

JOHN WAIHEE  
GOVERNOR



RECEIVED

JOSEPH K. CONANT  
EXECUTIVE DIRECTOR

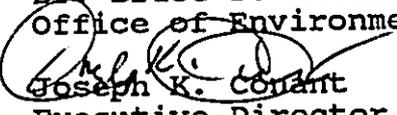
STATE OF HAWAII  
DEPARTMENT OF BUDGET AND FINANCE  
HOUSING FINANCE AND DEVELOPMENT CORPORATION  
677 QUEEN STREET, SUITE 300  
HONOLULU, HAWAII 96813  
FAX (808) 587-0600

'94 NOV 15 10:48

IN REPLY REFER TO:  
94:HFB/5782

November 14, 1994

TO: Dr. Bruce S. Anderson, Interim Director  
Office of Environmental Quality Control

FROM:   
Joseph K. Conant  
Executive Director

SUBJECT: Final Environmental Assessment - Negative Declaration  
Pokai Bay Affordable Rental Development

The Housing Finance and Development Corporation (the "HFDC") has reviewed all comments received during the 30-day public comment period which began on September 8, 1994, and has determined that the Pokai Bay Affordable Rental Development Project (the "Project") will not have significant environmental effects. Although we have expressed our reservation with regards to the ADAAG Requirements, the Developer has assured us that the Project when completed will be in full compliance with all applicable accessibility requirements.

We are approving the Negative Declaration for this Project. Please publish this notice in the November 23, 1994, OEQC Bulletin.

We have attached a completed OEQC Bulletin Publication Form and four (4) copies of the Final Environmental Assessment Update and the Negative Declaration.

Should there be any questions, please contact me at 587-0640, or Mr. Stacy L. Sur at 587-0576.

Attach.

c: Mr. Michael Klein, Pokai Bay Ocean View Ventures



157

1994-11-23-OA-PEA-Pokai Bay Ocean View  
Affordable Housing

NOV 23 1994

~~DEC 8 1994~~

FINAL ENVIRONMENTAL ASSESSMENT  
and  
NEGATIVE DECLARATION

POKAI BAY OCEAN VIEW DEVELOPMENT  
AFFORDABLE HOUSING PROJECT  
Waianae, Hawaii

Tax Map Key: 1-8-6-001-050, 1-8-6-001-043, 1-8-6-001-011

February 4, 1994  
Revised April 11, 1994  
(Revisions in Italics)  
Revised October 21, 1994  
(New Revisions are Underlined)

For: Pokai Bay Ocean View Development, Inc.

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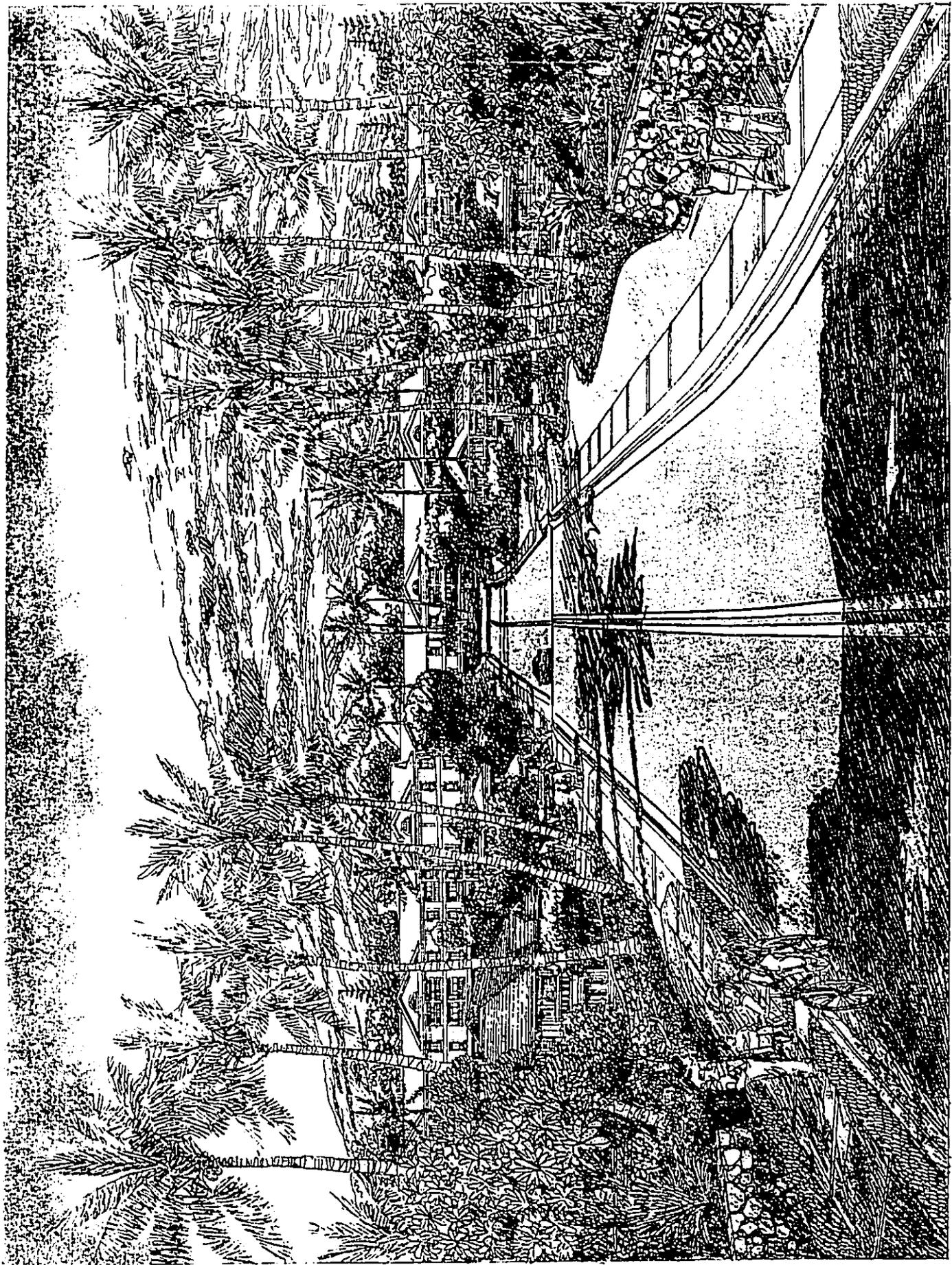
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\* Data contain in Appendix E is duplicated throughout this report. It has been consolidated to include all responses to concerns in one place.



## I. INTRODUCTION

### A.1. Purpose

The purpose of this Environmental Assessment is to comply with Chapter 343, Hawaii Revised Statutes ("HRS"), in conjunction with an application submitted to the State Housing Finance and Development Corporation (HFDC) for construction financing and for Rental Housing Trust Fund money to develop the Pokai Bay Elderly Apartments in Waianae. The request to utilize these State funds triggers the environmental review process as required by Chapter 343, (HRS).

Currently, an application is pending with the City and County of Honolulu, Department of Housing and Community Development (DHCD), in the form of a 201E Affordable Housing Project. This action may exempt the project from the County General Plan. However, if the exemption is not granted, the amendment to the County General Plan would trigger an Environmental Review process as required by Chapter 343 (HRS). If this situation should occur, a separate environmental review would be required with the City and County of Honolulu Planning Department as the accepting authority or approving agency.

### A.2. Identification of Applicant

PB Ocean View Development is the applicant to HFDC for Rental Assistance Revolving Fund construction financing and Rental Housing Trust Fund. Mrs. Hester Rangnow are the primary contacts for this environmental review process. They are doing business at 1154 Fort Street Mall, Suite 300, Honolulu, Hawaii, 96813.

### A.3. Identification of Approving Agency

Chapter 343, HRS, requires that an environmental review process be initiated whenever one of these eight actions or activities is proposed in the State of Hawaii. The use of State funds is one of the triggering activities for the environmental review process.

In accordance with Chapter 343, HRS, the HFDC is the appropriate accepting authority of the Environmental Assessment since it is the agency authorized to administer the Rental Assistance Revolving

Fund and Rental Housing Trust Fund. The Trust Fund is awarded by a separate commission but HFDC processes the applications.

#### A.4. Agency and Public Consultation

The following public and private organizations were consulted during the preparation of this environmental assessment:

##### State of Hawaii:

- Department of Land and Natural Resources
  - State Historic Preservation Division
- Department of Education
  - Leihoku Elementary School
- Department of Health
  - Office of Environmental Quality Control
- Department of Commerce and Consumer Affairs
  - Subdivision
- Department of Health
  - Clean Water Branch for:
    - (NPDES) National Pollution Discharge Elimination Systems
    - Emergency Medical Services Systems Branch

##### City and County of Honolulu:

- Board of Water Supply
- Department of Land Utilization
- Department of Housing and Community Development
- Department of Human Resources, Elderly Affairs Division
- Department of Wastewater Management
- Department of Public Works, Drainage
- Department of Transportation Services
- Department of General Planning
- Department of Parks and Recreation
- City Council

##### Public Organizations in Waianae

- Waianae Coast Neighborhood Board No. 24
- Waianae Coast Chapter AARP American Ass. of Retired Persons
- Golden Age Club
- Hui O Ka'ala (Club for Retired Individuals)
- (2) Community Meetings with over 75 individuals attending
- Over 100 individual meetings with local residents in the adjacent subdivision called Pokai Bay Estates and Marina.

## II. DESCRIPTION OF THE PROPOSED ACTION

### B.1. Technical Description

Pokai Bay Ocean View represents 184 housing units. The applicant proposes to develop 60 Elderly Rental Apartments on Lot 73 (See Figure 1- Site Plan), 54 Elderly Condominiums on Lot 71, Duplex Homes on Lots 12-17, and 64 Single Family Homes Lots 1-11 and 18-70. In addition to the above housing, this project will have a one half acre community center with meeting rooms, restrooms, kitchen and park area with grills located on Lot 72.

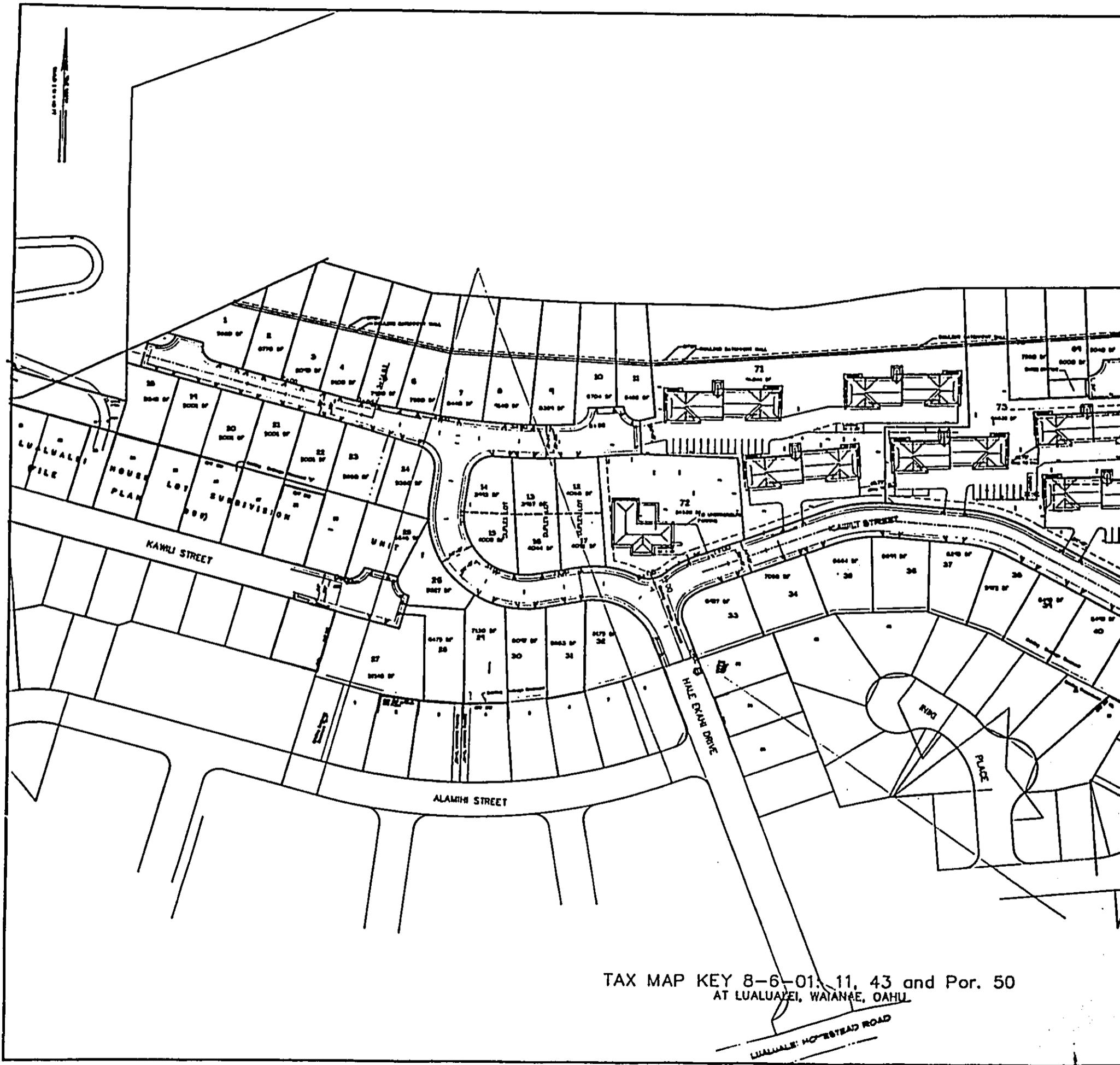
This project site is located approximately one half mile from Farrington Highway on Lualualei Homestead Road in Waianae. The site consists of approximately 17.4 acres on a portion of TMK 1-8-6-001-050, 1-8-6-001-043, and 1-8-6-001-011. (See Figure 2- Location Map)

The site is owned by PB Ocean View Development, Inc. a Hawaii Corporation. The apartments are located in the center portion of this property. To the back of the apartments is the Paheehee Mountain with conservation property bordering along its Northerly edge. The apartments are surrounded by the new Community Center, Duplex Units, and Single Family Homes.

Within the 60 apartments there are 24 Studio Units and 36 Single Family Units. All buildings have elevators and underground parking. All of the apartments will have washer, dryers, ceiling fans, and window blinds. Most of the residents will experience a dry climate with beautiful ocean and valley views with a country atmosphere.

Access to the site is from Lualualei Homestead Road turning left onto Hale Ekahi Drive a 44' right-of-way. (See picture of new Hale Ekahi Dr. located at the beginning of this report.) The road has been designed to meet City and County specification with a 5% starting slope. The new street will be dedicated to the City and County upon completion. (*Figure 3A - Road Profiles Design*)

The 60 rental apartment units will be developed as part of the first phase of this project along with the supporting infrastructure. The



TAX MAP KEY 8-6-01, 11, 43 and Por. 50  
AT LUALUALEI, WAIANAE, OAHU

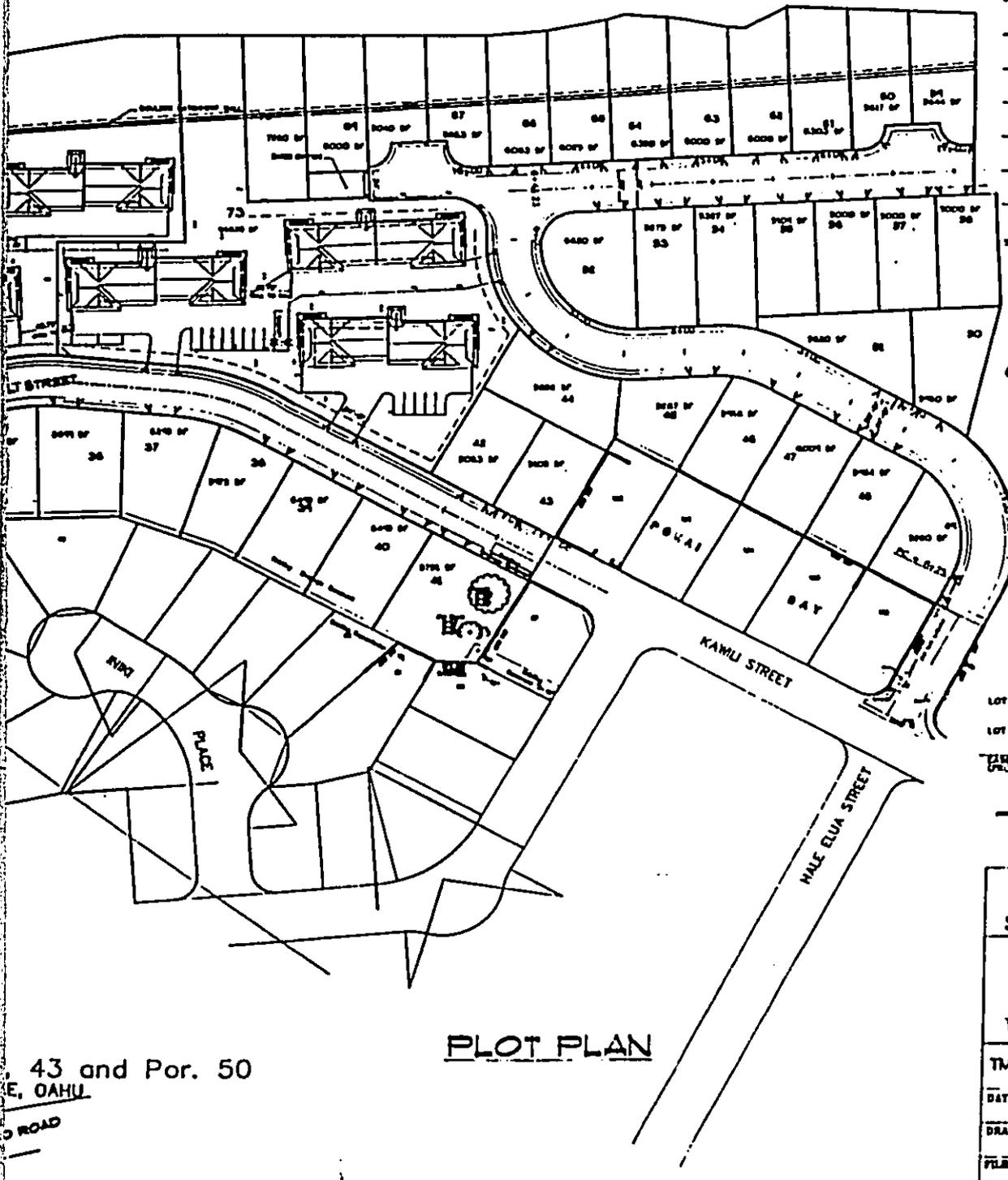
LUALUALEI HOHEPA ROAD



# HAWAII ARCHITECTS INC.

James Mallichuk, AIA  
WALANAE ADDRESS: 191A KEPLER ST. #103  
OFFICE ADDRESS: 433 WAIANAO ROAD  
KAPAA, HAWAII 96734  
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Phone: (808) 282-2475

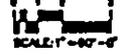
NO.	REVISIONS	BY:
1	1/12/94 REVISIONS	JRM
2	2/17/94 REVISIONS FOR LOT 52-77, BLDG 207	JRM
3	4/17/94 REVISIONS PARKING LAYOUT	JRM
4	4/17/94 REVISIONS LOT REARRANGING	JRM
5	1/7/94 REVISIONS LOT NOS. & HOME CONDOS & APARTS	JRM
6	5/5/94 REVISIONS NO. ALSO CHANGED APPTS & CONDO LAYOUT	JRM
7	5/18/94 REVISIONS LOT REARRANGING AND AREA FOR NEW AVENUE	JRM
8	1/7/94 REVISIONS MOVE C.C. TO LEFT, ADD PARKING LOTS	JRM
9	10/11/94 REVISIONS ADD DRIVEWAYS AND BOLDER CATCHMENT BASIN	JRM
10	11/3/94 REVISIONS MOVE BOLDER CATCHMENT BASIN FROM TO LEFT / ONE BOLDER DRIVE LOT 52-54	JRM



*James R. Mallichuk* 11/4/94

(This work was prepared by me or under my supervision and construction of the project will be under my supervision. (Supervision of construction as defined in section 15-82-2 of the rules and regulations of the Board of Professional Engineers, Architects, and Surveyors of the State of Hawaii.)

NOTE: Contractor to check and verify all dimensions at job before proceeding with work.



### LEGEND

- LOT LINE
- LOT LINE (PROPOSED)
- PROPERTY LINE AND DRIVEWAY (PROPOSED)

**PRELIMINARY SUBDIVISION PLAN**  
**POKAI BAY OCEAN VIEW**  
 Waianae, Hawaii

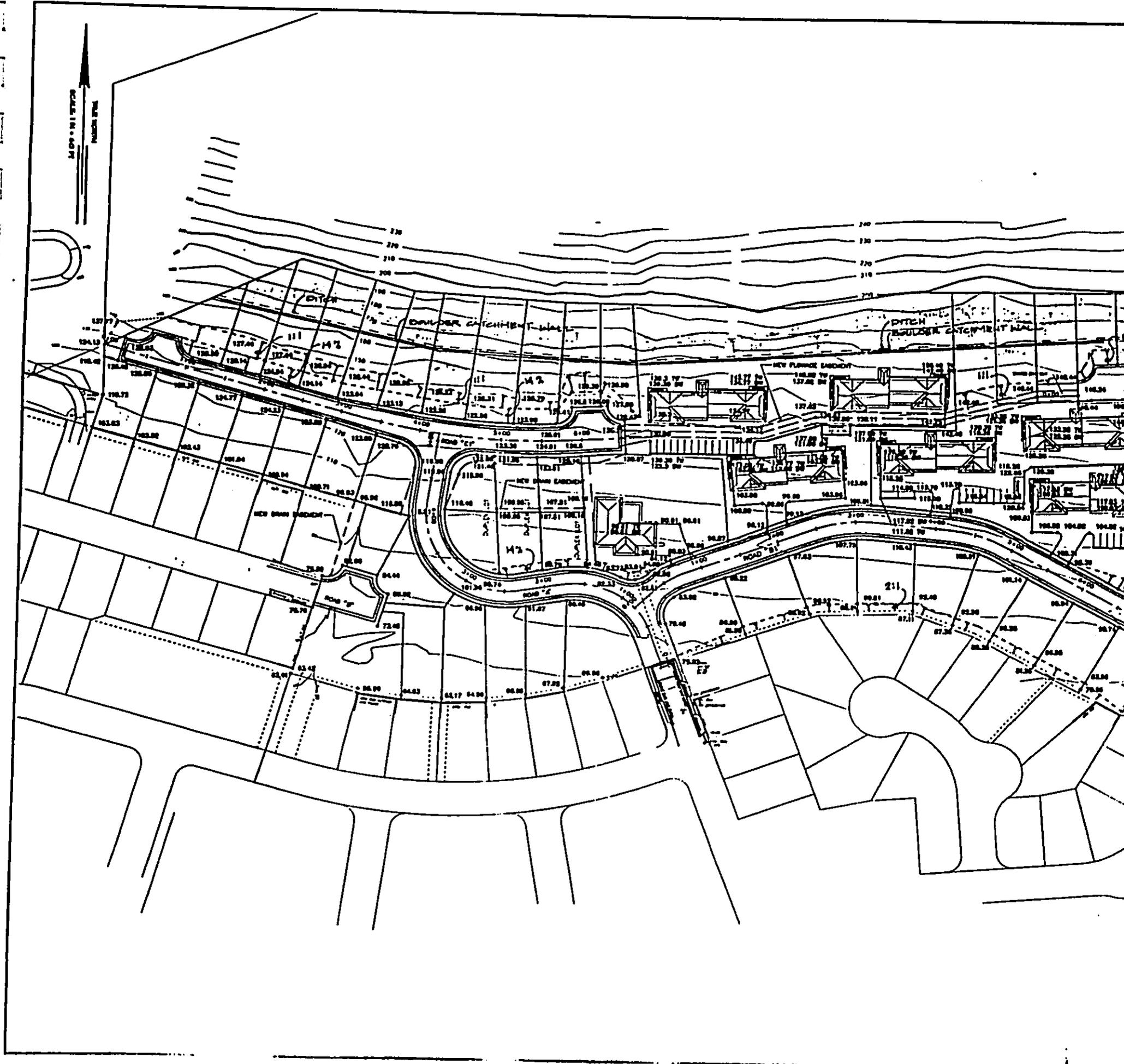
TMK: 8 - 6 - 001 : 043 & 050

DATE 6.9.93	SHEET NO.
DRAWN BY JRM	A1
FILE 83 - 418	

## PLOT PLAN

43 and Por. 50  
E. OAHU  
ROAD

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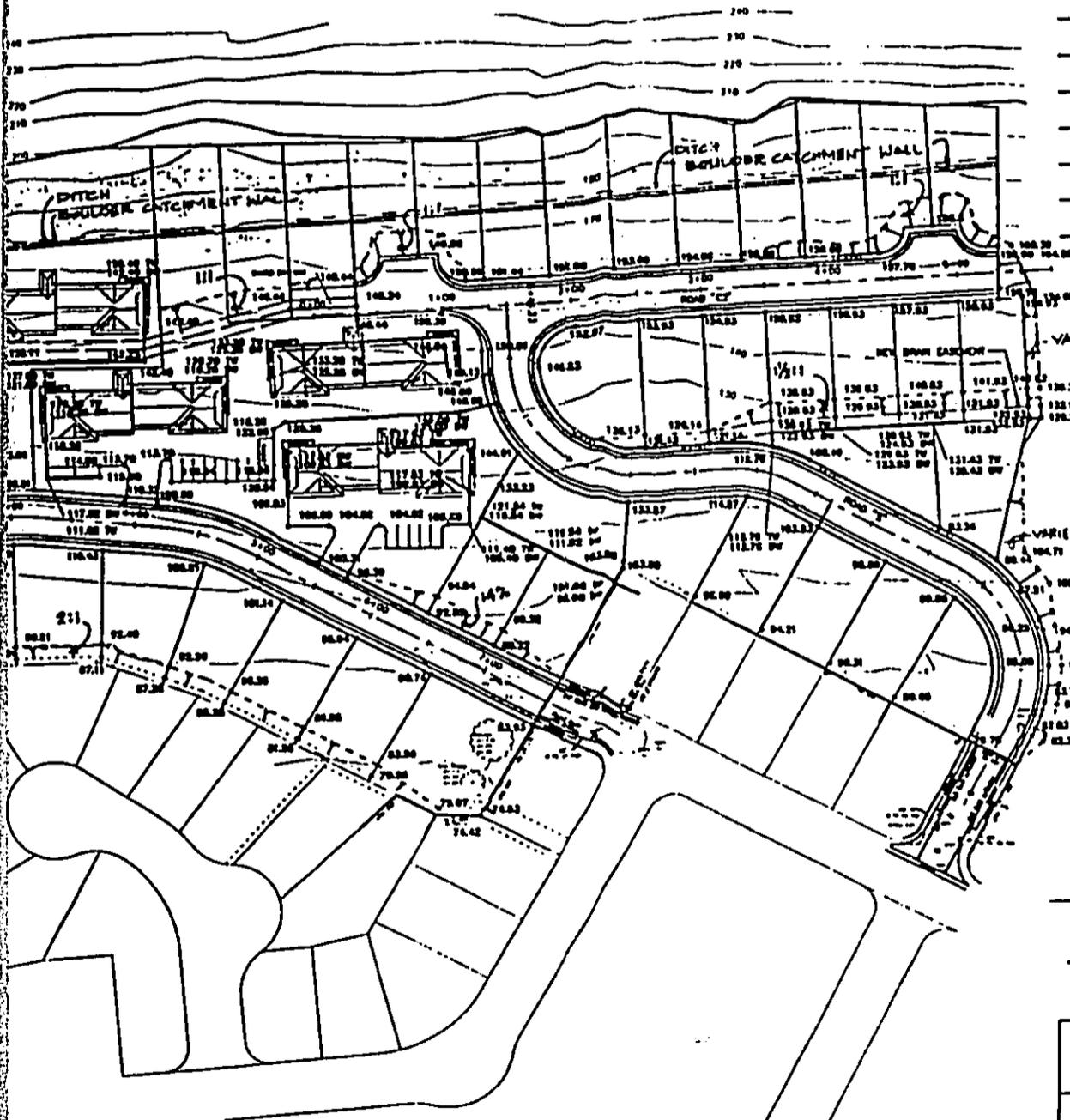
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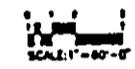
**HAWAII ARCHITECTS INC.**

James Matichuk, AIA  
 WALSH ADDRESS 1114 HAWAII ST. #115  
 DISTRICT OFFICE 433 HAWAII ST. #115  
 HONOLULU, HAWAII 96814  
 TEL (808) 263-8110  
 PHONE (808) 262-2475

NO	REVISIONS	BY
	REVISED PLACED CATCHMENT WALL LOCATION	VEN AVR



VARIES  
 DATE  
 This work was prepared by me or under my supervision and construction of this project will be under my supervision (Supervision as defined in section 18-22-2 of the rules and regulations of the Board of Professional Engineers, Architects, and Surveyors of the State of Hawaii)  
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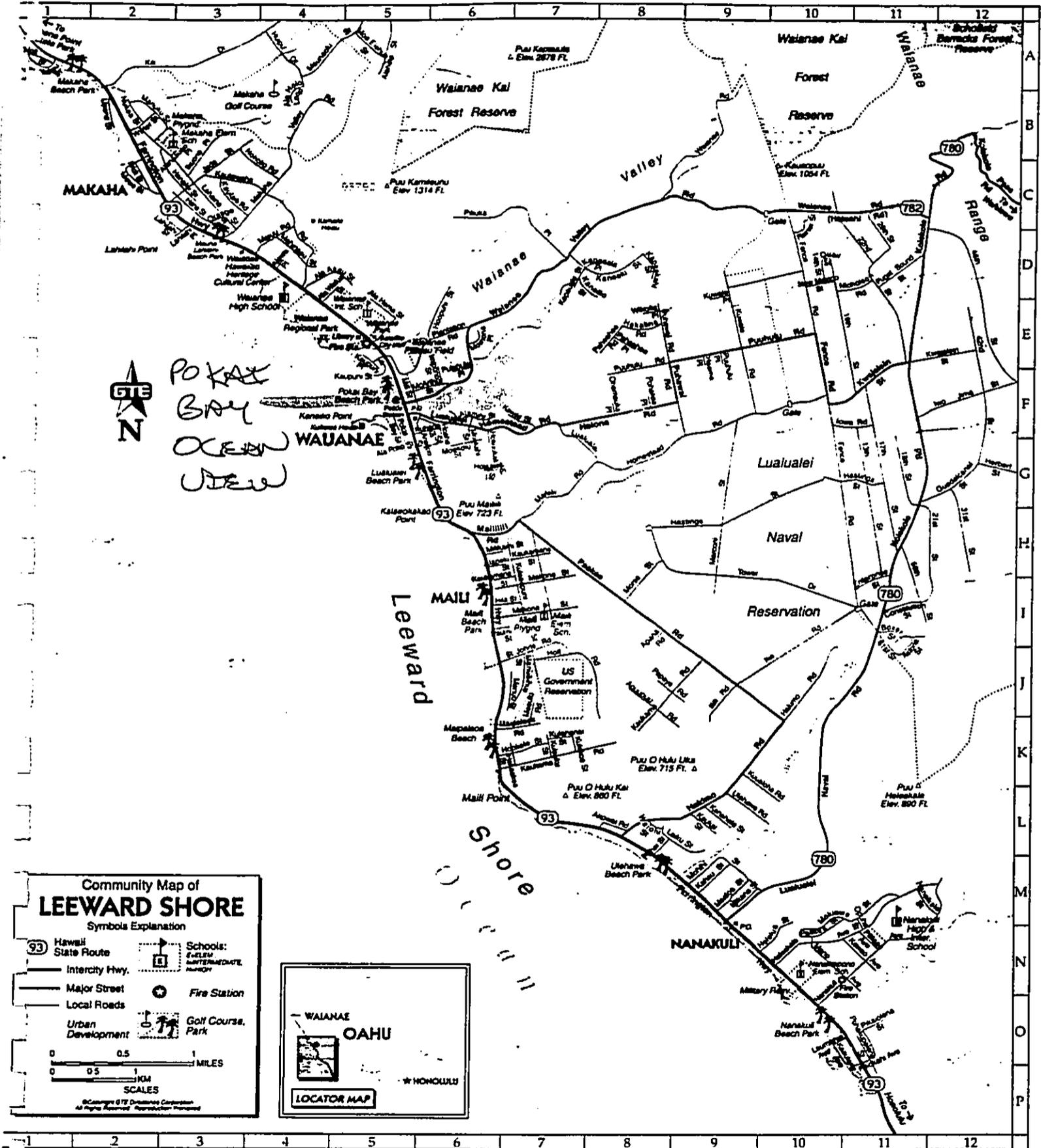
LEGEND

PRELIMINARY SUBDIVISION PLAN	
POKAI BAY OCEAN VIEW	
Wai'anae, Hawaii	
TAX: 8 - 6 - 001, 043 & 050	
DATE: 02/94	SHEET NO.
DRAWN BY:	
FILE: 83-410	OF FIFTY

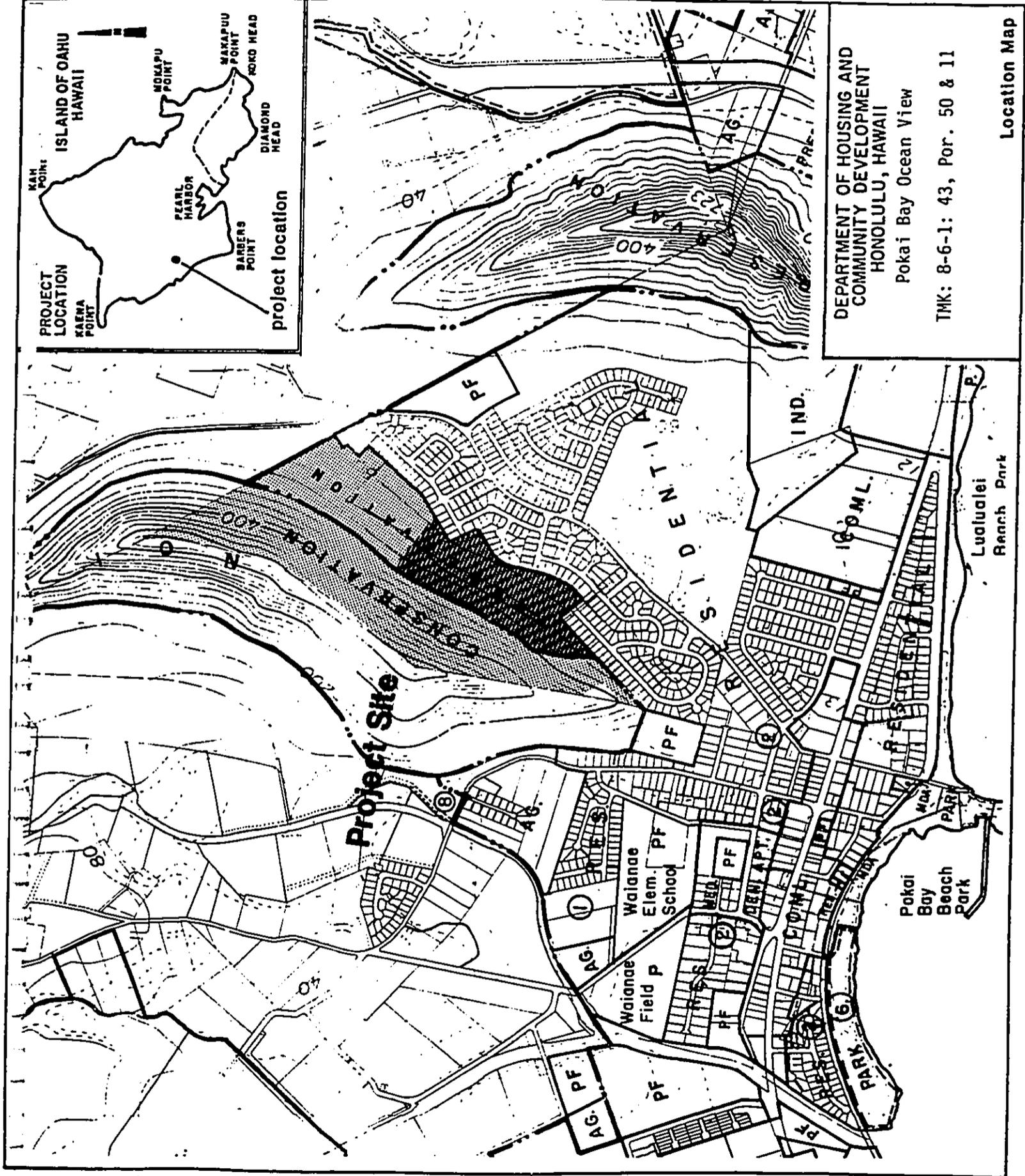
CONCEPTUAL GRADING PLAN -  
 PREPARED BY R.M. TENNILL CORPORATION  
 HIGHT  
*R.M. Tennill*

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Figure 2 - Location Map



These maps are not intended to show every street.



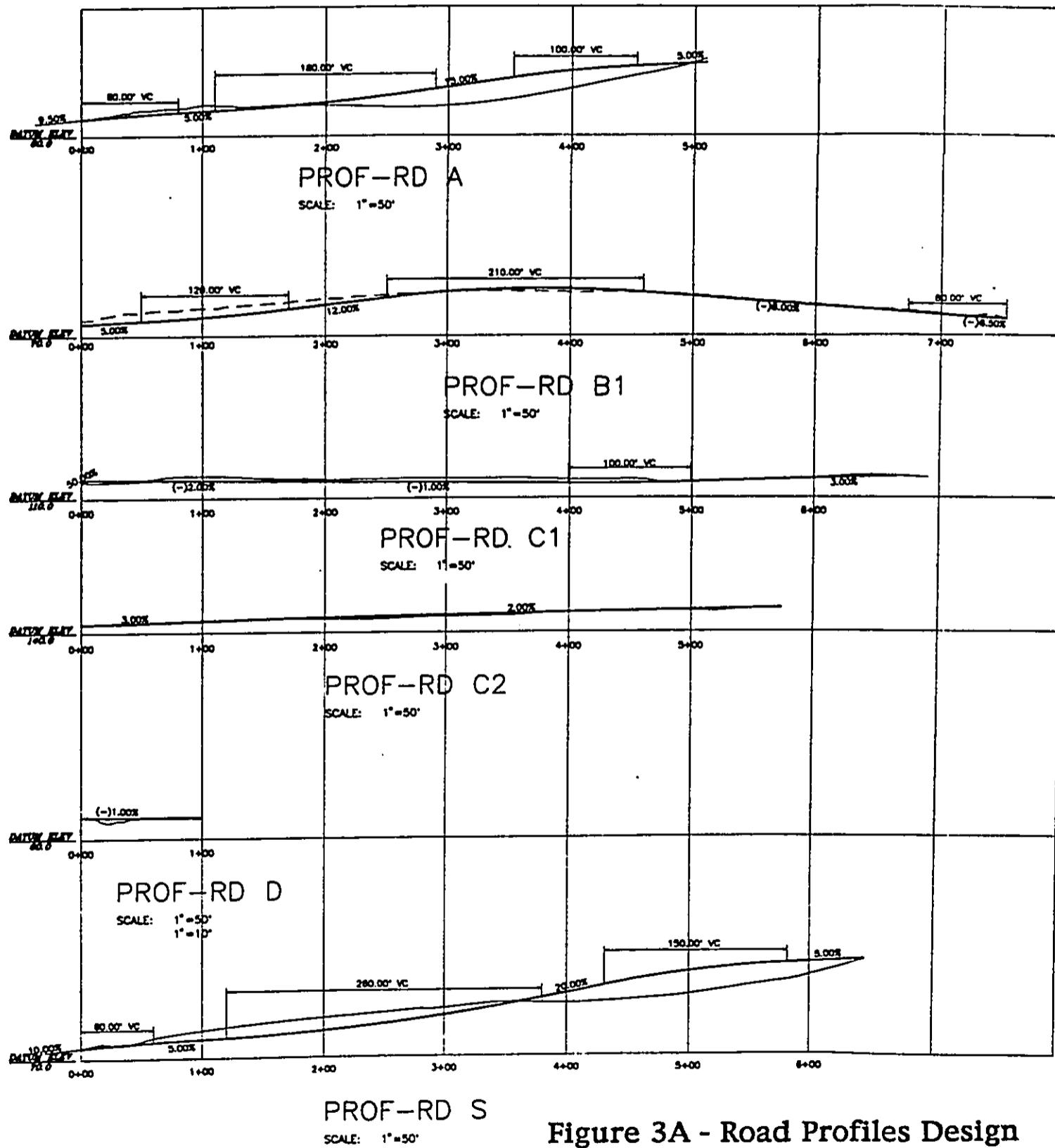


Figure 3A - Road Profiles Design

7.000	

es Design

ENGINEER					
DRAFTSMAN					
CHECKED BY	REVISION	DATE	BY	APPROVED	
	<b>R. M. TOWILL CORPORATION</b> ENGINEERS • PLANNERS • SURVEYORS • PHOTOGRAMMETRISTS CONSTRUCTION MANAGERS 470 West 42nd Street New York, N.Y. 10018-3641				
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION					
SIGNATURE	DATE		APPROVED BY		

apartments will be completed within 2 years and the overall development will be completed by 1997.

Construction of the first phase is scheduled to begin May, 1994 with occupancy of the units scheduled by July 1996. The 54 for sale condominiums and community center will be completed by September 1996. The apartments and condominiums will all have units to accommodate the needs of handicapped persons. Studio Units will be approximately 445 sq. ft. and One Bedroom Units will be approximately 527 sq. ft. (See Figure 3 - Floor Plan, Apartments, & Parking Plan) *The apartment and condominiums have two differences between the buildings; one the parking is slightly different (See Figure 3 Parking Plan), second the condominiums have Two Bedroom Units located on the top floors of all three buildings, instead of Studio Units. Parking has been changed for the elderly to make sure that they would not have to cross the street in order to park their vehicle. To accommodate this City request, additional parking has been provided so that all residents have at least one stall below or to the side of the building they live in. A new parking plan has been provided to show exactly where the apartment is in relationship to the parking stall.(See Figure 3 Parking Plan)* Landscaping will be provided along with gardens for the elderly to work. The total development budget for the 60 units is \$6,250,000.

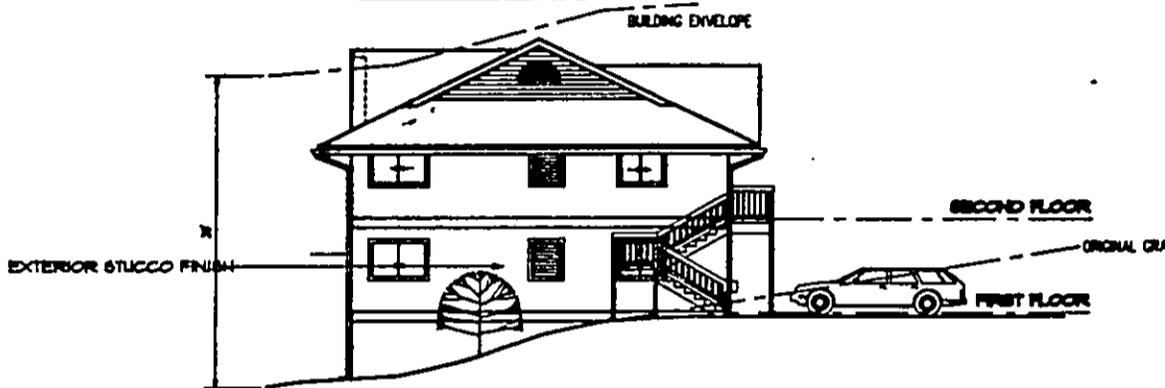
## **B.2. Socio-Economic Characteristics**

### **B.2.a. Need for the Project**

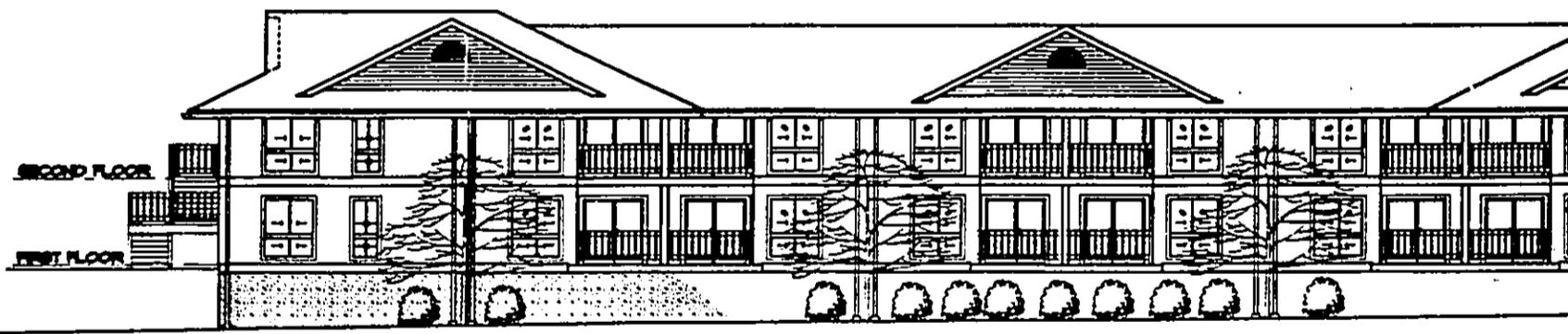
The purposed affordable housing units will address an existing affordable housing demand on Oahu and in Waianae specifically. This project is designed for the elderly age 62 years and older. The Waianae Coast only has two elderly projects, Keola Hoomalu with 18 units and the Kauhale Nani with 109 units. Both of these elderly projects have indefinite waiting lists for new seniors. Per the 1990 Census 3,700 elderly individuals 60 years and older live on the Waianae Coast. On Oahu over 3,300 elderly were on either a public or private waiting list in 1993. This project would help bring relief to this generally under assisted community. (See appendix A - Marketing Report " Plight of Oahu's Elderly") *Several community leaders and residents have voiced their concern about the lack of affordable rentals for the elderly on the Waianae Coast. The developer received input not only from neighbors below the project*



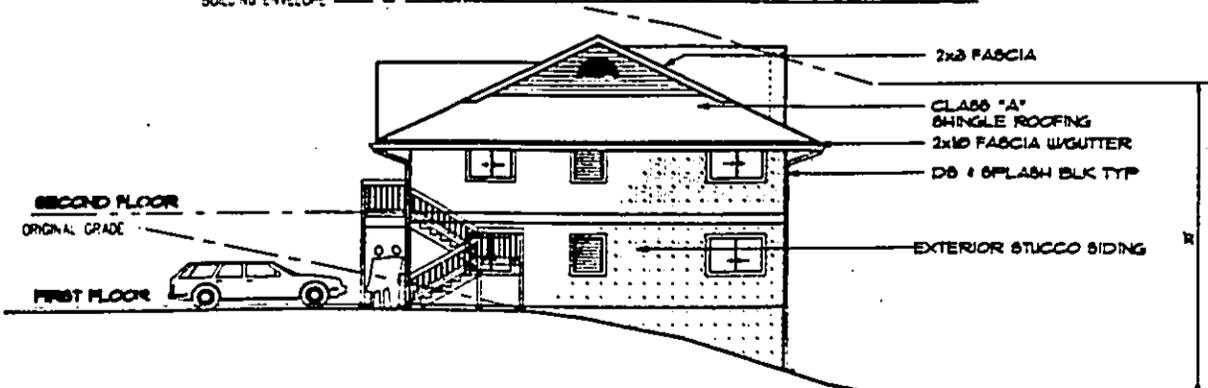
**ENTRY ELEVATION BUILDING I**



**LEFT ELEVATION BUILDING I**



**LANAI ELEVATION BUILDING I**



**RIGHT ELEVATION BUILDING I**

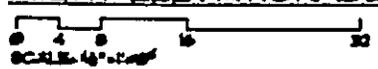


Figure 3 - Floor Plan, Apartments, & Parking Plan



**HAWAII  
ARCHITECTS  
INC.**

James Matichuk, AIA

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NO.	REVISIONS	BY:
1	1/14/04	JPM

SCALE



*J. Matichuk* DATE: 1/14/04

The work was prepared by me or under my supervision and I am a duly licensed professional architect in the State of Hawaii. (Supervision of construction as defined in section 10-82-2 of the rules and regulations of the Board of Professional Engineers, Architects and Surveyors of the State of Hawaii.)

NOTE: Contractor to check and verify all dimensions at job before proceeding with work.

**N BUILDING I**

ING ENVELOPE

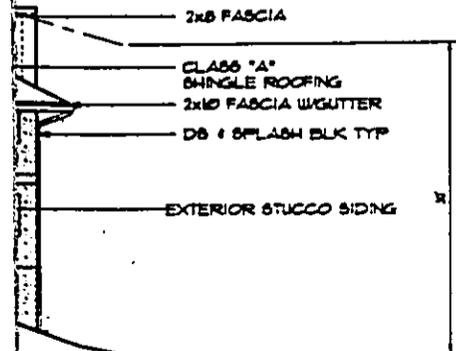


**BUILDING I**



- 2x8 FASCIA (TYP)
- CLASS "A" SHINGLE ROOFING
- D6 # 8 FLASH BLK TYP
- EXTERIOR STUCCO FINISH

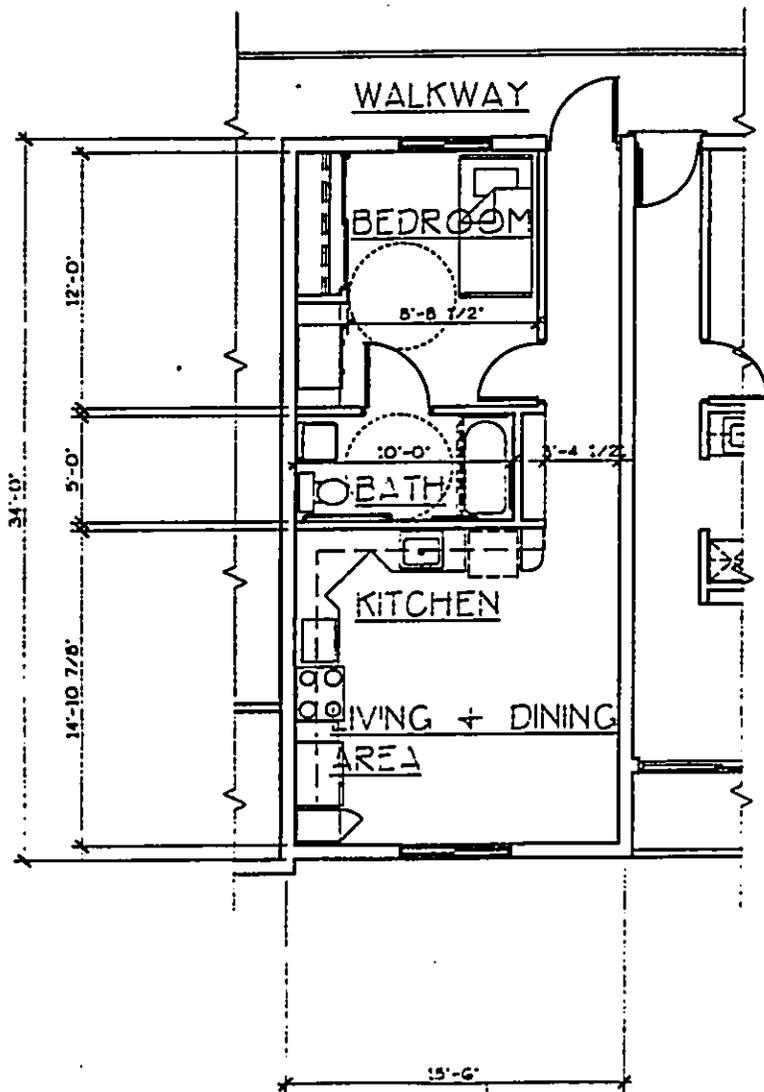
**BUILDING I**



- 2x8 FASCIA
- CLASS "A" SHINGLE ROOFING
- 2x10 FASCIA W/ GUTTER
- D6 # 8 FLASH BLK TYP
- EXTERIOR STUCCO SIDING

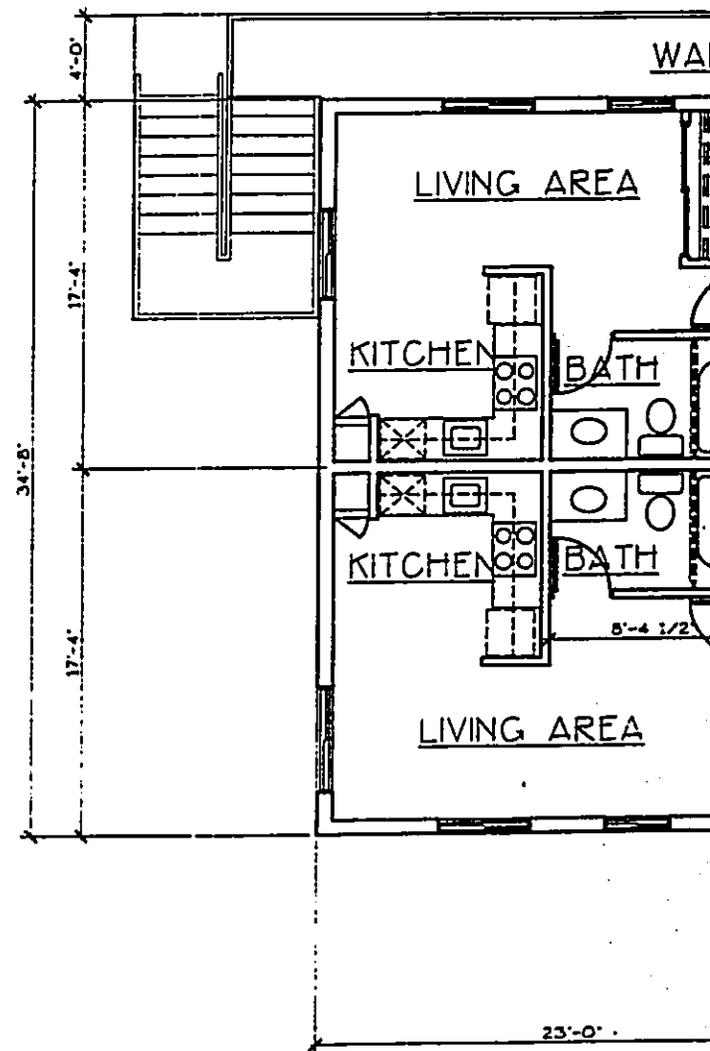
**BUILDING I**

PRELIMINARY DESIGN	
POKAI BAY OCEAN VIEW Waianae, Hawaii	
TMK: 8-6-001: 043 & 050	
DATE: 1-8-03	SHEET NO.
DRAWN BY: J. MATICHUK	A6
FILE: 03-430	



UNIT TYPE B

TYPICAL FIRST and SECOND FLOOR PLAN  
for INDIVIDUALS WITH DISABILITIES



EFFICIENCY UNIT TYPE A  
SERVING

TYPICAL FIRST and SECOND

Figure 3 - Floor Plan, Apartments, & Parking Plan



# HAWAII ARCHITECTS INC.

James Matichuk, AIA  
1127 - 11th Avenue #201  
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1988 20-020

NO.	REVISIONS	BY:

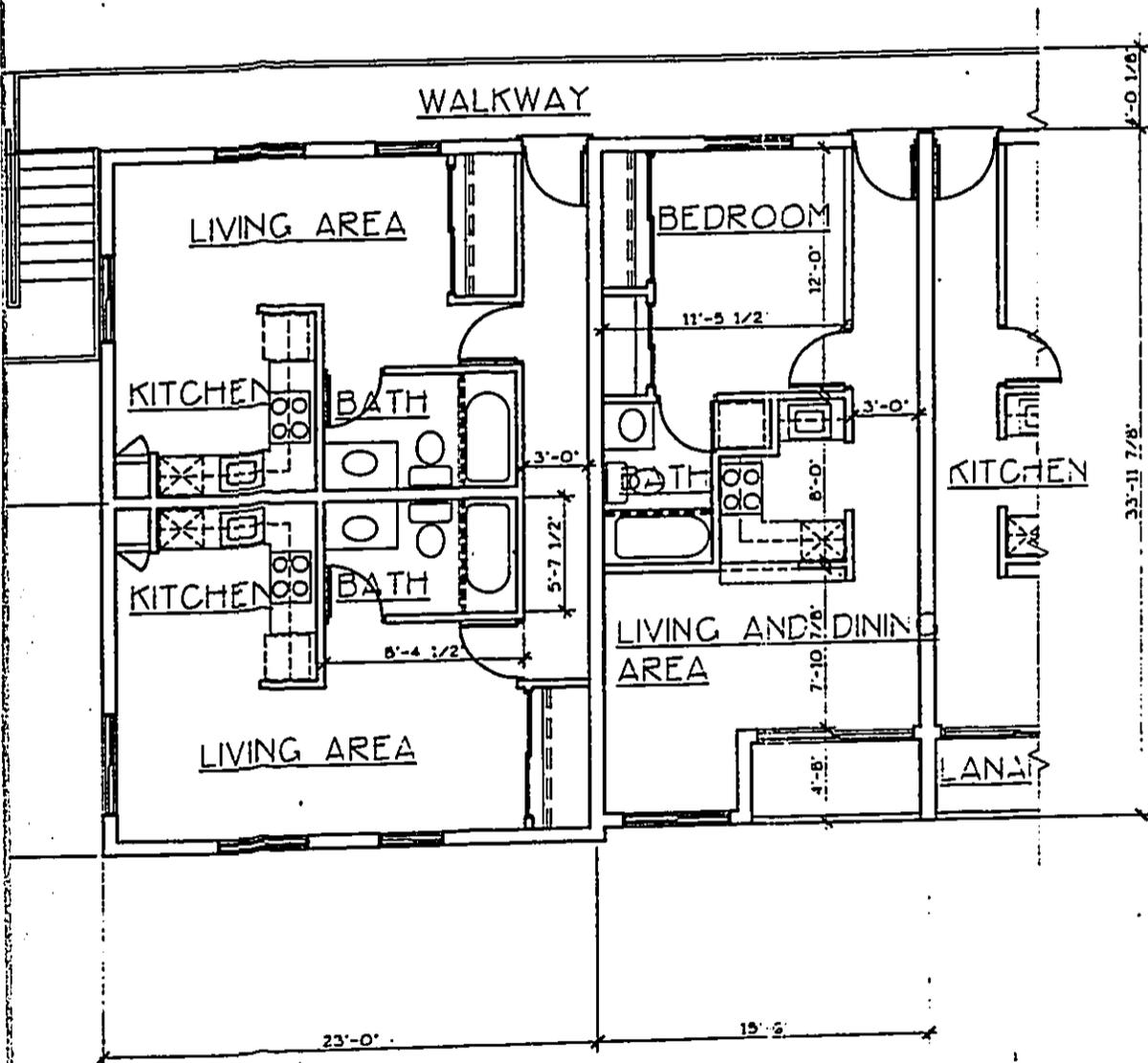
SCALE:



DATE:

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EFFICIENCY UNIT TYPE 'A'  
REVERSED

UNIT TYPE 'B'  
REVERSED

## TYPICAL FIRST and SECOND FLOOR PLAN FOR BUILDING

PRELIMINARY DESIGN

POKAI BAY OCEAN VIEW  
Waianae, Hawaii

TMK: 8-6-001: 043 & 050

DATE: 11/8/83	SHEET NO.
DRAWN BY: B. SALTER	A3
FILE: 83-400	

OF 2 SHEETS

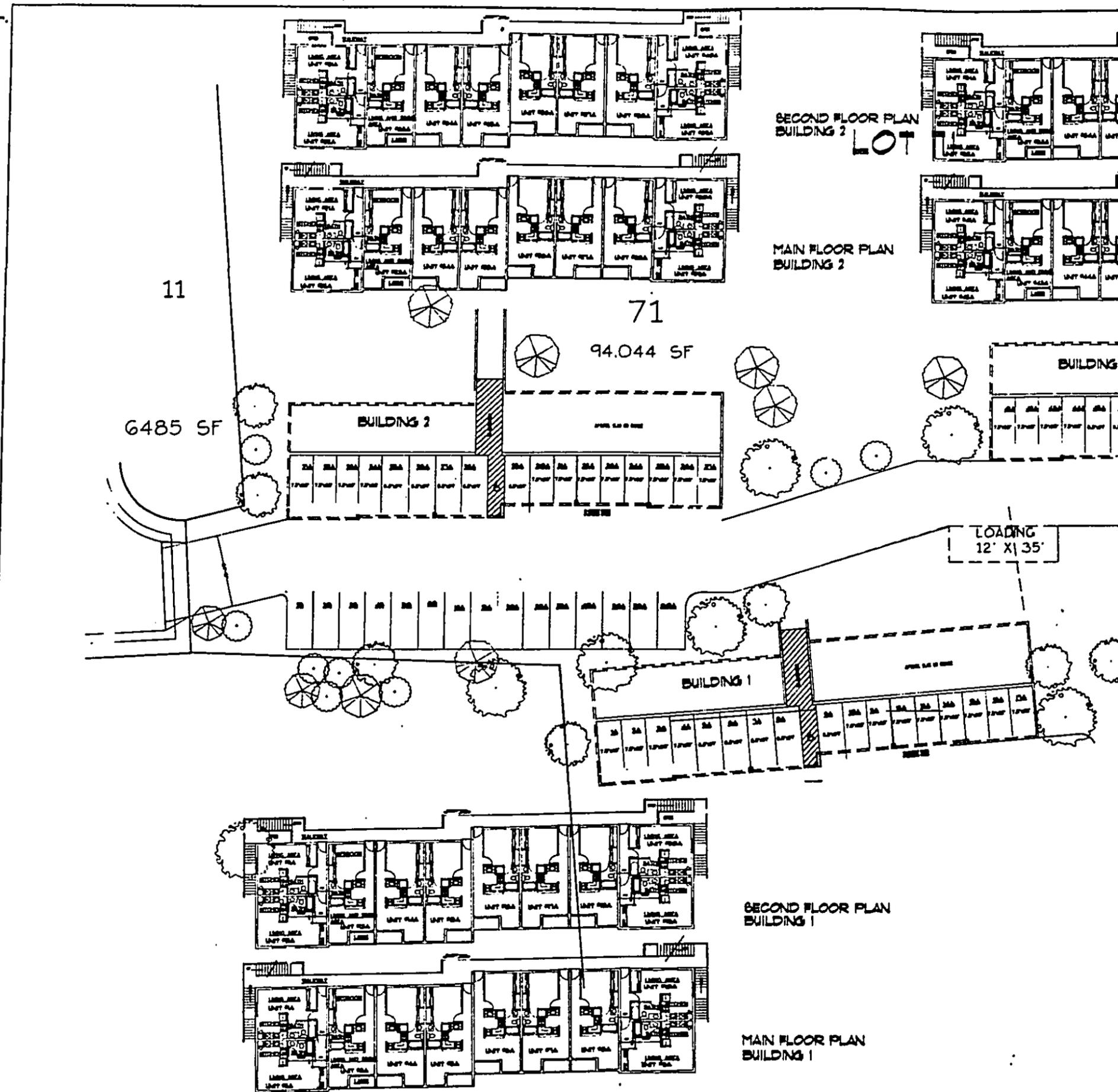
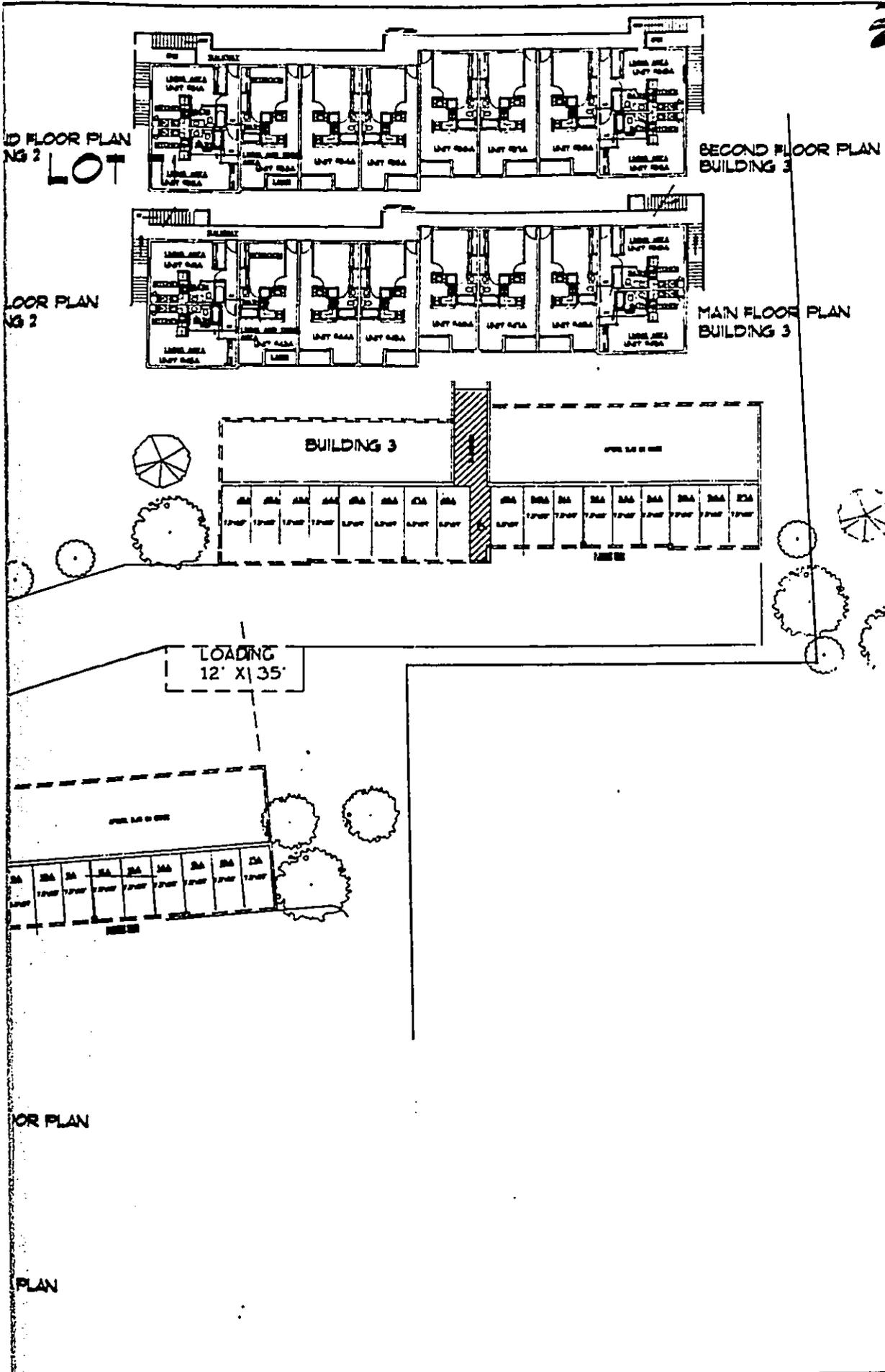


Figure 3 - Floor Plan, Apartments, & Parking Plan

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 James Matichuk, AIA  
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 OFFICE ADDRESS: 422 WAIANAE ROAD  
 WAIANAE, HAWAII 96734  
 Tel: (808) 263-8328  
 Phone: (808) 282-2475

NO.	REVISIONS	BY
1	Use Existing Layout	JM



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**PRELIMINARY FLOOR PLAN, & PARKING PLAN**  
 APARTMENT UNITS ON LOTS 71

**POKAI BAY OCEAN VIEW**  
 Waianae, Hawaii

TMK: 8-6-001:043 & 050

DATE: 1/9/78	SHEET NO.
DRAWN BY: B. BALTZER	A2a
FILE: 83-409	

OF 7 SHEETS

*but from farmers located in valley behind the project and from residents located in the Hawaiian Homes area by the elementary school.*

#### **B.2.b. Target Population**

All of the 60 units will be rent restricted and occupied by elderly individuals whose income is 60% or less of the area medium income. In 1993 an elderly person of one earning up to \$22,500 and an elderly family of two earning up to \$24,740 would qualify as eligible in this project. Initial rental rates for a Studio Unit is \$563 and One Bedroom Unit is \$603 and both of these include utilities.

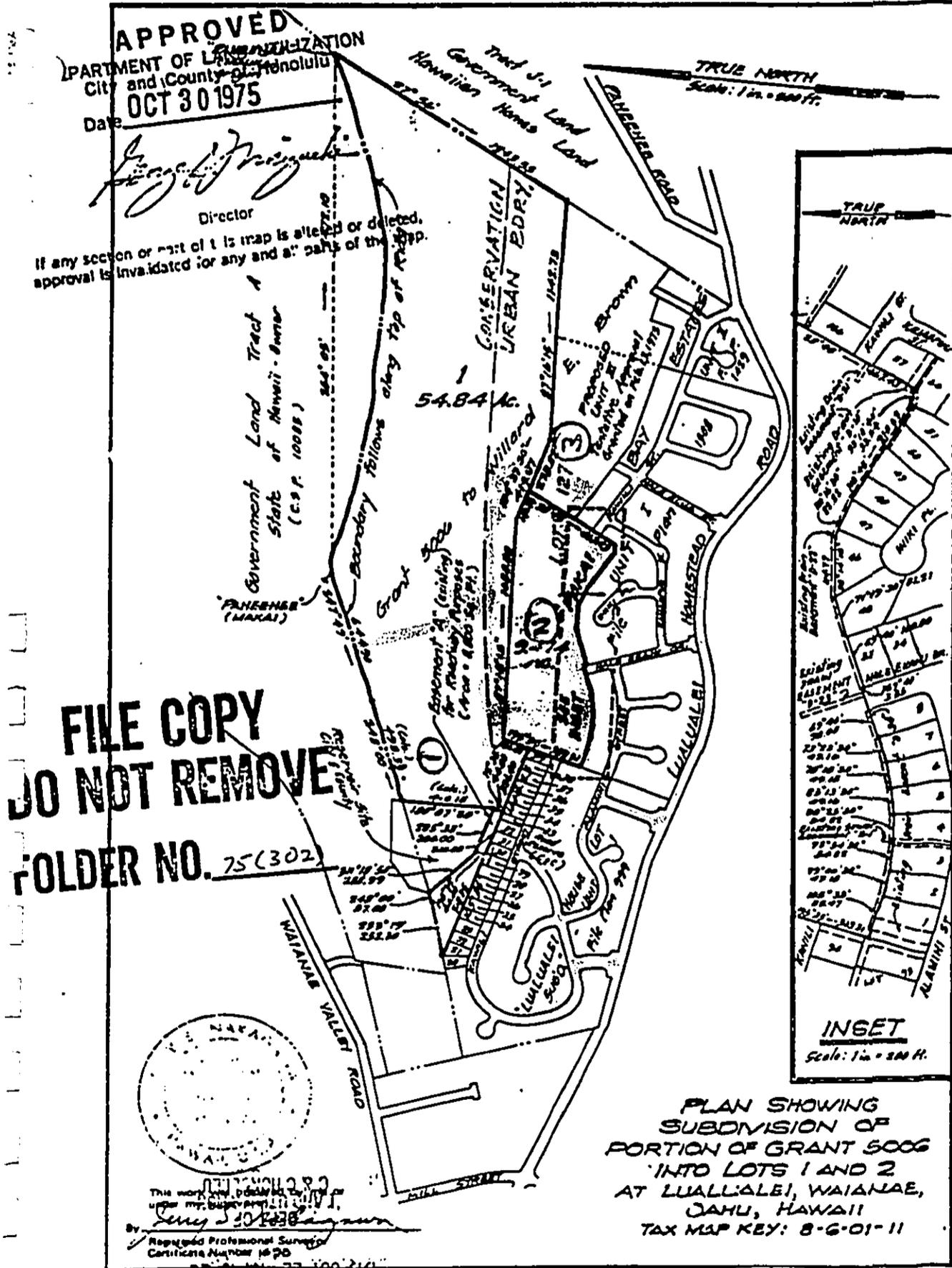
The 54 elderly for sale condominiums have prices which range from 80% to 120% of the medium income. The six duplex units are set to 140% of the medium income. Single family units all represent market priced homes. This project has over 62% of its units dedicated to affordable housing which is excellent in today's developments.

#### **B.2.c. Public Facilities and Services**

The public roadway providing access to this site is Lualualei Homestead Road with four roads leading to the project. (See Figure 4-Original Subdivision) Two of the roads Ihuku St. and Moekahi are 60 feet right-of-ways off of Lualualei Homestead Road. Both of these lead to Alamihi Street or Kawili St. which are 44 feet right-of-ways and access the project site. Hale Ekahi Drive is next and is the main road into this project which is a 44 foot right-of-way. And the last access to the project is Hale Elua St. which is a 44 foot right-of-way.

All four roads have 24 - 40 feet of pavement width and have a posted speed limit of 25 miles per hour. Based on the current project size of 184 units for Pokai Bay Ocean View Development, Phase I & II, the traffic impact is normal for these size roads. A 44 foot right-of-way will accommodate roughly 100 to 125 families. Currently, there are roughly 180 families located under the portion of the new project. The total impact allowable from this area would be in the 400 to 500 family range. Our project represents 114 units of elderly individuals which would drop in half to 57 units because of their time of travel and number of vehicles used. This 57 plus 71 units equals 128 units total. Thus with 128 new units plus 180 units both

1975-302



- ① TMK-1-8-6-001-050 55 ACRES
- ② TMK-1-8-6-001-043 9.4 "
- ③ TMK-1-8-6-001-011 12.4 "

Figure 4 - Original Subdivision

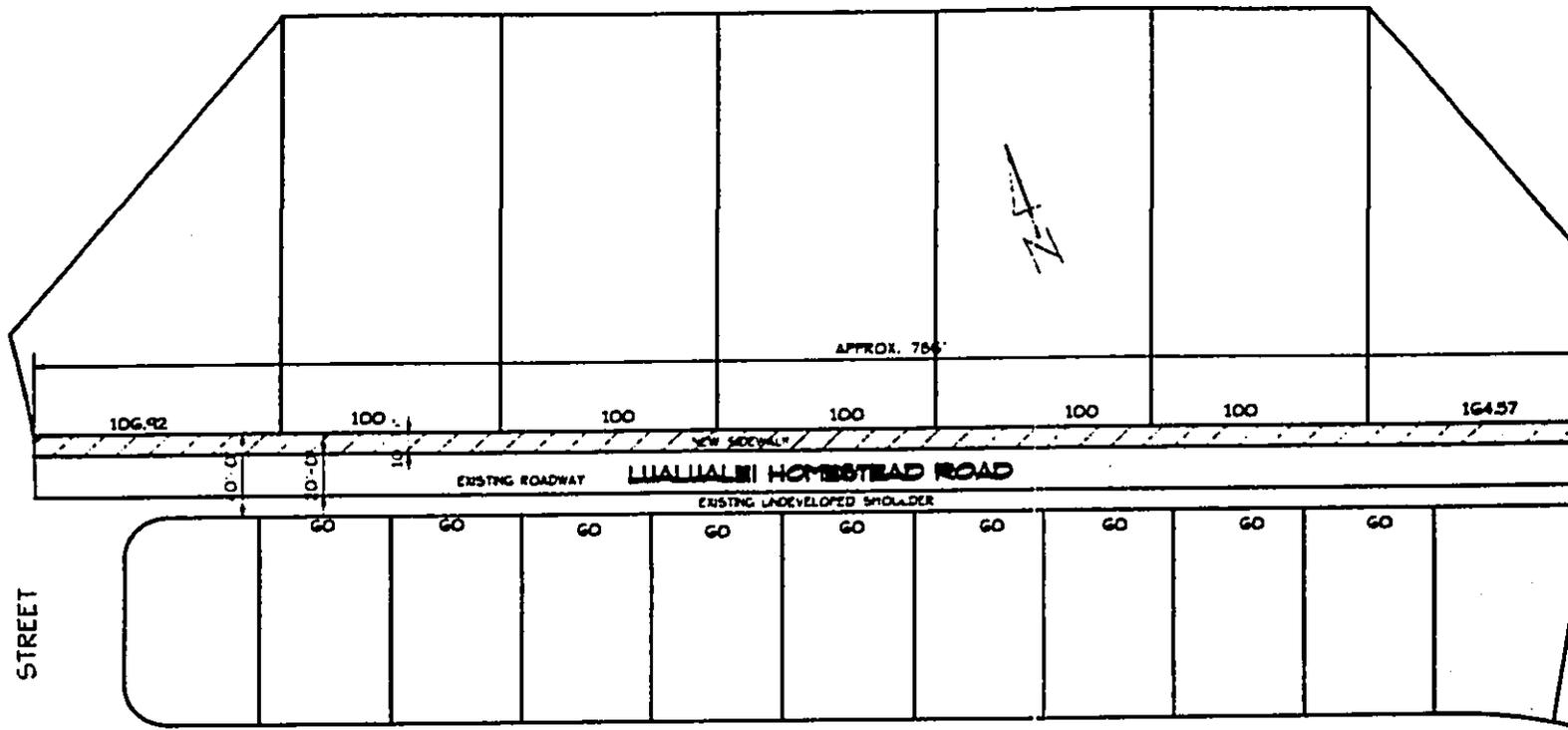
new and existing units would total 308, well under the demand level for these roads.

*Another mitigation measure for reducing the traffic situation is by providing a van service for the elderly apartments and condominiums. This van would be donated by the developer to the community center. The resident manager would be responsible for making sure the schedule and use of the vehicle was consistent with the posted purpose and schedule set by the developer. The van schedule has been added to Appendix E - Responses to Concerns. Trips will be made to the local shopping center daily with trips into Pearl City and Ala Moana once a week. Weekly scheduled trips or excursion for the elderly will be planned by the residents to enjoy other parts of Oahu. The upkeep, insurance, and driver would be the responsibility of the association. The expense for this van was in the original budget set for the operation of the apartments, condominiums, and association.*

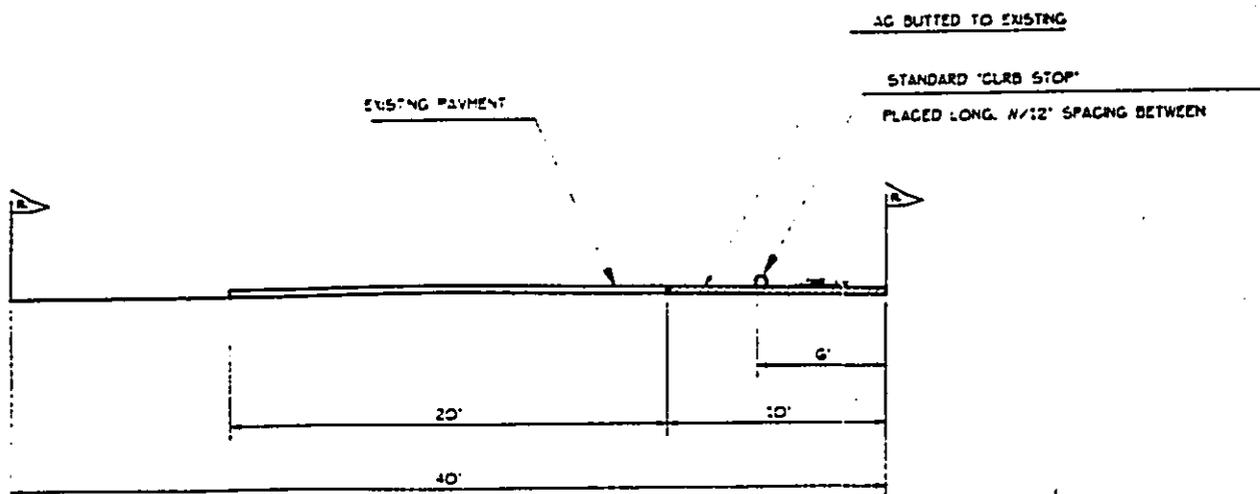
The impact on Lualualei Homestead Road would have been abnormally high but a new road is being finished that connects Leihoku St. from Farrington Highway to Lualualei Homestead Road. The first half of this road will open in December of 1994. Over 334 new families will have access straight to Farrington Highway, instead of having to use Lualualei Homestead Road which is their only access now. This new road is a 56 feet right-of-way. (See Figure 5 - Streets & Traffic)

Part of the improvements by the developer are to widen Lualualei Homestead Road and add a sidewalk for approximately 800 feet. (See Figure 6 - Proposed Sidewalk Location) This section of the road had no sidewalk and the City and County of Honolulu has only used 24 feet of the 40 feet right-of-way they own. The improvement starts on Mill Street and continues up to Village Pokai Bay's subdivision.

Board of Water Supply has given preliminary approval for 202 units on this property. The Manager and Chief Engineer indicated that the existing water system is presently adequate to accommodate the proposed development. The service limit for the area is 142-foot elevation. Homes, apartments, condominiums, or lots located above this elevation will be subject to adding water pumps to build-up the water pressure. The current project has eight-inch water pipelines stubbed in four streets. *These stubbed water pipes will accommodate all the water needs for the new 184 unit subdivision.*



LUALUALEI HOMESTEAD ROAD - PROPOSED SIDEWALK LOCATION  
SCALE: 1"=40'



ROAD CROSS-SECTION

SCALE: 1/4"=1'-0"

Figure 6 - Proposed Sidewalk Location



# HAWAII ARCHITECTS INC.

James Matichuk, AIA  
111 A. Hahaione St., #163  
Hahaione, Hawaii 96734  
Fax: (808) 263-8328  
Phone: (808) 262-2475

NO.	REVISIONS	BY:

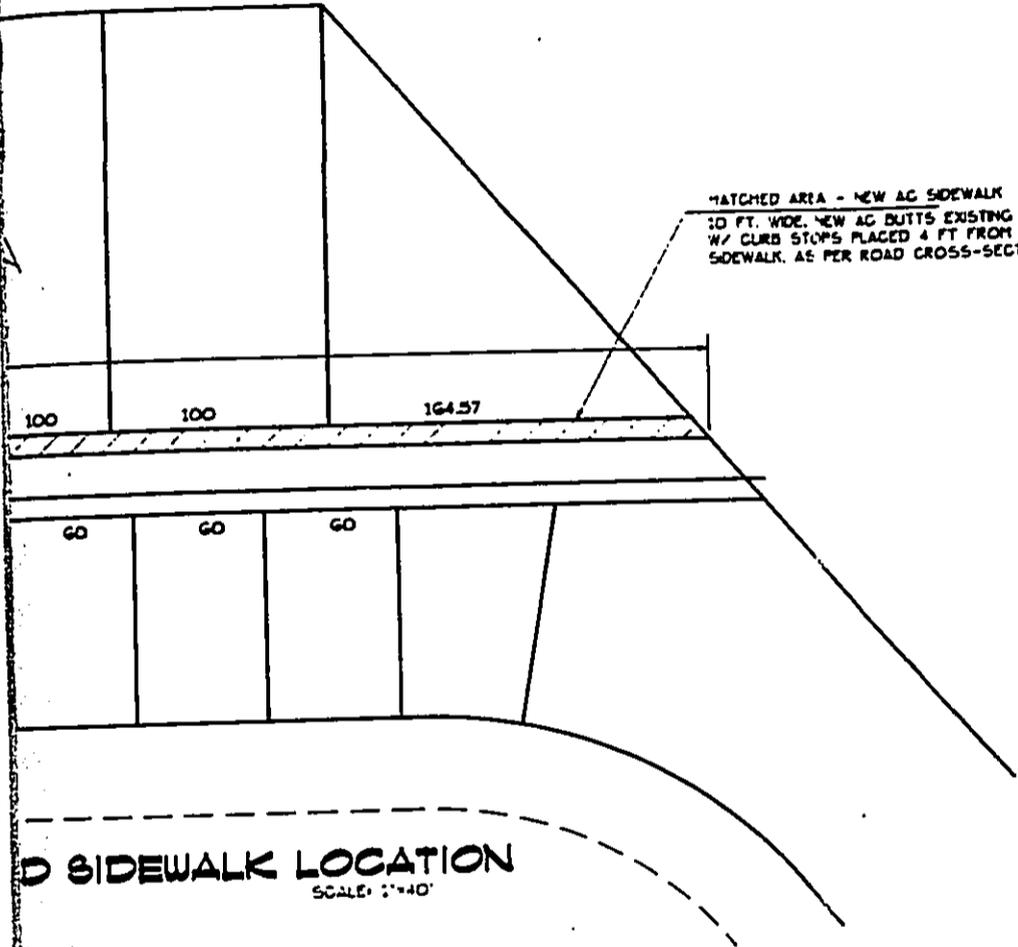
SEAL:



*James Matichuk* DATE: 1/25/94

The work was prepared by me or under my supervision and construction of this project will be under my supervision. Compliance of construction is defined in section 16-82-2 of the rules and regulations of the Board of Professional Engineers, Architects and Surveyors of the State of Hawaii.

NOTE: Contractor to check and verify all dimensions on job before proceeding with work.



HATCHED AREA - NEW AC SIDEWALK  
30 FT. WIDE. NEW AC BUTTS EXISTING AC PAVEMENT  
W/ CURB STOPS PLACED 4 FT FROM EXISTING LEAVING A 6"  
SIDEWALK. AS PER ROAD CROSS-SECTION SHOWN BELOW

D SIDEWALK LOCATION  
SCALE: 1"=40'

AC BUTTED TO EXISTING

STANDARD "CURB STOP"

PLACED LONG. W/12" SPACING BETWEEN

ROAD PROFILES  
DESIGN

POKAI BAY  
OCEAN  
VIEW  
Waianae, Hawaii

TMK: 8 - 6 - 001 043 & 050

DATE: 25/1/94

SHEET NO.

DRAWN BY:  
JOY

FILE:  
83 - 420

SW1

OF 0 SHEETS

1/25/94

Board of Water Supply has a reservoir site on parcel 1-8-6-001-050 which supplies all the water for that area. (See Figure 7 - Board of Water Supply Letter) (See Figure 8 - Water Map)

Wastewater collection will be accomplished by hooking up to current stubbed sewer lines in the four streets next to this project. The Department of Wastewater Management has given preliminary approval for the site. (See Figure 9 - Wastewater Management Letter)

Part of this letter from Wastewater Management requires a relief sewer line upgrade to accommodate master planned flows for the area. This upgrade is located along 800 feet of Farrington Highway and 800 feet beside Lualualei Homestead Road from Farrington Highway toward the ocean where it connects to the 36 inch sewer main. (See Figure 10 - Drawings for Sewer Relief Line) *Final design work from our civil engineer will be required before the exact distance of sewer line upgrade is determined by Wastewater Management. Any sewer line upgrade will be met by the developer for the whole subdivision, upgrading just for the apartments is not allowed by Wastewater Management.*

The treatment plant for this area is two miles away located on Farrington Highway just past the Waianae Shopping Mall toward Honolulu. It currently does not operate at capacity and can easily handle the addition flow from this project, *including all 184 units within the subdivision.*

Power from Hawaiian Electric, phone lines from Hawaiian Telephone, and cable TV are all available to this site from existing streets. *The needs of all 184 new units in this subdivision can be accommodated.*

The nearest police station is located one half mile away in Waianae. The fire station is located approximately one mile away in Waianae. Emergency medical services are provided on a limited bases from Waianae Coast Comprehensive Health Center located 2 miles from the project site. Saint Francis West is the next emergency medical services location and serves as a hospital for the Leeward Coast. It is located about 15 miles from the project site. These facilities and services adequately meet the needs that would be generated by the proposed project. *Kaiser Permanente and several major medical clinics are currently planned for Kapolei due for completion in the*

**BOARD OF WATER SUPPLY**

CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA STREET

HONOLULU, HAWAII 96843



September 14, 1993

FRANK F. FASI, Mayor

WALTER O. WATSON, JR., Chairman  
MAURICE H. YAMASATO, Vice Chairman  
SISTER M. DAVILYN AH CHICK, O.S.F.  
JOHN W. ANDERSON, JR.  
REX D. JOHNSON  
MELISSA Y.J. LUM  
C. MICHAEL STREET

KAZU HAYASHIDA  
Manager and Chief Engineer

Mr. Michael W. Klein  
500 Lunalilo Home Road  
Honolulu, Hawaii 96825

Dear Mr. Klein:

Subject: Your Letter of August 4, 1993 Regarding the Proposed Pokai Bay Ocean View Development in Waianae, TMK: 8-6-01: 43 and 50

Thank you for your letter regarding the proposed 80-unit low-income rental, 72-unit fee simple townhouse, and 50-lot single family development.

The existing water system is presently adequate to accommodate the proposed development.

The developer will be required to install the necessary water system facilities to serve the proposed development, in accordance with our water system standards. The construction drawings should be submitted for our review and approval.

The service limit for the area is the 142-foot elevation. Lots located above this elevation will be subject to the conditions and processing procedures which are attached for your information.

The availability of water will be confirmed when the construction drawings and/or building permit, whichever is applicable, is submitted for our review and approval. If the development plan requires action by the Department of Land Utilization, the plan should be approved by that department before we take action on the proposed development. When water is made available, the applicant will be required to pay our Water System Facilities Charges for source-transmission and daily storage.

If a three-inch or larger meter is required, the construction drawings showing the installation of the meter should be submitted for our review and approval.

If you have any questions, please contact Joseph Kaakua at 527-6123.

Very truly yours,

KAZU HAYASHIDA  
Manager and Chief Engineer

Attachments

**Figure 7 - Board of Water Supply Letter**

DEPARTMENT OF ~~Public Works~~ WASTEWATER MANAGEMENT  
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET  
HONOLULU, HAWAII 96813



FRANK F. FASI  
MAYOR

KENNETH M. RAPPOLT  
~~Director~~  
DIRECTOR

FELIX B. LIMTIACO  
DEPUTY DIRECTOR

In reply refer to:  
WPC 93-132

October 26, 1993

Mr. Michael W. Klein, Developer  
500 Lunalilo Home Road, 17B  
Honolulu, Hawaii 96825

Dear Mr. Klein:

Subject: Proposed Relief Sewer and Sewer Connection  
for 172 Units, Pokai Bay Apartments  
Tax Map Key: 8-6-01:43 & 50  
Waianae, Oahu, Hawaii

Please refer to your October 11, 1993 letter concerning your request for a preliminary letter of approval required by the Department of Housing for the subject project.

Preliminary approval is granted upon completion of the following conditions:

1. The relief sewer must be sized to accommodate master planned flows for the area.
2. The relief sewer must be constructed in accordance with City Standards.
3. Sewer connections will not be allowed until the completion of the relief sewer.
4. An applicable wastewater system facility charge (WSFC) must be paid prior to approval of the building permit application.

If you have any questions, please call Mr. Dennis Nishimura at 527-6091.

Very truly yours,

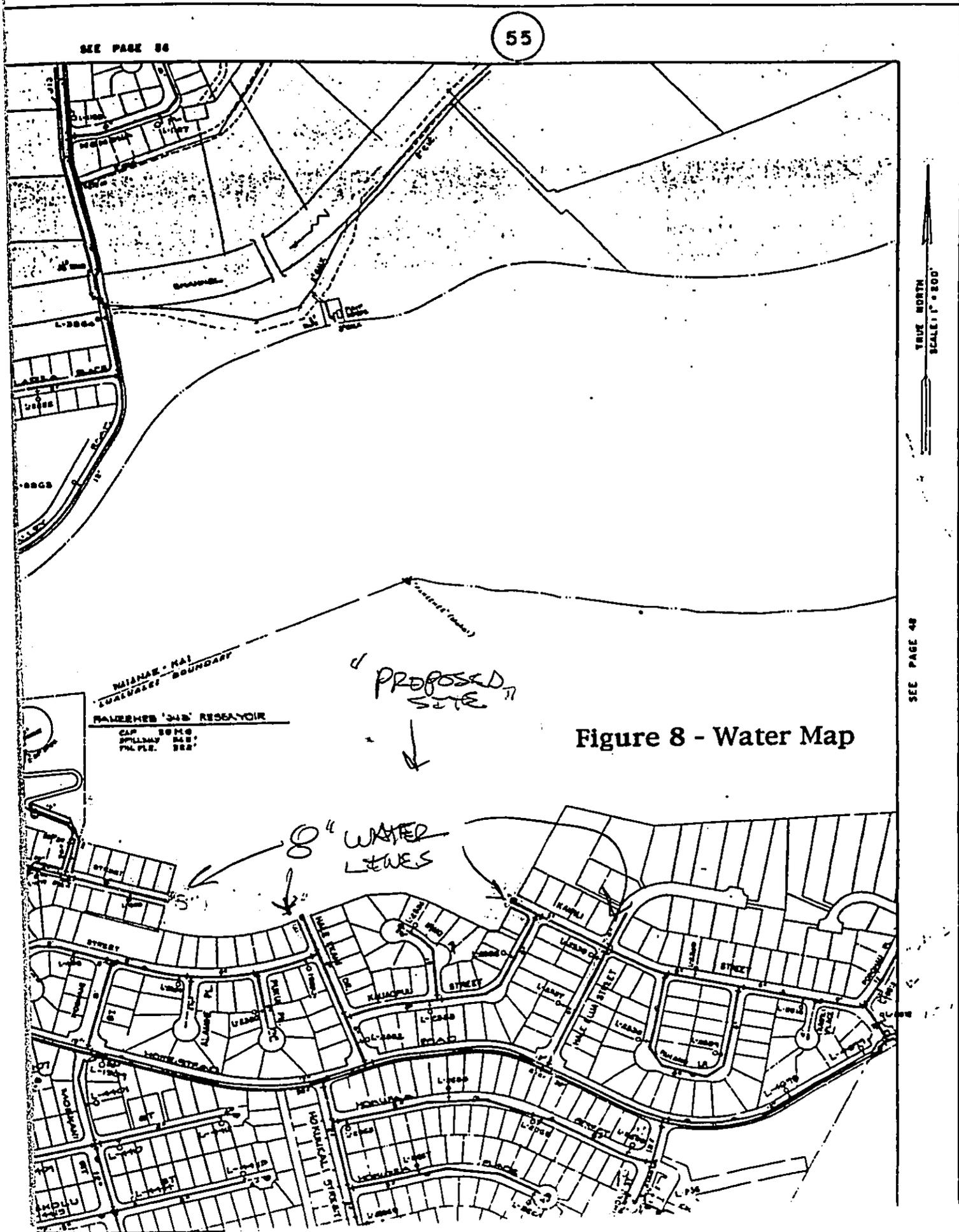
A handwritten signature in cursive script, appearing to read "Kenneth M. Rappolt".

KENNETH M. RAPPOLT  
Director

Figure 9 - Wastewater Management Letter



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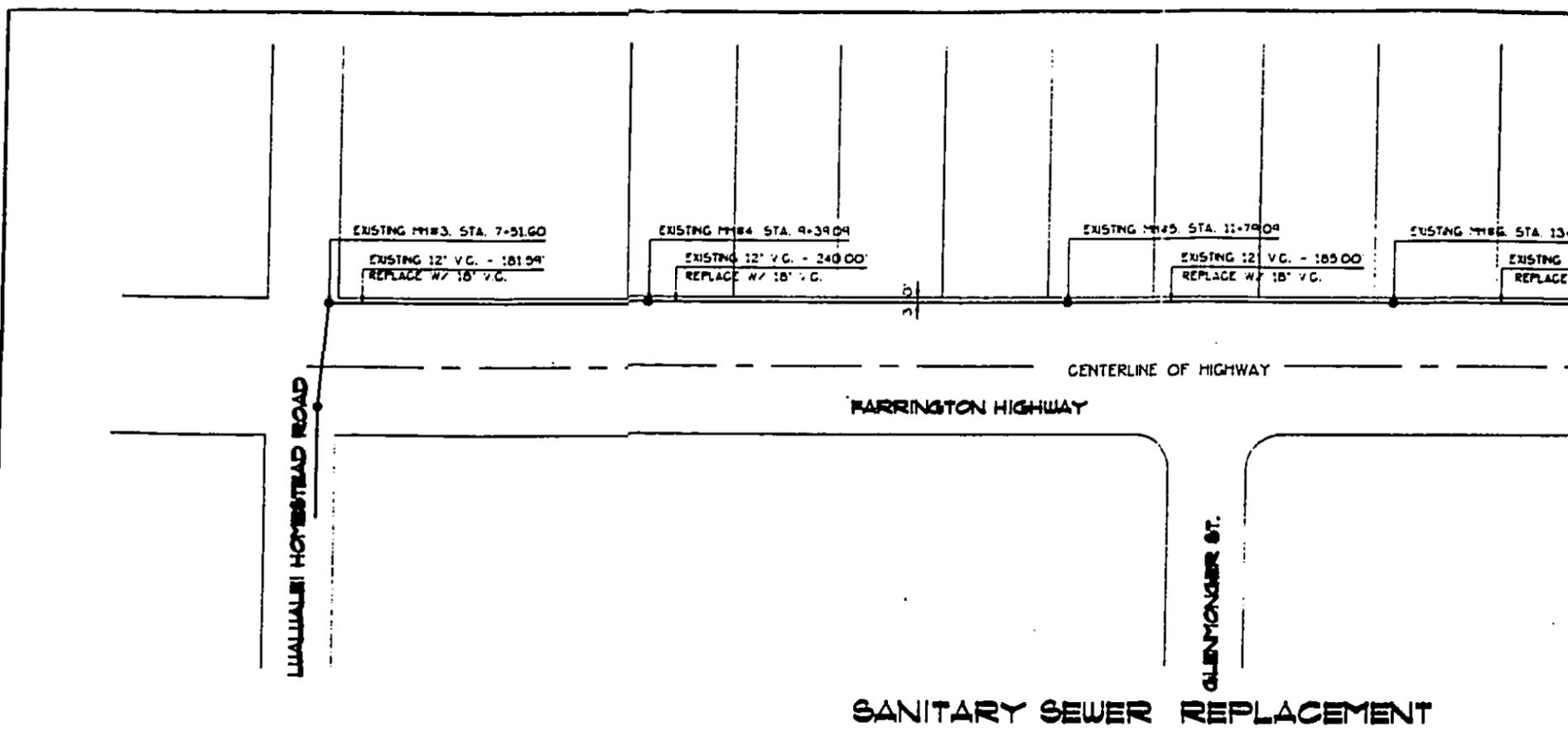
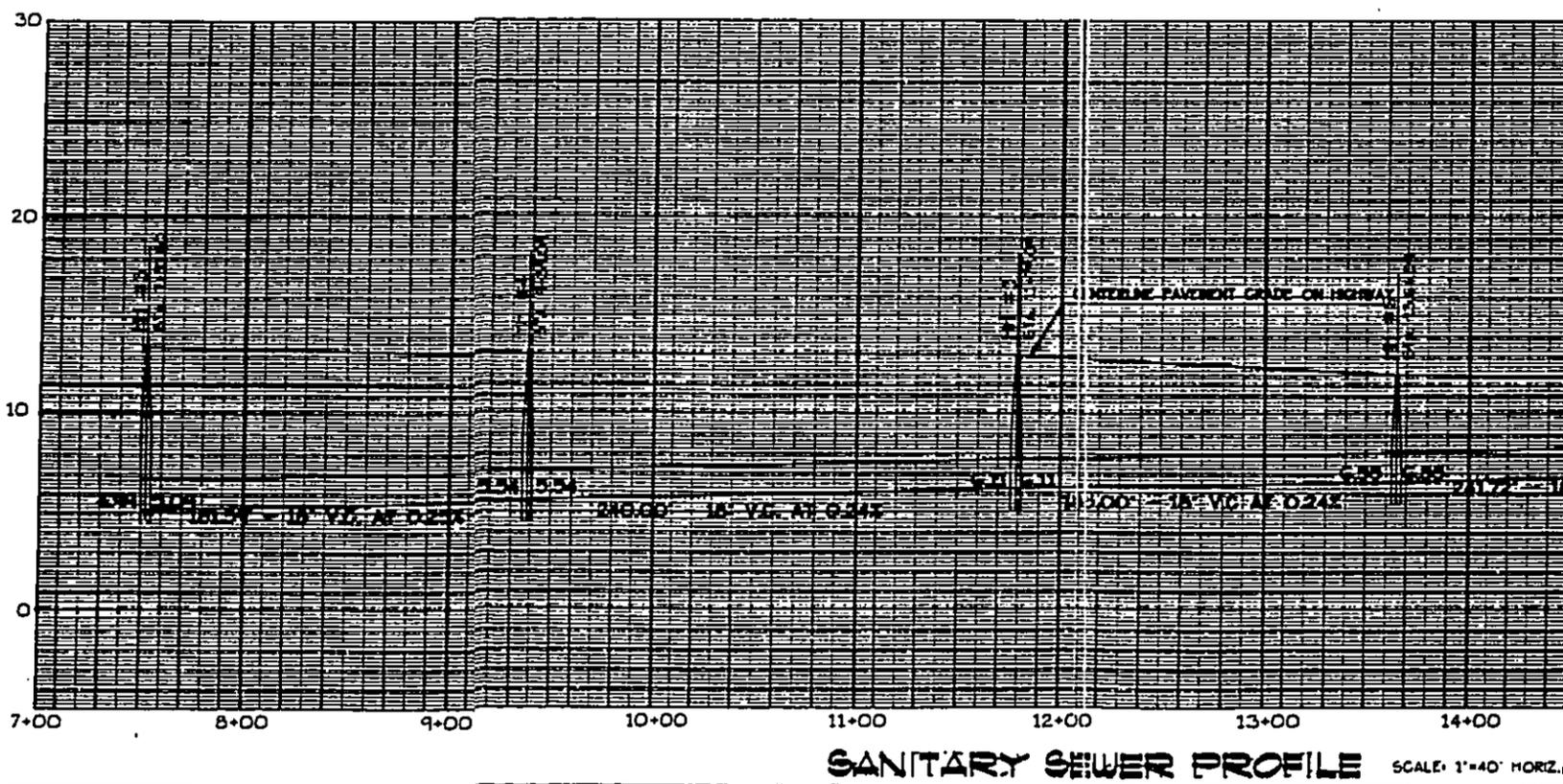


Figure 10 - Drawing for Sewer Relief Line



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James Matichuk, AIA  
 111 A Mohai St., #185  
 Kalaheo, Hawaii 96754  
 Fax: (808) 283-6378  
 Phone: (808) 282-2475

NO.	REVISIONS	BY:

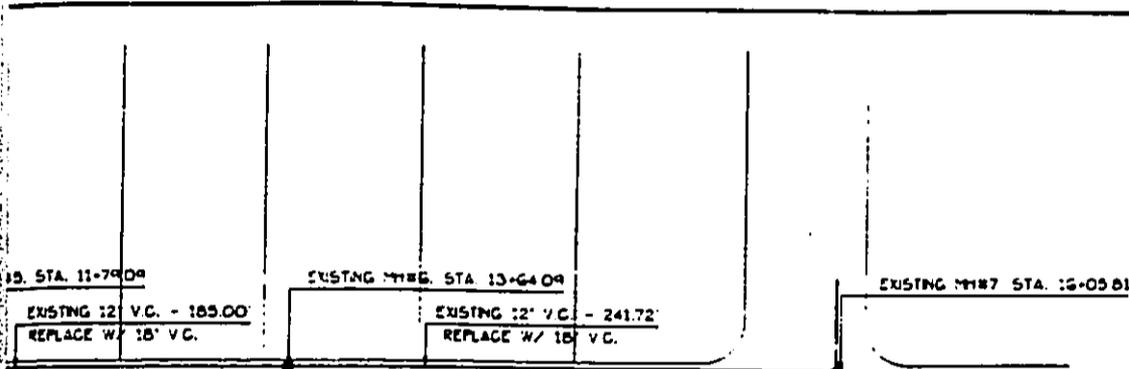
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*James Matichuk* DATE: 1/25/94

The work was prepared by me or under my supervision and construction of the project will be under my supervision. (Supervision of construction as defined in section 16-02-2 of the rules and regulations of the Board of Professional Engineers, Architects, and Surveyors of the State of Hawaii.)

NOTE: Contractor to check and verify all dimensions at job before proceeding with work.

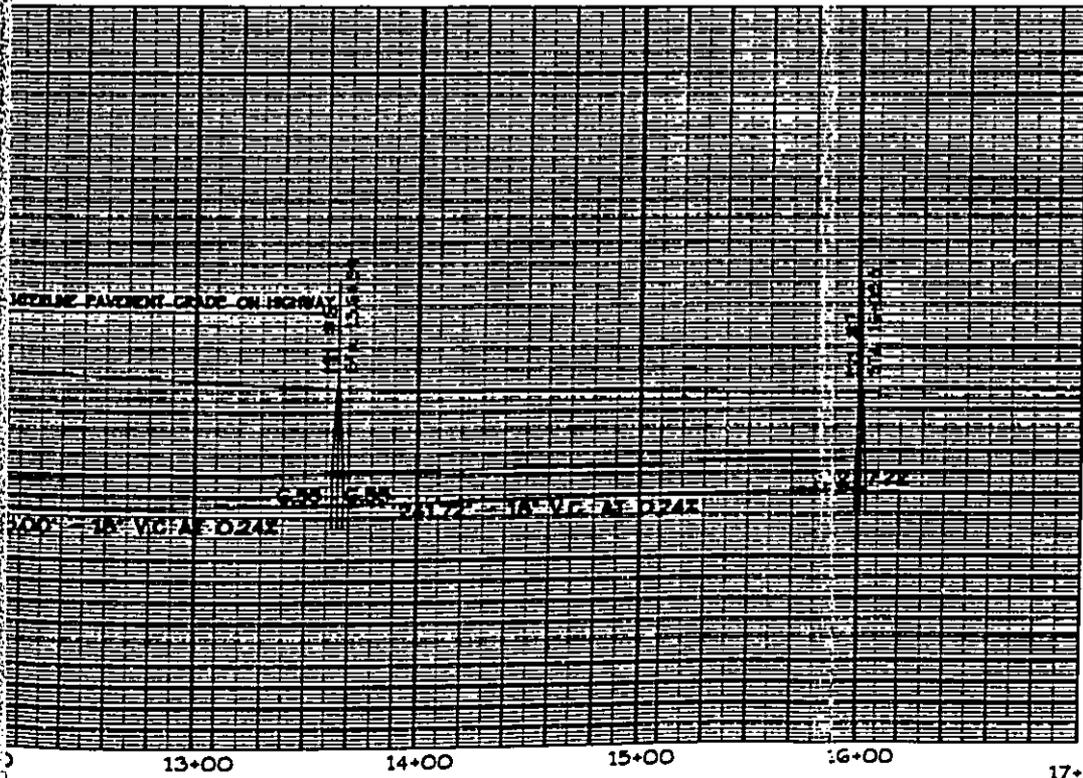


OF HIGHWAY

GLENNYONER ST.

REPLACEMENT

1"=40'



PROFILE SCALE: 1"=40' HORIZ., 1"=4' VERT.

FARRINGTON HWY.  
 PLAN & PROFILE

POKAI BAY  
 OCEAN  
 VIEW  
 Waianae, Hawaii

TMK: 8 - 6 - 007: 043 & 050

DATE: 25/1/94	SHEET NO.
DRAWN BY: J01	SS1
FILE: 43 - 420	

1/25/94



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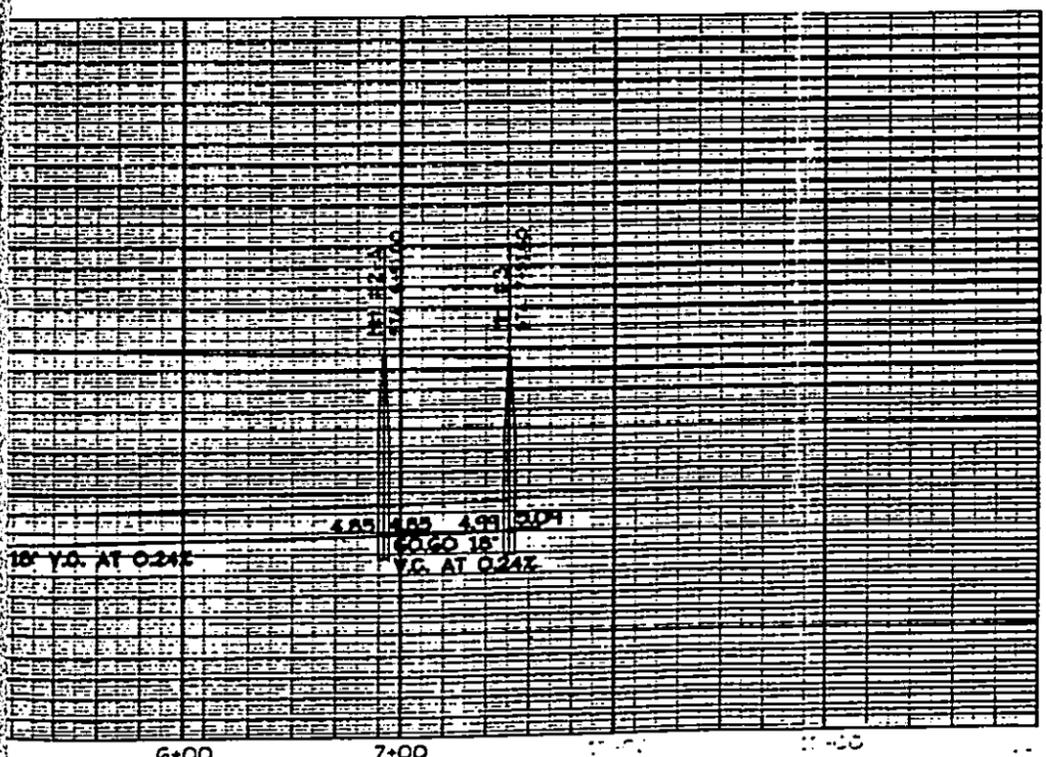
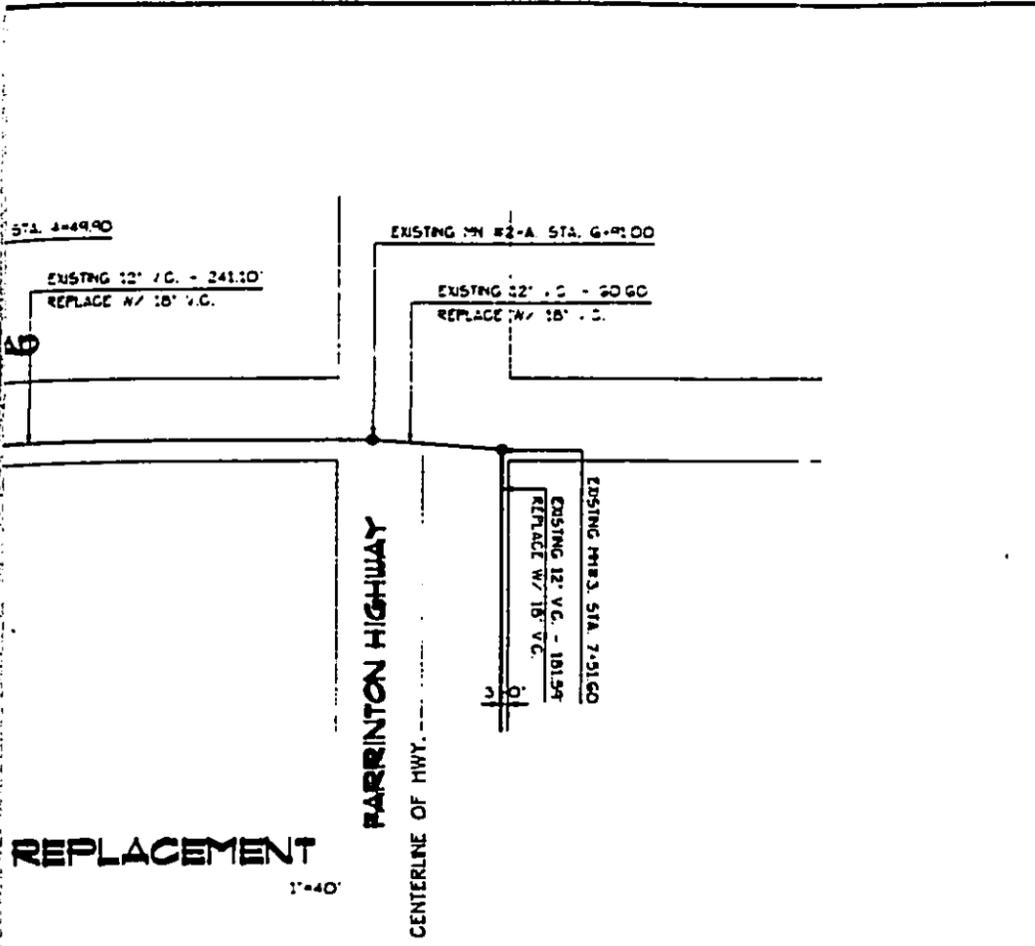


**HAWAII ARCHITECTS INC.**  
 James Matichuk, AIA  
 111 A. Hahaione St., #165  
 Kalaheo, Hawaii 96754  
 Fax: (808) 263-8328  
 Phone: (808) 262-2475

NO.	REVISIONS	BY:

SEAL:  
  
 JAMES R. MATICHUK  
 PROFESSIONAL ENGINEER  
 STATE OF HAWAII

*James Matichuk* 1/25/94  
 The work was prepared by me or under my supervision and construction of this project will be under my supervision. Construction of construction as defined in section 16-52-2 of the rules and regulations of the Board of Professional Engineers, Architects and Surveyors of the State of Hawaii.  
 NOTE: Contractor to check and verify all dimensions at job before proceeding with work.



**VERTICAL PROFILE** SCALE: 1"=40' HORIZ., 1"=4' VERT.

LUALUALEI  
 HOMESTEAD RD.  
 PLAN & PROFILE  
 POKAI BAY  
 OCEAN  
 VIEW  
 Waianae, Hawaii  
 TMB: 8 - 6 - 007 043 & 050  
 DATE: 25/1/04  
 DRAWN BY: JRM  
 FILE: 43 - 420  
 SHEET NO. SS2  
 OF 2 SHEETS

1/25/94

*next three or four years. These new facilities would be located within ten miles of the proposed project site.*

The elementary school principal was contacted and felt there was no major impact from our development, especially since a large percentage of it was built for Senior Citizens. It was estimated that there would be approximately 50 students more attending per year.

#### **B.2.d. Adjacent Land Uses**

Pokai Bay Ocean View is situated one half mile from the ocean. The property to the North is part of the Paheehee Mountain Range. Land to the South is an existing development with 250 homes which were built in the late 70's. This subdivision has underground utilities and has been well maintained. The land to the back of the valley adjacent to the development parcels is Hawaiian Homes Land and zoned agriculture. Across the street from Lualualei Homestead Road are three new developments. A Hawaiian Homes Land development of 136 homes, a 198 home development finished in March 1993, and a 154 unit development started in July 1993. All three developments are zoned R-5 with 25 foot height restrictions.

#### **B.2.e. Land Use Designation**

The subject property is Urban per State Land Use Law (Chapter 205, HRS) and Preservation (P-2), per City and County of Honolulu. (Absolutely, no Conservation land is being used for this subdivision.) Pokai Bay Ocean View has filed an application with the City and County of Honolulu as a 201E affordable housing project. Under this application the current P-2 zoning would be preempted to allow for R-5 and A-1 building standards on this 17.4 acres site.

#### **B.3. Environmental Characteristics**

The site lies at an elevation of approximately 80 - 160 feet above sea level. Generally, the site supports dry grasslands and a few shrubs and trees that are typical of the area. There are no existing structures on the site. Slopes within the property are generally moderate to more extreme at the back of the urban designated areas. Most lots have an excellent ocean or mountain views.

### **B.3.a. Drainage**

The topography and soils of this site combine to provide for a generally well-drained landscape. When the lower subdivision was developed the civil engineers stubbed adequate drainage into lot 8-6-001-043 & 8-6-001-011 for the new 184 unit subdivision.

Currently there are three eighteen inch drainage pipes, one twenty-four inch, and one open thirty-six inch culvert which can be connected to by the new subdivision. All along the back of the existing subdivision adjacent to the new subdivision are 5 foot drainage easements with a concrete culvert. (See Figure 11 - Drainage Maps)

Lualualei Homestead Road has a forty-eight inch underground tile for drainage for this area. No flood plains or flood hazard area has been designated for this 17.4 acre affordable housing site, *which includes all 184 units.*

### **B.3.b. Air Quality**

Waianae has no major industry with the exception of Waianae Power Plant located eight miles away. This suburb of Honolulu is urban along Farrington Highway with agriculture toward the back of the various valleys. The agriculture does affect air quality due to agriculture odors, but is not intense enough to pose any health hazards. *To accommodate the local farming community the master association, which all residents of this 184 units subdivision must belong, will require an affidavit to be signed. This affidavit will explain that living in the country means additional agriculture odors that the residents understand this and can not complain of these odors to Department of Health or local authorities. The only complaint allowed is if hazardous material is being used or burned which poses a health or safety risk.*

The prevailing trade winds generally provide for excellent air movement in this general area. With a lower density of development than Honolulu this area generally has excellent air quality. The air quality impact will come from construction, primarily due to dust and exhaust fumes from construction vehicles. Several steps have been taken to ease this impact with the surrounding neighborhood. (See Figure - 12 Neighborhood Concerns I.) After construction has been completed, the only negative impact on the area air quality will be from exhaust fumes from the residents vehicles. This impact will

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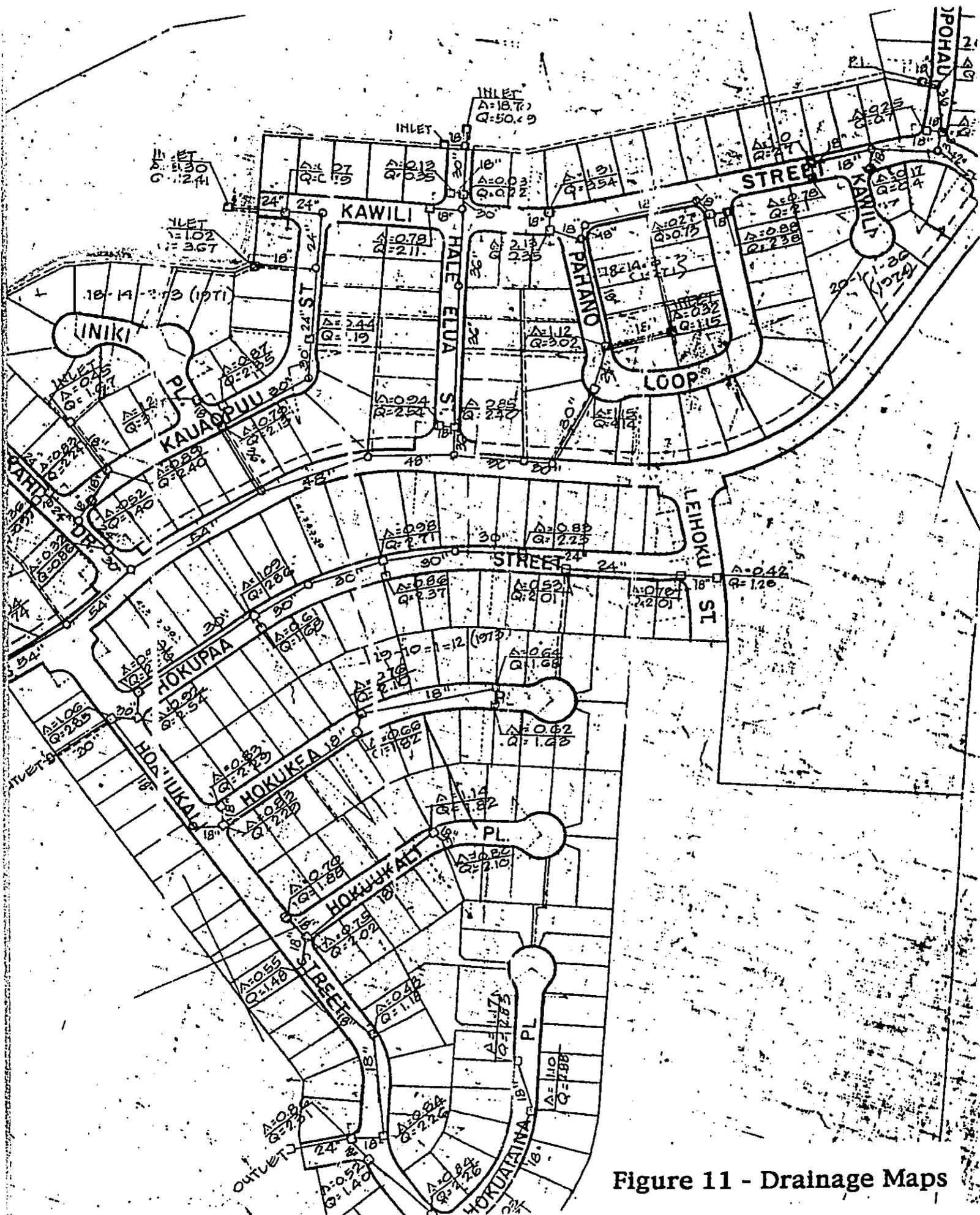


Figure 11 - Drainage Maps

November 20, 1993

## **Pokai Bay Ocean View Development Neighborhood Concerns**

### **I. Construction Site Building:**

- A. Noise:**
  - 1. Limit Construction Time from 7:00 A.M. to 5:00 P.M. Monday thru Friday, Saturday 8:00 A.M. to 2:00 P.M.
- B. Dust:**
  - 1. Correct Fencing to reduce dust.
  - 2. Special Needs Health Reasons, Air Conditioning will be installed for residents with lung problems or late work hours requiring morning sleep time.
  - 3. Window Coverings (Special Screens) for existing perimeter homes to the development.
- C. Drainage Disruption:**
  - 1. Clear Limited Area at One Time
  - 2. Dig Temporary Ditch
- D. Foundation Moving:**
  - 1. Take Pictures of Foundations for Existing Residents
  - 2. Treat Expansive Soil both under new streets and new foundations.
- E. Waianae Workers:**
  - 1. On the Single Family Houses have the Contractor hire 50% of the workers who live in Waianae.
  - 2. Use Waianae Subcontractors on 50% of the Project.

### **II. Elderly Apartments and Condominiums:**

- A. Age:**
  - 1. Must be 55 years or older to live in Condominiums
  - 2. Must be 65 years or older to live in Apartments.
- B. Height of Apartments and Condominiums Buildings:**
  - 1. Located away from Existing Homes.
  - 2. Moved Apartments and Condos down 75' from the back property line to protect mountain view.
- C. Section 8:**
  - 1. No Section 8 (State or City Funds)

**Figure 12 - Neighborhood Concerns & Mitigation Measures**

- D. Walking:
  - 1. Van donated to project by developer.
  - 2. Road Widening between Miller St. existing development.

### III. Single Family Homes:

- A. Traffic:
  - 1. New street 56' Right-of-Way back of Pokai Village.
  - 2. No Parking New Subdivision on certain streets.
- B. Value Homes Dropping:
  - 1. Average Lot and Home \$326,000
  - 2. Design Committee/Homeowners Association
- C. Elementary School:
  - 1. Principal indicates new K-6 students will not effected school attendance causing overcrowding.
  - 2. Donate \$120,000 to school for their use.
  - 3. Develop a Nature Center.
- D. Children's Safety:
  - 1. Install a new Traffic Light & Crosswalk.
  - 2. Sidewalks improvements were possible.
  - 3. Increase width of sidewalks from street.
- E. Offensive Activities:
  - 1. All new residents must be part of a Homeowners Association.

### IV. General:

- A. Community Center:
  - 1. Build and Maintain by the Association.
- B. Buffer Zone:
  - 1. 25 - 30 Ft. Adjacent Residents May Purchase
- C. Water:
  - 1. Plenty, Must Add Hydraulics over 140 ft. in elevation.
- D. Electric:
  - 1. May Connect
  - 2. Problem in large loop, little can be done.
  - 3. Old transformers along large loop, little can be done.
- E. Sewer:

1. Upgrade 1600' on Farrington & Lualualei Homestead Road by widening relief line.

F. Drainage:

1. Completely upgraded by new drainage lines, a 400% improvement.

G. Fires/Grass Field:

1. Back rock retaining wall to stop fires from coming over the mountain.
2. Development apartments, condos, and single family homes with concrete and steel, with clay or cement tile roofs.

Mike Klein  
Developer

be relatively small due to the small volume of vehicle, therefore no significant adverse impact on air quality is expected.

### **B.3.c. Natural Hazards**

The island of Oahu, which includes the Waianae Coast, is only susceptible to minor seismic activity.

Pokai Bay Ocean View Development is not situated within a flood area since it is located at 80 feet or greater above sea level. Therefore the property is not subject to Tsunamis.

The largest natural hazard in this area is hurricanes which pose a threat to buildings and single family homes. This subdivision is being built with steel studs with shear strength increased to withstand higher than normal wind speeds. Also, the roofs of all of the buildings, *included in this 184 unit subdivision*, will have hurricane clips with addition steel clamps.

## **III. SUMMARY DESCRIPTION OF THE AFFECTED ENVIRONMENT**

### **C.1 Physical Environment**

#### **C.1.a. Geology and Soils**

The soil reports show that the proposed site contains many outcrops of basalt rock with the natural vegetation of Keawee trees and scrub brush. The lower elevations contain shallow coral reefs roughly four feet under the topsoil. On top of this coral is a clayey silt which washed down from the weathered basalt mountain side. As you move to the 100 foot elevation the clayey silt increases to seven to twenty feet deep. No ground water was encountered in depths up to twenty-five feet.

Geological and soil investigations show that addition stabilization is required against an overall downward transfer of creep forces from the abode materials. Also recommended is post and beam construction for all townhouse construction. Subdivision residences must be supported on a minimum of a three foot thick cap of non-expansive materials. Continuous footings should be used and

reinforced with a minimum of one No. 4 reinforcing bar placed at the top and bottom of the footings. (See Appendix B - Geologic And Soils Investigation) & (See Appendix F - Additional Soils Mitigation Measures)

#### **C.1.b. Water Supply**

Water is supplied from City and County of Honolulu Paheehee 242' Water Reservoir. This reservoir is located adjacent to the far westerly side of the subdivision. This tank has a two million gallon capacity with a spillway of 242 feet. The tank is currently not at capacity use and will be able to supply all potable water necessary for this 184 unit subdivision. (See Figure 7 - Board of Water Supply Letter)

#### **C.1.c. Climate**

Pokai Bay Ocean View is located in an area that is generally characterized by a relatively hot, dry climate. Mean rainfall is about 20 inches, and the mean daytime temperature is in the 80's. The predominant winds are valley or sea breezes. Clear, sunny skies are the typical condition in this area and elevation.

*Fires are common in this area and have happened twice in the last year because of the dryness of the grass and trade winds blowing from the valley to the ocean. The developer will be building a wall along the upper back property line between urban and conservation portion of this property. This wall will be approximately three feet tall and be made out of local moss rock. This wall will help stop fires and boulders from coming down the side of the mountain into the subdivision.*

#### **C.2. Biological Resources**

##### **C.2.a. Vegetation**

A botanical survey shows that these open rolling grasslands with very few scattered scrubs, kiawee trees (*Prosopis Pallida*), and rock outcrops of basalt rock are native vegetation and are common in many other places throughout Oahu. These old sugar cane lands were cleared many years ago when it was used by Waianae Coast Sugar Mill. (See Figure 13 - DLNR Letter) Lengthy efforts are being

JOHN WAINEE  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
STATE HISTORIC PRESERVATION DIVISION  
33 SOUTH KING STREET, 6TH FLOOR  
HONOLULU, HAWAII 96813

KRITHI AILUK, CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCE

DEPUTIES

JOHN P. KEPPELER II  
DONA L. HANAKE

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

September 29, 1993

LOG NO: 9628  
DOC NO: 9309TD39

Michael W. Klein  
Pokai Bay Ocean View Ventures, Inc.  
500 Lunalilo Home Road 17B  
Honolulu, Hawaii 96825

Dear Mr. Klein:

**SUBJECT: Proposed Pokai Bay Ocean View Development at Lualualei  
Wai'anae, Wai'anae, O'ahu  
TMK: 8-6-1: 11, 34, and 50**

Thank you for the opportunity to review this proposed project. These are old sugar cane lands where it is unlikely that historic sites will be found. We believe that the proposed housing development will have "no effect" on historic sites.

It is possible that historic sites, including human burials, will be uncovered during routine construction activities. Should this be the case all work in the vicinity must stop and the Historic Preservation Division must be contacted at 587-0047.

Sincerely,

A handwritten signature in black ink, appearing to read "Don Hibbard".

DON HIBBARD, Administrator  
State Historic Preservation Division

TD:jt

Figure 13 - DLNR Letter

made to import various local types of plants and tree life that will enhance the area and beautify a very barren piece of land.

#### **C.2.b. Avifauna and Feral Mammals**

As far as the wildlife habitat is concerned, it is devoid of wildlife with the exception of a few rats, mice, and mongoose that live on this site. There are also some stray dogs and cats that inhabit the area from time to time.

No resident endemic (native) land and water birds were observed on the site. And no resident indigenous (native) birds or seabirds were observed on the property.

#### **C.3 Cultural Resources**

##### **C.3.a. Archaeological Resources**

No historic sites are visible on the current 184 unit subdivision site. Department of Land and Natural Resources has stated that "These are old sugar cane lands where it is unlikely that historic sites would be found." (See Figure - 13 DLNR Letter) This site was cleared when it was sugar cane and again in 1975 when it was cleared for a proposed townhouse subdivision.

### **IV. SUMMARY**

#### **D.1 Anticipated Impacts and Proposed Mitigation Measures**

The proposed development of 17.4 acres is classified as an affordable housing project consisting of 184 unit. Of these 184 units roughly 114 are affordable. The affordable component is 60 elderly apartments and 54 elderly for sale condominiums. Out of the 184 units it is anticipated that no significant adverse environmental effects exists.

*It is also anticipated that most of the residents of this new subdivision will be from the local community. Strong support from the elderly citizens from Waianae Coast is evident by the signatures of 50 elderly located under Appendix D - Community Support*

*Waianae. Of these 150 elderly we presented to, of 3,700 elderly over 60 on Waianae Coast, nearly 45 apartment rentals and condominium sales were identified. This sampling indicates extreme demand within the local community for this type of housing product..*

The applicant intends to take necessary precautions to minimize the physical disturbance to the subject property and surrounding area through creative design and careful planning. *The Department of Health will require a NPDES (National Pollution Discharge Elimination System) Permit. This permit mandates controls on the project and its discharges from this site. Our project will apply for and follow the appropriate laws regulating this permit.*

Temporary, short-term impacts may be generated by the construction activity on the site. These will include an increase in noise levels, dust and exhaust fumes from construction vehicles. Normal construction practices such as watering the area and dust fences will mitigate the potential dust problems. Individuals located on the perimeter of the site have been offered air conditioning units for noise or health reasons because of the dust. Two individuals have been offered rental units away from the site if health is effected by the dust. Both of these individuals have lung problems.

Potential visual impacts will be minimized with careful architectural design as well as a combination of natural open space buffers and landscaping which is sensitive to the existing character of the area. This can be achieved through careful site planning of structures to take advantage of natural topographic features, the choice of natural colors for the exterior elevations, architectural designs that will keep the dwellings at a low profile and effective landscaping. All residents will be required to be part of a community association that will monitor and enforce the above issues.

The subject property does not serve as a habitat for any rare or endangered plant or animal species. As such, the proposed project will not have any adverse impact on flora or fauna listed for protected status by the United States Fish and Wildlife Services.

Based on the foregoing, the potential short and long term impacts of the proposed project on the environment and surrounding community should be minimal. These impacts, if any, should be outweighed by the social benefit to be gained by the addition of

these affordable housing units which addresses a pressing need in the community.

#### **D.2 Additional Considerations**

Extensive research was compiled to develop not only an affordable community but to upgrade and enhance the current market price availability of homes in Waianae. Not only are our new homes well built and landscaped but the market lots average 6,107 square feet compared to the average of 4,900 square feet from Ewa Beach to Waianae. (See Appendix C - Pokai Bay Market Homes Analysis) By creating larger lots than normal this subdivision will not give the closed in feeling of many of the market home subdivisions throughout Oahu. This gives both the new buyer and community an open and expansive feeling which will enhance their lives.

### **V. ANTICIPATED DETERMINATION**

#### **E.1 Findings**

Based on the foregoing information presented, it is determined that the proposed development of a 17.4 acre 184 units, which includes the 60 elderly apartments, affordable housing project in Waianae will not have a significant effect. As such, a determination of a Negative Declaration for the proposed action is appropriate.

#### **E.2 Reasons Supporting Determination**

The nature and scale of the proposed action is such that no significant environmental effects are anticipated. Potential impacts, if any, can be mitigated through sensitive site planning and architectural design, careful construction methods and compliance with all governmental requirements.

This along with very close relations with the existing neighborhood next to the new subdivision and with the Waianae Coast Neighborhood Board No. #24 will create a beautiful and productive addition to this community. (See Figure 14 - Neighborhood Board Approval) and (See Appendix D - Community Support)

*Final Note: All subdivision improvements and buildings will be built to meet all City and County standards and building codes.*

Choy moved and Kila seconded that the Board support site 6 on Lualualei Naval Road for the school. The motion passed unanimously.

- B. Pokai Bay Ocean View Development Proposal - Mike Klein - Klein presented the Board with the proposal. An application for a 201(E) waiver has been submitted to the city to develop a high percentage of affordable senior housing along with market priced homes on Lualualei Homestead Road. There will be 114 affordable senior housing units (apartments, townhouses, and duplexes) and 69 market priced homes. The affordable price range will be: studios \$95,000-\$115,00; 1 bedroom \$121,000-\$141,000; and 2 bedrooms \$139,000-\$159,000. Market homes will cost: \$192,000-\$320,000. There is a need for this type of housing. To qualify, seniors must be at least 62 years old.

Klein noted holding a number of meetings with the neighbors of the proposed project area and with a number of senior citizen groups. Through the meetings, many of the residents' concerns were addressed. The neighbors noted that they did not want too many low-cost houses in the project.

Comments, concerns and responses followed: proposal to add sidewalk and widen road area because project road is narrow - landowners would have to give 10 feet of their property for widening; elevation of property was questioned; project will provide better drainage for the area; according to Leihoku School principal, project would increase student enrollment by 50.

Gomes moved and Wright seconded that the Board support the Pokai Bay Ocean View Development project. Discussion followed on: number of senior units (114); cost for 69 single dwellings (\$192,000-\$320,000); questioned whether quoted prices were affordable for seniors.

Gomes moved and Wright seconded to amend the motion by adding "with conditions agreed to by residents of the project area". Discussion followed on: state's land use designation (Urban and Preservation 2); 201(E) application waiver; questioned ground stability; benefits of the project; water concerns; request that an Environmental Impact Statement be done for the project; questioned the impact to the intermediate and high school; protection of homes from fire. The above amendment passed 17-2-1. Nays: Armitage-Eli and Keawe. Abstention. Choy.

Albert H. Silva moved and Keawe seconded that the Board amend the motion to add to the conditions agreed to by the residents "widen Lualualei Homestead Road and adding of sidewalks from Ihuku Street to Mill Street and the upgrading of the sewage system. The amendment passed unanimously.

The amended main motion passed unanimously.

- D. Makaha 7-Eleven/Aloha Petroleum Zoning Variance Request - A representative from Aloha Petroleum asked for the Board's support for the above variance request. He explained that although the city (Building Department) approved signs for the Makaha store operation, the city (Department of Land Utilization) also cited the store for sign violation. The city's Department of Land Utilization has determined that 7-Eleven/Aloha Petroleum is one principle user, and therefore, only a certain number and size signs are allowed. However, the petroleum representative explained that 7-Eleven and Aloha Petroleum are separate principle users of the Makaha site.

### Figure 14 - Neighborhood Board Approval

**Appendix A**

**Marketing Report  
"Plight of Oahu's Elderly"**



**LAGOON REALTY, LTD.**

August 28, 1993

Mr. Michael W. Klein  
Ocean View Ventures, Inc.  
500 Lunalilo Home Road 17B  
Honolulu, HI 96825

Dear Mr. Klein:

Enclosed is your marketing analysis for Pokai Bay Elderly Apartments. I was surprised to find such great support for renters on the Waianae Coast. With the number of elderly individuals living out on the Leeward side of Oahu, filling your 48 units should happen quickly. You must market these rentals at least 90 days before they are complete, otherwise you may have vacancies.

If we had another two weeks this report would go further into how, who, and where to market these apartments. We can still develop more to this report and need to establish a survey list, but it will not be in time for you application due date.

Again, thank you Mike for using Lagoon Realty for this marketing analysis.

Sincerely,

Charles Underwood

## **The Plight of Oahu's Elderly**

Prepared by Lagoon Realty  
August 1993

Oahu's Elderly is on a collision course with time and money. The Life Expectancy at birth is rising yearly.<sup>1</sup> More elderly are projected in the 60+ population with growth estimates increasing to 18 percent over the next decade.<sup>2</sup> Cost of living and affordability of housing alone continue to worsen the condition. The recent raise in land prices over the last four years drives this situation into the danger zone. The only saving grace in "The Plight of Oahu's Elderly" is the current lower interest rates for construction and mortgages offered by local lenders.

By examining the numbers it became clear that current building trends will not meet housing requirements for the Elderly over the next five years. In 1991 approximately 3,500 elderly were on either a public or private waiting list.<sup>3</sup> In 1993 the City and County Housing Department estimated the waiting list to be 3,300 elderly individuals.

The numbers tell another important story on the elderly housing story. An increasing number of native Hawaiian elderly are moving to the mainland due to high rents and mortgages. Families of three generations of Hawaiian heritage are forced to leave because of not enough affordable housing. In 1990, 46 percent of American citizens who identified themselves as ethnic Hawaiians live outside of Hawaii.<sup>4</sup>

### **Rental for the Elderly:**

One of the most recent studies on Housing was done by Locations, Inc., Research & Consulting Division and SMS Research & Marketing Services. This report was called Hawaii Housing Policy Study and it was finished in May 1993. Very important percentile extrapolations evolved from this study especially in relation to housing needs for renters. By taking these percentiles and identifying the elderly in a given census tract you can estimate the demand for a given area.

In Honolulu the total out-migration in 1992 because of housing cost was 37,088.<sup>5</sup> Sixty-three percent of this out-migration represents individuals leaving because of cost of housing or 9.45 percent of the 247,349 total units on Oahu. In Waianae Division of five CDP's there were 3,747 elderly individuals over the age of 60. That represents 356 elderly over 60 that may out-migrate because of housing costs in the Waianae Coast area.

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- 1 Exhibit A Social Security Admin., Social Security Area Population Projections
  - 2 DBED, Population and Economic Projections for State of HI to 2010 Nov., 1988.
  - 3 Elderly Affairs Division: Oahu's Elderly Housing Shortage
  - 4 1990 Census
  - 5 Table 8 Hawaii Housing Policy Study May 1993

One of the more interesting statistics was the preferred location of new housing for renters.<sup>6</sup> Unlike the preferred location for new home owners where Waianae Coast ranked 13 out of 14 locations, the renters ranked Waianae Coast 9 out of 14. Waianae Coast was preferred over Aina Haina, Hawaii Kai, Ewa Beach, Ewa, Kapolei, Kahala, Waikiki, and Waipahu.

Of the 142,517 individuals who will or may move and who stated a preference for either purchasing or renting new units, 78,839 of them were interested in rentals.<sup>7</sup> Consequently, 3,657 renters of these 142,517 individuals would prefer moving to the Waianae Coast. The elderly portion of this group would represent up to 548 of these 3,657 renters. This clearly shows definite support for the new rental units on the Waianae Coast.

Vacancy rate in census tract 97.02 was at 2.0 percent verse Oahu's vacancy rate of 4.3 percent. This census tract is in demand because of its family setting and the excellent appearance.

The number of rentals in the Waianae Coast per overall dwelling units is 46 percent verse 48 percent for rentals in Oahu.<sup>8</sup> This means adding rentals into this area will cause no major conflict from a numbers standpoint.

On the basis of the numbers in Table 12 the price preference of 78,839 renters was 68.9 percent of this number or 54,320 renters statewide would pay \$1,100 per month or less for rent.<sup>9</sup> The rent for the apartments at Pokai Bay Ocean View Elderly Apartments clearly falls into these guidelines.

Also, of the potential renters that will move in the future 64 percent prefer a free standing home, but up to 86 percent would either prefer or be willing to settle for a multi-family unit if it meant they could afford to move.<sup>10</sup> From an elderly standpoint almost all individuals prefer a condo or townhouse that requires low maintenance.

Oahu's out-migration is at the top of the list for adding new elderly units on the Waianae Coast. Clearly the numbers speak for themselves, that up to 356 elderly over 60 may have to leave the state because of housing costs in Waianae. Next in line is renter preference for Waianae Coast identified in the survey. Based on these numbers up to 548 elderly would prefer the Waianae Coast. Both Keloia Hoomalu and Kauhale Nani, which represent 127 units for the elderly in Waianae, have indefinite waiting lists.<sup>11</sup>

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6 Table 11 Hawaii Housing Policy Study May 1993

7 Table 10 Hawaii Housing Policy Study May 1993

8 DBEDT Hawaii State Data Center Report #6 General Population and Housing Characteristics July 1993

9 Table 12 Hawaii Housing Policy Study May 1993

10 Multi-Family versus Single Family Hawaii Housing Policy Study May 1993

11 Elderly Affairs Division: Oahu's Elderly Housing Shortage

In overwhelming favor for the project are the moderate rental prices, lower vacancy rate, and quality of the location.

#### **Current Market and Absorption:**

Absorption figures by new elderly housing projects has helped to lower the overall numbers of elderly on waiting lists; but location, design errors, and lack of marketing have caused some problems.

The new West Loch Elderly Project have rental units available. This project has roughly 150 studio and one bedroom apartments. The vacancy after four months is still in the 65 percent level for this village. The grounds at West Loch Elderly are outstanding. Location is average but it has an isolated feeling because of the several miles drive to Waipahu. One design problem slightly slowing occupancy is that none of the 15 buildings have elevators for the second story. And finally the biggest error is lack of marketing. Only a few ads have been run since its opening in May. Marketing should have started on a regular basis 90 - 180 days before completion of the project.

Even with the absorption problems at West Loch Elderly Village the waiting list at other projects still continues. The population is still growing older, faster and rents continue to rise on Oahu. Marketing is essential regardless of the location. The only time marketing is unnecessary is if the project has subsidized rent below \$375.00.

#### **The Challenges of Pokai Bay Ocean View Elderly Apartments:**

Pokai Bay has two challenges to overcome. One is distance from Honolulu's medical facilities and doctors. Residence have access to Waianae Coast Comprehensive Health Center one mile away, but they may have other preferred providers. The impact of this problem can be solved by first marketing to Waianae senior citizens first. Marketing could start at ground breaking. Secondly, a van donated by the developer to the project could provide a two day a week shuttle service into Pearl City and Honolulu.

The second challenge is overcoming the bad road conditions on LuaLuaLei Homestead Road just before the Post Office. There are no sidewalks and the road is too narrow for cars and walking pedestrians. This challenge could also be solved by use of a donated Van having a five day a week shuttle service to the Post Office and Waianae Mall.

#### **Conclusion or Feasibility**

Pokai Bay Ocean View Elderly Apartments would provide a quiet, tranquil, and safe environment for the senior citizens. The marketing data submitted in this report provides concrete evidence of the need for elderly rental housing by the Waianae Coast alone. The project is small enough to provide natural absorption of these needs in this area. Any short fall will easily be filled by senior citizens from other areas of Oahu.

There are few opportunities where communities needs and desires can be filled with little or no distraction. From the ocean to the valley breezes accompanied with these majestic views one's retiring days can be comforting.

Pokai Bay Elderly Apartments provides the missing ingredients to a beautiful community. The data, community, and investors appear ready to support this project. Now it is time for forward constructive action to complete this unique opportunity.

**Charles Underwood**  
**Lagoon Realty**

NOTE: Error factor can be as high as 6 percent due to the shifting of data between sources of information and methods of tabulation differences on 1990 census data.

**Population and Census Tract Information Oahu**

1990 CENSUS TRACTS *				
Area Descriptions	All Persons	60 to 64 yrs.	65 yrs. & over	Total 60 yrs.+
Honolulu County	836,231	36,658	91,832	128,490
Waianae Division	37,411	1,246	2,501	3,747
Maui CDP	6,059	214	385	599
Makaha CDP	7,990	279	645	924
Makaha Valley CDP	1,012	31	27	58
Nanakuli CDP	9,575	281	536	817
Waianae	8,758	315	587	902
*1990 Census of Population and Housing				
Summary Populatoin and Housing Characteristics				

**FACT SHEET: OAHU'S ELDERLY HOUSING SHORTAGE**

Prepared by the Elderly Affairs Division  
 Department of Human Resources, City and County of Honolulu  
 April 1991

**OLDER POPULATION GROWTH:** In 1990, the State of Hawaii had approximately 174,200 older persons (60+).<sup>1</sup> Oahu has an estimated 72% of the State's 60+ population, estimated at 130,000 older persons. By the year 2000, Oahu's 60+ population is estimated to grow to 152,000 persons. Overall the 60+ population is projected to grow 18% within the next decade. The oldest of the old (age 80+) will grow as a group 68%.<sup>2</sup>

**SHORTAGE OF LOW COST ELDERLY HOUSING:** Approximately 3500 elders are on wait lists of both public and private subsidized elderly housing projects. Although public and private developers have plans on the drawing board to build roughly 3476 units, only a portion of these units have subsidized rents. Most projects can take three to seven years to build and usually face neighborhood opposition and costly delays.

There are approximately 2215 subsidized rental units designated for elderly and disabled persons on Oahu. This includes 1200 units owned by the Hawaii Housing Authority and approximately 1015 HUD-sponsored units, privately owned and managed.<sup>3</sup>

**OVERWHELMING NUMBER OF APPLICATIONS:** In July, 1989 about 1,080 elderly persons applied for 206 newly constructed subsidized apartments at Hale Po'ai Elderly Housing project developed and owned by the Hawaii Housing Authority (HHA) at North School Street in Palama.<sup>4</sup> In the two years since Hale Po'ai has opened, only 14 turnovers have resulted from deaths and people moving out. 900 people remain in the original wait list. Since the wait list was started, an additional 5,000 applications have been received, averaging 5-10 applications submitted every day.<sup>5</sup>

The City's new rental projects have also received an enormous response from applicants: The River Nimitz project with 30 elderly designated units received 93 applications. Chinatown Gateway, with 120 subsidized units, received 512 applications.<sup>6</sup>

**WAIT LISTS FOR ELDERLY HOUSING:**

**PUBLIC ELDERLY HOUSING WAIT LISTS:**

For the calendar year 1990, the Hawaii Housing Authority had the following wait lists by county:

- Oahu: 2309 unduplicated elderly applicants.
- Hawaii: 253 unduplicated elderly applicants.
- Kauai: 45 unduplicated elderly applicants.
- Maui: 19 unduplicated elderly applicants.<sup>7</sup>

**LENGTHS OF WAIT:** Elderly/disabled applicants will have to wait an average of five years for one of seven elderly public housing projects depending upon their preference status. Without preference status, their wait is indefinite. For the year ending December, 1990, HHA reported only 98 turnovers.<sup>8</sup> Using 1990 statistics, the lengths of wait for persons with preferences varied by elderly project:

Paoakalani	45 months
Makua Alii	40 months
Punchbowl	29 months
Pumehana	24 months
Kalanihuaia	20 months
Makamae	19 months
Waialua	7 months <sup>9</sup>

Wait lists for HHA projects were so long and discouraging that only 265 new applications were received in 1990.<sup>9</sup>

**PRIVATE ELDERLY HOUSING WAIT LISTS:** The waiting lists for the privately owned subsidized projects, which includes 1015 units on Oahu, report average waiting periods longer than one year. The only shorter wait lists are for the remote rural elderly projects.

**Wait lists by Neighborhood:** These privately managed units have wait lists that vary according to the location and remoteness of the project: (as of April, 1991)<sup>10</sup>

<u>Building</u>	<u># on Wait list</u>	<u>Wait time</u> (estimated)
<u>Urban Core:</u> Pauahi	54	2-3 years
Keola Hoonanea	188	1-1½ years
Kapuna I	170	1 year
Hale Po'ai	900	indefinite
Malulani Hale	133	1-1½ years
Hausten Gardens	143	2 years
River Nimitz	136	1 year
Chinatown Gateway	400	N/A
<u>Leeward:</u> Waipahu Hall	53	1-1½ years
Pearl City, HaleO'Hauoli	52	2 years
Waianae, Keola Hoomalu	18	indefinite
Waianae, Kauhale Nani	109	indefinite
<u>Central:</u> Haleiwa	30	1 year
Whitmore	16	6-12 months
<u>Windward:</u> Kaneohe	51	2 years
Kahuku Hale Hauoli	51	6-8 months

November, 1988]. County estimates prepared by

**WAIT LISTS FOR RENT SUBSIDIES:**

**SECTION 8 PROGRAMS:** As of the end of 1990, 669 elderly persons on Oahu were on the wait list for the State's HHA sponsored Section 8 program. The City and County of Honolulu's Section 8 certificate and voucher program has a one year wait for a studio apartment for a single person, and a 6 month wait for a one bedroom apartment for two persons.<sup>11</sup>

**STATE RENT SUPPLEMENT PROGRAM:** There are 55 elderly persons on the Hawaii Housing Authority list for the rent supplement program.<sup>7</sup>

**SKY ROCKETING RENT INCREASES:**

Honolulu is the most costly residential rental city in the nation, according to Chaney, Brooks & Company, compared to published figures as of December 31, 1988 in the National Real Estate Index.<sup>12</sup>

Honolulu is the leader in annual rent per square foot with \$14.86 compared with Houston at \$5.45. In Honolulu, rent takes 28.5% of median income, compared with Houston's 13%. Based on these statistics, a 700 square foot apartment in Honolulu would cost \$866 a month, compared with Houston's rent of \$318.<sup>12</sup>

Average rents on Oahu are \$1,131 a month for a 2 bedroom apartment, and \$1502 a month for 3 bedrooms, according to a survey of newspaper want ads.<sup>13</sup>

In February, 1991, the City and County of Honolulu's Housing Services Division requested a 20% increase in allowable "fair market rents" used for HUD rent subsidy programs, due to market conditions of rent increases.

This was based on a random sample survey by SMS Research and Marketing Services, Inc. of 400 2 bedroom rentals in different neighborhoods:<sup>14</sup>

32% of units charged monthly rents from \$ 801 - \$1,000  
29% of units charged monthly rents from \$ 601 - \$ 800  
16% of units charged monthly rents from \$1,001 - \$1,200  
8% of units charged monthly rents more than - \$1,200

The Honolulu Consumer Price Index (CPI-U) indicated market pressures and inflation increased renter's costs by 8.8% from the first half of 1990 to the first half of 1991.<sup>15</sup>

**VACANCY RATES:** Hawaii has the Nation's tightest rental markets: Vacancy rates average 1.5%, with 1% in areas which are experiencing economic growth.<sup>16</sup> Locations' Hawaii's report indicates that the vacancy rate for rental units is at the lowest point in fourteen years.<sup>17</sup>

**Footnotes:**

DBED, Population and Economic Projections for the State of Hawaii to 2010 (Series M-K),

the Census Bureau for Oahu [September 1988] from the Hawaii State Data Center.

2. DBED, Ibid. November 1988.
3. Executive Office on Aging, *Guide to Housing Options for the Elderly in Hawaii*, July 1988.
4. Oshiro, David, "Hawaii's Elderly in Housing Pinch," *Honolulu Star Bulletin*, July 13, 1989, Page A-1.
5. Vicki Sutton, Soriakoff Realty, April 4, 1991.
6. National Mortgage and Finance Co. 3/91.
7. Roxanne Shimakawa, HHA Applications Office, Hawaii Housing Authority, Statistics as of 2/28/91. (These figures include combined lists for various rental programs including federal low rent units, state projects, Section 8, and rent supplement program.)
- 8.& 9. Ibid, HHA 2/28/91.
10. Compiled from: Chaney Brooks & Company; Loyalty Enterprises; Mark Development; Urban Management; Foundation Property Management; Soriakoff Realty; National Mortgage and Finance Company; HHA.
11. Scarfone, Michael, Honolulu Dept. of Housing and Com.Dev., Memo 12/5/89.
12. "Honolulu Rental Costs are Highest in the Nation," *Sunday Honolulu Star Bulletin & Advertiser*, December 10, 1989, HOME p.12.
13. "State to Focus on Lack of Affordable Rentals," Vicky Ong, *Honolulu Advertiser*, February 11, 1991, Page A6.
14. "Rising Oahu Rents Keep the Section 8 Program Under Evaluation," *Sunday Star Bulletin & Advertiser*, February 17, 1991, p.G5.
15. CPI "Statistical Economic Report, Quarterly", DBED, 4th Quarter, 1990, Table 3-4, p.25.
16. "Hawaii State Housing Functional Plan", 1989, Housing Finance & Development Corp., p.6.
17. Sklarz, Michael Ph.D., *Hawaii Real Estate Indicators*, Fourth Quarter, 1988 Report, Locations Inc.

PLANNED ELDERLY HOUSING PROJECTS ON OAHU  
June 1991

<u>PROJECT/LOCATION</u>	<u>DEVELOPER</u>	<u># UNITS</u>	<u>TYPE OF UNITS</u>	<u>SUBSIDIZED UNITS</u>	<u>ESTIMATED COMPLETION DATE</u>	<u>FUNDING STATUS</u>
<u>RENTALS:</u>						
HALE PO'AI Palama	HFDC	206	80 studios 126 1-bedroom	100% \$150/mo. \$175/mo.	June, 1989 completed.	\$ million State funds.
WHITMORE CIRCLE Whitmore Village	Whitmore Associates	44	41 1-bedroom 3 2-bedrooms	100%	Summer, 1990	\$ Farmers Home Administration \$ HFDC interim cons.financing
EWA ELDERLY Ewa Plantation	DHCD	84	84 1-bedrooms	60%-100%	4th Qtr.1991	CIP HFDC rental assistance revolving funds.
WAHIAWA ELDERLY Wahiawa	HFDC	108	60 studios 48 1-bedrooms	100% \$150/mo. \$175/mo.	Summer 1991	\$11.5 million State funds
MANOA ELDERLY Manoa	DHCD	70	Not determined.	60%-100%	1st Qtr.1992	\$6.7 million CIP Bonds - 1989 & \$2.2 million CIP Bonds - 1991
CROWN ELDERLY, I Waipahu	HFDC	108	Not determd.	100%	FY 1991-92	\$10.4 million
CROWN ELDERLY, II Waipahu	HFDC	222	Not determd.	100%	FY 1991-92	\$10.4 million
KAPOLEI ELDERLY Kapolei Villages, I & II	HFDC	800	Not determd.	100%	FY 1991-92	
SCHNACK BUILDING Kaimuki	DHCD	18	18 studio			CDBG
WILIKINA ELDERLY Wahiawa	DHCD	61	Not determd.	60%-100%	3rd Qtr. 1992	
POHULANI ELDERLY Kakaako, Queen Street	HFDC	262	128 studios 134 1-bedrooms	100%	FY 1991-92	\$100 Million Bonds & Hawaii Community Authority. Now under construction.
HALE MOHALU Pearl City	Coalition Specialized Housing; HFDC	200+	Not Determd.		FY 1991-92	\$1.306 for infrastructure improvements. HFDC seed funds.

PROJECT/LOCATION	DEVELOPER	# UNITS	TYPE OF UNITS	SUBSIDIZED UNITS	ESTIMATED COMPLETION DATE		FUNDING STATUS
WAIOLI TEA ROOM Manoa Elderly	Salvation Army	80	80 1-bedrooms		1993		HUD Section 202, \$6.4 million
PHILLIP STREET ELDERLY, McCully	DHCD Retire.Hous.Found.	34	10 studios 24 1-bedrooms	100% Section 8	1st Qtr. 1992		HUD Section 202 & CIP funds
KAILUA ELDERLY Kailua	DHCD	81	Not determined.	60%-100%	4th Qtr. 1992		
WEST LOCH ELDERLY Ewa	DHCD	150	Not determined.	60%-100%	4th Qtr. 1992		
KIPAPA RIDGE ELDERLY, Waiola	DHCD	134	Not determined	60%-100%	4th Qtr. 1992		
PAWAA Old Police Station	DHCD & HFDC	1000	Not determined				
KAPIOLANI TOWERS KCC-Pensacola	HFDC	500	Not determined				
<b>TOTALS OF PLANNED RENTAL UNITS:</b>		<b>4162</b>	<b>TOTAL COMPLETED: 250</b>	<b>TOTAL RENTAL UNITS: 4352</b>			

CONDOMINIUMS FOR ELDERS:

OLALO Retirement Community, Milliani	Four Milliani Partnership	376	fee-simple condos		1992		Private Developers & Dalchi Hawaii Real Estate Corp.
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CONTINUING CARE COMMUNITY:

HALE O'MALIA Star of the Sea	Episcopal Homes Foundation of HI.	300 60	Membership fee SNF				
<u>TRANSITIONAL APARTMENTS:</u>							
WARD KINAU APARTMENTS	HFDC	31	30% of income 18-24 months		Summer '92		Appropriation

Legend:

DHCD: Honolulu, Department of Housing and Community Development  
 HFDC: Hawaii State Housing Finance Development Corporation

**BOLD** under construction



**Table 2  
1992 Distribution of Housing Demand**

% of Median Income	Type of Unit	% of Units Needed	Price Range	
			Min	Max
<b>State</b>				
below 50%	Rental	19.77%	n.a.	\$530
50% to 80%	Rental	19.02%	\$530	\$850
80% to 100%	Ownership	11.22%	\$120,000	\$149,000
100% to 120%	Ownership	10.43%	\$149,000	\$179,000
120% to 140%	Ownership	11.11%	\$179,000	\$215,000
140% to 180%	Ownership	13.02%	\$215,000	\$311,000
over 180%	Ownership	15.44%	\$311,000	n.a.
<b>Oahu</b>				
below 50%	Rental	20.36%	n.a.	\$580
50% to 80%	Rental	19.34%	\$580	\$920
80% to 100%	Ownership	11.10%	\$129,000	\$162,000
100% to 120%	Ownership	11.60%	\$162,000	\$194,000
120% to 140%	Ownership	10.37%	\$194,000	\$233,000
140% to 180%	Ownership	12.15%	\$233,000	\$337,000
over 180%	Ownership	15.08%	\$337,000	n.a.
<b>Maui</b>				
below 50%	Rental	19.78%	n.a.	\$480
50% to 80%	Rental	38.56%	\$490	\$790
80% to 100%	Ownership	12.59%	\$111,000	\$139,000
100% to 120%	Ownership	11.01%	\$139,000	\$167,000
120% to 140%	Ownership	9.44%	\$167,000	\$200,000
140% to 180%	Ownership	13.44%	\$200,000	\$289,000
over 180%	Ownership	14.96%	\$289,000	n.a.
<b>Big Island</b>				
below 50%	Rental	20.15%	n.a.	\$420
50% to 80%	Rental	18.20%	\$420	\$670
80% to 100%	Ownership	12.08%	\$94,000	\$118,000
100% to 120%	Ownership	11.47%	\$118,000	\$141,000
120% to 140%	Ownership	9.51%	\$141,000	\$169,000
140% to 180%	Ownership	13.05%	\$169,000	\$245,000
over 180%	Ownership	15.54%	\$245,000	n.a.
<b>Kauai</b>				
below 50%	Rental	21.17%	n.a.	\$460
50% to 80%	Rental	17.96%	\$460	\$730
80% to 100%	Ownership	11.03%	\$103,000	\$128,000
100% to 120%	Ownership	10.43%	\$128,000	\$154,000
120% to 140%	Ownership	9.43%	\$154,000	\$185,000
140% to 180%	Ownership	15.08%	\$185,000	\$267,000
over 180%	Ownership	14.90%	\$267,000	n.a.

Table 7 put Hawaii into the national context. It shows that for 37 percent of the people who pay \$1,250 or more for monthly mortgage, their mortgage payment represents 30 percent or more of their household's income. In that category, Hawaii ranks fourth in the nation.

**Table 7**  
**Mortgage-to-Income Ratios**  
**U.S. and Hawaii, 1992**

Monthly Mortgage	Percent of Households that spend more than 30% on mortgage		
	U.S.	Hawaii	Hawaii's Rank
Less than \$500	24.0%	17.6%	39
\$500 to \$799	32.2%	19.9%	3
\$800 to \$1,249	26.5%	25.9%	26
\$1,250 or more	17.3%	36.6%	4

Source: *The Numbers News*, 13:1 (January 1993)

Half of Hawaii's people (53%) want to buy a home in Hawaii but only 18% think they can afford one. (See Appendix Table C-7). Among those who plan to move out-of-state, Table 8 shows that 62% say it is due to the cost of housing.

**Table 8**  
**Housing Cost and Out-Migration, 1992**

Issue	County of Residence				Total
	Honolulu	Maui	Hawaii	Kauai*	
Total households planning to move out-of-state	37,088	1,328	1,868	812	41,095
Is housing cost the reason for moving out-of-state?					
yes	61.3	77.3	51.0	76.4	61.7
no	37.5	22.7	49.0	23.6	37.3
not sure	1.2	0.0	0.0	0.0	1.0

\* Pre-Hurricane Iniki

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**Table 10**  
**Preferences of Buyers and Renters, 1992**

Preference	Will Buy	Will Rent
<b>Total Will Move</b>	<b>87,027</b>	<b>78,839</b>
<b>Preferred type</b>		
single family	79.2	66.6
townhouse	10.9	3.9
condominium	7.1	11.6
apartment	1.0	12.3
undecided	0.1	0.5
other	1.7	5.0
<b>Preferred number of bedrooms</b>		
studio or one bedroom	2.3	13.8
two bedrooms	29.4	40.2
three bedrooms	46.7	36.6
four or more bedrooms	21.6	9.2
undecided	0.1	0.2

Percentages may not sum to 100.0 due to rounding.  
Based on the number of people who will or may move and who stated a preference for either purchasing or renting the new unit.

#### **Preferred Location**

Most people prefer to remain on the island of current residence. This preference was stronger for Neighbor Islanders than for Oahu residents — 72% in Maui County, 81% on the Big Island, and 77% on Kauai compared with 62% on Oahu. Oahu's population is the most mobile of the four counties with 26% looking to move out-of-state compared with nine to eleven percent in other counties. (See Appendix Table C-4). Table 11 shows preferences for specific geographic areas.

**Table 11**  
**Preferred Location of New Housing Unit (Continued)**

Preferred Location	County of Residence				Total
	Honolulu	Maui	Hawaii	Kauai	
<b>Total Will Move</b>	<b>142,517</b>	<b>15,337</b>	<b>17,900</b>	<b>7,654</b>	<b>183,408</b>
<b>PREFERRED TENANCY: RENT</b>					
<b>OAHU</b>					
other Oahu	34.1	4.6	0.0	11.7	21.5
Windward (Kaliua, Kaneohe)	19.0	1.3	1.9	0.0	16.7
Manoa, Punahou	16.6	0.6	0.0	0.0	14.4
Aiea, Pear City, Pearlridge	14.3	0.0	0.0	2.5	12.5
Kaimuki, St. Louis	13.7	0.9	0.3	3.2	12.0
Haleiwa, North Shore	11.3	1.5	0.0	9.1	10.1
Kakaako, Downtown	10.5	1.3	0.0	2.5	9.3
Wahiawa, Milliani, Makakilo	9.2	1.0	0.0	0.0	8.1
Waianae Coast	8.1	0.0	0.0	0.0	7.0
Aiea Haina, Hawaii Kai	8.2	0.7	0.0	0.0	7.2
Ewa Beach, Ewa, Kapolei	6.5	1.0	0.0	0.0	5.7
Kahala	3.7	4.0	0.0	0.0	3.2
Waikiki	3.4	0.1	0.0	0.0	3.0
Waipahu	1.2	0.4	0.0	0.0	1.1
<b>MAUI</b>					
Upcountry	1.2	37.0	1.0	0.0	3.4
other Maui	0.6	31.0	1.5	0.0	2.5
Kula	0.6	11.4	0.3	0.0	1.3
Kihui	0.0	18.3	0.0	0.0	1.1
Lehaina, Keanspall	0.0	12.0	0.0	0.0	0.7
Waikuku	0.0	9.6	0.0	0.0	0.6
Hana	0.0	7.6	0.0	0.0	0.5
Pala, Haiku	0.0	7.3	0.0	0.0	0.4
Wailea, Makana	0.0	4.6	0.0	0.0	0.3
anywhere on Molokai	0.0	3.3	0.3	0.0	0.2
Kahului	0.0	4.4	0.0	0.0	0.3
anywhere on Lanai	0.0	2.1	0.0	0.0	0.1
<b>HAWAII</b>					
Kamuela, Waimea	4.1	0.0	13.7	0.0	4.2
Hilo	0.6	3.3	23.6	0.0	2.3
Kailua-Kona	3.9	7.8	27.0	0.0	5.1
other Big Island	0.3	0.1	40.0	1.1	2.2
Honokaa	0.8	0.0	5.5	0.0	0.9
Mountain View, Volcano	0.0	0.0	9.5	0.0	0.4
Kau	0.5	0.0	0.0	0.0	0.4
<b>KAUAI</b>					
other Kauai	0.0	4.5	2.9	56.2	1.8
Hanalei	0.5	1.0	0.0	11.5	0.8
Waimea	0.5	0.3	0.0	2.6	0.5
Lihue	0.0	0.0	0.0	15.1	0.4
Kekaha	0.0	0.0	0.0	0.8	0.0
<b>OTHER</b>					
any place not in Hawaii	13.1	4.5	4.3	3.1	11.8
don't know	3.7	2.6	8.6	5.4	3.9

Percentages will not sum to 100.0 due to the exclusion of percentages for those who stated no geographic preference

### Price Preference

As might be expected, potential buyers can afford slightly higher monthly housing expenses than can renters. Forty-four percent of would-be homeowners can pay \$1,400 or more compared with 15% of the renters. (See Table 12).

**Table 12**  
**Affordable Housing Cost of New Unit, 1992**

Preference	Will Buy	Will Rent
Total Will Move	87,027	78,839
Affordable monthly housing cost:		
less than \$200	1.1	1.4
\$200 to \$499	1.9	2.3
\$500 to \$800	17.5	29.6
\$801 to \$1,100	27.6	35.1
\$1,100 to \$1,400	12.3	16.3
\$1,400 to \$1,700	20.3	9.6
\$1,700 to \$2,000	7.1	2.8
\$2,000 to \$3,000	5.5	2.3
over \$3,000	6.6	0.0

Percentages may not sum to 100.0 due to rounding. Based on those who may or will move and who specified an affordable monthly cost. Calculated from numbers in Appendix Table C-9.

### QUALIFICATIONS

Appendix Tables C-15 through 19 provide information on the ability for potential home buyers in each county to qualify to purchase a new home. For the sake of comparison, they are compared with those who would prefer to rent their next home.

Would-be homeowners are generally more affluent than renters. They have higher household incomes, personal incomes, savings, and more money available for a down payment. They are also far more likely to own property the equity from which can be put against the purchase of a new home. Unemployment is higher among renters than potential home buyers.

The financial profiles of potential buyers and renters for each county are summarized in Table 13.

## STATE HOUSING DEMAND MODEL

HOUSING DEMAND MODEL								
	Population	HH Size	Households	HU	Vacant HU	Non Res HU	Avail HU	HU Needed
1980	967,400	3.14	307,704	335,301	16,765	22,107	296,429	11,274
1981	978,300	3.13	312,539	342,945	17,147	27,031	298,767	13,772
1982	994,000	3.12	318,948	347,935	17,397	27,552	302,985	15,963
1983	1,013,300	3.10	326,569	351,116	17,556	25,376	308,184	18,385
1984	1,028,900	3.09	333,083	355,548	17,777	33,672	304,098	28,984
1985	1,041,300	3.08	338,592	359,563	17,978	42,173	299,411	39,180
1986	1,053,600	3.06	344,116	364,372	18,219	44,558	301,596	42,520
1987	1,070,200	3.05	351,112	370,399	18,520	42,406	309,474	41,639
1988	1,084,200	3.03	357,308	376,409	18,820	39,801	317,788	39,520
1989	1,097,100	3.02	363,237	382,995	19,150	34,904	328,942	34,295
1990	1,113,600	3.01	370,424	390,628	19,531	34,162	336,935	33,489
1991	1,123,815	3.00	374,327	400,388	20,019	35,211	345,157	29,170
1992	1,136,531	3.00	378,561	406,219	20,311	35,211	350,696	27,865
1993	1,149,444	3.00	382,892	413,153	20,658	35,211	357,284	25,610
1994	1,162,557	3.00	387,292	419,559	20,978	35,211	363,369	23,924
1995	1,175,874	3.00	391,761	425,995	21,300	35,211	369,484	22,278
1996	1,189,399	3.00	396,300	431,107	21,555	35,211	374,340	21,961
1997	1,203,137	3.00	400,911	436,357	21,818	35,211	379,328	21,585
1998	1,217,091	3.00	405,596	441,607	22,080	35,211	384,315	21,282
1999	1,231,266	3.00	410,355	446,857	22,343	35,211	389,303	21,054
2000	1,245,667	3.00	415,191	452,107	22,605	35,211	394,290	20,902
2001	1,260,298	3.00	420,104	457,357	22,868	35,211	399,278	20,827
2002	1,275,163	3.00	425,097	462,607	23,130	35,211	404,265	20,833
2003	1,290,267	3.00	430,171	467,857	23,393	35,211	409,253	20,919
2004	1,305,616	3.00	435,327	473,107	23,655	35,211	414,240	21,088
2005	1,321,213	3.00	440,568	478,357	23,918	35,211	419,228	21,341
2006	1,337,065	3.00	445,894	483,607	24,180	35,211	424,215	21,680
2007	1,353,175	3.00	451,309	488,857	24,443	35,211	429,203	22,108
2008	1,369,551	3.00	456,813	494,107	24,705	35,211	434,190	22,624
2009	1,386,196	3.00	462,409	499,357	24,968	35,211	439,178	23,232
2010	1,403,116	3.00	468,098	504,607	25,230	35,211	444,165	23,934

Exhibit I-a

**Definitions****Actual Price:**

The actual home price was based on a weighted average of single family and condominium resales.

**Affordable Price:**

The affordable home price is determined by utilizing established housing qualification methodology and the following assumptions; 30 year loan, prevailing/projected interest rate, 30% of income median available for housing, and a downpayment equal to the median income.

**Non-Resident Housing Units:**

The definition of a non-resident housing unit for demand estimation purposes was any housing unit that is not intended to be available to local residents on an ongoing basis.

OAHU INCOME DISTRIBUTION

Median Income (HUD, FY 1982) \$48,000

Income	Percent of Median Income	1982 Household Count	Percent of Total Households
\$0-\$4.9	0%	4,234	1.60%
\$5-\$9.9	11%	6,210	2.30%
\$10-\$14.9	22%	15,247	5.40%
\$15-\$19.9	33%	19,759	7.00%
\$20-\$24.9	43%	20,640	7.10%
\$25-\$29.9	54%	20,804	7.50%
\$30-\$34.9	65%	19,759	7.00%
\$35-\$39.9	74%	17,217	6.10%
\$40-\$44.9	87%	19,939	7.00%
\$45-\$49.9	95%	18,916	6.80%
\$50-\$54.9	109%	12,348	4.50%
\$55-\$59.9	120%	21,189	7.60%
\$60-\$64.9	130%	19,191	6.90%
\$65-\$69.9	141%	10,191	3.60%
\$70-\$74.9	152%	9,878	3.50%
\$75-\$79.9	163%	9,314	3.30%
\$80-\$84.9	174%	8,488	3.00%
>\$86	185%	37,922	13.40%
<b>Totals</b>		<b>282,282</b>	<b>100.00%</b>

Percent of Median Income	1982 Household Count	Percent of Total Households
<50%	87,488	30.99%
50% - 80%	84,878	29.99%
80% - 100%	31,241	11.07%
100% - 120%	32,741	11.59%
120% - 140%	30,288	10.73%
140% - 160%	34,287	12.16%
>160%	42,955	15.08%
<b>Total</b>	<b>282,282</b>	<b>100.00%</b>

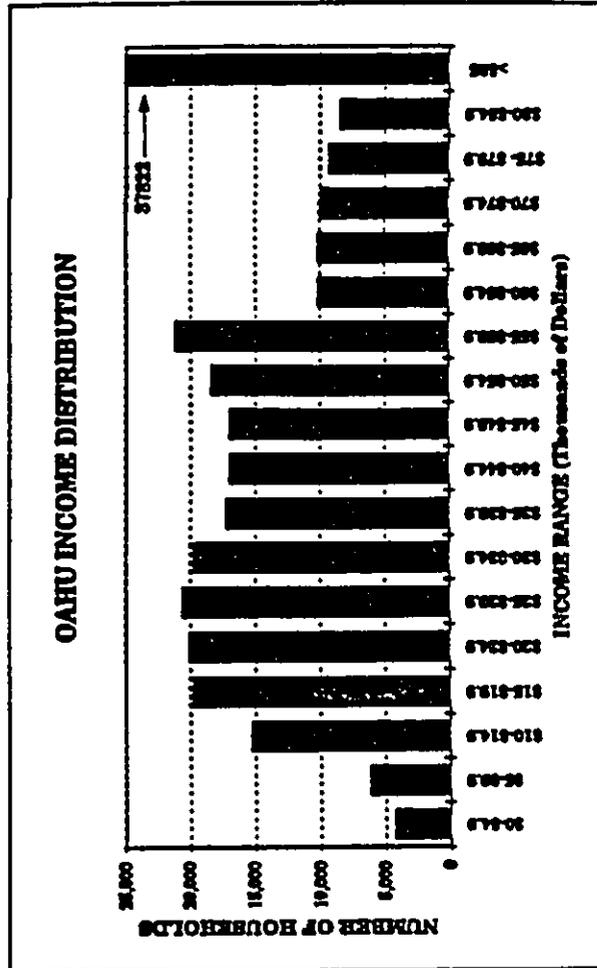


Exhibit VII-B

### Willing to Accept as Housing Choice

Oahu	Rent		Own	
	Single Family	Multi Family	Single Family	Multi Family
Percent of Median Income				
<80%	6.33%	73.69%	3.68%	16.30%
80%-99%	12.27%	38.86%	8.58%	40.29%
100%-119%	8.33%	43.34%	11.65%	36.69%
120%-139%	9.55%	59.73%	7.22%	23.50%
140%-179%	22.67%	29.03%	27.31%	21.00%
>180%	11.99%	25.59%	26.88%	35.54%

Maul	Rent		Own	
	Single Family	Multi Family	Single Family	Multi Family
Percent of Median Income				
<80%	26.72%	44.87%	13.67%	14.74%
80%-99%	23.53%	24.94%	35.89%	15.64%
100%-119%	9.85%	40.92%	6.39%	42.84%
120%-139%	21.84%	28.88%	33.98%	15.29%
140%-179%	20.27%	35.45%	36.40%	7.88%
>180%	0.87%	40.25%	35.40%	23.48%

Hawaii	Rent		Own	
	Single Family	Multi Family	Single Family	Multi Family
Percent of Median Income				
<80%	21.19%	32.43%	26.26%	20.12%
80%-99%	23.61%	1.27%	52.29%	22.83%
100%-119%	19.72%	18.47%	40.43%	21.38%
120%-139%	16.18%	21.48%	49.02%	13.33%
140%-179%	3.88%	8.18%	55.15%	32.78%
>180%	5.04%	14.29%	57.79%	22.88%

Kauai	Rent		Own	
	Single Family	Multi Family	Single Family	Multi Family
Percent of Median Income				
<80%	25.39%	37.25%	14.67%	22.69%
80%-99%	15.55%	35.49%	17.86%	31.10%
100%-119%	26.84%	27.32%	45.84%	0.00%
120%-139%	14.00%	29.99%	19.60%	36.41%
140%-179%	14.99%	18.40%	48.96%	17.66%
>180%	9.54%	9.40%	38.18%	42.88%

Exhibit XI

A P P E N D I X A

FIELD EXPLORATION  
AND  
LABORATORY TESTING

GEOLABS - HAWAII, INC.

DECEMBER 20, 1973

A P P E N D I X A

FIELD EXPLORATION

The subsurface soil conditions at the site were explored by drilling 13 test borings and excavating 5 test pits. The borings were drilled utilizing truck-mounted rotary auger equipment with rock coring attachments. The test pits were dug with a back hoe. The depths of the borings ranged from 14 to 30 feet below the existing ground surface. The test pits extended approximately 5 to 11 feet below the existing ground. The locations of the borings and test pits are shown on the Site Plan in the text of this report. The soils and rock were classified by visual and textural examinations in the field by our geologist and engineer who continuously supervised the drilling operations. The classifications were verified by inspection and testing in the laboratory. All soils were classified in accordance with the Unified Soil Classification System. The description of rocks is based on local geologic terminology. Graphical representations of the soils and rock encountered are presented on the Boring Logs, Plates A-1A through A-1M.

Soil samples were obtained by driving a 2.4 inch diameter or a standard penetration sampler with a 140 pound hammer free falling a distance of 30 inches. The blow counts to drive the

GEOLABS - HAWAII, INC.

December 26, 1973

per square foot. The results of this test showed expansion as listed below:

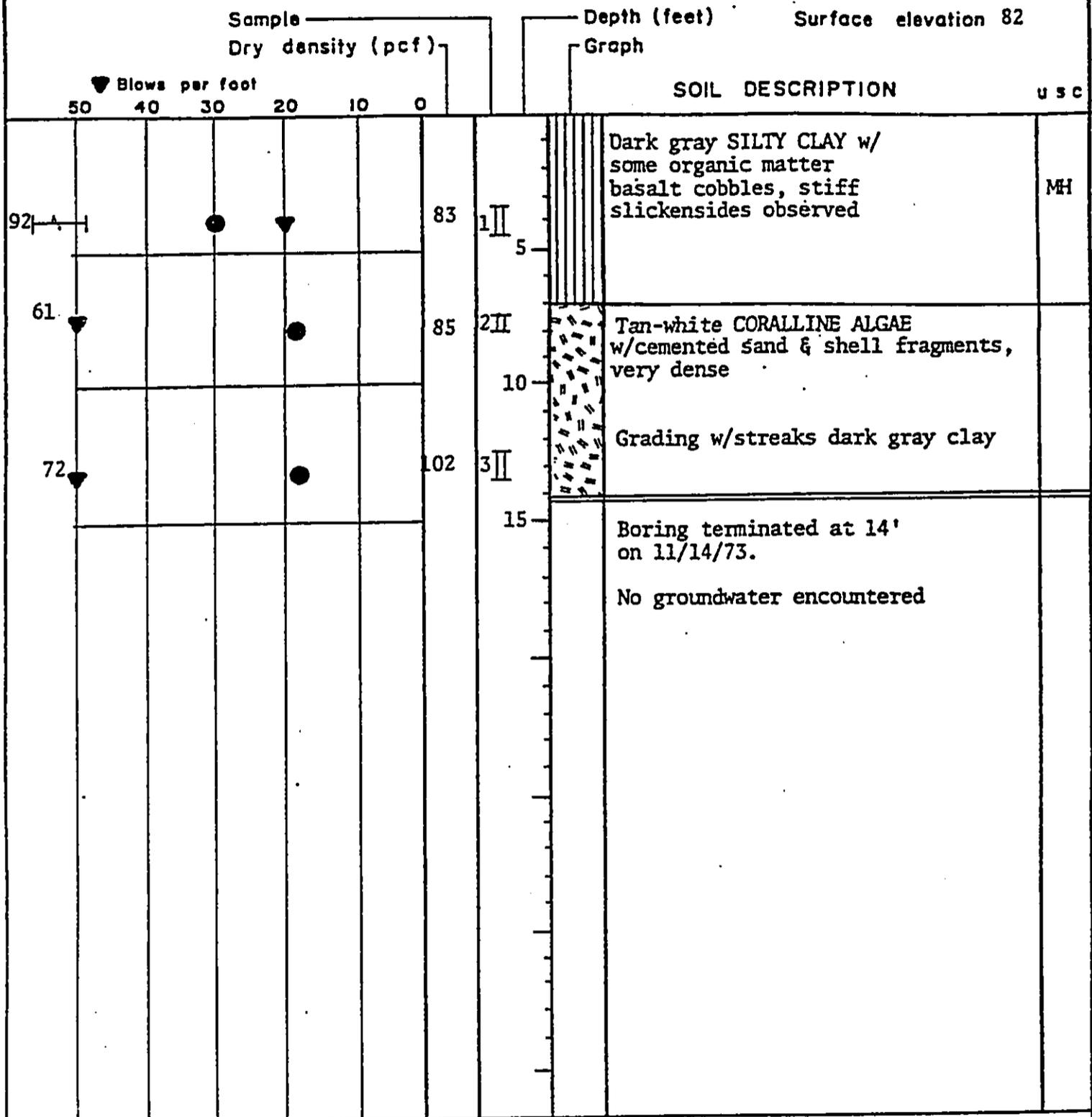
<u>Boring No.</u>	<u>Depth</u>	<u>Expansion</u>
3	5.0'	4.7%
2	5.5'	7.5%

The following plates are attached and complete this Appendix:

Plate A-1A	Log of Boring 1
Plate A-1B	Log of Boring 2
Plate A-1C	Log of Boring 3
Plate A-1D	Log of Boring 4
Plate A-1E	Log of Boring 5
Plate A-1F	Log of Boring 6
Plate A-1G	Log of Boring 7
Plate A-1H	Log of Boring 8
Plate A-1I	Log of Boring 9
Plate A-1J	Log of Boring 10
Plate A-1K	Log of Boring 11
Plate A-1L	Log of Boring 12
Plate A-1M	Log of Boring 13
Plate A-1N	Log of Boring-Test Pit 1
Plate A-1O	Log of Boring-Test Pit 2
Plate A-1P	Log of Boring-Test Pit 3
Plate A-1Q	Log of Boring-Test Pit 4
Plate A-1R	Log of Boring-Test Pit 5
Plate A-2	Direct Shear Test
Plate A-3	Consolidation Test
Plate A-4	Grain Size Analysis

GEOLABS - HAWAII, INC.

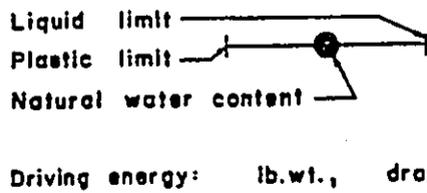
# BORING B-1



● Moisture content

### LEGEND

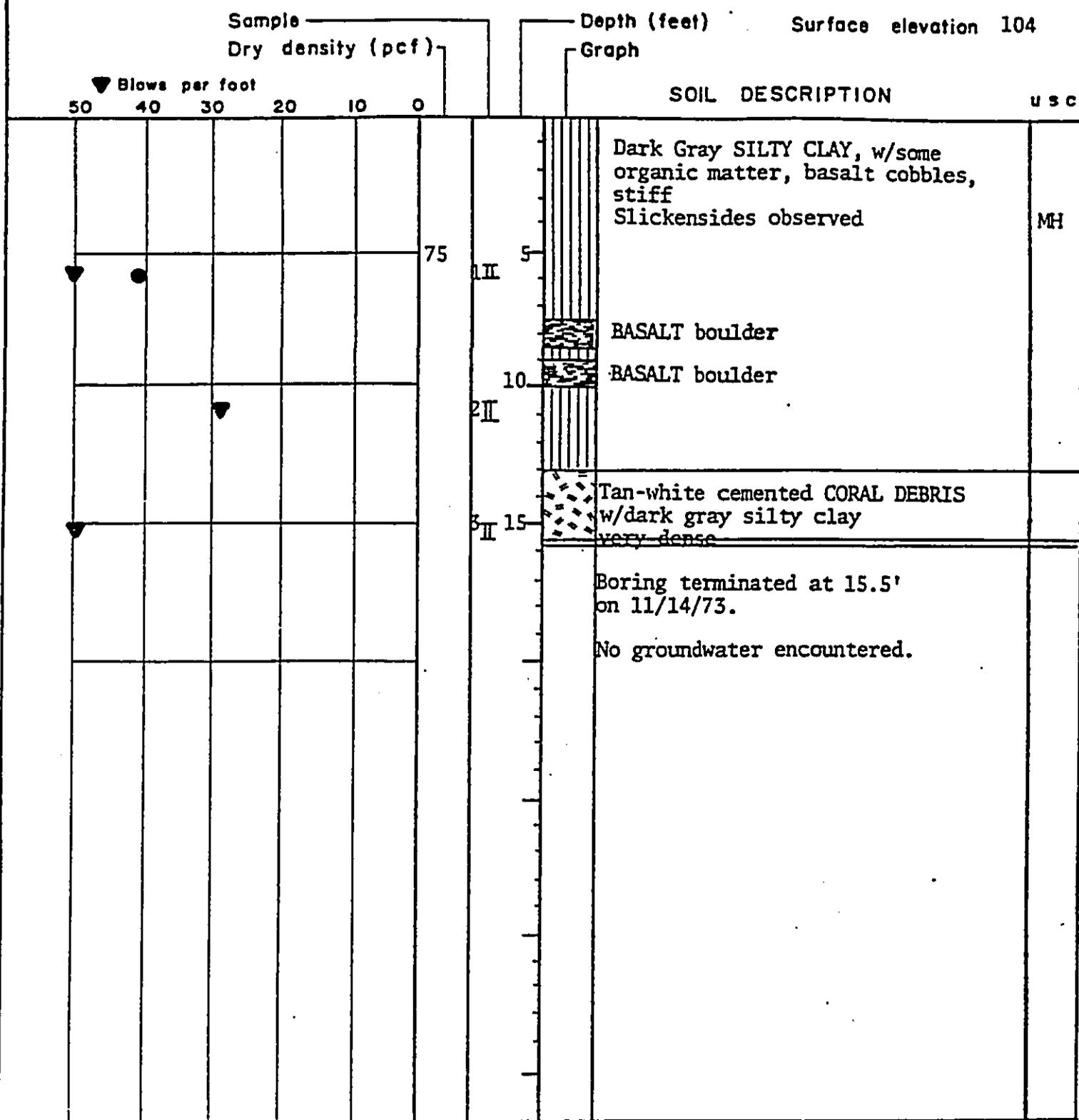
- I 2.0" O.D. split- spoon sample
- II Undisturbed ring sample
- III Disturbed ring sample
- IV Core sample
- P Sampler pushed



### LOG OF BORING

Pokai Bay Cluster Homes  
**GEOLABS-HAWAII, INC.**  
 W. O. 500-00 DECEMBER, 1973  
 PLATE A-1A

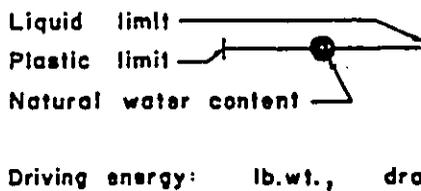
# BORING B-2



● Moisture content

### LEGEND

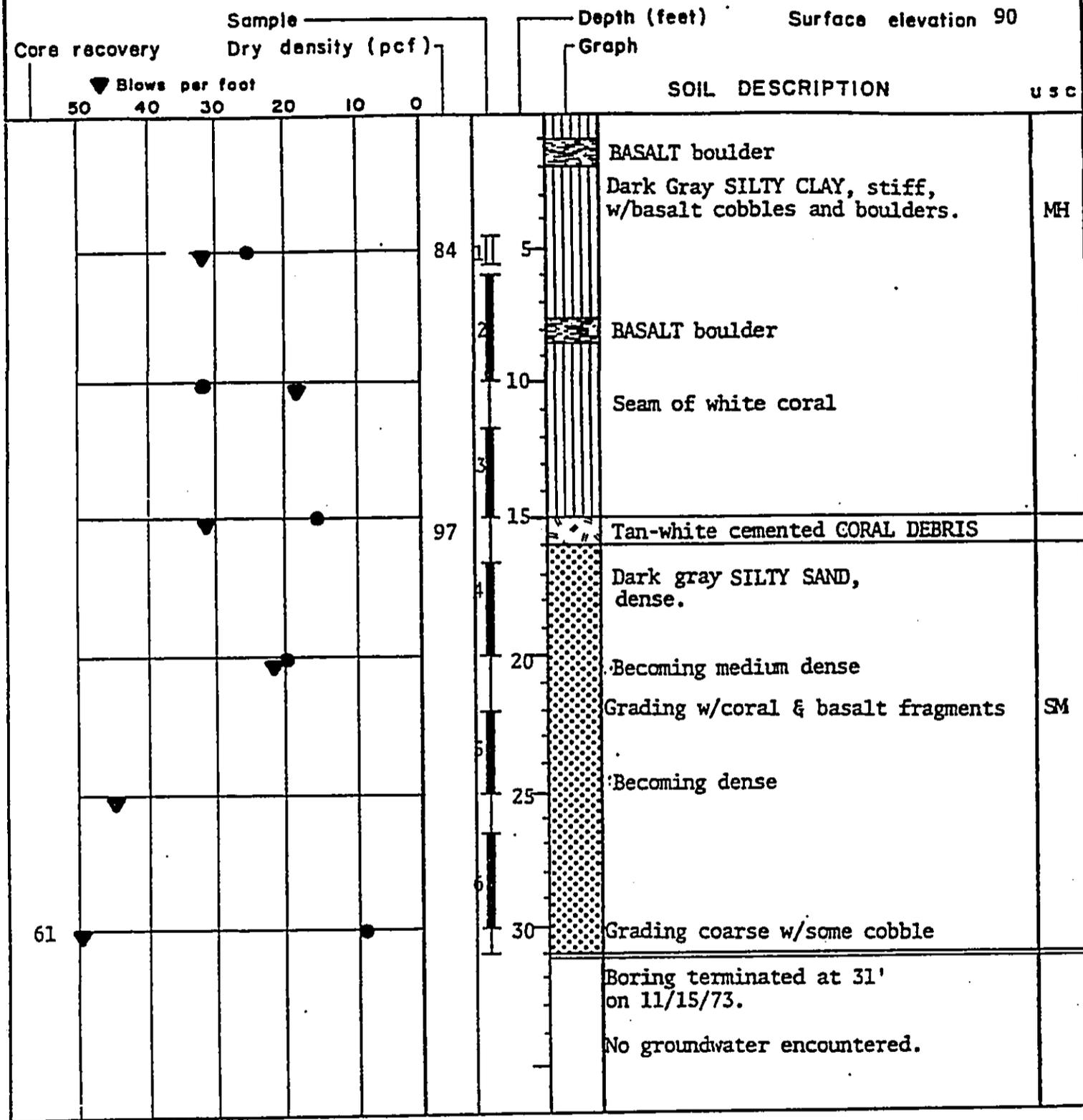
- I 2.0" O.D. split-spoon sample
- II Undisturbed ring sample
- III Disturbed ring sample
- IV Core sample
- P Sampler pushed



**LOG OF BORING**  
Pokai Bay Cluster Homes

**GEOLABS-HAWAII, INC.**  
W. O. 500-00 DECEMBER, 1973  
PLATE A-1B

**BORING D-3**



● Moisture content

**LEGEND**

I 2.0" O.D. split-spoon sample      Liquid limit 

II Undisturbed ring sample      Plastic limit 

III Disturbed ring sample      Natural water content 

IV Core sample

P Sampler pushed

Driving energy: lb.wt., drop

**LOG OF BORING**  
 Pokai Bay Cluster Homes  
**GEOLABS-HAWAII, INC.**  
 W. O. 500-00 DECEMBER, 1973  
 PLATE A-1C

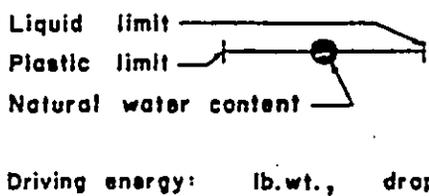
# BORING B-4

	Blows per foot	Dry density (pcf)										
Core recovery	50	40	30	20	10	0	Sample	Depth (feet)	Graph	Surface elevation 104	SOIL DESCRIPTION	u s c
				▼				1			Dark gray SILTY CLAY, very stiff, w/some basalt boulders	MH
								2			Dark brown highly DECOMPOSED BASALT w/clayey silt matrix	GM
								3			Boring terminated at 19' on 11/19/73.  No groundwater encountered.	

● Moisture content

### LEGEND

- I 2.0" O.D. split-spoon sample
- II Undisturbed ring sample
- III Disturbed ring sample
- IV Core sample
- P Sampler pushed



## LOG OF BORING

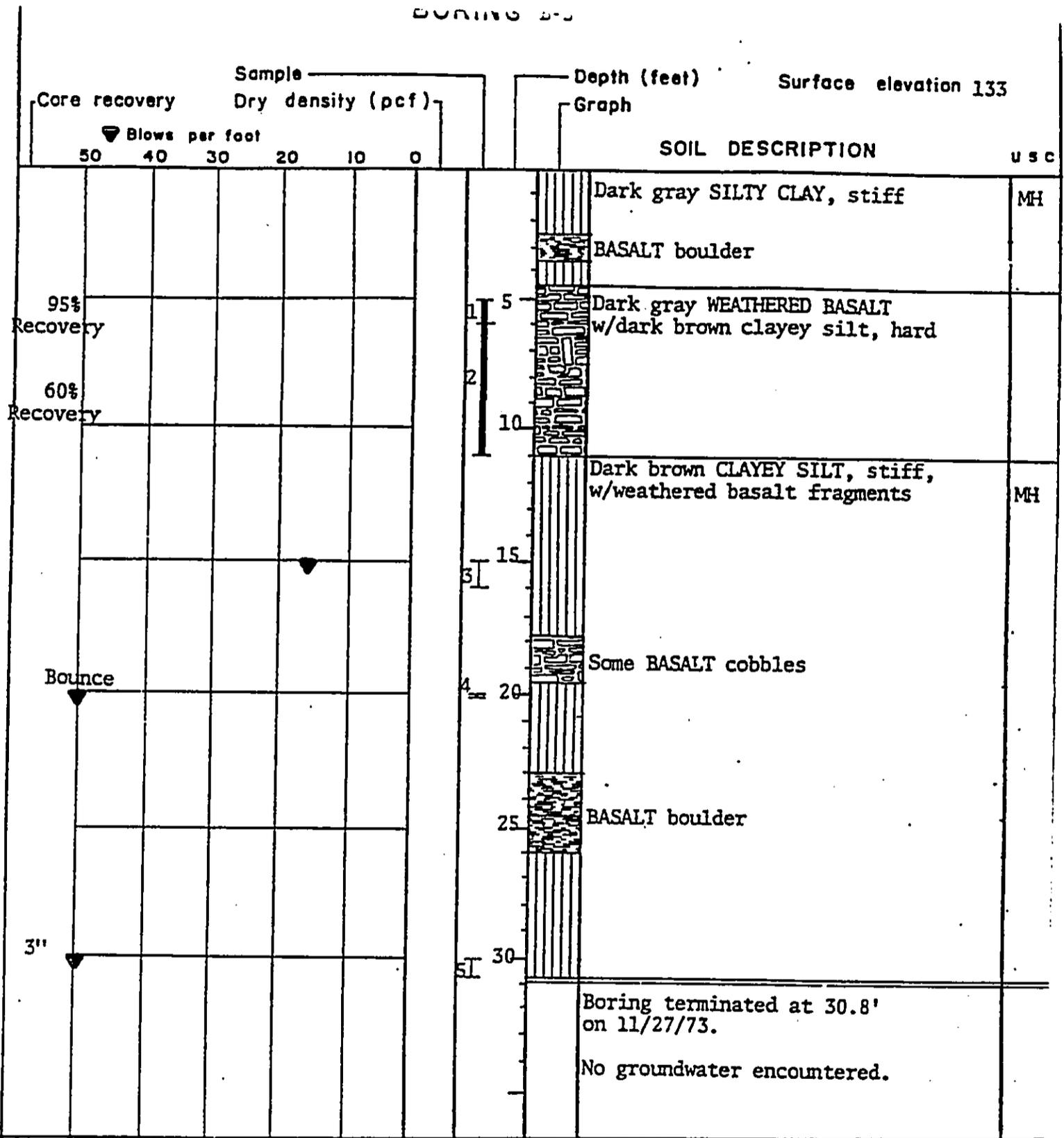
Pokai Bay Cluster Homes

**GEOLABS-HAWAII, INC.**

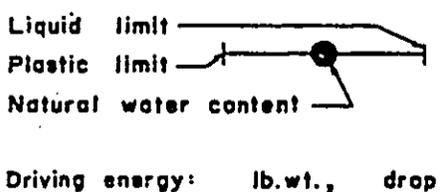
W. O. 500-00 DECEMBER, 1973

PLATE A-1D

BORING 3-3

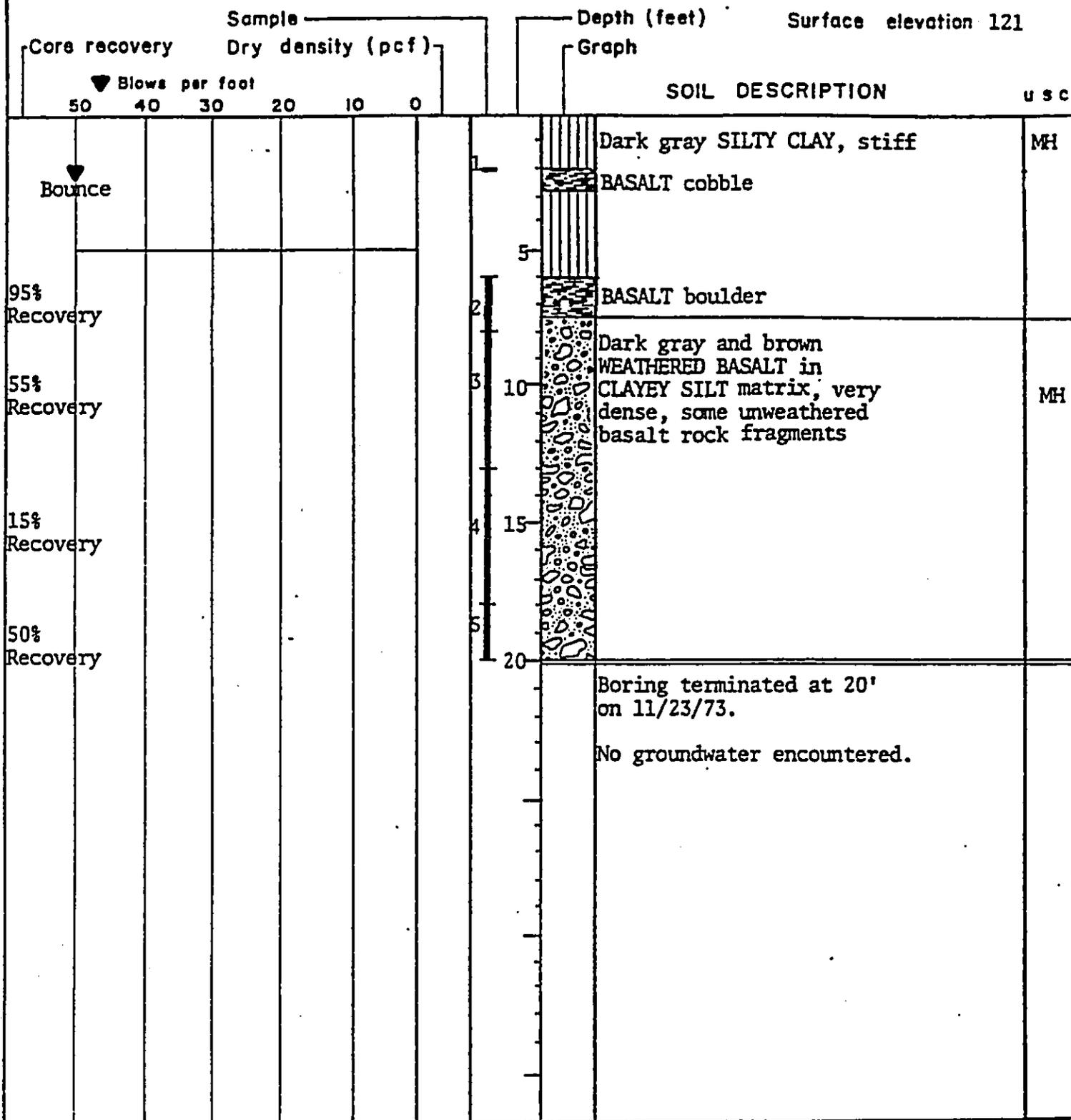


- Moisture content
- LEGEND**
- I 2.0" O.D. split-spoon sample
  - II Undisturbed ring sample
  - III Disturbed ring sample
  - IV Core sample
  - P Sampler pushed



**LOG OF BORING**  
 Pokai Bay Cluster Homes  
**GEOLABS-HAWAII, INC.**  
 W. O. 500-00 DECEMBER, 1973  
 PLATE A-1E

# BORING B-6



● Moisture content

### LEGEND

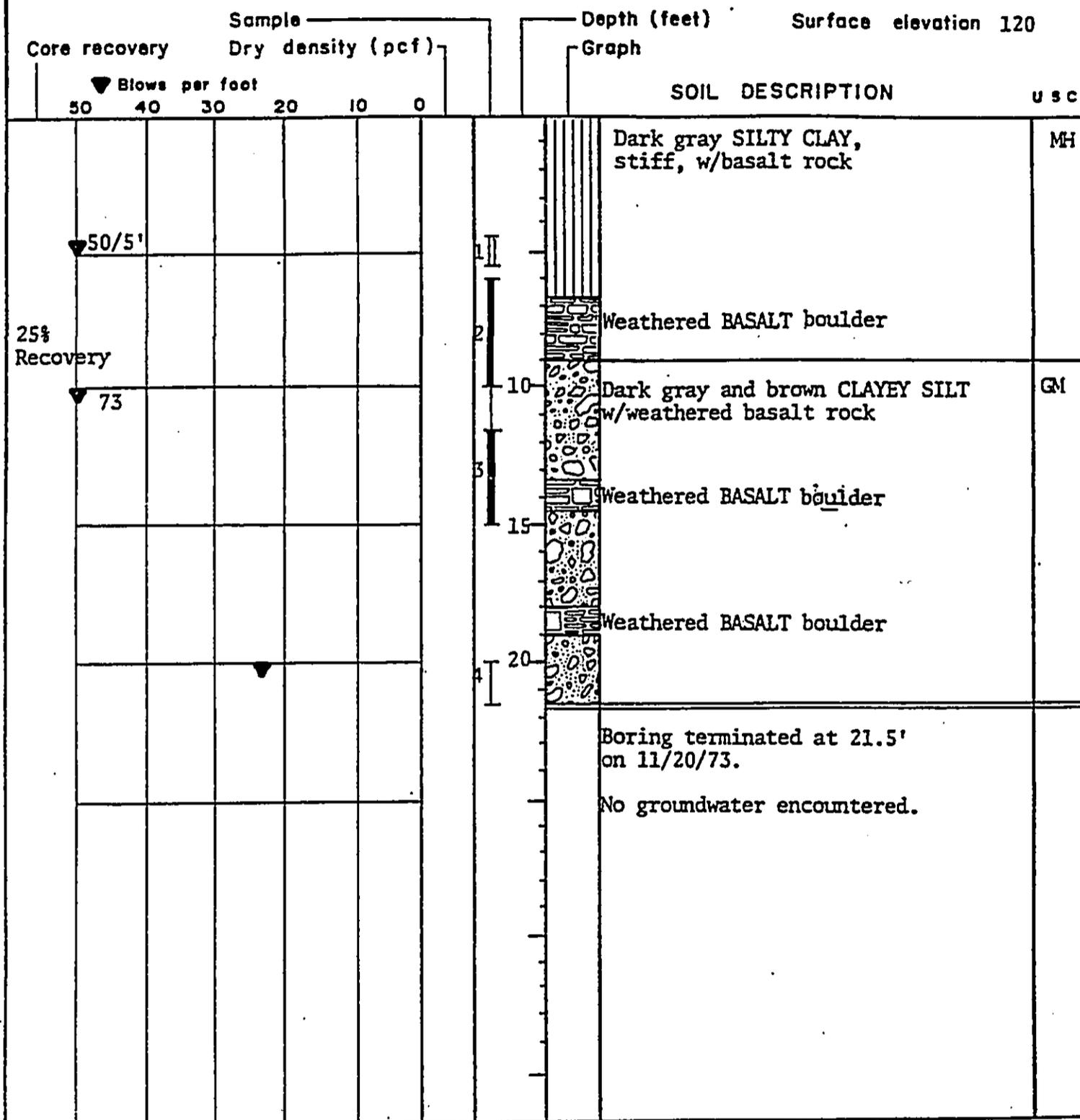
- I 2.0" O.D. split-spoon sample
- II Undisturbed ring sample
- E Disturbed ring sample
- I Core sample
- P Sampler pushed

- Liquid limit
- Plastic limit
- Natural water content
- Driving energy: lb.wt., drop

## LOG OF BORING

Pokai Bay Cluster Homes  
**GEOLABS-HAWAII, INC.**  
 W. O. 500-00 DECEMBER, 1973  
 PLATE A-1F

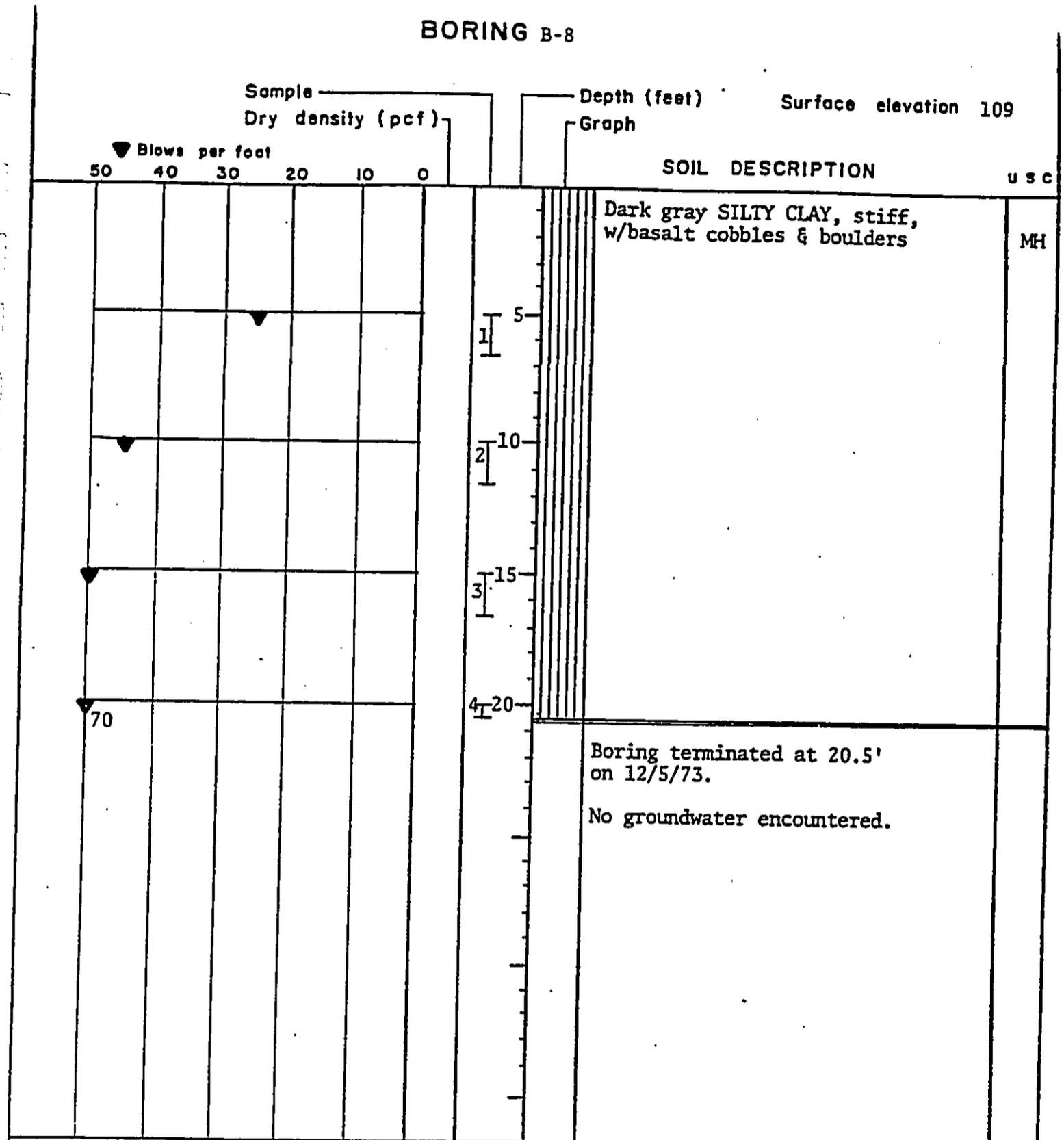
# BORING B-7



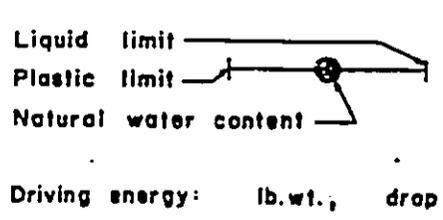
- Moisture content
- LEGEND**
- I 2.0" O.D. split- spoon sample
  - II Undisturbed ring sample
  - III Disturbed ring sample
  - IV Core sample
  - P Sampler pushed
- Liquid limit
  - Plastic limit
  - Natural water content
- Driving energy: lb.wt., drop

**LOG OF BORING**  
 Pokai Bay Cluster Homes  
**GEOLABS-HAWAII, INC.**  
 W. O. 500-00 DECEMBER, 1973  
 PLATE A-1G

# BORING B-8

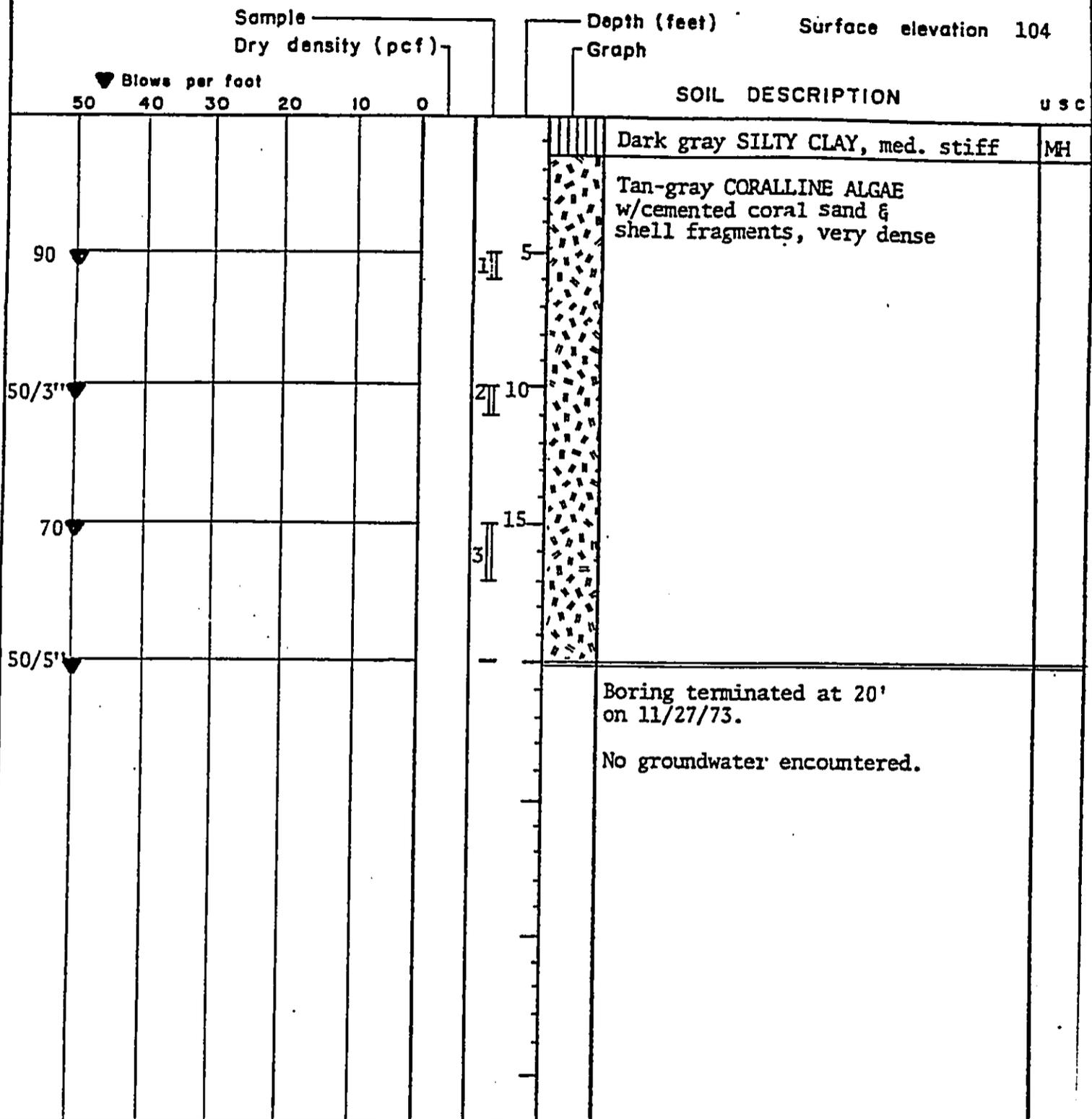


- Moisture content
- LEGEND**
- I 2.0" O.D. split-spoon sample
  - II Undisturbed ring sample
  - III Disturbed ring sample
  - IV Core sample
  - P Sampler pushed



**LOG OF BORING**  
 Pokai Bay Cluster Homes  
**GEOLABS-HAWAII, INC.**  
 W. O. 500-00 DECEMBER, 1973  
 PLATE A-1H

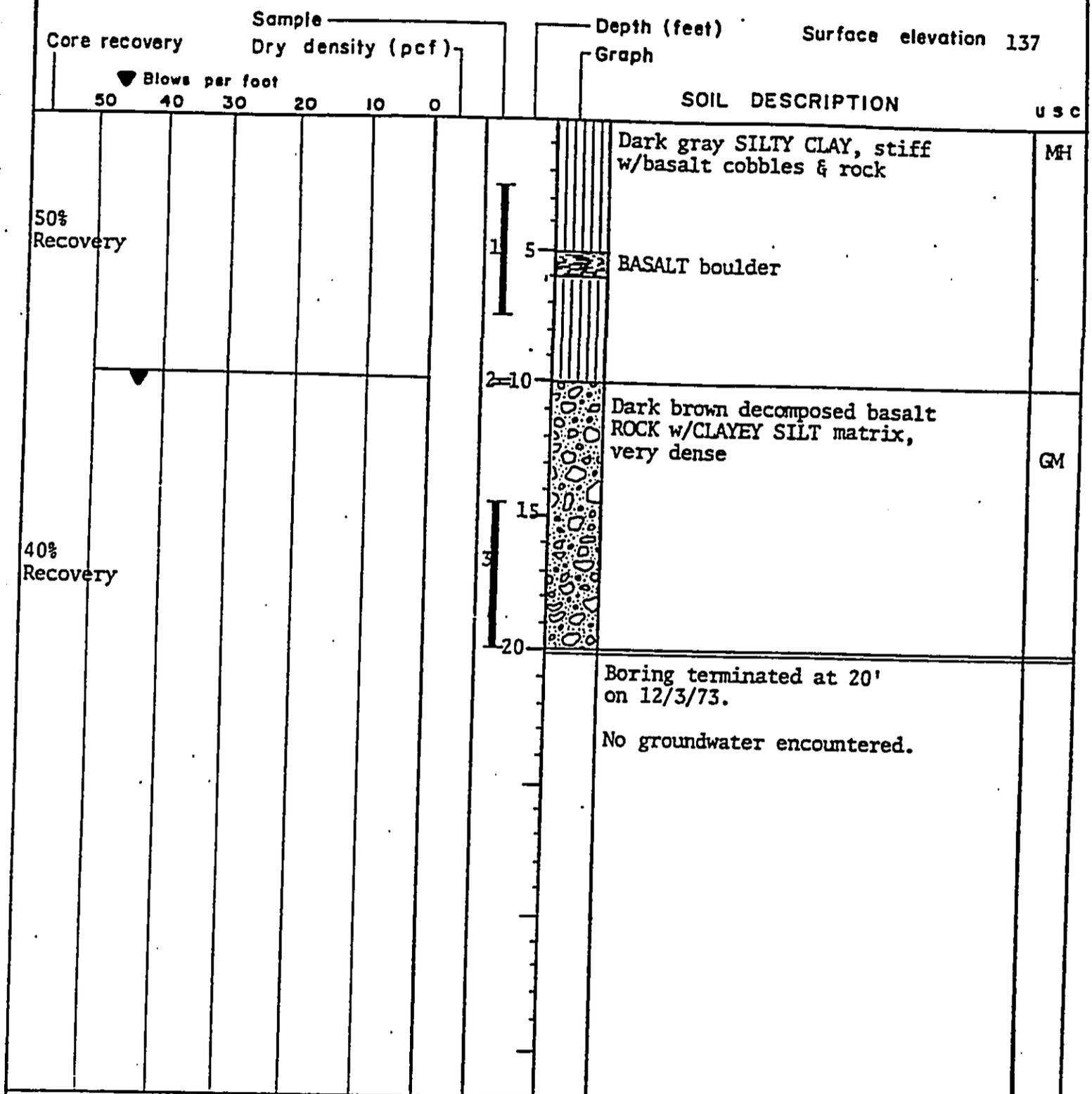
# BORING B-9



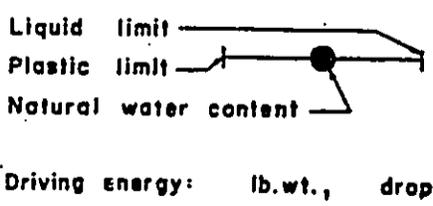
- Moisture content
- LEGEND**
- |                                |                              |
|--------------------------------|------------------------------|
| I 2.0" O.D. split-spoon sample | Liquid limit                 |
| II Undisturbed ring sample     | Plastic limit                |
| III Disturbed ring sample      | Natural water content        |
| IV Core sample                 |                              |
| P Sampler pushed               | Driving energy: lb.wt., drop |

**LOG OF BORING**  
 Pokai Bay Cluster Homes  
**GEOLABS-HAWAII, INC.**  
 W. O. 500-00 DECEMBER, 1973  
 PLATE A- 11

# BORING B-10



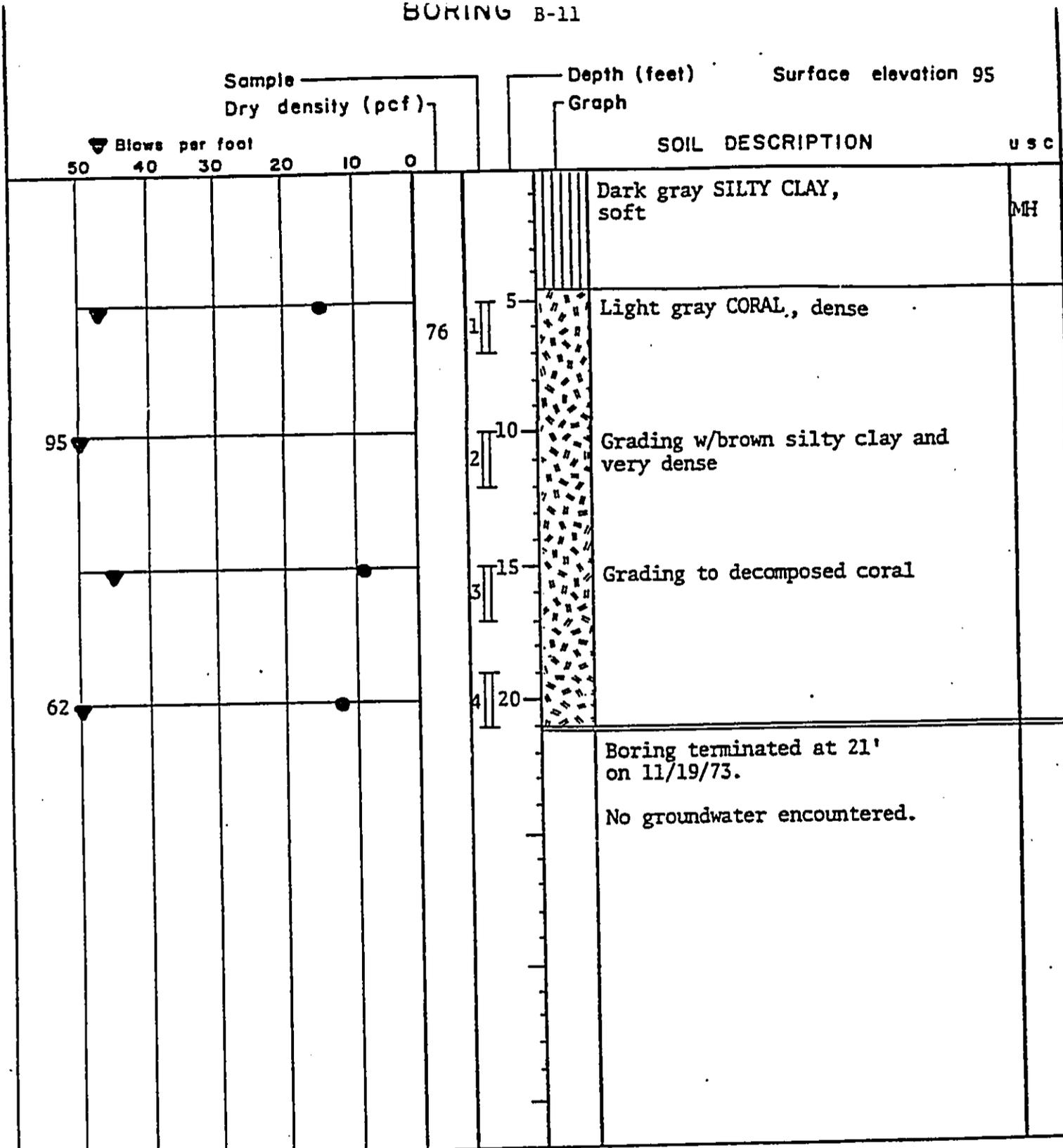
- Moisture content
- LEGEND**
- I 2.0" O.D. split-spoon sample
  - II Undisturbed ring sample
  - III Disturbed ring sample
  - IV Core sample
  - P Sampler pushed



## LOG OF BORING

Pokai Bay Cluster Homes  
**GEOLABS-HAWAII, INC.**  
 W. O. 500-00 DECEMBER, 1973  
 PLATE A-1J

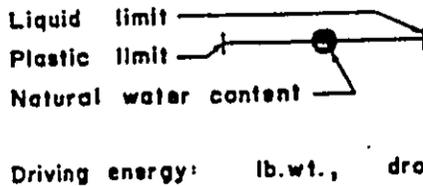
BORING B-11



● Moisture content

LEGEND

- I 2.0" O.D. split-spoon sample
- II Undisturbed ring sample
- III Disturbed ring sample
- IV Core sample
- P Sampler pushed



LOG OF BORING

Pokai Bay Cluster Homes

GEOLABS-HAWAII, INC.

W. O. 500-00 DECEMBER, 1973

PLATE A-1K

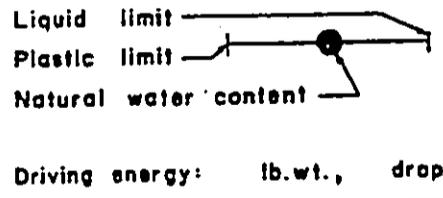
**BORING B-12**

Sample						Depth (feet)	Surface elevation 83
Dry density (pcf)						Graph	
Blows per foot						SOIL DESCRIPTION	u s c
50	40	30	20	10	0		
						1   5	Dark gray SILTY CLAY, very stiff, w/basalt cobbles and boulders MH
						2   10	
						3   15	Brown SILTY CLAY w/coral fragments, dense. ML
						4   20	Tan CORALLINE ALGAE, very dense
							Boring terminated 21.5' on 12/5/73. No groundwater encountered.

● Moisture content

**LEGEND**

- I 2.0" O.D. split-spoon sample
- II Undisturbed ring sample
- E Disturbed ring sample
- I Core sample
- P Sampler pushed



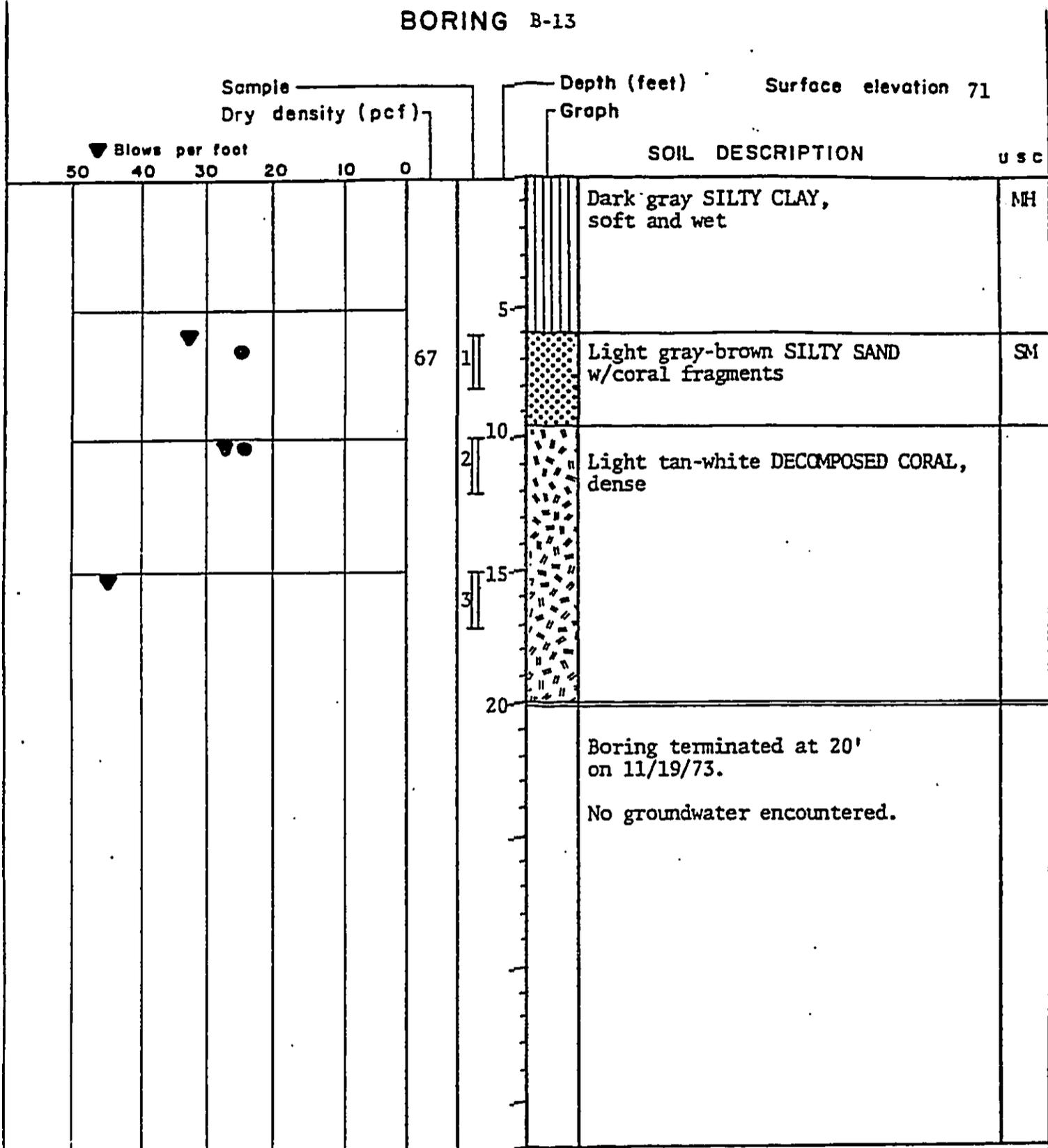
**LOG OF BORING**

Pokai Bay Cluster Homes

**GEOLABS-HAWAII, INC.**

W. O. 500-00 DECEMBER, 1973  
PLATE A-1L

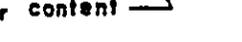
# BORING B-13



● Moisture content

### LEGEND

- I 2.0" O.D. split- spoon sample
- II Undisturbed ring sample
- H Disturbed ring sample
- I Core sample
- P Sampler pushed

- Liquid limit 
- Plastic limit 
- Natural water content 
- Driving energy: lb.wt., drop

**LOG OF BORING**  
Pokai Bay Cluster Homes

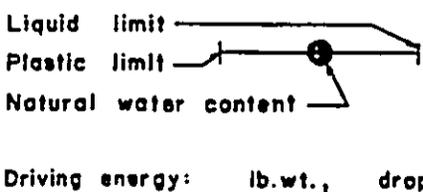
**GEOLABS-HAWAII, INC.**  
W. O. 500-00 DECEMBER, 1973  
PLATE A-1M

# BORING TP-1

Blows per foot							Sample	Depth (feet)	Surface elevation 82			
50	40	30	20	10	0	Dry density (pcf)	Graph	SOIL DESCRIPTION			u s c	
								5	Dark gray, SILTY CLAY, stiff, w/cobbles & boulders.			MH
								10	Tan-white CORAL			
									Excavation terminated at 96'. No groundwater encountered.			

Moisture content **LEGEND**

- I 2.0" O.D. split-spoon sample
- II Undisturbed ring sample
- III Disturbed ring sample
- IV Core sample
- P Sampler pushed



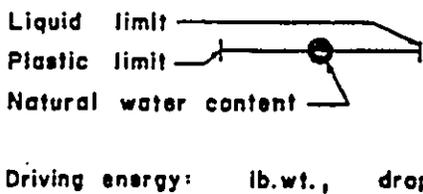
**LOG OF BORING**  
 Pokai Bay Cluster Homes  
**GEOLABS-HAWAII, INC.**  
 W. O. 500-00 DECEMBER, 1973  
 PLATE A-1N

BORING TP-2

Sample						Depth (feet)	Surface elevation 92
Dry density (pcf)						Graph	
Blows per foot						SOIL DESCRIPTION	
50	40	30	20	10	0		U S C
						0 - 10	Dark gray SILTY CLAY, w/cobbles and boulders, moist, medium stiff. MH
						10 - 11	Tan-white CORAL
						11 - 11'	Test Pit terminated at 11'. No groundwater encountered.

Moisture content LEGEND

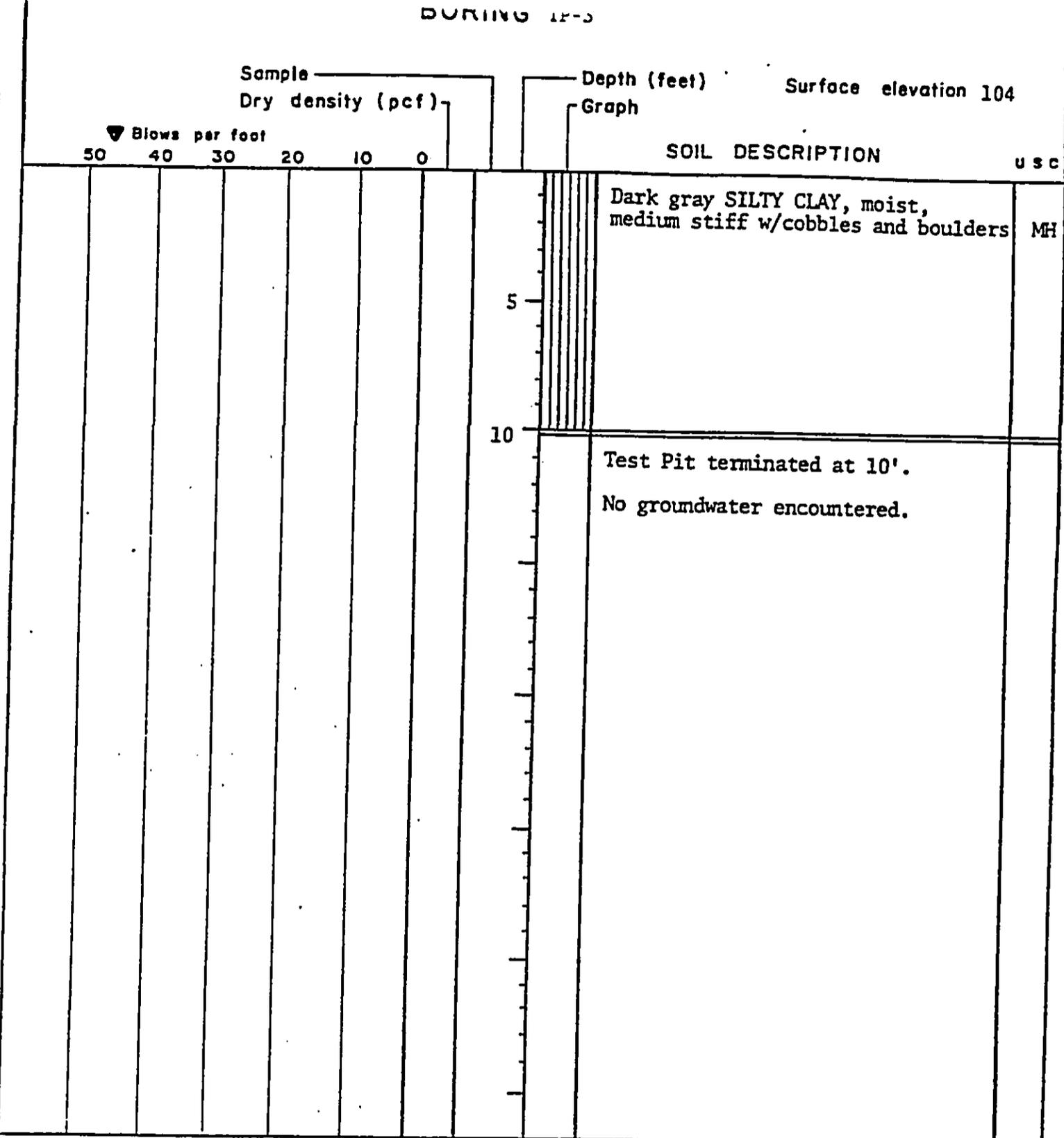
- I 2.0" O.D. split-spoon sample
- II Undisturbed ring sample
- H Disturbed ring sample
- I Core sample
- P Sampler pushed



LOG OF BORING

Pokai Bay Cluster Homes  
**GEOLABS-HAWAII, INC.**  
 W. O. 500-00 DECEMBER, 1973  
 PLATE A-10

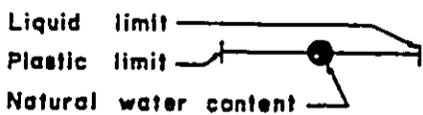
BORING 1P-3



Moisture content

LEGEND

- I 2.0" O.D. split-spcon sample
- II Undisturbed ring sample
- III Disturbed ring sample
- IV Core sample
- P Sampler pushed



Driving energy: lb.wt., drop

LOG OF BORING  
Pokai Bay Cluster Homes

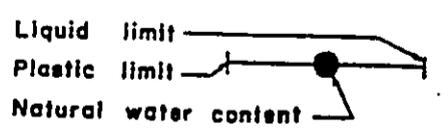
GEOLABS-HAWAII, INC.  
W. O. 500-00 DECEMBER, 1975  
PLATE A-1P

# BORING TP-4

	Blows per foot ▼	Sample Dry density (pcf)		Depth (feet) Graph	SOIL DESCRIPTION	usc
	50 40 30 20 10 0					
				5	Dark gray SILTY CLAY	MH
					Dark brown SILTY CLAY with CORAL fragments	
					Test Pit terminated at 5'. No groundwater encountered.	

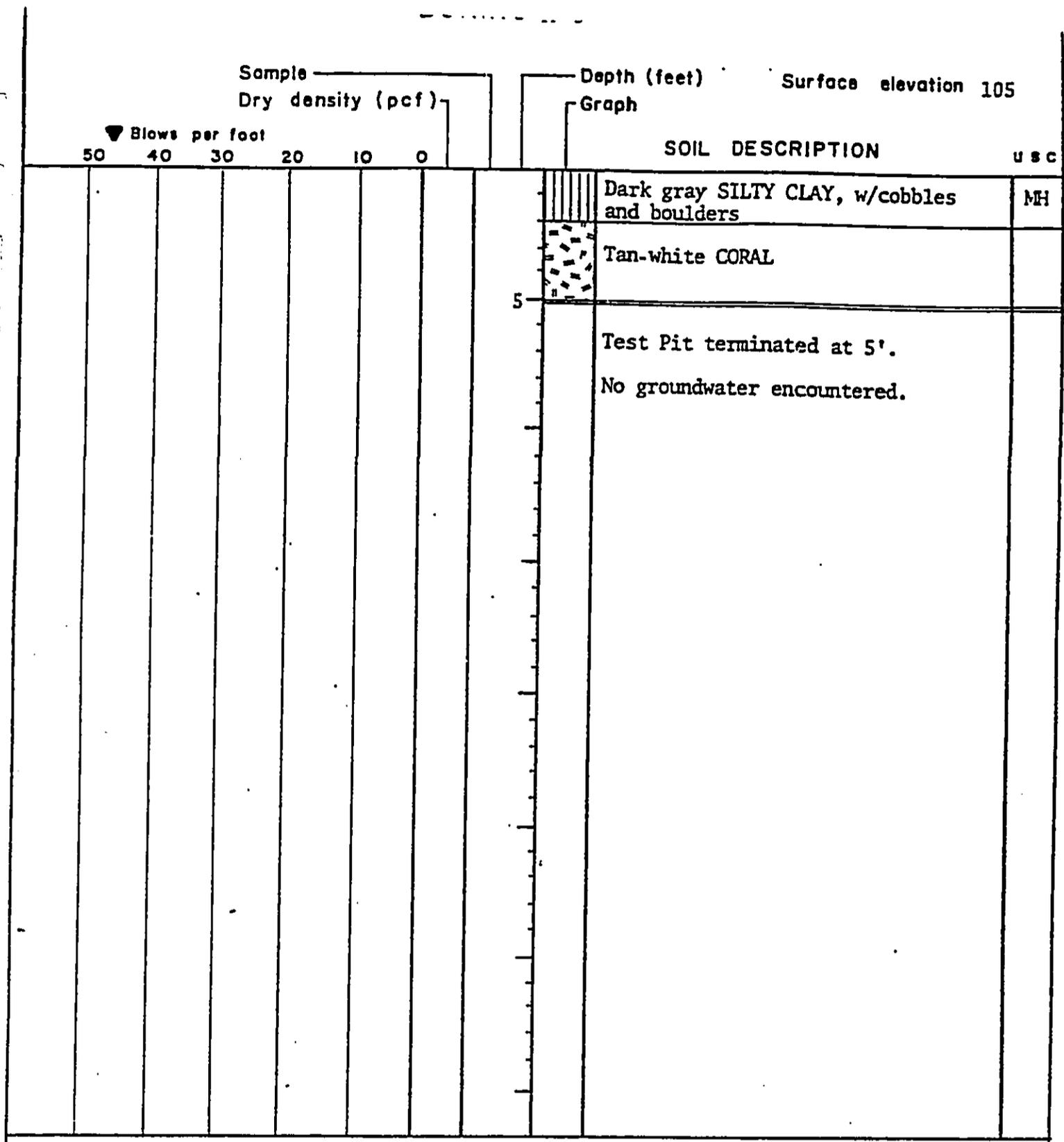
● Moisture content      **LEGEND**

- I 2.0" O.D. split-spoon sample
- II Undisturbed ring sample
- H Disturbed ring sample
- I Core sample
- P Sampler pushed



Driving energy: lb.wt., drop

**LOG OF BORING**  
 Pokai Bay Cluster Homes  
**GEOLABS-HAWAII, INC.**  
 W. O. 500-00    DECEMBER, 1973  
 PLATE A-1Q



Moisture content

**LEGEND**

I 2.0" O.D. split-spoon sample

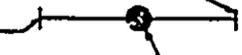
II Undisturbed ring sample

E Disturbed ring sample

I Core sample

P Sampler pushed

Liquid limit 

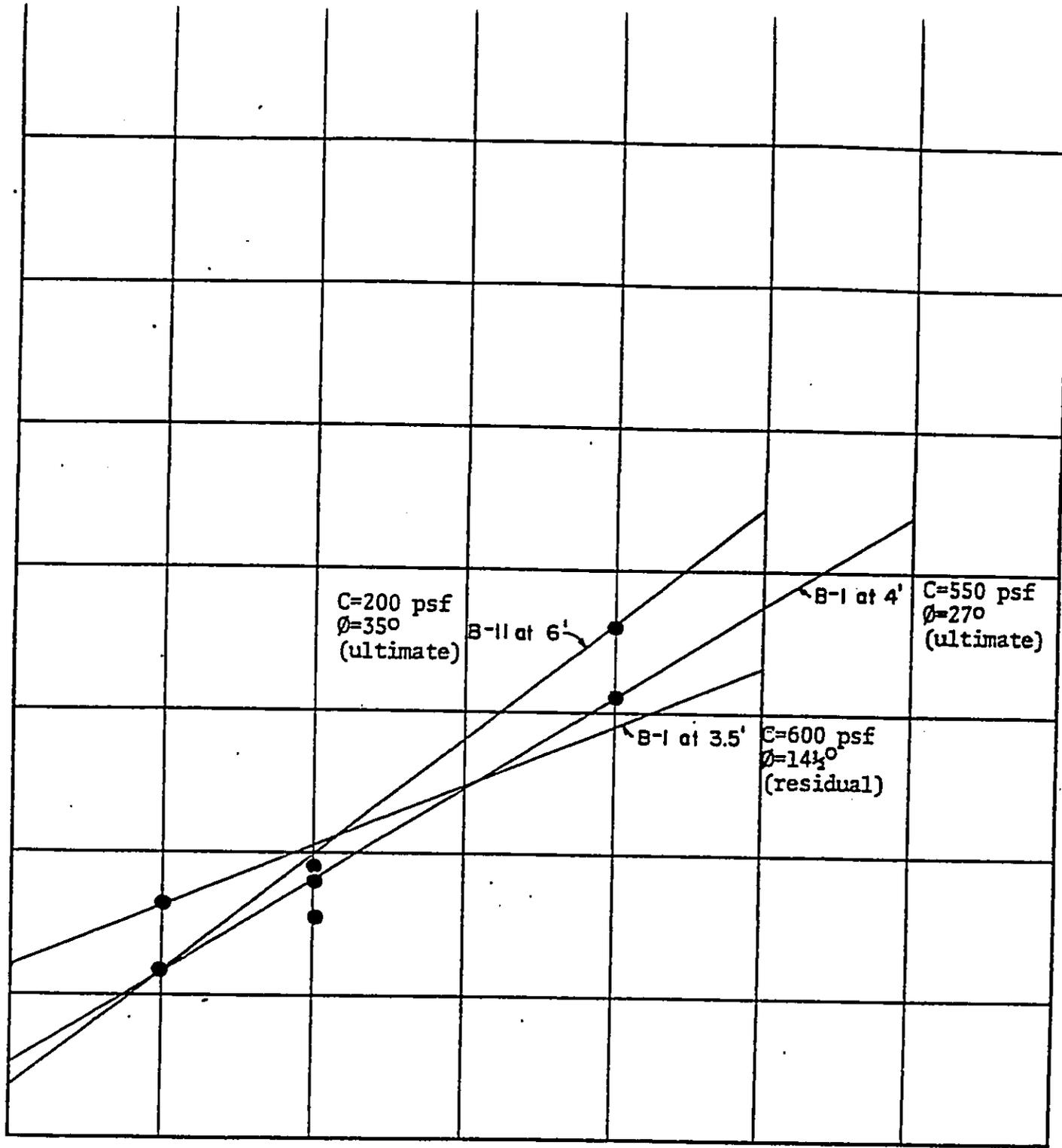
Plastic limit 

Natural water content 

Driving energy: lb.wt., drop

**LOG OF BORING**  
Pokai Bay Cluster Homes  
**GEOLABS-HAWAII, INC.**  
W. O. 500-00 DECEMBER, 1973  
PLATE A-1R

SHEARING STRENGTH



NORMAL PRESSURE

	<b>DIRECT SHEAR TEST</b>	
	<b>GEOLABS-HAWAII, INC.</b> Foundation & Soil Engineering • Geology	
DATE DECEMBER, 1973	W.O. 500-00	

PLATE A-2

DATE DECEMBER, 1973

.W.O. 500-00

JOB Pokai Bay Cluster Homes

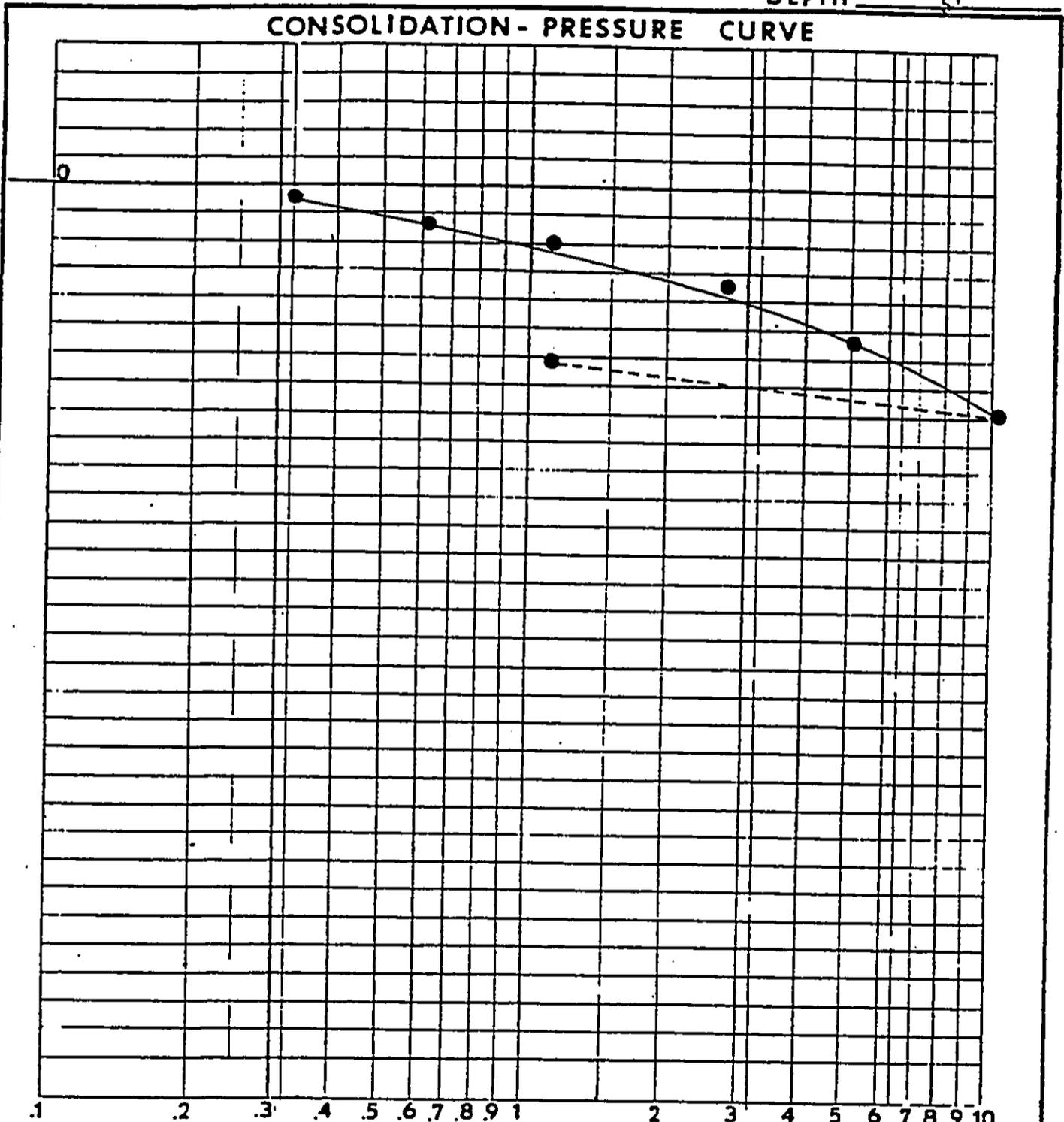
BORING NO. 3

DEPTH 5'

### CONSOLIDATION - PRESSURE CURVE

% SWELL

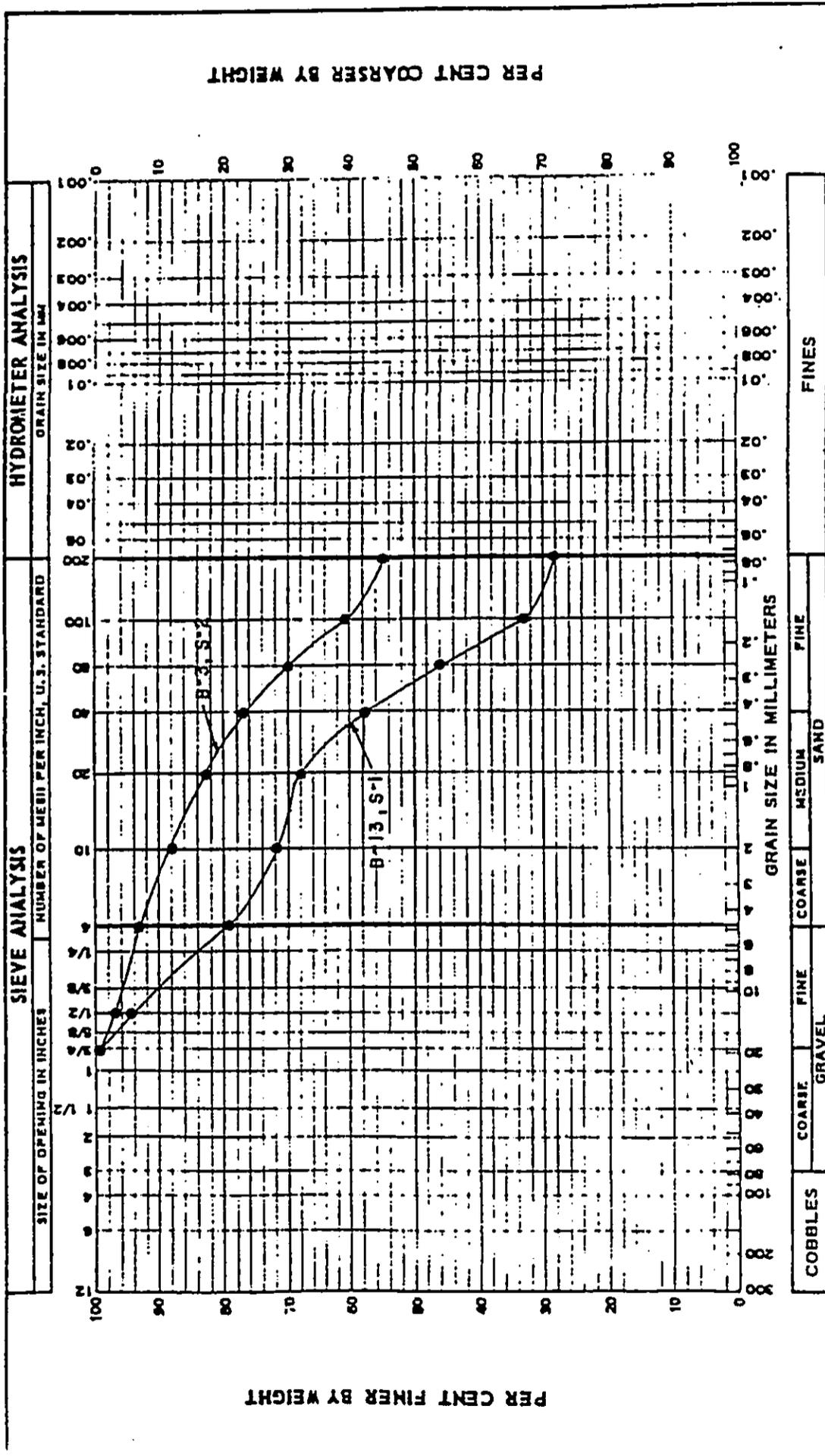
% CONSOLIDATION



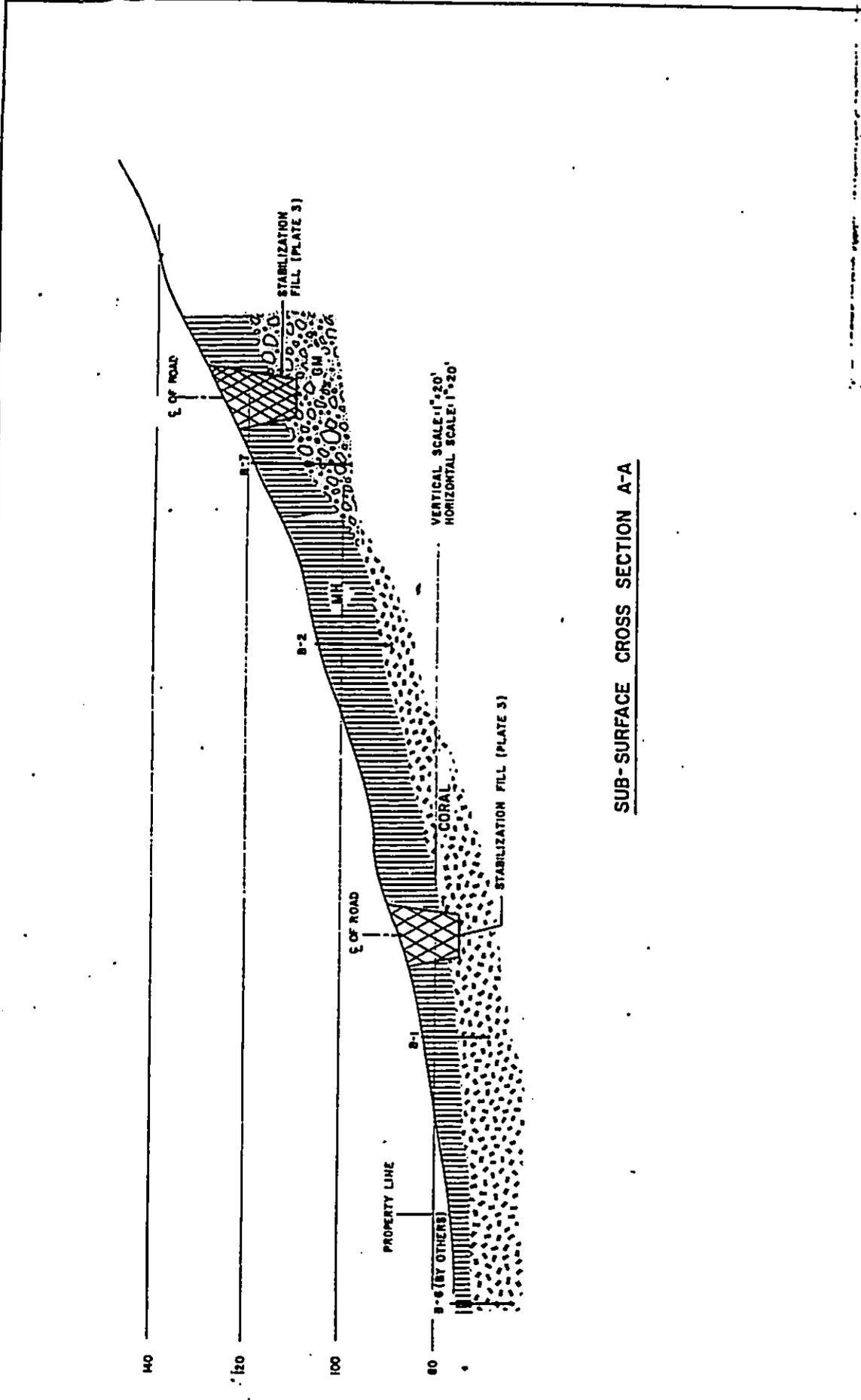
NORMAL PRESSURE, KIPS PER SQ. FT

SOIL TYPE MH  
DRY UNIT WT. 84 PCF  
LIQUID LIMIT 92 %  
PLASTIC LIMIT 49%  
PLASTIC INDEX 43%

**PLATE A-3**



SAMPLE NO.	DEPTH - FT.	U.S.C.	CLASSIFICATION		LL	FL	PI	GRAIN SIZE CLASSIFICATION
			Dark gray silty clay	Light gray-brown sandy silt				
3	11.0	MI	32	25	92	49	43	Pokai Bay Cluster Homes W. O. 500-00 DECEMBER, 1973 <b>GEOLAB-B-HAWAII, INC.</b> <small>FOUNDATION ENGINEERING • SOIL ENGINEERING • DRAINAGE</small>
3	6.0	SM						



SUB-SURFACE CROSS SECTION A-A

		<b>GEOLAB-B-HAWAII, INC.</b> Foundations & Soil Engineering • Geology	
		DATE DEC. 1973	DRAWN BY CC
SCALE 1"=20'		WO 500-00	





DOCUMENT CAPTURED AS RECEIVED

**GEOLOGIC AND SOIL INVESTIGATION  
PROPOSED POKAI BAY CLUSTER HOMES, UNIT II  
AND  
POKAI BAY ESTATES, UNIT II  
WAIANAE, OAHU, HAWAII**

**W.O. 500-10      FEBRUARY 13, 1974**

**FOR  
HEBB AND NARODICK**

**C.W. ASSOCIATES INC.  
DBA GEOLABS-HAWAII  
2006 KALIHI STREET  
HONOLULU, HAWAII 96819**



Geologic and Soil Investigation  
Proposed Pokai Bay Cluster Homes, Unit II  
and  
Pokai Bay Estates, Unit II  
Waianae, Oahu, Hawaii  
Tax Map Key: 8-6-01: 11

SUMMARY OF RECOMMENDATIONS

The cluster townhouse development site is a potential creep zone that should be stabilized against downhill movement. Stabilization fills, extending down to competent material, will be required. The depth of these fills will be on the order of 15 feet. Post and beam construction is recommended for townhouse structures with a bearing value of 2500 psf.

The subdivision residences should be placed on a three foot minimum cap of non-expansive soils. Slab-on-grade construction may be used.

INTRODUCTION

This report presents the results of our geologic and soils investigation for the proposed development located at Pokai Bay, Oahu, Hawaii.

The scope of this study was to investigate geologic and sub-surface conditions, evaluate over-all site stability and determine foundation requirements for the proposed residences.

### PROJECT CONSIDERATIONS

It is presently planned to construct about 21 single family residences on the lower portion of the property. Approximately 20 townhouse cluster units are planned for the upper portion of the property. It is our understanding that slab-on-grade construction will be used for the subdivision units, and post and beam construction for the townhouse units. The townhouses will generally be two-story residences stepped down on hillside lots. Building loads for the townhouses will have column loads on the order of 10 kips. Wall loads for the residential units will be on the order of 1 kip per lineal foot. Maximum cuts and fills on the order of 10 vertical feet will be required to prepare the site for construction.

### SITE CONDITIONS

#### Surface

The proposed development site comprising approximately 15 acres is located on the southern slopes of Puu Paheehee Ridge. On the subdivision area the slopes are generally flat, approximately 5%. The cluster portion of the site varies from about 10% on the southerly portion, ranging as steep on the upper portion of the site as 40%. The entire area is covered with indigenous growth of trees and bushes. Numerous large rock outcrops were observed throughout the upper portion of the site.

Our borings revealed that the site is immediately underlain by a dark brown adobe clay that varies in depth from about 2 to 25 feet. Weathered and unweathered basalt boulders varying in size from a few inches to several feet in diameter are found throughout this clay. These deposits were eroded down from the ridge of weathered basalt. Based on close examination of the undisturbed samples obtained from our borings and the results of our investigation from the adjacent site, it is our opinion that this upper mantle of colluvium is in a state of potential creep or very slow downward movement, especially in the upper cluster development site.

In the lower slope area, generally below elevation 120, an approximately 4 foot thick layer of a clayey sandy silt underlies the adobe material. Underlying this silt material are the coral reef materials. The adobe is approximately 5 feet thick at the upper end of the subdivision area. In the upper portion of the site the mantle of adobe colluvium becomes thicker, generally up to 25 feet in depth. Underlying this material is a decomposed basalt. The upper portion of this decomposed basalt is a light brown clayey silt that grades with more decomposed rock. The depth of this decomposed basalt material does not appear to be uniform throughout the site and will vary depending upon the

weathering intensity of the local area and joints and fractures of the parent rock. Bedrock can be expected at considerable depths, perhaps over 80 feet below the existing upper surface.

Groundwater was not encountered in any of our borings. However, this does not discount the possibility of sub-surface drainage taking place in the upper colluvium during the rainy seasons.

#### DISCUSSION AND RECOMMENDATIONS

##### General

It is our opinion that the site is suitable for the construction of the proposed single family residences and cluster townhouses. However, certain measures must be taken to insure the overall stability of the site against creep. The cluster townhouse unit site, it appears, will be more susceptible to creep than the lower, more level, subdivision area. However, the upper portion of the subdivision site should still be stabilized against an overall downward transfer of creep forces from the adobe materials.

It is recommended that post and beam construction be utilized for the townhouse construction.

Slab-on-grade construction may be used for the subdivision residences if certain precautions are taken to minimize the effect of the expansive adobe soils.

## Foundations

### Townhouses

Exterior footings should be founded a minimum of 24 inches and interior footings a minimum of 18 inches below the final adjacent grade. If footings are founded in coral or granular materials then these requirements may be reduced to 18 and 12 inches respectively. Continuous footings should be reinforced with a minimum of two No. 4 reinforcing bars placed at the top and bottom of footings. A bearing value of 2500 pounds per square foot may be used for continuous and isolated footings bottomed in fill or in natural grounds. Continuous footings should have a minimum width of 12 inches. The bearing value may be increased by one third when considering wind and seismic loads. A minimum set-back distance of 4 feet should be maintained from the outer edge of the footing measured horizontally to the slope face.

### Single Family Residences

It is our opinion that the subdivision residences be supported on a minimum 3 foot thick cap of non-expansive materials. At the lower portion of the subdivision the thickness of the expansive material may be less than 3 feet, thus requiring less over excavation. By using the non-expansive soil cap footings may be founded a minimum

of 12 inches below the final adjacent grade. Continuous footings should be reinforced with a minimum of one No. 4 reinforcing bar placed at the top and bottom of footings. A bearing value of 2000 pounds per square foot should be used for continuous and isolated footings bottomed in a non-expansive material. Continuous footings should have a minimum width of 12 inches. This bearing value may be increased by one-third when considering wind and seismic loads.

#### Slabs-on-Grade

##### Townhouses

It is our opinion that concrete slabs-on-grade should be avoided wherever possible in townhouse buildings but they may be utilized for garage floors. However, should the townhouses be constructed on a minimum of 3 feet of non-expansive soils then it may be the option of the developer to use slabs-on-grade for residences. These slabs-on-grade should be provided with 4 inches of granular material and a vapor barrier. Where garage slabs are to be used without the non-expansive soil cap then they should be structurally separated from footings and underlain by a minimum of 6 inches of granular material and reinforced with 6 x 6 No. 6 welded wire mesh.

Single Family Residences

If a minimum 3 foot cap of non-expansive materials is provided the slabs-on-grade may be placed on 4 inches of granular material. In areas where dampness in the floor slab would be undesirable or where moisture susceptible floor coverings are to be used, a plastic membrane should be placed over the granular material.

Lateral Pressures

It is our opinion that retaining walls parallel to contours should be avoided wherever possible, however, if they are absolutely required then it is recommended an equivalent fluid pressure of 100 pounds per square foot be used for the design. Retaining walls acting perpendicular to the existing contours may be designed to resist lateral loads with an equivalent fluid pressure of 45 pounds per square foot. Passive earth pressures may be designed as an equivalent fluid having a density of 250 pounds per cubic foot. An allowable coefficient of friction between soil and concrete of 0.35 may be used. The backfill immediately against the retaining wall should be an open-graded, compacted granular material. Weep holes or a subsurface drainage system should be provided to prevent the buildup of excessive pore pressures behind the wall.

### Slope Stability

Based on the results of our field investigation and laboratory testing this project site does not appear to be as critical as Unit I of the Cluster Home Development. This is due to the fact that most of the development will be on the lower and less steep slopes. However, the upper layer of colluvial adobe clay still has the potential for creep. It is our recommendation that preventative measures be taken to eliminate this potential downslope movement. It will also be necessary because residential development on the land will alter the equilibrium of the existing slope. This will be done by:

- 1.) Landscape watering that will increase the amount of water entering the colluvium and eventually reduce its shear strength and overall stability.
- 2.) Concentration of stresses due to construction of fills, cuts, walls and foundations may cause settlements or lateral movements that will effect cracking and allow water to enter the creep mass.
- 3.) Subsequent movements in the creep zone may snap utility lines and hence will supply substantial increased amounts of water into the mass to accelerate its downward motion.

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February 13, 1974

The preventive alternate methods to prevent downhill movement and stabilize the creep zone were discussed with the client and his consultants for Unit I. It is our opinion that the method arrived upon during these discussions will be adequate and feasible for the second unit. It is therefore our opinion that partial removal of the colluvium be done in the area of the roadways and this material replaced with a stabilization fill to prevent further downward movement of the potential creep zone. The final layout of the townhouses were not available during this investigation. The precise location and extent of the stabilization fills will have to be determined during grading operations. It is our understanding that a roadway will be constructed along the same alignment as the upper roadway of Unit I. This will be the most feasible location for the stabilization fill. A generalized cross-section of subsurface conditions as shown on Plate 2 indicates the position of this stabilization fill. If partial removal and replacement with a 3 foot non-expansive soil cap is provided below the stabilization fill, then only one stabilization fill may be required. If not, then a stabilization fill may be required along the lower roadway. The over-excavation of the stabilization fill should extend a minimum of 2 feet into the existing decomposed basalt or coral sands that will be found beneath the creep zone in the area of the roadway. The details of the stabilization key is shown on Plate 3, Stabilization Key. The general downhill movement of the slide mass will be eliminated

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February 13, 1974

or reduced significantly by the construction of this stabilization fill. However, some movements within the creep zone above the keys may still take place, therefore a minimum of 3 feet of non-expansive fill may have to be placed on the upper lots above the road key to act as a surcharge that will consolidate the underlying creep materials and subsequently increase its shear strength. The need and location of these surcharge areas should be determined during the grading operation. Excess rock or boulders may be used in the lower portion of the stabilization fill if it is placed in the manner recommended for disposal for oversize rock and boulders.

#### Rock Disposal

Boulders and rock larger than 8 inches in diameter should be windrowed in the following manner and as illustrated on Plate 4. The windrows should not be over 5 feet in width and not closer than 10 feet between windrows. The height of the windrows should not exceed 4 feet. The maximum size rock acceptable within the windrows should not exceed 4 feet in the greatest dimension. Rock over this size should be broken down or disposed of in areas other than the fill. The resultant rock configurations in the windrow will offer considerable void space between the rocks. Granular coral material should be used for fill along and over the rock windrows, thoroughly watered and consolidated to insure that all void spaces between the rocks are filled with soil. Successive lifts may be made if the

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fill is sufficiently deep. However, the windrows should be staggered horizontally and have a vertical distance of at least 2 feet between the top of the lower windrow and the bottom of the next windrow. Rock should not be placed within 10 feet of finished pad grades or above the lowest utility lines in roadways. All boulder disposal should be done under the constant supervision of the soils engineer to assure that these recommendations are followed.

#### Site Preparations

The site shall be cleared of all deleterious and organic matter and removed from the site. In areas to receive fill the ground should be scarified a minimum depth of 12 inches. In areas where desiccation cracks extend to further depths, the scarification will have to extend to the depth of the desiccation crack. The scarified surface shall then be brought to near optimum water content and compacted to a minimum density of 90% of maximum dry density as determined by ASTM D 1557-72T. Fill shall then be placed in horizontal 6 inch maximum lifts and also compacted to a minimum of 90% of maximum density. Where the natural ground slope is 5 horizontal to 1 vertical or steeper, the fill material should be keyed and benched into firm bedrock or soil as approved by the soils engineer. Due to the expansive nature of the site clay soils, they may be compacted to a minimum of 85% of maximum

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February 13, 1974

density as determined by ASTM D 1557-72 T. All other materials should be compacted to a minimum of 90%. The expansive clay soils will be unsuitable for trench backfill when using jetting compaction methods. These soils will require mechanical compaction in thin lifts. The coral material may be jetted or flooded, provided the lift does not exceed 18 inches in thickness. All imported fill should be approved by the soils engineer prior to use in fill areas. All grading operations should be under the direct supervision of the soils engineer.

#### Pavement Design

Based on our experience with similar site materials, the following pavement sections can be considered for preliminary planning:

Coral Areas - 2" A.C.

6" Base

Silty Clay (Adobe) - 2" A.C.

6" Base

18" Select Material

The final pavement sections should be determined during grading operations by sampling actual subgrade materials for CBR Tests.

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Design Review

The grading and utility plan should be forwarded to the soils engineer for review and comments prior to finalizing design. Due to the moisture sensitivity of the upper clay soils it is recommended that flexible joints be used on all utility pipes.

Long reaches of lines should, if possible, be perpendicular to the contours.

It is planned to construct an interceptor ditch along the upper property line. The exact location or type of ditch is not known at this time. The ditch should also be designed as a boulder catchment to prevent large rock from reaching the lower developed area. The natural dense vegetation can also act as a boulder catchment. The areas above the developed zone should be left in the natural state where feasible. After this location has been determined, this firm should be consulted regarding the lining of the ditch.

Should you have any questions or need any additional clarification regarding this report, please do not hesitate to contact us.

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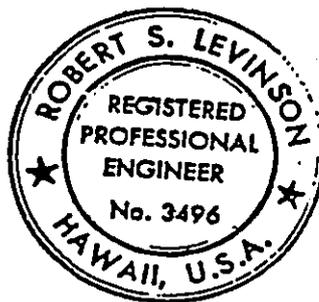
The following plates and Appendix are attached and complete this report:

- |          |   |  |
|----------|---|--|
| Plate 1  | - | Site Plan                                |
| Plate 2  | - | Cross-Section                            |
| Plate 3  | - | Stabilization Key                        |
| Plate 4  | - | Rock Disposal Detail                     |
| Appendix | - | Field Exploration and Laboratory Testing |

Respectfully submitted,  
GEOLABS-HAWAII, INC.

*Robert S. Levinson*

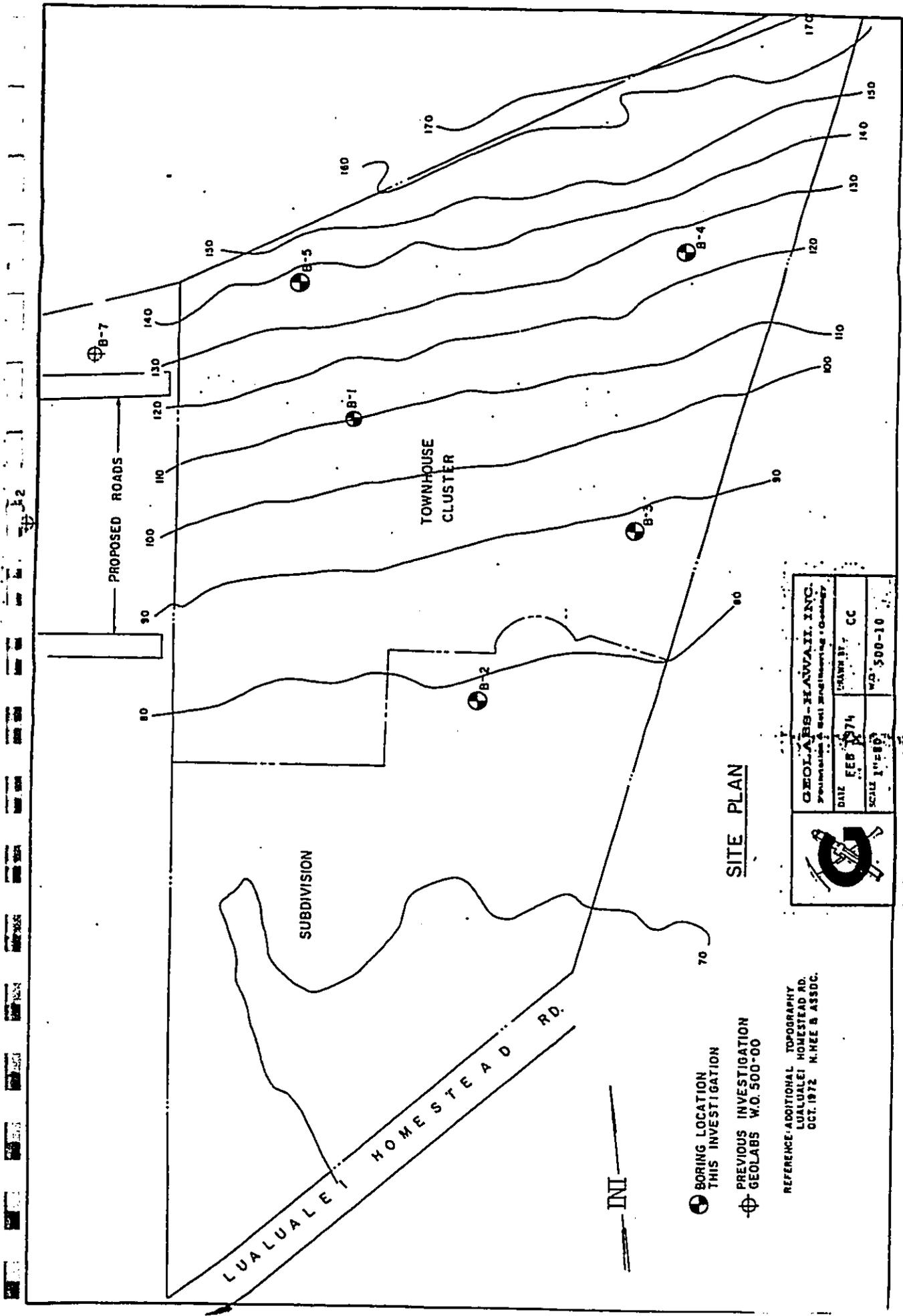
Robert S. Levinson  
Chief Engineer



RSL/pg







**SITE PLAN**

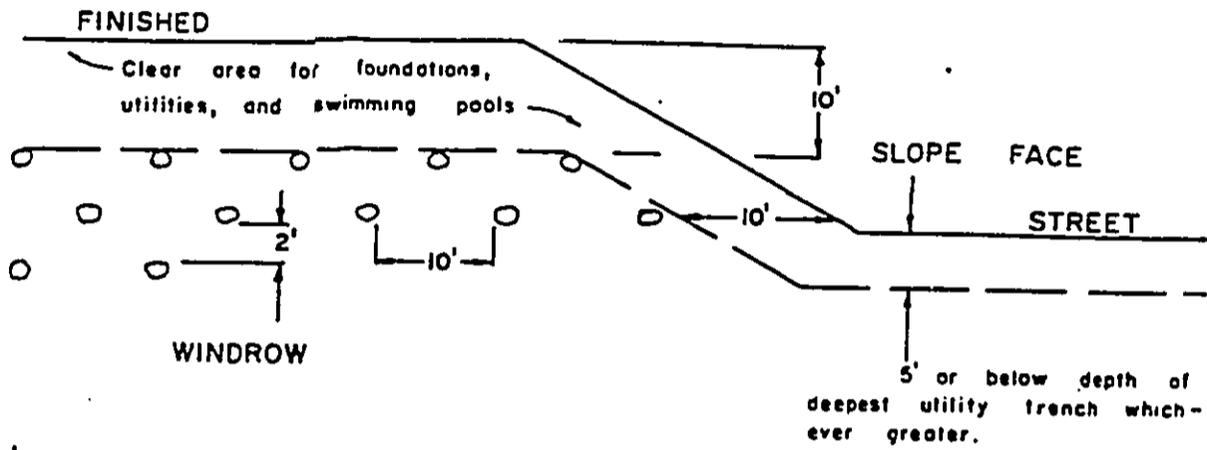
● BORING LOCATION  
 THIS INVESTIGATION  
 ⊕ PREVIOUS INVESTIGATION  
 GEOLABS W.O. 500-00

REFERENCE: ADDITIONAL TOPOGRAPHY  
 LUALUALE HOMESTEAD RD.  
 OCT. 1972 N. HEE B ASSOC.

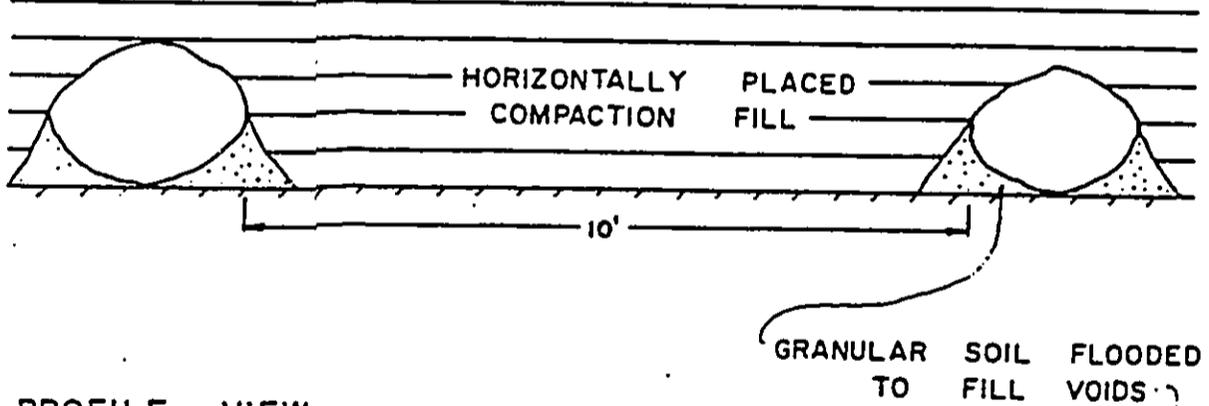
		<b>GEOLABS-HAWAII, INC.</b> <small>Professional &amp; Civil Engineering - Geology</small>	
		DATE FEB 1974	DRAWN BY CC
		SCALE 1"=80' W.O. 500-10	

# ROCK DISPOSAL DETAIL

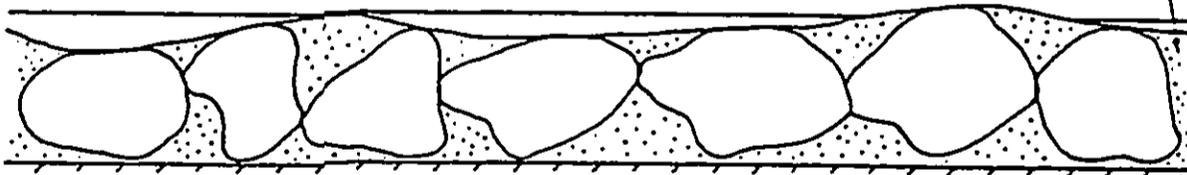
## BUILDING



## TYPICAL WINDROW DETAIL (edge view)



## PROFILE VIEW



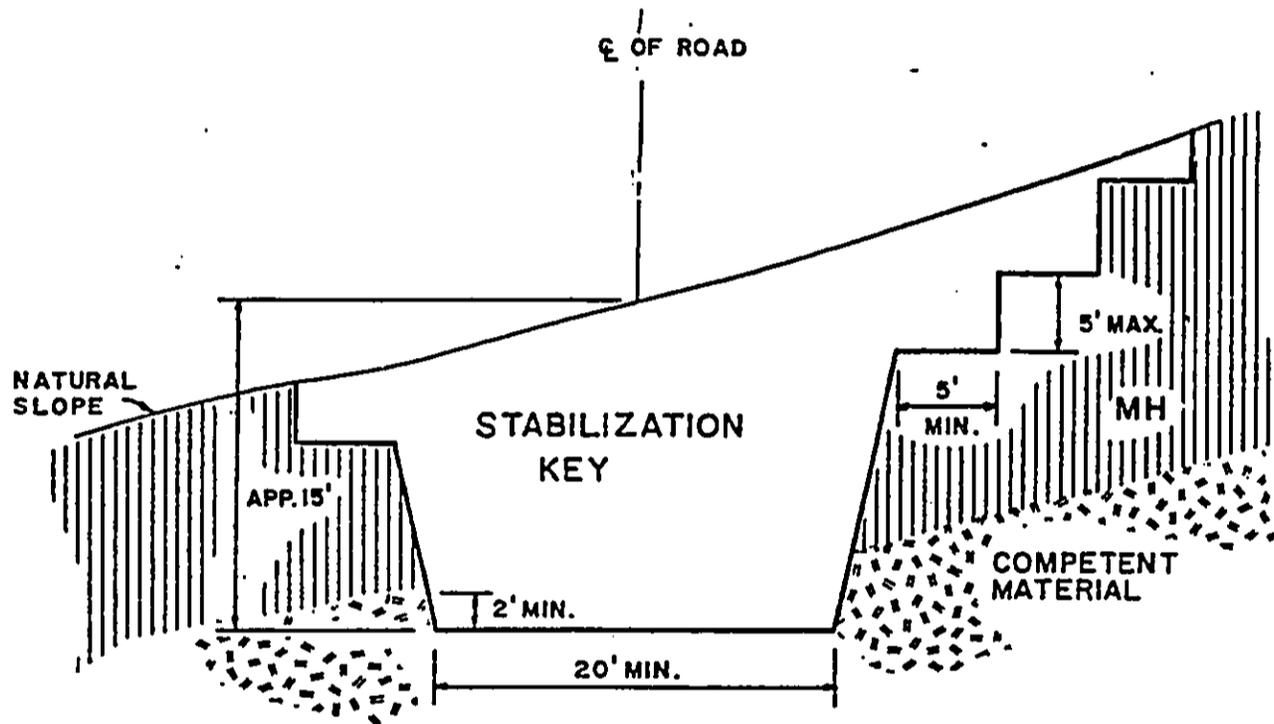
**GEOLABS-HAWAII, INC.**  
 Foundation & Soil Engineering - Geology

DATE FEB. 1974

DRAWN BY LJC

SCALE NONE

W.O. 500-10



STABILIZATION KEY

- NOTE: 1. SIDE SLOPES OF KEY EXCAVATION WILL BE CUT TO STEEPEST STABLE CONDITION.
2. KEY SHOULD EXTEND A MINIMUM OF 2 FT. INTO COMPETENT MATERIAL
3. KEY MATERIAL SHOULD BE NON-EXPANSIVE AND COMPACTED TO A MINIMUM OF 90% OF MAXIMUM DENSITY.



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Foundation & Soil Engineering • Geology

DATE	FEB. 1974	DRAWN BY	CC
SCALE	1" = 10'	W.O.	500-10

## A P P E N D I X

### FIELD EXPLORATION

The subsurface soil conditions at the site were explored by drilling 5 test borings. The borings were drilled utilizing truck-mounted rotary auger equipment with rock coring attachments. The test pits were dug with a back hoe. The depths of the borings ranged from 10½ to 45 feet below the existing ground surface. The locations of the borings are shown on the Site Plan in the text of this report. The soils and rock were classified by visual and textural examinations in the field by our field engineer who continuously supervised the drilling operations. The classifications were verified by inspection and testing in the laboratory. All soils were classified in accordance with the Unified Soil Classification System. The description of rocks is based on local geologic terminology. Graphical representations of the soils and rock encountered are presented on the Boring Logs, Plates A-1A through A-1E.

Soil samples were obtained by driving a 2.4 inch diameter or a standard penetration sampler with a 140 pound hammer free falling a distance of 30 inches. The blow counts to drive the sampler are also shown on the Log of Borings at the appropriate sample depths.

**GEOLABS - HAWAII, INC.**

February 13, 1974

### LABORATORY TESTING

To provide data for evaluating the strength characteristics of the soil encountered, an unconfined compression test was performed on a selected sample. The result of this test is presented on the Log of Boring, Plate A-1A. Comparisons of the upper silty clay material were made with the test results from Unit I.

In-place moisture and density determinations were made on selected samples. Atterberg Limits were performed to aid in the classification of the site soils. The results of these tests are presented on Log of Borings at the appropriate sample location.

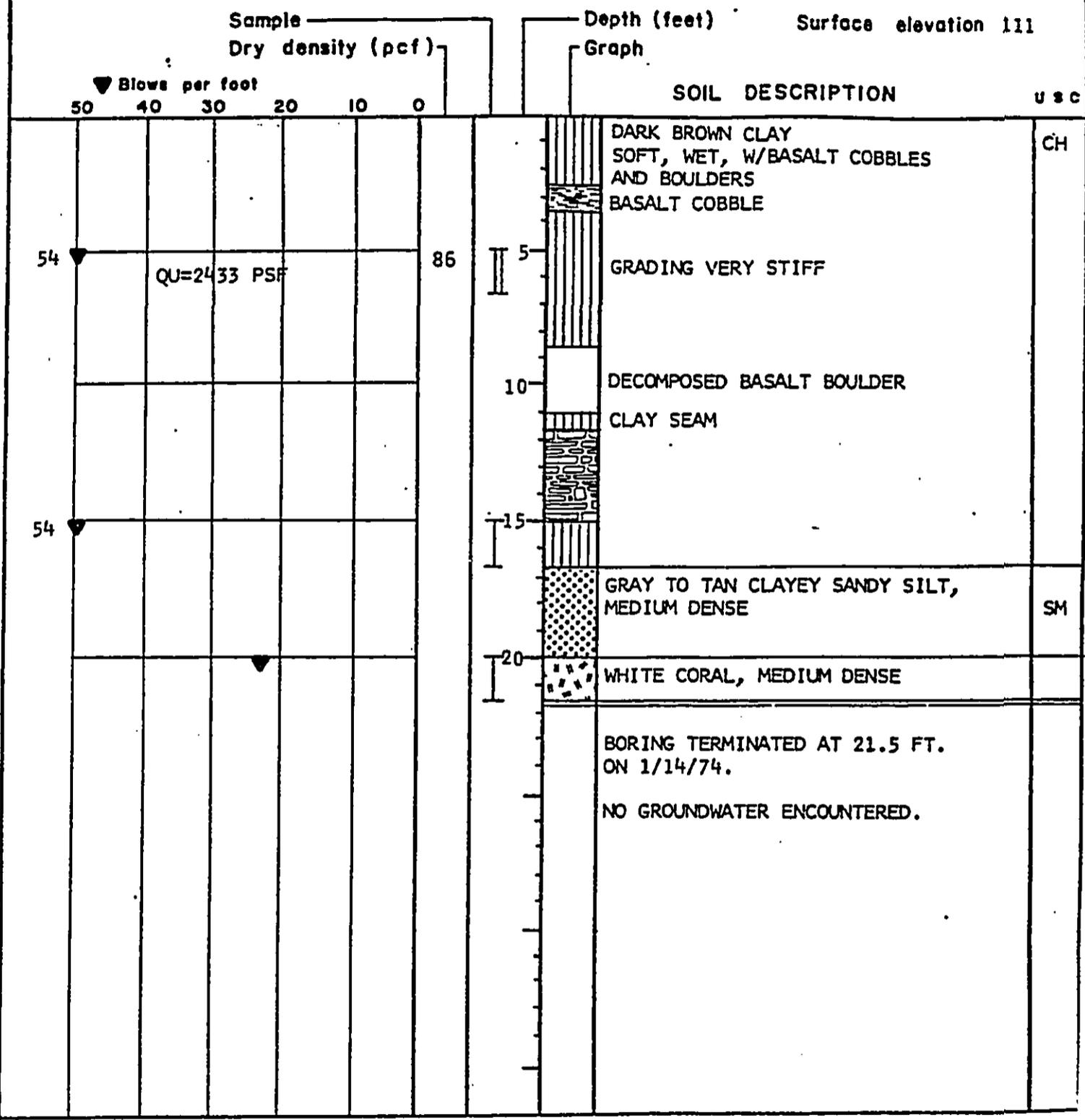
Grain size analyses including hydrometer analysis were performed on two representative samples of the site soils and the results of this test is illustrated on Plate A-2.

The following Plates are included and complete this Appendix:

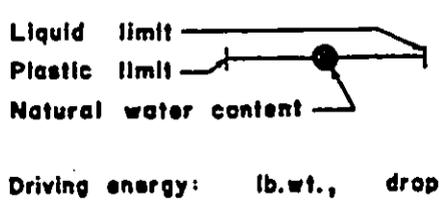
Plate A-1A	-	Log of Boring 1
Plate A-1B	-	Log of Boring 2
Plate A-1C	-	Log of Boring 3
Plate A-1D	-	Log of Boring 4
Plate A-1E	-	Log of Boring 5
Plate A-2	-	Grain Size Analysis

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# BORING 1

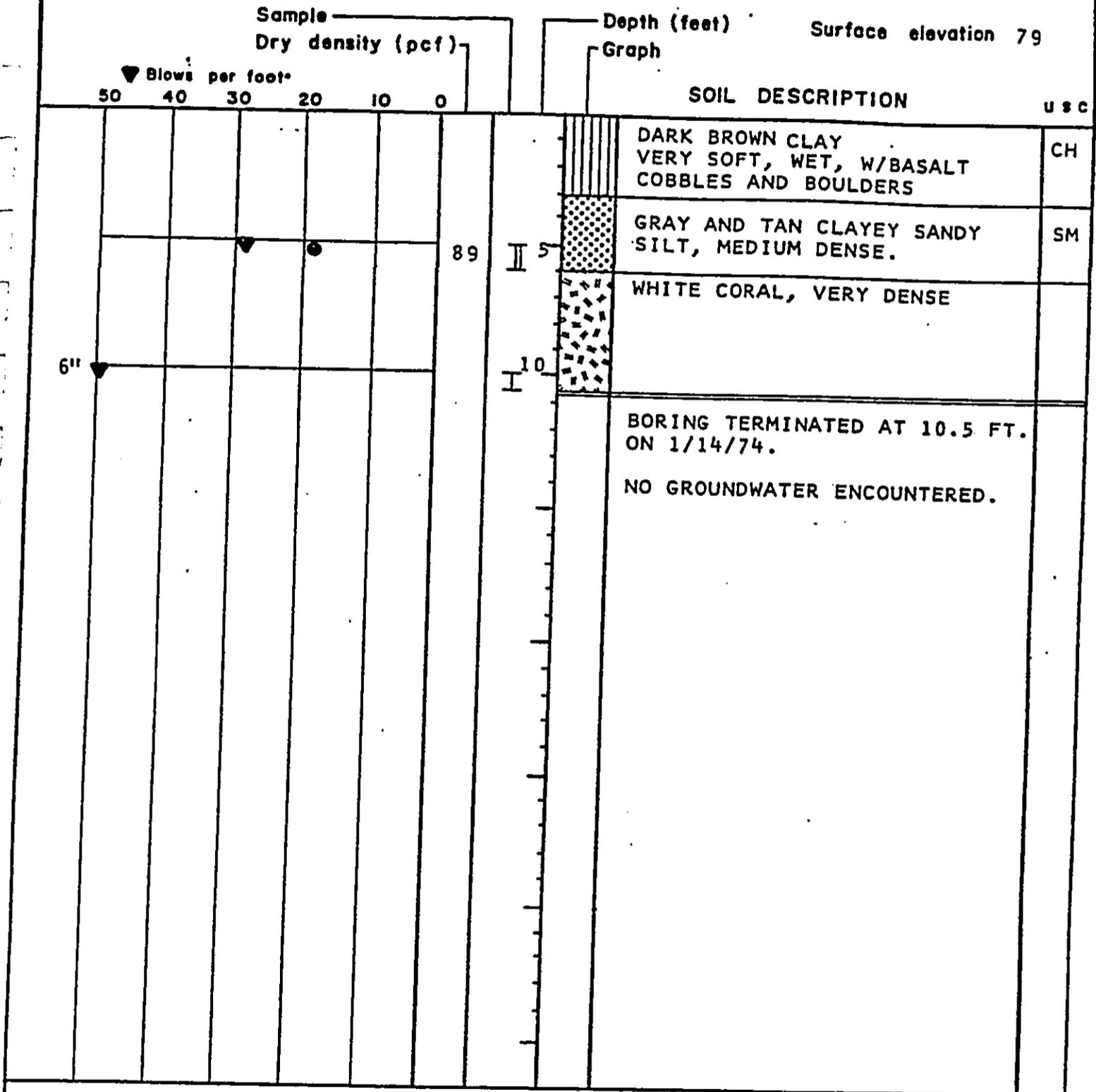


- Moisture content
- LEGEND**
- I 2.0" O.D. split-spoon sample
  - II Undisturbed ring sample
  - III Disturbed ring sample
  - I Core sample
  - P Sampler pushed



**LOG OF BORING**  
 POKAI BAY CLUSTER HOMES  
**GEOLABS-HAWAII, INC.**  
 FEBRUARY, 1974 W.O. 500-10

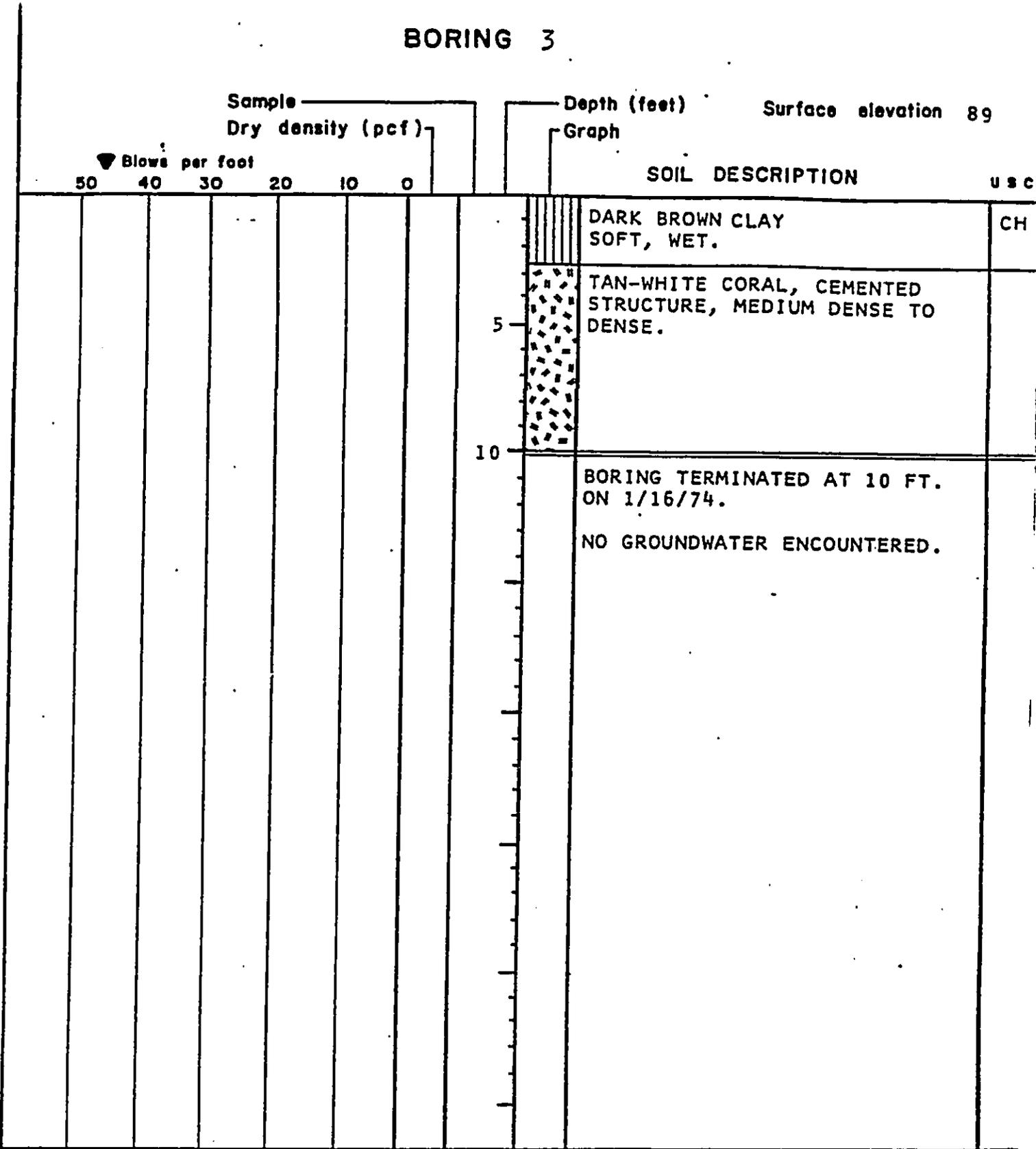
# BORING 2



- LEGEND**
- Moisture content
  - I 2.0" O.D. split-spoon sample
  - II Undisturbed ring sample
  - III Disturbed ring sample
  - IV Core sample
  - P Sampler pushed
  - Liquid limit 
  - Plastic limit 
  - Natural water content 
- Driving energy: lb.wt., drop

**LOG OF BORING**  
 POKAI BAY CLUSTER HOMES  
 GEOLABS-HAWAII, INC.  
 FEBRUARY, 1974 W.O.500-10

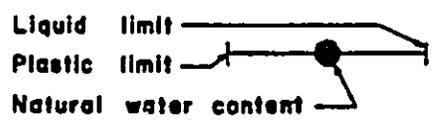
# BORING 3



● Moisture content

### LEGEND

- I 2.0" O.D. split- spoon sample
- II Undisturbed ring sample
- III Disturbed ring sample
- I Core sample
- P Sampler pushed

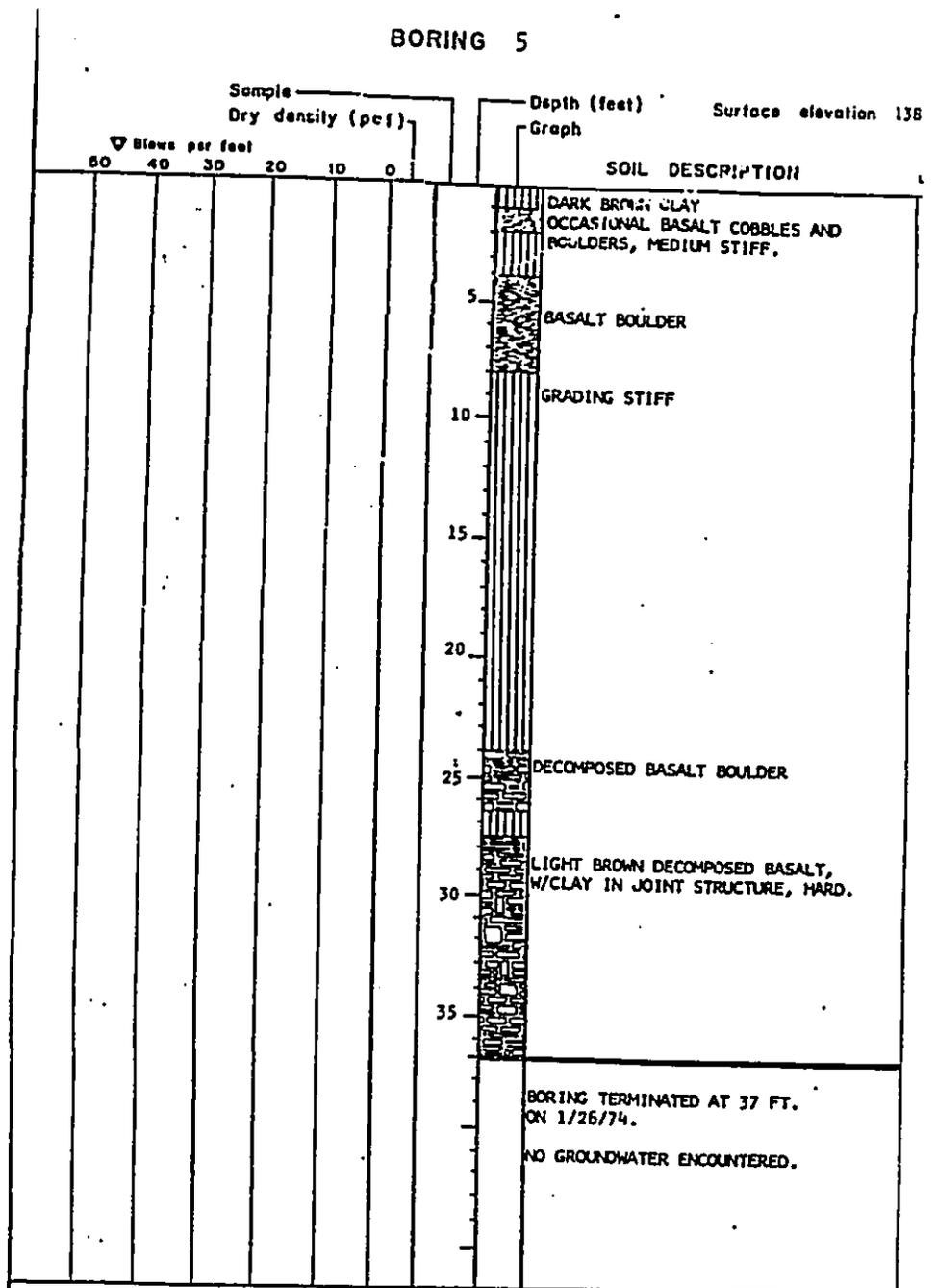


## LOG OF BORING

POKAI BAY CLUSTER HOMES  
GEOLABS-HAWAII, INC.

Driving energy: lb.wt., drop FEBRUARY, 1974 W.O.500-10

# BORING 5

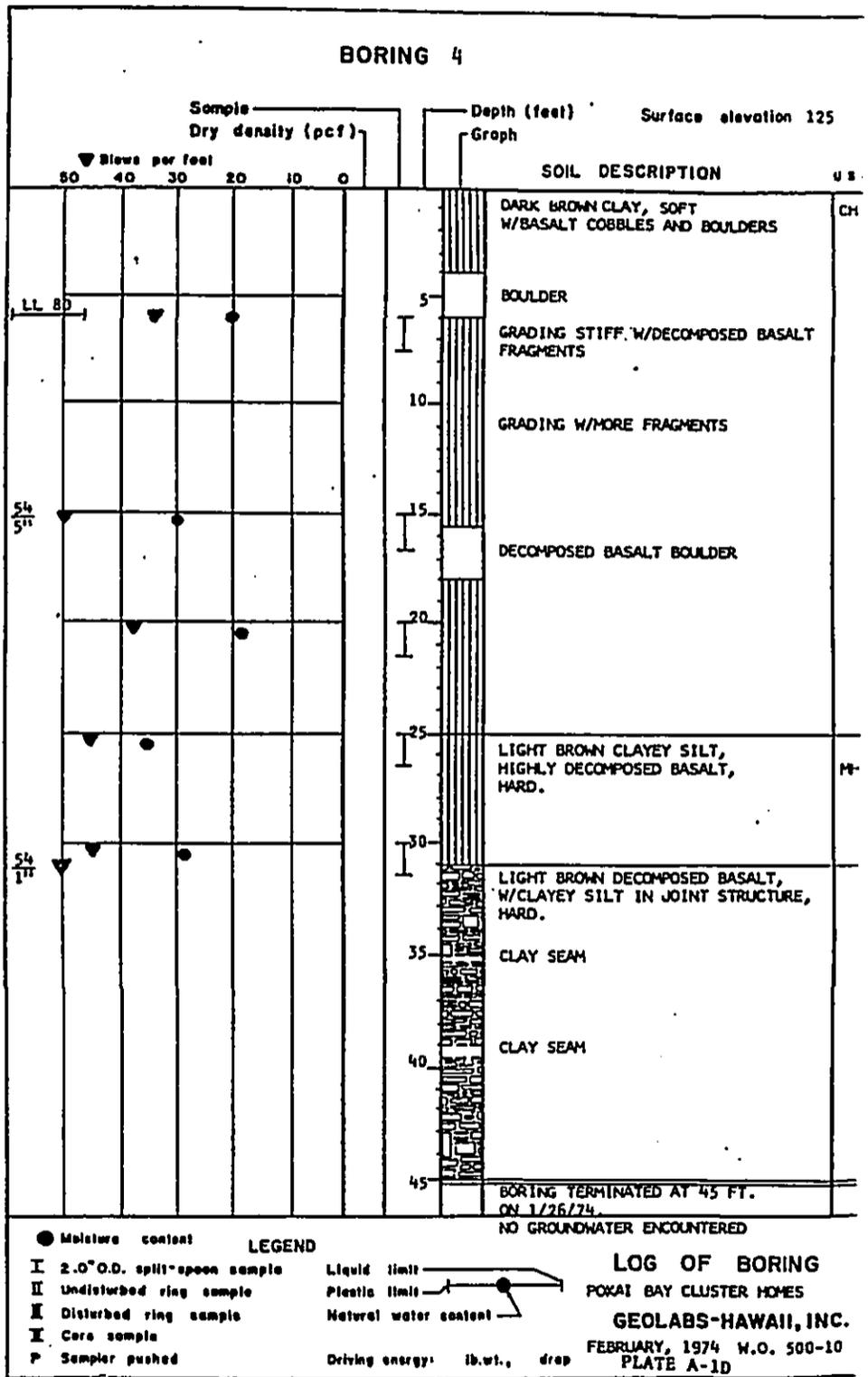


**LEGEND**

- Moisture content
- I 2.0" O.D. split-needle sample
- II Undisturbed ring sample
- III Disturbed ring sample
- IV Core sample
- P Sampler pushed

Liquid limit 
  
 Plastic limit 
  
 Natural water content 
  
 Driving energy: lb. wt., drop

**LOG OF BORING**  
 POKAY BAY CLUSTER HOMES  
 GEOLABS-HAWAII, INC.  
 FEBRUARY, 1974 W.O. 500-11  
 PLATE A-1E



**Appendix B**  
**Geologic and Soils**  
**Investigation**

**GEOLOGIC AND SOIL INVESTIGATION  
PROPOSED POKAI BAY CLUSTER HOMES  
WAIANAE, OAHU, HAWAII**

**W.O. 500-00      DECEMBER 26, 1973**

**FOR**

**HEBB & NARODICK CONSTRUCTION CO.**

**C.W. ASSOCIATES INC.  
DBA GEOLABS-HAWAII  
2006 KALIHI STREET  
HONOLULU, HAWAII 96819**

Geologic and Soil Investigation  
Proposed Pokai Bay Cluster Homes  
Waianae, Oahu, Hawaii  
Tax Map Key: 8-6-01:43

SUMMARY OF RECOMMENDATIONS

Our study revealed the site to be undergoing very slow downward movements. Stabilization fills, extending down to competent material will be required. Post and beam type construction is recommended for structures located on the expansive and unstable site soils. A soil bearing value of 2500 may be used for footings.

INTRODUCTION

This report presents the results of our geologic and soils investigation for the proposed development located at Pokai Bay, Oahu, Hawaii. The purposes of this study were to investigate geologic and subsurface conditions, evaluate overall site stability, and determine foundation requirements for the proposed residences.

PROJECT CONSIDERATIONS

It is presently planned to construct about 110 townhouse units with a recreation center. It was initially planned to use concrete slab-on-grade construction with block retaining walls. However,

December 26, 1973

based on our preliminary findings, it was decided to use a different design concept. Post and beam construction will now be the basic building design, using a few concrete retaining walls in the structure. The units will generally be two story residences stepped down on the hillside lots. The building loads will be normal for this type of construction with column loading on the order of approximately 10 kips. Maximum cuts and fills on the order of 10 vertical feet will be required to prepare the site for construction.

#### SITE CONDITIONS

##### Surface

The proposed development site, comprising approximately 16 acres, is located on the southernly slopes of Puu Paheehee Ridge and immediately north of the Hale Ekahi sub-division in the Lualualei Valley. The southerly half of the site has slopes that vary from 10 to 15 percent. The northern half becomes generally steeper with slopes as steep as 30%. The westerly lower half has been planted in grass. The easterly lower portion contains natural vegetation. The upper and steeper portions of the site contain many outcrops of basalt rock with natural vegetation of Keawee trees and scrub brush. An east-west running swale has been constructed along the lower slopes as an interceptor ditch and

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W. O. 500-00  
December 26, 1973

boulder catchment. A graded road runs parallel to the northerly boundary line. Clusters of large boulders are located just above the property on the western half, and dispersed throughout the slopes above the entire site.

### Geology

The Lualualei Valley between Puu Paheehee and Puu Mailiilii was formed by erosion of the Waianae volcanic mountain range basalts during a late tertiary stage of Oahu's development. The plain between the ridges was formed by the combined constructional processes of coral reef and alluvial plain formation. Clastic non-marine alluvial debris was washed into the Lualualei embayment from the Waianae range as the region sank. The embayment may never have been very deep and probably filled with sediment as it sank. This is evidenced by the presence of shallow water coral reefs. A late stage relative lowering of sea level or island emergence has left the reef exposed above sea level. Recent weathering and erosional and depositional deposits have covered the reef with black expansive clays and boulder debris from the ridge.

### Subsurface

To explore the subsurface conditions at the site 13 borings were drilled and 5 test pits excavated at the locations shown on the

December 26, 1973

Site Plan, Plate 1. A more detailed description of the field investigation and laboratory testing is contained in the Appendix, which also includes the log of each boring and the results of our laboratory tests.

Our borings revealed that the site is immediately underlain by a clayey silt that varies from 1 to 20 feet in depth. These deposits of clayey silt were washed down from the ridge of weathered basalt. Weathered and unweathered basalt boulders varying in size from a few inches to several feet in diameter are abundant throughout the clayey silt. On close examination of test pits and undisturbed samples obtained from our borings, it appears that this upper mantle of colluvium may be undergoing creep, which is a continual very slow downward movement. Slickensides observed in the test pits and undisturbed samples indicate the soil is undergoing internal shearing stresses. This material is up to 5 feet in thickness on the lower westerly slopes as outlined on the Site Plan. It is our understanding this area is a recently placed fill and is in a fairly soft and moist condition. In this area coral reef materials were encountered fairly close or near to the existing surface. The exact depths of these coral materials other than at the boring or test pit locations can only be estimated. The contact line between the stable coral areas and the creep area is estimated on our Site Plan, Plate 1. In the

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easterly half of the site, the clayey silt material extends to 15 to 20 feet below the existing surface. This material grades into a decomposed basalt with varying amount of clay matrix. The depth of this decomposed basalt material does not appear to be uniform through out the site and will vary depending upon the depositional history of the local area. The depth of our borings ranged from 15 to 30 feet below the existing ground surface. It is expected that bedrock would be at considerable depths, perhaps between 60 to 80 feet below the existing surface.

Groundwater was not encountered in any of our borings, however; this does not discount the possibility of subsurface drainage taking place during the rainy seasons.

#### DISCUSSION AND RECOMMENDATIONS

##### General

It is our opinion that the site is suitable for the construction of the proposed townhouses. However, certain measures must be taken to insure the overall stability of the site against creep. Due to the presence of the critically expansive clayey silts, it is recommended that post and beam construction be utilized wherever this material will be encountered. This type of construction will also minimize the effect of any differential movements taking place within the soils.

December 26, 1973

### Foundations

Exterior footings should be founded a minimum of 24 inches and interior footings a minimum of 18 inches below the final adjacent grade. If the footings are founded in coral materials then these requirements may be reduced to 18 inches and 12 inches, respectively. Continuous footings should be reinforced with a minimum of two No. 4 reinforcing bars placed at the top and bottom of the footings. A bearing value of 2500 pounds per square foot should be used for continuous and isolated footings bottomed in fill or in natural grounds. The bearing value may be increased by one third when considering wind and seismic loads. A minimum set back distance of 4 feet should be maintained from the outer edge of the footing measured horizontally to the slope face.

### Slabs-on-Grade

It is our opinion that concrete slabs-on-grade should be avoided wherever possible in buildings, but they may be utilized for garage floors. However, should the residences be constructed on a minimum of 3 feet of non-expansive soils, then it may be the option of the developer to use slabs-on-grade for residences. Garage slabs should be structurally separated from footings underlain by a minimum of 6 inches of granular material and reinforced with 6 x 6 No. 6 welded wire mesh. If slabs-on-grade are used for the residences with a minimum of 3 feet of non-expansive soils, then only 4 inches of granular material would be

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W. O. 500-00  
December 26, 1973

required. A vapor barrier should be provided between the sub-grade and slab.

#### Lateral Pressures

It is our opinion that retaining walls parallel to contours should be avoided where possible; however, if they are required then it is recommended an equivalent fluid pressure of 100 pounds per square foot be used for design. Retaining walls acting perpendicular to the existing contours may be designed to resist lateral loads with an equivalent fluid pressure of 45 pounds per square foot.

Passive earth pressures may be computed as an equivalent fluid having a density of 250 pounds per cubic foot. An allowable coefficient of friction between soil and concrete of 0.35 should be considered. The backfill immediately against retaining walls should be an open-graded compacted granular material. Weep holes or a subsurface drainage system should be provided to prevent the build up of excessive pore pressures behind the wall.

#### Slope Stability

There is evidence of a continual, very slow downward movement occurring within the subject property. The upper layers of unconsolidated colluvium clayey silt revealed numerous slickensides

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December 20, 1973

The rate of the natural creep is unknown. It is to some extent a function of long term precipitation, slope angle and vegetation cover. Residential development will alter the equilibrium of the creeping slope by:

1. Landscape watering will increase the amount of moisture entering the creep mass and reduce its shear strength and overall stability.
2. Concentration of stresses due to construction of fills, cuts, walls and foundations may cause settlements or lateral movements that will cause cracking and allow water to enter the creep mass.
3. Subsequent movements in the mass may break utility lines that will supply substantial amounts of water into the creeping mass and accelerate its downward motion.

The stability conditions were evaluated using residual shear strengths, which are significantly lower than normal shear strength parameters and reflect more closely the actual strength of the creep mass. The results of our residual shear tests indicated that the creep materials will not be stable on slopes steeper than 15%. As the material becomes over-saturated this safe stability angle may decrease. It is therefore recommended that preventative measures be taken to reduce or eliminate the potential for excessive downslope movements.

There are two basic alternates available to prevent downhill creep movements:

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December 26, 1973

1. complete removal of the material within the creep zone and replacement with a compacted structural fill;
2. partial removal and construction of stabilization fills to prevent further movement of the creep mass.

These alternates were discussed with the client and his consultants. The first alternate will be economically unfeasible. Therefore, the second alternate was selected as the method to stabilize the area. Due to the presence of coral reef material at relatively shallow depths on the lower western portion of the site, the stabilization fills will not be required throughout the full development area. The exact extent of the stabilization fills will have to be determined during grading operations. However, the area inside the lines shown on the Site Plan can be considered as not requiring stabilization fills. The selection of the areas to be stabilized will depend upon the final grading plan. Based on the present grading plan, the most feasible locations for the stabilization fills will be along the roads which generally run parallel to the existing contours. The generalized cross-section of the sub-surface conditions as shown on Plate 2 indicates the position of these stabilization fills. A generalized cross-section of the stabilization fill is presented on Plate 3. The over-excavation of the stabilization fill area should extend a minimum of 2 feet into the existing firm decomposed basalt or coral materials that are found beneath the creep zone. The general

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December 26, 1973

downhill movement of the slide mass will be eliminated or reduced significantly by the construction of the stabilization fills or road keys. However, some movements within the creep zone above the keys may still take place. It is our opinion that a minimum of 3 feet of fill may have to be placed on some upper lots to act as a surcharge that will consolidate the underlying creep material and subsequently increase its shear strength. The locations of these surcharge areas should be determined during the grading operations. Excess rock or boulders may be used in the lower portion of the stabilization fill if it is placed in the manner recommended for disposal of oversized rock and boulders.

#### Rock Disposal

Boulders and rock larger than 8 inches in dimension should be windrowed in fill areas in the following manner and as presented on Plate 4. The windrows should not be over 5 feet in width and not closer than 10 feet between windrows. The height of the windrows should not exceed 4 feet.

The maximum size rock acceptable within the windrow should not exceed 4 feet in the greatest dimension. Rock over this size should be broken down or disposed of in areas other than fill. The resultant rock configurations in the windrows will offer considerable void space between the rocks. Granular coral materials should be used for fill along and over the rock

December 20, 1973

windrows; thoroughly watered and consolidated to insure that all void spaces between the rocks are filled with soil. Successive lifts may be made, however the windrows should be staggered horizontally and have a vertical distance of at least 2 feet between the top of lower windrow and bottom of the next windrow. Rocks should not be placed within 10 feet of finished pad grades. All boulder disposal should be done under the constant supervision of the soils engineer.

#### Site Preparation

The site shall be cleared of all deleterious and organic matter and removed from the site. In areas to receive fill the ground should be scarified to a minimum depth of 12 inches. In areas where desiccation cracks extend to further depths, the scarification will have to extend to the depth of the desiccation crack. The scarified surface shall then be brought to near optimum water content and compacted to a minimum density of 90% of maximum dry density as determined by ASTM D 1557-72 T. Fill shall then be placed in horizontal 6 inch maximum lifts and also compacted to a minimum of 90% of maximum density. Where the natural ground slope is 5 horizontal to 1 vertical or steeper, the fill material should be keyed and benched into firm bedrock or soil as approved by the soils engineer. Due to the expansive nature of these clay soils, they may be compacted to a minimum of 85% of maximum density as determined by ASTM D 1557-72 T. All other materials.

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December 26, 1975

should be compacted to a minimum of 90%. The expansive clay soils will be unsuitable for trench backfill when using jetting compaction methods. These soils will require mechanical compaction and thin lifts. The coral material may be jetted or flooded, provided the lift does not exceed 18 inches in thickness. All imported fill should be approved by the soils engineer prior to use in fill areas. All grading operations should be under the direct supervision of the soils engineer.

Pavement Design

Based on our experience with similar site materials, the following pavement sections can be considered for preliminary planning:

Coral Areas - 2" A.C.  
6" Base

Clayey Silt Areas - 2" A.C.  
6" Base  
18" Select Material

The final pavement sections should be determined during grading operations by sampling actual subgrade materials for CBR tests.

Design Review

The grading and utility plan should be forwarded to the soils engineer for review and comments prior to finalizing design. Due to the moisture sensitivity of the upper clay soils it is recommended that flexible joints be used on all utility pipes.

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Long reaches of lines should, if possible, be perpendicular to the contours.

It is planned to construct an interceptor ditch along the upper property line. The exact location or type of ditch is not known at this time. After this location has been determined, this firm should be consulted regarding the lining of the ditch.

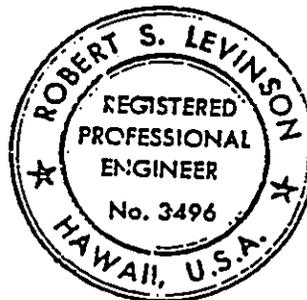
Should you have any questions or need any additional clarification regarding this report, please do not hesitate to contact us.

The following plates and Appendix are attached and complete this report:

- Plate 1 - Site Plan
- Plate 2 - Subsurface Cross Section
- Plate 3 - Stabilization Fill Cross Section
- Plate 4 - Rock Disposal Detail
- Appendix A - Field Exploration and Laboratory Testing

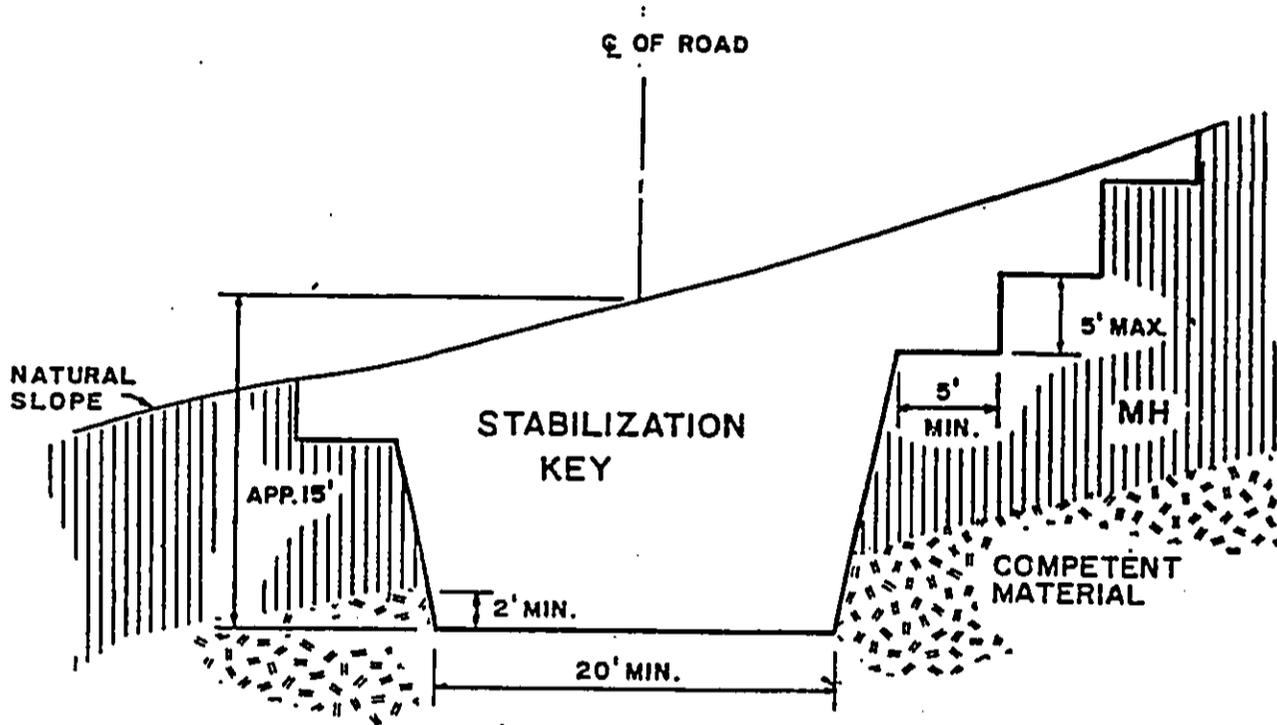
Respectfully submitted,  
GEOLABS-HAWAII, INC.

*Robert S. Levinson*  
Robert S. Levinson  
Chief Engineer



RSL:pg

GEOLABS - HAWAII, INC.



**STABILIZATION KEY**

- NOTE: 1. SIDE SLOPES OF KEY EXCAVATION WILL BE CUT TO STEEPEST STABLE CONDITION.
2. KEY SHOULD EXTEND A MINIMUM OF 2 FT. INTO COMPETENT MATERIAL
3. KEY MATERIAL SHOULD BE NON-EXPANSIVE AND COMPACTED TO A MINIMUM OF 90% OF MAXIMUM DENSITY.



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DATE DEC. 1973

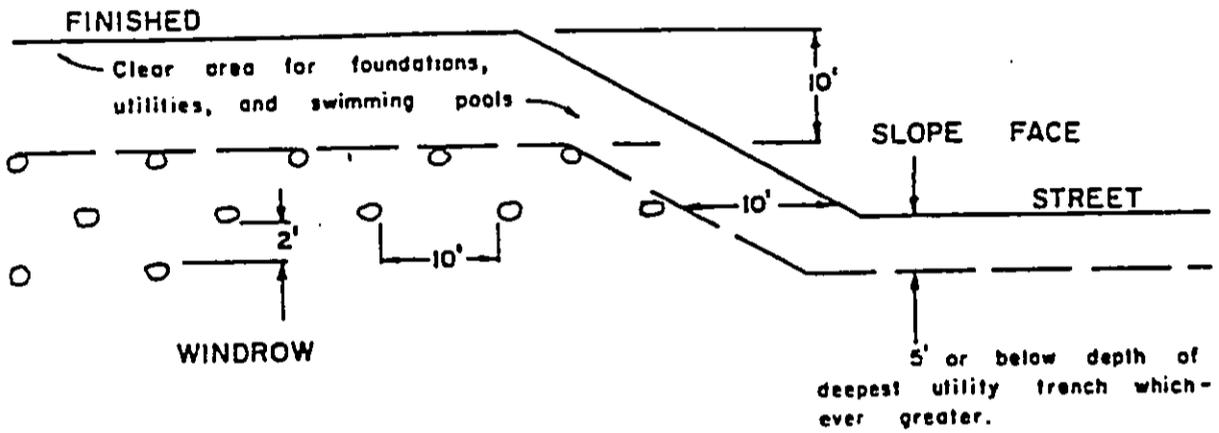
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SCALE 1"=10'

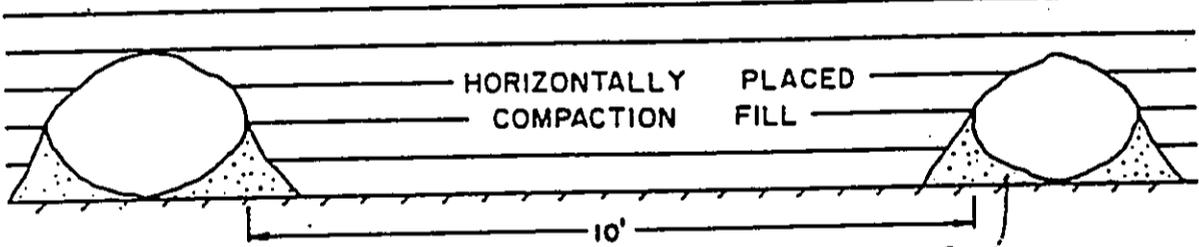
W.O. 500-00

# ROCK DISPOSAL DETAIL

## BUILDING

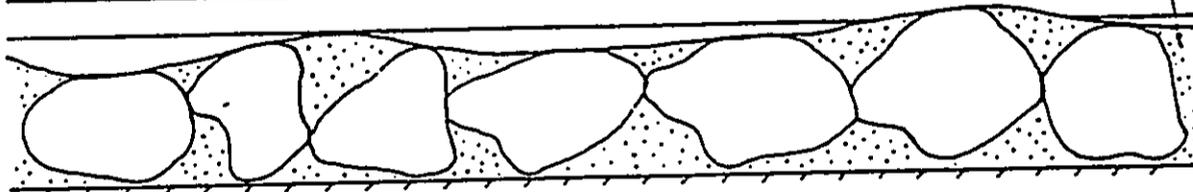


## TYPICAL WINDROW DETAIL (edge view)



GRANULAR SOIL FLOODED TO FILL VOIDS

## PROFILE VIEW



	<b>GEOLABS-HAWAII, INC.</b> Foundation & Soil Engineering - Geology	
	DATE DEC. 1973	DRAWN BY LJC
	SCALE NONE	W.O. 500-00

**SLOPE STABILITY ANALYSES  
AND  
SUPPLEMENTAL INVESTIGATION  
POKAI BAY ESTATES, UNIT III  
LUALUALEI, OAHU, HAWAII**

**W.O. 500-20(II)      JANUARY 30, 1976**

**FOR**

**HEBB & NARODICK CONSTRUCTION CO.**

**C.W. ASSOCIATES INC.  
DBA GEOLABS-HAWAII  
2006 KALIHI STREET  
HONOLULU, HAWAII 96819**

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**GEOLABS-HAWAII**

Geology. Soils and Foundation Engineering  
1553 Colburn Street, Suite 202 • Honolulu, Hawaii 96817 • (808) 841-5064

February 4, 1976

W.O. 500-20(II)

Hebb & Narodick Construction Co.  
c/o Gray, Rhee & Associates  
116 South King Street  
Suite 508  
Honolulu, Hawaii 96813

Attention: Mr. Brian Gray

Gentlemen:

Submitted herewith is our report "Slope Stability Analyses and Supplemental Soil Investigation, Pokai Bay Estates, Unit III, Lualualei, Oahu, Hawaii".

The scope of this work was performed in accordance with our proposal dated October 16, 1975. Additional test pits were dug in the course of our analyses to verify and supplement the assumptions used in our analyses. Preliminary results of our study were verbally transmitted to Gray, Rhee & Associates as the data became available.

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Test Pit Logs .....	Nos. 1 to 10
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Slope Stability Calculations - Section A-A thru D-D	

SLOPE STABILITY ANALYSES  
AND  
SUPPLEMENTAL SOIL INVESTIGATION  
PROPOSED POKAI BAY ESTATES, UNIT III  
LUALUALEI, OAHU, HAWAII

SUMMARY OF RECOMMENDATIONS

Our stability analyses indicate that the slopes of the proposed development using the special construction method and stabilization fill scheme as outlined in the report will have a factor of safety of 1.5 or greater.

Based on the generally accepted principles and practices of soil and foundation engineering, a factor of safety of 1.5 for long term stability is an acceptable one.

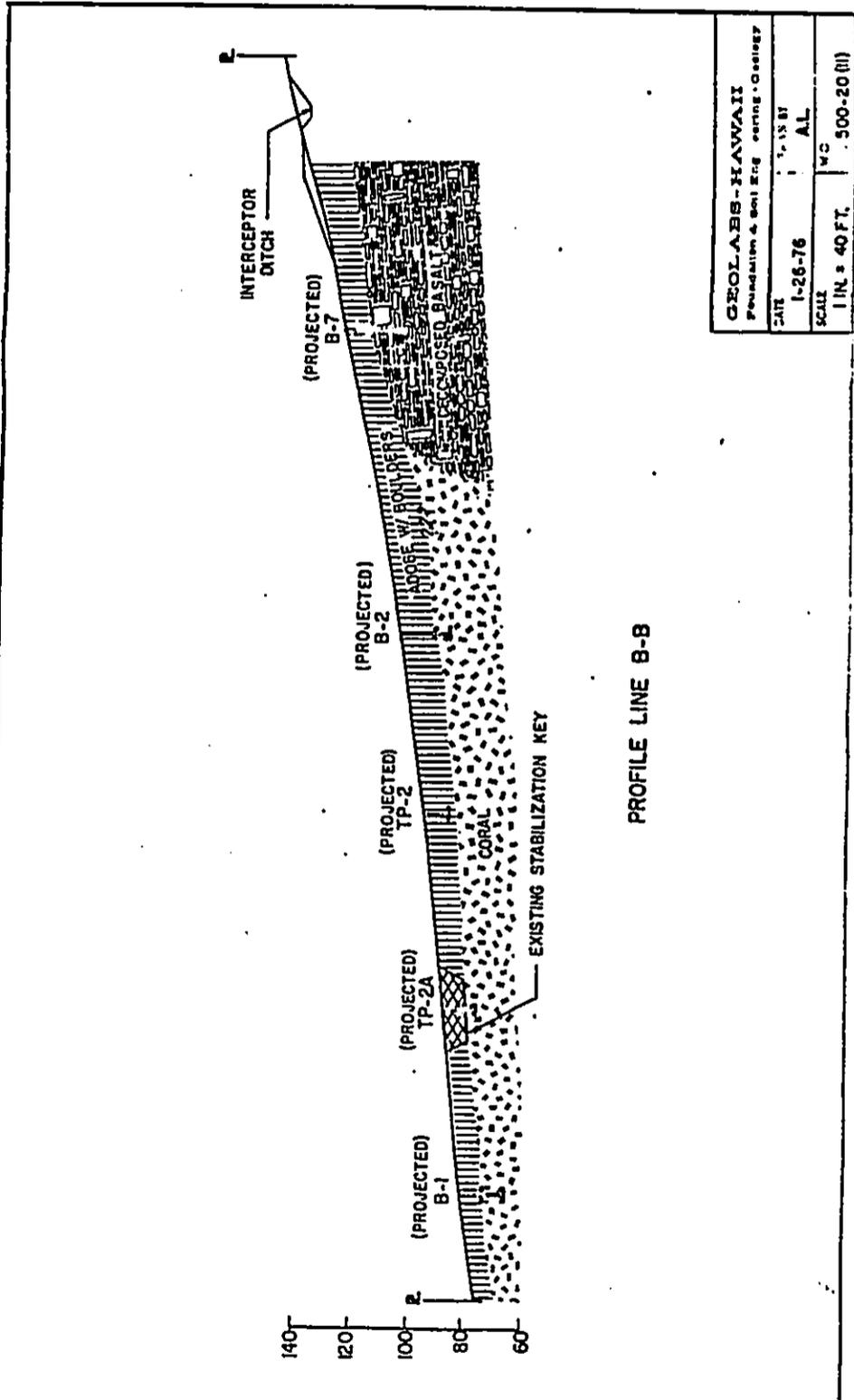
Based on the results of our study, it is our opinion that the proposed subdivision development as planned and as shown on the enclosed grading plan is feasible provided the project design and construction incorporate the recommendations given in this report.

INTRODUCTION

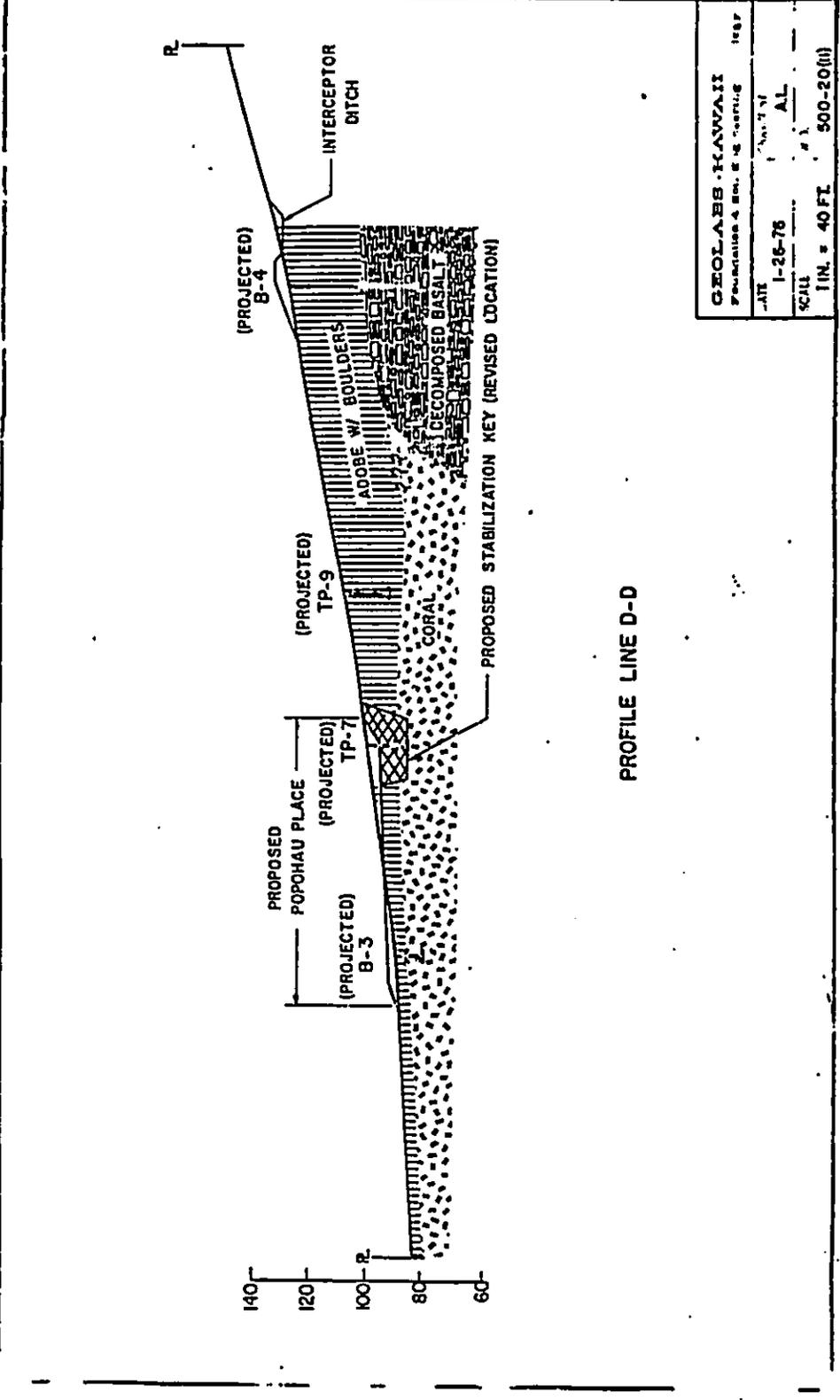
This report presents the results of our stability analyses and additional study performed on the proposed residential development located in Pokai Bay, Oahu, Hawaii. Originally, at the present Unit III site, cluster home development concept were planned. Soil and geologic investigations were performed on the sites by Geolabs-Hawaii, Inc. between the periods of December 1973 and February 1974 and they had prepared and issued the following reports:



DOCUMENT CAPTURED AS RECEIVED



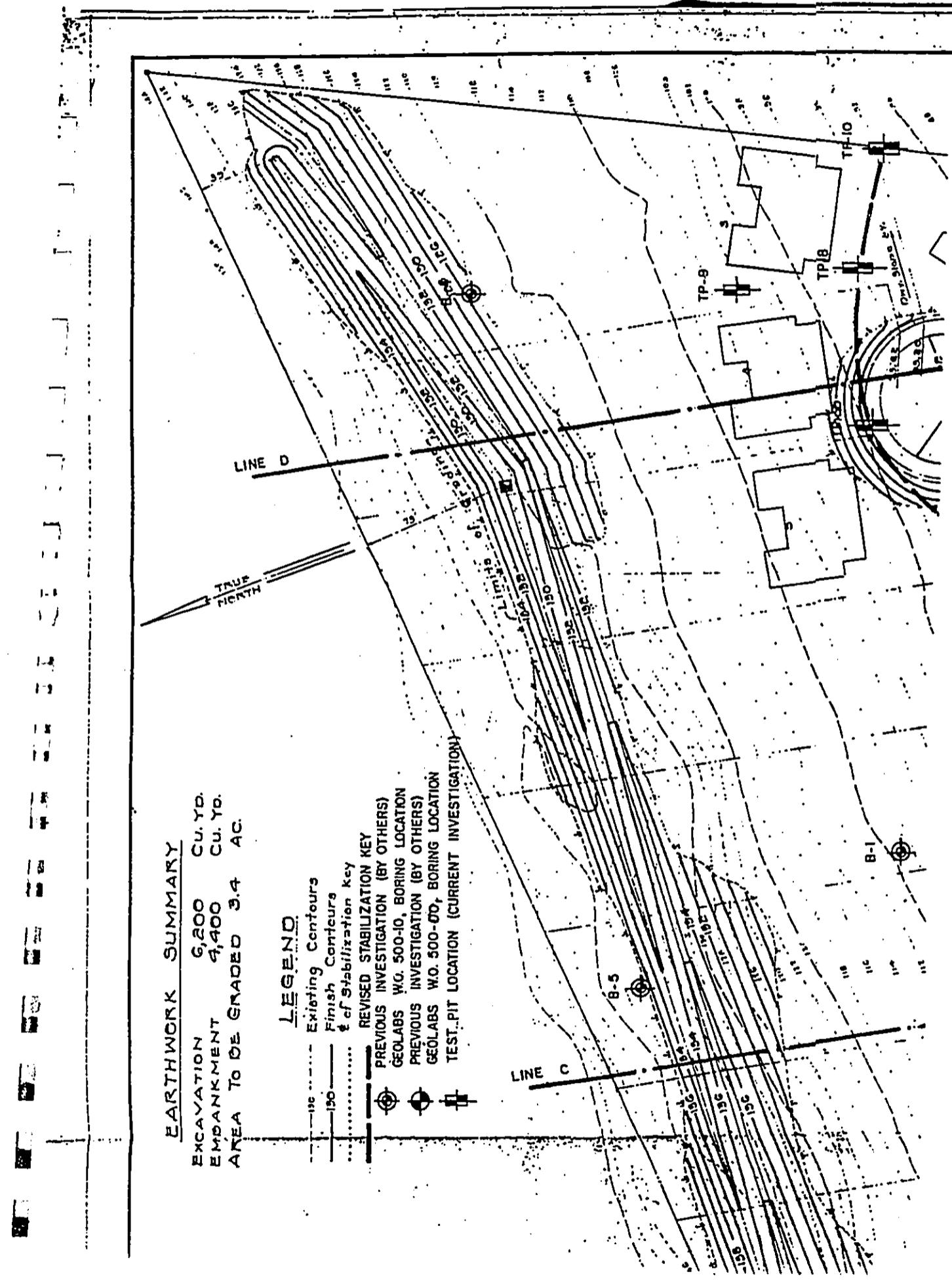




PROFILE LINE D-D

GEOLABB-KAWAII	1987
Penetration & Soil. & Seismic	
DATE 1-26-78	SCALE 1 IN. = 40 FT.
500-20(II)	





**EARTHWORK SUMMARY**

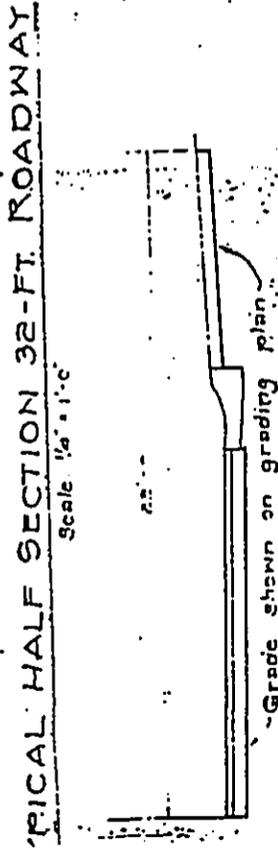
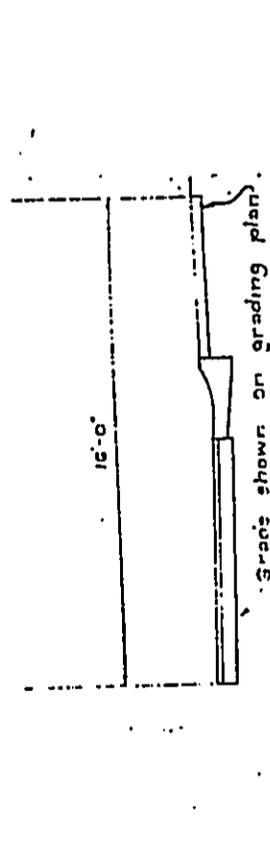
EXCAVATION	6,200	CU. YD.
EMBANKMENT	4,400	CU. YD.
AREA TO BE GRADED	3.4	AC.

**LEGEND**

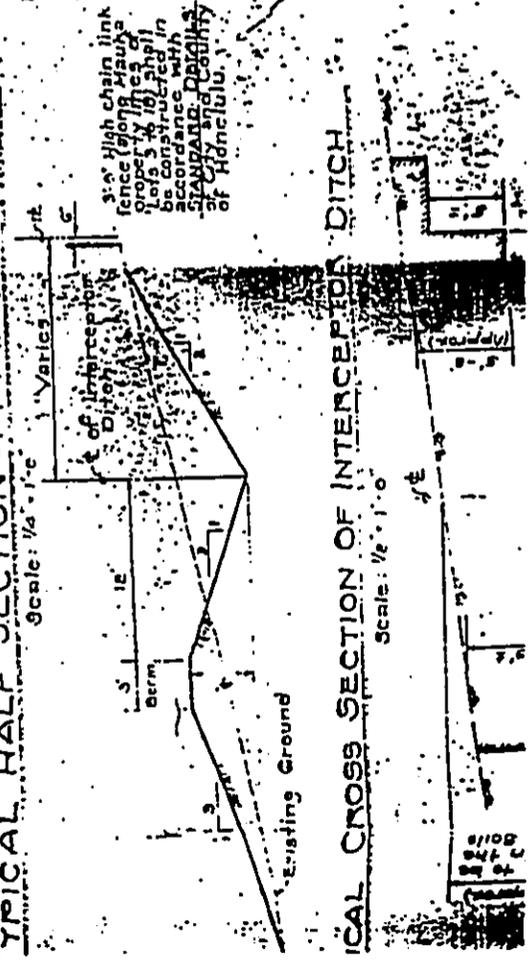
- - - Existing Contours
- Finish Contours
- ⋯⋯⋯ Key of Stabilization
- REVISED STABILIZATION KEY
- PREVIOUS INVESTIGATION (BY OTHERS)
- GEOLABS W.O. 500-10, BORING LOCATION
- PREVIOUS INVESTIGATION (BY OTHERS)
- GEOLABS W.O. 500-00, BORING LOCATION
- ⊕ TEST PIT LOCATION (CURRENT INVESTIGATION)

GRADING NOTES

1. All grading work shall conform to Chapter 23, revised Ordinances of Honolulu 1963, as amended, (Ordinance No. 3568), Soils report by Geolabs - Hawaii, Inc., W.O. 500-10 dated Feb. 13, 1974.
2. The Contractor shall remove all soil and debris resulting from his work and deposited in drainage facilities, roadways and other areas. The costs incurred for any necessary remedial action by the Chief Engineer shall be payable by the Contractor.
3. The Contractor, at his own expense, shall keep the project area free from dust nuisance. The work shall be in conformance with the air pollution control standards and regulations of the State Department of Health.
4. All grading operations shall be performed in conformance with the applicable provisions of the Water Pollution Control and Water Quality Standards contained in the Public Health Regulations, State Department of Health, on Water Pollution Control and Water Quality Standards.
5. All slopes and exposed areas shall be seeded or planted immediately after the grading work has been completed.
6. Fills or slopes steeper than 3:1 shall be keyed.
7. Prior to issuance of a grading permit, the permittee shall obtain a certification by the State Department of Health on the acceptability of the proposed erosion control.
8. No grading work shall be done on Saturdays, Sundays and holidays at any time without prior notice to the Chief Engineer.
9. The limits of the graded area shall be flagged before the commencement of the grading work.
10. The City shall be informed of the location of the disposal site for the excess material from the project site when the application for a grading permit is made.
11. Temporary Erosion Control Procedures shall be submitted for approval prior to application for a grading permit.



TYPICAL CROSS SECTION OF INTERCEPTOR DITCH



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#### Construction Observation

To a degree, the performance of any structure is dependent upon construction procedures and quality. Hence, observation of site clearing, stripping, subgrade preparation, fill placement, inspection of foundation excavations and keyway installation should be carried out by this firm to permit correlation between the preliminary soil data obtained during this investigation and the actual soil conditions encountered during construction in order to minimize misunderstanding of the field forces by both the letter and spirit of our report as well as to note any subsurface conditions different from those forming the basis of our recommendations.

#### INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted soil and foundation engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied.

The analyses and recommendations submitted in this report are based on our site reconnaissance review of previous reports as referenced, and the soil information derived from our field test pits and laboratory tests. Unanticipated soil conditions are commonly encountered and cannot fully be determined by taking soil samples and test pits. These unforeseen conditions may

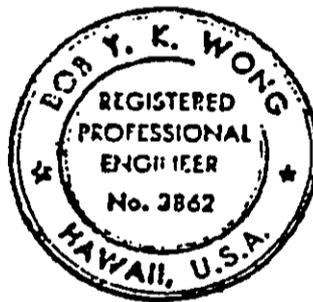
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require that additional expenditures be made during construction to attain a properly constructed project. Some contingency fund is thus recommended to accommodate these possible extra costs.

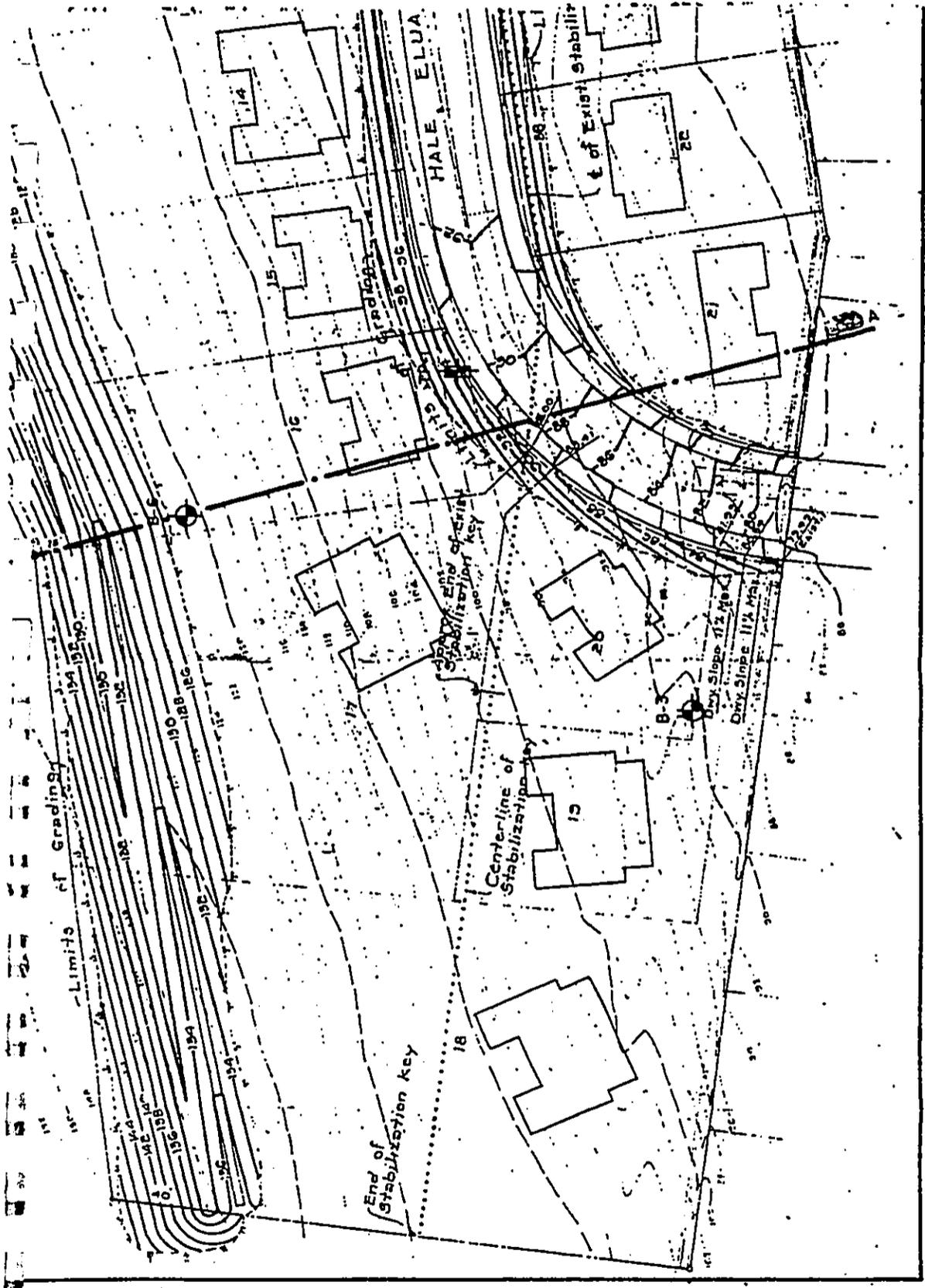
This report has been prepared in order to assist in the evaluation of the property and to assist the architect and engineer in the design of this project. In the event any changes in the design or location of the facilities are planned, our conclusions and recommendations shall not be considered valid unless the changes are reviewed and our recommendations modified or approved by us in writing.

Respectfully submitted,  
GEOLABS-HAWAII

By Bob Y.K. Wong  
Bob Y.K. Wong P.E.



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Job No. 235-3

1. "Geologic and Soil Investigation, Proposed Pokai Bay Cluster Homes, Waianae, Oahu, Hawaii" dated December 26, 1973, their W.O. 500-00.
2. "Geologic and Soil Investigation, Proposed Pokai Bay Cluster Homes, Unit II and Pokai Bay Estates, Unit II, Waianae, Oahu, Hawaii" dated February 13, 1974, their W.O. 500-10.
3. Letters on Construction Specifications for Shear Key and slope stability analysis, dated May 13, 1974 and August 27, 1974 respectively.

Initial excavation of shear keys (stabilization fill) along the lower roadway of the proposed Cluster Home development were started in July 1974. The construction was subsequently halted without completing the keyway construction. Portions of the keyway were excavated under the observation of a soil engineer. Majority of the backfill operation of the keyway was not tested or inspected by the above soil engineer.

In August 1975, the Cluster Home development concept was changed to the current Pokai Bay Estate Unit III comprising of 32 single family residences. The extent of the Unit III area to be developed encompasses the upper portion (approximately 6 acres) of the original Cluster Home development as described in the February 13, 1974 soil report referenced above plus approximately 6 acres or

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more of the mauka area as contained in the soil report dated December 26, 1973.

The purpose of this study is to evaluate the feasibility and slope stability of the currently planned subdivision concept utilizing the available soil and geologic data and using the recommended shear key scheme as contained in the above referenced reports prepared by Geolabs-Hawaii, Inc.

#### SCOPE

The scope of this study is for our firm to review all the available reports as referenced above and utilizing the data and information developed therein to perform the slope stability analyses for the proposed development. This work was performed in accordance with our proposal dated October 16, 1975.

The basis for this study was a plan entitled, "Pokai Bay Estates, Unit III, Lualualei, Oahu, Hawaii - Grading Plan" dated 6-4-75 prepared by Gray, Rhee & Associates, Inc., Consulting Engineers and all of the above mentioned previous reports. Proposed individual house locations were also made available to us as shown on the enclosed Grading Plan, Plate 1. In addition to the planned scope of work, 10 test pits were dug at various locations in the course of our study. Samples were obtained and laboratory tests were performed to supplement our evaluation of this study.

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It is neither uncommon to encounter unforeseen variations in the soil conditions during construction nor is it practical to determine such variations during a normally acceptable program of drilling and sampling for a project of this scope. Such variations, if encountered, frequently require additional engineering services to attain a properly constructed project. Therefore, we suggest that a contingency fund be provided to accommodate any additional charges that may result from such additional technical services during the construction phase to obtain a properly constructed project.

#### PLANNED DEVELOPMENT

It is presently planned to construct 32 single family residences over the property currently under study. The approximate house locations and street layout is shown on Plate 1. We understand that majority of the residences are of post and beam construction while slab-on-grade construction may be used for some floor plans. Building loads are generally relatively light and typical for this type of construction.

Cut and fill operation will be required within the building area to prepare the site for building construction.

The house locations of the development are generally planned below elevation 110, in the area where the slope gradients are approximately 5:1 (horizontal to vertical) or flatter.

SITE CONDITIONS

The proposed development area under study is located on the southern slopes of Puu Paheehee ridge. The site has relatively gentle slopes, approximately 10 horizontal to 1 vertical (10:1) increasing to about 4 horizontal to 1 vertical (4:1) at the northern property line.

The site is immediately north of an existing residential development near the west and a residential development under construction, known as Pokai Bay Estate II near the east. At the eastern portion of the site, Popohau Place will be extended into the study site while the present Hale Eulua Street will be extended to serve as an access road to the western development. This firm is not involved with the grading of earthwork for the Pokai Bay Estate II under construction.

We understand the initial stabilization keyway, as shown on the enclosed plan, Plate 1, was started within the study area, but not completed under soil engineering monitoring.

The approximate slope of the site area is roughly shown on the enclosed profile sections A-A through D-D, Plates 2 through 5 in this report.

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Based on previous boring and test pit data, generalized subsurface soil conditions of the site with the various soil strata are roughly indicated on the profile sections.

### DISCUSSION AND RECOMMENDATIONS

#### General

It is our opinion that the site is suitable for the construction of the proposed single family residences as currently planned provided the project design and construction incorporates the recommendations presented herein. However, certain measures must be taken to insure the overall stability of the site against creep.

Revised approximate locations of stabilization keyways are presented for the eastern portion of the development. The existing stabilization keyways to the west, if verified and confirmed by this firm as properly installed and compacted, will be acceptable.

Based on our recommended keyway location and the original keyway location initially started, slope stability analyses were performed on 4 profiles over the site as designed as Profile Line A-A through D-D as shown on Plates 2 through 5. Calculations of our slope stability analyses are enclosed in Appendix B.

The results of our stability analyses indicate that the proposed development, using special construction methods as recommended, will have a long term factor of safety of 1.5. Because of the potential creep of the adobe material present on the site, close inspection and testing during construction for both the keyway installation and house construction are critical for the future project performance.

This report was prepared specifically for the proposed subdivision development. Use of special construction procedures was assumed throughout our analysis and it represents one of the basis of the recommendations presented henceforth. Should there be any alterations to the proposed development as stated in this report, we should be informed so that we can review such changes and submit additional recommendations.

It is recommended that we review the final plans prior to construction to minimize discrepancies between our recommendations and the plans.

#### Slope Stability

Based on the results of our field study, laboratory testing and review of available data and soil investigations previously performed, this project site does not appear to be as critical as the original scheme of cluster development previously planned. This is due to the fact that most of the house locations will be on the lower and less steep slopes generally below elevation 110.

However, the upper surface layer is a talus of adobe boulder clay and it still has the potential for creep. It is our recommendation that preventative measures be taken to eliminate this potential down-slope movement. This is necessary because residential development on the land will alter the equilibrium of the existing slope. This will be done by:

- 1) Landscape watering that will increase the amount of water entering into talus boulder clay and eventually reduces its shear strength and overall slope stability.
- 2) Concentration of stresses due to construction of fills, cuts, walls and foundations which may cause settlements or lateral movements that will affect cracking and allow water to enter the creep mass.
- 3) Subsequent movements in the creep zone may snap utility lines and hence will supply substantial increased amounts of water into the mass to accelerate its downward motion.

Alternate methods to stabilize the creep zone and to prevent its downhill movement were discussed with the client and consultants during the course of this investigation. It is our opinion that the stabilization keyway construction method

# CORRECTION

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

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However, the upper surface layer is a talus of adobe boulder clay and it still has the potential for creep. It is our recommendation that preventative measures be taken to eliminate this potential down-slope movement. This is necessary because residential development on the land will alter the equilibrium of the existing slope. This will be done by:

- 1) Landscape watering that will increase the amount of water entering into talus boulder clay and eventually reduces its shear strength and overall slope stability.
- 2) Concentration of stresses due to construction of fills, cuts, walls and foundations which may cause settlements or lateral movements that will affect cracking and allow water to enter the creep mass.
- 3) Subsequent movements in the creep zone may snap utility lines and hence will supply substantial increased amounts of water into the mass to accelerate its downward motion.

Alternate methods to stabilize the creep zone and to prevent its downhill movement were discussed with the client and consultants during the course of this investigation. It is our opinion that the stabilization keyway construction method

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arrived upon during these discussions and those previously developed by others will be adequate and feasible for the development. Therefore, it is our opinion that the original planned stabilization keyway be revised to the new location shown on the enclosed site plan. The precise location and extent of the stabilization fills will have to be verified during construction by this firm. Generalized profiles of subsurface conditions as shown on Plates 2 through 5 also indicate the position of this stabilization fill.

The details of the stabilization key was previously submitted and as shown on Plate 1, Grading Plan. However, we recommended that keying and benching be implemented as the fills are brought up during construction. A general downhill movement of the slide mass will be eliminated or reduced significantly by the construction of this stabilization fill.

However, some movements within the creep zone above the stabilization keys may still take place, therefore, a minimum of 3 feet of non-expansive fill may have to be placed on the upper lots above the stabilization key to act as a surcharge that will consolidate the underlying creep materials and subsequently increase its shear strength. The need and location of these surcharge areas should be determined during the grading operation. Excess rock or boulders may be used in the construction of the lower portion of the stabilization fill if it is properly backfilled with fines and placed under the continuous soil engineer's observation.

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If the recommended stabilization keyways are constructed as outlined above, it is our professional opinion that the residential development will perform adequately. The calculations of the slope stability analyses are enclosed in the Appendix. The assumptions used and strength parameters utilized in the calculations are believed to be reasonable and probably on the conservative side. Based on the assumed conditions as utilized, our calculations indicated a factor of safety of 1.5 and greater at some locations where shallower creep susceptible talus materials are encountered. This factor of safety, in our opinion, is an acceptable one for the proposed development.

#### Construction Specifications for Stabilization Key

The specification for keyway construction was submitted previously as referenced above. We believe that the keyway construction sketch as shown on the enclosed grading plan is acceptable provided that keying and benching operation is implemented for all slopes steeper than 5:1 as the fill soils are brought up to assure that adequate bonding is achieved with the native soil.

The keying and benching operation should be approved by the soil engineer during construction, and if necessary, modification of keyway construction will be made by the soil engineer to his satisfaction.

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Proper outlets for subdrains should be maintained so as to prevent ponding and saturation of the underlying material, and thus reducing the slope stability of those development below the stabilization keyway alignment.

#### Site Preparation

The site shall be cleared of all deleterious and organic matter and removed from the site. In areas to receive fill the ground should be scarified a minimum depth of 12 inches. In areas where desiccation cracks extend to further depths, the scarification will have to extend to the depth of the desiccation crack. The scarified surface shall then be brought to near optimum water content and compacted to a minimum density of 90% of maximum dry density as determined by ASTM D1557-72T. Fill shall then be placed in horizontal 6 inch maximum lifts and also compacted to a minimum of 90% of maximum density. Where the natural ground slope is 5 horizontal to 1 vertical or steeper, the fill material should be keyed and benched into firm bedrock or soil as approved by the soils engineer. Due to the expansive nature of the site clay soils, they may be compacted to a minimum of 85% of maximum density as determined by ASTM Designation D1557. The moisture content of the fill soils should be at least 2% above the optimum moisture content during compaction. All other materials should be compacted to a minimum of 90%. The expansive clay soils will be unsuitable for trench backfill when using jetting compaction methods. These soils will require mechanical compaction in thin lifts. The coral material

may be jetted or flooded, provided the lift does not exceed 18 inches in thickness. All imported fill should be approved by the soils engineer prior to use in fill areas. All grading operations should be under the direct and continuous observation of the soils engineer.

#### Slopes For House Construction

Based on the information provided us, cut within the building areas will be required to prepare the site for construction. Because of the expansive nature of the adobe soils, all cuts should be limited to 8 feet in vertical height and slope gradients should be kept at 3 horizontal to 1 vertical or flatter.

Any cut slopes above 8 feet high should be individually evaluated prior to construction.

#### Foundations

##### Footings Above Stabilization Keyways -----

All footings above stabilization keyways should be founded a minimum of 24 inches below the final adjacent grade. Continuous footings should be reinforced with a minimum of two No. 4 reinforcing bars placed at the top and bottom of footings. A bearing value of 2500 pounds per square foot may be used for continuous and isolated footings bottomed in fill or in natural grounds. Continuous footings should have a minimum width of 12 inches. The bearing value may be increased by one-third when

considering wind and seismic loads. A minimum set back distance of 5 feet should be maintained from the outer edge of the footing measured horizontally to the slope face.

#### Footings Below Stabilization Keyways

Individual garage excavation below stabilization keyway might penetrate through the adobe-boulder clay layer and into the underlying coral sand. Therefore, footings should bear on similar materials. For footing bearing on the coral sand, a bearing value of 4,000 p.s.f. may be used.

To ensure that all footings are placed either on coral sand or into the adobe clay soil of sufficient bearing capacity, it is essential that the Soil Engineer inspect all footing excavations prior to placing steel or concrete. Some field adjustment might have to be made in order to bear all footings on similar materials. Due to the expansive nature of the clayey soils, footing excavations should not be allowed to dry and crack prior to placing concrete. All visible cracks in the bottom of the footing excavations should either be closed by soaking or the footing should penetrate the dry crack soils. Provision to provide positive drainage away from all foundation is critical because of the expansive adobe soil.

#### Slab-On-Grade

It is our opinion that concrete slab-on-grade should not be used in the building areas except in garage floors. However, should the building pad be constructed on a minimum of 3 feet of non-expansive soils then it may be the option of the developer to use slab-on-grade

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for residences. These slab-on-grade should be provided with 4 inches of granular material and a vapor barrier.

Where garage slabs are to be used without the non-expansive soil cap then they should be structurally separated from footings and underlain by a minimum of 6-inch of granular material and reinforced with 6 x 6 No. 6 welded wire mesh so as to minimize cracking. All posts within the garage areas should be supported on individual footings designed with the recommendations outlined under the "Foundation" section.

#### Lateral Pressures

It is our opinion that retaining walls parallel to contours should be avoided wherever possible, however, if they are absolutely required then it is recommended an equivalent fluid pressure of 100 pounds per square foot be used for the design. Retaining walls acting perpendicular to the existing contours may be designed to resist lateral loads with an equivalent fluid pressure of 45 pounds per square foot. Passive earth pressures may be designed as an equivalent fluid having a density of 250 pounds per cubic foot. An allowable coefficient of friction between soil and concrete of 0.35 may be used. When combining passive earth pressure and friction for lateral resistance, the passive component should be reduced by one-third.

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The backfill immediately against the retaining wall should be an open-graded, compacted granular material. Weepholes or a subsurface drainage system should be provided to prevent the buildup of excessive pore pressures behind the wall.

#### Pavement Design

Based on our experience with similar site materials, the following pavement sections can be considered for preliminary planning:

Coral Areas	-	2" A.C.
		6" Base Course
Silty Clay (Adobe)	-	2" A.C.
		6" Base Course
		18" Select Material

The final pavement sections should be determined during grading operations by sampling actual subgrade materials for CBR-Expansion Tests.

#### Drainage

Runoff from roofs and paved areas should be collected and drained to a suitable discharge point. Usually drainage is connected to the storm drainage system. Water should not be allowed to pond adjacent to foundations and to the top of the slopes. The site should be graded to provide positive drainage away from all structures and prevent any runoff over the slopes.

Rock Disposal

If necessary and if approved by the soil engineer during construction, boulders and rock larger than 8 inches in diameter can be wind-rowed in the following manner and as illustrated on Plate 6. The windrows should not be over 5 feet in width and not closer than 10 feet between windrows. The height of the windrows should not exceed 4 feet. The maximum size rock acceptable within the windrows should not exceed 4 feet in the greatest dimension. Rock over this size should be broken down or disposed of in areas other than the fill. The resultant rock configurations in the windrows will offer considerable void space between the rocks. Granular coral material should be used for fill along and over the rock windrows, thoroughly watered and consolidated to insure that all void spaces between the rocks are filled with coral sand soil. Successive lifts may be made if the fill is sufficiently deep. However, the windrows should be staggered horizontally and have a vertical distance of at least 2 feet between the top of the lower windrow and the bottom of the next windrow. Rock should not be placed within 10 feet of finished pad grades or above the lowest utility lines in roadway. All boulder disposal should be done under the constant observation of the soils engineer to assure that these recommendations are followed.

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#### Design Review

The plans for foundations, grading and utility plan should be forwarded to the soils engineer for review and comments prior to construction to assure that the intent of our recommendations is included in the project plans and specifications. Due to the moisture sensitivity of the upper adobe clay soils, it is recommended that flexible joints be used on all utility pipes. Long reaches of lines should, if possible, be perpendicular to the contours.

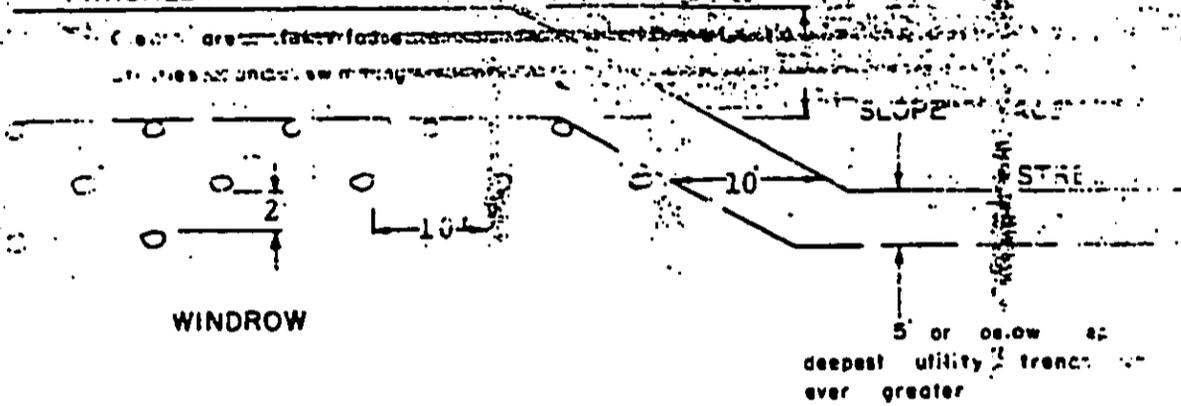
#### Upper Interceptor Ditch

It is planned to construct an interceptor ditch along the upper property line. The ditch should also be designed as a boulder catchment to prevent large rock from reaching the lower developed area. The natural dense kiawe vegetation can also act as a boulder catchment. The areas above the developed zone should be left in the natural state where feasible.

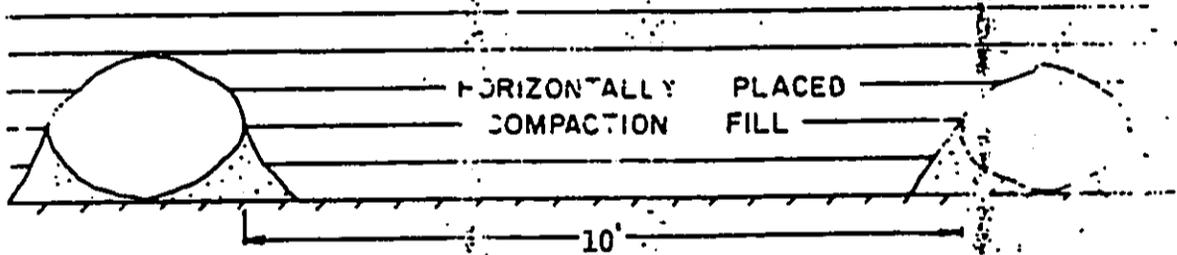
Provision to prevent water and moisture infiltration from the ditch to the underlying soil is extremely essential in the ditch lining construction. This is to minimize the saturation of the underlying soils.

# ROCK DISPOSAL DETAIL

BUILDING  
FINISHED



## TYPICAL WINDROW DETAIL (edge view)



GRANULAR SOIL REDUCED TO FILL VES

## PROFILE VIEW



	<b>GEOLABS-HAWAII</b> Foundation & Building Engineering	
	DATE JANUARY 1976	DRAWN BY LJC
	SCALE NONE	NO 500-20 (11)

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A P P E N D I X A  
TEST PIT LOGS

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TEST PIT LOGS

<u>Test Pit Number</u>	<u>Depth (ft)</u>	<u>Soil Description</u>
1	0' - 9'	Dark Brown Adobe Clay with 6" to 3' diameter boulders (CH)  10% boulders from 0' - 7' 30% boulders from 7' - 8' 60% boulders from 8' - 9'
2	0' - 9'	Dark Brown Adobe Clay with boulders sizes range from 6" to 3' in diameter (CH)  20% boulders from 0' to 3' 40% boulders from 3' to 7' 60% boulders from 7' to 9'  Moisture Content = 37%
2A	0' - 4'	(FILL) Dark Brown Adobe Clay with 30% boulders (CH)
	4' - 8'	(FILL) Brown Silt (MH) with 10% boulders and wood pieces  Moisture Content = 42%
	8' - 9'	Light Brown Silty Sand (Coral)
3	0' - 3'	Dark Brown Adobe Clay (CH) with 30% boulders
	3' - 8'	Light Brown Silty Sand (Coral)
4	0' - 7'	Dark Brown Adobe Clay with boulders (CH)  20% boulders from 0' - 3' 50% boulders from 3' - 7'  Moisture Content = 24%

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2  
TEST PIT LOGS (cont'd)

<u>Test Pit Number</u>	<u>Depth (ft)</u>	<u>Soil Description</u>
4	7' - 9.5'	Light Brown Silty Sand (Coral) Moisture Content = 31%
5	0' - 6.5'	Dark Brown Adobe Clay with Boulders (CH) 20% Boulders from 0' - 3' 50% Boulders from 3' - 6.5' Moisture Content = 38%
	6.5' - 9'	Light Brown Silty Sand (Coral)
6	0' - 3.5'	Dark Brown Adobe Clay with 20% boulders & roots (CH) Moisture Content = 35%
	3.5' - 8'	Light Brown Silty Sand (Coral)
7	0' - 9'	Dark Brown to Brown Adobe Clay with boulders (CH) 30% Boulders from 0' - 4' 60% Boulders from 4' - 6' 20% Boulders from 6' - 9' Moisture Content = 37%
	9' - 11'	Light Brown Silty Sand (Coral)
8	0' - 4'	Dark Brown Silty Clay with 30% boulders (CH) Moisture Content = 36%
	4' - 8'	Light Brown Silty Sand (Coral) Moisture Content = 22%

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TEST PIT LOGS (cont'd)

<u>Test Pit Number</u>	<u>Depth (ft)</u>	<u>Soil Description</u>
9	0' - 4'	Dark Brown to Brown Adobe Clay with 30% boulders and roots (CH) Moisture Content = 26%
	4' - 11'	Dark Brown to Brown Adobe Clay with 30% boulders Moisture Content = 31%
10	0' - 3'	Dark Brown Adobe Clay with 40% boulders & roots (CH) Moisture Content = 25%
	3' - 8'	Light Brown Silty Sand (Coral) Moisture Content = 24%

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A P P E N D I X B  
Slope Stability Calculations

W.D. 500.2

RS.

2/1/76

Section A-A

Thickness of Adobe  $t = 6' \sim 20'$  Use 15'Length  $L = 200$  ft. (from Key to interception ditch)Use slope  $\alpha = 13^\circ$  (Actual 1:5 slope  $\alpha = 11^\circ$  is surface slope & coral slope is much less than  $11^\circ$ )

$$\text{Driving Force (1) } W_A \sin \alpha = 15 \times 200 \times 110 \sin 13^\circ = 74 \text{ K}$$

$$\text{Resisting Force (1) } W_A \cos \alpha \tan \phi_s = 330 \text{ K} \times 0.97 \times 0.25 = 80 \text{ K}$$

$$(2) L \times c = 200 \times 0.20 = 40 \text{ K}$$

$$(3) W_B \cos \alpha \tan \phi_B = 15 \times 25 \times 1.2 \cos(13^\circ) \tan(14.5^\circ) = 44 \text{ K}$$

$$F.S. = \frac{\Sigma \text{ Resisting Force}}{\Sigma \text{ Driving Force}}$$

$$= \frac{80 + 40 + 44}{74}$$

$$= 2.2 > 1.5 \text{ O.K.}$$

Check the Section below the Key:

$$t = 15'$$

$$L = 100'$$

$$\alpha = 10^\circ \text{ (Actual slope } 1:10 \text{ } \alpha = 6^\circ)$$

$$\text{Driving Force (1) } 15 \times 100 \times 11 \times \sin 10^\circ = 28 \text{ K}$$

$$\text{Resisting Force (1) } 165 \text{ K} \cos 10^\circ \tan 14^\circ = 40 \text{ K}$$

$$(2) 100 \times 0.2 = 20 \text{ K}$$

$$F.S. = \frac{40 + 20}{28} = 2.1 > 1.5 \text{ O.K.}$$

Section B-B

W.O. 500-2015

RS  
2/1/76

Thickness of Adobe  $t = 10 \sim 15'$  Use  $12'$

Length  $L = 320$  ft (from Key to interception ditch)

Use slope  $\alpha = 13^\circ$  (Actual  $1:5$  slope  $\alpha = 11^\circ$  is the surface slope and canal slope is incl.  $2:11$ .)

$$\text{Driving Force} = (1) W_A \cdot \sin \alpha = 12 \times 320 \times 0.11 \cdot \sin 13^\circ = 95 \text{ K}$$

$$\text{Resisting Force (1) } W_A \cdot \cos \alpha \cdot \tan \phi_A = 102$$

$$(2) L \times c = 64$$

$$(3) W_B \cdot \cos \alpha \cdot \tan \phi_B = 10 \times 25 \times 0.12 \times 0.97 = 29$$

$$F.S. = \frac{\Sigma \text{Resisting Force}}{\Sigma \text{Driving Force}} = \frac{102 + 64 + 29}{95}$$

$$= 2.0 > 1.5 \quad \text{O.K.}$$

Check the section below the Key

$$t = 8'$$

$$L = 90'$$

$$\alpha = 10^\circ \text{ (Actual } \alpha < 6^\circ \text{)}$$

$$\text{Driving Force (1) } 8 \times 90 \times 0.11 \cdot \sin 10^\circ = 13$$

$$\text{Resisting Force (1) } 79 \times \cos 10 \cdot \tan 14 = 19$$

$$(2) 90 \times 0.2 = 18$$

$$F.S. = \frac{19 + 18}{13} = 2.8 > 1.5 \quad \text{O.K.}$$

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RS  
2/1/76

Section D-D

$t = 10 \sim 25'$  Use  $20'$

$L = 250$  (from REvised Key location to FE).

Use  $\alpha = 13^\circ$  (Actual 1:5 slope,  $\alpha = 11^\circ$  is the surface slope, the core slope is much  $< 11^\circ$ )

Driving Force (1)  $W_A \cdot \sin \alpha = 20 \times 250 \times .11 \cdot \sin 13$   
 $= 124.4$

Resisting Force (1)  $W_B \cos \alpha \cdot \tan \phi_A = 550 \times 0.97 \times 0.25$   
 $= 133.4$

(2)  $L \times c = 250 \times 20 = 50K$

(3)  $W_B \cdot \cos \alpha \cdot \tan \phi_B = 10 \times 25 \times .12 \times 0.513 \tan 45$   
 $= 29K$

F.S. =  $\frac{\sum \text{Resisting Force}}{\sum \text{Driving Force}}$

$= \frac{133 + 50 + 29}{124}$

$= 1.7 > 1.5$  O.K.

check the section below the key

$t = 3 \sim 10'$  Use  $10'$

$L = 180'$

$\alpha = 10^\circ$

Driving Force (1)  $10 \times 180 \times .11 \times \sin 10^\circ = 34$

Resisting Force (1)  $198 \cdot \cos 10^\circ \cdot \tan 14^\circ = 48.6$

(2)  $180 \times 0.2 = 36$

F.S. =  $\frac{48.6 + 36}{34} = 2.5 > 1.5$  O.K.

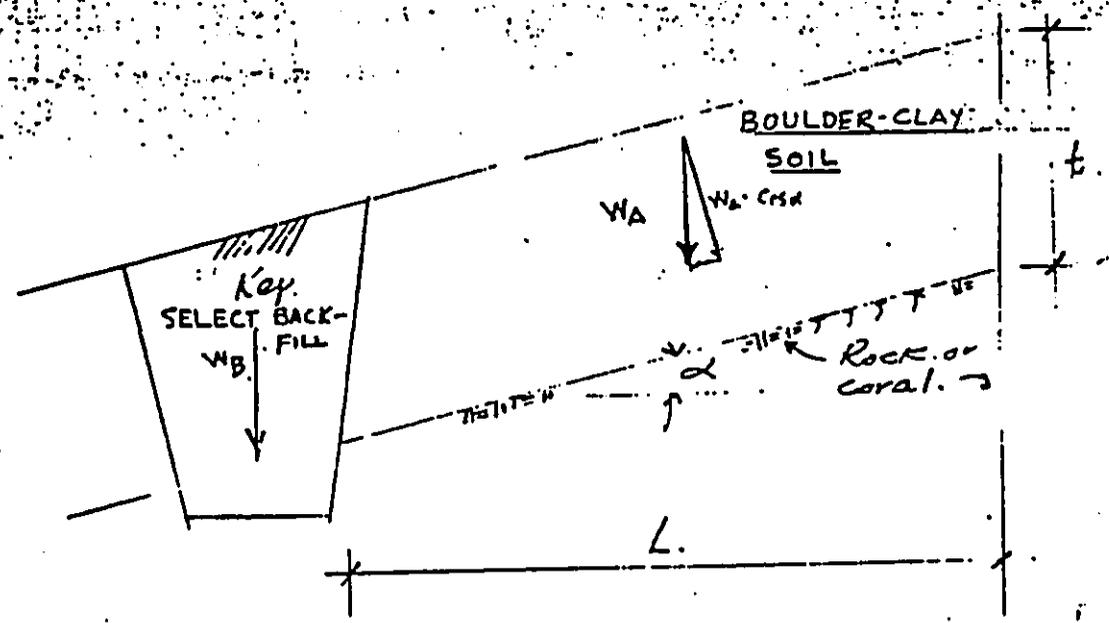
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SLOPE STABILITY CALCULATIONS

RS. 2/1/76

SAEED KEY ANALYSES

POKAI BAY ESTATES - UNIT III



Assumption (1) L = distance from stabilization key to intersection  
(The ditch elevation = 120' ±, above El. 130.5. Soil was found.)

$$F.S. = \frac{\sum \text{Resisting Force}}{\sum \text{Driving Force}}$$

- Driving Force: (1) Weight of Adobe soil  $W_A \times \sin \alpha$   
(Note: the down-slope component)
- Resisting Force: (1)  $W_A \times \cos \alpha \times \tan \phi_A$   
(2)  $L \times C$   
(3)  $W_B \times \cos \alpha \times \tan \phi_B$

Keyway:  $\delta = 120 \text{ pcf}$   
 $\phi_B = 45^\circ$  (presence of boulders in granular backfill)  
 $C = 0$

Adobe:  $\delta = 110 \text{ pcf}$   
 $\phi_A = 14^\circ$  (Residual)  $C = 200 \text{ psf}$

Section CC

$$t = 10 \sim 24' \quad \text{USE } 20'$$

$$L = 230' \quad (\text{from Key to interception Ditch})$$

Use  $\alpha = 13^\circ$  (Actual 1:5 slope:  $\alpha = 11^\circ$  is the surface and the corad. slope is much  $< 11^\circ$ ).

$$\begin{aligned} \text{Driving Force} &:: (1) W_A \cdot \sin \alpha = 20 \times 230 \times 0.11 \cdot \sin 13^\circ \\ &= 114 \text{ K} \end{aligned}$$

$$\begin{aligned} \text{Resisting Force} &(1) W_A \cdot \cos \alpha \cdot \tan \phi_1 = 506 \times 0.97 \times 0.25 \\ &= 123 \text{ K} \end{aligned}$$

$$(2) L \times c = 230 \times 20 = 46 \text{ K}$$

$$\begin{aligned} (3) W_B \cdot \cos \alpha \cdot \tan \phi_2 &= 10 \times 25 \times 0.12 \times \cos 13^\circ \cdot \tan 14^\circ \\ &= 29 \text{ K} \end{aligned}$$

$$F.S. = \frac{\sum \text{Resisting Force}}{\sum \text{Driving Force}}$$

$$= \frac{123 + 46 + 29}{114}$$

$$= 1.7 > 1.5 \quad \text{O.K.}$$

Check the section below the key:

$$t = 3 \sim 8' \quad \text{Use } 10'$$

$$L = 200'$$

$$\text{Use } \alpha = 10^\circ$$

$$\text{Driving Force} (1) 10 \times 200 \times 0.11 \times \sin 10^\circ = 38 \text{ K}$$

$$\text{Resisting Force} (1) 220 \times \cos 10^\circ \cdot \tan 14^\circ = 54$$

$$(2) 200 \times 0.2 = 40$$

$$F.S. = \frac{54 + 40}{38} = 2.5 > 1.5 \quad \text{O.K.}$$

**Appendix C**  
**Pokai Bay Market Homes**  
**Analysis**

# HOWELL & ASSOCIATES

Hugh M. Howell, MAI / Richard H. Sylva, MAI / Scot J. Voronaeff / Steven D. Chee  
Stephen E. Stadlbauer / Patricia A. MacLean / Timothy W.L. Chee  
Angela L. Atherley / Lowell T.S. Chung / Of Counsel: Joseph L. Hastings, MAI

Real Estate Appraisers & Consultants

## COMPANY PROFILE

Howell & Associates is a real estate appraisal and consulting firm located in Honolulu. The goal of the company is to offer appraisal and consulting services to clients in a professional and timely manner, covering all types of real estate located throughout the State of Hawaii, South Pacific, and certain areas of the west coast of the United States. Owner/principal Hugh M. Howell, MAI, and the staff members are dedicated to carrying out the Company's goals, which involve serving clients' needs to the fullest, by implementation of various traditional appraisal approaches, and also creative solutions to any real estate appraisal/consultation problem. We enjoy working with our clients on a personal basis.

The principal and staff members of Howell & Associates have extensive experience in providing appraisal and consultancy services for all types of real property and real property interests, on a large and small scale, in the above-cited geographic venues. For example, the firm has been involved in valuing small and large industrial and office properties in Honolulu, or on the other hand, all of the real estate assets statewide for a large agribusiness company. Additionally, appraisals, market studies, and various consultations have involved properties with a wide range of geographical locations (*i.e., office building valuation in Guam, resort-residential market studies in Pebble Beach, Los Angeles, and Palm Springs California, etc.*).

Hugh M. Howell, MAI (*Member Appraisal Institute*) has been actively involved in commercial real estate appraisal and consultation since 1977. Prior to the formation of Howell & Associates in 1993, Mr. Howell was the managing partner of Sylva, Howell & Associates, which was formed in 1988 with partner Richard H. Sylva, MAI. Before the formation of Sylva, Howell & Associates, Mr. Howell was a senior appraiser and vice president with Raymond A. Leshner & Company, Ltd., for 11 years.

Mr. Howell's work experience is represented by a broad variety of past assignments, involving typical commercial appraisals (*i.e., office buildings, shopping centers, residential subdivisions, etc.*) and also more specialized and unique appraisals and/or consultation (*involving for example, master planned resorts, condemnation valuation, legal and expert testimony work, and arbitration, etc.*).

To serve our clients, Howell & Associates enjoys the services of an exceptionally experienced and talented senior appraisal staff. These associates involve Richard H. Sylva, former partner in the firm, and now senior associate; Scot J. Voronaeff, MBA, senior appraiser with the firm since 1988; and Steven D. Chee, senior appraiser, with the firm since 1988; and Stephen E. Stadlbauer, senior appraiser, joined the firm in 1993.

Richard H. Sylva, MAI (*Member Appraisal Institute*), has been a commercial real estate appraiser and consultant since 1974, and holds a senior designation from the Appraisal Institute. Mr. Sylva served as the 1989 President of the Honolulu Chapter of the Society of Real Estate Appraisers, and is currently serving on the Board of Directors. He was with Raymond A. Leshner & Company, Ltd., for 11 years as a

## COMPANY PROFILE - Page Two

senior appraiser and vice president, prior to the formation of the partnership of Sylva, Howell & Associates in 1988. Mr. Sylva's experience is extensive, covering a wide range of real property and interests; and currently his focus primarily involves the valuation of small and large retail/office complexes, residential projects, and arbitration work.

Scot J. Voronaeff is currently a senior appraiser with Howell & Associates. Prior to his current position with Howell & Associates, Mr. Voronaeff was a senior appraiser with Sylva, Howell & Associates between 1988 to 1993. Before working at Sylva, Howell & Associates, Mr. Voronaeff was both an appraiser and research analyst with Realty Research Corporation in Honolulu for seven years, from 1981 to 1988, working under Don Voronaeff, MAI (*his father*). Mr. Voronaeff earned an MBA in Finance and Real Estate Development from the University of California, Irvine, in 1987, and is currently an advanced candidate with the Appraisal Institute. He has a wide range of appraisal experience with all types of real property; and currently specializes in complex income producing properties.

Prior to his current position as a senior appraiser with Howell & Associates, Steven D. Chee was a senior appraiser with Sylva, Howell & Associates from 1988 to 1993. Mr. Chee has a broad range of appraisal experience with a wide variety of income and non-income producing properties located throughout the State of Hawaii, and in the territory of Guam. The scope of his appraisal experience also includes involvement as an expert witness in the State of Hawaii. Mr. Chee is currently an advanced candidate with the Appraisal Institute. Additional professional real estate experience has included a position as a commercial real estate asset manager with Chaney Brooks & Company, during 1987 and 1988.

Stephen E. Stadlbauer, senior appraiser with Howell & Associates, has been a commercial real estate appraiser and consultant since 1985, and most recently was engaged as Vice President of the Commercial Appraisal Division of Yamaguchi & Yamaguchi, Inc. (1989 to 1993). Qualified as a Certified General Appraiser by the State of Hawaii, Mr. Stadlbauer is also an advanced candidate with the Appraisal Institute, working toward his MAI designation. In addition to an extensive background in retail, office and industrial property valuation/consultation, Mr. Stadlbauer's expertise in the valuation of public and private sector housing has been recognized by the United States Department of Housing and Urban Development, selecting him as one of a limited number of appraisers in Honolulu qualified to perform appraisals under the Low Income Housing Preservation and Resident Homeownership Act of 1990 (*LIHPRHA*).

To assist the principal and staff members in carrying out their duties to clients, the firm has, at their disposal, state of the art computer equipment, analytical software programs, an extensive library of comparable and resource data, a computer data retrieval system and other necessary tools and information relevant to the real estate appraisal and consultation field.

HOWELL & ASSOCIATES

## COMPANY PROFILE - Page Three

### PROFESSIONAL SERVICES

**Valuation Reports** - Market valuation is the major focus of most real property appraisal assignments. It involves defining an appraisal problem, and finding a solution via preliminary data collection and analyses, highest and best use analysis, application of three appraisal valuation approaches, if applicable, reconciliation and final value estimation, (*also if applicable*), and the reporting of a defined value. Other valuation studies may involve the estimation of investment value for various real property interests, or may involve the valuation of special use properties.

**Real Estate Consulting** - Consulting assignments covering all property types, are usually performed to assist clients with a specific problem or situation. Providing competent, unbiased, professional guidance on diversified problems in real estate has taken on ever increasing importance in the real estate field. The principals have undertaken such tasks as highest and best use analyses, various product market studies, subdivision analyses, resort analyses, office/retail analyses, project planning studies, market and feasibility analyses, expert witness services, etc.

Howell & Associates considers its clients to be its most valuable assets. The firm has had the privilege of serving various small and large corporations, financial institutions, developers, private individuals, attorneys, residential community associations, and governmental agencies. Following, is a sampling of various clients Howell & Associates has had the privilege of serving:

Ainalani Associates	Damon, Key, Char & Boken
Alexander & Baldwin Corporation	Davis & Levin
Aloha State Corporation	F.J.Schumann Funding, Ltd.
All Pool & Spa, Inc.	Federal Savings & Loan
Alston Hunt Floyd & Ing	First Federal Savings and Loan
American Landmark Development Co.	First Hawaiian Bank
American Savings Bank, FSB	First Hawaiian Creditcorp, Inc.
Amfac Corporation	First Interstate Bank
Aston Hotels and Resorts	Fujiyama, Duffy & Fujiyama
Atherton Family Foundation	Gannet Pacific Corporation
Bank of America	Gasco
Bank of Hawaii	GECC Financial Corporation
Bay Street Investments	Gentry-Pacific, Limited
Bishop Square Management, Inc.	The Gentry Companies
Bishop Trust Company, Ltd.	Albert B. Glickman & Associates
Bradley Properties	Goodsill Anderson Quinn & Stifel
C. Brewer and Company, Ltd.	GSA
California and Hawaiian Sugar	Guild Mortgage Company
The Estate of James Campbell	Hiroshi Sakai, Esquire
Carlsmith, Wichman, Case, Mukai and Ichiki	HMF, Inc.
Case & Lynch	Honfed Bank, FSB
Castle and Cooke Corporation	Honolulu Board of Realtors
Chevron USA, Inc.	Honolulu Club
City and County of Honolulu	Honolulu Mortgage Company, Inc.
Crown Pacific - Hawaii	Intellect, Inc.
	JDC (America) Corporation

HOWELL & ASSOCIATES

**COMPANY PROFILE - Page Four**

Kaiser Permanente  
Kodak Corporation  
Kohala Ranch  
Knight Development Corporation  
KRC Hawaii Company, Ltd.  
L.A. Gear  
Lanai Company  
Long-Term Credit Bank of Japan, Ltd.  
Malama Pacific Corporation  
Mauna Loa Macadamia Nut Corporation  
Meridian Pacific Corporation  
Mitsubishi Bank  
Mitsui Fudosan Company  
Moon, O'Connor, Tam & Yuen  
Nakamoto, Yoshioka & Okamoto  
Nakano Company  
Nansay Hawaii, Inc.  
National Mortgage & Finance Co., Ltd.  
The Nature Conservancy of Hawaii  
Onipa'a Development  
Pacific Construction Co., Ltd.  
Pankow Development Co., Ltd.  
Pannel Kerr Forster  
Princeville Development Corporation  
Property Resources Consultants, Inc.  
Queen Emma Foundation  
Reinwald O'Connor Marrack  
    Hoskins & Playdon  
Reynolds + Shidler  
Richard Smart Trust  
Royal Bank of Canada  
San Wa Bank  
Security Pacific Bank  
Shell Oil Company  
South Pacific Restaurants, Ltd.  
Torkildson, Katz, Jossem  
    Fonseca, Jaffe and Moore  
Tobishima USA, Inc.  
Waikiki Joy Hotel  
W.H. Shipman, Ltd.  
Waitec Development Inc.  
Waterhouse Properties  
Watt Hawaii, Inc.  
Western Physicians Services, Inc.  
Wilcox Estate

HOWELL & ASSOCIATES

# HOWELL & ASSOCIATES

Hugh M. Howell, MAI / Richard H. Sylva, MAI / Scot J. Voronaeff / Steven D. Chee  
Stephen E. Stadlbauer / Patricia A. MacLean / Timothy W.L. Chee  
Angela L. Atherley / Lowell T.S. Chung / Of Counsel: Joseph L. Hastings, MAI

Real Estate Appraisers & Consultants

February 9, 1994

Mr. Michael W. Klein  
OCEAN VIEW VENTURES, INC.  
500 Lunalilo Home Road, No. 17B  
Honolulu, Hawaii 96825

**Re: REAL ESTATE COUNSELING SERVICES**  
**Market Study Related to 47 Market Price, Single-Family Residential Homes,**  
**Representing a Component of the Proposed POKAI BAY OCEAN VIEW**  
**Master Planned Residential Housing Project**  
**Located at Hale Ekahi Drive (Off of Lualualei Homestead Road)**  
**Waianae, Island of Oahu, State of Hawaii**  
**Tax Map Key: Division 1, Zone 8, Section 6, Plat 01, Parcels 011, 043 and 050**

Dear Mr. Klein:

At your request, we have conducted a market study, relative to the proposed development of 47 market price single-family residences as a component of the master planned POKAI BAY OCEAN VIEW housing project, in Waianae, Island of Oahu, State of Hawaii. Specifically, it has been requested, as to what would be the estimated optimum sales price range for the proposed single-family residences, assuming an average lot size of 5,925 square feet and an average home size of 1,650 square feet of interior area. The effective date of this assignment is February 1, 1994.

## **FORMAT OF THIS COUNSELING LETTER**

This letter is broken down into the following sections, in order of presentation:

- SECTION I:** Executive Summary of the Subject Area and Property
- SECTION II:** Purpose and Scope of This Study, and Current Preliminary Plans for Development of the Subject Project Site
- SECTION III:** Research Parameters and Findings of This Market Study
- SECTION IV:** Summary, Conclusions and Recommendations

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SUBJECT AREA MAP

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**EXHIBIT B**  
**Definitions and Terminology**

## DEFINITIONS AND TERMINOLOGY

Throughout this report, the reader will encounter various technical words or phrases necessary to the appraisers for the proper presentation of material and conclusions. In addition, certain Hawaiian words, by common usage, which are a part of the everyday local and business language, will be utilized. We present at this point those most commonly used in the report, together with a brief explanation.

### MARKET VALUE

Market value is the major focus of most real property appraisal assignments. Both economic and legal definitions of market value have been developed and refined. Continual refinement is essential to the growth of the appraisal profession. The current economic definition of market value, as defined under Title XI of FIRREA (*Federal Financial Institutions Reform, Recovery, and Enforcement Act of 1989*) assumes the consummation of a sale as of a specific date and the title passing from seller to buyer under the following conditions:

- 1) *Buyer and seller are typically motivated;*
- 2) *Both parties are well informed or well advised, and acting in what they consider their own best interests;*
- 3) *A reasonable marketing time is allowed for exposure to the open market;*
- 4) *Payment is made in terms of cash in U.S. dollars, or in terms of financial arrangements comparable thereto; and*
- 5) *The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions arranged by anyone associated with the sale.*

Many of the legal definitions of market value are based on the following:

*The highest price estimated in terms of money that the land would bring if exposed for sale in the open market, with reasonable time allowed in which to find a purchaser, buying with knowledge of all of the uses and purposes to which it was adapted and for which it was capable of being used. {Sacramento Southern R. R. Co. v. Heilbron 156 Cal. 408, 104 P. 979 (1909).} [2]*

A definition that incorporates concepts that are most widely agreed upon, such as willing, able, and knowledgeable buyers and sellers who act prudently, gives an appraiser a choice among three bases: 1) all cash, or 2) terms equivalent to cash, or 3) other precisely revealed terms, and still requires increments or diminutions from the all-cash market value to be quantified in terms of cash. [3]

## DEFINITIONS AND TERMINOLOGY

(Continued)

### **HIGHEST AND BEST USE**

The reasonably probable and legal use of vacant land or an improved property, which is physically possible, appropriately supported, financially feasible, and that results in the highest value. The four criteria the highest and best use must meet are legal permissibility, physical possibility, financial feasibility, and maximum profitability.

**Highest and best use of land or a site as though vacant.** The use of a property based on the assumption that a parcel of land is vacant or can be made vacant through demolition of any improvements.

**Highest and best use of property as improved.** The use that should be made of a property as it exists. [2]

### **FEE SIMPLE ESTATE**

Absolute ownership unencumbered by any other interest or estate subject only to the four powers of government (*limitation of eminent domain, escheat, police power, and taxation*). [2]

### **LEASED FEE ESTATE**

An ownership interest held by a landlord with the right of use and occupancy conveyed by lease to others; the rights of lessor or the leased fee owner and leased fee are specified by contract terms contained within the lease. [2]

### **LEASEHOLD ESTATE**

The right to use and occupy real estate for a stated term and under certain conditions; conveyed by a lease. [2]

### **EASEMENT**

Easements represent another division of property ownership. An easement is *an interest in real property that conveys use, but not ownership, of a portion of an owner's property* [1]. Easements frequently permit a specific portion of a property to be used for access to an adjoining property or as a public right-of-way. Although surface easements are the most common, subterranean and overhead easements are used for public utilities, subways, and bridges. [3]

## DEFINITIONS AND TERMINOLOGY

(Continued)

### CASH EQUIVALENCY ANALYSIS

The procedure in which the sale prices of comparable properties sold with atypical financing terms are adjusted to reflect typical market terms. [2]

### DIRECTIONAL TERMS

The individual islands do not generally lie on a clear north/south axis. Directional terminology, therefore, frequently makes reference to location, such as: mauka - (*uka*) inland, upland, towards the mountain [4]; makai - (*kai*) toward the sea [4]; and townside - toward the town.

SOURCE: [1] Rules and Regulations, *Federal Register*, Volume 55, No. 165, Page 34696 (1989).

[2] *The Dictionary of Real Estate Appraisal*, 3rd Ed., Appraisal Institute, (1992).

[3] *The Appraisal of Real Estate*, 10th Ed., Appraisal Institute (1992).

[4] *Hawaiian Dictionary*, Pakui and Elbert (1973).

**EXHIBIT C**

**Assumptions and Limiting Conditions**

## **ASSUMPTIONS AND LIMITING CONDITIONS**

This counseling letter has been made with the following general assumptions:

- 1) No responsibility is assumed for the legal description or for matters including legal or title consideration. Title to the property is assumed to be good and marketable unless otherwise stated.
- 2) The property is appraised free and clear of any or all liens or encumbrances unless otherwise stated.
- 3) Responsible ownership and competent property management are assumed.
- 4) The information furnished by others is believed to be reliable. However, no warranty is given for its accuracy.
- 5) All engineering is assumed to be correct. The plot plans and illustrative material used in this analyses pertaining to this letter are included only to assist the reader in visualizing the property.
- 6) It is assumed that there are no hidden or unapparent conditions of the property, subsoil, or structures that render it more or less valuable. No responsibility is assumed for such conditions or for arranging for engineering studies that may be required to discover them.
- 7) It is assumed that there is full compliance with all applicable federal, state, and local environmental regulations and laws unless noncompliance is stated, defined, and considered in the counseling letter.
- 8) It is assumed that all applicable zoning and use regulations and restrictions have been complied with, unless a nonconformity has been stated, defined, and considered in the counseling letter.
- 9) It is assumed that all required licenses, certificates of occupancy, consents, or other legislative or administrative authority from any local, state, or national government or private entity or organization have been or can be obtained or renewed for any use on which the value estimate contained in this letter is based.
- 10) It is assumed that the utilization of the land and improvements is within the boundaries or property lines of the property described and that there is no encroachment or trespass unless noted in the letter.

This counseling letter has been made with the following general limiting conditions:

- 1) The distribution, if any, of the total valuation in this letter between land and improvements applies only under the stated program of utilization. The separate allocations for land and buildings must not be used in conjunction with any other appraisal and are invalid if so used.

## ASSUMPTIONS AND LIMITING CONDITIONS

(Continued)

- 2) Possession of this letter, or a copy thereof, does not carry with it the right of publication.
- 3) The appraiser[s], by reason of this appraisal, is not required to give further consultation, testimony, or be in attendance in court with reference to the property in question unless arrangements have been previously made.
- 4) Neither all nor any part of the contents of this letter (*especially any conclusions as to value, the identity of the appraiser[s], or the firm with which the appraiser[s] is connected*) shall be disseminated to the public through advertising, public relations, news, sales, or other media without the prior written consent and approval of the appraiser[s].
- 5) In this appraisal assignment, the existence of potentially hazardous material used in the construction or maintenance of the building, such as the presence of urea-formaldehyde foam insulation, asbestos, and/or the existence of toxic waste, which may or may not be present on the property, was not observed by us; nor do we have any knowledge of the existence of such materials on or in the property. The appraiser[s], however, are not qualified to detect such substances. The existence of urea-formaldehyde insulation or other potentially hazardous waste material may have an effect on the value of the property. We urge the client to retain an expert in this field, if desired.
- 6) All counseling letters must state that it is the intention of the appraiser[s] that the letter complies with all statutes, rules and regulations prohibiting discrimination on the basis of race, color, religion, sex, or national origin, and marital status.

**Appendix D**  
**Community Support**  
**Waianae**

August 21, 1993

Mike Kline  
500 Lunalilo Home Road PH #17B  
Honolulu, HI 96825

Dear Mike:

Thank you for taking the time to meet with myself and some of my neighbors concerning your proposed project.

As we discussed, elderly housing is greatly needed here on the Wai'anae Coast. We have recently lost several families here in our neighborhood as they were forced to move in with their relatives as they could no longer maintain both house and yard. One family in particular hurt me the most to lose. Masa and Betty Shimabukuro were both born and raised here in Wai'anae and had worked for the plantation. They were both Grandma and Grandpa to many children here who loved to listen to their stories and eat all their goodies that were always waiting for them after school. Masa was in his 80's and Betty her 70's when they were forced to realize they could no longer take care of the house and yard.

If there had been a project as you are proposing for our area, they would have been able to stay and our community would have saved a valuable resource.

For the now five years I have been a member of the Wai'anae Coast Neighborhood Board #24, we are constantly being asked to help with the housing crunch. I believe a project such as yours would allow the seniors to move into their own homes where they could be self sufficient and free the "regular" houses for those who need it.

Again thank you for your time. We will be looking forward to meeting with you in the future.

Sincerely,



Gail Gomes  
86-232 Alamihi St.  
Wai'anae, HI 96792

86-297 Ala Mihi Street  
Waianae, Hawaii 96792

October 5, 1993

Mr. Mike Klein  
POKAI BAY OCEAN VIEW VENTURES, INC.  
500 Lunalilo Home Road 17B  
Honolulu, Hawaii 96825

Dear Mike:

Please be informed that my wife and I, residents of 86-297 Alamihi Street, Waianae, Hawaii, are supportive of the proposed senior citizen development regarding the POKAI BAY OCEAN VIEW VENTURES, INC.

My wife and I both have reviewed the various aspects of this proposed development and can only conclude that all elements regarding this development have been systematically reviewed by the officials of the corporation to blend into our community a modern day multi-faceted housing-type complex.

Personally, my wife and I feel that there is an urgent need for senior citizen complex-type developments to be planned, built and maintained to best meet the specific needs of the individual senior citizen.

And, too, we are proud to anticipate the fact that we are residing in the community that will benefit from this development. Needless to say, both of us want to become advocates of this venture because of the many positive attributes of this planned venture.

Mahalo for the opportunity to share our thoughts!

Sincerely,

  
Ben Mayes

Waianae, Hawaii 96792  
84-757 Kiana Place 10C

October 19, 1993

To whom it may concern:

This is to express approval of plans for Pokai Ocean View housing for the elderly.

We are in our seventies, retired, residents in the area for several years. We have many friends and acquaintances who have voiced a similar desire for a quiet place to live, designed with the needs of older persons in mind. There are some who have said they would like to move to this area if there were such housing available. Waianae is the perfect town for such a project.

As former resident manager and now president of the board of directors at Makaha Valley Plantation, and as a member of the Senior Club, Sacred Hearts Church, and president of the Waianae Coast AARP, we are well acquainted here.

Very sincerely,

Cecil & Evelyn Bindel

*Cecil A. Bindel*

*Evelyn Bindel*

Pokai Bay Ocean View  
Elderly Apartment Petition  
October 1993

The Developer of Pokai Bay Ocean View located on 32 acres on the water tank side of Lualualei Homestead Road in Waianae needs your support for 60 elderly apartments and 54 elderly condominiums.

1. Susan Starzynski Phone # 696-6037 Age 75 :
2. Rufino C. Dubane Phone # 668-2646 Age 86 :
3. Marilynne Strong Phone # 696-2958 Age 75 :
4. Edith Uterhardt Phone # 668-8776 Age 73 :
5. Alice M. Giverson Phone # 669-6557 Age 76 :
6. Margaret Evans Phone # 696-2626 Age 60 :
7. Cecil A. Bindel Phone # 695-7669 Age 75 :
8. Bessie B. Besente Phone # 668-2602 Age 73 :
9. Louise Kong Phone # 668-7046 Age 76 :
10. Eddie C. Lora Phone # 668-5919 Age 72 :

Pokai Bay Ocean View  
Elderly Apartment Petition  
October 1993

The Developer of Pokai Bay Ocean View located on 32 acres on the water tank side of Luualalei Homestead Road in Waianae needs your support for 60 elderly apartments and 54 elderly condominiums.

1. Andrew K Lynch Phone # 696-2253 Age 66
2. Robert J. Hoffman Phone # - Age 69
3. Van Gormley Phone # 696-9991 Age 76
4. Zola Browning Phone # 696-3405  
696-9805 Age 61
5. Henriette J. Suttell Phone # 668-8968 Age 70
6. Janice Webb Phone # 695-5783 Age 71
7. Ethelyn Ballou Phone # 696-4562 Age 62
8. \_\_\_\_\_ Phone # \_\_\_\_\_ Age \_\_\_\_\_
9. \_\_\_\_\_ Phone # \_\_\_\_\_ Age \_\_\_\_\_
10. \_\_\_\_\_ Phone # \_\_\_\_\_ Age \_\_\_\_\_

Pokai Bay Ocean View  
Elderly Apartment Petition  
October 1993

The Developer of Pokai Bay Ocean View located on 32 acres on the water tank side of Lualualei Homestead Road in Waianae needs your support for 60 elderly apartments and 54 elderly condominiums.

1. Walter Suella Phone # \_\_\_\_\_ - \_\_\_\_\_ Age 64:
2. Gertrude W. Souza Phone # \_\_\_\_\_ - \_\_\_\_\_ Age 73:
3. Esther Pasquella Phone # \_\_\_\_\_ - \_\_\_\_\_ Age 45:
4. Julia Barbarella Phone # \_\_\_\_\_ - \_\_\_\_\_ Age 62:
5. Joyce Matute Phone # \_\_\_\_\_ - \_\_\_\_\_ Age 63:
6. Annie Tuyen Phone # \_\_\_\_\_ - \_\_\_\_\_ Age 73:
7. Quintie Adams Phone # \_\_\_\_\_ - \_\_\_\_\_ Age 66:
8. Leona John Phone # \_\_\_\_\_ - \_\_\_\_\_ Age 77:
9. Maria C Magana Phone # \_\_\_\_\_ - \_\_\_\_\_ Age 66:
10. William M. Stoughton Phone # 696-7653 Age 82:

Pokai Bay Ocean View  
Elderly Apartment Petition  
October 1993

The Developer of Pokai Bay Ocean View located on 32 acres on the water tank side of Lualualei Homestead Road in Waianae needs your support for 60 elderly apartments and 54 elderly condominiums.

1. Evelyn Bindel Phone # 695-4669 Age 76:

2. Olive K. Williamson Phone # 695-5741 Age 73:

3. Helen. Gubane Phone # - Age :

4. George Roman Phone # 696-3108 Age 60:

5. Fay Foster Phone # 696-4134 Age 65:

6. Helen E. Foster Phone # " Age 53:

7. Kim Phone # 696-7896 Age 58:

8. Joy Pickering Phone # 696-5646 Age 59:

9. Phone # - Age :

10. Phone # - Age :

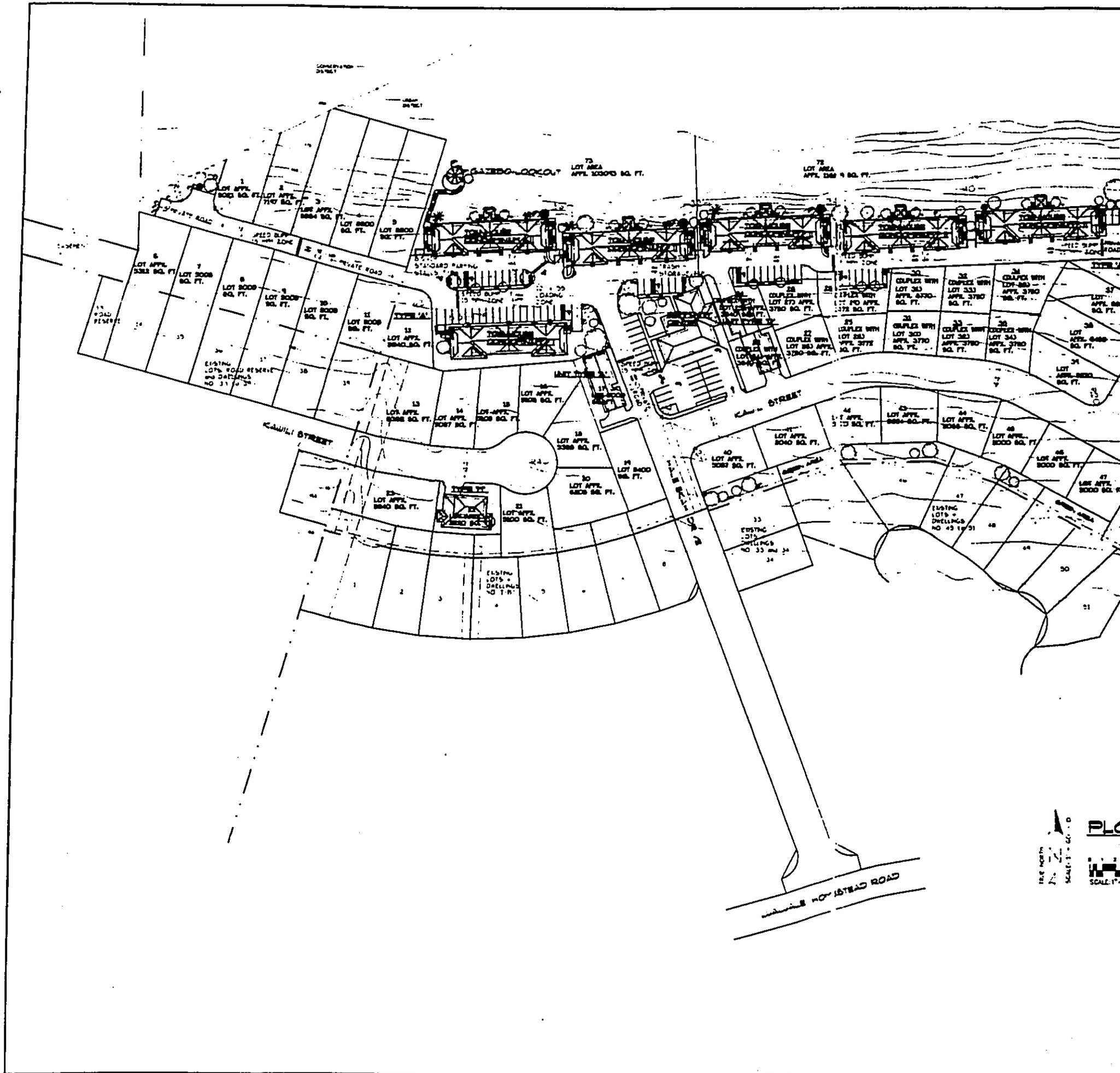
DOCUMENT CAPTURED AS RECEIVED

Pokai Bay Ocean View  
Elderly Apartment Petition  
October 1993

The Developer of Pokai Bay Ocean View located on 32 acres on the water tank side of Lualualei Homestead Road in Waianae needs your support for 60 elderly apartments and 54 elderly condominiums.

1. Marge Sigmond Phone # 696-9227 Age 64 :
2. John Smith Phone # 696-7794 Age 69 :
3. PAT E FURT Phone # 696-7794 Age 70 :
4. Ruby K. Bivia Phone # 696-2255 Age 62 :
5. Mildred H. Lynch Phone # 696-2253 Age 63 :
6. \_\_\_\_\_ Phone # \_\_\_\_\_ Age \_\_\_\_\_ :
7. \_\_\_\_\_ Phone # \_\_\_\_\_ Age \_\_\_\_\_ :
8. \_\_\_\_\_ Phone # \_\_\_\_\_ Age \_\_\_\_\_ :
9. \_\_\_\_\_ Phone # \_\_\_\_\_ Age \_\_\_\_\_ :
10. \_\_\_\_\_ Phone # \_\_\_\_\_ Age \_\_\_\_\_ :

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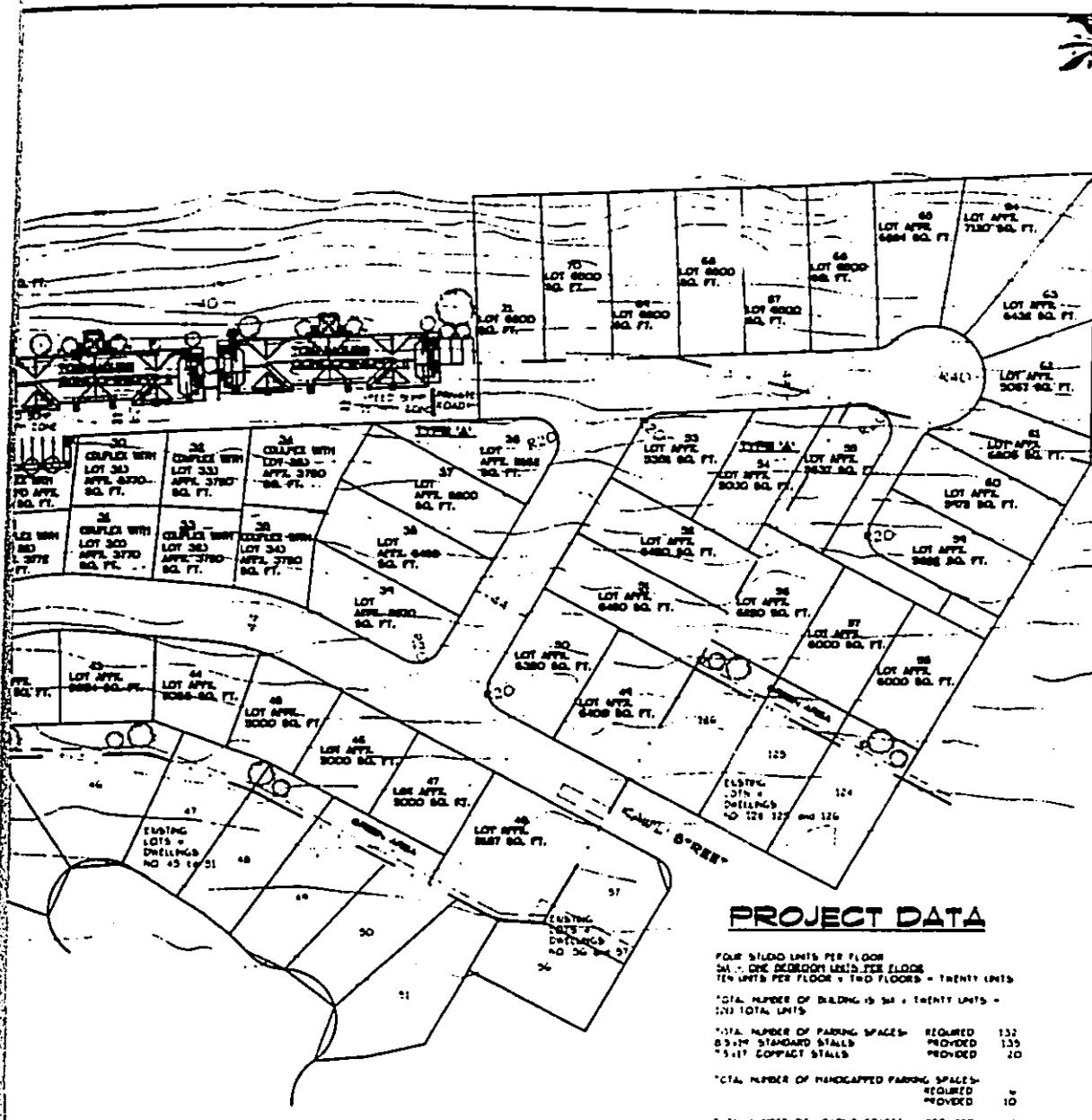
**HAWAII ARCHITECTS INC.**  
James Matienok, AIA

NO REVISIONS



The work was prepared by me or under my supervision and limited supervision of the project and by my subordinate. I am a duly licensed Professional Engineer in the State of Hawaii.

NOTE: Contractor to verify and verify all dimensions at job before proceeding with job.



**PROJECT DATA**

FOUR STUDIO UNITS PER FLOOR  
ONE ONE BEDROOM UNITS PER FLOOR  
TEN UNITS PER FLOOR - TWO FLOORS - TWENTY UNITS

TOTAL NUMBER OF BUILDING IS 34 - THIRTY UNITS - 120 TOTAL UNITS

TOTAL NUMBER OF PARKING SPACES - REQUIRED	132
8.5' X 12' STANDARD STALLS - PROVIDED	132
5.0' X 7' COMPACT STALLS - PROVIDED	20

TOTAL NUMBER OF HANDICAPPED PARKING SPACES - REQUIRED 6  
PROVIDED 10

TOTAL NUMBER OF LOADING SPACES - REQUIRED 0  
PROVIDED 0

TOTAL FLOOR AREA

STUDIO UNITS	445 x 8 = 3560 SQ FT
ONE BEDROOM UNITS	327 x 12 = 6324 SQ FT
EXTERIOR WALKWAY AND STAIR	416 SQ FT

TOTAL PER BUILDING - 20000 SQ FT  
34 BUILDINGS - 680000 SQ FT

**INDEX TO PAGES**

- SHEET A1**  
LOWER SHEET PRELIMINARY MAP PROJECT DATA, INDEX TO PAGES
  - SHEET A2**  
TYPICAL FIRST AND SECOND FLOOR PLAN FOR BUILDINGS AND 1 BASEMENT PARKING PLAN FOR BUILDING 1
  - SHEET A3**  
TYPICAL FIRST AND SECOND FLOOR PLAN FOR UNITS TYPE 1 AND 2 TYPICAL FLOOR PLAN UNIT TYPE 3 FOR INDIVIDUALS WITH DISABILITIES
  - SHEET A4**  
TYPICAL FLOOR PLAN FOR A DUPLEX AFFORDABLE AND MARKET DRILLING
  - SHEET A5**  
FIRST FLOOR PLAN OF PROPOSED COMMUNITY CENTER
  - SHEET A6**  
EXTERIOR BUILDING ELEVATIONS FOR BUILDING TYPE 1
  - SHEET A7**  
EXTERIOR BUILDING ELEVATIONS FOR BUILDING TYPE 2 TYPICAL BUILDING CROSS SECTION BUILDING MATERIALS AND FINISHES
- NOTE:**  
BUILDING TYPE 1 - SINGLE FAMILY DWELLING  
BUILDING TYPE 2 - DUPLEX FAMILY DWELLING  
BUILDING TYPE 3 - SINGLE FAMILY DWELLING  
SEE SHEET A1 FOR BUILDING LAYOUT



**PRELIMINARY MAP**

**POKAI BAY OCEAN VIEW**  
Waiānae, Hawaii

TMK: 8 - 6 - 001 : 043 & 050

DATE: 11/2/83 SHEET NO:

DRAWN BY: B. BALYASAR

FILE: 83 - 470 07 SHEETS

A1

**SECTION I: EXECUTIVE SUMMARY OF THE  
SUBJECT AREA AND PROPERTY**

---

**SUBJECT AREA DESCRIPTION**

The proposed subject POKAI BAY OCEAN VIEW SUBDIVISION is located in the Lualualei Valley in the Leeward Oahu neighborhood of Waianae. Primary access to and from Farrington Highway is provided by Lualualei Homestead Road. The immediate surroundings of the subject project are characterized by the recently completed Village Pokai Bay single-family residential development to the southwest, a steep hillside (*Pu'u Mailiili*) to the southeast, and undeveloped preservation and agricultural areas to the north and east. It should be noted that various agriculture and livestock operations (*primarily poultry and piggeries*), are located throughout the Waianae and adjacent Lualualei Valley area. In addition to livestock operations, the Lualualei Naval Reservation comprises much of the rear of the Lualualei Valley. The mouth of the valley is improved with older single-family development along secondary streets, while Farrington Highway is improved with both residential and commercial uses, which service the community and commuters traveling to and from Waianae and Makaha. A Subject Area Map is included on the preceding facing page.

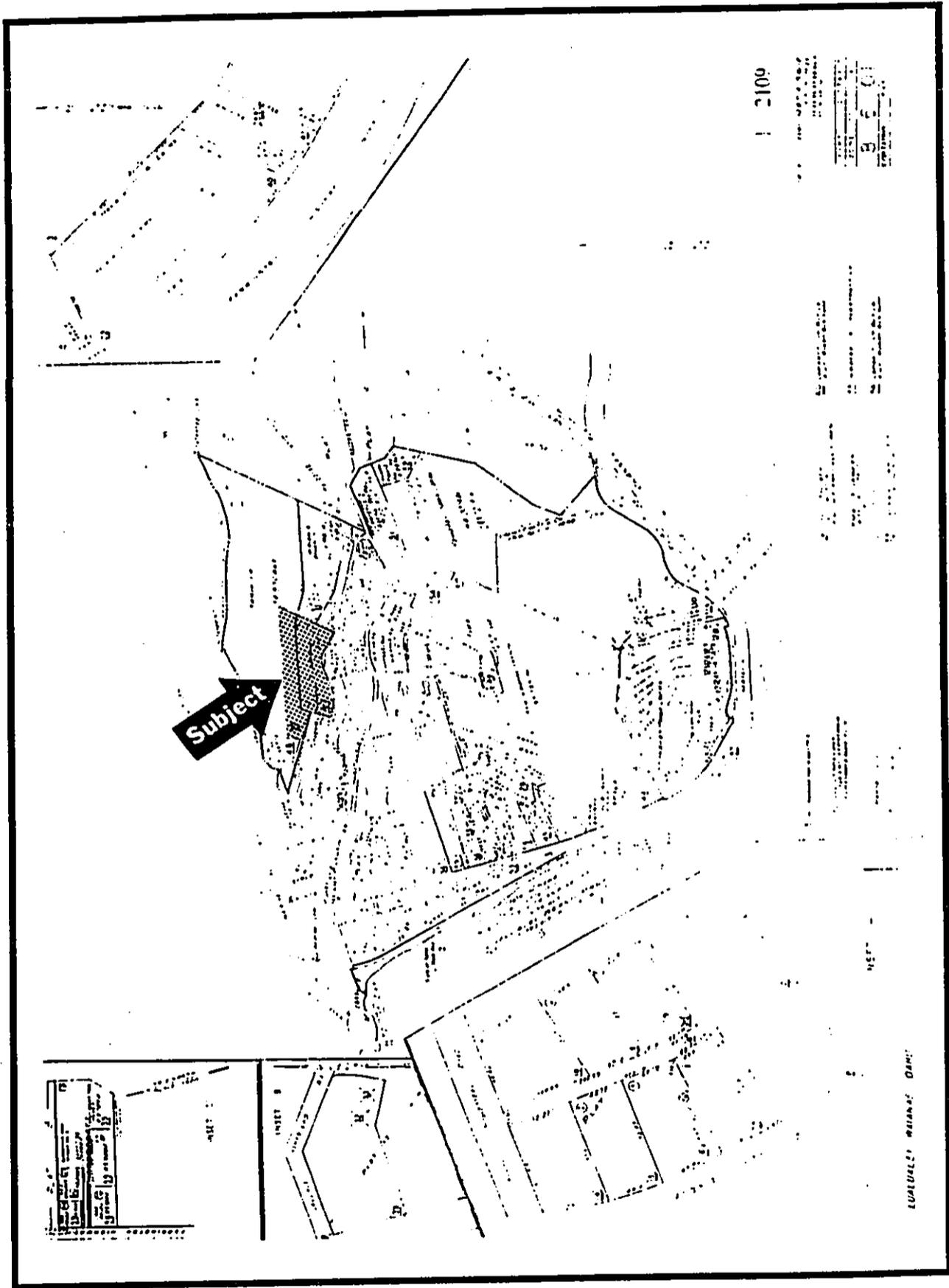
Waianae is bordered by the sea to the west, the Leeward Oahu neighborhoods of Maili and Nanakuli to the south, Makaha to the north, and the Waianae Mountain range and Waianae Kai Forest Reserve to the east. Honolulu proper is approximately 36 miles south of Waianae. Leeward Oahu is serviced primarily by Farrington Highway, a coastal route that stretches from Waipahu, in Central Oahu, to near Kaena Point, which is the western tip of Oahu. Thus, from most of Oahu, Waianae can only be accessed from Farrington Highway, via Central Oahu.

The subject area is considered to be a fairly rural area, as compared to Honolulu and Central Oahu. The subject area is located northwest of much of Oahu's new and proposed residential development in the Ewa plain and Central Oahu. However, development in the subject area reflects a succession of the general development trend westward from Honolulu. The Ko' Olina Resort and Kapolei, Oahu's proposed second urban center, will both be continuously developed through the 1990s, and are both located in the Ewa plain. The subject area has relatively good access to these areas and is expected to generally benefit from their proximity. As of April 1, 1990, the Waianae Coast, in which the subject is located, had a resident population of 58,472, according to U.S. Bureau of the Census.

**PROPERTY DESCRIPTION**

**LOCATION:** Hale Ekahi Drive (*Off of Lualualei Homestead Road*),  
Waianae, Island of Oahu, State of Hawaii

**TAX MAP KEY:** Division 1, Zone 8, Section 6, Plat 01, Parcels 011, 043  
and a Portion of Parcel 050



SUBJECT LOCATION MAP

**SITE DESCRIPTION/  
PRESENT USE:**

Subject Parcel 043 contains 9.47 acres of gradually sloping land presently zoned for Preservation use under the current State Land Use Ordinance. The portion of Subject Parcels 011 and 050 to be included in the proposed development lot is also gradually sloping and contains roughly 1.00 and 6.93 acres, respectively, of Preservation zoned land area (*according to a Preliminary Map prepared by James Matichuk, ALA, dated November 9, 1993 - see Addenda Exhibit A for a copy of the Preliminary Map*). A Subject Location Map is provided on the facing page.

**STATE LAND USE**

**COMMISSION CLASSIFICATION:**

- PARCEL 011: Urban
- PARCEL 043: Urban
- PARCEL 050: Urban/Conservation

**DEVELOPMENT PLAN:**

- PARCEL 011: Preservation
- PARCEL 043: Preservation
- PARCEL 050: Preservation

**COUNTY ZONING:**

- PARCEL 011: Restricted and General Preservation
- PARCEL 043: General Preservation
- PARCEL 050: Restricted and General Preservation

**UTILITIES:**

Public utility services are available to the subject site at street frontage (*water, power, and sanitary sewer services*). Power delivery is via overhead conduits. The proposed master planned POKAI BAY OCEAN VIEW subdivision calls for the enhancement or replacement of certain portions of the existing infrastructure, particularly the sanitary sewer connections.

**PROPOSED USE:**

Subdivision of the subject 17.40-acre site (*gross site area, inclusive of roadways*) into a master planned, mixed use housing development, to be known as the POKAI BAY OCEAN VIEW SUBDIVISION. The proposed development is to incorporate low income, multi-family elderly rental units; affordable multi-family townhomes restricted to elderly persons 55 years or older; and single-family, market price residential detached dwellings. The total number of units to be developed is 185, of which, 47 will be single-family residences. The project is planned for development in two phases.

**PROPOSED USE  
(CONTINUED):**

A necessary condition of the proposed subject development is the rezoning of the subject site from P-2, General Preservation to A-2, Medium Density Apartment and R-5, Residential. The rezoning of the subject site will be sought by the developer under the exemptions permitted for 201E affordable housing projects.

The aforementioned 47 single-family residences are the focal point of this study.

**HIGHEST AND BEST USE:**

Subdivision of the subject site for residential use (*redevelopment of the subject site*). Such a redevelopment would require the rezoning of the site to accommodate a higher order use.

**TITLE DATA  
(OWNERSHIP OF RECORD):**

Currently, the City and County of Honolulu Real Property Tax Office records reflect that the subject site is owned in fee simple by William A. Stricklin (*Parcels 011 and 043*) and William A. Stricklin Attorney Corp. (*Parcel 050*).

**REAL PROPERTY RIGHTS  
INVOLVED IN  
THIS ASSIGNMENT:**

Fee Simple

**SECTION II: PURPOSE AND SCOPE OF THIS STUDY,  
AND CURRENT PRELIMINARY PLANS FOR  
DEVELOPMENT OF THE SUBJECT PROJECT SITE**

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**PURPOSE AND SCOPE OF THIS MARKET STUDY**

As indicated at the beginning of this letter, the purpose of this assignment is to conduct a market study to estimate the optimum sales price range for the 47 single-family, market price homes to be developed as a component of the POKAI BAY OCEAN VIEW housing project. The optimum sales price range is predicated upon the assumption of an average lot size of 5,925 square feet and an average home size of 1,650 square feet of interior area (*the developer indicates that homes will be offered in three-bedroom/three-bathroom and four-bedroom/three and one-half bathroom models*).

This market study includes data from within the Central and Leeward Oahu residential markets. While certain macro-data involving overall business and residential trends is important in correlation with various residential markets on the Island of Oahu, it was considered that this macro-data, while discussed briefly herein, was on a detailed basis, out of the scope of this study. This market study is very specific, regarding the most important residential market supply and demand factors, which were assumed to influence the optimum sales price points for the single-family house and lot packages to be built on the subject developer's parcel, as will be explained in following Section III, which is entitled *Research Parameters and Findings of this Market Study*. The market study was primarily conducted on a practical basis, involving emphasis on residential first-sales (*developer's sales*) market data.

**PRELIMINARY PLANS FOR DEVELOPMENT  
OF THE SUBJECT - ACRE DEVELOPER'S SITE**

According to the client, as of the date of this assignment, the subject developer's site is planned for development with a master planned, mixed use housing project, which will incorporate multi-family units designed to accommodate low income elderly rentals and salable affordable elderly townhomes. In addition, 47 single-family, detached residences will be included in the development to be sold at market prices without elderly resident restrictions. As mentioned previously, the focal point of this study is the 47 single-family residences.

The average lot size for the 47 proposed single-family residences is to be 5,925 square. The average interior area is to be 1,650 square feet. As mentioned earlier, the homes will be offered in three-bedroom and four-bedroom models. The construction quality is to be of good quality, offering details not presently found in new homes developed on the scale of the subject project (*i.e., subdivision product as opposed to custom homes*), in the subject marketplace. Certain construction details will include: steel stud framing; monier tile roofing; structural wind resistance to 140 miles per hour (*current building code requirement for wind resistance is 85 miles per hour*); and stucco exterior finish. An artists rendering of the proposed POKAI BAY OCEAN VIEW housing project is presented on the facing page.

The average house and lot package, proposed by the developer, will generally exceed the typical size of competitive product in various other new subdivisions in Central Oahu and Ewa.

### **SECTION III: RESEARCH PARAMETERS AND FINDINGS OF THIS MARKET STUDY**

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#### **RESEARCH PARAMETERS OF THIS MARKET STUDY**

To determine the optimum sales price range for the proposed subject market price, single-family residential homes, offered as a component of the master planned POKAI BAY OCEAN VIEW housing project, the appraisers conducted a market study with the following research parameters:

#### **RESEARCH PARAMETERS**

##### **DEFINED MARKET AREA:**

Central/Leeward Oahu (Typical Search Boundaries: the Waikele area to the east; Ewa Plain, Kapolei, Makakilo and the Waianae Coast to the west; Mililani to the north, and the ocean to the south.)

##### **REAL PROPERTY PRODUCT SURVEYED/STUDIED:**

New, single-family, residential home sales and listings.

##### **TIME FRAME OF THIS STUDY:**

NEAR TERM: 1 to 2 Years From Date of Assignment (February 1, 1994)

LONG TERM: Within Past 2 Years From Date of Assignment

##### **PRIMARY DATA RESEARCH CONDUCTED FOR PURPOSES OF THIS STUDY:**

##### **■ SUPPLY FACTOR RESEARCH (COMPETITION ASSESSMENT) INVOLVING:**

- 1) Current and proposed new residential house and lot package listing data (*developer's inventory*).

##### **■ DEMAND FACTOR RESEARCH INVOLVING:**

- 1) New first sale activity (*developer's sales*);
- 2) Sales price indicators (*listings*) and perceived price ceilings; and
- 3) Purchaser profile outlines.

##### **SECONDARY DATA RESEARCH CONDUCTED FOR PURPOSES OF THIS STUDY:**

Research and discussion of corollary economic and demographic factors that may have an influence on the future residential development of the subject developer's site.

**SOURCES:**

- 1) Honolulu Board of Realtors Multiple Listing Service
- 2) City and County of Honolulu Real Property Tax Office
- 3) State of Hawaii Bureau of Conveyances
- 4) City and County of Honolulu Planning Department
- 5) Honolulu Star Bulletin
- 6) Various Interviews With Commercial Real Estate Brokers and Developers' Representatives:
  - Mr. Colin Yasukochi, Research Project Manager; Locations Sales and Research, Inc.
  - Ms. Doreen Sugita; Locations Sales and Research, Inc.
  - Ms. Greta Kilipinen; Gentry Realty, Ltd.
  - Mr. Roy Ishikawa; Budget Realty, Ltd.
  - Ms. Pakinee Portmore; West Oahu Realty, Inc.
  - Mr. Roy Nakamura; Coldwell Banker - McCormick Realty.
  - Mr. Richard Cayer; Waianae Coast Realty.
  - Mr. Charles Underwood; Lagoon Realty, Ltd.
  - Savio Realty, Inc.
  - Mr. Stanley Ajimura; Finance Realty, Ltd.
  - Mr. Richard Tongg; Tongg Realty, Inc.
  - Ms. Ivy Kumai; Kumai Realty, Inc.
  - Mr. Alan Kashiwabara; Premier, Inc. (for Olaloa).
  - Ms. Alexis Coppedge; Schuler Realty/Oahu, Inc.
  - Ms. Billie Levesque; Lokelani Homes.

**FINDINGS OF THIS MARKET STUDY**

Based on the above-cited research parameters of this study, the appraisers were able to summarize their findings, as indicated following, beginning with our *Supply Factors* discussion.

**SUPPLY FACTORS (COMPETITION ASSESSMENT)**

The appraisers researched various supply factors in the Central and Leeward Oahu residential market, to ascertain the following: 1) to find out what new, single-family residential inventory may be currently available, or planned for development within say, two years, which may be potentially competitive with any single-family homes proposed for development on the subject project property; and 2) based on the current and planned inventory of single-family residential homes in Central and Leeward Oahu, is there a viable market niche for upscale single-family housing product in Waianae such as that proposed for development on the subject developer's site.

Relative to the foregoing, the appraisers' research revealed the following, with respect to available new sale residential inventory.

## **CURRENTLY AVAILABLE AND PROPOSED NEW SALE INVENTORY**

Research for single-family residential new sale listing data was based on data collected from the Honolulu Board of Realtors, Multiple Listing Service, and various publications (e.g., *Honolulu Star Bulletin*); and also on listed resumes provided by various Island of Oahu residential real estate brokerage firms.

Our research for currently available and/or proposed new single-family residential home product in the immediate Waianae Coast area of Leeward Oahu found only two housing projects, the Village Pokai Bay (*situated adjacent to the proposed subject development site*) and the Lokelani at Maili Kai (*situated nearby in the Lualualei Valley area of Maili*). The Village at Pokai Bay was started in 1991 with Increment 1 containing 198 units and Increment 2 to contain 227 units. Lokelani at Maili Kai was started in 1992 with Increment 1 containing 288 units and Increment 2 to offer as many as 1,000 units to be developed over a ten-year period.

Homes within Village Pokai Bay were offered in eight different models with interior areas ranging from 1,000 square feet to 1,915 square feet. Typical lot size is 5,000 square feet, however, there are some larger lots available within the project. Homes within Lokelani at Maili Kai are offered in four different models with interior areas ranging from 974 square feet to 1,309 square feet. Typical lot size is from 3,800 square feet to 5,400 square feet.

The Department of Hawaiian Home Lands has plans to develop 520 units over the next several years, however, this product is not seen as competitive with the proposed subject project.

The majority of new home construction in Central and Leeward Oahu has occurred between Mililani Town and the Ewa plain. Between 1990 and the year 2007, a total of 28,730 single-family homes are planned within ten different master planned communities. As of February 1994, approximately 14,150 (or 49%) of these homes have been delivered to the marketplace. In addition, multi-family units have become a popular product line and will make-up additional competing inventory at the entry level price points.

## **DEMAND FACTORS**

To research demand factors for new housing product in the subject market area, the appraisers studied general housing and population projections for Central and Leeward Oahu; new sales activity in the immediate subject market area as well as competing product in the Leeward and Central Oahu market areas; current sales price indicators, purchaser profile outlines, and general market perceptions gained from interviews with various brokers and developers. Our research findings are reported as follows.

## **HOUSING AND POPULATION PROJECTIONS LEEWARD AND CENTRAL OAHU**

The Central Oahu area (*inclusive of the Ewa plain*) is planned for major secondary urban growth, by the City and County of Honolulu planning authorities. The Central and Leeward areas of the Island of Oahu, will play a major role in the future of the Island of Oahu, as developable land in other areas becomes less available. These areas are

**TABLE 1**

**ESTIMATED CURRENT SHORTAGE  
OF RESIDENT HOUSING STOCK  
LEEWARD AND CENTRAL OAHU,  
ISLAND OF OAHU, STATE OF HAWAII**

	Existing 1992	Projected 2010
<b>Calculated Resident to Housing Unit Ratio:</b>		
1) Resident Population:	864,800	999,500
2) Resident Housing Stock:	288,805	357,478
3) Ratio of Residents Per Housing Unit:	2.99	2.80
<b>Indicated Housing Shortage Based on Targeted Resident to Housing Ratio:</b>		
1) Existing Resident Population (1992):	864,800	Residents
2) Ideal Ratio of Residents Per Housing Unit:	2.80	
3) Ideal Resident Housing Stock (1992):	309,302	Units
4) Less: Existing Resident Housing Stock (1992):	288,805	Units
5) Indicated Current Shortage of Resident Housing (1992):	20,497	Units
6) Allocation to the Ewa (Leeward) and Central Oahu Areas:	24.7%	
7) Allocated Current Resident Housing Shortage, Ewa (Leeward) and Central Oahu Areas (1992):	5,063	Units

SOURCE: HOWELL & ASSOCIATES, FEBRUARY 1994

# CORRECTION

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

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SOURCE: HOWELL & ASSOCIATES, FEBRUARY 1994

experiencing, and will continue to experience, the majority of new residential development. Various service industries, community amenities, and medical facilities have evolved in recent years, paralleling rapid population growth in the areas. The major Ewa Judicial District core areas in the future will be: planned Kapolei Town on the Ewa Plain; Makakilo, above the Ewa Plain; Waipahu Town near Pearl Harbor, and below Waikele, just west of Waipio; Waipio By Gentry, just above Waikele; Mililani Town, between Waipio By Gentry and Wahiawa; and Pearl City, just southeast of Waikele.

As of April 1, 1990, various U.S. Bureau of the Census data estimated the population of the Ewa Judicial District (*Central/Leeward Oahu - exclusive of Waianae*) to be 230,189, or approximately 28% of the total population estimate for the City and County of Honolulu (836,231).

To examine future housing and population trends in the Waianae area, we relied on our own research as discussed herein, and also referred to a study prepared in September 1989 by the Department of General Planning, City and County of Honolulu, entitled "*Development Plan Status Report, Fiscal Year: 1989*". According to the Development Plan Status Report, the Waianae district is projected to experience population growth from 35,180 in 1988 to 41,200 in 2010, yet will reflect a relatively constant share of total island population (*about 4%*). In terms of housing units, the Waianae district will require about 13,981 units to satisfy housing needs for the area by the year 2010, or roughly 3,622 more units than existed in 1988. When considering the proposed new product housing supply for Waianae discussed previously, there are at least 2,233 units (*or 62% of the projected maximum necessary supply by 2010*) planned for development in the near future (*exclusive of the proposed subject housing project*). Given a continuous level of development over the next ten to fifteen years, it would appear that sufficient residential housing would be created to satisfy projected demand in the Waianae market area.

Table 1, on the facing page, illustrates of the shortage of resident housing stock in Leeward and Central Oahu for 1992 based on information obtained from the Department of General Planning of the City and County of Honolulu. The pent-up demand for housing is primarily reflective of the Central Oahu and Ewa market areas, and will likely continue into the next several years as developers are adding inventory at a rate such that housing supply is kept under the demand curve.

#### RECENT NEW SALES ACTIVITY

It has generally been observed, that the residential market in Central and Leeward Oahu, and on the Island of Oahu experienced robust growth during 1989 and 1990, due to foreign investment activity, and overall strong economic trends in the State of Hawaii and mainland U.S. economies. It has also generally been observed, that the State of Hawaii and U.S. economies have typically been sluggish from late 1990 to date, and these trends have had a slowing affect on the Central and Leeward Oahu residential market, as well as other residential markets on the Island of Oahu. This most recent trend is usually gauged by a slowdown in the number of transactions; the dollar value of transactions; and the length of time it takes to consummate a transaction.

The most recent sales price indicators for new housing product in the immediate Waianae Coast area of Leeward Oahu is reflected in first sales activity for the Village Pokai Bay and the Lokelani at Maili Kai. Developer sales prices within Village Pokai Bay during 1993 range between \$176,000 and \$290,000. The predominant price structure was found to be in the \$180,000 to \$200,000 range. For Lokelani at Maili Kai, the developer sales prices ranged between \$179,000 and \$227,000. Again, the predominant price structure was found

TABLE 2

**SUMMARY OF CURRENT SINGLE-FAMILY PRODUCT  
UNIT SIZE AND PRICING CHARACTERISTICS FROM  
SELECTED COMPETING RESIDENTIAL DEVELOPMENTS  
LEEWARD AND CENTRAL OAHU, STATE OF HAWAII**

DEVELOPMENT - Location - Single-Family Project	RANGE OF HOME PRICES			RANGE OF HOME LIVING AREAS (SQUARE FEET)			RANGE OF HOME PRICES PER SQ. FT.			Typical Lot Size (Square Foot)
	Low	High	Average	Low	High	Average	Low	High	Average	
	<b>EWA BY GENTRY</b> - Ewa									
1) Sun Terra	\$252,000	\$305,000	\$279,000	945	1,671	1,268	\$266.67	\$182.53	\$220.03	3,400
<b>KAPOLEI VILLAGE</b> - Ewa										
1) Kumu Iki	\$280,000	\$401,000	\$341,000	1,200	1,924	1,488	\$233.33	\$208.42	\$229.17	4,900
2) Malanai	\$335,000	\$365,000	\$350,000	1,721	2,246	1,987	\$194.65	\$162.51	\$176.14	5,000
<b>MAKAKILO</b> - Ewa										
1) West Cliff	\$315,000	\$350,000	\$333,000	1,436	2,370	1,903	\$219.36	\$147.68	\$174.99	5,700
2) West Park	\$317,000	\$343,000	\$329,000	1,394	1,787	1,494	\$227.40	\$191.94	\$220.21	5,600
<b>WEST LOCH ESTATES</b> - Ewa										
1) Fairway Paradise	\$319,000	\$424,000	\$372,000	1,812	2,210	2,018	\$176.05	\$191.86	\$184.34	4,500
2) Fairway Signature	\$285,000	\$330,000	\$308,000	1,635	1,828	1,757	\$174.31	\$180.53	\$175.30	4,800
3) Fairway Homes	\$400,000	\$578,000	\$489,000	2,220	2,744	2,483	\$180.18	\$210.64	\$196.94	5,500
<b>WAIKELE</b> - Central Oahu										
1) Sunset Pointe	\$328,000	\$375,000	\$342,000	1,300	1,471	1,351	\$252.31	\$254.93	\$253.15	4,100
2) Golf Club Estates	\$477,000	\$500,000	\$489,000	1,600	2,016	1,771	\$298.13	\$248.02	\$276.12	5,000
<b>MILILANI - MAUKA</b> - Central Oahu										
1) Pacific Traditions	\$346,000	\$491,000	\$380,000	1,411	2,290	1,701	\$245.22	\$214.41	\$223.40	6,000
2) Na Lei	\$318,000	\$366,000	\$335,000	1,075	1,456	1,250	\$295.81	\$251.37	\$268.00	4,700
3) Na Pua	\$296,000	\$353,000	\$320,000	1,033	1,572	1,279	\$286.54	\$224.55	\$250.20	4,500
<b>MARKET AVERAGE</b>	\$328,300	\$398,500	\$359,000	1,445	1,968	1,673	\$227.23	\$202.48	\$214.57	4,900

SOURCE: HOWELL &amp; ASSOCIATES, FEBRUARY 1994

TABLE 2

**SUMMARY OF CURRENT SINGLE-FAMILY PRODUCT  
UNIT SIZE AND PRICING CHARACTERISTICS FROM  
SELECTED COMPETING RESIDENTIAL DEVELOPMENTS  
LEEWARD AND CENTRAL OAHU, STATE OF HAWAII**

DEVELOPMENT - Location - Single-Family Project	RANGE OF HOME PRICES			RANGE OF HOME LIVING AREAS (SQUARE FEET)			RANGE OF HOME PRICES PER SQ. FT.			Typical Lot Size (Square Foot)
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	<b>EWA BY GENTRY</b> - Ewa									
1) Sun Terra	\$252,000	\$305,000	\$279,000	945	1,671	1,268	\$266.67	\$182.53	\$220.03	3,400
<b>KAPOLEI VILLAGE</b> - Ewa										
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3) Na Pua	\$296,000	\$353,000	\$320,000	1,033	1,572	1,279	\$286.54	\$224.55	\$250.20	4,500
<b>MARKET AVERAGE</b>	\$328,300	\$398,500	\$359,000	1,445	1,968	1,673	\$227.23	\$202.48	\$214.57	4,900

SOURCE: HOWELL &amp; ASSOCIATES, FEBRUARY 1994

to be in the \$180,000 to \$200,000 range. The similarity of predominant sales price reflects the general similarity of product type, which is seen to be inferior to the construction quality and house-and-lot size proposed for the subject homes.

Table 2, on the facing page, is a summary of current single-family product price structures for new housing product in the Leeward (*Ewa*) and Central Oahu districts. As shown on Table 2, the average market sales price (*developer's first sales*) structure for single-family homes in Central/Leeward Oahu (*exclusive of the Waianae district*) ranges from a low of \$328,300 to a high of \$398,500, with a mean sales price indicator of \$359,000.

#### **OVERALL MARKET PERCEPTIONS AND PURCHASER PROFILES**

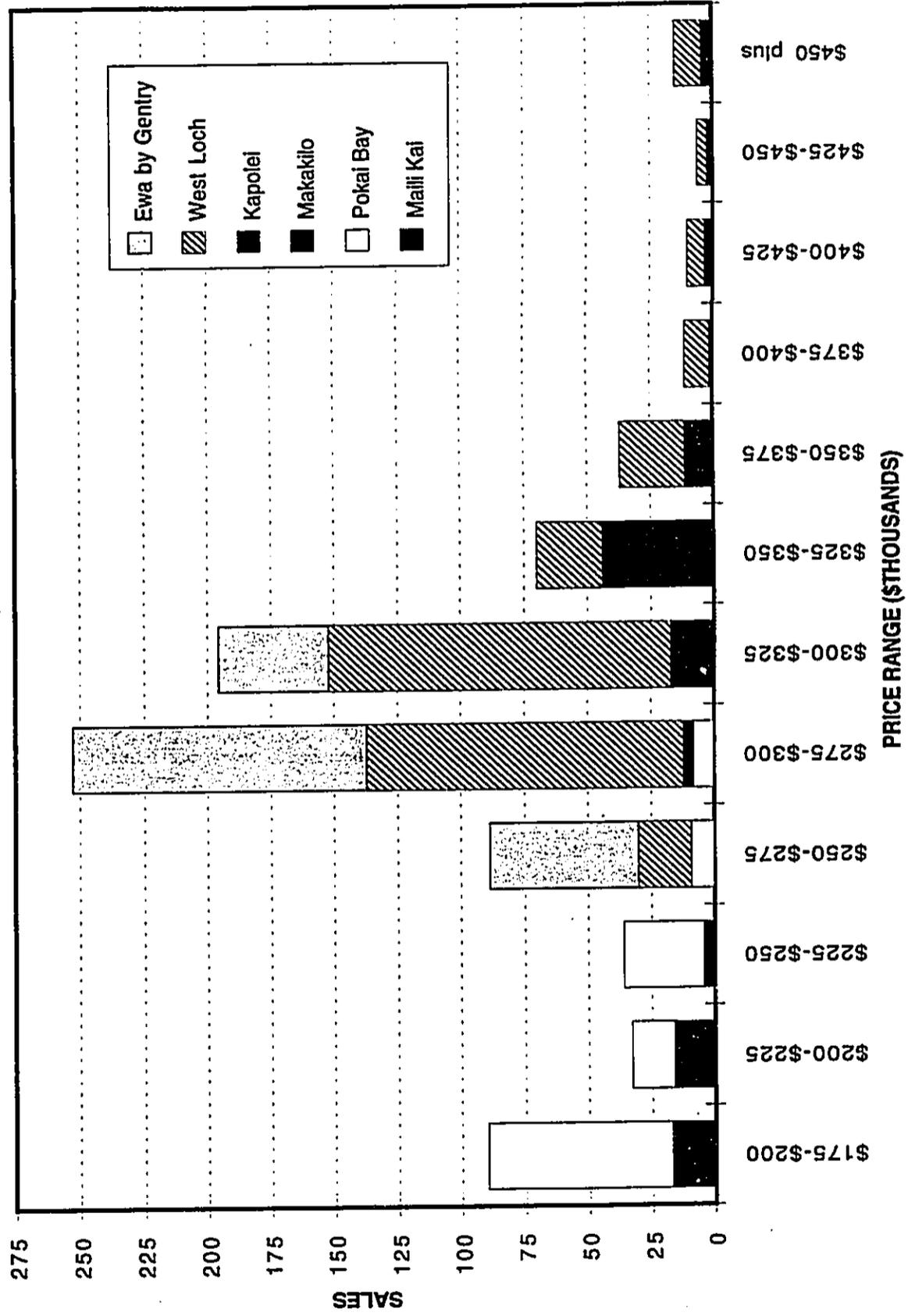
Our interviews with brokers and developers active in the Central and Leeward residential markets indicated that demand for housing units remains strong. Affordable rates for borrowed capital continues to assist the overall market, even though the Hawaii economy reflects a prolonged recessionary climate. Nevertheless, the available supply of competitive new housing product has introduced a certain price sensitivity that was not as prevalent during the volatile 1988 to 1990 period.

The combined economic pressures of a slow business cycle in conjunction with high housing costs in the urban Honolulu areas have forced more buyers to the Central/Leeward marketplace. Lower price thresholds have been experienced the farther out of Honolulu the buyer is willing to go. However, there continues to be a preference exhibited by buyers for the Central Oahu and Ewa plain districts as compared to the Waianae district. Our survey respondents continually expressed a perception of a sales price ceiling of \$300,000 for new product in Waianae of a comparable level of quality to that proposed by the subject POKAI BAY OCEAN VIEW housing project.

As to typical buyers for new homes in Waianae, the brokers indicate that the majority of buyers are already residents of Waianae. Income constraints tend to limit the purchasing power of these residents to the \$170,000 to \$200,000 price level. For price points significantly above \$200,000, the buyer usually will be a local extended family (*more than one generation under roof*) or come from outside of Waianae. Many brokers expressed a difficulty in attracting a significant number of buyers to Waianae given that new homes are available in the Central/Leeward market areas.

It was expressed that good home quality, ocean views and larger house-and-lot packages would be attractive options for a buyer willing to look into the Waianae community, however, the price threshold of \$300,000 was often expressed. It should be noted that there is no subdivision single-family housing product offered in Waianae of similar quality as that proposed for the subject or at a price point above \$300,000. Therefore, it is difficult to establish whether the \$300,000 price "ceiling" is an actual ceiling or a segment of the market that has yet to be examined. In this respect, the proposed subject single-family component of the POKAI BAY OCEAN VIEW housing project will represent a leading effort in the marketplace.

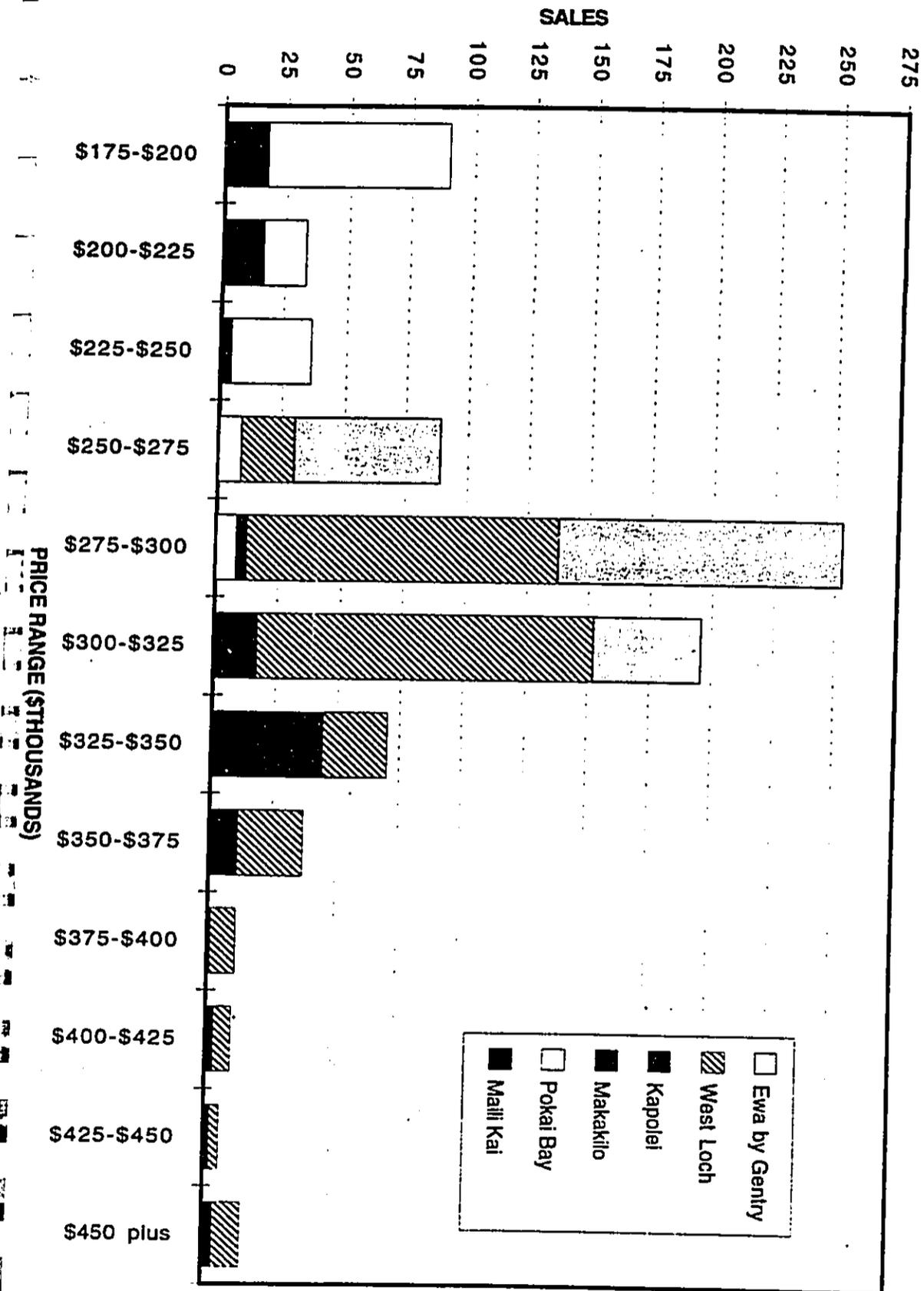
LEEWARD/EWA 1992-1993 NEW SINGLE FAMILY HOME SALES PRICE DISTRIBUTION



Locations, Inc. Research & Consulting

2/4/94

LEEWARD/EWA 1992-1993 NEW SINGLE FAMILY HOME SALES PRICE DISTRIBUTION



#### **SECTION IV: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

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After conducting our research and analyses for this study, the appraisers formulated the following conclusions and recommendations,

- The average house-and-lot package used as a basis for comparison in this study from the proposed POKAI BAY OCEAN VIEW housing project exhibits a lot size generally 1,000 square feet to 2,000 square feet greater than the typical lot size for new single-family homes in Central/Leeward Oahu. The average interior area of the proposed subject single-family home is larger than new home product in Waianae, but just about the market average for new homes in the Central/Leeward Oahu market (refer to preceding Table 2). The general construction quality exceeds that found in the immediate Waianae market and is on the upper end of quality for competitive product in Central/Leeward Oahu. The ocean views afforded the proposed subject homes would be seen as an attractive amenity.
- Given the income constraints demonstrated by overall demographic profiles within the Waianae district, the most logical purchaser for the proposed subject single-family product would come from outside of the Waianae neighborhood.
- The challenge for the developer of the proposed subject single-family product would be to market the project such that it would attract buyers from the Central/Leeward Oahu market, who have, thus far, demonstrated a reluctance to select Waianae as a neighborhood for active home buying. The subject project would need to combine all the advantages of a larger house-and-lot package; good construction quality; and the amenity of ocean views in order to overcome the disadvantages of longer travel times to urban Honolulu and the somewhat lesser desirability of Waianae as a residential neighborhood, as compared to other Central/Leeward Oahu alternatives.
- Our new sales research and surveys of residential real estate brokers active in the Central, Ewa and Leeward Oahu residential marketplace, indicated that market acceptance for the subject single-family product could be reasonably projected in the range of \$270,000 to \$300,000.
- Our survey of residential real estate brokers active in the Central, Ewa and Leeward Oahu residential marketplace, indicated that there is a noticeable price sensitivity to new product at or near the \$300,000 price level.
- Notwithstanding the above, it is important to note that the proposed subject single-family housing product to be contained within the POKAI BAY OCEAN VIEW housing project represents a pioneering effort into a more upscale housing product for the Waianae district that is not resort oriented. Consequently, there are no existing benchmarks from which actual acceptance of a price structure in the range of \$300,000 to \$350,000 can be measured. It would be incumbent upon the developer to test market the product at the higher price points to fully ascertain the degree of market price sensitivity. Should the aforementioned price ceiling be determined to be correct, the subject project contains a certain flexibility to scale down the unit size slightly, or select alternative construction materials, that would reduce development costs without sacrificing necessary product appeal.

The opinions and conclusions included in this marketing study, are subject to the *Definitions and Terminology, and Assumptions and Limiting Conditions* as stated herein (as are presented in the *Addenda* of this marketing study as Exhibits B and C, respectively).

The opinions and conclusions contained in this marketing study are based on additional research and analysis materials contained in our files. If there are any inquiries concerning our opinions and conclusions contained herein, the appraisers are available for discussion at the client's convenience, and the appraisers' files are available for review upon the client's request.

It is hereby certified, that to the best of the appraisers' knowledge and belief:

- 1) The statements of fact contained in this letter are true and correct to the best of the appraisers' knowledge.
- 2) The reported analyses, opinions, and conclusions in this letter are limited only by the reported assumptions and limiting conditions, and are the personal, unbiased professional analyses, opinions, and conclusions of the appraisers.
- 3) The appraisers have no present or prospective interest in the property that is the subject of this letter, and have no personal interest or bias with respect to the parties involved.
- 4) The appraisers' compensation is not contingent upon the reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value estimate, the attainment of a stipulated result, or the occurrence of a subsequent event.
- 5) The appraisers' analyses, opinions, and conclusions were developed, and this letter has been prepared, in conformity with the Uniform Standards of Professional Appraisal Practice, and with the requirements of the Code of Professional Ethics and Standards of Professional Practice of the Appraisal Institute.
- 6) Hugh M. Howell, MAI, and Stephen E. Stadlbauer have made only a limited drive-by inspection of the property that is the subject of this letter.
- 7) Use of this letter is subject to the professional requirements of the Appraisal Institute regarding review by its duly authorized representatives.
- 8) Hugh M. Howell, MAI, appraiser, is currently certified under the voluntary continuing education program of the Appraisal Institute.

It is further certified that no persons, other than the undersigned or stated within the context of this letter, provided a significant degree of professional assistance required for the execution of this appraisal assignment.

The appraisers' contractual arrangement with the client does not authorize the out-of-context quoting from or partial reprinting of this study, nor does it permit all or any part of this study to be disseminated to the general public by the use of media for public communication without the written consent and approval of the appraisers.

Thank you for the privilege of assisting you in this interesting assignment.

Very truly yours,

**HOWELL & ASSOCIATES**



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Stephen E. Stadlbauer  
Real Estate Appraiser and Counselor  
Hawaii State Certified General Appraiser, CGA-190  
Expiration Date: 12/31/95



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Hugh M. Howell, MAI  
Real Estate Appraiser and Counselor  
Hawaii State Certified General Appraiser, CGA-116  
Expiration Date: 12/31/95

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**ADDENDA**

**PROFESSIONAL QUALIFICATIONS  
OF  
HUGH M. HOWELL, MAI**

**PROFESSIONAL ORGANIZATIONS**

- Appraisal Institute - MAI Designation Received March 1992.
- Current Member of American Arbitration Association.
- Associate - The Urban Land Institute (*ULI*).

**PROFESSIONAL EXPERIENCE**

- Owner/Principal, Real Estate Appraiser/Consultant, Howell & Associates, Honolulu, Hawaii, since April 1993. (*Experience consists of extensive appraisal/consultation assignments involving a wide variety of commercial investment, and residential real estate in the State of Hawaii, South Pacific, and Mainland U.S. West Coast.*)
- Managing Partner/Real Estate Appraiser, Sylva, Howell & Associates, Appraisers/Consultants, Honolulu, Hawaii, July 1988 to March 1993.
- Senior Real Estate Appraiser/Consultant/Vice President, Raymond A. Leshner & Company, Ltd., Appraisers/Counselors, Honolulu, Hawaii, 1977 to 1988.
- Real Estate Sales Experience: Bishop Associates, Ltd., Honolulu, Hawaii, 1977 to February 1993; Howell Properties, Honolulu, Hawaii, March 1993 to Current.

**PROFESSIONAL LICENSES**

- State of Hawaii, Realtor-Associate License No. 17913, Dated January 24, 1977.
- Hawaii State Certified General Appraiser, License No. CGA-116, Expiration Date December 31, 1995.

**EDUCATION**

- Bachelor of Arts, Political Science (*With Distinction*), University of Hawaii, Honolulu, Hawaii, 1974.

**PROFESSIONAL QUALIFICATIONS  
OF  
HUGH M. HOWELL, MAI**

(Continued)

**EDUCATION (Continued)**

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**Appraisal Courses**

- Course 2-1: Case Studies Real Estate Valuation (*American Institute of Real Estate Appraisers*), University of Portland, Portland, Oregon, 1986.
- Course 2-2: Valuation Analysis and Report Writing (*American Institute of Real Estate Appraisers*), University of North Carolina, Chapel Hill, North Carolina, 1985.
- Standards of Professional Practice (*American Institute of Real Estate Appraisers*), Honolulu, Hawaii, 1980.
- Course 201: Principles of Income Property Appraising (*Society of Real Estate Appraisers*), Honolulu, Hawaii, 1979.
- Course 101: An Introduction to Appraising Real Property (*Society of Real Estate Appraisers*), Honolulu, Hawaii, 1979.
- Course VIII: Residential Valuation (*American Institute of Real Estate Appraisers*), Honolulu, Hawaii, 1977.
- Comprehensive Examination (*American Institute of Real Estate Appraisers*), Passing Grade Received on August 8, 1988.

**Appraisal Seminars**

- Capitalization and Income Approach Update Seminar (*American Institute of Real Estate Appraisers*), Honolulu, Hawaii, 1981.
- Money Market and Economic Analysis Seminar (*Society of Real Estate Appraisers*), Honolulu, Hawaii, 1978.
- Memorandum R41c and the Recordkeeping Requirements of the Federal Home Loan Bank Board (*American Institute of Real Estate Appraisers*), Honolulu, Hawaii, 1987.
- Current Appraisal Policy of Hawaiian Thrift Institutions, Presented by the Federal Home Loan Bank of Seattle (*Society of Real Estate Appraisers*), Honolulu, Hawaii, April 1989.
- Hotel/Motel Valuation Seminar (*Appraisal Institute*), Honolulu, Hawaii, June 1992.

PROFESSIONAL QUALIFICATIONS  
OF  
HUGH M. HOWELL, MAI

(Continued)

EDUCATION (Continued)

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Appraisal Seminars (Continued)

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Valuation in Today's Capital and Financing Markets (*Appraisal Institute*),  
1992 Region VII Appraisal Conference, Honolulu, Hawaii, June 1992.

Arbitration Principles, Procedures and Pitfalls (*Appraisal Institute*),  
1992 Region VII Appraisal Conference, Honolulu, Hawaii, June 1992.

Institutional Real Estate in the 1990s: A Valuation Perspective (*Appraisal  
Institute*), 1992 Region VII Appraisal Conference, Honolulu, Hawaii,  
June 1992.

Valuation of Leased Fee Interests (*Appraisal Institute*), Honolulu, Hawaii,  
May 1993

Valuation of Leasehold Interests (*Appraisal Institute*), Honolulu, Hawaii,  
May 1993

Appraising the Tough Ones, (*Appraisal Institute*), Honolulu, Hawaii, May 1993

**PROFESSIONAL QUALIFICATIONS  
OF  
STEPHEN E. STADLBAUER**

**PROFESSIONAL ORGANIZATIONS**

- Appraisal Institute - Candidate for MAI Designation
- Commercial Builders Council of Hawaii (CBC), an affiliate of the Building Industry Association of Hawaii (BLA). Steering Committee Member of CBC.

**PROFESSIONAL EXPERIENCE**

- Real Estate Appraiser and Consultant, Howell & Associates, Appraisers/Consultants, Honolulu, Hawaii, Since October 1993.
- Vice President - Commercial Division, Yamaguchi & Yamaguchi, Inc., Real Estate Appraisers, Honolulu, Hawaii, 1989-1993.
- Associate Appraiser, Appraisal Resource (*formerly Alexander & Alexander*), Real Estate Appraisers, Honolulu, Hawaii, 1984 to 1989.

**PROFESSIONAL LICENSES**

- Hawaii State Certified General Appraiser, License No. CGA-190, Expiration Date December 31, 1995.

**EDUCATION**

- University of Hawaii at Manoa, College of Business Administration, Honolulu, Hawaii (*Major: Real Estate*).
- University of Alaska, Anchorage, College of Business Administration, Anchorage, Alaska, (*Major: Real Estate*).

**Appraisal Courses**

Course 1-A-1: Challenge Exam - Real Estate Appraisal Principals, (*American Institute of Real Estate Appraisers*), Honolulu, Hawaii, September 1988.

Course 1A-2: Challenge Exam - Basic Valuation Procedures, (*American Institute of Real Estate Appraisers*), Honolulu, Hawaii, September 1988.

**PROFESSIONAL QUALIFICATIONS  
OF  
STEPHEN E. STADLBAUER**

(Continued)

**EDUCATION (Continued)**

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**Appraisal Courses (Continued)**

- Course 2-3: Standards of Professional Practice, (*American Institute of Real Estate Appraisers*), Honolulu, Hawaii, June 1988.
- Course 1-B-A: Capitalization Theory and Techniques - Part A, (*American Institute of Real Estate Appraisers*), Honolulu, Hawaii, July 1988.
- Course 101: Introduction to Appraising Real Property (*Society of Real Estate Appraisers*), Honolulu, Hawaii, 1990.
- Course SPP-A: Standards of Professional Practice - Part A, (*Appraisal Institute*), Honolulu, Hawaii, March 1991.
- Course SPP-B: Standards of Professional Practice - Part B, (*Appraisal Institute*), Honolulu, Hawaii, March 1991.
- Course 510: Advanced Income Capitalization, (*Appraisal Institute*), Honolulu, Hawaii, October 1993.
- Other Courses: Real Estate Principals and Practices; University of Alaska at Anchorage, Alaska, 1980.
- Advanced Real Estate Appraisal, University of Alaska at Anchorage, Alaska, 1981.
- Real Estate Law; University of Hawaii at Manoa, Honolulu, Hawaii, 1982.

**Appraisal Seminars**

- Exam Prep for General Appraiser Certification, (*Appraisal Institute*), Los Angeles, California, 1983.
- Warehouse Leasing, (*Society of Real Estate Appraisers*), Honolulu, Hawaii, 1984.
- Retail/Office/Basement (*Storage*) Leasing, (*Society of Real Estate Appraisers*), Honolulu, Hawaii, 1984.

PROFESSIONAL QUALIFICATIONS  
OF  
STEPHEN E. STADLBAUER

(Continued)

EDUCATION (Continued)

Appraisal Seminars (Continued)

Other Seminars:

Real Estate Brokerages; University of Alaska at Anchorage, Alaska, 1980.

Creative Financing; University of Alaska at Anchorage, Alaska, 1981.

Regularly Scheduled Seminars, Building Industry Association (*BLA*) of Hawaii,  
Honolulu, Hawaii, 1990 to 1993.

Financial Institutions Reform, Recovery and Enforcement Act of 1989  
(*FIRREA*); Office of Thrift Supervision (*OTS*), Honolulu, Hawaii,  
September 1990.

**EXHIBIT A**

**Pokai Bay Ocean View  
Preliminary Suidivision Map**

**Pokai Bay Ocean View  
Elderly Apartment Petition  
October 1993**

The Developer of Pokai Bay Ocean View located on 32 acres on the water tank side of Lualualei Homestead Road in Waianae needs your support for 60 elderly apartments and 54 elderly condominiums.

1. Rose R. Williams Phone # 696 7071 Age 66 :
2. Bella Estrella Phone # - Age - :
3. Marie Waganä Phone # - Age 66 :
4. Faye Ojawa Phone # - Age 66 :
5. \_\_\_\_\_ Phone # - Age - :
6. \_\_\_\_\_ Phone # - Age - :
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10. \_\_\_\_\_ Phone # - Age - :

Pokai Bay Ocean View  
Elderly Apartment Petition  
October 1993

The Developer of Pokai Bay Ocean View located on 32 acres on the water tank side of Lualualei Homestead Road in Waianae needs your support for 60 elderly apartments and 54 elderly condominiums.

1. Mary Botelho Phone # 696-8231 Age 63

2. Lana Lauer Phone # 696-2221 Age 54

3. Barbara Rohman Phone # 696-4746 Age 52

4. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

5. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

6. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

7. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

8. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

9. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

10. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

**Pokai Bay Ocean View  
Elderly Apartment Petition  
October 1993**

The Developer of Pokai Bay Ocean View located on 32 acres on the water tank side of Lualualei Homestead Road in Waianae needs your support for 60 elderly apartments and 54 elderly condominiums.

1. James T. ... Phone # 1-68-575 Age 74 :

2. Cliff ... Phone # 68-7115 Age 73 :

3. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

4. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

5. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

6. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

7. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

8. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

9. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

10. \_\_\_\_\_ Phone # \_\_\_\_\_ - \_\_\_\_\_ Age \_\_\_\_\_ :

Appendix E  
Responses to Concerns  
(Contains Duplicated Information)

## **Neighborhood Concerns & Mitigation Measures Described January 1994**

Starting in August I contacted Gail Gomes who lives in the subdivision adjacent to the proposed new Pokai Bay Ocean View Development. Gail is on the Waianae Coast Neighborhood Board No. 24. On August 21, 1993 I meet with five neighbors who lived in the adjacent subdivision and explained my project. These neighbors recommended a community meeting with specific concerns being covered. Overall this meeting went well and set the tone for the larger community meeting in September.

On September 9, 1993, at Leihoku Elementary School, 55 individuals attended the meeting. The attendance list may be review by contacting Hester Rangnow at 524-5414. This meeting generated additional concerns which needed addressing. These concerns were discussed with developer and it was determined that after these issues were dealt another community meeting would be held.

On November 20, 1993 another community meeting was held at Leihoku School. Before this meeting many individual meetings were held in their homes with the neighborhood. A total of over 100 such meeting occurred which help structure the mitigation measures for the concerns from the September 9, 1993 meeting. At this meeting 30 individuals heard our mitigation measures listed as "Pokai Bay Ocean View Development Neighborhood Concerns", which are attached for review. The attendance list may be review by contacting Hester Rangnow at 524-5414. All 21 items were discussed and revised to express the acceptable mitigation measures. The meeting went extremely well and the neighborhood had proper input into this project and the resulting mitigations to their concerns.

The next step was to meet with the Waianae Neighborhood Board on December 7, 1993. At this meeting these 21 concerns, pricing of the units, plus widening the sidewalk were discussed. The developer agreed to include these 21 concerns & mitigation to the minutes. Also, included was an amendment to the minutes which required widening of the Lualualei Homestead Road and adding of sidewalks from Mill Street up to the sidewalks on the Pokai Bay Marina subdivision on the Makaha side of the road only. Pokai Bay Ocean

View Development Proposal including 185 units passed the Waianae Neighborhood Board that night.

Many other meetings were held with local elderly residents in Waianae during September thru December 1993. (See Appendix D Community Support Waianae)

This project has had tremendous public input and resulting changes that have made this development a community project. The affordable section of this project for the elderly represents a need that is critical in the coming years.

Hester Rangnow  
Developer

November 20, 1993

## **Pokai Bay Ocean View Development Neighborhood Concerns**

- I. **Construction Site Building:**
  - A. **Noise:**
    - 1. **Limit Construction Time from 7:00 A.M. to 5:00 P.M. Monday thru Friday, Saturday 8:00 A.M. to 2:00 P.M.**
  - B. **Dust:**
    - 1. **Correct Fencing to reduce dust.**
    - 2. **Special Needs Health Reasons, Air Conditioning will be installed for residents with lung problems or late work hours requiring morning sleep time.**
    - 3. **Window Coverings (Special Screens) for existing perimeter homes to the development.**
  - C. **Drainage Disruption:**
    - 1. **Clear Limited Area at One Time**
    - 2. **Dig Temporary Ditch**
  - D. **Foundation Moving:**
    - 1. **Take Pictures of Foundations for Existing Residents**
    - 2. **Treat Expansive Soil both under new streets and new foundations.**
  - E. **Waianae Workers:**
    - 1. **On the Single Family Houses have the Contractor hire 50% of the workers who live in Waianae.**
    - 2. **Use Waianae Subcontractors on 50% of the Project.**
  
- II. **Elderly Apartments and Condominiums:**
  - A. **Age:**
    - 1. **Must be 55 years or older to live in Condominiums**
    - 2. **Must be 65 years or older to live in Apartments.**
  - B. **Height of Apartments and Condominiums Buildings:**
    - 1. **Located away from Existing Homes.**
    - 2. **Moved Apartments and Condos down 75' from the back property line to protect mountain view.**
  - C. **Section 8:**
    - 1. **No Section 8 (State or City Funds)**

**Figure 12 - Neighborhood Concerns & Mitigation Measures**

- D. Walking:
  - 1. Van donated to project by developer.
  - 2. Road Widening between Miller St. existing development.

### III. Single Family Homes:

- A. Traffic:
  - 1. New street 56' Right-of-Way back of Pokai Village.
  - 2. No Parking New Subdivision on certain streets.
- B. Value Homes Dropping:
  - 1. Average Lot and Home \$326,000
  - 2. Design Committee/Homeowners Association
- C. Elementary School:
  - 1. Principal indicates new K-6 students will not effected school attendance causing overcrowding.
  - 2. Donate \$120,000 to school for their use.
  - 3. Develop a Nature Center.
- D. Children's Safety:
  - 1. Install a new Traffic Light & Crosswalk.
  - 2. Sidewalks improvements were possible.
  - 3. Increase width of sidewalks from street.
- E. Offensive Activities:
  - 1. All new residents must be part of a Homeowners Association.

### IV. General:

- A. Community Center:
  - 1. Build and Maintain by the Association.
- B. Buffer Zone:
  - 1. 25 - 30 Ft. Adjacent Residents May Purchase
- C. Water:
  - 1. Plenty, Must Add Hydraulics over 140 ft. in elevation.
- D. Electric:
  - 1. May Connect
  - 2. Problem in large loop, little can be done.
  - 3. Old transformers along large loop, little can be done.
- E. Sewer:

1. Upgrade 1600' on Farrington & Lualualei Homestead Road by widening relief line.

F. Drainage:

1. Completely upgraded by new drainage lines, a 400% improvement.

G. Fires/Grass Field:

1. Back rock retaining wall to stop fires from coming over the mountain.
2. Development apartments, condos, and single family homes with concrete and steel, with clay or cement tile roofs.

Mike Klein  
Developer

**The Van Plan**  
March 1994  
**Pokai Bay Ocean View**  
**Elderly Apartments and Condominiums**

PB Ocean View Development will donate a passenger van to the association for the apartments and Condominiums.

**Purpose:** To provide additional transportation for the elderly who rent or own in Pokai Bay Ocean View. To be used by the residents only for short trips to the local mall and longer trips to Pearl Ridge, Ala Moana, and Waikiki. This van will also be use for planned excursions that involve picnics, tours, and outings for the elderly residents.

**Maintained By:** The association for the Apartments and Condominiums, to include funding of the driver, maintenance, and insurance. A small fee will be charged for the gasoline used by the residents.

**Managed By:** The Resident Manager for the 114 unit elderly apartments and condominiums.

**Proposed Schedule:**

<b>Dates:</b>	<b>Time:</b>	<b>Location:</b>
Monday - Friday	10:00 & 11:00 AM 5:30 & 6:30 PM	Waianae Mall Waianae Mall
Tuesday	1:00 PM	Pearl City - Ala Moana
Wednesday	12:00 - 5:00 PM	Excursion
Saturday & Sunday	9:00 & 10:00 AM	Local Churches
Saturday	1:00 & 2:00 PM 5:00 & 6:00 PM	Waianae Mall Waianae Mall
Sunday	1:00 PM	Excursion or Shopping

Choy moved and Kila seconded that the Board support site 6 on Lualualei Naval Road for the school. The motion passed unanimously.

- B. Pokai Bay Ocean View Development Proposal - Mike Klein - Klein presented the Board with the proposal. An application for a 201(E) waiver has been submitted to the city to develop a high percentage of affordable senior housing along with market priced homes on Lualualei Homestead Road. There will be 114 affordable senior housing units (apartments, townhouses, and duplexes) and 69 market priced homes. The affordable price range will be: studios \$95,000-\$115,00; 1 bedroom \$121,000-\$141,000; and 2 bedrooms \$139,000-\$159,000. Market homes will cost: \$192,000-\$320,000. There is a need for this type of housing. To qualify, seniors must be at least 62 years old.

Klein noted holding a number of meetings with the neighbors of the proposed project area and with a number of senior citizen groups. Through the meetings, many of the residents' concerns were addressed. The neighbors noted that they did not want too many low-cost houses in the project.

Comments, concerns and responses followed: proposal to add sidewalk and widen road area because project road is narrow - landowners would have to give 10 feet of their property for widening; elevation of property was questioned; project will provide better drainage for the area; according to Leihoku School principal, project would increase student enrollment by 50.

Gomes moved and Wright seconded that the Board support the Pokai Bay Ocean View Development project. Discussion followed on: number of senior units (114); cost for 69 single dwellings (\$192,000-\$320,000); questioned whether quoted prices were affordable for seniors.

Gomes moved and Wright seconded to amend the motion by adding "with conditions agreed to by residents of the project area". Discussion followed on: state's land use designation (Urban and Preservation 2); 201(E) application waiver; questioned ground stability; benefits of the project; water concerns; request that an Environmental Impact Statement be done for the project; questioned the impact to the intermediate and high school; protection of homes from fire. The above amendment passed 17-2-1. Nays: Armitage-Eli and Keawe. Abstention. Choy.

Albert H. Silva moved and Keawe seconded that the Board amend the motion to add to the conditions agreed to by the residents "widen Lualualei Homestead Road and adding of sidewalks from Ihuku Street to Mill Street and the upgrading of the sewage system. The amendment passed unanimously.

The amended main motion passed unanimously.

- D. Makaha 7-Eleven/Aloha Petroleum Zoning Variance Request - A representative from Aloha Petroleum asked for the Board's support for the above variance request. He explained that although the city (Building Department) approved signs for the Makaha store operation, the city (Department of Land Utilization) also cited the store for sign violation. The city's Department of Land Utilization has determined that 7-Eleven/Aloha Petroleum is one principle user, and therefore, only a certain number and size signs are allowed. However, the petroleum representative explained that 7-Eleven and Aloha Petroleum are separate principle users of the Makaha site.

## Figure 14 - Neighborhood Board Approval

**PB Ocean View Development, Inc.**  
1154 Fort Street Mall, Suite 300  
Honolulu, HI 96813  
(808) 524-5414

January 21, 1994

Ms. Donna Omine-Goo  
85-1059 Pilokea St.  
Waianae, HI 96792

Dear Ms. Donna Omine-Goo:

Thank you for meeting with me at the January Neighborhood Board Meeting. Enclosed are the buildings that represent completed projects in Hawaii by both Mr. Bob Gerell and Mr. Gil Evans. This information is consolidated from a brochure of The Gerell Group and from Gil Evans resume. The brochure is attached since it contains additional information for your review.

A color rendering of Pokai Bay Ocean View Development is enclosed of Hale Ekahi Street looking upward to the top of the ridge with all buildings represented and landscaping for you information.

The Gerell Group has developed the following projects:

Punahou Cliffs	80 Unit Residential
Wilder at Piikoi	166 Unit Residential
Village Maluhia	150 Unit Residential
Kinau Lanai's	180 Unit Residential
Wilder Terrace	40 Unit Residential
The Strangerwald Bldg.	Downtown Office Bldg.
Kaheka Professional Center	King Street Office Bldg.
1350 King Street	King Street Office Bldg.
Fifteen other Historical Building Renovations	
Old Koloa Town	Restoration of 16 Bldg. Sugar Plantation Town
Enchanted Lake Center	Neighborhood Shopping Center

Kona Marketplace  
Maunakea Marketplace

Resort Retail Center  
Specialty Retail Center

Gil Evans was the General Manager for KG (Hawaii) Construction, a subsidiary of Kumagai Gumi Co., Ltd. He holds an ABC Contractor License and completed the following construction projects in Hawaii.

The Hyatt Regency Waikaloa  
The Westin Maui  
The Westin Kauai

1244 Room Resort Hotel  
766 Room Resort Hotel  
801 Room Resort Hotel

Gil Evans was Project Manager or Superintendent for the following projects.

Rainbow Promenade  
Canterbury Place  
Maui Pacific Shores  
Kahului Shopping Center  
Kapiolani Terrace  
Kailani Apartments  
Royal Grove Hotel

Oahu, 9 Floor Shopping Complex  
Oahu, 40 Floor Condominium  
Maui, Two 5 Floor Condominiums  
Maui, 1 & 2 Floor Shopping Center  
Oahu, 17 Floor Condominium  
Oahu, 15 Floor, 32 Unit Condo  
Oahu, 15 Floor, 360 Unit Hotel

If you need any other information please call and I will try to get it to you as soon as possible.

Sincerely,



Michael W. Klein  
Developer

cc: Mr. Fred Shaw

**PB Ocean View Development, Inc.**  
1154 Fort Street Mall, Suite 300  
Honolulu, HI 96813  
(808) 524-5414

February 11, 1994

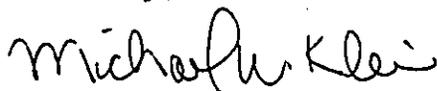
Mr. Don Hibbard  
State of Hawaii  
Department of Land and Natural Resources  
33 South King St., 8th Floor  
Honolulu, HI 96813

Dear Mr. Don Hibbard:

Per your letter dated September 29, 1993 I understand that this site was old sugar cane lands where it is unlikely that historic sites will be found.

I also understand that if any historic sites, including human burials, are uncovered during routine construction activities that all work will stop and you will be contacted.

Sincerely,



Michael W. Klein  
Developer

JOHN WAIHII,  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

September 29, 1993

Michael W. Klein  
Pokai Bay Ocean View Ventures, Inc.  
500 Lunalilo Home Road 17B  
Honolulu, Hawaii 96825

Dear Mr. Klein:

**SUBJECT: Proposed Pokai Bay Ocean View Development at Lualualei  
Wai'anae, Wai'anae, O'ahu  
TMK: 8-6-1: 11, 34, and 50**

Thank you for the opportunity to review this proposed project. These are old sugar cane lands where it is unlikely that historic sites will be found. We believe that the proposed housing development will have "no effect" on historic sites.

It is possible that historic sites, including human burials, will be uncovered during routine construction activities. Should this be the case all work in the vicinity must stop and the Historic Preservation Division must be contacted at 587-0047.

Sincerely,

A handwritten signature in black ink, appearing to read "Don Hibbard".

DON HIBBARD, Administrator  
State Historic Preservation Division

TD:jt

KRISTI AHUE, CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCES

DEPUTES

JOHN P. KEPPELER II  
DONA L. KANAKA

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

LOG NO: 9628  
DOC NO: 9309TD39

Figure 13 - DLNR Letter

**PB Ocean View Development, Inc.**  
1154 Fort Street Mall, Suite 300  
Honolulu, HI 96813  
(808) 524-5414

February 14, 1994

Mr. Kazu Hayashida  
Manager and Chief Engineer  
Board of Water Supply  
City and County of Honolulu  
630 South Beretania St.  
Honolulu, HI 96843

Dear Mr. Hayashida:

Subject: Your letter of September 14, 1993 Regarding the Proposed  
Pokai Bay Ocean View Development in Waianae, TMK: 8-6-001: 43  
and 50.

The developer understands the requirement to install necessary  
water system facilities to serve the proposed development, in  
accordance with your water system standards. Also, it is understood  
that the service limit is 142 feet, that lots above this level will  
require additional conditions.

As always your department is required to review all constructions  
drawings that are done and approve them accordingly.

Sincerely,



Michael W. Klein  
Developer

**BOARD OF WATER SUPPLY**

CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA STREET

HONOLULU, HAWAII 96843



September 14, 1993

FRANK F. FASI Mayor

WALTER O. WATSON JR. Chairman  
MAURICE H. YAMASATO Vice Chairman  
SISTER M. DAVILYN AM. CHICK, O.S.F.  
JOHN W. ANDERSON, JR.  
REX D. JOHNSON  
MELISSA Y. J. LUM  
C. MICHAEL STREET

KAZU HAYASHIDA  
Manager and Chief Engineer

Mr. Michael W. Klein  
500 Lunalilo Home Road  
Honolulu, Hawaii 96825

Dear Mr. Klein:

Subject: Your Letter of August 4, 1993 Regarding the Proposed Pokai Bay Ocean View Development in Waianae, TMK: 8-6-01: 43 and 50

Thank you for your letter regarding the proposed 80-unit low-income rental, 72-unit fee simple townhouse, and 50-lot single family development.

The existing water system is presently adequate to accommodate the proposed development. ✓

The developer will be required to install the necessary water system facilities to serve the proposed development, in accordance with our water system standards. The construction drawings should be submitted for our review and approval.

The service limit for the area is the 142-foot elevation. Lots located above this elevation will be subject to the conditions and processing procedures which are attached for your information.

The availability of water will be confirmed when the construction drawings and/or building permit, whichever is applicable, is submitted for our review and approval. If the development plan requires action by the Department of Land Utilization, the plan should be approved by that department before we take action on the proposed development. When water is made available, the applicant will be required to pay our Water System Facilities Charges for source-transmission and daily storage.

If a three-inch or larger meter is required, the construction drawings showing the installation of the meter should be submitted for our review and approval.

If you have any questions, please contact Joseph Kaakua at 527-6123.

Very truly yours,

KAZU HAYASHIDA  
Manager and Chief Engineer

Attachments

**Figure 7 - Board of Water Supply Letter**

**PB Ocean View Development, Inc.**  
1154 Fort Street Mall, Suite 300  
Honolulu, HI 96813  
(808) 524-5414

February 14, 1994

Mr. Dennis Lau  
Branch Chief/Department of Health  
Clean Water Branch  
#5 Waterfront Plaza  
500 Ala Moana Blvd., Suite 250A  
Honolulu, HI 96813

Dear Mr. Dennis Lau:

Please be advised that Pokai Bay Ocean View Development is planning a subdivision of greater than 5 acres in Waianae. It is our intention to apply for inclusion in the State of Hawaii General Permit.

This subdivision will grade over 5 acres, thus please send all documents that are required to apply under this inclusion. It is our intention to comply with this law as soon as we receive your forms. No grading has occurred or will occur until this law is complied with.

Thank you for your time,



Mike Klein  
Developer

**PB Ocean View Development, Inc.**  
1154 Fort Street Mall, Suite 300  
Honolulu, HI 96813  
(808) 524-5414

April 11, 1994

Mr. John Harrison, Ph.D  
Environmental Coordinator  
University of Hawaii at Manoa  
Environmental Center  
2550 Campus Road, Crawford 317  
Honolulu, HI 96822

Dear Mr. John Harrison:

Thank for your letter with the comments on the Environmental Assessment for Pokai Bay Ocean View Development dated April 7, 1994. Your comments along with Huilin Dong and Andrew Tomlinson of the Environmental Center have been incorporated into the revised EA dated April 11, 1994. I have summarized the changes in this letter that are now in the revised EA.

Great care was taken to add language which would include the complete 185 unit project. Originally, it was not clearly stated nor always clear how the overall project related to potential environmental impacts when taking into account the magnitude of the entire project. The revision, which is in *(Italics)*, has these changes incorporated into the text to more clearly state the environmental impacts of the entire 185 unit project.

The comment on the parking was well taken in your letter. City and County of Honolulu has also ask that elderly individuals should not have to walk across a street to get to their vehicles. To correct this error the apartments buildings now have 20 parking stalls under each building served by an elevator. (See Figure 3 - Floor Plan, Apartments, & Parking Plan). A complete parking plan for all of the three apartment buildings has been included in the EA which shows the 20 stalls and their assigned apartment numbers. Most of the guest parking for the apartments is still located under the

community center. This new parking plan will satisfy and meet all of the city's parking requirements. ✓

Several of the figures and maps in the EA were poorly reproduced. Thus in the revised EA reproduction was done from originals whenever possible to make the reproduction clearer.

The social impact where more clearly articulated in the revised EA. Additional information about discussions with residents of the Hawaiian homestead lands and the farmers was identified. The adjacent agricultural and residential land uses was also discussed with the appropriate mitigation measure explained. ✓

Your comments were helpful in preparation of the final document, which was enhanced through your review of the original document.

Sincerely,



Michael W. Klein  
Developer



## University of Hawai'i at Mānoa

Environmental Center  
A Unit of Water Resources Research Center  
Crawford 317 • 2550 Campus Road • Honolulu, Hawai'i 96822  
Telephone: (808) 956-7361 • Facsimile: (808) 956-3980

April 7, 1994  
EA:00055

Mr. Stacy Sur  
Housing Finance and Development Corporation  
677 Queen Street, Suite 300  
Honolulu, Hawaii 96813

Dear Mr. Sur:

Environmental Assessment (EA)  
Pokai Bay Ocean View Development  
Affordable Housing Project  
Waianae, Hawaii

The applicant proposes to develop 60 Elderly Rental Apartments as part of the 185 unit Pokai Bay Ocean View Development. The proposed development also would include 54 Elderly Condominiums, 16 Duplex Homes, and 55 Single Family Home in addition to a one half acre community center, restrooms, kitchen and park with grills. The project is located approximately one half mile from Farrington Highway on Lualualei Homestead Road in Waianae.

The Environmental Center has reviewed this document with the assistance of Huilin Dong and Andrew Tomlinson of the Environmental Center.

### General Comments

In general, we find that the document does not meet the content requirements for an Environmental Assessment as prescribed in Section 200-11-10, Hawaii Administrative Rules (HAR) or Section 200-11-7, (HAR) and subsequently does not fulfill the intent of Chapter 343, HRS. While the project encompasses the development of 185 units, the scope of the draft EA is limited to a description and discussion of only the 60 Elderly Apartments. In addition, the EA does not include an adequate description of the action's technical and environmental characteristics.

Mr. Stacy sur  
April 7, 1994  
Page 2

Scope of the Environmental Assessment

The applicant states that the 60 Elderly Rental Apartment units will be developed as part of the first phase of the 185 unit Pokai Bay Ocean View Development and that they are subject to Chapter 343 because of the use of State funding in this phase of the proposed project. The applicant also states that a separate environmental review process will be conducted for the remaining portions of the proposed project if they are not granted an exemption from the County General Plan by the City and County of Honolulu, Department of Housing and Community Development. The applicant subsequently infers that the remaining portions of the proposed 185 unit project will be exempt from inclusion in the environmental review process if the project is exempted from the County General Plan. Consequently, the magnitude of the entire project and its potential environmental impacts are not addressed in the draft EA.

The Department of Health's Administrative Rules in Section 200-11-7 clearly state that "a group of actions proposed by an agency or an applicant shall be treated as a single action when:

- (1) The component actions are phases or increments of a larger total undertaking.
- (3) An individual project represents a commitment to a larger project.

Clearly, the applicant must describe and discuss all phases of the project and address the potential impacts to the environment from each of the proposed phases.

Technical Comments

Section B.1., Technical Description, stipulates that "All buildings have elevators and underground parking." However, the number of the parking stalls for each building is not given in this section and is not discussed elsewhere in the EA. However, the project description in the March 8th OEQC Bulletin stated that "The elderly apartment complex will consist of three, two-story buildings ...Each building will have 16 parking stalls located under the apartments." If this information is still accurate, then it should be included in the EA. Whether the number of the parking stalls satisfies the city's parking requirement also should be discussed.

Several of the figures and maps in the EA, such as Figure 1, Site Plan and Map 8, Water Map, are sufficiently poorly reproduced that deriving meaningful information from them is hopeless.

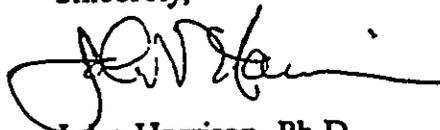
Mr. Stacy sur  
April 7, 1994  
Page 3

Social Impacts

The draft EA does not address impacts of the addition of an elderly residential complex to the social and cultural character of the Waianae community. Although proximity to the Hawaiian homestead lands is mentioned, there is no discussion of community responses to the planned development, nor is there any consideration of potential conflicts between adjacent agricultural and residential land uses.

Thank you for the opportunity to review and comment on the draft EA, and we hope our comments are helpful in preparation of the final document.

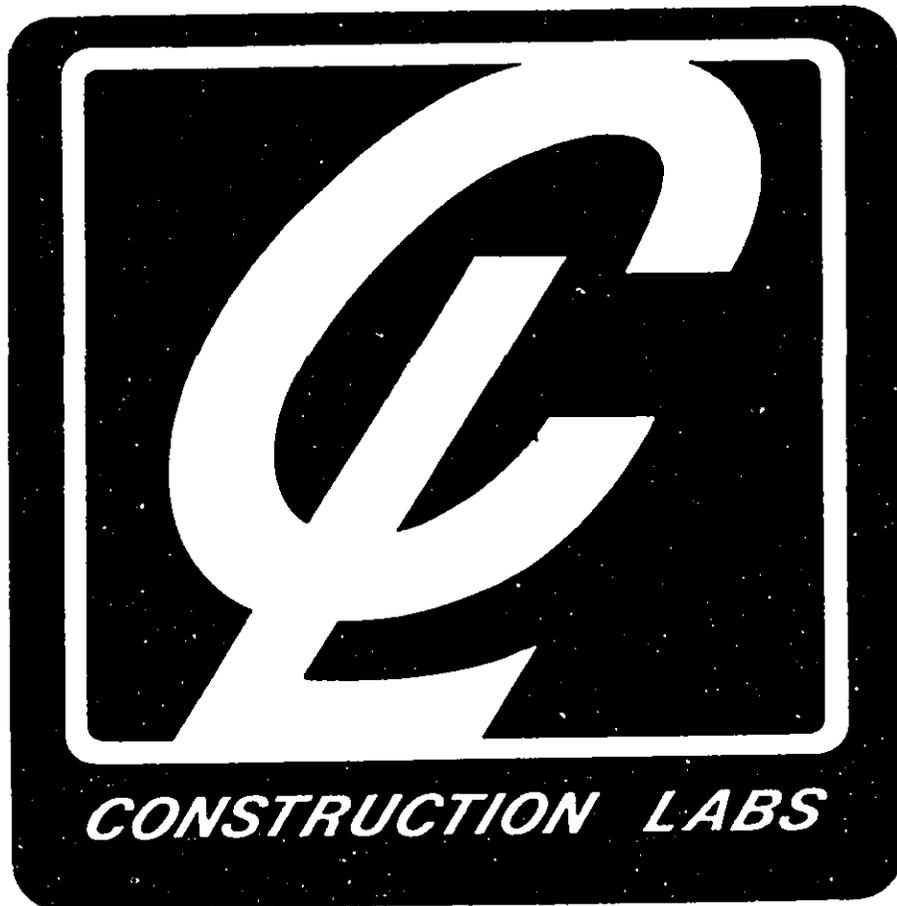
Sincerely,



John Harrison, Ph.D  
Environmental Coordinator

cc: OEQC  
✓PB Ocean View Development, Inc.  
Roger Fujioka  
Huilin Dong  
Andrew Tomlinson

**Appendix F**  
**Additional Soils Mitigation Measures**



PB OCEAN VIEW DEVELOPMENT, INC.  
SOILS ENGINEERING CONCERNS AND  
PROPOSED RECOMMENDATIONS  
POKAI BAY OCEAN VIEW  
WO#94072-1



CONSTRUCTION QUALITY CONTROL, INC.  
dba CONSTRUCTION LABS  
96-1173 WAIHONA STREET, #B-7, PEARL CITY, HAWAII 96782  
Phone (808) 455-1LAB FAX (808) 455-1384

March 7, 1994

PB Ocean View Development, Inc.  
1154 Fort Street Mall, Suite #300  
Honolulu, HI 96813

Attn: Mike Klein

Subject: Soils Engineering Concerns and Proposed Recommendations

Project: Pokai Bay Ocean View Development  
WO#94072-1  
Waianae, Hawaii

I. Slope Stability and Creep

The slope stability and down-hill movement or creep of the general soil materials in this area have been previously analyzed by a soils engineering firm with reports dated Dec. 26, 1973 and addendum reports dated Feb. 13, 1974 and Jan. 30, 1976. These reports were reviewed by Construction Labs' Registered Civil Engineer (Geotechnical) and our Engineering Geologist in September 1993. In addition, several site visits were made by Construction Labs' personnel in Sept-Oct. 1993 to evaluate the area with regard to slope movement and expansive soils. In general, we agree with the construction procedures necessary to reduce the slope movement. As shown in the referenced reports a buttress/keel construction will be followed. The purpose for this buttress construction is to provide sufficient reaction forces to counteract the movement of soil due to gravity forces and water erosion. The previous analysis shows that if the buttress construction is done properly, the reaction forces will be at least two (2) times greater than the downhill forces which will provide a safety factor in excess of two. In essence the buttress construction will be placed in street areas where the streets will be over-excavated a sufficient depth to allow placement of boulders

and non-expansive fine material under the control of a Soils Engineer to provide the necessary reaction. When final street and lot configurations are completed, an additional soils investigation report will be undertaken, if necessary, to insure that any changes in street location and outline will be acceptable for construction of the buttress and keel at locations as determined by the design of the subdivision area. Once again, this type of buttress construction, if constructed under the continual supervision of a Soils Engineer/Engineering Geologist will insure that the factor of safety for slope movement or lack thereof, will be in excess of two times that which is required. It should be pointed out that movement of concrete slabs on existing houses in the area is due to improper treatment of expansive soils. It is Construction Labs' opinion that distress occurring in some of the existing houses in the area is not due to creep and/or downhill movement of the soils but is attributed to the expansive soils.

## II. Expansive Soils

The history of expansive soils in this area is well known to many people particularly to the residents in the area. Houses were built, approximately 20 years ago, on some lots that contained the expansive soils without any concern for proper design and construction. The clayey soils which occur throughout the area in question, are classified as a dark brown, black, highly plastic, highly expansive clay (CH) which have been derived from the upper areas of the hill to the north and deposited by water and gravitational forces in the lower to mid portions of the valley. The clayey soil is locally known as "ADOBE". As is general information, the problem with the adobe clays is the volume change or expansion and shrinkage that happens when the material goes through a wetting and drying cycle and then re-wetting. This causes the soil material to expand when subjected to water with up-lift

pressures exceeding 5,000 PSF with a volume change equal to approximately 15%. Although the area in general is considered a dry area, the rainy season creates considerable problems with water run-off which causes the potentially expansive soils to become wet and expand as stated above. The project design Civil Engineer will have developed a grading plan including street layout and storm drains that will cause any surface runoff to be channeled per the grading plan. There are a number solutions to be followed to reduce the effects of the expansive soils problems. These are summarized as follows:

1. Complete removal of expansive soils. Since the layers of expansive clay occur in varying thicknesses the complete removal of all expansive material becomes uneconomical and is also a waste of natural resources (soil) since the material would have to be exported to a dump site with other non-expansive material imported and placed on the site. This is not an economical solution and in our opinion not necessary.
2. Post-tensioning concrete slabs. Post-tensioning of concrete slabs involves a special structural design such that steel wires are placed at designed distances within the concrete slab and then the cables are post-tensioned or pulled to improve the structural capability of the slab-on-grade. In general, this procedure gives a 300%-500% increase in resistance to uplift pressures. This method has been used in a number of places on Oahu and Construction Labs was involved in post-tension slab recommendation for a 230 unit housing development with the same type of soil at Kanehoe Marine Corp Air Station. This project built by Hunt Building Corp. (Mr. Bud Waters - General Manager) has experienced no difficulties since it was constructed in 1992. Figure #1 shows a sketch of a typical post-tension construction for slabs-on-grade.

The cost for constructing post-tensioned concrete slabs is reasonable and not considered prohibitive with regard to other alternatives.

3. A third solution to construction on expansive soils is defined as installing shallow caissons with wooden floors. Shallow caissons are merely pipes 12" diameter drilled down to either lava rock and/or coral ledge and filled with concrete. This will allow the foundations for the structures to be placed at 6-8' depth depending on the soil profile. Using suspended wood or steel floors, expansive soils would not present a structural problem with regard to the buildings. Depending on final design of the buildings, driveways and carports could either be over-excavated to a depth of 3' and backfilled with compacted non-expansive material or garage slabs could be post-tensioned to resist the uplift pressures that would be developed by landscape watering and/or rainfall. Figure #2, attached with this report, shows a sketch of what a shallow caisson installation would look like during construction.

4. It should be pointed out that either post-tensioning or shallow caissons will not affect the outward appearance of the buildings since these would be covered by soil material and/or landscaping.

### III. Boulders

It is well-known in this area that boulders have a way of tumbling down the side of the hill which could, and has, created problems with regard to safety of the residents. Many of the boulders that are existing on the site would be use to fill-in the construction areas for the buttresses. To compensate for future erosion and boulder movement from the areas above the general construction as outlined for this

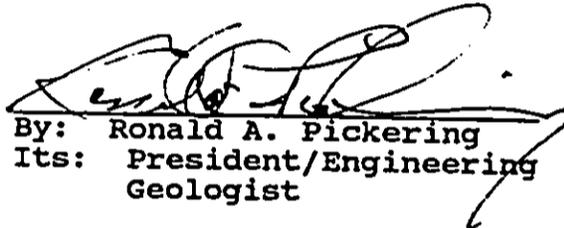
project the design Architect/Engineer is providing for a 3'  
rock wall to act as a catchment for the boulders.

If there are any questions or technical information that may  
be necessary, contact one of the undersigned at 455-1522.

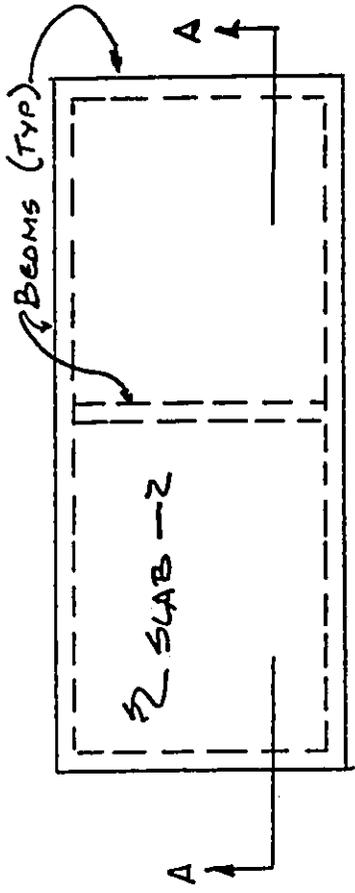
Very truly yours



By: George F. Moore  
Its: V.P. - Engineering

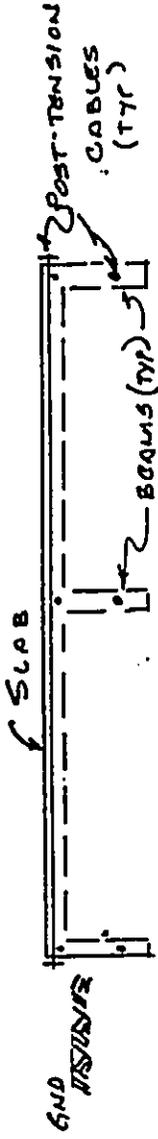


By: Ronald A. Pickering  
Its: President/Engineering  
Geologist



PLAN VIEW

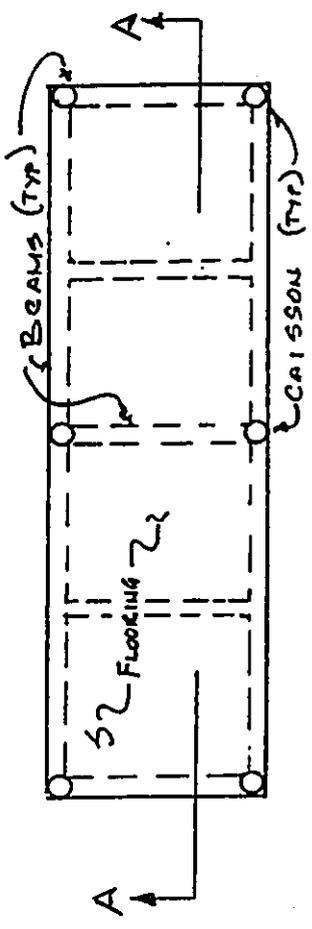
MATERIALS:  
 CONCRETE  
 P-T CABLES (GAL.)  
 (CLASS & SIZE TO BE DETERMINED)



SECTION A-A

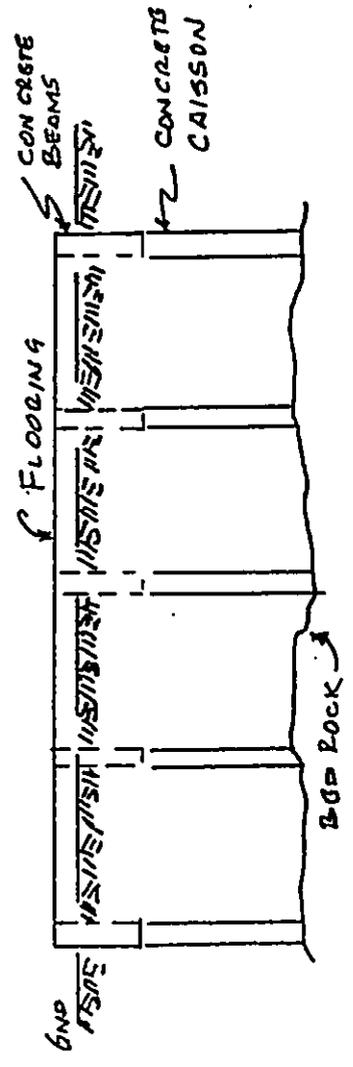
SKETCH SHOWING  
 POST-TENSIONED SLAB IN GRADE  
 MARCH 5, 1994  
 GEL, INC. G.F. MOORE, PE  
 NO SCALE

FIGURE 1



MATERIALS:  
 CONCRETE - BEAMS & CAISSONS  
 WOOD - FLOORING  
 (CLASS & TYPE TO BE DETERMINED)

PLAN VIEW



SECTION A-A

SKETCH SHOWING  
 REINFORCED CONCRETE BEAMS & CAISSONS  
 MARCH 5, 1994  
 CEL, INC. G.F. MOORE, P.E.  
 NO SCALE

FIGURE 2