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PLANTATION DRIVE INDUSTRIAL PARK  
PRELIMINARY SOIL REPORT

**FOR REFERENCE**  
not to be taken from this room

HALAWA, EWA, OAHU, HAWAII  
TAX MAP KEY: 9-9-02: 2 & 3

To:  
COMMUNITY PLANNING, INC.

**WALTER LUM ASSOCIATES, INC.**  
**CIVIL, STRUCTURAL, SOILS ENGINEERS**

MAY 28, 1974

MUNICIPAL REFERENCE & RECORDS CENTER  
City & County of Honolulu  
City Hall, Room 503 S. King Street  
Honolulu, Hawaii 96813

WITHDRAWN

**WALTER LUM ASSOCIATES, INC.**  
**CIVIL, STRUCTURAL, SOILS ENGINEERS**

3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

WALTER LUM  
EDWARD WATANABE  
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WALLACE WAKAHIRO

May 28, 1974

COMMUNITY PLANNING, INC.  
700 Bishop Street, Suite 608  
Honolulu, Hawaii 96813

Gentlemen:

Subject: Plantation Drive Industrial Park  
Preliminary Soil Report  
(for site grading for light industrial  
development)  
Halawa, Ewa, Oahu, Hawaii  
Tax Map Key: 9-9-02: 2 & 3

Transmitted herewith is our preliminary soil report for general site grading design purposes for light industrial development at the proposed Plantation Drive Industrial Park at Halawa, Ewa, Oahu, Hawaii.

This report includes a Boring Location Sketch, boring logs, laboratory test results, recommendations and limitations.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

By

Ezra Koike  
Ezra Koike

FM/EK:rmf

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PLANTATION DRIVE INDUSTRIAL PARK  
PRELIMINARY SOIL REPORT

HALAWA, EWA, OAHU, HAWAII  
TAX MAP KEY: 9-9-02: 2 & 3

SCOPE OF EXPLORATION

The purpose of this exploration was to evaluate general soil conditions for site grading design for light industrial development for the proposed Plantation Drive Industrial Park at Halawa, Ewa, Oahu, Hawaii.

This report includes field explorations, laboratory tests, general site grading design recommendations and limitations.

FIELD EXPLORATION

Thirty-one exploratory borings were made at the site. The locations of these borings are shown on the Boring Location Sketch. Descriptions of the underlying soils encountered are shown on Boring Log Nos. 1 thru 31.

Borings were made with 4-in. diameter augers using carbide drag and finger type bits. Soil samples were recovered with 2 and 3-in. diameter thin-wall tubes and a standard split spoon sampler with a 140-lb hammer falling 30 inches. Rock samples were recovered with a "BX" double tube core barrel using a carbide bit.

### LABORATORY TESTS

Laboratory tests included: natural water content and density, unconfined compression, laboratory vane shear, Atterberg limit, grain-size analysis, specific gravity, AASHO T-180-73I density and CBR.

Some identification tests were done by the U. H. Agronomy laboratory on "calcite" surface samples found in a localized section in the northeastern corner of the site.

A summary of the laboratory test results is given in Tables IA thru IC.

### SOIL DESCRIPTIONS BY OTHERS

From a review of geologic literature and the U. S. Soil Conservation Service maps of the area, the soils described by others are as follows:

Stearns, H. T. and U. S. Geological Survey, "Geologic and Topographic Map, Island of Oahu," USGS 1938:

Qht - Honolulu volcanic series

Volcanic tuff

U. S. Soil Conservation Service, "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii,"

August 1972:

At the southwesterly end of the site;

HnB - Hanalei silty clay, 2 to 6% slopes

Unified Soil Classification - MH

Over most of the site;

MdB - Makalapa clay (over volcanic  
tuff), 2 to 6% slopes,

Unified Soil Classification - CH

#### SOIL CLASSIFICATION SYSTEM

Soil samples were visually observed and subjected to appropriate tests in the laboratory. Based on visual observations and laboratory tests, the soil descriptions given on the boring logs are generally made in accordance with the "Unified Soil Classification System."

#### GENERAL SITE CONDITIONS

The proposed site is located makai (west side) of Salt Lake Boulevard and south of Radford High School grounds.

Radford High School, Hale Keiki School and portions of U. S. Naval Reservation land form the northern boundary. Plantation Drive Road runs along the southern boundary. An existing Hawaiian Electric Co. (HECO) substation was located on the east side of the site next to Salt Lake Boulevard.

The site is mostly on a gentle mudrock slope with a thin clayey soil cover. The ground generally slopes down in a southwesterly direction at

about 5 to 20% gradients with steeper localized sections, particularly along the banks of existing drainageways.

In general, there are 3 natural drainageways crossing the site. Two drainageways cross the makai half of the site in a southwesterly direction. A third drainageway is located at the northerly corner of the site and discharges to the northerly direction.

A shallow ditch is along the existing dirt road at the northwesterly side of the site.

The drainage channels are filled with alluvial and man-made deposits. The thickness of the deposits vary from little to 25 ft deep at the discharge end of the drainageway at the southwesterly corner of the site.

A "calcite" deposit was noted in the drainageway at the northerly corner of the site.

Some concrete pads and concrete walls were noted at the northeast portion of the site.

An existing radio tower was noted at the middle western section. Some electrical towers and poles were also noted along the northerly boundary of the site.

Stockpiles of earth and boulders, abandoned cars, rubbish and debris were noted in various areas of the site.

Portions of the drainageway at the southwesterly end of the site were probably used as a rubbish dump.

Portions of the site were overgrown with "sorghum" cane, particularly along the lower areas. Trees and shrubs were generally scattered throughout the perimeter and northern areas and were thicker near the northern perimeter.

#### INTERPRETATION OF SOIL CONDITIONS

From the field explorations and laboratory test results, the soils encountered in the borings may be generally approximated as follows:

A thin "CH" clay cover, 0 to 4 ft, over mudrock  
(volcanic tuff) formation.

Alluvial and clayey deposits were noted in the natural drainageways. The deposits were little to 25 ft or more at the discharge end of the drainageways.

Soft "calcite with sodium" surface layers were encountered in the natural depressions at the northerly end of the site.

Water was noted in Boring Nos. 3, 5, 7, 11 and 22 at about 2 to 29-ft depths during the field explorations.



Variations to the above soil conditions are to be expected in localized areas. For more detailed descriptions of soils encountered in the borings, refer to the boring logs.

#### DISCUSSION AND RECOMMENDATIONS

In general, the present plan is to clear and grade the site for light industrial development. The proposed grading is to create terraced lots by cutting the upper sections and filling the drainageways and lower areas. Cuts and fills of up to 25 to 30 ft are anticipated in localized sections.

A 30-ft high fill is proposed along the perimeter side slopes along the northerly boundary of the site. The fill will be made on a mudrock formation that is covered with some "CH" clay and "calcite" or organic material. The clay and soft "calcite" and organic deposits should be removed before the construction of a fill to minimize the occurrence of a slide.

The drainageway at the southwesterly end of the site is filled with alluvial and clayey deposits. In addition, the outlet of the drainageway is probably blocked or will be blocked by the proposed perimeter road. Positive drainage at the lower end of the drainageway must be provided. Loose layers and rubbish fills should be removed as much as practicable. Subdrains and rock blankets should be installed before the construction of fills. Settlements and differential settlements of fills should be expected over these drainageways.

Fills should be placed as soon as practicable along the drainageways. Settlement gages should be installed and periodic level readings taken to monitor the performance of the fills, particularly where fills are placed over natural drainageways and ditches.

The northerly section of the site is covered with soft "calcite with some sodium," about 0 to 7 ft or more in thickness. The material and underlying organic deposits should be removed and replaced with compacted select on-site soils. The natural depression may require drainage and subdrains before filling.

The "calcite" may be mixed with the "CH" clays for topsoil. However, the merits of using the "calcite" and clay for topsoil for growing grass, plants, etc., should be checked with an agronomist.

The clayey on-site surface soils may be stripped and used at the bottoms of the deeper fills at the lower end of the site. The mudrock from the excavation may be used to construct the perimeter fills along the northerly boundary of the site. The mudrock may also be used as drainage blankets and buttress fills at the lower or discharge ends of natural drainageways.

Before the start of grading operations, the location of the power line that leads to the radio tower should be verified. Cesspools and underground utility lines such as water lines, etc., should also be located prior to grading, if practicable.

### Site Grading

Surface vegetation, rubbish, debris, concrete rubble, abandoned cars, abandoned structures and utilities, etc., should generally be cleared and removed prior to site filling.

Existing stockpiles of soils or boulders or loose rubbish fills should be stripped down to stiff natural ground before the placement of fills in the area.

In general, the on-site soils should be carefully selected for the construction of the proposed fills. Clayey soils may generally be used in the deeper fills along the lower flatter portions of the site and away from slopes. The more granular (mudrock) soils should be placed in the upper portions of the fills and in the outer portions of slopes.

For fills on side slopes along the northerly perimeter, the clayey soils, "calcite" and organic deposits should be stripped and removed. Only granular mudrock should be used for the construction of the fill.

Grading work should be done as required by the Revised Ordinances of Honolulu, 1969 As Amended; and as recommended below:

1. The area should be cleared and grubbed.
2. Topsoil and stockpiled soils should be stripped to stiff natural ground before the placement of fills.
3. Soft pockets encountered during the site preparations should be excavated and replaced with select soils compacted in thin lifts.
4. Hard surfaces in localized areas should be scarified down to stiff soils and recompactd to match the density of the surrounding soil.
5. The bottoms and sides of drainageways should be stripped down to stiff natural ground before the placement of fills. Subdrains with laterals in a herringbone pattern should be placed along the bottoms of natural drainageways.
6. Thin sidehill fills (sliver fills) on sloping areas should be avoided.

7. Fills should be constructed in approximately level layers starting at the lower end and working upward. Where fills are made on sloping areas steeper than about 5 horizontal to 1 vertical, the ground at the toe of the fill should be benched to a generally level condition. As the fill is brought up, it should continually be keyed into the stiff natural ground by cutting steps into the slopes and compacting the fill into these steps.
  
8. If boulders are proposed to be used in the construction of fills, they should be generally placed along the toe sections of fill slopes and outside of probable building sites. Before placing any boulders, the subgrade should be stripped to stiff natural ground and shaped to drain. A transition layer of select granular material (6 in. to dust sizes) should be placed on the subgrade and the boulders placed on the select material. Earth fill may be used in the

void spaces between boulders. A transition layer of select granular material should also be placed against the boulders before any earth fills are placed against the boulders. See attached sketch, Figure 1.

9. In general, fills should be laid in 6-in. compacted layers to 90% of the maximum density determined by the AASHO T-180-73I test method. In roadway areas, the top 2 ft of fill should be compacted to 95% of the maximum density.
10. Provisions to drain the site should be included during and after the completion of filling operations.

#### Slopes

In general, cut and fill slopes of 2 horizontal to 1 vertical or flatter should be used.

Cut slopes of about 1-1/2 horizontal to 1 vertical may be considered where fairly continuous mudrock is encountered.

If slope heights (top to toe) of greater than 15 ft are considered, 8-ft-wide benches should be placed at height intervals of about 15 ft.

To minimize erosion, the runoff from rainstorms should be diverted by berms or ditches away from slopes whenever practicable.

The surface of fill slopes should be compacted by cat-tracking or with a sheepsfoot roller.

Slope planting is recommended on cut and fill slopes to minimize erosion.

Slope adjustments or other precautions may be necessary if seepage zones or expansive clay pockets are encountered in localized areas.

#### Foundations

In general, spread footings well-tied together or deep continuous footings may be considered for structures on mudrock or mudrock fills over mudrock.

Where clay "CH" soils occur near finish grade, the area below the building and to about 5 ft beyond the perimeter

of the building should be graded such that there is about 3 ft of selected non-expansive soils below finish grade and bottoms of footings.

Where the buildings may be located over utility trenches, cesspools, ditches, drainageways, etc., some differential settlements are expected. The buildings should be either located to avoid or designed to span over utility trenches, cesspools, etc. The footings should extend to the bottoms of trenches when practicable.

Differential settlements are also anticipated where a building may rest partially on mudrock formations and partially on soil. When practicable, the mudrock formation should be shaved or flattened to about 10 to 15 horizontal to 1 vertical to provide a smooth transition to the soil.

In general, construction of buildings in the lower areas on fills covering natural drainageways should be delayed until observations generally indicate that settlements are within the tolerances for the structures planned.

Because of the downhill creep effect of soils on a slope, some settlements may occur near the tops of slopes. Buildings should generally be placed about 15 ft away from the tops of slopes.



Construction of retaining walls on slopes should generally be avoided.

Good surface drainage away from structures should be maintained and the site should be graded to prevent the ponding of water.

#### Additional Explorations

Guidelines for building foundations have been quite general. More specific recommendations can be made after additional explorations are made for a specific structure and site.

#### Utilities

Utilities should be placed after the fills are constructed.

Utilities on or near slopes should be avoided, if practicable. Otherwise, the actual placement of utilities near slopes should be carefully designed and constructed with care.

The bottoms of utility trenches should be daylighted for drainage and graded to drain water, particularly near the tops and toes of slopes.

Utility lines should be designed with flexible joints, particularly where lines are connected to structures.

### Existing Cesspools and Trenches

Because existing building slabs and structures were presently located on portions of the site, cesspools and underground utilities may be encountered in the area. If cesspools are encountered within a building site, they should be located and backfilled under controlled conditions.

1. Sludge should be removed from the bottom and the cesspool backfilled with well-graded granular material. The materials should be placed in thin level layers and rammed into place or compacted with vibratory equipment. The top 5 ft of fill should be compacted in 6-in. compacted layers.
2. Portions of the building that rest over cesspools or existing trenches should be designed to span over them.

### Unforeseen Conditions

Because of the variability of soil deposits, site improvements, designs and construction techniques, conditions may be encountered that cannot be foreseen with even the most exhaustive studies of site and project conditions. These unforeseen conditions should

be recognized when encountered and then evaluated so that the designs or the construction methods may be modified accordingly, if necessary.

Unforeseen or undetected conditions such as soft spots, existing utility trenches, structure foundations, voids or cavities, boulders, expansive soil pockets or seepage water, etc., may occur in localized areas and will have to be adjusted and corrected in the field as they are detected.

#### Site Regrading

After mass grading work is done and cuts and fills are made according to the grading plans, regrading at some future date should be avoided unless done under the guidance of a soils engineer.

PROPOSED SPECIFICATION FOR EARTHWORK

PLANTATION DRIVE INDUSTRIAL PARK

General Description

This item shall consist of clearing and grubbing, preparing of land to be filled, excavating and filling of the land, spreading, compacting and testing of the fill, and subsidiary work for grading the site.

Clearing, Grubbing and Preparing Areas to be Filled

Vegetation, rubbish and miscellaneous material shall be removed and disposed of, leaving the disturbed area with a neat, debris-free appearance.

Topsoil and stockpiled soils shall be stripped to stiff natural ground before the placement of fills. Loose surface soils encountered at finish grade shall be scarified and recompacted.

Hard surfaces along the existing access roads shall be scarified down to stiff soils and recompacted to match the density of the surrounding soil.

Where fills are proposed in sidehill areas and gullies, loose material along the bottoms and the sides shall be stripped down to stiff natural ground before the placement of fills. New fills shall be keyed into the stiff natural ground.

Along the perimeter side slopes near the northerly boundary, "CH" clay and soft "calcite" and organic deposits shall be removed before construction of subdrains and fills.

Subdrains shall be placed along the bottoms and sides of the natural drainageways before the construction of fills. The locations of subdrains should be determined in the field after clearing and grubbing.

Where fills are made on sloping areas steeper than 5 horizontal to 1 vertical, the ground at the toe of the slope shall be benched to a generally level condition. As the fill is brought up, it shall be continually keyed into the stiff natural ground by cutting steps into the slope and compacting the fill into these steps.

#### Materials

Fill material shall consist of selected on-site soils or approved borrow soils. The soils shall contain no more than a trace of organic and deleterious matter.

Borrow soils shall be select soils generally less than 6-in. maximum size, with more than 30% fines and a plasticity index generally less than 20.

Fill material placed in the top 2 ft of fills shall contain less than 30% gravel.

#### Placing, Spreading and Compacting Fill Material

The selected fill material shall be placed in level layers which, when compacted, is about 6 inches. Each layer shall be spread evenly and blade-mixed during the spreading to attain uniformity of material and water content within each layer.

Rocks or cobbles shall not be allowed to nest and voids between rocks shall be filled and compacted with small stones or earth.

When the water content of the fill material is well below the optimum for compacting purposes, water shall be added until the water content is near the optimum.

When the water content of the material is well above the optimum for compacting purposes, the fill material shall be aerated by blading or by other satisfactory methods until the water content is near the optimum.

After each layer has been placed, mixed and spread evenly, it shall be compacted to 90% of maximum density in accordance with AASHTO Test No. T-180-73I or other comparable density tests. For fills in roadway areas, the top 2 ft of fill shall be compacted to 95% of the maximum density. Compaction shall be with sheepsfoot rollers, multiple-wheel pneumatic-tired rollers or other acceptable rollers which shall be able to compact the fill to the specified density. Rolling shall be accomplished while the fill material is at the specified water content. The rolling of each layer shall be continuous over its entire area and the roller shall make sufficient passes to obtain the desired density.

Field density tests shall be made to get an indication of the compaction of the fill. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density readings shall be taken as often as necessary in the compacted material below the disturbed surface. When these readings indicate that the density of

any layer of fill or portion thereof is below the required density, that layer or portion shall be reworked until the required density has been obtained.

The fill operation shall be continued in 6-in. compacted layers, as specified above, until the fill has been brought to the finished slopes and grades as shown on the accepted plans.

#### Backfilling of Old Cesspools or Wells

The following procedures shall be followed for backfilling:

(1) Sludge Removal

Remove the sludge from the bottom of the old cesspool by (a) pumping or (b) by clamshell or any other suitable way. The material shall be disposed of away from the site. The completeness of removal shall be verified by probing and shall be less than 12 in. at the bottom.

(2) Granular Fill (below 3 ft from finish grade)

Use granular material, graded from 6 to 0 inches. The fines passing the No. 200 sieve shall be less than 10%. The materials shall be placed in thin layers (12 in. maximum) and compacted with vibratory equipment to 90% of AASHTO T-180-73I density. Ramming each layer into place with a clamshell bucket will be allowed. The granular fill shall be wetted before placement into the

cesspools. Sufficient compaction tests shall be conducted to verify that 90% compaction is obtained by the construction method selected.

(3) Top 3 Ft of Fill

Linings encountered in the cesspools within the top 3 ft from finish grade shall be removed. The fill within the top 3 ft from finish grade shall be constructed from on-site soil in thin layers (6-in. compacted thickness) to 90% of AASHTO T-180-73I density. The material at finish grade shall blend with the surrounding soil.

Excavation

Suitable material from excavation shall be used in the fill and unsuitable material from excavation shall be disposed of.

Slope Adjustments

Where plastic "CH" clays are encountered and where fill slopes greater than 6 ft are proposed, the outer portions of the slopes shall be constructed with select materials (Plasticity Index less than 20).

If clay soils are encountered in slope excavations, the slopes shall be adjusted by use of flatter slopes or by removal of the clay "CH" pockets and reconstruction of the slopes with select materials. The actual remedial measures will depend upon field conditions.



### Boulder Fills

If boulders are used for the construction of fills, they shall be generally placed along the toe sections of slopes and outside of probable building sites. The subgrade shall be stripped to stiff natural ground, shaped to drain and a transition layer of select granular material (6 in. to dust sizes) shall be placed on it. Earth fill may be used in the void spaces between boulders. A transition layer of select granular material shall be placed against the boulder fill before construction of fills against it.

### Unforeseen Conditions

If unforeseen or undetected soil conditions such as soft spots, existing utility trenches, structure foundations, voids or cavities, boulders, seepage water or expansive soil pockets, etc., are encountered, corrective measures shall be made in the field as they are detected.

### Rainy Weather

Fill material shall not be placed, spread or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests indicate that the water content and density are as previously specified.

## BORING LOGS

The stratification lines shown on each of the boring logs represent the approximate boundary between soil types and the transition may be gradual.

### Symbols

Symbols used generally are in accordance with the Unified Soil Classification System.

Where a parenthesis "(MH)" is used, the soil sample was classified by visual observation of the sample recovered.

Where no parenthesis "MH" is used, the soil sample was classified from either the Atterberg limit or sieve analysis test results.

PLANTATION DRIVE INDUST. PARK

# WALTER LUM ASSOCIATES, INC.

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

## Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

BORING NO. 1 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

LOCATION Halawa, Ewa, Oahu, Hawaii

Driller W. LUM ASSOC., INC. Date FEB. 19, 1974

Tax Map Key: 9-9-02: 2 & 3

Field Party KAKU, CHOW SHIGENAGA

**HAMMER:**

Weight 140#

Drop 30"

Type of Boring AUGER (VERSA DRILL) Diam. 4"

Elev. 69' ± \* Datum \_\_\_\_\_

Drill Bit I.C. DRAG

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time \_\_\_\_\_

Date 2-19-74

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA					
										Standard Penetration Test					
DRILL RATE	ELEV. = <u>69' ± *</u>									N (Blows per foot)					
										0	10	20	30	40	
(CH)	STIFF, MOTTLED DARK BROWN CLAY W/ SAND, CORAL & GRAVEL (FILL)	0 - 5	H	1-A	-	26	-	-	-						30/0.5
		5 - 10	H	1-B	NO RECOVERY	18									35/0.0 HAMMER BOUNCES
	MUDROCK	10 - 15	H	1-C	NO RECOVERY										40/0.0 HAMMER BOUNCES
		15 - 20	H	1-D	MUDROCK FRAGMENT										40/0.1 HAMMER BOUNCES
	END OF BORING @ 20' 2-19-74	20	H	1-E	NO RECOVERY										40/0.0 HAMMER BOUNCES

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

BORING NO. 2 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

LOCATION Halawa, Ewa, Oahu, Hawaii

Driller W. LUM ASSOC., INC. Date FEB. 16, 1974

Tax Map Key: 9-9-02: 2 & 3

Field Party KAKU, PICONE

Type of Boring AUGER & CORING (VERSA DRILL) Diam. 4" & "BX"

HAMMER: Weight 140 #

Elev. 70' ± \* Datum \_\_\_\_\_

Drop 30"

Drill Bit T.C. DRAG & T.C. CORING

SAMPLER: 2" SS - 2" STANDARD SPLIT SPOON "BX" - BX DOUBLE TUBE CORE BARREL

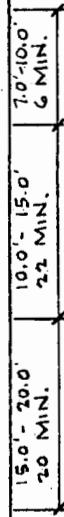
Water Level NOT NOTICED

Time \_\_\_\_\_ Date 2-16-74

PENETRATION DATA

Unified Soil Classification	DRILL RATE	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test				
											N (Blows per foot)				
		ELEV. = 70' ± *	0								0	10	20	30	40

BROWN & GRAY MUDROCK



END OF BORING @ 20' 2-16-74

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

	2"SS	H	2-A	NO RECOVERY											30/0.0'	HAMMER BOUNCES
5	"BX"		RUN #1	CORED: 1.5'												
	2"SS	H	2-B	RECOV.: 1.3'											30/0.0'	HAMMER BOUNCES
	"BX"		RUN #2	CORED: 1.5'												
				RECOV.: 1.4'												
10	2"SS	H	2-C	NO RECOVERY											30/0.0'	HAMMER BOUNCES
15	2"SS	H	2-D	NO RECOVERY											30/0.0'	HAMMER BOUNCES
20	2"SS	H	2-E	NO RECOVERY											30/0.0'	HAMMER BOUNCES

PLANTATION DRIVE INDUST. PARK

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK  
 LOCATION Halawa, Ewa, Oahu, Hawaii  
 Tax Map Key: 9-9-02: 2 & 3  
 HAMMER: 140#  
 Weight 30"  
 Drop 2" STANDARD SPLIT SPOON  
 SAMPLER:

BORING NO. 3 Sheet No.        of         
 Driller W. LUM ASSOC., INC. Date FEB. 15, 1974  
 Field Party KAKU, SHIGENAGA  
 Type of Boring AUGER (VERSA DRILL) Diam. 4"  
 Elev. 70' ± \* Datum         
 Drill Bit T. G. DRAG  
 Water Level 28.0  
 Time 2:30 PM  
 Date 2-15-74

Unified Soil Classification	DRILL RATE	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA				
											Standard Penetration Test				
											N (Blows per foot)				
											0	10	20	30	40
(SM)		MEDIUM DENSITY MOTTLED BROWN, SILTY SAND w/ GRAVEL & CORAL (FILL)	0		3-A	-	12	-	-	-	7	0.5			
							22	-	-	-					20/0.5
		DENSE, MOTTLED BROWN SILTY SAND & MUDROCK	5		3-B	-	21	-	-	-					40/0.3
			10		3-C			MUDROCK FRAGMENTS							40/0.1
			15		3-D			NO RECOVERY							10/0.1
		MUDROCK													
			20		3-E			MUDROCK FRAGMENT							40/0.1
			25		3-F			MUDROCK FRAGMENT							40/0.1
			30		3-G		30								40/0.2
		DENSE, BROWN SANDY SILT w/ GRAVEL (MUDROCK)													
		MUDROCK													
			35		3-H			MUDROCK FRAGMENT							50/0.2
		END OF BORING @ 35.2													
		2-15-74													

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

LOCATION Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 2 & 3

HAMMER:

Weight 140#

Drop 30"

2" S. 2" O.D. THIN WALL TUBE

SAMPLER:

2" SS. 2" STANDARD SPLIT SPOON

BORING NO. 4 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date FEB. 4, 1974

Field Party KAKU, SHIGENAGA

Type of Boring AUGER (VERSA DRILL) Diam. 4"

Elev. 42' ± \* Datum \_\_\_\_\_

Drill Bit T.C. DRAG

Water Level NOT NOTICED

Time \_\_\_\_\_

Date 2-4-74

PENETRATION DATA

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test				2" O.D. THIN WALL TUBE SAMPLER	
										N (Blows per foot)					
										0	10	20	30	40	Blows/0.5'
(CH)	STIFF, MOTTLED BROWN CLAY W/ SAND, CORAL & GRAVEL (FILL)	0	2" S	4-A	107	29	83	-	-						3/0.5' 5/0.5'
(GC)	MEDIUM DENSITY MOTTLED GRAY CLAYEY GRAVEL W/ SAND & WOOD PIECES (FILL)	5	2" SS	4-B	-	8	-	-	-						
(CH)	LOOSE, GRAY BROWN CLAY, SAND, GRAVEL & CORAL (FILL)	10	2" SS	4-C	-	16	-	-	-						
(CH)	MEDIUM GRAY BROWN CLAY W/ SAND & GRAVEL (FILL)	15	2" SS	4-D	-	23	-	-	-						
(SM)	DENSE, BROWN SILTY SAND W/ GRAVEL (MUDROCK)	20	2" SS	4-E	-	28	-	-	-						37/0.5'
(ML)	DENSE, BROWN SANDY SILT W/ GRAVEL (MUDROCK)	25	2" SS	4-F	-	38	-	-	-						50
	END OF BORING @ 30.4' 2-4-74	30	2" SS	4-G	-	30	-	-	-						50/0.4'

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE INDUSTRIAL PARK

PLANTATION DRIVE INDUSTRIAL PARK

**Boring Log**

PROJECT PLANTATION DRIVE INDUSTRIAL PARK  
 LOCATION Halawa, Ewa, Oahu, Hawaii  
 Tax Map Key: 9-9-02: 2 & 3

BORING NO. 5 Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 Driller W. LUM ASSOC., INC Date JAN. 29, 1974  
 Field Party KAKU, SHIGENAGA  
 Type of Boring AUGER (VERSA DRILL) Diam. 4"  
 Elev. 29' ± \* Datum \_\_\_\_\_  
 Drill Bit T.O. DRAG

HAMMER:  
 Weight 140 #  
 Drop 30"  
2" S - 2" O.D. THIN WALL TUBE  
 SAMPLER: 2" SS - 2" STANDARD SPLIT SPOON

Water Level	29'			
Time	2:45 PM			
Date	1-29-74			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA							
										Standard Penetration Test			2" O.D. THIN WALL TUBE SAMPLER				
										N (Blows per foot)							
										0	10	20	30	40	BLOWS		
(GH)	MOTTLED BROWN CLAY w/ SAND & GRAVEL (FILL)	0	2" S	5-A	-	26	-	-	-							4/0.5	6/0.5
(GP-GM)	LOOSE, BROWN SILTY SAND, GRAVEL & CINDERS (FILL)	5	2" SS	5-B	-	4	-	-	-								
(GH)	STIFF, GRAY-BROWN CLAY w/ MUDROCK	10	2" SS	5-C	-	36	-	-	-								
		15	2" SS	5-D	-	40	-	-	-								
		20	2" SS	5-E	-	26	-	-	-								
		25	2" SS	5-F	-	40	-	-	-								
		29.1	2" SS	5-G	-	24	-	-	-								50/10.1
	BROWN MUDROCK	30	2" SS	5-G													40/10.1
	END OF BORING @ 30.1'																
	1-29-74																
	*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74																

8' ± RECENT FILL

WATER 1-29-74

PLANTATION DRIVE INDUST. PARK

# WALTER LUM ASSOCIATES, INC.

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

## Boring Log

**PROJECT** PLANTATION DRIVE INDUSTRIAL PARK  
**LOCATION** Halawa, Ewa, Oahu, Hawaii  
**Tax Map Key:** 9-9-02: 2 & 3

**BORING NO.** 6 **Sheet No.** \_\_\_\_\_ of \_\_\_\_\_  
**Driller** W. LUM ASSOC., INC. **Date** JAN. 30, 1974  
**Field Party** KAKU, SHIGENAGA  
**Type of Boring** AUGER (VERSA DRILL) **Diam.** 4"  
**Elev.** 44' ± \* **Datum** \_\_\_\_\_  
**Drill Bit** T.C. DRAG

**HAMMER:**  
**Weight** 140#  
**Drop** 30"  
**SAMPLER:** 2" S - 2" O.D. THIN WALL TUBE  
2" SS - 2" STANDARD SPLIT SPOON

**Water Level** NOT NOTICED  
**Time** \_\_\_\_\_  
**Date** 1-30-74

Unified Soil Classification	DESCRIPTION	Depth (ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA							
										Standard Penetration Test			2" O.D. THIN WALL TUBE SAMPLER				
										N (Blows per foot)							
										0	10	20	30	40	Blows/0.5'		
(CH)	STIFF MOTTLED GRAY BROWN CLAY W/ TRACES OF SAND & ROOTS.	0	2" S	G-A	109	46	15	6520	-							2/0.5	5/0.5
	BROWN SANDY SILT (MUDROCK)	5	2" SS	G-B	-	25	-	-	-								40/0.3
	MUDROCK	10	2" SS	G-C	NO RECOVERY												40/0.1
	END OF BORING @ 15'	15	2" SS	G-D	NO RECOVERY												30/0.0

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74



Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

LOCATION Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 2 & 3

HAMMER:

Weight 140#

Drop 30"

2" S - 2" O.D. THIN WALL TUBE

SAMPLER: 2" SS - 2" STANDARD SPLIT SPOON

BORING NO. 7 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date JAN. 28, 1974

Field Party KAKU, SHIGENAGA

Type of Boring AUGER (VERSA DRILL) Diam. 4"

Elev. 44' ± \* Datum \_\_\_\_\_

Drill Bit T.O. DRAG

Water Level 18.0' 18.5'

Time 11:30 AM 1:50 AM

Date 1-28-74 1-29-74

PENETRATION DATA

Standard Penetration Test  
N (Blows per foot)  
0 10 20 30 40  
2" O.D. THIN WALL TUBE SAMPLER  
BLOWS/0.5'

Unified Soil Classification	DESCRIPTION	Depth (ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA				
(GH)	MEDIUM DENSITY, BROWN SANDY CLAY w/ MUDROCK & CORAL (FILL)	0	2" S	T-A	121	26	96	-	-					4/0.5 8/0.5
(SM)	LOOSE, DARK BROWN SILTY SAND w/ MUDROCK	5	2" SS	T-B	-	52	-	-	-					
MH	DARK GRAY SILTY CLAY w/ SAND	10	2" SS	T-C	-	30	-	-	-					40/0.2 HAMMER BOUNCES
	BROWN MUDROCK	15	2" SS	T-D	NO RECOVERY		LL= 101 PL= 47	(CUTTINGS)						40/0.0 HAMMER BOUNCES
	END OF BORING @ 20' 1-28-74	20	2" SS	T-E	NO RECOVERY									40/0.0 HAMMER BOUNCES

NOTE:  
LL= LIQUID LIMIT  
PL= PLASTIC LIMIT

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE INDUSTRIAL PARK

PLANTATION DRIVE INDUSTRIAL PARK

**WALTER LUM ASSOCIATES, INC.**

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

**Boring Log**

PROJECT PLANTATION DRIVE INDUSTRIAL PARK  
 LOCATION Halawa, Ewa, Oahu, Hawaii  
 Tax Map Key: 9-9-02: 2 & 3

BORING NO. 8 Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 Driller W. LUM ASSOC., INC. Date JAN. 28, 1974  
 Field Party KAKU, SHIGENAGA  
 Type of Boring AUGER (VERSA DRILL) Diam. 4"  
 Elev. 50'± \* Datum \_\_\_\_\_  
 Drill Bit T.C. DRAG

HAMMER: Weight 140 #  
 Drop 30"  
 SAMPLER: 2" S - 2" O.D. THIN WALL TUBE  
2" SS - 2 STANDARD SPLIT SPOON

Water Level	NOT NOTICED			
Time	-			
Date	1-28-74			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA							
										Standard Penetration Test				2" O.D. THIN WALL TUBE SAMPLER			
										N (Blows per foot)							
										0	10	20	30	40	BLOWS/0.5'		
(CH)	ELEV. = 50'± ↓ *	0															
	MEDIUM, BROWN CLAY W/ SAND & TRACES OF GRAVEL	0-5	2" S	B-A	113	26	90	5040	-								4/0.5 4/0.5'
	BROWN MUDROCK	5-10	2" SS	B-B	-	23	-	-	-								4/0.3 HAMMER BOUNCES
		10-15	2" SS	B-C				MUDROCK FRAGMENT									4/0.0' HAMMER BOUNCES
		15-15.1'	2" SS	B-D		23											4/0.1' HAMMER BOUNCES
	END OF BORING @ 15.1'																

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE IND. PARK

# WALTER LUM ASSOCIATES, INC.

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

## Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK  
 LOCATION Halawa, Ewa, Oahu, Hawaii  
 Tax Map Key: 9-9-02: 2 & 3

HAMMER:  
 Weight 140#  
 Drop 30"  
 SAMPLER: 2" SS - 2" STANDARD SPLIT SPOON  
"BX" - BX DOUBLE TUBE CORE BARREL

BORING NO. 9 Sheet No.      of       
 Driller W. LUM ASSOC., INC. Date FEB. 6, 1974  
 Field Party KAKU, SHIGENAGA  
 Type of Boring AUGER & CORING Diam. 4" & "BX"  
(VERSA DRILL)  
 Elev. 52' ± \* Datum       
 Drill Bit T.C. DRAG, T.C. CORING & ROLLER ROCK

Water Level	NOT NOTICED			
Time				
Date	2-6-74			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA				
										Standard Penetration Test				
	ELEV. = 52' ± *									N (Blows per foot)				
										0	10	20	30	40
(SM)	DENSE, TANNISH WHITE SILTY SAND & CORAL (FILL)	0	2" SS	9-A	-	17	-	-	-					40/0.4
			"BX"	RUN #1		CORED: 3.0'	RECOV.: 2.0'							
		5	2" SS	9-B		32	-	-	-					40/0.3
	BROWN MUDROCK		"BX"	RUN #2		CORED: 1.7'	RECOV.: 1.6'							HAMMER BOUNCES
			"BX"	RUN #3		CORED: 0.5'	RECOV.: 0.2'							40/0.4
			2" SS	9-C		33	-	-	-					HAMMER BOUNCES
		10	2" SS	9-D		NO RECOVERY								30/0.1
														HAMMER BOUNCES
		15	2" SS	9-E		NO RECOVERY								30/0.0
	END OF BORING @ 15'													HAMMER BOUNCES
	2-6-74													

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE IND. PARK

# WALTER LUM ASSOCIATES, INC.

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

## Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK  
 LOCATION Halawa, Ewa, Oahu, Hawaii  
 Tax Map Key: 9-9-02: 2 & 3

BORING NO. 10 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date FEB. 5, 1974

Field Party KAKU, SHIGENAGA

Type of Boring AUGER & CORING (VERSA DRILL) Diam. 4" & "BX"

Elev. 56' ± \* Datum \_\_\_\_\_

Drill Bit T.C. DRAG & T.C. CORING

HAMMER: 140#  
 Weight 140#  
 Drop 30"  
 SAMPLER: 2" SS - 2" STANDARD SPLIT SPOON  
"BX" - BX DOUBLE TUBE CORE PARREL

Water Level	NOT NOTICED			
Time	-			
Date	2-5-74			

### PENETRATION DATA

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test					
										N (Blows per foot)					
										0	10	20	30	40	
(MH)	DENSE WHITE & BROWN SILTY SAND & CORAL (FILL)	0	2"SS	10-A	-	-	13 25	-	-						20/0.5
	DENSE, BROWN SILTY CLAY w/ SAND & MUDROCK	5	"BX"	RUN #1			CORED: 3.0' RECOV.: 3.0'								40/0.2
	BROWN MUDROCK	10	"BX"	RUN #2			CORED: 5.0' RECOV.: 5.0'								40/0.1
	END OF BORING @ 10.1' 2-5-74	10.1	2"SS	10-B	-	-	19	-	-						HAMMER BOUNCES

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK  
 LOCATION Halawa, Ewa, Oahu, Hawaii  
 Tax Map Key: 9-9-02: 2 & 3

BORING NO. 11 Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 Driller W. LUM ASSOC., INC. Date FEB. 9, 1974  
 Field Party ASATO, OMORI  
 Type of Boring ALGER (SIMCO VERSA DRILL) Diam. 4"  
 Elev. 56' ± \* Datum \_\_\_\_\_  
 Drill Bit T.C. DRAG

HAMMER:  
 Weight 140#  
 Drop 30"  
 2"SS - 2" STANDARD SPLIT SPON  
 SAMPLER: 3" S - 3" O.D. THIN WALL TUBE

Water Level 9.0'  
 Time 3:15 PM  
 Date 2-9-74

PENETRATION DATA

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA					
										Standard Penetration Test		3" O.D. THIN WALL TUBE SAMPLER			
										N (Blows per foot)					
										0	10	20	30	40	BLOWS/0.5'
	ELEV. = 56' ± ↓ *	0													
		0-5	2"SS	11-A	-	134	-	-	-						
	GRAYISH WHITE CALCITE w/ SODIUM? (FILL?)	5	3" S	11-B	-	234 259	-	560							
(SM)	LOOSE, DARK BROWN SILTY SAND w/ GRAVEL & DECOMPOSED ROCK (FILL?)	10	2"SS	11-C	-	86	-	-							1 BLOW PER FT. 1 BLOW PER 0.5 FT.
(SM)	MEDIUM DENSITY, GRAY SILTY SAND w/ GRAVEL	15	2"SS	11-D	-	36	-	-							1/1.0
(SM)	DENSE, MOTTLED GRAY w/ TAN, SILTY SAND w/ GRAVEL	20	2"SS	11-E	-	40	-	-							
	BROWN MUDROCK w/ SAND & CLAY POCKETS	25	2"SS	11-F	-	43	-	-							40/0.4
	END OF BORING @ 31.2' 2-9-74	30	2"SS	11-G	-	45 60 43	-	-							21/0.5 40/0.2

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

LOCATION Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 2 & 3

HAMMER: °

Weight 140#

Drop 30"

2" S. 2" O.D. THIN WALL TUBE

SAMPLER: 2" SS. 2" STANDARD SPLIT SPOON

BORING NO. 12 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date FEB. 1, 1974

Field Party KAKU, SHIGENAGA

Type of Boring Auger (Versa Drill) Diam. 4"

Elev. 54 ± \* Datum \_\_\_\_\_

Drill Bit T.O. DRAG

Water Level NOT NOTICED

Time \_\_\_\_\_ Date 2-1-74

PLANTATION DRIVE INDUST. PARK

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA						
										Standard Penetration Test				2" O.D. THIN WALL TUBE SAMPLER		
										N (Blows per foot)					1 MAN PUSH	
										0	10	20	30	40	BLOWS/0.5'	
	ELEV. = 54' ± * ↓	0														
	GRAYISH-WHITE CALCITE w/ SODIUM? (FILL?)	0-2	2"S	12-A	86	82	47	690	-							1 MAN PUSH 1.5'
(OH)	SOFT, DARK GRAY ORGANIC CLAYS w/ SAND & DECOMPOSED ROCK	2-5	2"SS	12-B	-	135 81	-	-	-							3/1.0'
(SM)	DENSE, BROWN & DARK GRAY, SILTY SAND w/ GRAVEL (MUDROCK)	5-10	2"SS	12-C	-	18	-	-	-							40/0.2 HAMMER BOUNCES
(SM)	DENSE, MOTTLED BROWN SILTY SAND (MUDROCK)	10-16.5	2"SS	12-D	-	44	-	-	-							76
	END OF BORING @ 16.5' 2-1-74															

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK  
 LOCATION Halawa, Ewa, Oahu, Hawaii  
 Tax Map Key: 9-9-02: 2 & 3

BORING NO. 13 Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 Driller W. LUM ASSOC. INC. Date FEB. 11, 1974  
 Field Party KAKU, SHIGENAGA, OMORI  
 Type of Boring AUGER (VERSA DRILL) Diam. 4"  
 Elev. 77' ± \* Datum \_\_\_\_\_  
 Drill Bit T.C. DRAG

HAMMER:  
 Weight 140#  
 Drop 30"  
 SAMPLER: 2" STANDARD SPLIT SPOON

Water Level	NOT NOTICED			
Time	-			
Date	2-11-74			

PENETRATION DATA

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test					
										N (Blows per foot)					
										0	10	20	30	40	
	DARK BROWN, MUDROCK & TRACES OF SILTY SAND & CLAY	0		13-A	-	26	-	-	-						40/0.5
	BROWN MUDROCK	5		13-B	-	19	-	-	-						40/0.1
	MUDROCK FRAGMENTS	10		13-C											30/0.0
	MUDROCK FRAGMENTS	15		13-D											30/0.0
	END OF BORING @ 15' 2-11-74														

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE INDUSTRIAL PARK

**Boring Log**

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

LOCATION Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 2 & 3

**HAMMER:**

Weight 140#

Drop 30"

**SAMPLER:**

2" STANDARD SPLIT SPOON

BORING NO. 14 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date FEB. 19, 1974

Field Party KAKU, CHOW, SHIGENAGA

Type of Boring AUGER (VERSA DRILL) Diam. 4"

Elev. 59' ± \* Datum \_\_\_\_\_

Drill Bit T.C. DRAG

Water Level NOT NOTICED

Time \_\_\_\_\_

Date 2-19-74

**PENETRATION DATA**

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test					
										N (Blows per foot)					
DRILL RATE	ELEV. = <u>59' ± *</u>									0	10	20	30	40	
(MH)	STIFF, DARK BROWN SILTY CLAY w/ SAND & GRAVEL	0		14-A	-	20	19	-	-					10/0.5	
		5		14-B	MUDROCK FRAGMENTS									20/0.5	
	MUDROCK	10		14-C	NO RECOVERY									35/0.0	HAMMER BOUNCES
		15		14-D	NO RECOVERY									40/0.0	HAMMER BOUNCES

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE INDUSTRIAL PARK



Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

BORING NO. 15 Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 Driller W. LUM ASSOC., INC. Date FEB. 14 1974

LOCATION Halawa, Ewa, Oahu, Hawaii

Field Party KAKU, SHIGENAGA

Tax Map Key: 9-9-02: 2 & 3

Type of Boring AUGER (VERSA DRILL) Diam. 4"

HAMMER:

Weight 140#

Elev. 45' ± \* Datum \_\_\_\_\_

Drop \_\_\_\_\_

Drill Bit T.C. DRAG

SAMPLER:

2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time \_\_\_\_\_

Date 2-14-74

PENETRATION DATA

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test						
										N (Blows per foot)						
										0	10	20	30	40		
(GH)	STIFF, MOTTLED BROWN CLAY, GRAVEL, SAND & CORAL (FILL)	0		15-A	-	27	-	-	-							
(GM)	MEDIUM DENSITY, BROWN SILTY GRAVEL, CONCRETE, SAND & WOOD (FILL)	5		15-B	-	13	-	-	-				1/0.5'			
(GP-GM)	MEDIUM DENSITY BROWNISH WHITE SILTY SAND & CORAL (FILL)	8		15-C	-	9	-	-	-				2/0.5'			
(GM)	LOOSE MOTTLED DARK BROWN SILTY CLAY, SAND, CORAL, GRAVEL, CONCRETE & WOOD (FILL)	10		15-D	-	18	-	-	-				1/0.5'			
		15		15-E	-	20	-	-	-				5/0.5'			
	MOTTLED BROWN MUDROCK	20		15-F	-	37	-	-	-					40/0.3'	HAMMER BOUNCES	
	END OF BORING @ 25.1'	25													40/0.1'	HAMMER BOUNCES
	2-14-74															

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE INDUST. PARK

PLANTATION DRIVE IND. PARK

# WALTER LUM ASSOCIATES, INC.

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

## Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK  
 LOCATION Halawa, Ewa, Oahu, Hawaii  
 Tax Map Key: 9-9-02: 2 & 3

BORING NO. 16 Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 Driller W. LUM ASSOC., INC. Date FEB. 7, 1974  
 Field Party KAKU, SHIGENAGA  
 Type of Boring AUGER (VERSA DRILL) Diam. 4"  
 Elev. 50' ± \* Datum \_\_\_\_\_  
 Drill Bit T.C. DRAG  
 Water Level NOT NOTICED  
 Time \_\_\_\_\_  
 Date 2-7-74

HAMMER: Weight 140 #  
 Drop 30"  
 2" S. 2" O.D. THIN WALL TUBE  
 SAMPLER: 2" SS-2" STANDARD SPLIT SPOON

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA							
										Standard Penetration Test			2" O.D. THIN WALL TUBE SAMPLER				
										N (Blows per foot)							
										0	10	20	30	40	BLOWS/0.5'		
CH	MEDIUM DARK MOTTLED BROWN CLAY W/ GRAVEL & SOME SAND	0 - 2.5	2" S	16-A	110	39	79	1910	-							3/0.5	5/0.5
(SM)	DENSE, BROWN SILTY SAND & GRAVEL (MUDROCK)	2.5 - 5	2" SS	16-B	-	31	-	-	-							50/0.5	HAMMER BOUNCES
		5 - 10	2" SS	16-C	-	26	-	-	-							50/0.5	HAMMER BOUNCES
	END OF BORING @ 15.5'	10 - 15.5	2" SS	16-D	-	27	-	-	-							40/0.5	HAMMER BOUNCES
										NOTE: LL= LIQUID LIMIT PL= PLASTIC LIMIT							

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

LOCATION Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 2 & 3

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 17 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date JAN. 26, 1974

Field Party KAKU, KAU

Type of Boring AUGER (VERSA DRILL) Diam. 4"

Elev. 46' ± \* Datum \_\_\_\_\_

Drill Bit T.C. DRAG

Water Level NOT NOTICED

Time \_\_\_\_\_

Date 1-26-74

PENETRATION DATA

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test					
										N (Blows per foot)					
										0	10	20	30	40	
(SM)	LOOSE, BROWN, SILTY SAND	0				48									
(ML)	SOFT, BLACK W/ BROWN CLAYEY SILT W/ SAND & TRACES OF ROOTS			17-A	-	42									
(CH)	MEDIUM, BROWN CLAY W/ TRACES OF MUDROCK	5		17-B	-	30									40/0.1 HAMMER BOUNCES
	BROWN MUDROCK	10		17-C	-	26									40/0.2 HAMMER BOUNCES
	END OF BORING @ 15' 1-26-74	15		17-D	NO	RECOVERY									40/0.0 HAMMER BOUNCES

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE INDUSTRIAL PARK

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

BORING NO. 18 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

LOCATION Halawa, Ewa, Oahu, Hawaii

Driller W. LUM ASSOC., INC. Date JAN. 26, 1974

Tax Map Key: 9-9-02: 2 & 3

Field Party KAKU, KAU

Type of Boring AUGER (VERSA DRILL) Diam. 4"

Elev. 57' ± \* Datum \_\_\_\_\_

Drill Bit T.C. DRAG

HAMMER: Weight 140#.

Drop 30"

Water Level NOT NOTICED

Time \_\_\_\_\_

SAMPLER: 2" STANDARD SPLIT SPOON

Date 1-26-74

PENETRATION DATA

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
	MUDROCK W/ TRACES OF BROWN CLAY & ROOTS	0		18-A	-	34	-	-	-					
	BROWN MUDROCK	5		18-B	-	25	-	-	-					40% 0.2' HAMMER BOUNCES
		10		18-C	-	21	-	-	-					40% 0.2' HAMMER BOUNCES
	END OF BORING @ 15.1' 1-26-74	15		18-D										40% 0.1' HAMMER BOUNCES

PLANTATION DRIVE INDUSTRIAL PARK

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE INDUSTRIAL PARK

# WALTER LUM ASSOCIATES, INC.

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

## Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK  
 LOCATION Halawa, Ewa, Oahu, Hawaii  
 Tax Map Key: 9-9-02: 2 & 3

BORING NO. 19 Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 Driller W. LUM ASSOC. INC. Date JAN. 25, 1974  
 Field Party KAKU, SHIGENAGA  
 Type of Boring AUGER (VERSA DRILL) Diam. 4"  
 Elev. 75'± \* Datum \_\_\_\_\_  
 Drill Bit T.O. DRAG

HAMMER:  
 Weight 140#  
 Drop 30"  
 SAMPLER: 2" STANDARD SPLIT SPOON

Water Level	<u>NOT NOTICED</u>			
Time	<u>-</u>			
Date	<u>1-25-74</u>			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA					
										Standard Penetration Test					
										N (Blows per foot)					
										0	10	20	30	40	
(SM)	LOOSE, BROWN, SILTY SAND W/TRACES OF ROOTS	0		19-A	-	58 16	-	-	-						50/0.5
															HAMMER BOUNCES
	BROWN MUDROCK	5		19-B											40/0.1
															HAMMER BOUNCES
		10		19-C											40/0.1
															HAMMER BOUNCES
	END OF BORING @ 15.1' 1-25-74	15		19-D											40/0.1
															HAMMER BOUNCES

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE INDUSTRIAL PARK

# WALTER LUM ASSOCIATES, INC.

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

## Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

LOCATION Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 2 & 3

**HAMMER:**

Weight 140#

Drop 30"

**SAMPLER:**

2" STANDARD SPLIT SPOON

BORING NO. 20 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date JAN. 25, 1974

Field Party KAKU, SHIGENAGA

Type of Boring AUGER (VERSA DRILL) Diam. 4"

Elev. 93' ± \* Datum \_\_\_\_\_

Drill Bit T.C. DRAG

Water Level NOT NOTICED

Time \_\_\_\_\_

Date 1-25-74

**PENETRATION DATA**

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test					
										N (Blows per foot)					
										0	10	20	30	40	
	BROWN MUDROCK	0		20-A	MUDROCK									40/0.1'	
		5		20-B	MUDROCK									40/0.1'	
		10		20-C		27								40/0.2'	
		15		20-D	MUDROCK										40/0.1'
		20		20-E	MUDROCK										40/0.1'
	END OF BORING @ 20.1'														
	1-25-74														

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

LOCATION Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 2 & 3

BORING NO. 21 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSO., INC. Date FEB. 11, 1974

Field Party KAKU, SHIGENAGA, OMORI

Type of Boring AUGER (VERSA DRILL) Diam. 4"

Elev. 81' ± \* Datum \_\_\_\_\_

Drill Bit T.O. DRAG

HAMMER: Weight 140 #

Drop 30"

SAMPLER: 2" S - 2" O.D. THIN WALL TUBE  
2" SS - 2" STANDARD SPLIT SPOON

Water Level	NOT NOTICED			
Time	-			
Date	2-11-74			

PENETRATION DATA

Unified Soil Classification	DESCRIPTION	Depth (ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test					2" O.D. THIN WALL TUBE SAMPLER	
										N (Blows per foot)						BLOWS/0.5'
										0	10	20	30	40		
	GRAYISH-WHITE CALCITE W/ SODIUM? (FILL?)	0	2" S	21-A	-	79 86	-	1750	-							1/0.5' 1/0.5'
	MOTTLED GRAY BROWN MUDROCK	5	2" SS	21-B	-	17	-	-	-							40/0.5'
	DARK BROWN MUDROCK	10	2" SS	21-C	No RECOVERY											40/0.0'
	END OF BORING @ 15.1' 2-11-74	15	2" SS	21-D	MUDROCK FRAGMENTS											40/0.1'

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE INDUSTRIAL PARK

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK  
 LOCATION Halawa, Ewa, Oahu, Hawaii  
 Tax Map Key: 9-9-02: 2 & 3

BORING NO. 22 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date FEB. 8, 1974

Field Party KAKU, OMORI

Type of Boring AUGER (SIMCO VERGER DRILL) Diam. 4"

Elev. 26' ± \* Datum \_\_\_\_\_

Drill Bit T.C. DRAG

HAMMER:  
 Weight 140#  
 Drop 30"  
 SAMPLER: 2" SS - 2" STANDARD SPLIT SPOON  
3" S - 3" O.D. THIN WALL TUBE

Water Level	<u>2.0'</u>			
Time	<u>11:30 AM</u>			
Date	<u>2-8-74</u>			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA					
										Standard Penetration Test				3" O.D. THIN WALL TUBE SAMPLER	
										N (Blows per foot)					
										0	10	20	30	40	Blows/0.5'
(MH)	SOFT, DARK RED SILTY CLAY w/SAND & SOME ROOTS (FILL)	0	3" S	22-A	109	49	76	-	-						2/0.5 1/0.5 2/0.5
MH	SOFT, DARK BROWN SILTY CLAY w/SAND, GRAVEL & TRACES OF ORG. MATL (FILL)	5	2" SS	22-B	-	44	LL= 60 PL= 32	-	-						
(GH)	MEDIUM DENSITY GRAY BROWN CLAY w/GRAVEL & SAND	10	2" SS	22-C	-	48	-	-	-						
GH	MEDIUM TO STIFF GRAY BROWN, CLAY w/DECOMPOSED ROCK, SAND, MUDROCK & GRAVEL	15	2" SS	22-D	-	44	LL= 90 PL= 35	-	-						
(SM)	DENSE, MOTTLED GRAY SILTY SAND w/GRAVEL (MUDROCK)	20	3" S	22-E	130	52	85	-	-						12/0.5'
	DENSE, DARK BROWN SILTY SAND w/SOME DECOMPOSED ROCK (MUDROCK)	25	2" SS	22-F	-	51	-	-	-						52
	DENSE, DARK BROWN SILTY SAND w/SOME DECOMPOSED ROCK (MUDROCK)	30	2" SS	22-F	-	46	-	-	-						68
	END OF BORING @ 26.5' 2-8-74	26.5													HAMMER BOUNCES

NOTE  
 LL= LIQUID LIMIT  
 PL= PLASTIC LIMIT

Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74



Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

LOCATION Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 2 & 3

HAMMER:

Weight 140 #

Drop 30"

SAMPLER:

2" SS- 2" STANDARD SPLIT SPOON  
"BX" - BX DOUBLE TUBE CORE BARREL

BORING NO. 23 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date FEB. 12, 1974

Field Party KAKU, SHIGENAGA

Type of Boring Auger (Coring) (VERSA DRILL) Diam. 4" & "BX"

Elev. 48'± Datum \_\_\_\_\_

Drill Bit T.C. DRAG & T.C. CORING

Water Level Noticed

Time \_\_\_\_\_

Date 2-12-74

PLANTATION DRIVE INDUSTRIAL PARK

Unified Soil Classification	DESCRIPTION	Depth (ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA					
										Standard Penetration Test					
	ELEV. = 48'± ↓ *	0								N (Blows per foot)					
										0	10	20	30	40	
	BROWN, CLAYEY GRAVEL TAN, SILTY SAND & DARK GRAY GRAVEL w/ CORAL (FILL) DARK GRAY, SILTY SAND & GRAVEL w/ CORAL	0 - 5	2" SS	23-A		28 10 22									26/0.5 40/0.3 HAMMER BOUNCES
	GRAY BROWN MUDROCK	5 - 10	2" SS "BX"	23-B RUN #1	ROCK FRAGMENTS		CORED: 2.0 RECOV.: 2.0								40/0.3 HAMMER BOUNCES
			"BX"	RUN #2			CORED: 1.7 RECOV.: 1.7								
			"BX"	RUN #3			CORED: 4.5 RECOV.: 4.5								
	END OF BORING @ 13.5' 2-12-74	10 - 13.5													

\* Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE IND. PARK

# WALTER LUM ASSOCIATES, INC.

3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

## Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

LOCATION Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 2 & 3

**HAMMER:**

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 24 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date FEB. 8, 1974

Field Party KAKU, OMORI

Type of Boring AUGER (VERSA DRILL) Diam. 4"

Elev. 41' ± \* Datum \_\_\_\_\_

Drill Bit T.C. DRAG

Water Level NOT NOTICED

Time \_\_\_\_\_

Date 2-8-74

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA					
										Standard Penetration Test					
										N (Blows per foot)					
										0	10	20	30	40	
(MH)	ELEV. = 41' ± ↓ * STIFF, MOTTLED BROWN SILTY CLAY W/ SAND & SOME ROOTS	0		24-A	-	29	-	-	-						40/0.2'
		5		24-B	-	30	-	-	-						30/0.1'
	BROWN MUDROCK	10		24-C		NO RECOVERY									40/0.2'
	END OF BORING @ 15' 2-8-74	15		24-D		NO RECOVERY									40/0.0'

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

BORING NO. 25 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date FEB. 13, 1974

LOCATION Halawa, Ewa, Oahu, Hawaii

Field Party KAKU, SHIGENAGA

Tax Map Key: 9-9-02: 2 & 3

Type of Boring AUGER & CORING (VERSA DRILL) Diam. 4" & "BX"

Elev. 59' ± \* Datum \_\_\_\_\_

HAMMER:

Weight 140#

Drop 30"

Drill Bit T.C. DRAG & T.C. CORING

Water Level NOT NOTICED

Time \_\_\_\_\_

SAMPLER:

2" SS - 2" STANDARD SPLIT SPOON  
"BX" - BX DOUBLE TUBE CORE BARREL

Date 2-13-74

PENETRATION DATA

Unified Soil Classification	DESCRIPTION	Depth (ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test					
										N (Blows per foot)					
										0	10	20	30	40	
	ELEV = 59' ± ↓ * 0														
		0	2" SS	25-A		18									40/0.3
			"BX"	RUN # 1			CORED: 3.0'								HAMMER BOUNCES
		5	2" SS	25-B			RECOV.: 2.7'								40/0.1
	GRAY-BROWN MUDROCK						MUDROCK FRAGMENTS								HAMMER BOUNCES
		10	2" SS	25-C			NO RECOVERY								30/0.0
															HAMMER BOUNCES
		15	2" SS	25-D			NO RECOVERY								30/0.0
	END OF BORING @ 15'														HAMMER BOUNCES
	2-13-74														

\*Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE INDUSTRIAL PARK

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

LOCATION Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 2 & 3

BORING NO. 26 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date OCT. 6 1973

Field Party RADOVICH, CHOW, OMORI

Type of Boring AUGER & CORING (MOBILE B-30) Diam. 4" & "BX"

Elev. 93' ± \* Datum \_\_\_\_\_

Drill Bit T.C. DRAG & T.C. CORING

HAMMER:

Weight 140 #

Drop 30"

SAMPLER:

2" SS - 2" STANDARD SPLIT SPOON  
"BX" - BX DOUBLE TUBE CORE BARREL

Water Level	NOT NOTICED			
Time				
Date	10-8-73			

PLANTATION DRIVE

Unified Soil Classification	DESCRIPTION	Depth (ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA				
										Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
	ELEV. = 93' ± * ↓ *	0												
	DENSE, GRAY-BROWN SILTY SAND & MUDROCK	0 - 2.5	2" SS	26-A	-	17	-	-	-					50% D
		2.5 - 5.0	"BX"	RUN #1			CORED: 4.4 RECOV.: 4.4							
		5.0 - 10.0	"BX"	RUN #2			CORED: 5.0 RECOV.: 5.0							
	FRACTURED, BROWN MUDROCK	10.0 - 15.0	"BX"	RUN #3			CORED: 5.0 RECOV.: 5.0							
	END OF BORING @ 15' 10-8-73	15.0	2" SS	26-B	H		NO RECOVERY							30% D

\* Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK  
 LOCATION Halawa, Ewa, Oahu, Hawaii  
 Tax Map Key: 9-9-02: 2 & 3

BORING NO. 27 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date JAN. 30, 1974

Field Party KAKU, SHIGENAGA

Type of Boring AUGER (VERSA DRILL) Diam. 4"

Elev. 101' ± \* Datum \_\_\_\_\_

Drill Bit T.G. DRAG

HAMMER:  
 Weight 140 #  
 Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level	NOT NOTICED				
Time					
Date	1-30-74				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA				
										Standard Penetration Test				
	ELEV. = 101' ± ↓	0								N (Blows per foot)				
										0	10	20	30	40
(CH)	STIFF, BROWN CLAY w/ MUDROCK & SOME SAND	0 - 2.5	□	27-A	-	27	-	-	-					29/0.1
	MUDROCK	2.5 - 5	□	27-B	NO RECOVERY									40/0.1 HAMMER BOUNCES
		5 - 10	□	27-C	NO RECOVERY									40/0.0 HAMMER BOUNCES
	END OF BORING @ 15' 1-30-74	10 - 15	□	27-D	NO RECOVERY									40/0.0 HAMMER BOUNCES

\* Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

LOCATION Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 2 & 3

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 28 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date Nov. 27, 1973

Field Party RADOVICH, OMORI

Type of Boring AUGER (MOBILE) Diam. 4"

Elev. 68' ± \* Datum \_\_\_\_\_

Drill Bit FINGER TYPE

Water Level NOT NOTICED

Time \_\_\_\_\_

Date 11-27-73

PLANTATION DRIVE IND. PARK

PENETRATION DATA

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test					
										N (Blows per foot)					
										0	10	20	30	40	
(ML)	STIFF, MOTTLED, BROWN SILTY CLAY w/ DECOMPOSED ROCK	0		28-A	-	22	-	-	-						40/0.4
	BROWN, MUDROCK			28-B	-	18	-	-	-						40/0.1
	BROWN-GRAY SILTY SAND & GRAVEL w/ TRACES OF CORAL (FILL?)	5		28-C	-	14	-	-	-						40/0.3
	BROWN, MUDROCK			28-D	-	18	-	-	-						40/0.3
(SM)	GRAY-BROWN SILTY SAND w/ GRAVEL (MUDROCK)	15		28-E	-	21	-	-	-						40/0.3
	GRAY-BROWN SILTY SAND (MUDROCK)	20		28-F	-	32	-	-	-						66

\* Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK  
 LOCATION Halawa, Ewa, Oahu, Hawaii  
 Tax Map Key: 9-9-02: 2 & 3

BORING NO. 29 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date NOV. 27, 1973

Field Party RADOVICH, OMORI

Type of Boring ALGER (MOBILE B-50) Diam: 4"

Elev. 77' ± \* Datum \_\_\_\_\_

Drill Bit FINGER TYPE

HAMMER:

Weight 140#  
 Drop 30"

SAMPLER:

2" STANDARD SPLIT SPOON

Water Level	<u>NOT NOTICED</u>				
Time	<u>-</u>				
Date	<u>11-27-73</u>				

PLANTATION DR. IND. PARK

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA					
										Standard Penetration Test					
										N (Blows per foot)					
										0	10	20	30	40	
(SM)	DENSE, MOTTLED GRAY & BROWN, SILTY SAND W/ MUDROCK & GRAVEL	0		29-A	-	25	-	-	-						40/0.3'
	MOTTLED BROWN MUDROCK W/SILTY SAND			29-B	-	33	-	-	-						40/0.4'
	TAN MUDROCK W/SILTY SAND	5		29-C	-	24	-	-	-						40/0.5'
	GRAY, MUDROCK W/SILTY SAND														
	GRAY-BROWN MUDROCK W/SILTY SAND	10		29-D	-	22	-	-	-		10				37/0.5'
	BROWN MUDROCK W/SILTY SAND	15		29-E	-	26	-	-	-						40/0.2'
	DENSE, BROWN SILTY SAND W/GRAVEL (MUDROCK)	20		29-F	-	26	-	-	-						40/0.5'
	END OF BORING @ 20.5'														
	11-27-73														

\* Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

LOCATION Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 2 & 3

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 30 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC, INC. Date NOV. 27, 1973

Field Party RADOVICH, OMORI

Type of Boring AUGER (MOBILE B-50) Diam. 4"

Elev. 74' ± \* Datum \_\_\_\_\_

Drill Bit FINGER TYPE

Water Level NOT NOTICED

Time \_\_\_\_\_

Date 11-27-73

PENETRATION DATA

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
(SM)	DENSE TAN BROWN SILTY SAND W/MUDROCK	0	□ A	30-A	-	24	-	-	-					40/0.4'
	GRAY-BROWN MUDROCK W/SILTY SAND		□ B	30-B	-	24	-	-	-					40/0.2'
		5	□ C	30-C										40/0.2'
	BROWN, MUDROCK	10	□ D	30-D	-	30	-	-	-					40/0.5'
		15	□ E	30-E	-	20	-	-	-					40/0.4'
		20	□ F	30-F	-	29	-	-	-					40/0.3'

END OF BORING @ 20.3'  
11-27-73

\* Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE INDUSTRIAL PARK



Boring Log

PROJECT PLANTATION DRIVE INDUSTRIAL PARK

BORING NO. 31 Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Driller W. LUM ASSOC., INC. Date OCT. 5 & 6, 1973

LOCATION Halawa, Ewa, Oahu, Hawaii

Field Party RADOVICH, CHOW

Tax Map Key: 9-9-02: 2 & 3

Type of Boring AUGER & CORING Diam. 4" & "BX"

Elev. 101' ± \* Datum -

HAMMER:

Weight 140#

Drop 30"

Drill Bit FINGER TYPE & T.G. CORING

SAMPLER:

2" SS - 2" STANDARD SPLIT SPOON  
"BX" - BX DOUBLE TUBE CORE BARREL

Water Level NOT NOTICED

Time -

Date 10-5-73

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA						
										Standard Penetration Test						
										N (Blows per foot)						
										0	10	20	30	40		
	DENSE, GRAY BROWN SANDY SILT W/ GRAVEL (MUDROCK)	0	2"SS	31-A	-	17	-	-	-						30/0.2	
	GRAY BROWN MUDROCK	5	2"SS	31-B	NO RECOVERY										50/0.1	
		"BX"	RUN #1		CORED: 5.0'											
		"BX"	RUN #2		RECOV.: 4.0'											
		"BX"	RUN #3		CORED: 4.0'											
	END OF BORING @ 15.9' 10-6-73	10	2"SS	31-C	NO RECOVERY										30/0.0	
		"BX"	RUN #2		CORED: 1.5'											
			"BX"	RUN #3		RECOV.: 1.2'										
		15	2"SS	31-D	MUDROCK FRAGMENTS										50/0.4	

\* Elev. Estimated from Preliminary Grading Plan by Community Planning, Inc. Dated 1-30-74

PLANTATION DRIVE IND. PARK.

PLANTATION DRIVE INDUSTRIAL PARK

TABLE I A - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	4	7	10	
SAMPLE NO.				
DEPTH BELOW SURFACE				
DESCRIPTION	SURFACE BROWN CLAYEY SAND W/ GRAVEL & CORAL	CUTTINGS 7'-8' DARK GRAY SILTY CLAY W/ SAND	SURFACE WHITE & BROWN SILTY SAND & CORAL	
GRAIN-SIZE ANALYSIS (% Passing)				
Sieve				
1"	91.3		87.6	
1/2"	85.6		69.2	
#4	75.6		56.2	
#10	67.2		48.2	
#20	58.8		40.2	
#40	52.8		31.9	
#100	45.9		15.8	
#200	43.8		13.0	
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL		
Liquid Limit	74	101		
Plastic Limit	27	47	NON-PLASTIC	
Plasticity Index	47	54		
Dilatancy	NONE	MEDIUM		
Toughness	HIGH	MEDIUM		
Dry Strength	HIGH	MED-HIGH		
UNIFIED SOIL CLASSIFICATION	SC	MH	GM	
APPARENT SPECIFIC GRAVITY	2.87			
CBR TEST				
(Surcharge-51 P.S.F.)				
Molding Moisture, %	17.1		12.8	
Molding Dry Density, P.C.F.	110.3		108.9	
Swell upon saturation, %	4.7		NIL	
CBR at 0.1" Penetration	44		>100	
MOISTURE-DENSITY RELATIONS OF SOILS (AASHTO T-180-73I, Method ___)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

REMARKS:

**WALTER LUM ASSOCIATES, INC.**  
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 4-2-74 By PJF

PLANTATION DRIVE INDUSTRIAL PARK

TABLE I B - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	16	16	22	22
SAMPLE NO.		A		A (BTM.)
DEPTH BELOW SURFACE	SURFACE	0.5'-1.5'	SURFACE	1'-2.5'
DESCRIPTION	DARK GRAY-BROWN SILTY CLAY W/SAND & GRAVEL	DARK MOTTLED BROWN CLAY W/GRAVEL & SOME SAND	BROWN SILTY CLAY, SAND, GRAVEL & SOME DEBRIS	DARK BROWN SILTY CLAY W/SAND, GRAVEL & TRACES OF ORG. MATL (FILL)
GRAIN-SIZE ANALYSIS (% Passing)				
Sieve				
1"	89.3		100	
1/2"	89.3		82.4	
#4	86.1		69.5	
#10	83.1		62.9	
#20	79.4		56.5	
#40	74.7		50.5	
#100	65.2		42.7	
#200	60.2		39.6	
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL	NATURAL	NATURAL
Liquid Limit	84	75	61	60
Plastic Limit	43	34	33	32
Plasticity Index	41	41	28	28
Dilatancy	MEDIUM	NONE	MED.-QUICK	MEDIUM
Toughness	MEDIUM	HIGH	MED.-SLIGHT	MEDIUM
Dry Strength	MED.-HIGH	HIGH	SLIGHT-MED.	MEDIUM
UNIFIED SOIL CLASSIFICATION	MH	CH	GM	MH
APPARENT SPECIFIC GRAVITY	2.78			
CBR TEST				
(Surcharge-51 P.S.F.)				
Molding Moisture, %	34.4			
Molding Dry Density, P.C.F.	80.1			
Swell upon saturation, %	3.8			
CBR at 0.1" Penetration	2.8			
MOISTURE-DENSITY RELATIONS OF SOILS (AASHTO T-180-73I, Method <u>    </u> )				
Dry to Wet or Wet to Dry	A			
Max. Dry Density (P.C.F.)	DRY TO WET 84			
Optimum Moisture (%)	31			

REMARKS:

**WALTER LUM ASSOCIATES, INC.**  
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 4-2-74 By BT

PLANTATION DRIVE INDUSTRIAL PARK

TABLE I C - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	22	28
SAMPLE NO.	C	
DEPTH BELOW SURFACE	10'-11.5'	SURFACE
DESCRIPTION	GRAY-BROWN CLAY W/DECOMP. ROCK, SAND, MUDROCK & GRAVEL	BROWN SILTY GRAVEL W/SAND & CORAL
GRAIN-SIZE ANALYSIS		
(% Passing)		
Sieve 1/2"		100
1"		72.1
1/2"		62.2
#4		50.5
#10		41.7
#20		33.9
#40		27.6
#100		15.9
#200		12.0
ATTERBERG LIMITS		
Air Dried or Natural	NATURAL	NATURAL
Liquid Limit	90	51
Plastic Limit	35	30
Plasticity Index	55	21
Dilatancy	NONE	MEDIUM
Toughness	HIGH	MEDIUM
Dry Strength	HIGH	MEDIUM
UNIFIED SOIL CLASSIFICATION		
	CH	GP-GM
APPARENT SPECIFIC GRAVITY		
		2.82
CBR TEST		
(Surcharge-51 P.S.F.)		
Molding Moisture, %		20.3
Molding Dry Density, P.C.F.		99.7
Swell upon saturation, %		0.9
CBR at 0.1" Penetration		36.0
MOISTURE-DENSITY RELATIONS OF SOILS		
(AASHTO T-180-73I, Method )		D
Dry to Wet or Wet to Dry		DRY TO WET
Max. Dry Density (P.C.F.)		103
Optimum Moisture (%)		19

REMARKS:

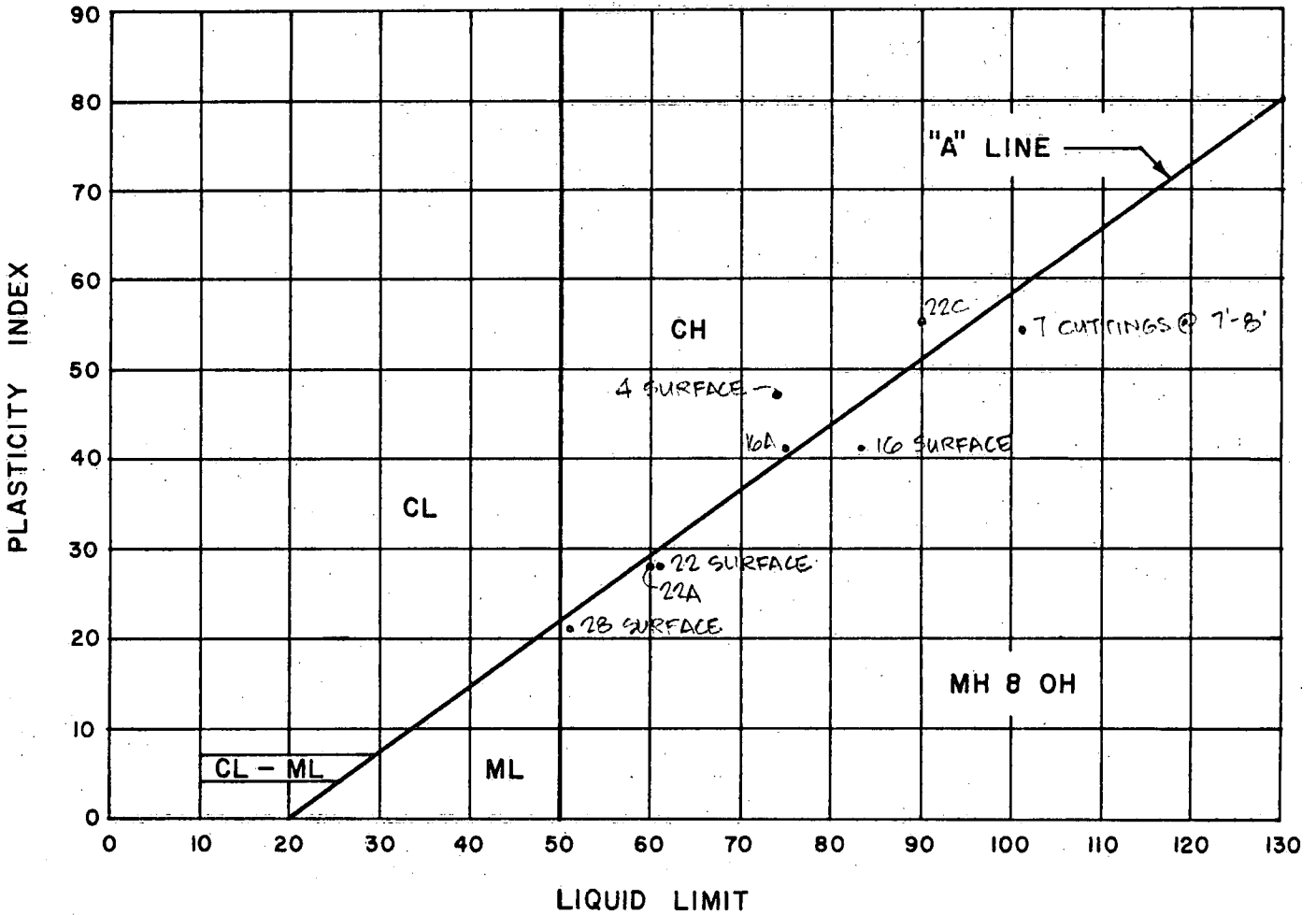
**WALTER LUM ASSOCIATES, INC.**  
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 4-2-74 By BT

# PLASTICITY CHART

PROJECT: PLANTATION DRIVE INDUSTRIAL PARK

LOCATION: HALAWA, EWA, OAHU, HAWAII



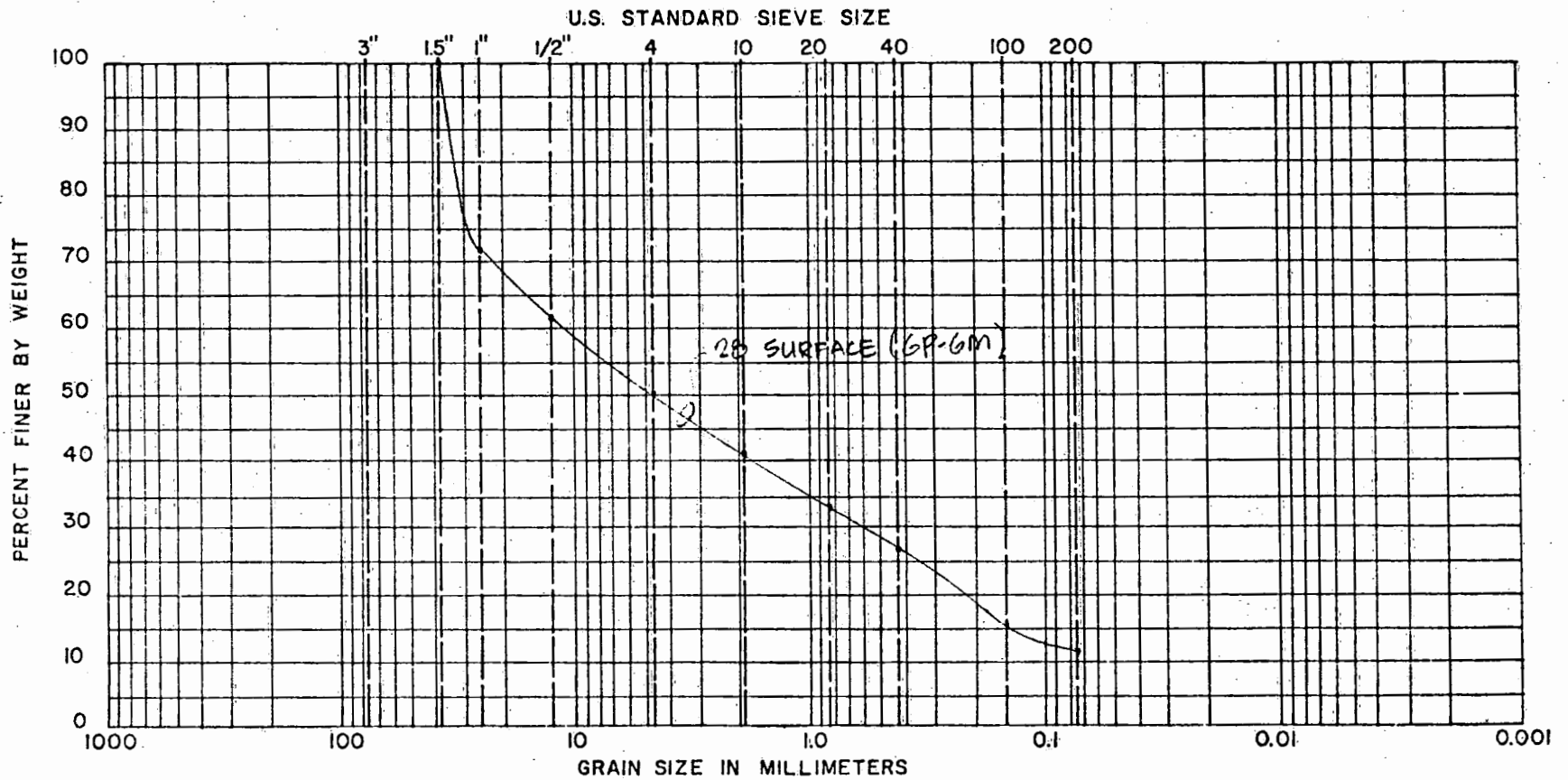
DATE 4-2-74 BY BT

WALTER LUM ASSOCIATES, INC.  
CIVIL, STRUCTURAL, SOILS ENGINEERS

# GRAIN-SIZE ANALYSIS CURVE

PROJECT: PLANTATION DRIVE INDUSTRIAL PARK

LOCATION: HALAWA, EWA, OAHU, HAWAII



COBBLE	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

DATE 4.2.14 BY MS

# MOISTURE-DENSITY CURVE (AASHO T-180-73I, METHOD A)

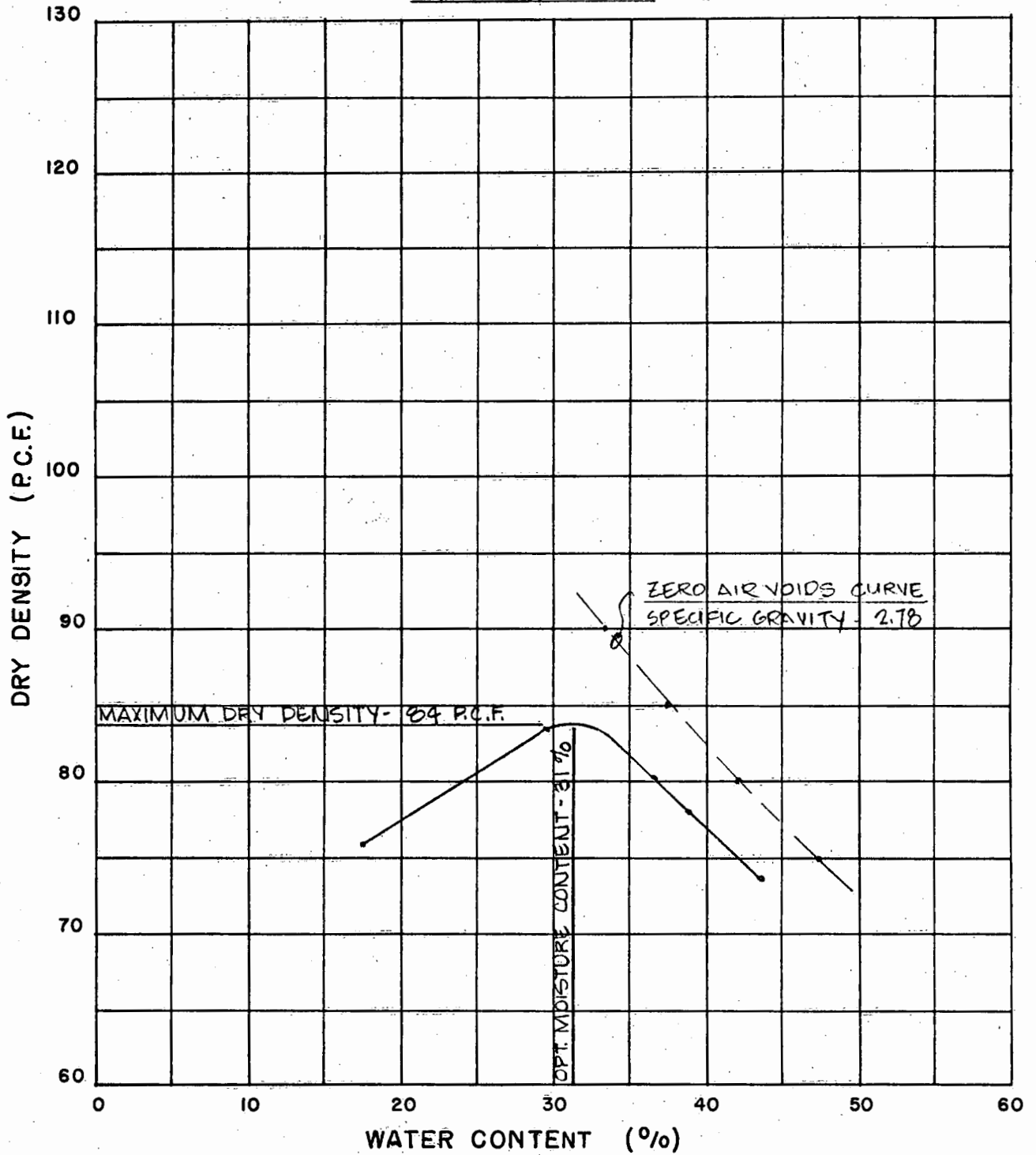
PROJECT: PLANTATION DRIVE INDUSTRIAL PARK

LOCATION: HALAWA, EWA, OAHU, HAWAII

SAMPLE NO.: 16 SURFACE

SAMPLE DESCRIPTION: DARK GRAY-BROWN SILTY CLAY  
W/ SAND & GRAVEL

AGGREGATE: 1/4" MINUS  
MOLD SIZE: 4" Ø X 4.584" HIGH  
HAMMER: 10 LBS. 18" DROP  
LAYERS: 5  
BLOWS: 25/LAYER



WALTER LUM ASSOCIATES, INC.  
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 2-15-74 BY NI

# MOISTURE-DENSITY CURVE (AASHO T-180-73I, METHOD D)

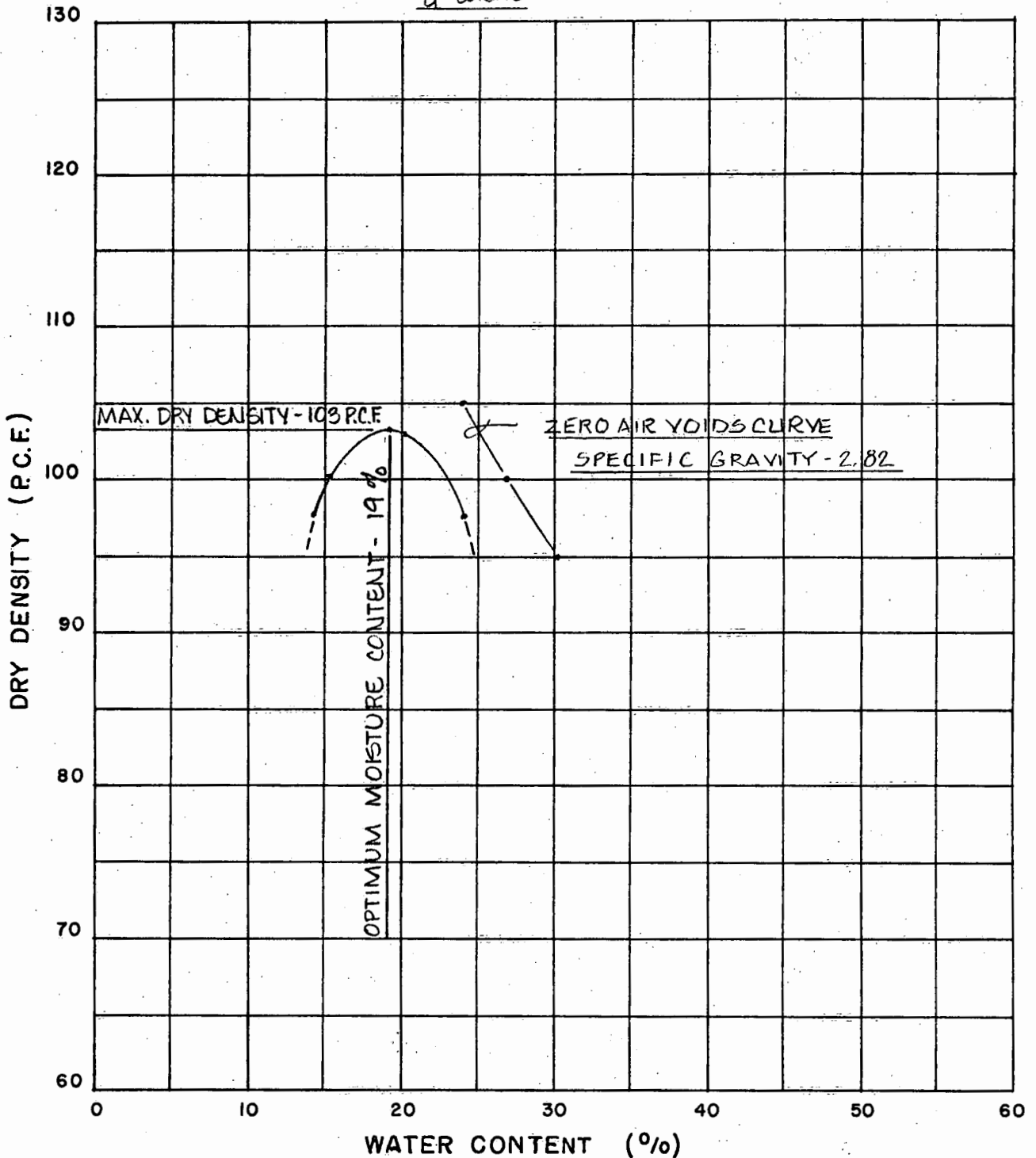
PROJECT: PLANTATION DRIVE INDUSTRIAL PARK

LOCATION: HALAWA, EWA, OAHU, HAWAII

SAMPLE NO.: 2B SURFACE

SAMPLE DESCRIPTION: BROWN SILTY GRAVEL W/SAND & CORAL

AGGREGATE: 3/4" MINUS  
 MOLD SIZE: 6" X 4.584" HIGH  
 HAMMER: 10 LBS. 18" DROP  
 LAYERS: 5  
 BLOWS: 56/LAYER



WALTER LUM ASSOCIATES, INC.  
 CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 12-7-73 BY NI



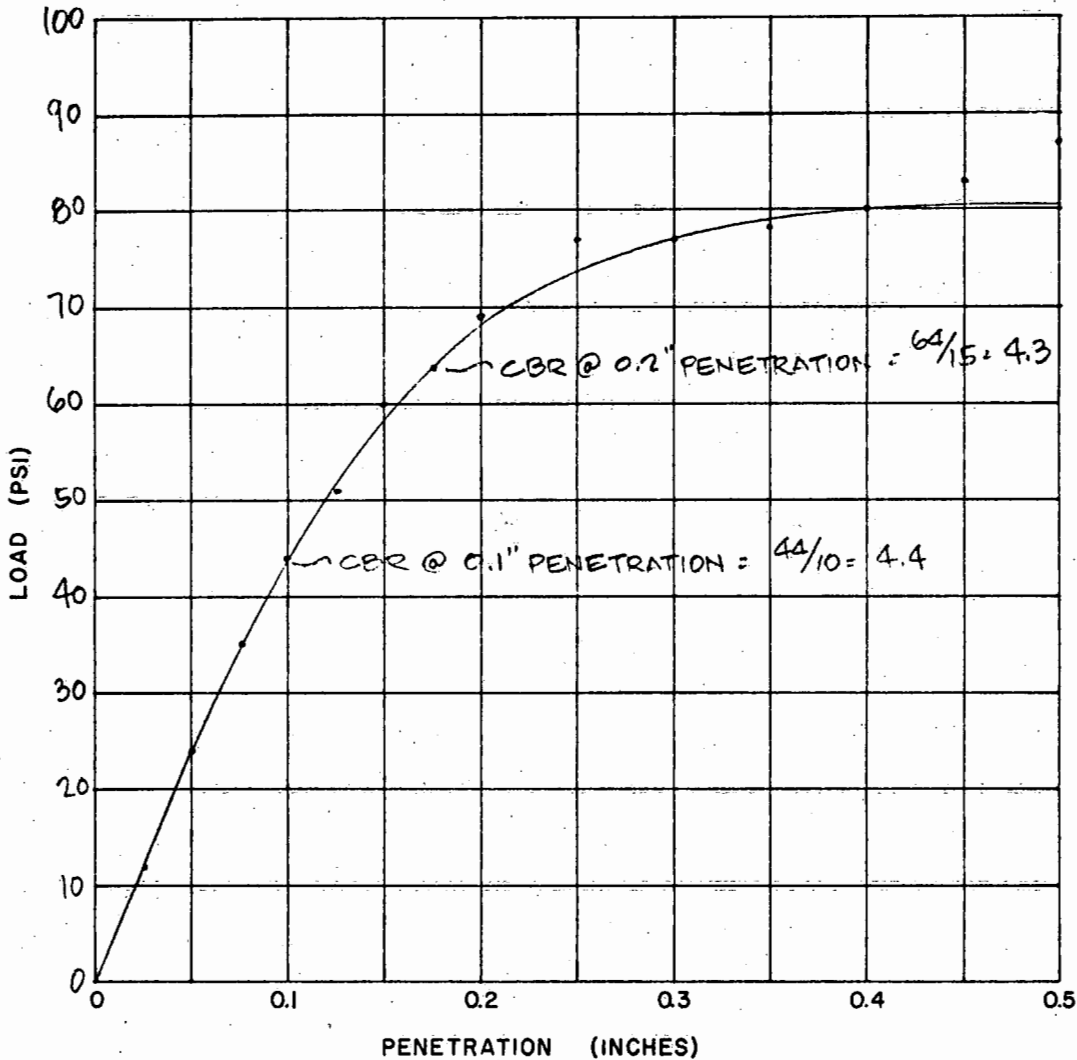
# CBR TEST

PROJECT: PLANTATION DRIVE INDUSTRIAL PARK

LOCATION: HALAWA, EWA, OAHU, HAWAII

SAMPLE NO: 4 SURFACE

SAMPLE DESCRIPTION: BROWN CLAYEY SAND W/ GRAVEL & CORAL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	37	12
0.050	71	24
0.075	106	35
0.100	132	44
0.125	154	51
0.150	179	60
0.175	193	64
0.200	207	69
0.250	231	77
0.300	230	77
0.350	233	78
0.400	239	80
0.450	250	83
0.500	262	87

AGGREGATE 3/4" MINUS  
 HAMMER WEIGHT 10 LBS.  
 HAMMER DROP 18"  
 No. OF BLOWS 56/LAYER  
 No. OF LAYERS 5

## TEST RESULTS:

MOLDING MOISTURE, % 17.1  
 MOLDING DRY DENSITY, P.C.F. 110.3  
 CBR @ 0.1" PENETRATION 4.4  
 DAYS SOAKED 4

DATE 3-11-74 BY G.S.  
 DATE 4-2-74 BY RF.

WALTER LUM ASSOCIATES, INC.  
 CIVIL, STRUCTURAL, SOILS ENGINEERS

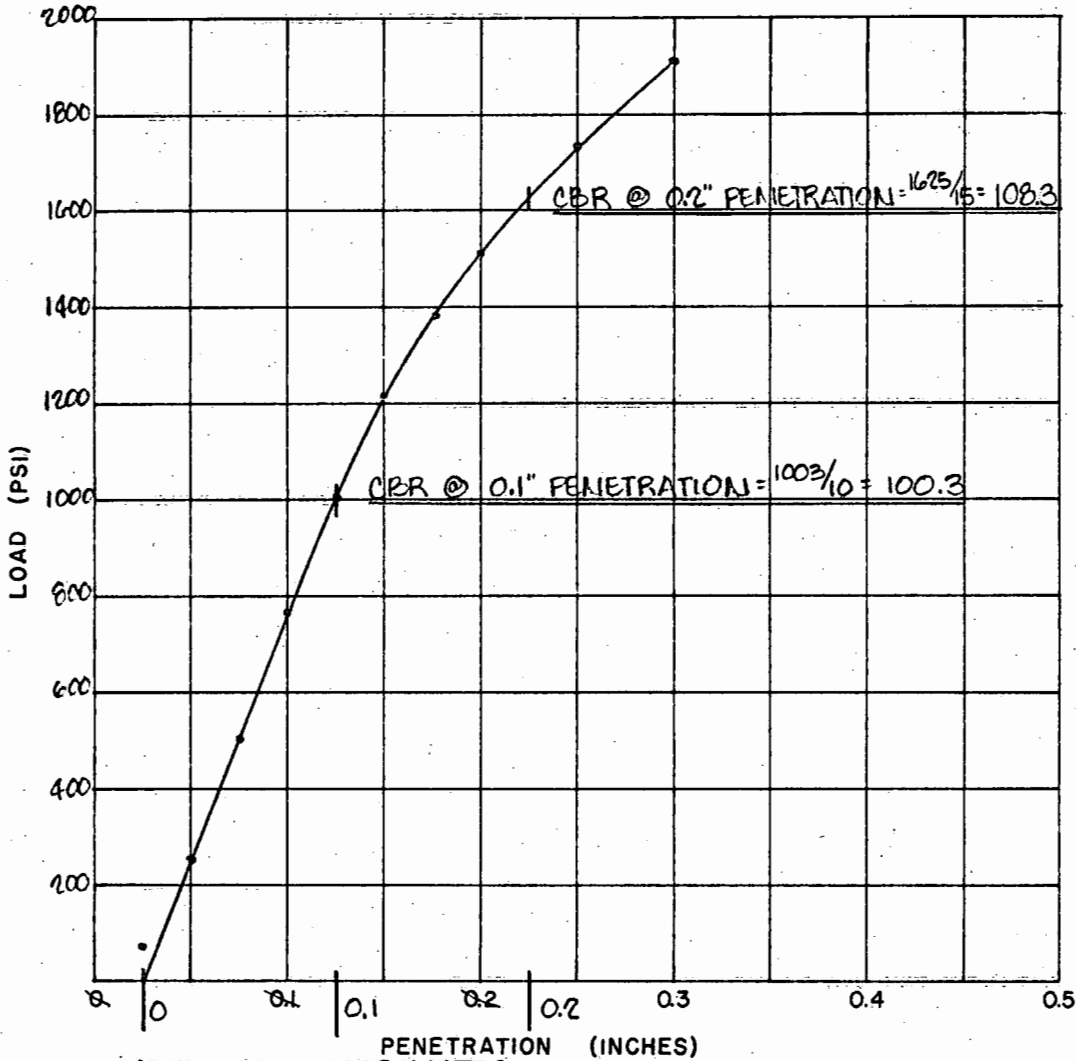
# CBR TEST

PROJECT: PLANTATION DRIVE INDUSTRIAL PARK

LOCATION: HALAWA, EWA, OAHU, HAWAII

SAMPLE NO: 10 SURFACE

SAMPLE DESCRIPTION: WHITE & BROWN SILTY SAND & CORAL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	210	70
0.050	750	250
0.075	1500	500
0.100	2280	760
0.125	3010	1003
0.150	3640	1213
0.175	4150	1383
0.200	4540	1513
0.250	5200	1733
0.300	5730	1910
0.350		
0.400		
0.450		
0.500		

AGGREGATE 3/4" MINUS  
 HAMMER WEIGHT 10 LBS.  
 HAMMER DROP 18 INS.  
 No. OF BLOWS 56/LAYER  
 No. OF LAYERS 5

ADJUSTED COORDINATES  
**TEST RESULTS:**

MOLDING MOISTURE, % 13.8  
 MOLDING DRY DENSITY, P.C.F. 108.9  
 CBR @ 0.1" PENETRATION 100.3  
 DAYS SOAKED 5

DATE 2-11-74 BY GS  
 DATE 2-12-74 BY NI

**WALTER LUM ASSOCIATES, INC.**  
 CIVIL, STRUCTURAL, SOILS ENGINEERS

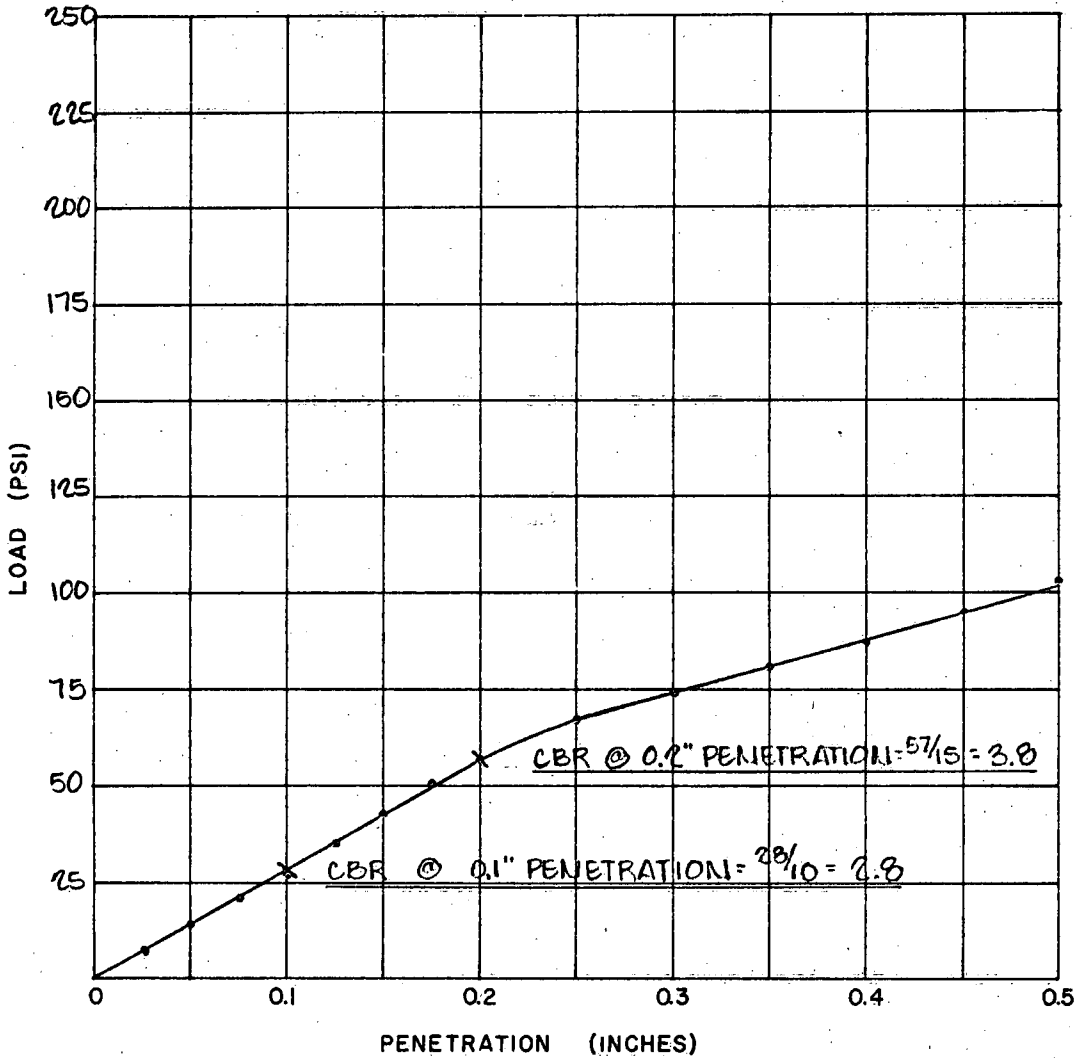
# CBR TEST

PROJECT: PLANTATION DRIVE INDUSTRIAL PARK

LOCATION: HALOANA, EWA, OAHU, HAWAII

SAMPLE NO: 16 SURFACE

SAMPLE DESCRIPTION: DARK GRAY-BROWN SILTY CLAY  
W/SAND & GRAVEL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	20	7
0.050	42	14
0.075	62	21
0.100	82	27
0.125	106	35
0.150	130	43
0.175	152	51
0.200	172	57
0.250	201	67
0.300	221	74
0.350	243	81
0.400	262	87
0.450	284	95
0.500	308	103

AGGREGATE 1/4" MINUS  
 HAMMER WEIGHT 10 LBS.  
 HAMMER DROP 18 INS.  
 No. OF BLOWS 56/LAYER  
 No. OF LAYERS 5

## TEST RESULTS:

MOLDING MOISTURE, % 34.4  
 MOLDING DRY DENSITY, P.C.F. 80.1  
 CBR @ 0.1" PENETRATION 2.8  
 DAYS SOAKED 4

DATE 2-16-74 BY TK

DATE 2-19-74 BY NI

WALTER LUM ASSOCIATES, INC.  
 CIVIL, STRUCTURAL, SOILS ENGINEERS

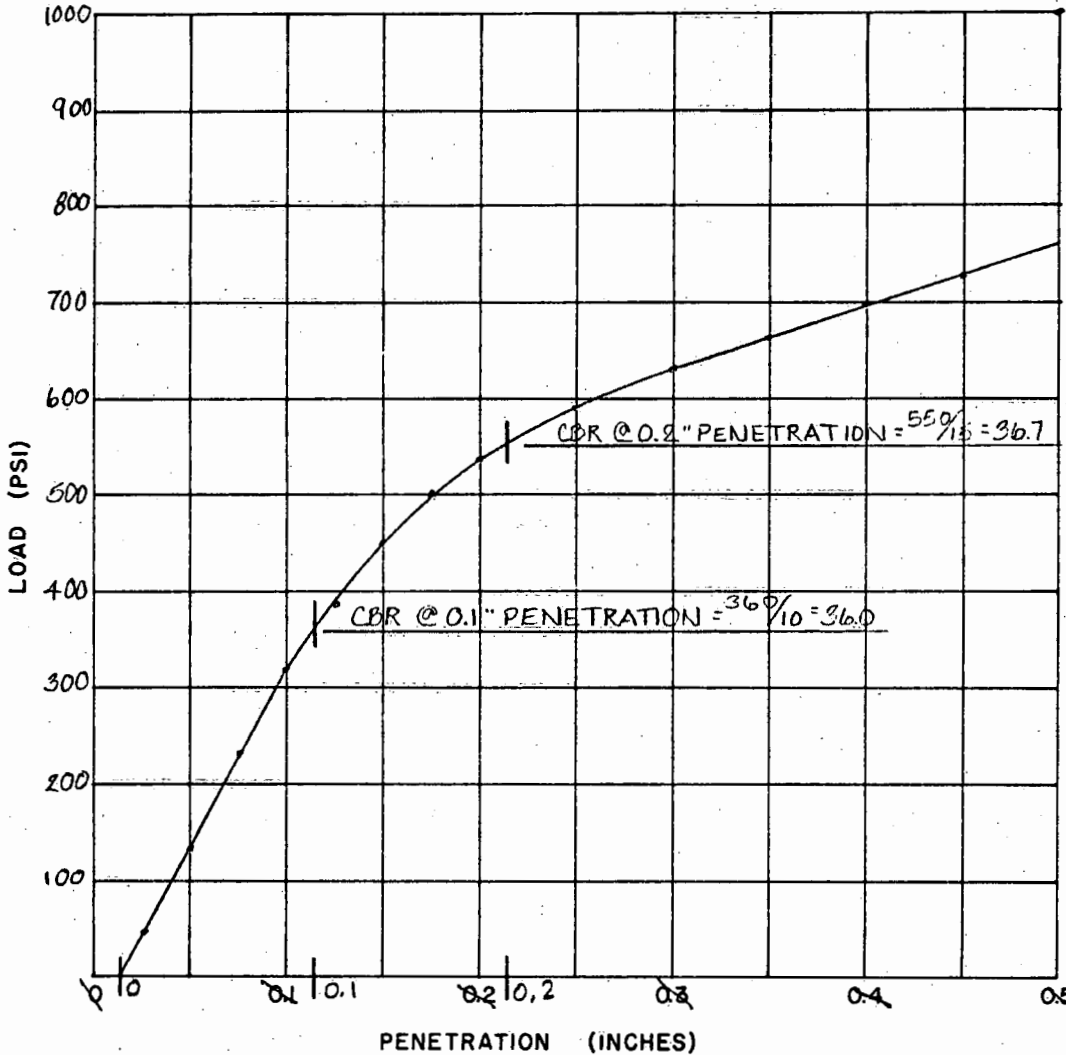
# CBR TEST

PROJECT: PLANTATION DRIVE INDUSTRIAL PARK

LOCATION: HALAWA, EWA, OAHU, HAWAII

SAMPLE NO: 28 SURFACE

SAMPLE DESCRIPTION: BROWN SILTY GRAVEL W/SAND & CORAL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	130	43
0.050	400	133
0.075	690	230
0.100	950	317
0.125	1150	383
0.150	1350	450
0.175	1500	500
0.200	1600	533
0.250	1760	587
0.300	1880	627
0.350	1990	663
0.400	2090	697
0.450	2180	727
0.500	3000	1000

AGGREGATE 3/4" MINUS  
 HAMMER WEIGHT 10 LBS.  
 HAMMER DROP 18 INS  
 No. OF BLOWS 56/LAYER  
 No. OF LAYERS 5

ADJUSTED COORDINATES

## TEST RESULTS:

MOLDING MOISTURE, % 20.3  
 MOLDING DRY DENSITY, P.C.F. 99.7  
 CBR @ 0.1" PENETRATION 36.0  
 DAYS SOAKED 4

DATE 12-7-73 BY CL

DATE 12-10-73 BY JS

WALTER LUM ASSOCIATES, INC.  
 CIVIL, STRUCTURAL, SOILS ENGINEERS

SUPPLEMENT

1. Test results on "calcite" sample from the University of Hawaii Department of Agronomy and Soil Science.
2. Atterberg Limit test results.  
Clay soil mixed with "calcite."

Lab No. <b>74-096</b>	Grower Address <b>Walter Lum &amp; Assoc. c/o R. Watanabe</b>	Phone No.	Sample No.
Soil Series		Sample Source <b>Aliamanu</b>	
County Agent			
Crop	Soil Test Results		pH <b>12.2</b> Acid Neutral Alkaline <b>STR</b>
Fertility	Very Low	Low	Moderate
High	Excessive	Fertility	Very Low
Low	Moderate	High	Excessive
Phosphorus(P) <b>IR</b>	<b>X</b>		
Calcium(Ca) <b>&gt;6000</b>			<b>X</b>
Potassium(K) <b>&gt;320</b>		<b>X</b>	
Magnesium(Mg) <b>&lt;250</b>	<b>X</b>		
Safe for Plants			
Salinity _____ millimohs/cm	All	Sensitive	Semitolerant
			Tolerant
			Very Few
Lime Recommendations	Lime is	is not <b>X</b>	needed as an amendment <b>X</b>
			as a nutrient <b>X</b>
Apply ground coral at _____ T/ac. or _____ lbs./_____ sq. ft. or _____ cu. yd.			
or apply hydrated lime at _____ T/ac. or _____ lbs. _____ sq. ft. or _____ cu. yd.			
Thoroughly mix lime into upper _____ to _____ inches of soil with harrow,			
plow	rotary tiller	spading fork	apply to surface
			Mix with entire vol. soil
Fertility recommendation:			
Send copies to:			
			11/68 Soil Test Report
<b>Soil Testing Service — Cooperative Extension Service — University of Hawaii &amp; U.S.D.A. Cooperating — F-313</b>			

PLANTATION DRIVE INDUSTRIAL PARK

TABLE I<sup>A</sup> - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	1	2	3	4
SAMPLE NO.				
DEPTH BELOW SURFACE	← SURFACE →			
DESCRIPTION	BROWN CLAY	*** 1 PART BROWN CLAY + 1 PART "CALCITE"	*** 1 PART BROWN CLAY + 2 PARTS "CALCITE"	*** 2 PARTS BROWN CLAY + 1 PART "CALCITE"
GRAIN-SIZE ANALYSIS (% Passing)				
Sieve				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	* NATURAL	* NATURAL	* NATURAL	* NATURAL
Liquid Limit	74	63	69	62
Plastic Limit	27	45	47	43
Plasticity Index	47	18	22	19
Dilatancy	NONE	MED-QUICK	QUICK	MED-QUICK
Toughness	HIGH	SLIGHT	SLIGHT	MEDIUM
Dry Strength	HIGH	SLIGHT-MED.	SLIGHT	MEDIUM
UNIFIED SOIL CLASSIFICATION	CH	MH	MH	MH
APPARENT SPECIFIC GRAVITY				
CBR TEST				
(Surcharge-51 P.S.F.)				
Molding Moisture, %				
Molding Dry Density, P.C.F.				
Swell upon saturation, %				
CBR at 0.1" Penetration				
MOISTURE-DENSITY RELATIONS OF SOILS (AASHTO T-180-73I, Method ___)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

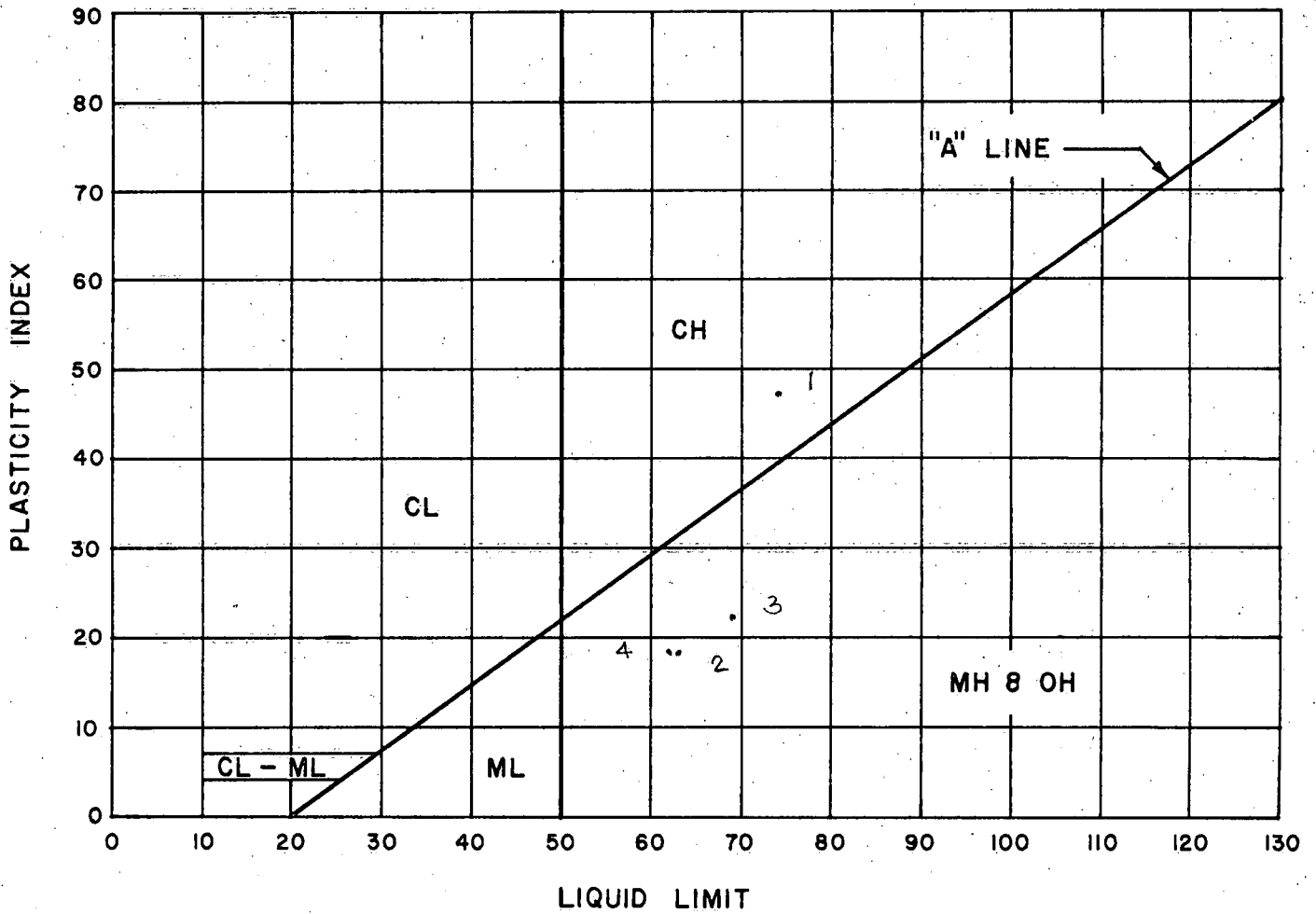
REMARKS: \* SAMPLE TESTED ON PORTION OF SAMPLE  
PASSING THE #40 SIEVE  
\*\* SAMPLE MIXING RATIO BY WEIGHT

WALTER LUM ASSOCIATES, INC.  
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 6-3-74 By FM

# PLASTICITY CHART

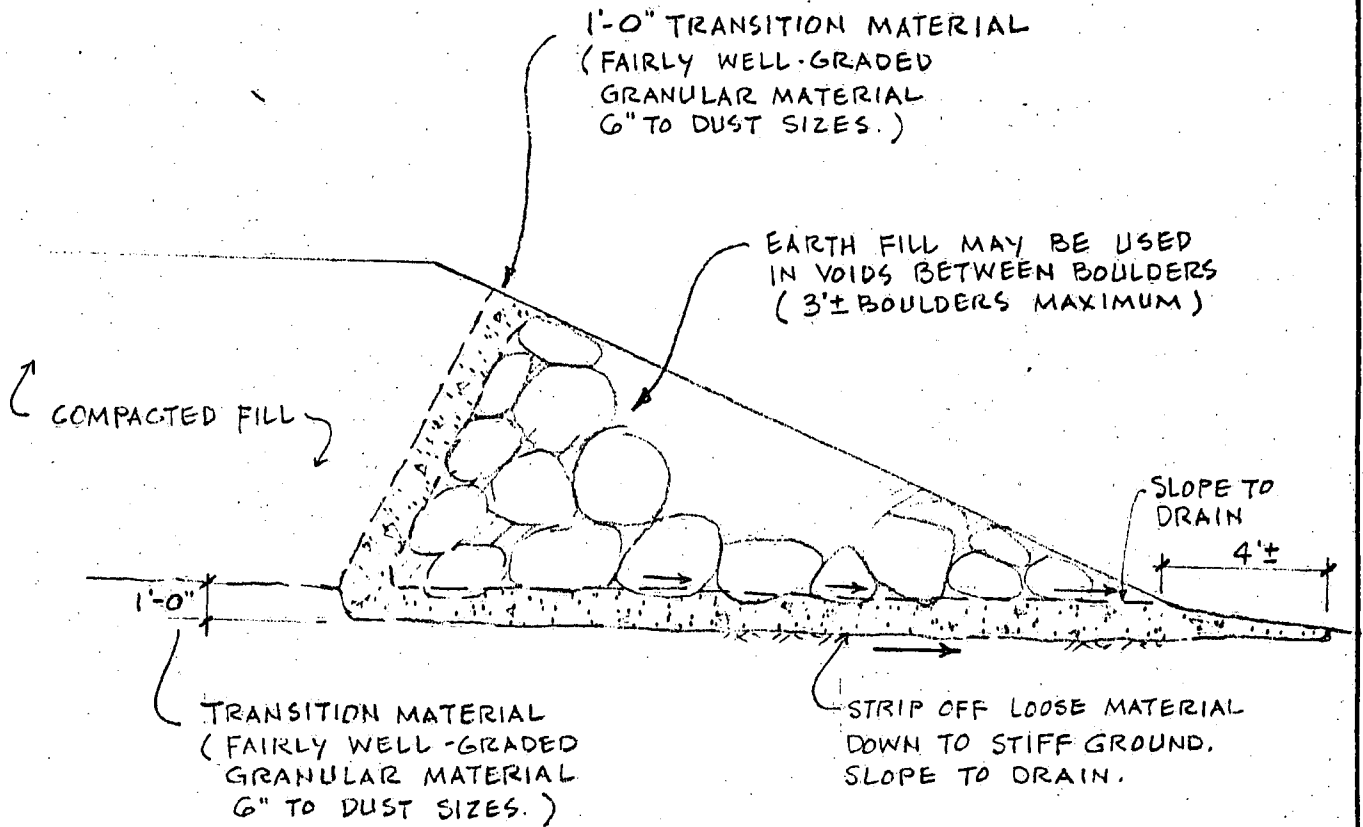
PROJECT: PLANTATION DRIVE INDUSTRIAL PARK  
LOCATION: EWA, OAHU, HAWAII



DATE 6-3-74 BY FM

WALTER LUM ASSOCIATES, INC.  
CIVIL, STRUCTURAL, SOILS ENGINEERS





SCHEMATIC SECTION

NOT TO SCALE

FIGURE 1

SCHEMATIC SECTION · BOULDER FILL

PLANTATION DRIVE INDUSTRIAL PARK

HALAWA, EWA, OAHU, HAWAII

TAX MAP KEY: 9-9-02: 2 & 3

WALTER LUM ASSOCIATES, INC.  
CIVIL, STRUCTURAL, SOILS ENGINEERS

MAY 31, 1974

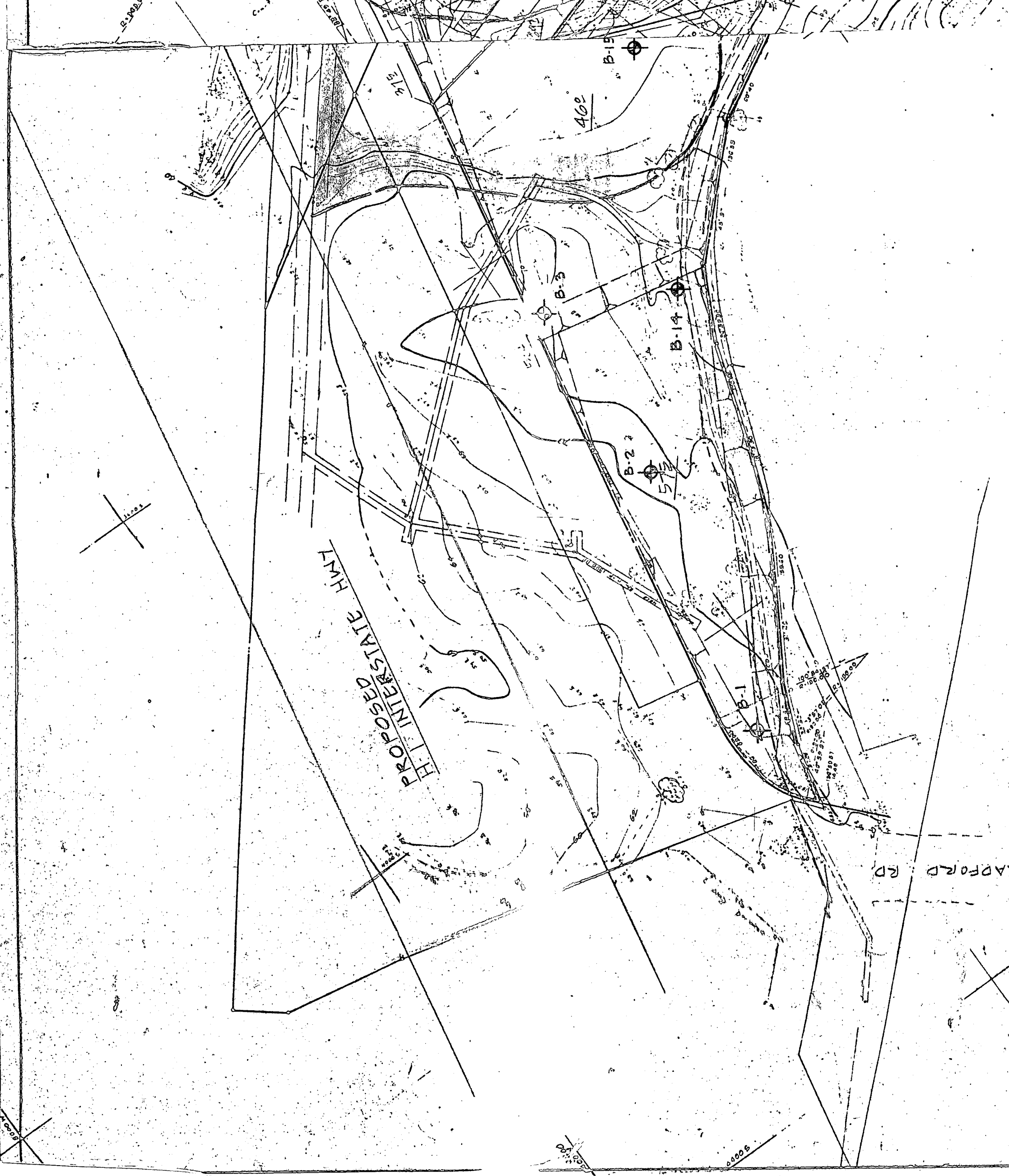
### LIMITATIONS

In general, soil formations are commonly erratic and rarely uniform or regular. The boring logs indicate the approximate subsurface soil conditions encountered only at the drill holes where the borings were made at the times designated on the logs and may not represent conditions at other locations or at other dates. Soil conditions and water levels may change with the passage of time and construction methods or improvements at the site.

During construction, should subsurface conditions much different from those in the borings be observed, encountered, or otherwise indicated, we should be advised immediately to review or reconsider our recommendations in light of the new developments.

If there is a substantial lapse of time between the submission of this report and the start of work at the site, or if conditions have changed due to natural causes, plan changes, or construction operations at or adjacent to the site, it is recommended that this report be reviewed to determine the applicability of the recommendations considering the time lapse, changed conditions, and changes in the state of the art of soil engineering.

Our professional services were performed, findings obtained and recommendations prepared in accordance with generally accepted engineering practices. This warranty is in lieu of all other warranties expressed or implied.



PROPOSED HWY

RADFORD RD

400

375

B-15

B-3

B-14

B-2

B-1

B-1000

B-1000

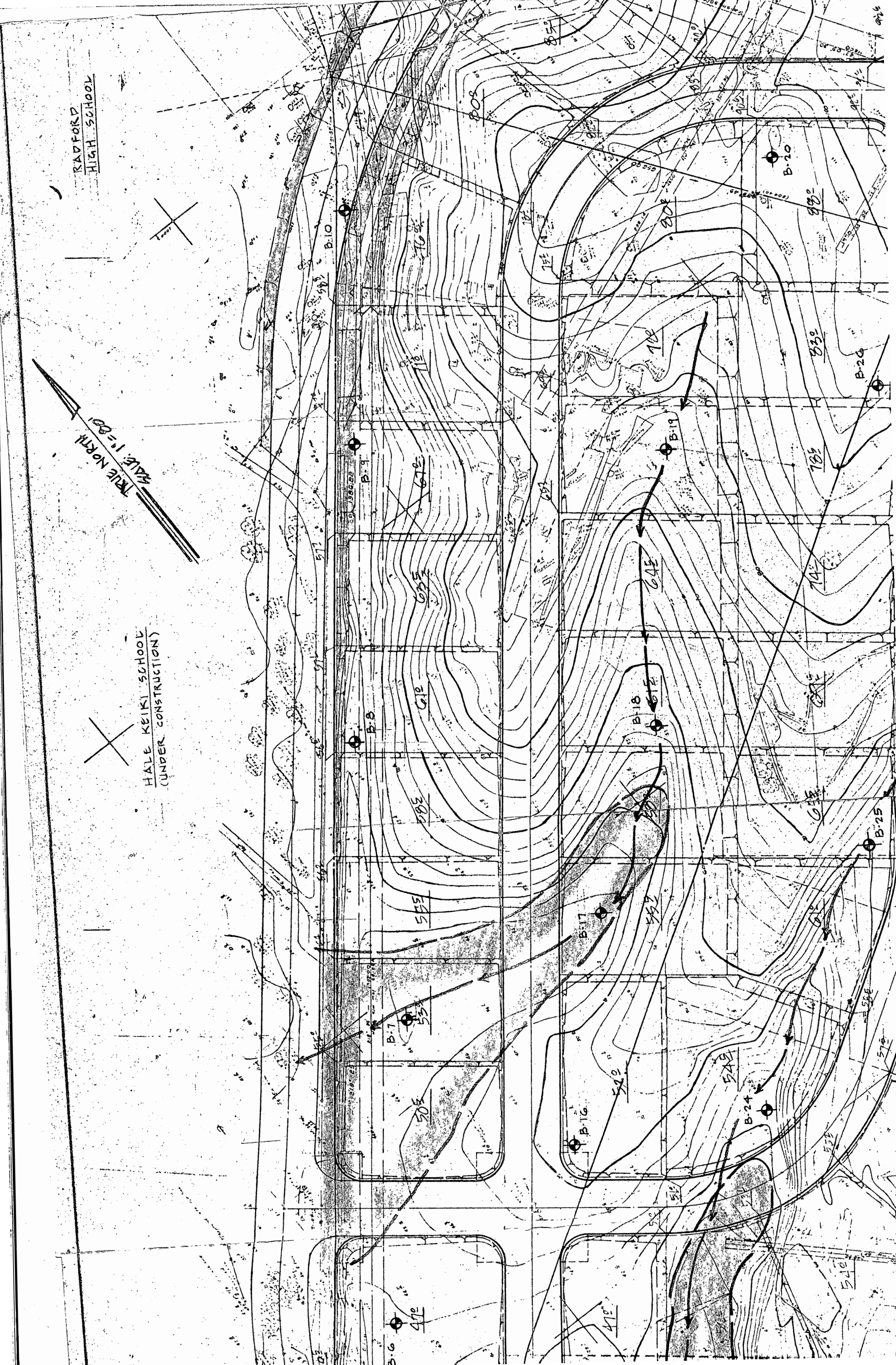
4000

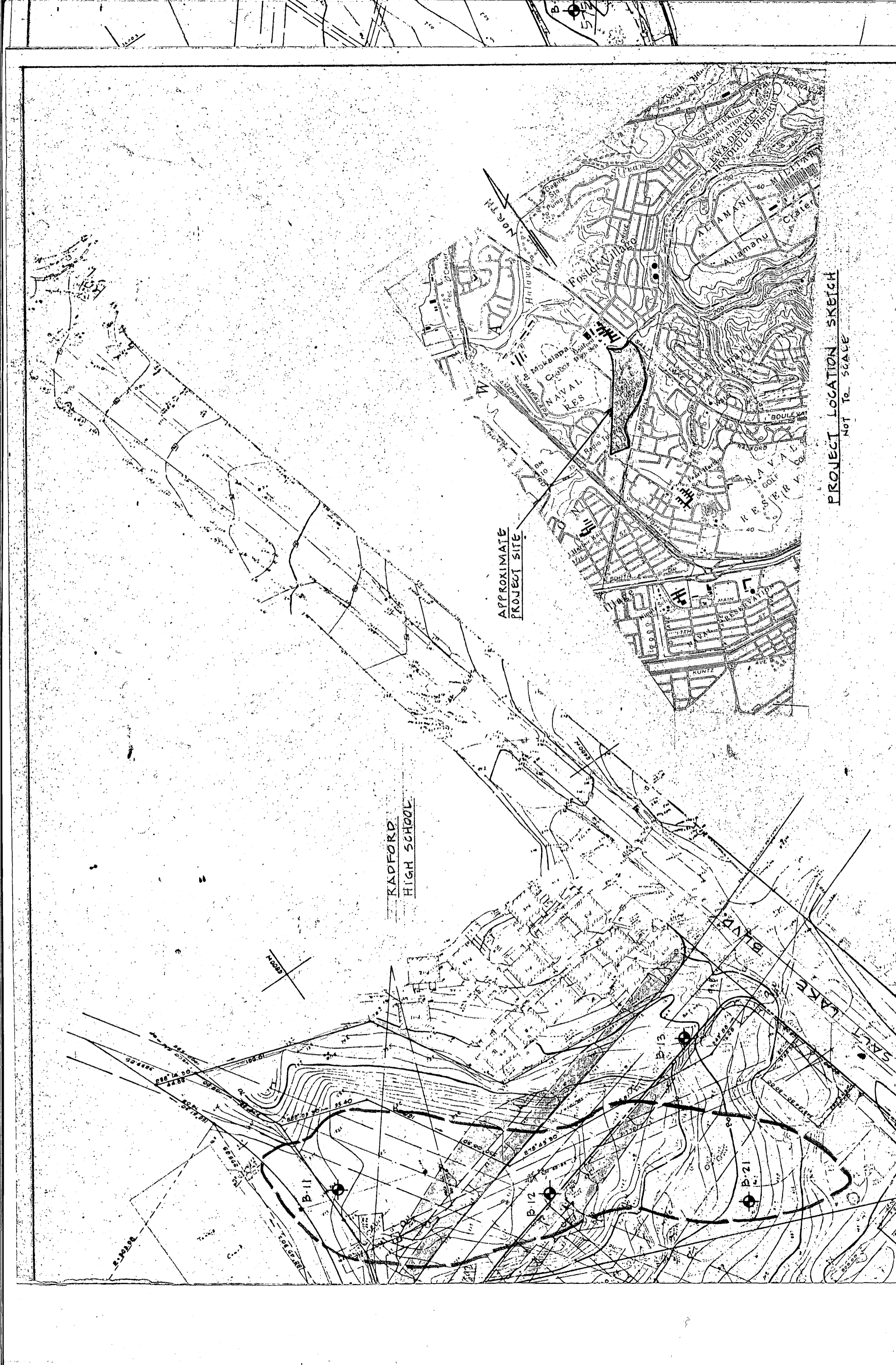


RADFORD  
HIGH SCHOOL

HALE KEIKI SCHOOL  
(UNDER CONSTRUCTION)

TRUE NORTH  
SCALE: 1"=80'

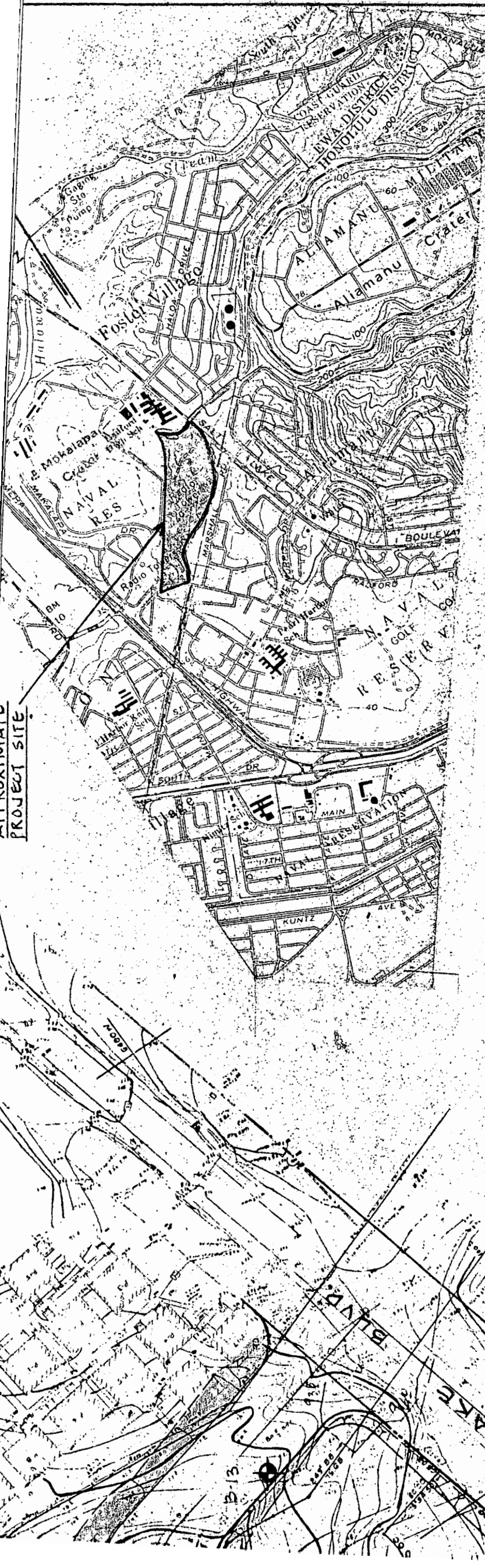




APPROXIMATE  
PROJECT SITE

RADFORD  
HIGH SCHOOL

PROJECT LOCATION SKETCH  
NOT TO SCALE



**PROJECT LOCATION SKETCH**  
Not To Scale

**LEGEND**

- APPROXIMATE ALLUVIAL MAN-MADE FILL
- APPROXIMATE CALCAREOUS SURFACE SOILS
- BORING
- FILL SLOPE UP TO 30°

<b>BORING LOCATION SKETCH</b>		Sheet
<b>PLANTATION DRIVE INDUSTRIAL PARK</b>		of
HALAWA	EWA	OAHU
TAX MAP KEY: 9-1-02-283		
Dr. _____	WALTER IUM ASSOCIATES, INC. 3030 WAIALAE AVE.	
Date _____	CIVIL ENGINEERS	
Rev. _____	PHONE 737-7931	