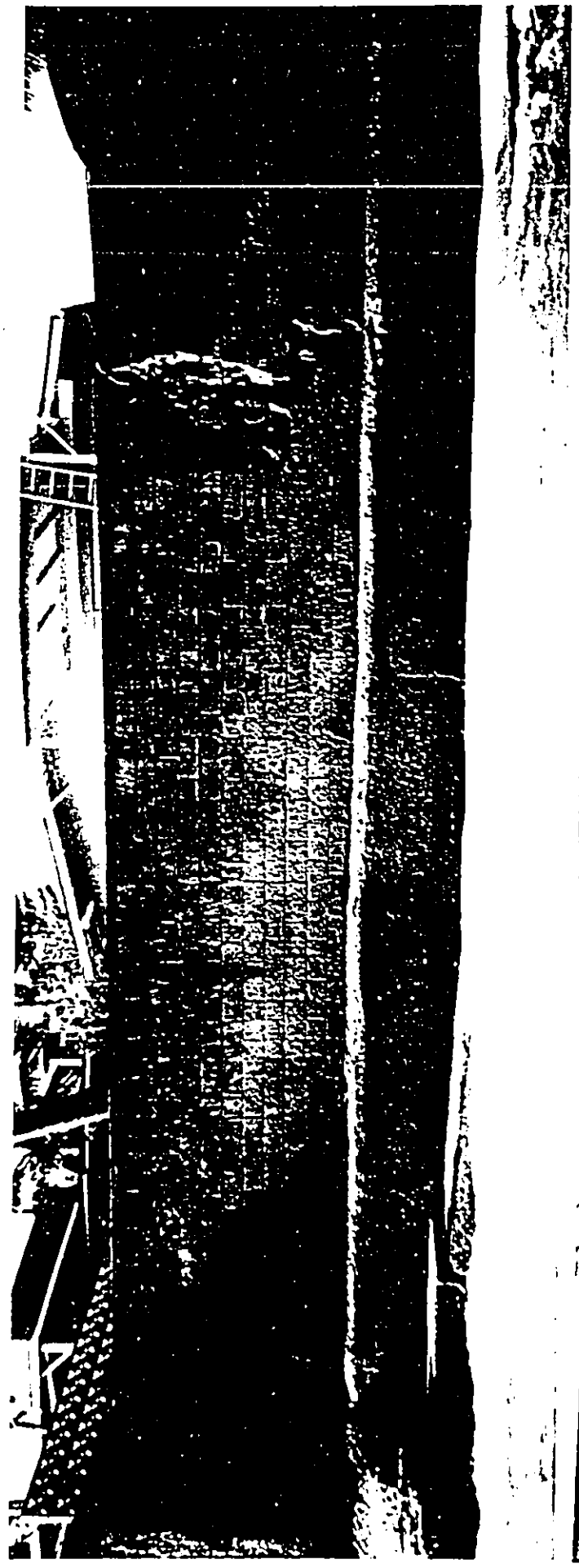
Sr = specific gravity of the armor unit relative to seawater (167 lbs/ft^3 ÷ 64.0 lbs/ft^3 = 2.593)

$\varnothing$ = angle of structural slope from the horizontal in degrees (60°)

Wave Runup and Overtopping. Computations using the Shore Protection Manual indicate that the top of the seawall would have to be placed impractically high to avoid overtopping by storm waves. As a matter of practical application, this was demonstrated quite clearly during the past winter when all three of the recently completed walls (TMKs 6-8-10:27, 28, and 29) were overtopped. To hopefully limit the frequency and amount of overtopping, the concrete cap shown on Figure 4 will be installed.

Appendix A

Photographs of
Existing Shoreline Conditions



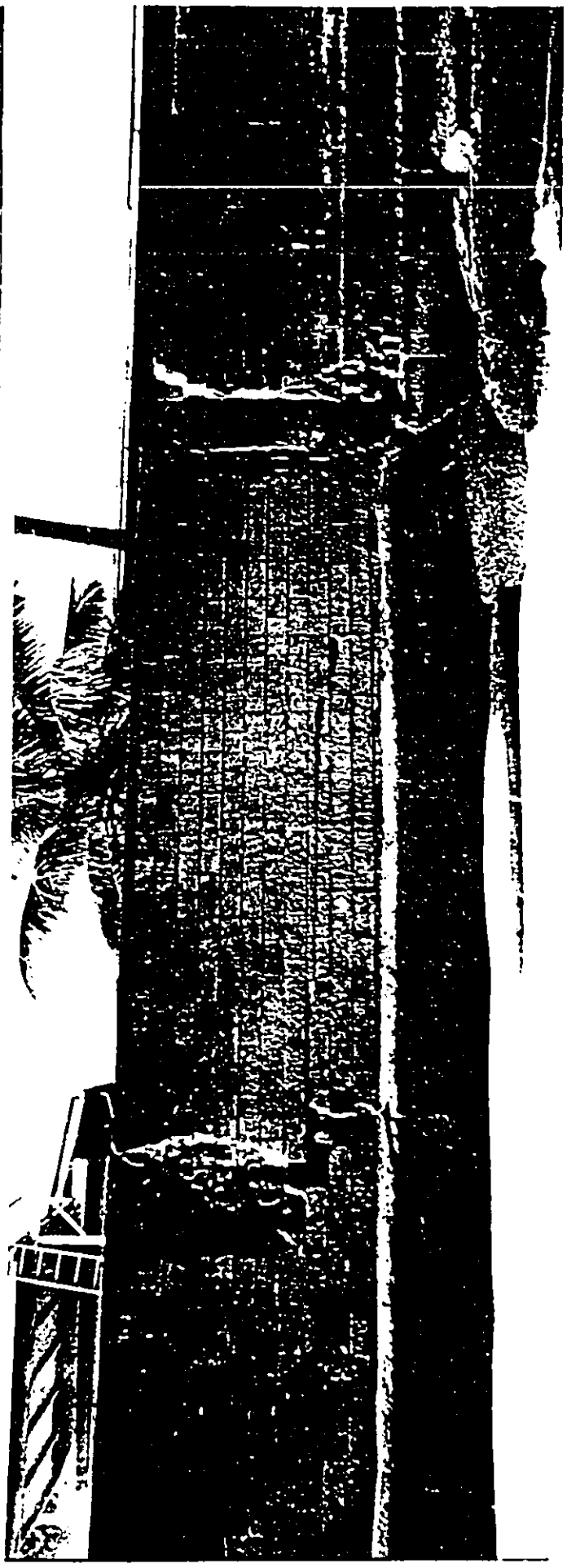


Photo Nos. 1 & 2. The seawall fronting TMK 6-8-10:23 has a large vertical crack at mid-length and another at its joint with the wall for TMK 6-8-10:24. Undermining is most obvious at the west end (right-hand side of Photo No. 2).

Photo Nos. 3 & 4. These photos illustrate the stop gap measures to stabilize the wall at TMK 6-8-10:23 and counteract the undermining occurring mostly at the west end.

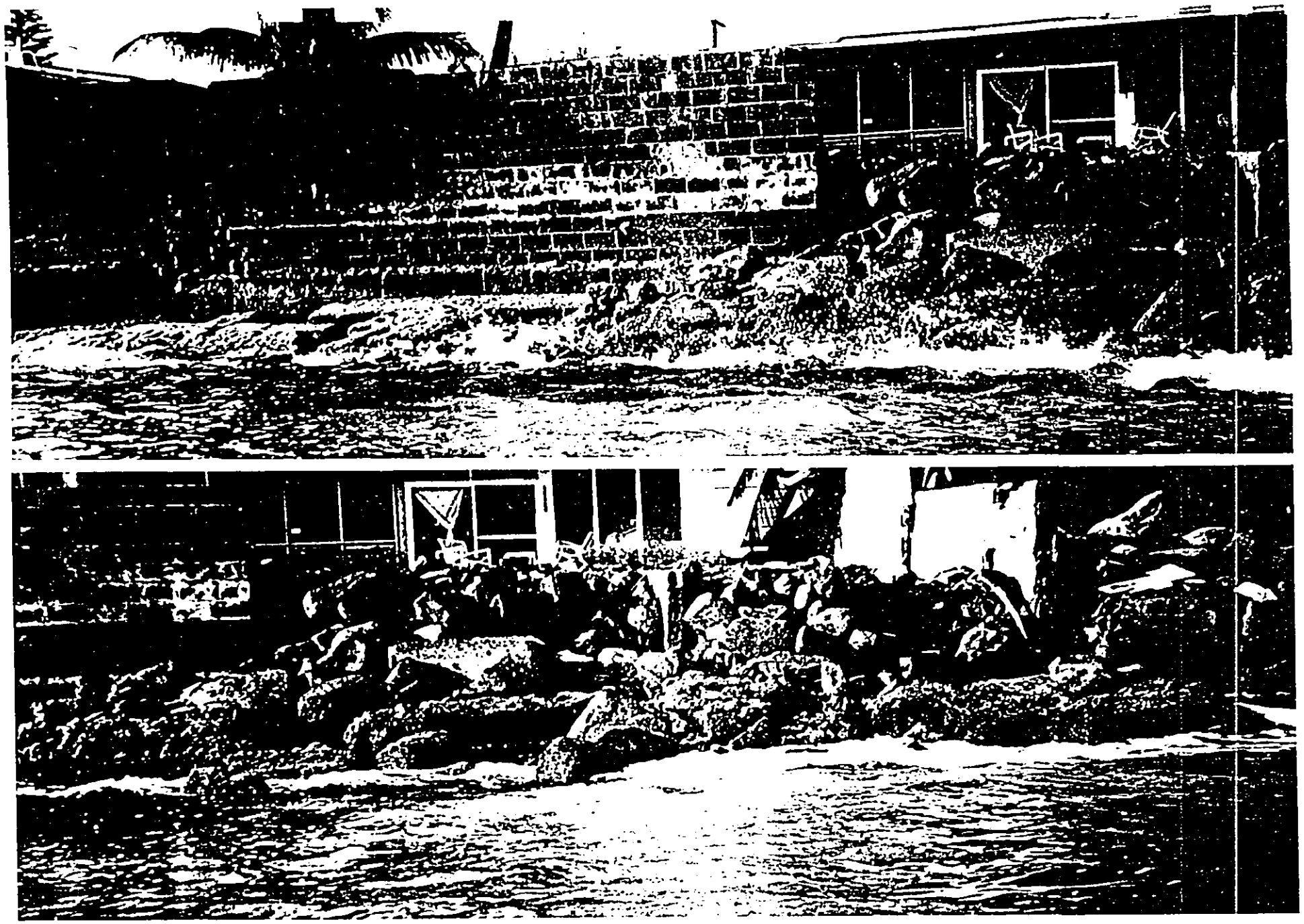


Photo Nos. 5 & 6. The west side of the wall at TMK 6-8-10:24 is completely gone and an assortment of loose boulders has been placed as an emergency measure (bottom photo). The hollow tile wall remaining on the east end is leaning outward and ready to fall on the beach (top photo).

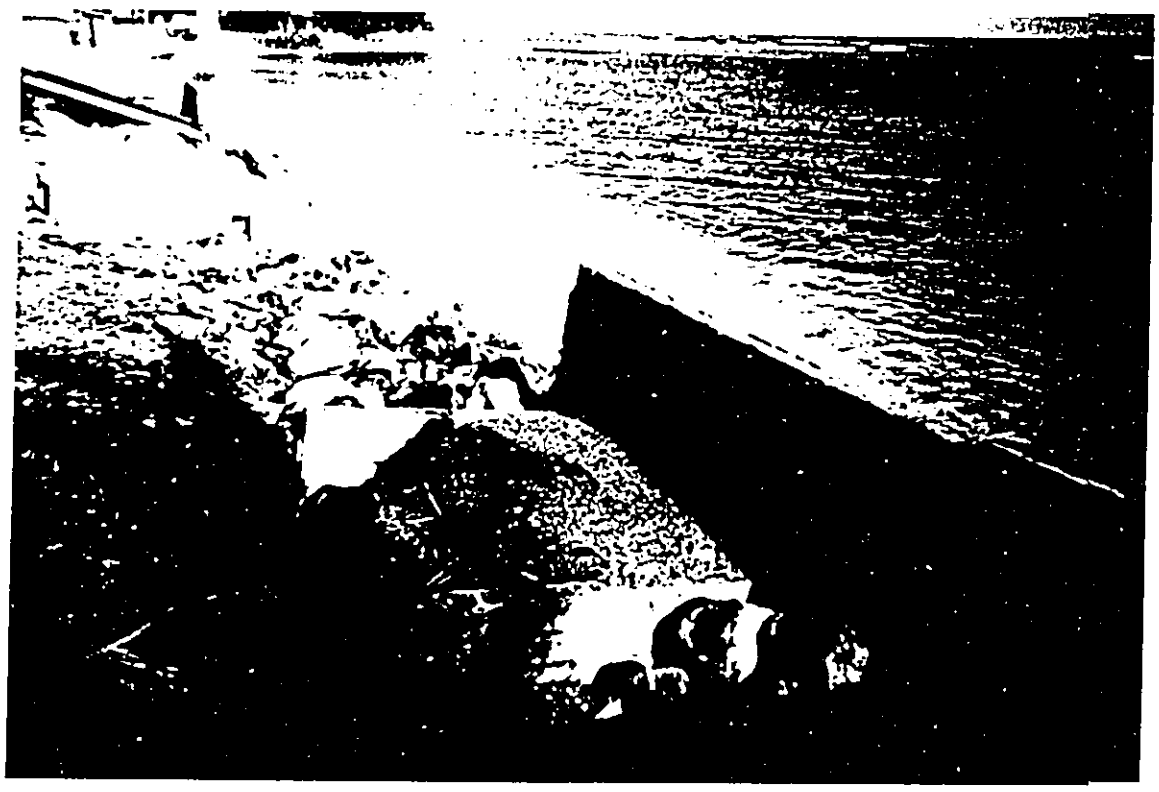


Photo Nos. 7 & 8. The top photo shows the undermining of the footing at TMK 6-β-10:24 and the outward tilt of the remaining portion of the seawall. The bottom photo shows some of the scour that has occurred behind the wall.

Photo Nos. 9 & 10. Only small remnants of the hollow tile seawall at TMK 6-8-10:25 remain (top left and bottom right). The remainder of the lots frontage has been temporarily stabilized with boulders as an emergency measure.

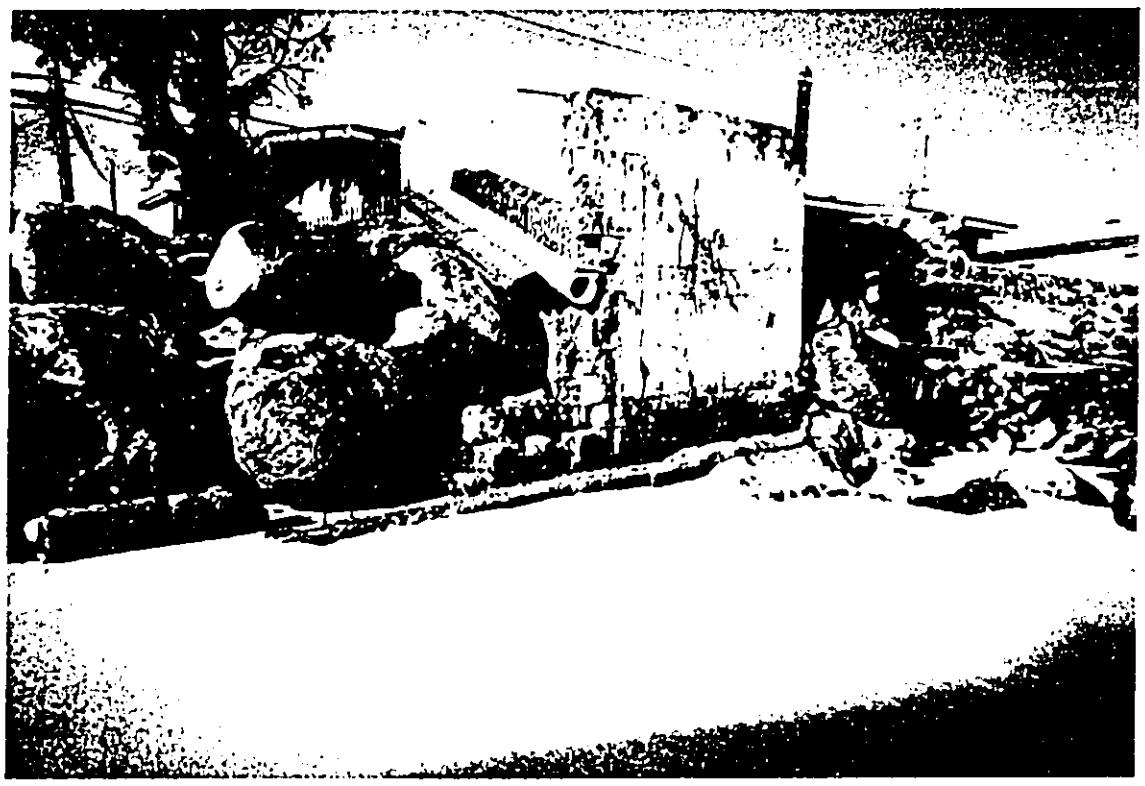


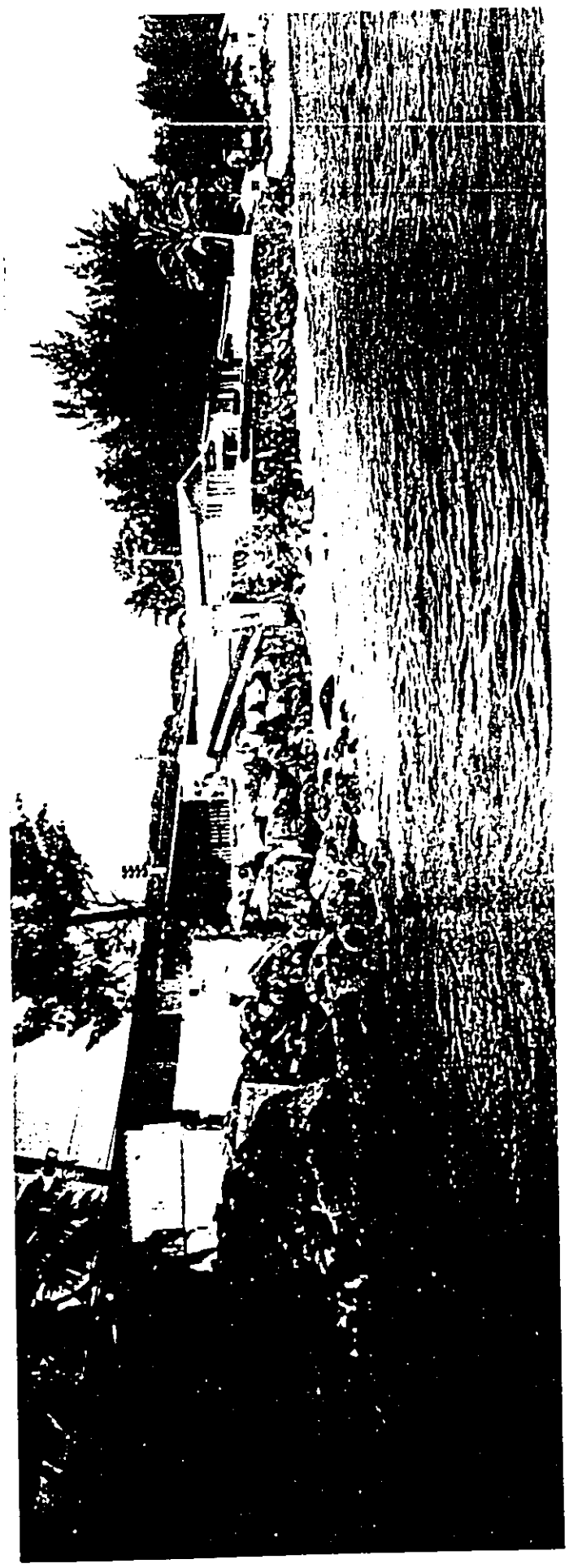
Photo Nos. 11 & 12. These details of the remnants of the seawall at TMK 6-8-10:25 show the top of the foundation to be well above sea level.

Photo Nos. 13 & 14. The rubble masonry seawall at TMK 6-8-10:26 has been undermined along its entire length. Portions of the stair structure (top left) has collapsed on the beach.

Photo Nos. 15 & 16.

The top photo shows the extent of undermining of the rubble-rock seawall at TMK 6-8-10:26. Concrete has been poured on the landward side to avoid undermining there (photo at right). A second wall set 14 feet behind the seawall has been constructed to contain overtopping waves.

DOCUMENT CAPTURED AS RECEIVED



Appendix B

Foundation Investigation and
Recommendations By
Geolabs-Hawaii

C.W. ASSOCIATES, INC. dba
GEOLABS-HAWAII
Geotechnical Engineering, Geology and Environmental Services

June 25, 1997
W.O. 3793-00

TN
GF
LS
GS
LT
MW
Job

Mr. Lance Suganuma
Tom Nance Water Resource Engineering
680 Ala Moana Blvd., Suite 406
Honolulu, HI 96813-5411

Dear **Mr. Suganuma:**

Preliminary Geotechnical Recommendations
Proposed Seawall at Mokuleia Beach Homes
TMK: 6-8-10: 23 to 26
Mokuleia, Waialua, Oahu, Hawaii

We have recently completed our field exploration for the proposed Seawall at Mokuleia Beach Homes across from Dillingham Field on Farrington Highway in Mokuleia on the island of Oahu, Hawaii. This letter serves to present our preliminary geotechnical engineering recommendations for the seawall design of the proposed project.

Project Considerations

We understand that it is proposed to construct a grouted stone masonry seawall along four adjacent lots at the proposed project site. At the time of our field exploration, the project site consisted of 4 beach homes on lots with existing seawalls in various stages of disrepair.

Subsurface Conditions

Our field exploration program consisted of drilling and sampling one boring, designated as Boring No. 1 to a depth of about 31 feet below the existing ground surface. In general, our field exploration encountered a thin layer of clayey silt overlying coral sand to a depth of approximately 23 feet below the existing ground surface. The sandy materials were generally underlain by a layer of very stiff silty clay to a depth of about 29 feet below the existing ground surface. Beneath the clay layer, coral sand was encountered to the maximum depth drilled of approximately 31 feet below the existing ground surface. Detailed findings are presented on the Log of Boring, Plates A and A-1. The approximate boring location is shown on the Site Plan, Plate 2.

2006 Kalihi St. • Honolulu, Hawaii 96819
Facsimile: (808) 847-1749 • Phone: (808) 841-5064

Groundwater was encountered in the drilled boring at an approximate depth of 8.2 feet below the existing ground surface at the time of our field exploration. However, groundwater levels can fluctuate depending on factors such as seasonal rainfall, groundwater withdrawal and/or injection, tidal effects and other factors.

Seawall

Based on the anticipated subsurface conditions at the project site, it is our opinion that the following general guidelines may be used for preliminary design of the proposed seawall structure.

Wall Foundations

In general, we believe that retaining wall foundations may be designed with an allowable bearing pressure of up to 3,000 pounds per square foot (p.s.f.) bearing on the in-situ coral sand. This bearing value is for dead plus live loads and may be increased by one-third for transient loads, such as those caused by wind or seismic forces.

Ideally, the walls should bear on hard, erosion-resistant formations to resist undermining by wave action; however, hard layers were not encountered within the depth of our exploration. In order to provide some resistance, the wall foundations should be embedded as deep as practicable. It should be understood that the walls will be susceptible to undermining by wave action.

Lateral Earth Pressures

The retaining wall should be designed to resist the lateral earth pressures due to adjacent soils and surcharge effects. The recommended lateral earth pressures for design of retaining walls with level backfill conditions, expressed in equivalent fluid pressures, are presented below.

Wall Condition	Equivalent Fluid Pressure per foot of depth (p.c.f.)
Above Water	40
Below Water	85

The values provided above assume the wall is free to deflect and that on-site granular fill and/or select granular fill will be used to backfill behind the wall. It is assumed that the backfill behind retaining walls will be compacted to between 90 and 95 percent relative compaction. Over-compaction of the retaining wall backfill should be avoided.

In general, an active condition may be used for walls that are free to deflect by as much as 0.1 percent of the wall height. If the tops of walls are not free to deflect beyond this degree or are restrained, the walls should be designed for the at-rest condition. Surcharge stresses due to areal surcharges, line loads, and point loads within a horizontal distance equal to the depth of the wall should be considered in the design. Lateral loads acting on the structure may be resisted by frictional resistance between the base of the foundation and the bearing materials. A coefficient of friction of 0.4 may be used for footings bearing on the coral sand or embedded in structural fill.

We recommend that footing excavations for the proposed seawall be observed by a representative of Geolabs-Hawaii prior to placement of reinforcing steel or concrete to confirm the foundation bearing conditions and the required embedment depths.

Drainage

Retaining walls should be well-drained to reduce the build-up of hydrostatic pressures above the water level. A typical drainage system would consist of a 1 to 2-foot wide zone of permeable material, such as No. 3B Fine gravel (ASTM C 33, No. 67 gradation), immediately around a perforated pipe (perforations down) at an elevation above the water level discharging to an appropriate outlet or weepholes. Backfill behind the permeable drainage zone should consist of granular fill material less than 3 inches in maximum dimension.

Design Review

Preliminary and final drawings and specifications for the proposed new seawall project should be forwarded to Geolabs-Hawaii for review and written comments prior to advertisement for bidding. This review is necessary to evaluate conformance with the intent of the earthwork and foundation recommendations provided herein. If this review is not made, Geolabs-Hawaii cannot be responsible for misinterpretation of our recommendations.

GEOLABS-HAWAII

Construction Monitoring

It is recommended that Geolabs-Hawaii be retained to provide geotechnical engineering services during the construction of the proposed project. The items of construction monitoring that are critical requiring "Special Inspection" include observation of footing excavation, subgrade preparation, fill placement and compaction. Other aspects of earthwork construction should also be observed by a representative from Geolabs-Hawaii. This is to observe compliance with the design concepts, specifications, or recommendations and to expedite suggestions for design changes that may be required in the event that subsurface conditions differ from those anticipated at the time this letter report was prepared. The recommendations provided in this report are contingent upon such observations. If actual exposed subsurface conditions encountered during construction are different from those assumed or considered in this report, then appropriate modifications to the design should be made.

Closure

The preliminary recommendations provided above are for information and preliminary design purposes. Detailed recommendations for design of foundations, site preparation, and pavements will be presented in our forthcoming report. If you have questions or need additional information, please contact our office.

Respectfully submitted,

C.W. ASSOCIATES, INC.
dba **GEOLABS-HAWAII**

By Clayton S. Mimura
Clayton S. Mimura, P.E.
President

Attachments: Log of Boring (Plates A and A-1)
Site Plan (Plate 2)

CSM:MTL:srr

(h:\user\letters\3793-00.ml1)

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL RETAINED ON NO. 200 SIEVE	GRAVELS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS LESS THAN 5% FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES MORE THAN 12% FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	SANDS 50% OR MORE OF COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	CLEAN SANDS LESS THAN 5% FINES	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES MORE THAN 12% FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE-GRAINED SOILS 50% OR MORE OF MATERIAL PASSING THROUGH NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT 50 OR MORE		MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

LEGEND:

	2-INCH O.D. STANDARD PENETRATION TEST	LL	LIQUID LIMIT
	3-INCH O.D. MODIFIED CALIFORNIA SAMPLE	PI	PLASTICITY INDEX
	SHELBY TUBE SAMPLE	TV	TORVANE SHEAR (tsf)
	CORE SAMPLE	PEN	POCKET PENETROMETER (tsf)
REC	CORE RECOVERY		WATER LEVEL OBSERVED IN BORING
RQD	ROCK QUALITY DESIGNATION		

CW ASSOCIATES, INC. dba
GEOLABS-HAWAII
Geology Soils and Foundation Engineering

WORK ORDER NO. 3793-00 Jun 97

BORING LOG LEGEND
SEAWALL AT MOKULEIA BEACH HOMES
TMK: 6-8-10: 23 TO 26
MOKULEIA, OAHU, HAWAII

PLATE
A

Date Started: 6/5/97
Date Completed: 6/5/97
Logged By: M. Lee
Total Depth: 31.0 feet

Drill Rig: Diedrich D-25
Drilling Method: H.S. Auger (4.25")
Driving Energy: 140 lb. wt., 30 in. drop

Depth, ft	FIELD: Sample	FIELD: Penetra. Resist. Blous/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength ksf	Other Data	Pen, tsf	DESCRIPTION
								Approximate Surface Elevation (ft): 11*
		14		9				Dark brown CLAYEY SILT (MH) with rootlets, stiff, dry
		19		13				Tan CORAL SAND (SP), medium dense, damp
5		18		10				grades with some coral fragments
10		4		36				grades with more coral and shell fragments (SW-SM), loose, wet
15		2						grades to very loose
20		13		27				grades less coarse, medium dense
25		23		33				Dark brown SILTY CLAY (CH), very stiff
30		3						Tan SAND (SW) with coral and shell fragments, very loose
35								Boring terminated at 31 feet
40								Groundwater level at: Depth 8.2 ft. Hours 1530 Date 06/05/97
								*Elevation estimated from Topographic Survey map provided by Tom Nance Water Resource Engineering on June 19, 1997.

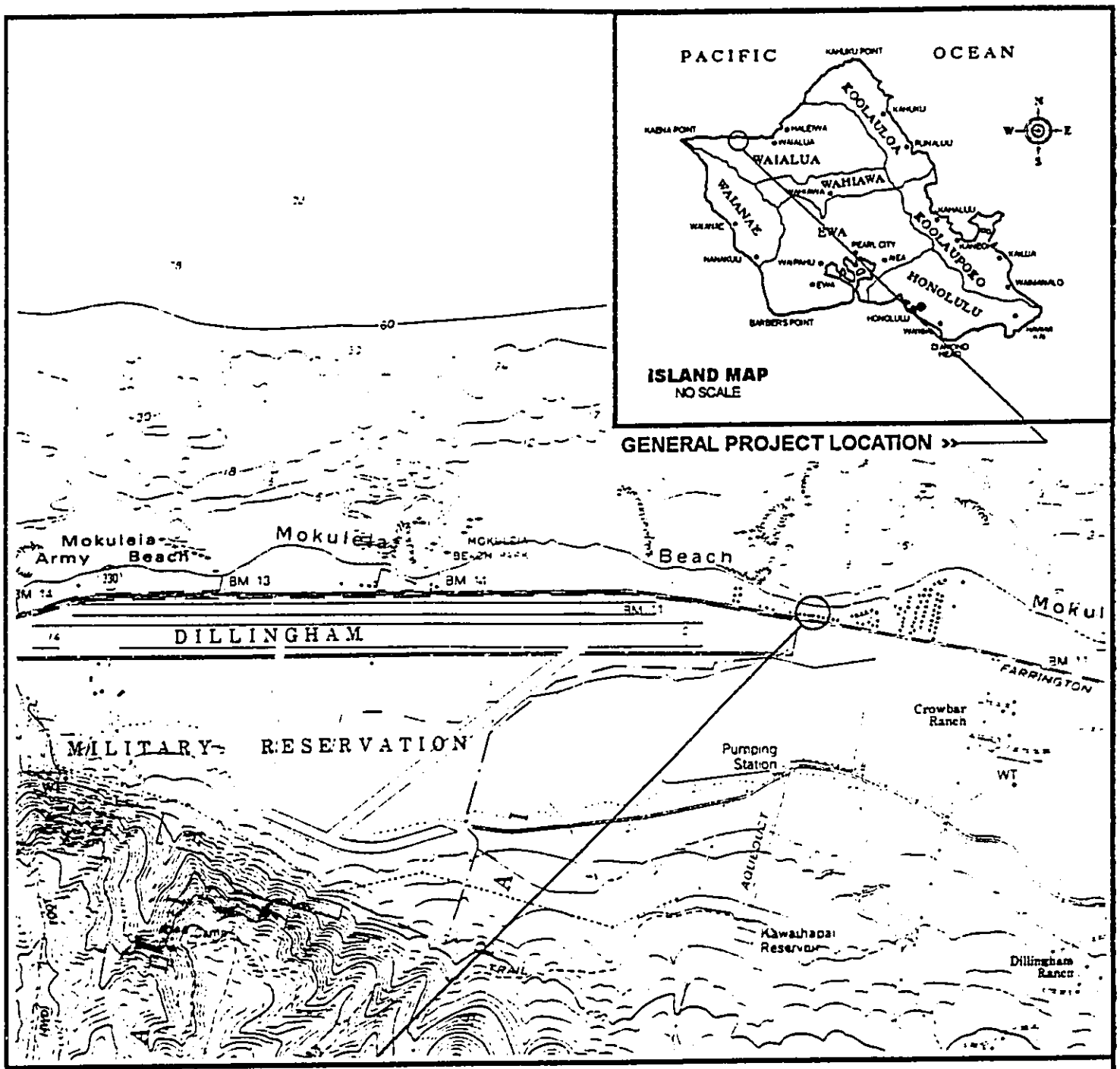
tk

CW ASSOCIATES, INC. dba
GEOLABS-HAWAII
Geology Soils and Foundation Engineering

WORK ORDER NO. 3793-00 MTL Jun 97

LOG OF BORING 1
SEAWALL AT MOKULEIA BEACH HOMES
TMK: 6-8-10: 23 TO 26
MOKULEIA, OAHU, HAWAII

PLATE
A-1



N

GRAPHIC SCALE IN FEET

REFERENCE: U.S.G.S. QUADRANGLE MAP; KAENA, OAHU, HAWAII (1983)

PROJECT LOCATION MAP

SEAWALL AT MOKULEIA BEACH HOMES
TMK: 6-8-10: 23 TO 26
MOKULEIA, WAIALUA, OAHU

PLATE 1

GEOLABS-HAWAII
Foundation & Soil Engineering-Geology

DATE	DRAWN BY
JUNE 1997	KHN
SCALE	W.O.
1" = 2,000'	3793-00

Appendix C

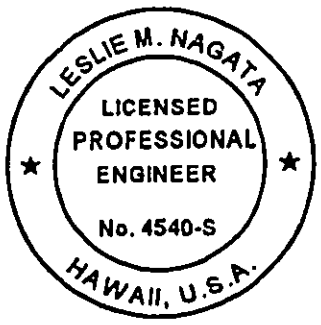
Retaining Wall Calculations
By Structural Analysis Group

STRUCTURAL CALCULATIONS

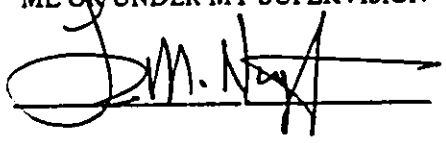
FOR

PROPOSED SEAWALL AT: MOKULEIA BEACH HOMES

TMK: 6-8-10: 23 TO 26
MOKULEIA, WAIALUA, OAHU, HAWAII



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION



PREPARED BY

STRUCTURAL ANALYSIS GROUP
2353 BERETANIA STREET ROOM 201
HONOLULU, HAWAII 96826

JUNE 1997

STRUCTURAL ANALYSIS GROUP, INC.
2353 SOUTH BERETANIA STREET #201
HONOLULU, HAWAII 96826

PAGE
DATE
ENGIN

PAGE SEAWALL

SEAWALL DESIGN

SEAWALL

SHALLOW WALL DESIGN
8'-0" EMBEDMENT

SEAWALL DESIGN

DATA INPUT :

			MATERIAL DENSITY:		
HEIGHT (YY1)	=	18.00 FT	SOIL ABOVE WATER	=	120 PCF
WALL EMBED (YY2)	=	6.00 FT	SOIL BELOW WATER	=	58 PCF
VERTICAL FACE (YY5)	=	2.00 FT	WALL ABOVE WATER	=	140 PCF
TOP WIDTH (XX3)	=	1.25 FT	WALL BELOW WATER	=	78 PCF
FRONT BATTER (BAT1)	=	6.00 X:12	FRICTION FACTOR	=	0.40
REAR BATTER (BAT2)	=	5.75 X:12	ALLOWABLE BEARING	=	3000 PSF
NEGLECT (N)	=	0.00 FT	BEARING FACTOR	=	1
SLIDE FS	=	1.53	PASSIVE PRESSURE	=	62 PCF
OVERTURN FS	=	1.70	PASSIVE FACTOR	=	1
MAX BEARING	=	2214 PSF	ACTIVE ABOVE H2O	=	40 PCF
MIN BEARING	=	1215 PSF	ACTIVE BELOW H2O	=	90 PCF

COMPUTE EXTERNAL ACTIVE FORCES:

PA1	=	2880 LBS	YP1	=	10.00 FT
PA2	=	2880 LBS	YP2	=	3.00 FT
PA3	=	1620 LBS	YP3	=	2.00 FT
TOTAL ACTIVE P (PA)	=	7380 LBS			

COMPUTER EXTERNAL PASSIVE FORCE:

FP	=	1116 LBS	YP	=	2.00 FT

COMPUTE VARIOUS LENGTHS:

XX1	=	2.88 FT
XX2	=	5.75 FT
XX4	=	5.00 FT
XX5	=	12.00 FT
YY3	=	12.00 FT
YY4	=	10.00 FT
XX6	=	14.88 FT

STRUCTURAL ANALYSIS GROUP, INC.
2353 SOUTH BERETANIA STREET #201
HONOLULU, HAWAII 96826

PAGE
DATE
ENGIN

PAGE SEAWALL

SEAWALL DESIGN

SEAWALL

SHALLOW WALL DESIGN
8'-0" EMBEDMENT

SEAWALL DESIGN

COMPUTE WALL PROPERTIES:

WALL WEIGHT:			ECCENTRICITY FROM TOE:		
WT1	=	4140 LBS	XWT1	=	13.44 FT
WT2	=	4140 LBS	XWT2	=	10.08 FT
WT3	=	4830 LBS	XWT3	=	8.17 FT
WT4	=	2100 LBS	XWT4	=	5.63 FT
WT5	=	3500 LBS	XWT5	=	3.33 FT
WT6	=	500 LBS	XWT6	=	13.92 FT
WT7	=	673 LBS	XWT7	=	12.96 FT
WT8	=	5616 LBS	XWT8	=	6.00 FT
TOTAL DL (WT)	=	25499 LBS	MOMENT ABOUT TOE:		
			MWT1	=	55631 FT-#
			MWT2	=	41745 FT-#
CG WT FROM TOE	=	8.22 FT	MWT3	=	39445 FT-#
			MWT4	=	11813 FT-#
			MWT5	=	11667 FT-#
			MWT6	=	6962 FT-#
			MWT7	=	8718 FT-#
			MWT8	=	33696 FT-#
			SUMMATION (MWT)	=	209676 FT-#

CHECK SLIDING:

SLIDING FORCE (SF)	=	7380 LBS	SLIDING FS (SFS)	=	1.53
FRICTION FORCE	=	10200 LBS			
PASSIVE FORCE	=	1116 LBS			
TOTAL RESIST (RF)	=	11316 LBS			

STRUCTURAL ANALYSIS GROUP, INC.
2353 SOUTH BERETANIA STREET #201
HONOLULU, HAWAII 96826

PAGE
DATE
ENGIN

PAGE SEAWALL

SEAWALL DESIGN

SEAWALL

SHALLOW WALL DESIGN
8'-0" EMBEDMENT

SEAWALL DESIGN

CHECK BEARING:

P/A (SPA)	=	1714 PSF
M/S (SMS)	=	500 PFS
SMAX	=	2214 PSF
SMIN	=	1215 PSF

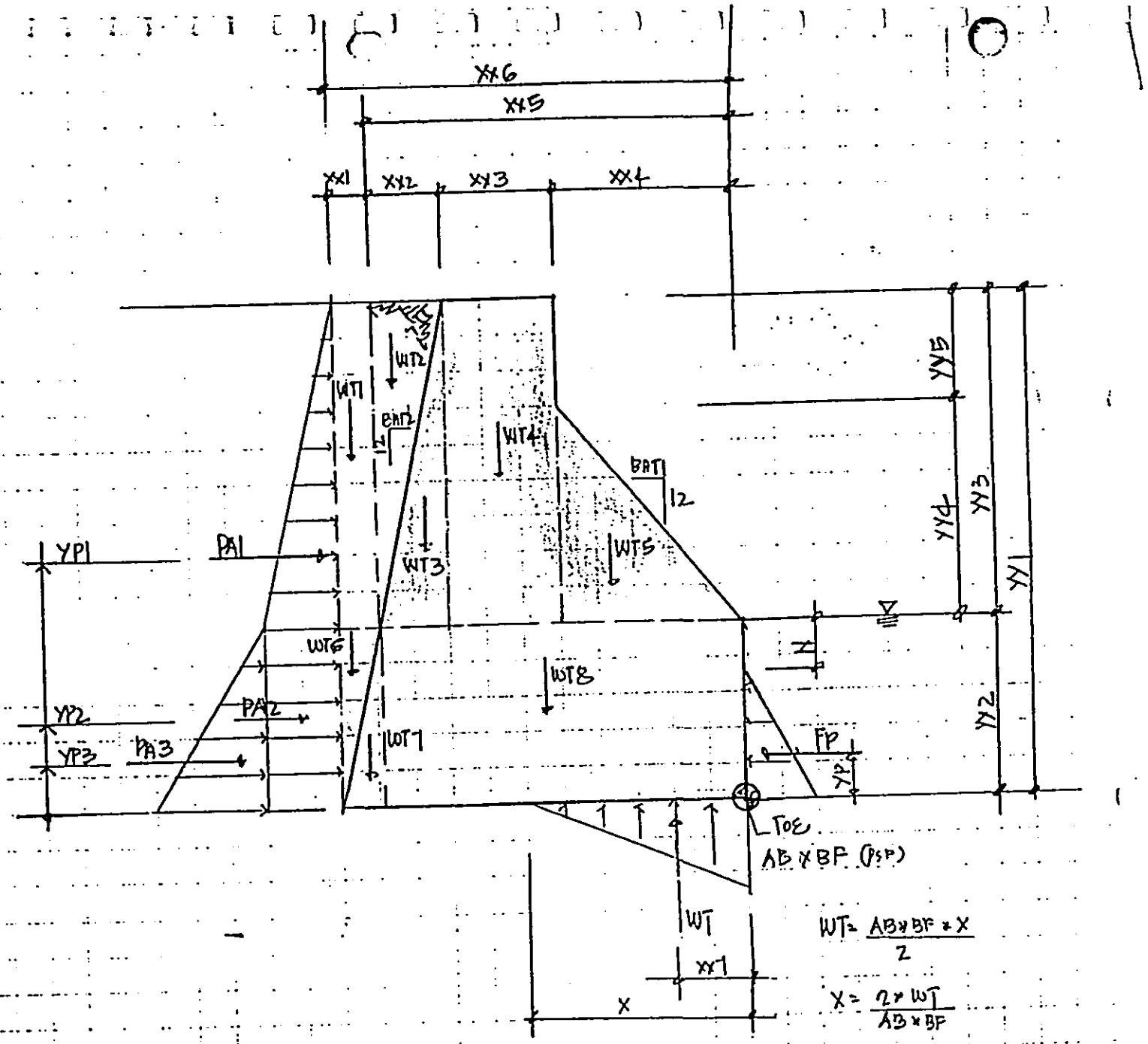
MOMENT ABOUT CL FOOTING:

MPA1	=	28800 FT-#
MPA2	=	8640 FT-#
MPA3	=	3240 FT-#
MPA SUM	=	40680 FT-#
MFP (PASSIVE)	=	-2232 FT-#
MWTCL	=	-20027 FT-#
MCL (AT XX6/2)	=	18421 FT-#
S	=	36.88 FT^3

CHECK OVERTURNING:

OTM	=	38448 FT-LB	XX7	=	5.67 FT
MR	=	65187 FT-LB			
FSOTM	=	1.70			

SEAWALL DESIGN



APPLICATION FOR SHORELINE SETBACK VARIANCE AND
FINAL ENVIRONMENTAL ASSESSMENT

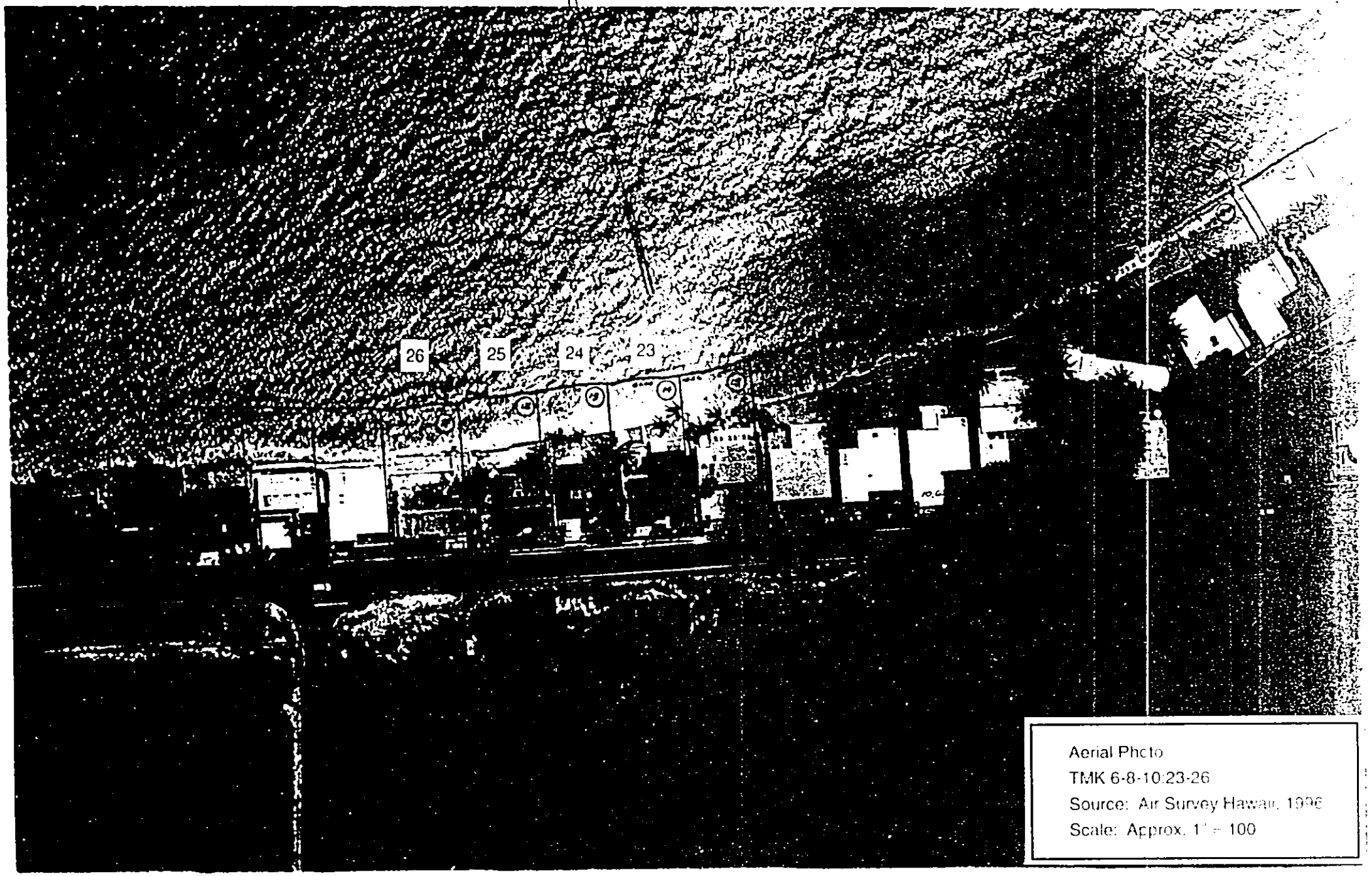
Reconstruction of Seawall at 68-695 Farrington Highway, Mokuleia

EXHIBIT D

AERIAL PHOTOGRAPHS
for TMK 6-8-10:23-26

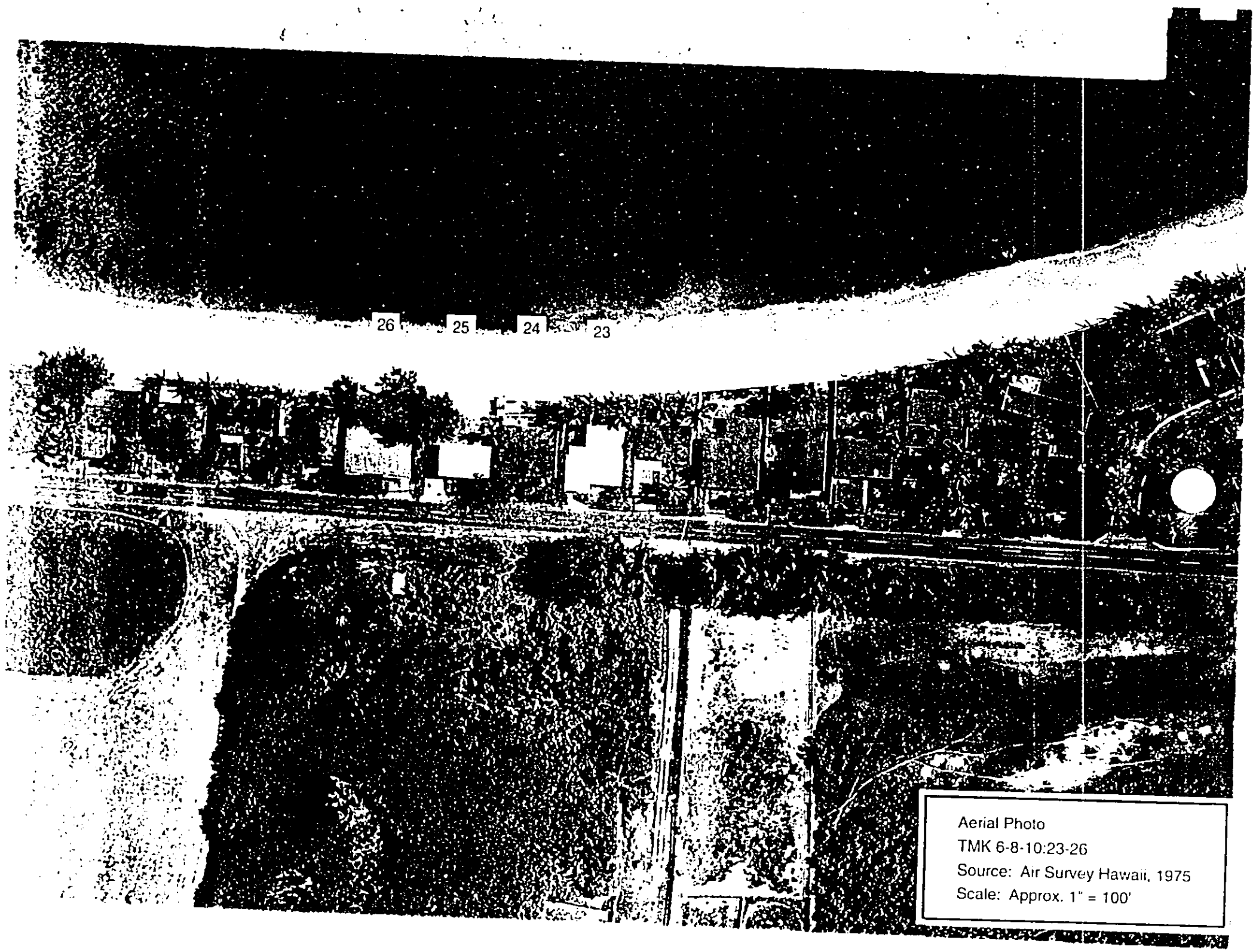
1949 - 1996

Mokuleia, Oahu, Hawaii



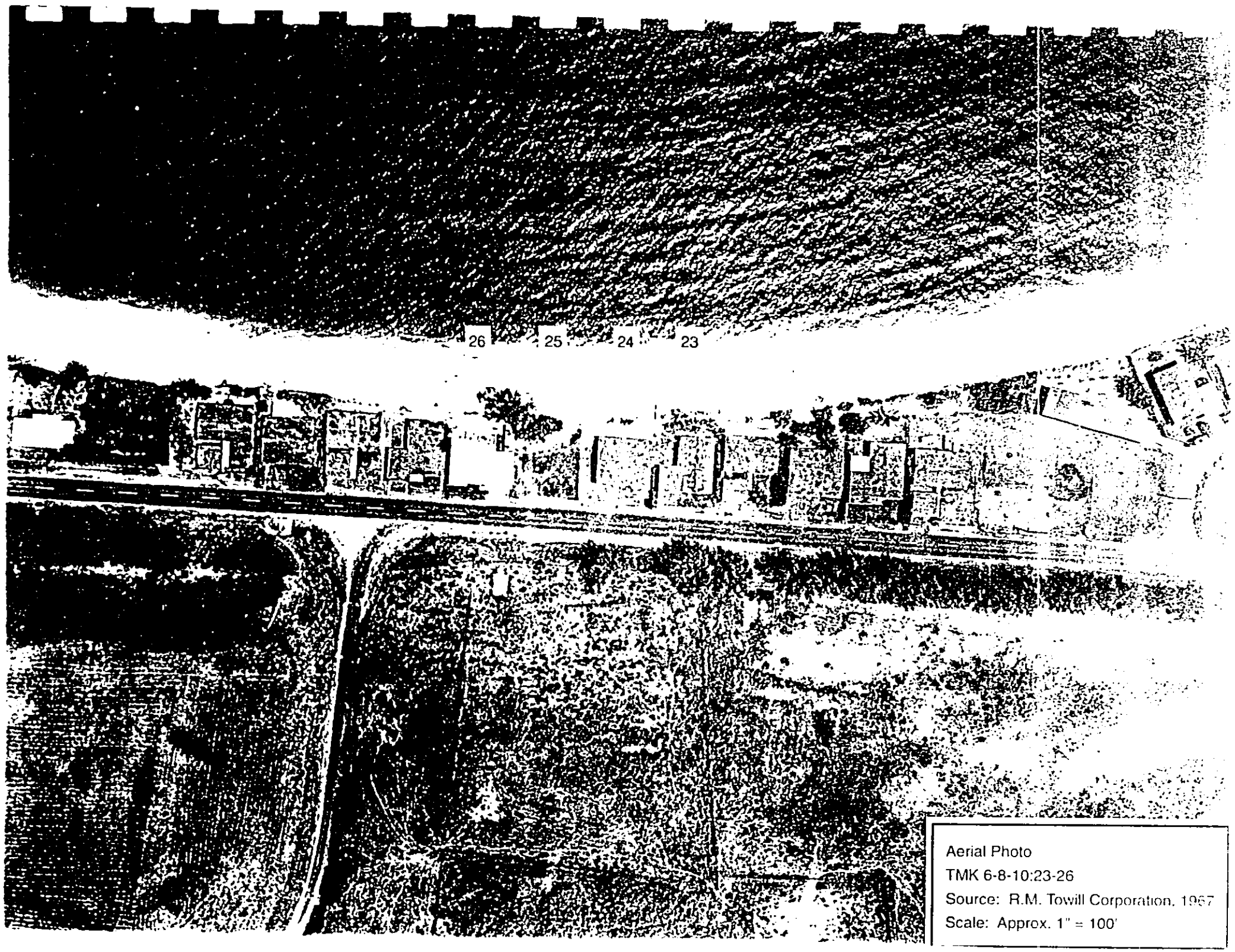
Aerial Photo
TMK 6-8-10:23-26
Source: Air Survey Hawaii, 1996
Scale: Approx. 1" = 100

Aerial Photo
TMK 6-8-10:23-26
Source: R.M. Towill Corporation, 1983
Scale: Approx. 1" = 100'

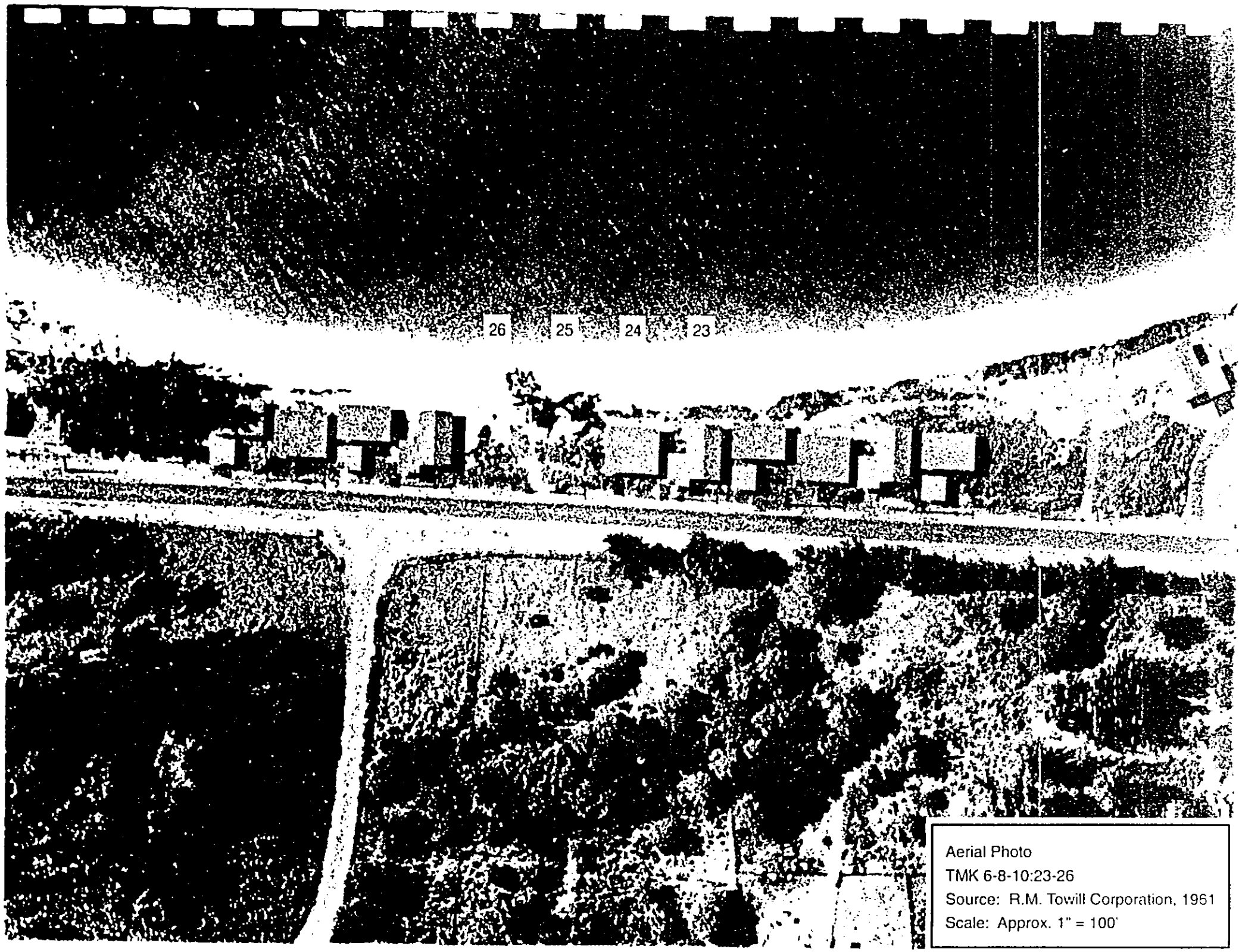


Aerial Photo
TMK 6-8-10:23-26
Source: Air Survey Hawaii, 1975
Scale: Approx. 1" = 100'

Aerial Photo
TMK 6-8-10:23-26
Source: R.M. Towill Corporation, 1969
Scale: Approx. 1" = 100'



Aerial Photo
TMK 6-8-10:23-26
Source: R.M. Towill Corporation, 1967
Scale: Approx. 1" = 100'



Aerial Photo
TMK 6-8-10:23-26
Source: R.M. Towill Corporation, 1961
Scale: Approx. 1" = 100'