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WAIAWA INDUSTRIAL PARK - PRELIMINARY SOIL REPORT

SEE G.P. #6087

WAIAWA, EWA, OAHU, HAWAII
TAX MAP KEY: 9-6-04: 14

Michael Oa 11/3/78

FOR REFERENCE

Not to be taken from this room

To:
COMMUNITY PLANNING, INCORPORATED

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

OCTOBER 30, 1972

MUNICIPAL REFERENCE & RECORDS CENTER
City & County of Honolulu
City Hall Annex, 505 S. King Street
Honolulu, Hawaii 96813

WITHDRAWN

WALTER LUM ASSOCIATES, INC.

CIVIL, STRUCTURAL, SOILS ENGINEERS

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October 30, 1972

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

Gentlemen:

Subject: Waiawa Industrial Park
Preliminary Soil Report
(for grading design purposes)
Waiawa, Ewa, Oahu, Hawaii
Tax Map Key: 9-6-04: 14

Transmitted herewith is our preliminary soil report for mass grading design for the proposed Waiawa Industrial Park at Waiawa, 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

JWS/EK:rmf

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WAIAWA INDUSTRIAL PARK - PRELIMINARY SOIL REPORT

WAIAWA, EWA, OAHU, HAWAII
TAX MAP KEY: 9-6-04: 14

SCOPE OF EXPLORATION

The purpose of this exploration was to determine general soil conditions for mass grading design purposes for the proposed Waiawa Industrial Park, Waiawa, Ewa, Oahu, Hawaii.

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

FIELD EXPLORATION AND LABORATORY TESTS

Fifty-one borings were made for the industrial site and six borings were made for the drainage channel at the approximate locations shown on the Boring Location Sketch. Borings were made with 3 and 4-in. diameter augers using carbide drag and finger type bits and rotary drill using diamond and roller rock bits.

Soil samples were recovered using thin-wall tube and standard split spoon samplers. Rock samples were obtained with a "BXM" core barrel using diamond bits.

Laboratory tests included: natural water content, Atterberg limit, grain-size analysis, unconfined compression, AASHO T-180-57 density, expansion and CBR.

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 site is a strip of land about one mile long located about 3,000 ft mauka of Kamehameha Highway and generally continues up Waiawa Valley with ground elevations varying from 30 to 140 ft. An access road from Kamehameha Highway crosses through the site.

The site is on stream terraces bordered by rock bluffs along each bank. The rock bluffs were probably formed by stream cutting or flow along Waiawa Stream.

The present stream meanders along the bottom of the valley between the rock bluffs.

The site consists of lower and upper stream terraces along Waiawa Stream. The lower terrace is slightly above the invert of Waiawa Stream and slopes upward from the stream at about 2 to 10% grades, then rises abruptly at 30 to 70% or more grades for a height of about 20 to 30 ft to form the upper terrace.

The upper terrace is mostly flat-lying and covers the greater part of the site.

Several warehouse buildings and access roads were noted at the site. Underground utility lines are located over much of the area.

The site is generally overgrown with brush and trees.

Water runoff from rainstorms or irrigation operations runs down the Ewa or western side slope above Boring No. 29 and ponds on the flat upper terrace.

Waimano Stream joins with Waiawa Stream near Boring No. 46.

Manana channel enters the Waiawa Stream near Boring DC-4 after crossing under the existing paved road.

INTERPRETATION OF SOIL CONDITIONS

From the field explorations, the soils at the site may be generally approximated as follows:

The soils in the lower, flat-lying terrace along the stream consist of surface layers of soft to stiff silty clay and clayey silts ("CL and "MH" soils) with gravels, cobbles and boulders to about 10 to 20-ft depths.

Occasional soft soil layers were noted in the lower

terrace. Boring DC-2 indicated soft or loose clayey silts and silty sand to a depth of about 18 ft.

The higher ground or upper terrace at the site may be described as older alluvium and colluvium and consists of silty clays ("MH" soils) to about 25 ft, the maximum depths drilled during the field explorations. Decomposed rock was noted below the surface fill in several of the borings.

The ground water levels in the lower terrace or areas varied from about 2 to 10-ft depths at the time of the field exploration.

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

The proposed plan is to channelize Waiawa Stream, fill the lower terrace and develop the site for industrial use. Waiawa Stream will be confined in a concrete lined channel some 1,500 ft long. Access roads from Kam Highway will be widened and improved.

Cuts and fills from 0 to about 30 ft are contemplated.

General Site Grading

Grading work should be done in accordance with the requirements of the Revised Ordinances of Honolulu, 1969 As Amended and as recommended below:

1. The area should be cleared and grubbed. Surface vegetation and miscellaneous debris should be cleared and removed prior to site filling.
2. Topsoil and stockpiled soils should be stripped to stiff natural ground before the placement of fills. Loose surface soils at grade should be scarified and recompactd.
3. Localized soft pockets encountered during the site preparation should be excavated and replaced with select material compacted in thin lifts.
4. Hard surfaces of existing roads and concrete slabs should be removed or scarified down to stiff soils and recompactd to match the density of the surrounding soil.
5. In general, the on-site soils may be used for the construction of the proposed fills.

6. Where fills are proposed on sidehill areas, gullies and in drainage ditches, loose material at the bottom and sides should be stripped down to stiff natural ground before the placement of fills. New fills should be keyed into the stiff natural ground.
7. Where fills are proposed in natural drainageways or gullies, trenches should be cut in a herringbone pattern along the bottom and sides before the placement of fills. Subdrains should be placed in the trenches. The locations of subdrains should be determined in the field after clearing and grubbing.
8. 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.

9. Fills should be laid in 6-in. compacted layers to 90% of the maximum density determined by the AASHO T-180-57 test method.
10. If boulders are proposed to be used in the construction of fills, they should be generally placed along the toe section of fill slopes and outside of probable building sites.

Fills Over Lower Terrace Along Waiawa Stream Channel

Preliminary plans of the channel section indicate a concrete-lined channel about 40 ft wide by 16 to 20 ft deep with vertical side walls.

The invert of the proposed channel will be generally below the existing stream bed.

Fills as high as 20 ft over a compressible subgrade may cause settlement and heave problems along the discontinuous edge of the fill next to the channel.

To minimize these problems, the fill along each side of the channel should be constructed as early as practicable to cause as much settlement or heave to occur prior to constructing the concrete lining for the channel. When practicable, granular materials should be used along the banks of the channel.

Before filling the lower terraces, the site should be cleared and grubbed and drained. Subdrains should be installed at the bottoms of existing stream flows to connect up with the new channel alignment. Granular filter blankets should be used over wet areas.

The surfaces of fills should be graded with sufficient slopes so that there will be some surface drainage in the event some settlements of the ground surface take place after development.

Settlement gages should be installed after the fills are in place to monitor settlements. After the gages show negligible settlements, the drainage channel construction may begin.

Slopes

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

For high cuts thru mixtures of decomposed rock and soil, slope ratios of 1-1/2 horizontal to 1 vertical or flatter may be used with the understanding that some sloughing will occur after construction.

For low cuts thru mixtures of lava rock and clinkers, slope ratios of 1 horizontal to 1 vertical or flatter may be used.

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

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

The tops of slopes in gravelly or fine soils will probably creep. Building foundations should be kept away from the tops of slopes.

Slope adjustments or other precautions may be necessary if seepage zones, soft spots or expansive soils are encountered in localized areas.

Access Roadway

In general, a rough estimate of the roadway pavement thickness for the light industrial traffic anticipated is as follows:

1. Wearing course - 2-1/2-in. asphaltic concrete.
2. Base course - 6-in. base course.

3. Select borrow course - 6-in. subbase course.
4. Borrow - 0 to 12-in. borrow material
over a prepared subgrade.

Provisions should be made in the contract documents to allow for local adjustments regarding subbase requirements in the field in accordance with the design standards of the City and County of Honolulu. In fill areas, the use of select soils within the top 2 to 3 ft of the subgrade may reduce the thickness of or eliminate the need for the borrow course.

The subgrade should be compacted and shaped to drain. To avoid the ponding of water and softening of the subgrade at low points, weep holes should be placed at subgrade levels thru the walls of the catch basins which are placed in these low areas.

Concrete-Lined Channel
Lateral Earth Pressures

Pockets of soft or loose soils at the invert level of the channel may be encountered. These pockets should be stripped for a depth of 2 ft and replaced with fairly well-graded rocky material and compacted in thin lifts.

For the channel lining resting on the compacted select backfill, bearing values of about 2000 p.s.f. may be used.

For lateral earth pressures on the side walls of the concrete channel lining, an equivalent fluid pressure of about 75 p.c.f. may be used, assuming that drainage of the backfill is provided. In addition, vehicle or other surcharge loads should be considered. Weep holes are recommended near the bottom of the channel to minimize the possible buildup of hydrostatic pressure.

The bedding and backfilling around the structure should be made with well-graded gravel 3/4-in. to 0 in. with less than 10% passing the No. 200 sieve.

Utilities

Utilities should be placed after the fills are constructed. Utility lines should be designed with flexible joints, particularly where lines are connected to structures.

Existing Cesspools

Cesspools possibly may be encountered during the site preparation work where the existing buildings are located. When encountered, they should be flagged and located on the plans. Sludge should be removed from the bottom and the cesspool backfilled with fairly well-graded granular materials. The materials should be compacted with vibratory

equipment or rammed into place. The top 5 ft of fill should be constructed in 6-in. compacted layers.

Building foundations should be designed to bridge over the cesspool.

Foundations for Future Structures

For building foundation design, supplementary borings should be made at the locations of the proposed structures.

Unforeseen Conditions

Unforeseen or undetected conditions such as soft spots, seepage water or expansive soil pockets 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.

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.

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROPOSED DEVELOPMENT

PROJECT WAIKANA INDUSTRIAL PARKLOCATION Waikana, Ewa, Oahu, HawaiiBORING NO. 1 Sheet No. _____ of _____Driller W. LUM ASSOC. INC. Date APR. 6, 1972Field Party GLORY, RADOVICH, SETOType of Boring AUGER (ACKER ACE) Diam. 4"Elev. 31' ± * Datum _____Drill Bit T.C. DRAGWater Level NOT NOTICED

Time _____

Date 4-6-72

HAMMER:

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

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.	Standard Penetration Test N (Blows per foot)	2" O.D. THIN WALL TUBE SAMPLER
	ELEV. = 31' ± *	0								0 10 20 30 40	BLOWS/0.5'
(SP-SM)	BROWN, CLAYEY SILT W/ SAND (FILL)		2" SS	1-A	-	12	-	-	-	10/.5'	
(ML)	DENSE, WHITE SAND & CORAL (FILL)					33	-	-	-	5/.5'	
(ML)	STIFF, MOTTLED BROWN CLAYEY SILT & DEC. ROCK COBBLE OR BOULDER	5	2" S	1-B	33	40	49	1410	-		1/.5' 1/.5' 1/.5'
ML	SOFT, MOTTLED BROWN CLAYEY SILT W/ SAND & DECOMPOSED ROCK										
(MH)	SOFT, BROWN CLAYEY SILT	10	2" SS	1-C	-	37	-	-	-	2 BLOWS/1.0'	
(MH)	COBBLE OR BOULDER					40	-	-	-		
(MH)	MEDIUM, BROWN CLAYEY SILT	15									
	MOTTLED BROWN DECOMPOSED PUKA PUKA ROCK W/ SAND & BROWN CLAY		2" S	1-D	-	37	-	-	-		2/.5' 3/.5' 4/.5' 5/.5'
	END OF BORING @ 17.5'										

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 2 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 6, 1972

Field Party GLORY, RADOVICH, SETO

Type of Boring AUGER (ACKER ACE) Diam. 4"

Elev. 34' ± * 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 4-6-72

PENETRATION DATA

Standard Penetration Test

2" O.D. THIN WALL TUBE SAMPLER

N (Blows per foot)

0 10 20 30 40 BLOWS/0.5'

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.

ELEV. = 34' ± *

(GC)

ASPHALT
MOTTLED BROWN
SAND & CORAL
CORAL W/ SAND & TAN. CLAY

2'55"

2-A

15

29

(MH)

STIFF, MOTTLED RED BROWN
SILTY CLAY W/ SAND &
DECOMPOSED PUKA PUKA
ROCK

2'5"

2-B

30

1/5' 1/5'
2/5' 6/5'

COBBLE OR BOULDER
END OF BORING @ 7'

NOTE: MOVED BORING, &
HIT ROCK AT 5'

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROPOSED DEVELOPMENT
WAIKAWA INDUSTRIAL PARK

PROJECT LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 3 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 6, 1972

Field Party GLORY, RADOVICH, SETO

Type of Boring ALGER (ACKER) ACE Diam. 4"

Elev. 37' ± * Datum

Drill Bit T.C. DRAG

HAMMER:

Weight 140#

Drop 30"

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

SAMPLER: 2" S.S. 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time

Date 4-6-72

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

ELEV. = 37' ± *

Depth (Ft.)

Sampler

Sample No.

Plastic Limit

Water Cont. %

Liquid Limit

Unconf. Comp. P.S.F.

Vane Shear P.S.F.

(MH)

BROWN, SILTY CLAY W/ SAND
SAND & CORAL W/ BROWN CLAY (FILL)

STIFF, REDDISH BROWN
SILTY CLAY W/
DECOMPOSED ROCK & ROOTS

DECOMPOSED
PUKA PUKA ROCK

MOTTLED GRAY W/ ORANGE
DECOMPOSED ROCK (SOME
CRUSHES TO CLAYEY SILT)

DARK GRAY W/ ORANGE
DECOMPOSED ROCK
(CRUSHES TO CLAYEY SILT)

END OF BORING @ 11'

2" SS

3-A

27

30

5/3'

5/0'

HAMMER
BOUNCES

2" S

3-B

ROCK FRAGMENTS

10/1'

HAMMER
BOUNCES

2" SS

3-C

30

45

25/5'

HAMMER
BOUNCES

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

PROPOSED DEVELOPMENT

4
BORING NO. _____ Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 7, 1972

Field Party GLORY, RADOVICH, SETO

Type of Boring AUGER (ACKER) Diam. 4"

Elev. 40' ± * Datum _____

Drill Bit T.C. DRAG

Weight 140#

Drop 30"
2" 5/8" O.D. THIN WALL TUBE

SAMPLER: 2" SS-2" STANDARD SPLIT SPOON

Water Level.	NOT NOTICED				
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Time
Date 4-7-72

REGISTRATION DATA	
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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	2" O.D. THIN WALL TUBE SAMPLER
										N (Blows per foot)	
										0 10 20 30 40	BLOWS/0.5'
(MH)	BROWN, CLAYEY SILT	0									
	STIFF, MOTTLED BROWN SILTY CLAY W/DEC. ROCK	2'55		4-A	-	29	-	-	-		
	ROCK W/DECOMPOSED ROCK & MOTTLED BROWN CLAYEY SILT	5		4-B	-	25	-	-	-		17.4' HAMMER BOUNCES
	MOTTLED REDDISH BROWN & YELLOW DECOMPOSED ROCK	10		4-C	-	54 47	-	-	-	11.5'	20.5'
	MOTTLED BROWN & GRAY DECOMPOSED ROCK (SOME CRUSHES TO SILTY SAND)										
	END OF BORING @ 11.5'										
* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72											

Boring Log

PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARKPROJECT
LOCATION Waiawa, Ewa, Oahu, HawaiiBORING NO. 5 Sheet No. of Driller W. LUM ASSOC., INC. Date APR. 7, 1972Field Party GLORY, RADOVICH, SETOType of Boring AUGER (ACKER ACE) Diam. 4"Elev. 46' ± * Datum Drill Bit T.C. DRAG

HAMMER:

Weight 140 #Drop 30"SAMPLER: 2" STANDARD SPLIT SPOONWater Level NOT NOTICEDTime Date 4-7-72

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.	Standard Penetration Test N (Blows per foot)
	ELEV. = 46' ± *	0								0 10 20 30 40
(ML)	STIFF, BROWN, SILTY CLAY w/ SAND & GRAVEL			5-A	-	17	-	-	-	
(GC)	CORAL & SAND w/ TRACES OF TAN & BROWN CLAY					15	-	-	-	
						36	-	-	-	
(ML)	STIFF, BROWN CLAYEY SILT									
(ML)	STIFF, MOTTLED BROWN CLAYEY SILT w/ DEC. ROCK, ROCK & GRAVEL	5		5-B	-	33	-	-	-	25/5'
	ROCK OR BOULDER									
	END OF BORING @ 9'	10		5-C	-	NO RECOVERY	-	-	-	15/0'
										HAMMER BOUNCES

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

WAI'AWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

3030 WAI'ALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAI'AWA INDUSTRIAL PARK
 LOCATION Wai'awa, Ewa, Oahu, Hawaii

BORING NO. 6 Sheet No. of
 Driller W. LUM ASSOC., INC. Date APR. 8
 Field Party GLORY, RADOVICH, SETO
 Type of Boring AUGER (ACKER ACE) Diam. 4"
 Elev. 46' ± * Datum
 Drill Bit T.C. DRAG
 Water Level NOT NOTICED
 Time
 Date 4-8-72

HAMMER:

Weight 140#

Drop 30"

SAMPLER:

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

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				2" O.D. THIN WALL TUBE SAMPLER
										N (Blows per foot)				BLOWS/0.5'
										0	10	20	30	40
(MH)	BROWN, SILTY CLAY W/ CORAL (FILL ?)	0	2"SS	G-A	-	32	-	-	-					
						34								
MH	STIFF, BROWN SILTY CLAY W/TRACES OF ROOTS (FILL ?)	5	2"SS	G-B	33	37	66	4920	-					4/5' 7/5' 7/5'
(MH-CH)	STIFF, BROWN SILTY CLAY (NATURAL GROUND ?)	10	2"SS	G-C	-	37	-	-	-					
						37								
	END OF BORING @ 10.5'													
													</	

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE ASSOC., INC. DATED 3-3-72

WAIAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROPOSED DEVELOPMENT
PROJECT WAIAWA INDUSTRIAL PARK
LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 7 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 8, 1972

Field Party GLORY, RADOVICH, SETO

Type of Boring AUGER (ACKER-ACE) Diam. 4"

Elev. 47' ± * Datum _____

Drill Bit T.C. DRAG

HAMMER:

Weight 140#

Drop 30"

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

SAMPLER: 2" S.S. 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time _____

Date 4-8-72

PENETRATION DATA

Standard Penetration Test
N (Blows per foot)
0 10 20 30 40
2" O.D. THIN WALL TUBE SAMPLER
41.5' 0.5'

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				
	ELEV. = 47' ± *	0												
(SC)	BROWN, SANDY SILT TAN, CLAYEY SAND w/CORAL	0-2	2" SS	1-A	-	16	-	-	-					
(MH-CH)	STIFF, BROWN SILTY CLAY w/CORAL	2-5	2" S	1-B	-	36	-	-	-					
(MH-CH)	STIFF, BROWN SILTY CLAY	5-10	2" S	1-C	-	29	-	21840	-					
(ML)	STIFF, REDDISH BROWN CLAYEY SILT w/SAND DECOMPOSED ROCK (CLINKERS?)	10-11.5	2" SS	1-C	-	16	-	-	-					
	END OF BORING @ 11.5'													

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 8 Sheet No. of
 Driller W. LUM ASSOC., INC. Date APR. 7, 1972

Field Party GLORY, RADOVICH, SETO

Type of Boring AUGER (ACKER) Diam. 4"

Elev. 43' ± * 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 4-7-72

PENETRATION DATA

Standard
Penetration Test

2" O.D. THIN
WALL TUBE
SAMPLER

N (Blows per foot)

0 10 20 30 40

10 BLOWS/0.5'

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.	Standard Penetration Test	2" O.D. THIN WALL TUBE SAMPLER
	ELEV = 43' ± *	0									
(CL)	STIFF, MOTTLED BROWN CLAY w/ SAND, CORAL & DECOMPOSED ROCK	0	2" SS	B-A	-	32	-	-	-		
(MH)	SOFT, MOTTLED BROWN SILTY CLAY w/ PUKA PUKA ROCK	3	2" S	B-B	-	31	-	1030	500		1/5' 10/5'
MH	STIFF, MOTTLED BROWN SILTY CLAY w/ DECOMPOSED ROCK	10	2" SS	B-C	32	32	61	-	-		
	END OF BORING @ 11.5'										

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

WAIAWA INDUSTRIAL PARK

WAIKAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROPOSED DEVELOPMENT
WAIKAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 9 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 8, 1972

Field Party GLORY, RADOVICH, SETO

Type of Boring AUGER (ACKER ACE) Diam. 4"

Elev. 50' ± * Datum

Drill Bit T.C. DRAG

HAMMER:

Weight 140#

Drop 30"

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

SAMPLER: 2" SS-2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time

Date 4-8-72

PENETRATION DATA

Standard Penetration Test

2" O.D. THIN WALL TUBE SAMPLER

N (Blows per foot)

0 10 20 30 40 BLOWS/0.5'

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.

(MH)

CORAL SAND & GRAVEL
W/ BROWN CLAY

2" SS

9-A

32

(MH)

STIFF, MOTTLED BROWN
SILTY CLAY W/ GRAVEL &
TRACES OF DEC. ROCK

2" S

9-B

31

4640

(MH)

STIFF, BROWN
CLAY & SILT

2" SS

9-C

42

END OF BORING @ 12'

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 10 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 10, 1972

Field Party MEYER, MAESHIRO RADOVICH

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

Elev. 52' ± * Datum _____

Drill Bit FINGER TYPE

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 4-10-72

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.	Standard Penetration Test					2" O.D. THIN WALL TUBE SAMPLER
										N (Blows per foot)					
	ELEV. 52' ± 2 *	0								0	10	20	30	40	BLOWS / 0.5'
MH	MEDIUM TO STIFF BROWN, SILTY CLAY		2" S	10-A	33	35	58	-	-						3.5' G/5'
(MH)	STIFF, BROWN CLAYEY SILT	5	2" SS	10-B	-	37	-	-	-						
	COBBLE														
(MH)	STIFF, BROWN CLAYEY SILT	10	2" SS	10-C	-	37	-	-	-						
(MH)	STIFF, TAN-BROWN CLAYEY SILT & DECOMPOSED ROCK		2" SS		-	23	-	-	-						
(ML)	TAN, CLAYEY SILT (DECOMPOSED ROCK)	15	2" SS	10-D	-	20	-	-	-						
(MH)	STIFF, GRAY CLAYEY SILT (DECOMPOSED ROCK)		2" SS		-	38	-	-	-						
	END OF BORING @ 16.5'														
* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC, INC. DATED 3-3-72.															

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72.

WAIAWA INDUSTRIAL PARK

Boring Log

PROPOSED DEVELOPMENT
PROJECT WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 11 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 10, 1972

Field Party METER, MAESHIRO, RADOVICH

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

Elev. 52' ± * Datum

Drill Bit FINGER TYPE

Water Level NOT NOTICED

Time

Date 4-10-72

HAMMER:

Weight 140*

Drop 30"

SAMPLER:

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

2" S.S. 2" STANDARD SPLIT SPOON

PENETRATION DATA

Standard
Penetration Test

2" O.D. THIN
WALL TUBE
SAMPLER

N (Blows per foot)

0 10 20 30 40 BLOWS/0.5'

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.	Standard Penetration Test	2" O.D. THIN WALL TUBE SAMPLER
	ELEV. = 52' ± *	0									
(MH)	2" A.C. CORAL (FILL)										
(MH)	MEDIUM, BROWN SILTY CLAY W/ DECOMPOSED ROCK	2'S		11-A	-	42	-	-	-		3/5' 3/5'
(MH)	SOFT TO MEDIUM BROWN, SILTY CLAY	2"SS		11-B	-	31	-	-	-		
MH	STIFF, BROWN CLAYEY SILT	2'S		11-C	38	42	65	-	-		3/5' 4/5'
	BOULDER OR ROCK	2"SS		11-D	-	31	-	-	-		18/5'
	END OF BORING @ 16.2'										30/2' HAMMER BOUNCES

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

WAIAWA INDUSTRIAL PARK

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 12 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 11, 1972

Field Party MEYER, M. ESCHIRO, TSUKAZAKI

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

Elev. 52' ± * Datum

Drill Bit FINGER TYPE

HAMMER:

Weight 140#

Drop 30"

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

SAMPLER: 2" S.S. 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time

Date 4-11-72

PENETRATION DATA

Standard Penetration Test

2" O.D. THIN WALL TUBE SAMPLER

N (Blows per foot)

0 10 20 30 40 BLOWS/0.5'

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.

(ML)

COBBLES & GRAVEL

STIFF, BROWN CLAYEY SILT

GRAY, ROCK FRAGMENTS W/ SOME STIFF, BROWN SILTY CLAY

END OF BORING @ 6.0'

2" S

12-A

39

1920

47.5' G/1.5'

2" S.S

12-B

15

207.2'

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

Boring Log PROPOSED DEVELOPMENT
PROJECT WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

Weight 140#

Drop 30"

2" STANDARD SPLIT SPOON

BORING NO. 12A Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 17, 1972

Field Party KAKU, ASATO, RADONICH

Type of Boring AUGER (MOBILE B-40) Diam. 4"

Elev. 52' ± * Datum _____

Drill Bit FINGER TYPE

Water Level	NOT NOTICED				
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Time					
------	--	--	--	--	--

Date 4-17-72

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

WALTER LUM ASSOCIATES, INC.

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Boring Log

PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

PROJECT LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 13 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 10, 1972

Field Party MEYER, MAESHIRO, RADOVICH

Type of Boring AUGER (MOBILE) Diam. 4"

Elev. 52' ± * Datum

Drill Bit FINGER TYPE

HAMMER:

Weight 140#

Drop 30"

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

SAMPLER:

2" SS - 2" STANDARD SPLIT SPOON

Water Level Not Noticed

Time

Date 4-10-72

PENETRATION DATA

Standard Penetration Test 2" O.D. THIN WALL TUBE SAMPLER

N (Blows per foot) 0 10 20 30 40 BLOWS/0.5'

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.	N (Blows per foot)	Standard Penetration Test
	ELEV. = 52' ± *	0									
(MH)	LOOSE, COBBLES & GRAVEL	0	2" S	13-A	-	38	-	5300	-		3/5' 4/5'
(MH)	MOTTLED BROWN SILTY CLAY w/ DECOMPOSED ROCK COBBLE	5	2" SS	13-B	-	41 40	-	-	-	2/5' 4/5'	
MH	MEDIUM TO STIFF DARK BROWN SILTY CLAY	10	2" SS	13-C	35	38	66	-	-		
	BROWN DECOMPOSED ROCK (SOME CRUSHES TO SANDY SILT)	15	2" S	13-D	-	41	-	-	-		5/5' 12/3'
	END OF BORING @ 15.8'										

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3.3.72

WAIAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROPOSED DEVELOPMENT

PROJECT WAIKAWA INDUSTRIAL PARK

LOCATION Waikawa, Ewa, Oahu, Hawaii

BORING NO. 14 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 10, 1972

Field Party METER, MAESHIRO, RADOVICH

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

Elev. 56' ± * Datum _____

Drill Bit FINGER TYPE

HAMMER:

Weight 140#

Drop 30"

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

SAMPLER: 2" SS-2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time _____

Date 4-10-72

PENETRATION DATA

Standard Penetration Test 2" O.D. THIN WALL TUBE SAMPLER

N (Blows per foot) 0 10 20 30 40 3/5' 4/5'

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.

(MH)

A.C. GRAVEL

MEDIUM TO STIFF RED BROWN SILTY CLAY

END OF BORING @ 14'

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

Boring Log

PROPOSED DEVELOPMENT

PROJECT WAIAWA INDUSTRIAL PARKLOCATION Waiawa, Ewa, Oahu, HawaiiBORING NO. 15 Sheet No. of Driller W. LUM ASSOC., INC. Date APR. 11, 1972Field Party MEYER, MAESHIRO, TSUKAZAKIType of Boring AUGER (MOBILE B-30) Diam. 4"Elev. 63' ± * Datum Drill Bit FINGER TYPEWater Level NOT NOTICEDTime Date 4-11-72

HAMMER:

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

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.	Standard Penetration Test N (Blows per foot)	0	10	20	30	40
	ELEV. = 63' ± *	0													
	2" A.C. ROAD BROWN CLAY, DECOMPOSED ROCK & GRAY, LAVA ROCK (FILL)			15-A	-	21	-	-	-						
MH	STIFF, REDDISH BROWN CLAYEY SILT W/ DECOMPOSED ROCK	5		15-B	34	26	58	-	-						
(MH)	STIFF, BROWN SILTY CLAY W/SAND					30									
MH	STIFF, LIGHT BROWN SANDY SILT W/ TRACES OF ROCK FRAGMENTS	10		15-C	39	24	55	-	-						
(SM)	STIFF, LIGHT BROWN SILTY SAND W/ DECOMPOSED ROCK	15		15-D	-	23	-	-	-						
	BOULDER OR ROCK														
	END OF BORING @ 18'														

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

WAIAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 16 Sheet No. of
Driller W. LUM ASSOC. INC. Date APR. 11, 1972
Field Party MEYER, MAESHIRO, TSUKAZAKI.
Type of Boring AUGER (MOBILE B-30) Diam. 4"
Elev. 81' ± * Datum
Drill Bit FINGER TYPE
Water Level NOT NOTICED
Time
Date 4-11-72

HAMMER:

Weight 140#

Drop 30"

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

SAMPLER:

2" S.S. 2" STANDARD SPLIT SPOON

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.	Standard Penetration Test N (Blows per foot)	2" O.D. THIN WALL TUBE SAMPLER
	ELEV. = <u>81' ± *</u>	0								0 10 20 30 40	BLOWS/0.5'
(MH)	BROWN, SILTY CLAY W/ DECOMPOSED ROCK	0 - 2.5	2" S	16-A	-	32	-	-	-		3/5'
	BROWN DECOMPOSED ROCK	2.5 - 5	2" S	16-B	-	42	-	-	-		HAMMER BOUNCES
(MH)	STIFF, TAN-BROWN CLAYEY SILT & DECOMPOSED ROCK	5 - 10	2" S	16-C	-	52	-	-	-		
(MH)	BROWN, CLAYEY SILT W/ DECOMPOSED ROCK	10 - 15	2" S	16-D	-	55	-	-	-		
(CH)	GRAY, CLAY	15 - 17.5	2" S	16-E	-	33	-	-	-		4/5' 4/2'
(CH)	GRAY, DECOMPOSED ROCK	17.5 - 20	2" S	16-F	-	41	-	-	-		
(CH)	STIFF, GRAY, CLAY W/ DECOMPOSED ROCK	20 - 21.5	2" S	16-G	-	39	-	-	-		
(MH)	REDDISH BROWN CLAYEY SILT	21.5 - 22.5	2" S	16-H	-	34	-	-	-		
	END OF BORING @ 21.5'	22.5	2" S	16-I	-	36	-	-	-		

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

WAIAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 17 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 14, 1972

Field Party SUZUKI, ASATO, RADOVICH

Type of Boring AUGER (MOBILE B-40) Diam. 4 1/2"

Elev. 89' ± * Datum _____

Drill Bit FINGER TYPE

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time _____

Date 4-14-72

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.	Standard Penetration Test				
										N (Blows per foot)				
	ELEV. = 89' ± *	0								0	10	20	30	40
	GRAVEL, COBBLES & CORAL W/BROWN CLAYEY SILT	0		17-A	-	35	-	-	-					
		5		17-B	-	35	-	-	-					
	STIFF, MOTTLED BROWN CLAYEY SILT, DECOMPOSED ROCK & TRACES OF GRAVEL	10		17-C	-	25	-	-	-					
		15		17-D	-	38	-	-	-					44
	END OF BORING @ 21.5'	20		17-E	-	42	-	-	-					

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72.

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 18 Sheet No. of

Driller W. LUM ASSOC., INC Date APR. 11, 1972

Field Party MEYER, MAESHIRO, TSUKAZAKI

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

Elev. 88' ± * Datum

Drill Bit FINGER TYPE

HAMMER:

Weight 140 #

Drop 30"

2" 5-2" O.D. THIN WALL TUBE

SAMPLER: 2" 5-2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time

Date 4-11-72

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.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test N (Blows per foot)	2" O.D. THIN WALL TUBE SAMPLER BLOWS/0.5'
	ELEV. = 88' ± *	0									
MH	BROWN, SILTY SAND, CLAY, CORAL & GRAVEL (FILL)	2'S		18-A	36	43	52	-	-		3/5' 5/5'
	MOTTLED BROWN CLAYEY SILT & DECOMPOSED ROCK	5		18-B	-	48	-	-	-		14/5'
		2"SS									30/5'
MH	STIFF, BROWN SILTY CLAY w/ DECOMPOSED ROCK & SAND	10		18-C	39	50	76	-	-		
		2"SS									
		15		18-D	-	41	52	-	-		7/5' 9/5'
		2"SS									
MH	MOTTLED BROWN DECOMPOSED ROCK (SOME CRUSHES TO CLAYEY SILT)	20		18-E	-	55	-	-	-		
		2"SS									
		25		18-F	42	58	62	-	-		
		2"SS				45					
	GRAY, DECOMPOSED LAVA ROCK										
	END OF BORING @ 26.5'										

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 19 Sheet No. of

Driller W. LUM ASSOC., INC. Date APRIL 14, 1972

Field Party SUZUKI, ASATO, RADOVICH

Type of Boring AUGER (MOBILE B-40) Diam. 4 1/2"

Elev. 87' ± * Datum

Drill Bit FINGER TYPE

HAMMER:

Weight 140 #

Drop 30"

2" 3/4" 2" O.D. THIN WALL TUBE

SAMPLER:

2" 5/8" 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time

Date 4-14-72

PENETRATION DATA

Standard
Penetration Test
N (Blows per foot)

2" O.D. THIN
WALL TUBE
SAMPLER

0 10 20 30 40 BLOWS/0.5'

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.	Standard Penetration Test N (Blows per foot)	2" O.D. THIN WALL TUBE SAMPLER
	ELEV. = 87' ± *	0									
	CORAL W/ SAND										
	DECOMPOSED ROCK & GRAVELS W/ MOTTLED BROWN SILTY CLAY		2" SS	19-A	-	21	-	-	-		23/5'
(MH)	COBBLES & GRAVEL W/ DECOMPOSED ROCK & MOTTLED BROWN CLAYEY SILT	5	2" SS	19-B	-	37	-	-	-		11/5'
(MH)	STIFF, BROWN CLAYEY SILT	10	2" SS	19-C	-	24	-	-	-		
		15	2" SS	19-D	-	29	-	-	-		
(MH)	STIFF, BROWN CLAYEY SILT W/ TRACES OF SAND	20	2" S	19-E	-	27	-	13500	-		3/5' 4/5'
(MH)	ROCK OR BOULDER STIFF, MOTTLED BROWN CLAYEY SILT W/ TRACES OF SAND END OF BORING @ 26.5'	25	2" SS	19-F	-	32	-	-	-		

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

WAIAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 20 Sheet No. of
 Driller W. LUM ASSOC., INC. Date APR. 17, 1972
 Field Party KAKU, ASATO, RADOVICH
 Type of Boring AUGER (MOBILE B-40) Diam. 4"
 Elev. 61' ± * Datum
 Drill Bit FINGER TYPE

HAMMER:

Weight 140#
 Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT RECORDED

Time

Date 4-17-72

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.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
	ELEV. = 61' ± *	0												
(MH)	BROWN, CLAYEY SILT w/ GRAVEL COBBLE OR BOULDER			20-A	-	44	-	-	-					
(MH)	SOFT, BROWN SILTY CLAY w/ TRACES OF DECOMPOSED ROCK													
(MH)	STIFF, MOTTLED BROWN SILTY CLAY w/ DECOMPOSED ROCK	5		20-B	-	41	-	-	-					40/5'
	COBBLES OR BOULDER													
MH	MEDIUM, MOTTLED BROWN CLAYEY SILT w/ DECOMPOSED ROCK & TRACES OF RIVER GRAVEL	10		20-C	57	32	10	-	-					
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT w/ DECOMPOSED ROCK	15		20-D	-	53	-	-	-					
	END OF BORING @ 16.5'													

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 21 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 17, 1972

Field Party MEYER, MAESHIRO, SETO

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

Elev. 88' ± Datum

Drill Bit FINGER TYPE

Water Level NOT NOTICED

Time

Date 4-17-72

HAMMER:

Weight 140 #

Drop 30"

SAMPLER:

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

2" SS. 2" STANDARD SPLIT SPOON

PENETRATION DATA

Standard
Penetration Test

2" O.D. THIN
WALL TUBE
SAMPLER

N (Blows per foot)

0 10 20 30 40 BLOWS/0.5'

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				
	ELEV. = 88' ± * 0													
(CH)	MEDIUM, BROWN CLAY w/ CORAL & SAND	0	2"SS	21-A	-	34	-	-	-					
(MH)	MEDIUM, BROWN SILTY CLAY w/DECOMPOSED ROCK	5	2"SS	21-B	-	39	-	-	-					
(MH)	MEDIUM TO STIFF MOTTLED BROWN CLAYEY SILT & DECOMPOSED ROCK	10	2"SS	21-C	-	36	-	-	-					3/5' 6/3'
MH	STIFF, LIGHT BROWN CLAYEY SILT w/ DECOMPOSED ROCK	15	2"SS	21-D	-	39	-	-	-					
	END OF BORING @ 21.5'	20	2"SS	21-E	-	31	-	-	-					

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

WAIAWA INDUSTRIAL PARK

Boring Log

PROPOSED DEVELOPMENT
PROJECT WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 22 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 18, 1972

Field Party METER, MAESHIRO

Type of Boring AUGER (MOBILE) Diam. 4"

Elev. 97' ± * Datum _____

Drill Bit FINGER TYPE

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time _____

Date 4-18-72

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.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
(MH)	STIFF, LIGHT BROWN CLAYEY SILT W/ DECOMPOSED ROCK	0		22-A	-	50	-	-	-				17 1/2'	
		5												
				22-B	42	39	61	-	-					52
		10												
MH	STIFF, LIGHT BROWN CLAYEY SILT W/ DECOMPOSED ROCK			22-C	-	46	-	-	-					
		15												
				22-D	-	48	-	-	-					
		20												
MH	STIFF, BROWN CLAYEY SILT W/ DECOMPOSED ROCK			22-E	42	48	63	-	-					
	END OF BORING @ 21.5'													

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

WAIAWA INDUSTRIAL PARK

WAIAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 23 Sheet No. of
Driller W. LUM ASSOC., INC. Date APR. 18, 1972
Field Party MAKAULA, KAKU, SETO
Type of Boring AUGER (MOBILE) Diam. 4"
Elev. 67' ± * Datum
Drill Bit FINGER TYPE
Water Level NOT NOTICED
Time
Date 4-18-72

HAMMER:

Weight 140#
Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

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.	Standard Penetration Test N (Blows per foot)
	ELEV. = 67' ± *	0								0 10 20 30 40
MH	COBBLE & GRAVEL									
MH	STIFF, REDDISH BROWN CLAYEY SILT			23-A	35	34	60	-	-	
(MH)	SOFT, BROWN CLAYEY SILT			23-B	-	27	-	-	-	ONE BLOW/1.0'
(MH)	MEDIUM TO STIFF BROWN CLAYEY SILT W/ TRACES OF DECOMPOSED ROCK			23-C	-	32	-	-	-	
	BROWN, CLAYEY SILT, DECOMPOSED ROCK & GRAVEL			23-D	-	32	-	-	-	
	BOULDER									
	END OF BORING @ 18.5'									

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC., DATED 3-3-72.

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 24 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 18, 1972

Field Party MEYER, MAESHIRO

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

Elev. 88' ± * Datum

Drill Bit FINGER TYPE

Water Level NOT NOTICED

Time

Date 4-18-72

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

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.	Standard Penetration Test N (Blows per foot)
	ELEV. = 88' ± *	0								0 10 20 30 40
(MH)	STIFF BROWN SILTY CLAY W/ GRAVEL & DECOMPOSED ROCK	0 - 4	24-A	-	37	-	-	-	-	
(MH)	STIFF BROWN SILTY CLAY	4 - 8	24-B	-	31	-	-	-	-	
(MH)	STIFF BROWN CLAYEY SILT W/ DECOMPOSED ROCK	8 - 14	24-C	-	36	-	-	-	-	
	BOULDER OR ROCK ?	14 - 15								
	END OF BORING @ 14'	15								

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 25 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 27 & 28, 1972

Field Party MEYER MAESHIRO, SETO, MAKAULA, KAKU

Type of Boring AUGER (MOBILE MINUTEMAN) Diam. 3" - 2 1/2"

Elev. 67' ± * Datum

Drill Bit FINGER TYPE, DIAMOND CORING & T.C. CORING

Water Level NOT NOTICED 4.5'

Time

Date 4-21-72 4-27-72

HAMMER:

Weight 140 #

Drop 30"

2" 5-2" STANDARD SPLIT SPOON

SAMPLER:

"BX" - BX DOUBLE TUBE CORE BARREL

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)
0 10 20 30 40

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.	Standard Penetration Test N (Blows per foot)
	ELEV. = 67' ± *	0								
(MH)	MEDIUM BROWN CLAYEY SILT	2' 35"	25-A			40				
	BOULDERS	5'	"BX"	RUN #1			CORED: 2.5' RECOV.: 2.5'			
	SAND, GRAVEL, COBBLES & BOULDERS	10'	"BX"	RUN #2			CORED: 4.5' RECOV.: 1.0'			
	END OF BORING @ 10'									

* ELEVATION ESTIMATED
 FROM TOPOGRAPHIC MAP
 BY WILLIAM HEE & ASSOC.,
 INC. DATED 3-3-72

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 27 Sheet No. of Driller W. LUM ASSOC., INC. Date MAY 3, 1972Field Party MEYER, MAESHIRO, KAKUType of Boring AUGER (CONCORE) Diam. 3"Elev. 68' ± * Datum Drill Bit T.C. DRAG

HAMMER:

Weight 140#Drop 30"SAMPLER: 2" STANDARD SPLIT SPOONWater Level 13.5'Time Date 5-3-72

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				
	ELEV. = 68' ± *									N (Blows per foot)				
										0	10	20	30	40
(MH)	SOFT, BROWN CLAYEY SILT W/ TRACES OF ROOTS & SHELLS	0		27-A	-	38	-	-	-	2.5'				
(MH)	MEDIUM, BROWN CLAYEY SILT	5		27-B	-	35	-	-	-	4.5'				
(MH)	MEDIUM, BROWN CLAYEY SILT W/ TRACES OF GRAVEL & SAND	10		27-C	-	40	-	-	-	5.5'				
(MH)	MEDIUM, MOTTLED BROWN CLAYEY SILT W/ DECOMPOSED ROCK	15		27-D	-	51	-	-	-					
(MH)	MEDIUM, BROWN CLAYEY SILT W/ TRACES OF SAND	20		27-E	-	50	-	-	-	4.5'				
	RIVER GRAVEL			27-F	-	56	-	-	-	10.5'				
	MEDIUM MOTTLED LIGHT BROWN CLAYEY SILT (DECOMPOSED ROCK)													
	END OF BORING @ 21.5'													

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

PROPOSED DEVELOPMENT WAIAWA INDUSTRIAL PARK

PROJECT

LOCATION Waiawa, Ewa, Oahu, Hawaii

HAMMER:

Weight 140#

Drop 30"

SAMPLER:

2" STANDARD SPLIT SPOON

BORING NO. 28 Sheet No. _____ of _____Driller W. LUM ASSOC., INC. Date APR. 18, 1972

Field Party: MAKALA KAKU, SETO

Type of Boring AUGER (MOBILE B-40) Diam. 4"

Elev. 94' ± * Datum

Drill Bit FINGER TYPE

Water Level	NOT NOTICED			
-------------	-------------	--	--	--

Time _____

Date 4-18-72

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

WAIAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 29 Sheet No. of

Driller W. LUM ASSOC. INC. Date APR. 18, 1972

Field Party MAKAULA, KAKU, SETO

Type of Boring AUGER (MOBILE B-40) Diam. 4"

Elev. 100' ± * Datum

Drill Bit FINGER TYPE

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time

Date 4-18-72

PENETRATION DATA

Standard Penetration Test

N (Blows per foot)

0 10 20 30 40

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.

(MH) REDDISH BROWN, CLAYEY SILT
 ASPHALT 1 1/2"
 STIFF, REDDISH BROWN
 SILTY CLAY W/
 SOME ASH
 5
 MH HARD, BROWN
 CLAYEY SILT
 10
 (MH) STIFF, BROWN
 CLAYEY SILT W/ A TRACE
 OF DECOMPOSED ROCK
 15
 (MH) STIFF, MOTTLED BROWN
 CLAYEY SILT W/
 DECOMPOSED ROCK &
 GRAVEL
 20
 STIFF, MOTTLED GRAY
 CLAYEY SILT &
 DECOMPOSED ROCK
 END OF BORING @ 21.5'

29-A

29

29-B

37

32

59

45

29-C

45

29-D

44

29-E

40

50

* ELEVATION ESTIMATED
 FROM TOPOGRAPHIC MAP
 BY WILLIAM HEE & ASSOC.,
 INC. DATED 3-3-72

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

PROJECT

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 30 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 21, 1972

Field Party MAKAULA, KAKU

Type of Boring AUGER (MOBILE B-40) Diam. 4"

Elev. 88' ± * Datum

Drill Bit FINGER TYPE

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time

Date 4-21-72

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)
0 10 20 30 40

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.

DECOMPOSED ROCK w/
ROCK FRAGMENTS
COBBLE

DECOMPOSED ROCK &
GRAVEL w/MOTTLED BROWN
CLAYEY SILT

COBBLE

BROWN, CLAYEY SILT w/
GRAVEL & DEC. ROCK
BOULDER

BROWN, CLAYEY SILT,
GRAVEL & DEC. ROCK
BOULDER

NOTE: DRILL TIME
10'-13' = 30 MIN.

END OF BORING @ 13'

30-A

30-B

30-C

ROCK FRAGMENTS

20/3'
HAMMER
BOUNCES

31/5'
10/1'
HAMMER
BOUNCES

20/1'

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 31 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 18, 1972

Field Party MEYER, MAESHIRO

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

Elev. 88' ± * Datum _____

Drill Bit FINGER TYPE

Water Level NOT NOTICED

Time _____

Date 4-18-72

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

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.	Standard Penetration Test				
	ELEV. = 88' ± *	0								N (Blows per foot) 0 10 20 30 40				
	FILL?													
MH	STIFF, BROWN CLAYEY SILT (DEC. ROCK) W/ROCK FRAGMENTS	5		31-A	38	31	64	-	-					
				31-B	-	27	-	-	-					
	COBBLES AND BOULDERS	10		31-C		NO RECOVERY								
(MH)	STIFF, BROWN SILTY CLAY W/ DECOMPOSED ROCK	15		31-D	-	38								
	LIGHT BROWN DECOMPOSED ROCK			31-E		42								
(MH)	STIFF, SILTY CLAY W/ DECOMPOSED ROCK	20												
	END OF BORING @ 21.5'													
* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72														

✓ 20%
HAMMER
BOUNCES

WAIAWA INDUSTRIAL PARK

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 33 Sheet No. of Driller W. LUM ASSOC., INC. Date MAY 2, 1972Field Party MEYER, MAESHIRO, KAKUType of Boring CORING (CONCORE) Diam. 3"Elev. 69' ± * Datum Drill Bit T.C. CORING

HAMMER:

Weight Drop

SAMPLER:

"BX" - BX DOUBLE TUBE CORE BARREL

"NX" - NX DOUBLE TUBE CORE BARREL

Water Level 3'Time Date 5-2-72

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified
Soil
Classification

DESCRIPTION

ELEV. = 69' ± *

Depth (ft.)

Sampler

Sample No.

Plastic Limit

Water Cont.
%

Liquid Limit

Unconf. Comp.
P.S.F.Vane Shear
P.S.F.

BROWN SILTY SAND,
 GRAVEL, COBBLES &
 BOULDERS W/ CLAY

END OF BORING @ 11'

* ELEVATION ESTIMATED
 FROM TOPOGRAPHIC MAP
 BY WILLIAM HEE & ASSOC.,
 INC. DATED 3-3-72

WAIAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 34 Sheet No. _____ of _____Driller W. LUM ASSOC., INC. Date MAY 1, 1972Field Party MEYER, MAESHIRO, KAKUType of Boring AUGER (CONCRETE) Diam. 3"Elev. 70' ± * Datum _____Drill Bit T.C. DRAGWater Level 7.5'

Time _____

Date 5-1-72

HAMMER:

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

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

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.

ELEV. = 70' ± *

(MH)

MEDIUM, BROWN
CLAYEY SILT W/ROOTS

34-A

34

5

34-B

NO RECOVERY

ONE BLOW/0.5'

DECOMPOSED ROCK,
RIVER GRAVEL,
COBBLES & BOULDERS

WATER

5-1-72

10

34-C

NO RECOVERY

END OF BORING @ 10'

HAMMER
BOUNCES✓ 10/0.0'
HAMMER
BOUNCES

* ELEVATION ESTIMATED
 FROM TOPOGRAPHIC MAP
 BY WILLIAM HEE & ASSOC.,
 INC. DATED 3-3-72

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROPOSED DEVELOPMENT
PROJECT WAIAWA INDUSTRIAL PARK
LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 35 Sheet No. _____ of _____Driller W. LUM ASSOC., INC. Date APR. 21, 1972Field Party MAKAULA, KAKUType of Boring AUGER (MOBILE 6-40) Diam. 4"Elev. 98' ± * Datum _____Drill Bit FINGER TYPEWater Level NOT NOTICED

Time _____

Date 4-21-72

HAMMER:

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

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

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.ELEV. = 98' ± *

(ML)

STIFF, MOTTLED BROWN
CLAYEY SILT W/
DECOMPOSED ROCK

5

GRAY & BROWN
DECOMPOSED ROCK

MH

STIFF, MOTTLED BROWN
CLAYEY SILT W/
DECOMPOSED ROCK

10

(CH)

STIFF, MOTTLED GRAY
CLAY W/
DECOMPOSED ROCK

15

END OF BORING @ 16.5'

35-A

17

35-B

38

44

35-C

40

42

65

35-D

48

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72.

WAIAWA INDUSTRIAL PARK

WAIAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 36 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 19, 1972

Field Party METER MAESHIRO

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

Elev. 96' ± * Datum _____

Drill Bit FINGER TYPE

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time _____

Date 4-18-72

PENETRATION DATA

Standard Penetration Test

N (Blows per foot)
 0 10 20 30 40

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				
	ELEV. = 96' ± *	0												
(MH)	2" A.C. ROAD													
	MEDIUM, BROWN SILTY CLAY			36-A	-	39	-	-	-					
	STIFF, MOTTLED BROWN CLAYEY SILT w/ DECOMPOSED ROCK & GRAVEL	5		36-B	-	15	-	-	-					
	BOULDER													
	END OF BORING @ 8'													

45 1/4'
 HAMMER BOUNCES

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 37 Sheet No. _____ of _____
 Driller W. LUM ASSOC., INC. Date APR. 19, 1972
 Field Party MAKAULA, KAKU, SETO
 Type of Boring AUGER (MOBILE P-40) Diam. 4"
 Elev. 101' ± * Datum _____
 Drill Bit FINGER TYPE
 Water Level NOT NOTICED
 Time _____
 Date 4-19-72

HAMMER:

Weight 140#Drop 30"

SAMPLER:

2" STANDARD SPLIT SPOON

PENETRATION DATA

Standard
Penetration TestN (Blows per foot)
0 10 20 30 40

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				
	ELEV. = 101' ± *	0												
MH	COBBLES & GRAVEL STIFF, BROWN SILTY CLAY			37-A	33	30	64	-	-					
(MH)	STIFF, BROWN CLAYEY SILT W/ TRACES OF DECOMPOSED ROCK	5		37-B	-	29	-	-	-					
	ROCK OR BOULDER	10		37-C	-	9	-	-	-					
	DECOMPOSED ROCK W/ GRAVEL													
(MH)	STIFF, BROWN CLAYEY SILT W/ DECOMPOSED ROCK	15		37-D	-	36	-	-	-					
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT W/ TRACES OF DECOMPOSED ROCK	20		37-E	-	56	-	-	-					
	END OF BORING @ 21.5'													

* ELEVATION ESTIMATED
 FROM TOPOGRAPHIC MAP BY
 WILLIAM HEE & ASSOC., INC.
 DATED 3-3-72

WAIAWA INDUSTRIAL PARK

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 38 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 20, 1972

Field Party MEYER, MAESHIRO

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

Elev. 98' ± * Datum

Drill Bit FINGER TYPE

Water Level NOT NOTICED

Time

Date 4-20-72

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

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.	Standard Penetration Test					
										N (Blows per foot)					
										0	10	20	30	40	
(MH)	MEDIUM RED & LIGHT BROWN CLAYEY SILT W/SOME DECOMPOSED ROCK	0		38-A	-	28	-	-	-	5/5'					✓ 10/0' HAMMER BOUNCES
	BOULDER														
	BROWN & TAN DECOMPOSED ROCK	5		38-B	-	19	-	-	-						
MH	STIFF, BROWN SILTY CLAY W/ DECOMPOSED ROCK	10		38-C	-	31 33	-	-	-						
(MH)	STIFF, LIGHT BROWN CLAYEY SILT (DEC. ROCK) W/SOME SAND	15		38-D	31	31 32	17	-	-						
(MH)	STIFF, LIGHT BROWN CLAYEY SILT W/SOME SAND	20		38-E	-	30	-	-	-						
	GRAY, DECOMPOSED ROCK & BOULDER CHIPS	25		38-F	-	19	-	-	-	50/5'					✓ 50/5'
END OF BORING @ 25.5'															
* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72															

WAIAWA INDUSTRIAL PARK

Boring Log

PROPOSED DEVELOPMENT
PROJECT WAIAWA INDUSTRIAL PARK

LOCATION Waiawa, Ewa, Oahu, Hawaii

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 39 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 20, 1972

Field Party MEYER, MAESHIRO

Type of Boring AUGER (MOBILE) Diam. 4"

Elev. 99' ± * Datum _____

Drill Bit FINGER TYPE

Water Level NOT NOTICED

Time _____

Date 4-20-72

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.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
	ROAD													
(MH)	MEDIUM REDDISH BROWN SILTY CLAY w/ ROCK FRAGMENTS & DEC. ROCK	5		39-A	-	44	-	-	-					
				39-B	-	27	-	-	-					
(MH)	BOULDER STIFF, RED BROWN SILTY CLAY w/ TAN DECOMPOSED ROCK	10		39-C	-	26	-	-	-				14/5'	
(CH)	STIFF, BROWN CLAY					34							23/5'	
	STIFF, BROWN CLAYEY SILT	15		39-D	-	30	-	-	-					
	BOULDER FRAGMENTS	20		39-E	-	15	-	-	-					40/5'
	END OF BORING @ 24'													

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 40 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 19, 1972

Field Party METER, MAESHIRO

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

Elev. 101' ± * Datum _____

Drill Bit FINGER TYPE

HAMMER:

Weight 140#

Drop 30"

SAMPLER:

2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time _____

Date 4-19-72

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.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
	ELEV. = 101' ± *	0												
	2" A.C. ROAD													
(MH)	STIFF, REDDISH BROWN SILTY CLAY W/ COBBLES & DECOMPOSED ROAD			40-A	—	32 25	—	—	—		41.5'			
CH	STIFF, REDDISH BROWN CLAY W/ DECOMPOSED ROCK	5		40-B	34	35	18	—	—					
	BOULDER													
		10		40-C	—	31	—	—	—					
MH	STIFF, BROWN CLAYEY SILT													
		15		40-D	37	30	56	—	—					
	BOULDER OR ROCK													
	END OF BORING @ 18.5'	20												

* ELEVATION ESTIMATED
 FROM TOPOGRAPHIC MAP BY
 WILLIAM HEE & ASSOC., INC.
 DATED 3-3-72

WAIAWA INDUSTRIAL PARK

Boring Log

PROPOSED DEVELOPMENT
PROJECT WAIAWA INDUSTRIAL PARK
LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 41 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 19, 1972

Field Party MEYER, MAESHIRO

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

Elev. 106' ± * Datum -

Drill Bit FINGER TYPE

HAMMER:

Weight 140 #

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time -

Date 4-19-72

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

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.

ELEV. = 106' ± *

(MH)

STIFF, BROWN
CLAYEY SILT w/ SAND &
DECOMPOSED ROCK

5

41-A

34

50

(MH)

STIFF, LIGHT BROWN
CLAYEY SILT &
DECOMPOSED ROCK

10

41-B

35

43

ROCK OR BOULDER

15

41-C

42

END OF BORING @ 15'

41-D

NO RECOVERY

10/0'

HAMMER
BOUNCES

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP BY
WILLIAM HEE & ASSOC., INC.
DATED 3-3-72

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

PROJECT

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 42 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 19, 1972

Field Party MAKAULA KAKU, SETO

Type of Boring AUGER (MOBILE) Diam. 4"

Elev. 113' ± * Datum

Drill Bit FINGER TYPE

Water Level NOT NOTICED

Time

Date 4-19-72

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

PENETRATION DATA

Standard Penetration Test

N (Blows per foot)
0 10 20 30 40

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.

42.5'
HAMMER BOUNCES

53

MH

(MH)

ELEV. = 113' ± 2 *

BROWN CLAYEY SILT W/
COBBLES & GRAVEL

GRAVEL W/
DECOMPOSED ROCK

BROWN, SILTY CLAY &
DECOMPOSED ROCK
W/ GRAVEL

STIFF, MOTTLED BROWN
CLAYEY SILT, GRAVEL &
DECOMPOSED ROCK

MEDIUM MOTTLED BROWN
CLAYEY SILT W/
DECOMPOSED ROCK

STIFF MOTTLED BROWN
CLAYEY SILT W/
DECOMPOSED ROCK

END OF BORING @ 21.5'

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP BY
WILLIAM HEE & ASSOC., INC.
DATED 3-3-72

PROPOSED DEVELOPMENT WAIAWA INDUSTRIAL PARK

PROJECT

LOCATION Waiawa, Ewa, Oahu, Hawaii

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 43 Sheet No. of

Driller W. LUM ASSOC, INC. Date APR. 19, 1972

Field Party: MEYER, MAESHIRO

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

Elev. 123' ± * Datum

FINGER TYPE

Water Level	NOT NOTICED				
-------------	----------------	--	--	--	--

Time _____

Date	4-19-72				
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* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP
BY WILLIAM HEE & ASSOC.,
INC. DATED 3-3-72

WAIAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 44 Sheet No. of

Driller W. LUM ASSOC. INC. Date APR. 19, 1972

Field Party MAKAULA, KAKU, SETO

Type of Boring AUGER (MOBILE) Diam. 4"

Elev. 104' ± * Datum

Drill Bit FINGER TYPE

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time

Date 4-19-72

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.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
(MH)	STIFF, BROWN & REDDISH BROWN CLAYEY SILT w/ DECOMPOSED ROCK	0		44-A	-	59	-	-	-					
(MH)	COBBLE BROWN, DECOMPOSED ROCK w/ CLAYEY SILT	5		44-B	-	41	-	-	-					
(MH)	STIFF, BROWN & REDDISH BROWN CLAYEY SILT w/ DECOMPOSED ROCK	10		44-C	-	47	-	-	-					
	STIFF, BROWN CLAYEY SILT & DECOMPOSED ROCK	15		44-D	-	35	-	-	-					
	END OF BORING @ 16.5'	16.5												

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC. INC. DATED 3-3-72

Boring Log

PROPOSED DEVELOPMENT WAIAWA INDUSTRIAL PARK

PROJECT

LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 45 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 21, 1972

Field Party MEYER, MAESHIRO, SETO

Type of Boring AUGER (MOBILE) Diam. 4"

Elev. 131' ± * Datum

Drill Bit FINGER TYPE

Water Level	NOT NOTICED				
-------------	-------------	--	--	--	--

Time _____

Date	4-21-72				
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HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

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				
										N (Blows per foot)				
										0	10	20	30	40
(MH)	ELEV. = 131' ± * MEDIUM TO STIFF BROWN, SILTY CLAY W/ BOULDER FRAGMENTS BOULDER BROWN, SILTY CLAY	0		45-A	-	31	-	-	-					
		5		45-B		NO RECOVERY							14/5'	
	TAN BROWN DECOMPOSED ROCK	10		45-C	-	27	-	-	-					50/3' HAMMER BOUNCES
	END OF BORING @ 15.1'	15		45-D	-		-	-	-					20/1' HAMMER BOUNCES

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 46 Sheet No. of
 Driller W. LUM ASSOC. INC. Date APR. 19, 1972
 Field Party MAKAULA, KAKU, SETO
 Type of Boring AUGER (MOBILE) Diam. 4"
 Elev. 138' ± * Datum
 Drill Bit FINGER TYPE
 Water Level NOT NOTICED
 Time
 Date 4-19-72

HAMMER:

Weight 140*

Drop 30"

SAMPLER:

2" STANDARD SPLIT SPOON

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.	Standard Penetration Test N (Blows per foot)
	ELEV. = 138' ± *	0								0 10 20 30 40
(MH)	MEDIUM BROWN SILTY CLAY W/ GRAVEL			46-A	-	15	-	-	-	
	GRAY DECOMPOSED ROCK	5		46-B	-	23	-	-	-	25/2'
	BOULDER									
(MH)	STIFF, MOTTLED BROWN SILTY CLAY W/ DECOMPOSED ROCK	10		46-C	-	42	-	-	-	
		15		46-D	-	45	-	-	-	
(MH)	STIFF, REDDISH BROWN SILTY CLAY W/ DECOMPOSED ROCK	20		46-E	-	46	-	-	-	
	END OF BORING @ 21.5'									

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

Boring Log

PROPOSED DEVELOPMENT
PROJECT WAIAWA INDUSTRIAL PARK
LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 47 Sheet No. of Driller W. LUM ASSOC., INC. Date APR. 19, 1972Field Party MAKAULA, KAKU, SETOType of Boring AUGER (MOBILE B-40) Diam. 4"Elev. 126' ± * Datum Drill Bit FINGER TYPEWater Level NOT NOTICEDTime Date 4-19-72

HAMMER:

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

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.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
(MH)	STIFF, REDDISH BROWN & OLIVE BROWN CLAYEY SILT w/ DECOMPOSED ROCK	0		47-A	-	38	-	-	-				7.5'	18.5'
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT w/ DECOMPOSED ROCK	5		47-B	-	39	-	-	-					
(MH)	STIFF, BROWN CLAYEY SILT w/ TRACES OF DECOMPOSED ROCK	10		47-C	-	41	-	-	-					
	BROWN DECOMPOSED ROCK	15		47-D	-	45	-	-	-					
(MH)	STIFF MOTTLED REDDISH BROWN CLAYEY SILT w/ DECOMPOSED ROCK	20		47-E	-	44	-	-	-					
	END OF BORING @ 21.5'													

* ELEVATION ESTIMATED
FROM TOPOGRAPHIC MAP BY
WILLIAM HEE & ASSOC., INC.
DATED 3-3-72.

WAIAWA INDUSTRIAL PARK

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 48 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 20, 1972

Field Party MAKAULA, KAKU, SETO

Type of Boring AUGER (MOBILE) Diam. 4"

Elev. 119' ± * Datum

Drill Bit FINGER TYPE

HAMMER:

Weight 40#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time

Date 4-20-72

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.	Standard Penetration Test N (Blows per foot)
	ELEV. = 119' ± *	0								0 10 20 30 40
(MH)	1 1/2" ASPHALT 5" CORAL & GRAVEL STIFF, BROWN SILTY CLAY w/ GRAVEL & ASPHALT	0		48-A	-	29	-	-	-	
(MH)	MEDIUM, BROWN SILTY CLAY w/GRAVEL	5		48-B	-	39	-	-	-	
(MH)	STIFF, MOTTLED BROWN SILTY CLAY w/ DECOMPOSED ROCK	10		48-C	-	35	-	-	-	
(MH)	MEDIUM TO STIFF DARK BROWN SILTY CLAY w/GRAVEL	15		48-D	-	37	-	-	-	3 1/5'
	STIFF, MOTTLED BROWN CLAYEY SILT, GRAVEL & DECOMPOSED ROCK	20		48-E	-	35	-	-	-	1 1/5'
	END OF BORING @ 21.5'									

* ELEVATION ESTIMATED
 FROM TOPOGRAPHIC MAP BY
 WILLIAM HEE & ASSOC., INC.
 DATED 3-3-72

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 49 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date APR. 20, 1972

Field Party MAKAULA, KAKU, SETO

Type of Boring AUGER (MOBILE) Diam. 4"

Elev. 118' ± * Datum _____

Drill Bit FINGER TYPE

HAMMER:

Weight 140 #

Drop 30"

SAMPLER:

2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time _____

Date 4-20-72

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.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
(MH)	ELEV. = 118' ± * STIFF REDDISH BROWN SILTY CLAY w/ GRAVEL & DECOMPOSED ROCK	0		49-A	-	20	-	-	-					
(MH)	HARD, DARK BROWN SILTY CLAY w/ TRACES OF DECOMPOSED ROCK	5		49-B	-	36	-	-	-					
	BOULDERS NOTE: DRILL TIME 6.0' - 8.5' = 45 MIN.													
MH	MEDIUM, DARK BROWN CLAYEY SILT w/ SOME GRAVEL	10		49-C	38	38	60	-	-			9/5'		
	STIFF, MOTTLED BROWN SILTY CLAY & ROCK FRAGMENTS	15		49-D	-	18	-	-	-					45/5'
(MH)	STIFF, MOTTLED BROWN SILTY CLAY w/ TRACES OF DECOMPOSED ROCK	20		49-E	-	53	-	-	-					
	END OF BORING @ 21.5'													
* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72														

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

WAIAWA INDUSTRIAL PARK

WAIKAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIKAWA INDUSTRIAL PARK
LOCATION Waikawa, Ewa, Oahu, Hawaii

BORING NO. 50 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 21, 1972

Field Party MAKAULA, KAKU

Type of Boring AUGER (MOBILE B-40) Diam. 4"

Elev. 118' ± * Datum

Drill Bit FINGER TYPE

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time

Date 4-21-72

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.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT W/ TRACES OF DECOMPOSED ROCK	0		50-A	-	42	-	-	-					
(MH)	MEDIUM, BROWN CLAYEY SILT W/ TRACES OF DECOMPOSED ROCK	5		50-B	-	38	-	-	-					
(MH)	STIFF, BROWN CLAYEY SILT W/ ROCK FRAGMENTS	10		50-C	-	19	-	-	-					
	BOULDER	15												
	END OF BORING @ 14.5'													

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. 51 Sheet No. of

Driller W. LUM ASSOC., INC. Date APR. 20, 1972

Field Party MAKAULA, KAKU, SETO

Type of Boring AUGER (MOBILE B-40) Diam. 4"

Elev. 120' ± * Datum

Drill Bit FINGER TYPE

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time

Date 4-20-72

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.	Standard Penetration Test				
										N (Blows per foot)				
	ELEV. = 120' ± *									0	10	20	30	40
	STIFF, BROWN CLAYEY SILT, DEC. ROCK & ROCK FRAGMENTS			SI-A	-	21	-	-	-					40/5'
	BOULDER, COBBLES & GRAVEL w/ BROWN, CLAYEY SILT	5		SI-B	NO RECOVERY									15/0' HAMMER BOUNCES
MH	STIFF, MOTTLED BROWN CLAYEY SILT w/ DECOMPOSED ROCK	10		SI-C	45	53	14	-	-					
(MH)	STIFF, REDDISH BROWN CLAYEY SILT w/ DECOMPOSED ROCK	15		SI-D	-	57	-	-	-					
(MH)	STIFF, BROWN & REDDISH BROWN CLAYEY SILT w/ DECOMPOSED ROCK	20		SI-E	-	63	-	-	-					
	END OF BORING @ 21.5'													

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP BY WILLIAM HEE & ASSOC., INC. DATED 3-3-72

PROPOSED DEVELOPMENT - WAIANA INDUSTRIAL PARK

TABLE I A - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	1	1	2
SAMPLE NO.		B	
DEPTH BELOW SURFACE			
DESCRIPTION	SURFACE BROWN CLAYEY SILT W/DECOMP ROCK & TRACES OF CORAL	4'-5.5' MOTTLED BROWN CLAYEY SILT W/SAND & DECOMP ROCK	SURFACE BROWN CLAYEY SILT W/DECOMP ROCK, GRAVEL & CORAL
GRAIN-SIZE ANALYSIS (% Passing)			
Sieve			
1"			
1/2"			
#4			
#10			
#20			
#40			
#100			
#200			
ATTERBERG LIMITS			
Air Dried or Natural	NATURAL	NATURAL	NATURAL
Liquid Limit	46	49	41
Plastic Limit	30	33	29
Plasticity Index	16	16	18
Dilatancy	MED.-QUICK	QUICK	SLOW-MED
Toughness	SLIGHT-MED.	SLIGHT-MED.	MED.-HIGH
Dry Strength	SLIGHT-MED.	SLIGHT-MED.	MEDIUM
UNIFIED SOIL CLASSIFICATION	ML	ML	ML
APPARENT SPECIFIC GRAVITY	2.86		
EXPANSION AND CBR TESTS (Surcharge-51 P.S.F.)			
Molding Moisture, %	23.9		26.0
Molding Dry Density, P.C.F.	102.6		98.0
Swell upon saturation, %	0.4		0.4
CBR at 0.1" Penetration	17.0		14.8
MOISTURE-DENSITY RELATIONS OF SOILS (AASHTO T-180-57 Method)	A		
Dry to Wet or Wet to Dry	WET TO DRY		
Max. Dry Density (P.C.F.)	104.0		
Optimum Moisture (%)	21.2		

REMARKS:

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

Date 6-22-72 By BT

PROPOSED DEVELOPMENT - WAIAWA INDUSTRIAL PARK

TABLE I B - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	5	6	7	8
SAMPLE NO.		B		
DEPTH BELOW SURFACE	SURFACE	5'-6.5'	SURFACE	SURFACE
DESCRIPTION	BROWN SILTY CLAY W/SAND, GRAVEL & CORAL	BROWN SILTY CLAY W/TRACES OF ROOTS	BROWN CLAY W/GRAVEL & CORAL	BROWN CLAY W/GRAVEL & CORAL
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	49	66	46	44
Plastic Limit	28	33	23	24
Plasticity Index	21	33	23	20
Dilatancy	MEDIUM	NONE-SLOW	NONE-SLOW	MEDIUM
Toughness	MED.-HIGH	MED.-HIGH	MED.-HIGH	MEDIUM
Dry Strength	MED.-HIGH	MED.-HIGH	MED.-HIGH	MED.-HIGH
UNIFIED SOIL CLASSIFICATION				
	ML	MH	CL	CL
APPARENT SPECIFIC GRAVITY				
	2.92			2.90
EXPANSION AND CBR TESTS				
(Surcharge-51 P.S.F.)				
Molding Moisture, %	22.4		25.9	19.8
Molding Dry Density, P.C.F.	104.2		98.7	105.9
Swell upon saturation, %	2.6		0.4	0.5
CBR at 0.1" Penetration	5.9		16.6	19.8
MOISTURE-DENSITY RELATIONS OF SOILS				
(AASHTO T-180-57 Method)	D			D
Dry to Wet or Wet to Dry	WET TO DRY			WET TO DRY
Max. Dry Density (P.C.F.)	105.2			101.8
Optimum Moisture (%)	22.3			24.1

REMARKS:

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

Date 6-22-72 By B.T.

PROPOSED DEVELOPMENT - WAIAWA INDUSTRIAL PARK

TABLE IC - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	8	10	11	11
SAMPLE NO.	C	A		C
DEPTH BELOW SURFACE	10'-11.5'	0.5'-1.5'	SURFACE	10'-11'
DESCRIPTION	MOTTLED BROWN SILTY CLAY W/DECOMP. ROCK	BROWN SILTY CLAY	BROWN CLAY W/GRAVEL	BROWN CLAYEY SILT
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	61	58	41	68
Plastic Limit	32	33	21	38
Plasticity Index	29	25	20	30
Dilatancy	NONE-SLOW	SLOW-MED.	MEDIUM	SLOW-MED.
Toughness	MED.-HIGH	MED.-HIGH	MEDIUM	MED.-HIGH
Dry Strength	MED.-HIGH	MED.-HIGH	MEDIUM	MEDIUM
UNIFIED SOIL CLASSIFICATION	MH	MH	CL	MH
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS				
(Surcharge-51 P.S.F.)				
Molding Moisture, %			15.1	
Molding Dry Density, P.C.F.			110.4	
Swell upon saturation, %			0.4	
CBR at 0.1" Penetration			45.2	
MOISTURE-DENSITY RELATIONS OF SOILS				
(AASHTO T-180-57 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 6-22-72 By BT

PROPOSED DEVELOPMENT - WAIANA INDUSTRIAL PARK

TABLE I-D - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	13	13	15
SAMPLE NO.		C	
DEPTH BELOW SURFACE	SURFACE	10'-11.5'	SURFACE
DESCRIPTION	BROWN SILTY SAND W/ GRAVEL	DARK BROWN SILTY CLAY	BROWN SANDY SILT W/ GRAVEL
GRAIN-SIZE ANALYSIS			
(% Passing)			
Sieve 1/2"	97.5		90.2
1"	89.0		84.8
1/2"	80.2		79.2
#4	70.7		74.1
#10	63.3		70.2
#20	55.0		65.5
#40	48.8		62.3
#100	36.0		56.8
#200	34.4		54.9
ATTERBERG LIMITS			
Air Dried or Natural		NATURAL	NATURAL
Liquid Limit		66	52
Plastic Limit		35	30
Plasticity Index		31	22
Dilatancy		NONE-SLOW	MED.-QUICK
Toughness		MED.-HIGH	MEDIUM
Dry Strength		MEDIUM	MEDIUM
UNIFIED SOIL CLASSIFICATION	SM	MH	MH
APPARENT SPECIFIC GRAVITY			
EXPANSION AND CBR TESTS			
(Surcharge-51 P.S.F.)			
Molding Moisture, %	19.2		20.6
Molding Dry Density, P.C.F.	105.9		105.9
Swell upon saturation, %	NIL		1.7
CBR at 0.1" Penetration	6.6		12.0
MOISTURE-DENSITY RELATIONS OF SOILS			
(AASHTO T-180-57 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 6-22-72 By WJ.

PROPOSED DEVELOPMENT-WAIAWA INDUSTRIAL PARK

TABLE I E - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	15	15	17
SAMPLE NO.	B (TOP)	C	
DEPTH BELOW SURFACE	5'-6.5'	10'-11.5'	SURFACE
DESCRIPTION	REDDISH-BROWN CLAYEY SILT W/DECOMP. ROCK	LIGHT BROWN SANDY SILT W/TRACES OF ROCK FRAGS.	BROWN CLAYEY GRAVEL W/SAND & CORAL
GRAIN-SIZE ANALYSIS			
(% Passing)			
Sieve 1 1/2"			96.5
1"			83.9
1/2"			68.8
#4			54.3
#10			46.1
#20			40.6
#40			36.8
#100			30.8
#200			29.4
ATTERBERG LIMITS			
Air Dried or Natural	NATURAL	NATURAL	NATURAL
Liquid Limit	58	55	45
Plastic Limit	34	39	25
Plasticity Index	24	16	20
Dilatancy	MEDIUM	MED-QUICK	MEDIUM
Toughness	MED-HIGH	MEDIUM	MEDIUM
Dry Strength	MEDIUM	SLIGHT-MED	MEDIUM
UNIFIED SOIL CLASSIFICATION	MH	MH	GC
APPARENT SPECIFIC GRAVITY			
EXPANSION AND CBR TESTS			
(Surcharge-51 P.S.F.)			
Molding Moisture, %			14.3
Molding Dry Density, P.C.F.			119.5
Swell upon saturation, %			0.4
CBR at 0.1" Penetration			66.3
MOISTURE-DENSITY RELATIONS OF SOILS			
(AASHTO T-180-57 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 6-22-72 By B.T.

PROPOSED DEVELOPMENT-WAIAWA INDUSTRIAL PARK

TABLE 1F - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	18	18	18	
SAMPLE NO.	A	C	F (TOP)	
DEPTH BELOW SURFACE	1'-2'	10'-11.5'	25'-26.5'	
DESCRIPTION	MOTTLED BROWN CLAYEY SILT & DECOMP. ROCK	BROWN SILTY CLAY WIDECOMP. ROCK & SAND	MOTTLED BROWN DECOMP. ROCK (SOME CRUSHES TO CLAYEY SILT)	
GRAIN-SIZE ANALYSIS (% Passing)				
Sieve				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL	NATURAL	
Liquid Limit	52	76	62	
Plastic Limit	36	39	42	
Plasticity Index	16	37	20	
Dilatancy	MEDIUM	MEDIUM	MEDIUM	
Toughness	MEDIUM	MED-HIGH	MEDIUM	
Dry Strength	MEDIUM	MEDIUM	SLIGHT-MED	
UNIFIED SOIL CLASSIFICATION	MH	MH	MH	
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS (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-180-57 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 6-22-72

By R.T.

PROPOSED DEVELOPMENT - WAIKAWA INDUSTRIAL PARK

TABLE 1G - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	20	20	22	22
SAMPLE NO.		C	B	E
DEPTH BELOW SURFACE	SURFACE	10'-11.5'	5'-6.5'	20'-21.5'
DESCRIPTION	BROWN SILTY GRAVEL W/ SAND	MOTTLED BROWN CLAYEY SILT W/ DECOMP. ROCK & TRACES OF RIVER GRAVEL	LIGHT BROWN CLAYEY SILT W/ DECOMP. ROCK	BROWN CLAYEY SILT W/ DECOMP. ROCK
GRAIN-SIZE ANALYSIS				
(% Passing)				
Sieve 1/2"	65.3			
1"	57.8			
1/2"	51.0			
#4	43.6			
#10	39.6			
#20	36.1			
#40	33.7			
#100	30.7			
#200	29.0			
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL	NATURAL	NATURAL
Liquid Limit	63	70	67	63
Plastic Limit	38	37	42	42
Plasticity Index	25	33	25	21
Dilatancy	MED.-QUICK	MEDIUM	QUICK	MEDIUM
Toughness	MEDIUM	MED.-HIGH	SLIGHT-MED.	MEDIUM
Dry Strength	SLIGHT-MED.	SLIGHT-MED.	SLIGHT-MED.	MED.-HIGH
UNIFIED SOIL CLASSIFICATION				
	GM	MH	MH	MH
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS				
(Surcharge-51 P.S.F.)				
Molding Moisture, %	23.8			
Molding Dry Density, P.C.F.	101.9			
Swell upon saturation, %	0.7			
CBR at 0.1" Penetration	12.2			
MOISTURE-DENSITY RELATIONS OF SOILS				
(AASHTO T-180-57 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 6-22-72

By B.T.

PROPOSED DEVELOPMENT - WAIAWA INDUSTRIAL PARK

TABLE I H - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	<u>23</u>	<u>28</u>	<u>29</u>	<u>29</u>
SAMPLE NO.	<u>A</u>	<u>B</u>		<u>B</u>
DEPTH BELOW SURFACE	<u>1'-2.5'</u>	<u>5'-6.5'</u>	<u>SURFACE</u>	<u>5'-6.5'</u>
DESCRIPTION	<u>REDDISH-BROWN CLAYEY SILT</u>	<u>DARK BROWN SILTY CLAY</u>	<u>REDDISH-BROWN SILTY CLAY</u>	<u>BROWN CLAYEY SILT</u>
GRAIN-SIZE ANALYSIS				
(% Passing)				
Sieve				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	<u>NATURAL</u>	<u>NATURAL</u>	<u>NATURAL</u>	<u>NATURAL</u>
Liquid Limit	<u>60</u>	<u>73</u>	<u>56</u>	<u>59</u>
Plastic Limit	<u>35</u>	<u>36</u>	<u>31</u>	<u>37</u>
Plasticity Index	<u>25</u>	<u>37</u>	<u>25</u>	<u>22</u>
Dilatancy	<u>MED.-QUICK</u>	<u>SLOW-MED</u>	<u>NONE-SLOW</u>	<u>MEDIUM</u>
Toughness	<u>MEDIUM</u>	<u>MED.-HIGH</u>	<u>MED.-HIGH</u>	<u>MEDIUM</u>
Dry Strength	<u>MEDIUM</u>	<u>MEDIUM</u>	<u>MED.-HIGH</u>	<u>MEDIUM</u>
UNIFIED SOIL CLASSIFICATION	<u>MH</u>	<u>MH</u>	<u>MH</u>	<u>MH</u>
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS				
(Surcharge-51 P.S.F.)				
Molding Moisture, %			<u>26.3</u>	
Molding Dry Density, P.C.F.			<u>94.9</u>	
Swell upon saturation, %			<u>4.3</u>	
CBR at 0.1" Penetration			<u>3.9</u>	
MOISTURE-DENSITY RELATIONS OF SOILS				
(AASHTO T-180-57 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 6-22-72 By WJ

PROPOSED DEVELOPMENT - WAIKAWA INDUSTRIAL PARK

TABLE IJ - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	30	31	35	36
SAMPLE NO.		A	C	
DEPTH BELOW SURFACE	SURFACE	1.5'-3'	10'-11.5'	SURFACE
DESCRIPTION	REDDISH-BROWN CLAYEY SILT W/DECOMP. ROCK	BROWN CLAYEY SILT & DECOMP. ROCK W/ROCK FRAGS	MOTTLED BROWN CLAYEY SILT W/DECOMP. ROCK	REDDISH-BROWN CLAYEY SILT W/DECOMP. ROCK & GRAVEL
GRAIN-SIZE ANALYSIS				
(% Passing)				
Sieve				
1"	100			96.5
1/2"	91.8			91.1
#4	88.0			84.4
#10	85.3			77.8
#20	83.6			70.8
#40	81.4			66.0
#100	78.0			59.0
#200	76.5			56.8
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL	NATURAL	NATURAL
Liquid Limit	60	64	65	50
Plastic Limit	35	38	40	31
Plasticity Index	25	26	25	19
Dilatancy	MEDIUM	SLOW-MED	MEDIUM	MED.-QUICK
Toughness	MED.-HIGH	MED.-HIGH	MED.-HIGH	SLIGHT-MED.
Dry Strength	MEDIUM	SLIGHT-MED.	SLIGHT-MED.	SLIGHT-MED.
UNIFIED SOIL CLASSIFICATION				
	MH	MH	MH	ML-MH
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS				
(Surcharge-51 P.S.F.)				
Molding Moisture, %	29.6			23.8
Molding Dry Density, P.C.F.	94.8			101.8
Swell upon saturation, %	0.8			0.4
CBR at 0.1" Penetration	10.8			16.5
MOISTURE-DENSITY RELATIONS OF SOILS				
(AASHTO T-180-57 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 6-22-72 By R.T.

PROPOSED DEVELOPMENT-WAIAWA INDUSTRIAL PARK

TABLE IK - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	<u>37</u>	<u>38</u>	<u>39</u>	
SAMPLE NO.	<u>A</u>	<u>D (TOP)</u>		
DEPTH BELOW SURFACE	<u>1'-2.5'</u>	<u>15'-16.5'</u>	<u>SURFACE</u>	
DESCRIPTION	<u>BROWN SILTY CLAY</u>	<u>BROWN SILTY CLAY W/DECOMP. ROCK</u>	<u>BROWN SANDY SILT W/GRAVEL</u>	
GRAIN-SIZE ANALYSIS				
(% Passing)				
Sieve			<u>95.9</u>	
1"			<u>86.8</u>	
1/2"			<u>81.9</u>	
#4			<u>73.7</u>	
#10			<u>68.0</u>	
#20			<u>62.7</u>	
#40			<u>59.3</u>	
#100			<u>54.5</u>	
#200			<u>53.0</u>	
ATTERBERG LIMITS				
Air Dried or Natural	<u>NATURAL</u>	<u>NATURAL</u>	<u>NATURAL</u>	
Liquid Limit	<u>64</u>	<u>77</u>	<u>59</u>	
Plastic Limit	<u>33</u>	<u>37</u>	<u>35</u>	
Plasticity Index	<u>31</u>	<u>40</u>	<u>24</u>	
Dilatancy	<u>NONE</u>	<u>MEDIUM</u>	<u>MEDIUM</u>	
Toughness	<u>MED.-HIGH</u>	<u>MEDIUM</u>	<u>MEDIUM</u>	
Dry Strength	<u>HIGH</u>	<u>MED.-HIGH</u>	<u>MEDIUM</u>	
UNIFIED SOIL CLASSIFICATION	<u>MH</u>	<u>MH</u>	<u>MH</u>	
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS				
(Surcharge-51 P.S.F.)				
Molding Moisture, %			<u>30.6</u>	
Molding Dry Density, P.C.F.			<u>92.3</u>	
Swell upon saturation, %			<u>0.7</u>	
CBR at 0.1" Penetration			<u>6.6</u>	
MOISTURE-DENSITY RELATIONS OF SOILS				
(AASHTO T-180-57 Method <u> </u>)				
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 6-22-72 By BT

PROPOSED DEVELOPMENT - WAIAWA INDUSTRIAL PARK

TABLE I.L - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	40	40	42	43
SAMPLE NO.	B	D	D	
DEPTH BELOW SURFACE	5'-6.5'	15'-16.5'	15'-16.5'	SURFACE
DESCRIPTION	REDDISH-BROWN CLAY WIDECOMP. ROCK	BROWN CLAYEY SILT	MOTTLED BROWN CLAYEY SILT WIDECOMP. ROCK	TAN CLAYEY SAND & CORAL
GRAIN-SIZE ANALYSIS				
(% Passing)				
Sieve				
1"				90.7
1/2"				79.1
#4				66.6
#10				59.1
#20				53.8
#40				50.3
#100				37.3
#200				32.5
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL	NATURAL	NATURAL
Liquid Limit	78	56	53	27
Plastic Limit	34	37	41	19
Plasticity Index	44	19	12	8
Dilatancy	NONE-SLOW	MEDIUM	MED-QUICK	QUICK
Toughness	MED.-HIGH	MEDIUM	SLIGHT-MED.	SLIGHT
Dry Strength	HIGH	MEDIUM	SLIGHT-MED.	SLIGHT-MED.
UNIFIED SOIL CLASSIFICATION	CH	MH	MH	SC
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS				
(Surcharge-51 P.S.F.)				
Molding Moisture, %				15.3
Molding Dry Density, P.C.F.				111.3
Swell upon saturation, %				NIL
CBR at 0.1" Penetration				7.0
MOISTURE-DENSITY RELATIONS OF SOILS				
(AASHTO T-180-57 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 6-22-72 By BT

PROPOSED DEVELOPMENT-WAIAWA INDUSTRIAL PARK

TABLE I M - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	47	49	51	51
SAMPLE NO.		C		C
DEPTH BELOW SURFACE	SURFACE	10'-11.5'	SURFACE	15'-16.5'
DESCRIPTION	REDDISH-BROWN SILTY CLAY W/TRACES OF DECOMP. ROCK	DARK BROWN CLAYEY SILT W/SOME GRAVEL	GRAY-BROWN SILTY CLAY W/SAND & GRAVEL	MOTTLED BROWN CLAYEY SILT W/DECOMP. ROCK
GRAIN-SIZE ANALYSIS				
(% Passing)				
Sieve 1/2"	100		96.3	
1"	88.6		96.3	
1/2"	87.9		93.9	
#4	87.1		85.3	
#10	87.0		78.4	
#20	86.7		73.0	
#40	86.1		69.5	
#100	85.0		64.2	
#200	84.6		62.9	
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL	NATURAL	NATURAL
Liquid Limit	58	60	61	74
Plastic Limit	34	38	36	45
Plasticity Index	24	22	25	29
Dilatancy	MEDIUM	MEDIUM	MEDIUM	MED.-QUICK
Toughness	MEDIUM	MEDIUM	MED.-HIGH	MEDIUM
Dry Strength	MED.-HIGH	MEDIUM	MED.-HIGH	SLIGHT-MED.
UNIFIED SOIL CLASSIFICATION	MH	MH	MH	MH
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS				
(Surcharge-51 P.S.F.)				
Molding Moisture, %	30.2		30.7	
Molding Dry Density, P.C.F.	91.3		86.7	
Swell upon saturation, %	2.4		1.6	
CBR at 0.1" Penetration	6.1		9.8	
MOISTURE-DENSITY RELATIONS OF SOILS				
(AASHTO T-180-57 Method)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

REMARKS:

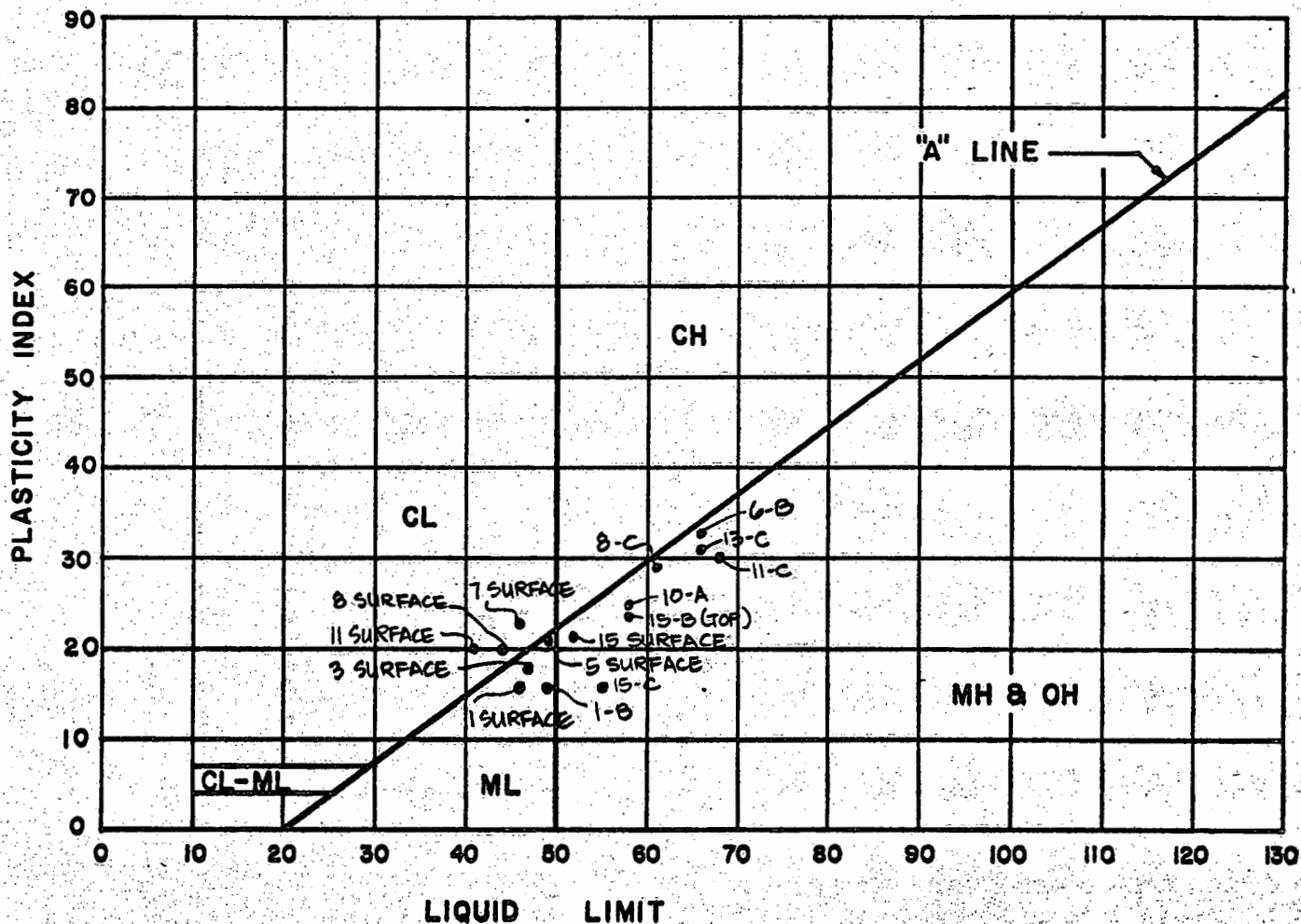
WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 6-22-72 By WJ

PLASTICITY CHART

PROJECT: PROPOSED DEVELOPMENT - WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII



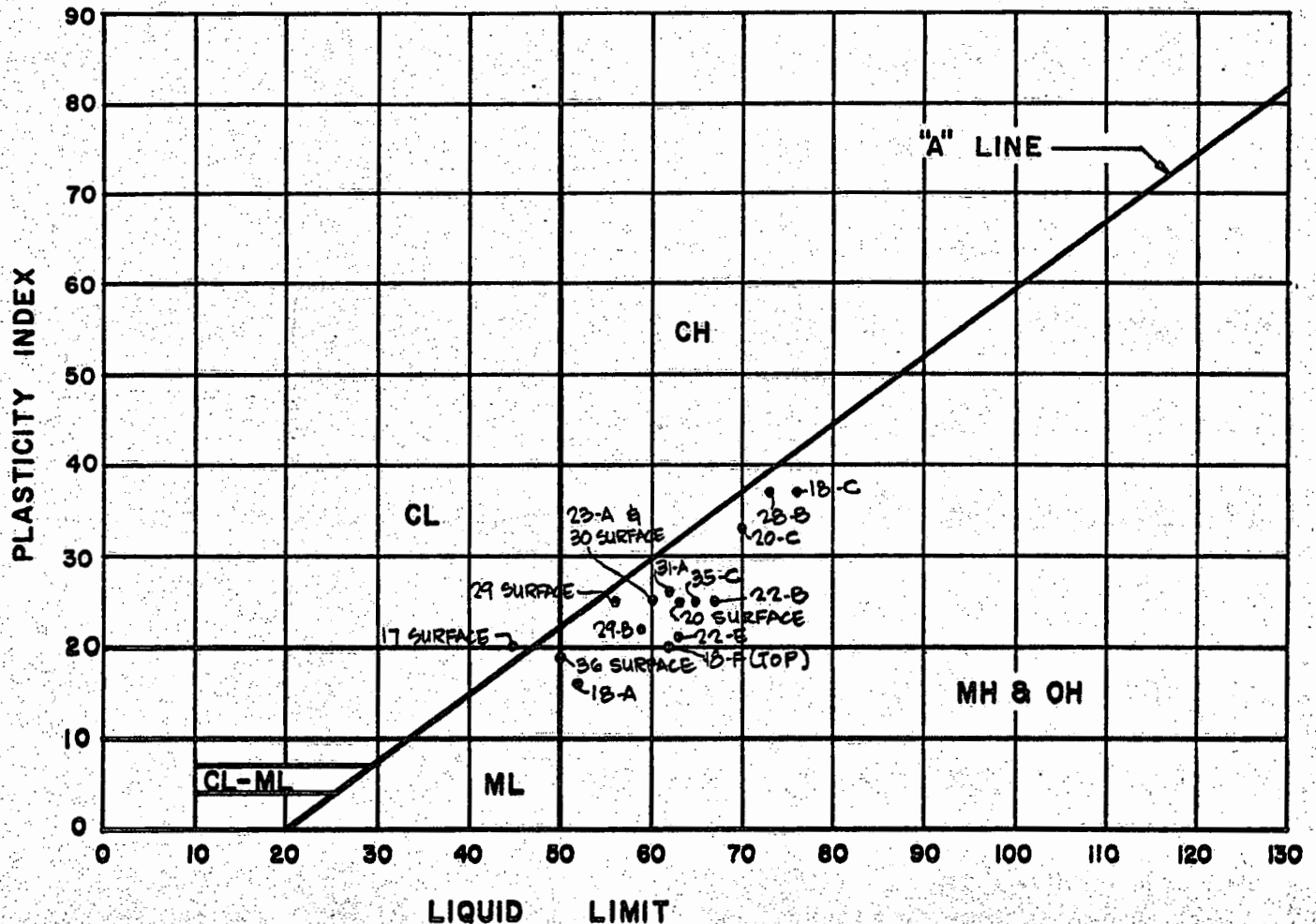
WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 6-22-72 BY P.T.

PLASTICITY CHART

PROJECT: PROPOSED DEVELOPMENT - WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII



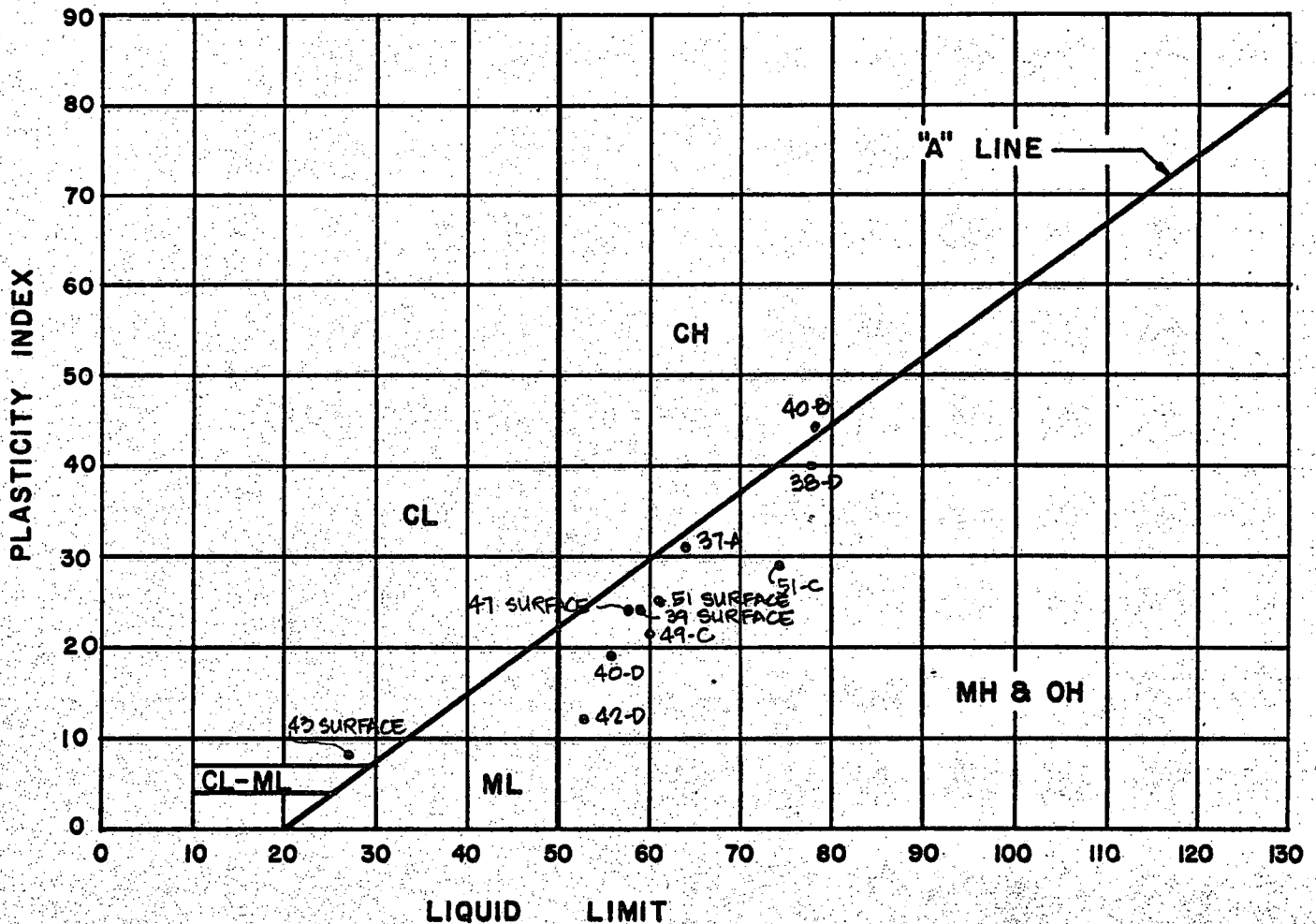
WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 6-22-72 BY BJT

PLASTICITY CHART

PROJECT: PROPOSED DEVELOPMENT - WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII



DATE 6-22-72 BY BT.

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

MOISTURE-DENSITY CURVE (AASHO T-180-57, METHOD D)

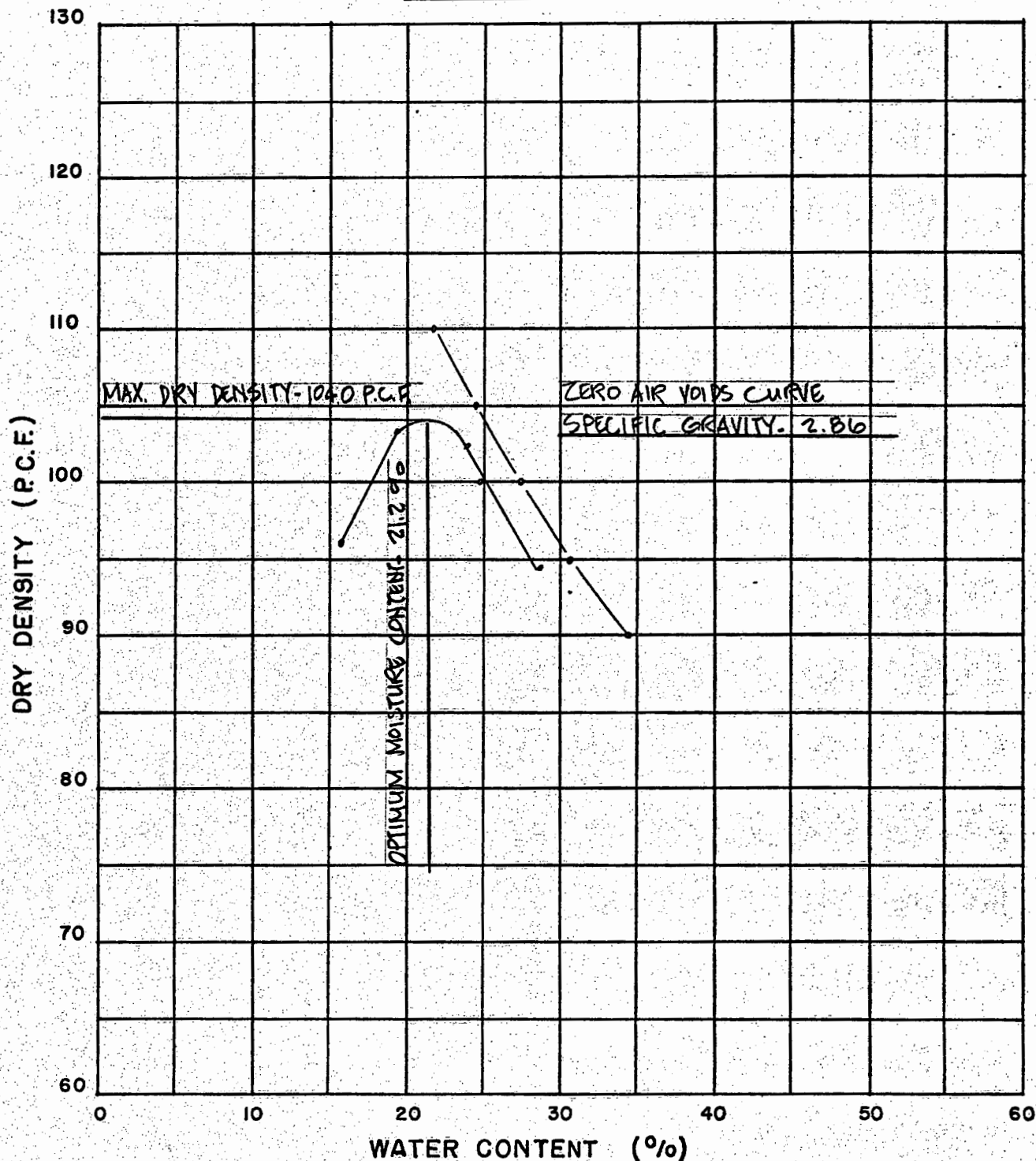
PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO.: 1 SURFACE

SAMPLE DESCRIPTION: BROWN CLAYEY SILT W/DECOMP.
ROCK & TRACES OF CORAL

AGGREGATE: 3/4" MINUS
MOLD SIZE: 6" x 9.5" HIGH
HAMMER: 10 LBS., 18" DROP
LAYERS: 5
BLOWS: 56/LAYER



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

DATE 4-21-72 BY SK

MOISTURE-DENSITY CURVE (AASHTO T-180-57, METHOD D)

PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK

AGGREGATE: 3/4" MINUS

LOCATION: WAIAWA, EWA, OAHU, HAWAII

MOLD SIZE: 10" ϕ 4.59" HIGH

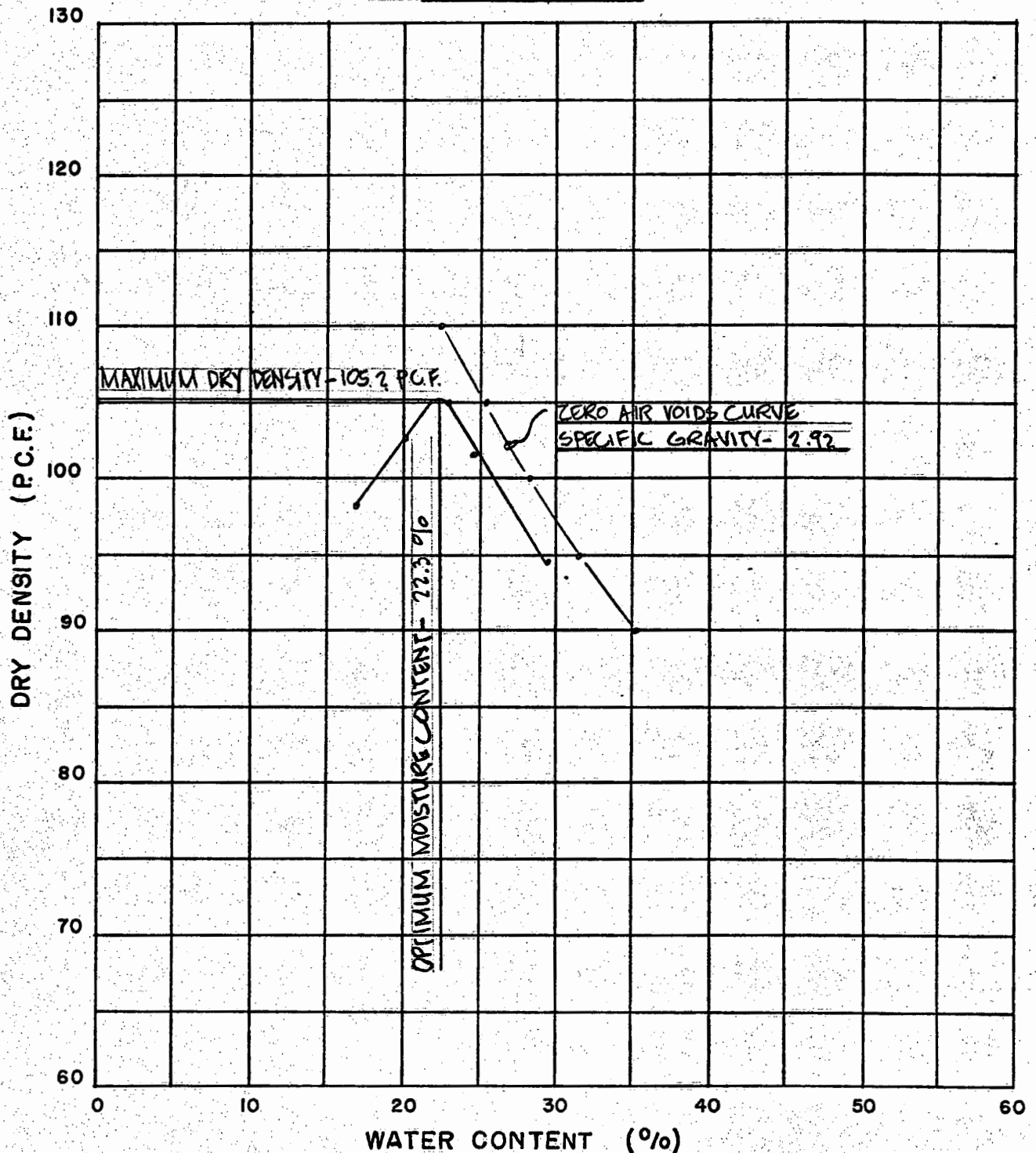
SAMPLE NO.: 5 SURFACE

HAMMER: 10 LBS, 18" DROP

SAMPLE DESCRIPTION: BROWN SILTY CLAY W/SAND,
GRAVEL & CORAL

LAYERS: 5

BLOWS: 56/LAYER



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

DATE 4-27-72 BY SK

MOISTURE-DENSITY CURVE (AASHTO T-180-57, METHOD D)

PROJECT: PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO.: B SURFACE

SAMPLE DESCRIPTION: BROWN CLAY W/ GRAVEL & CORAL

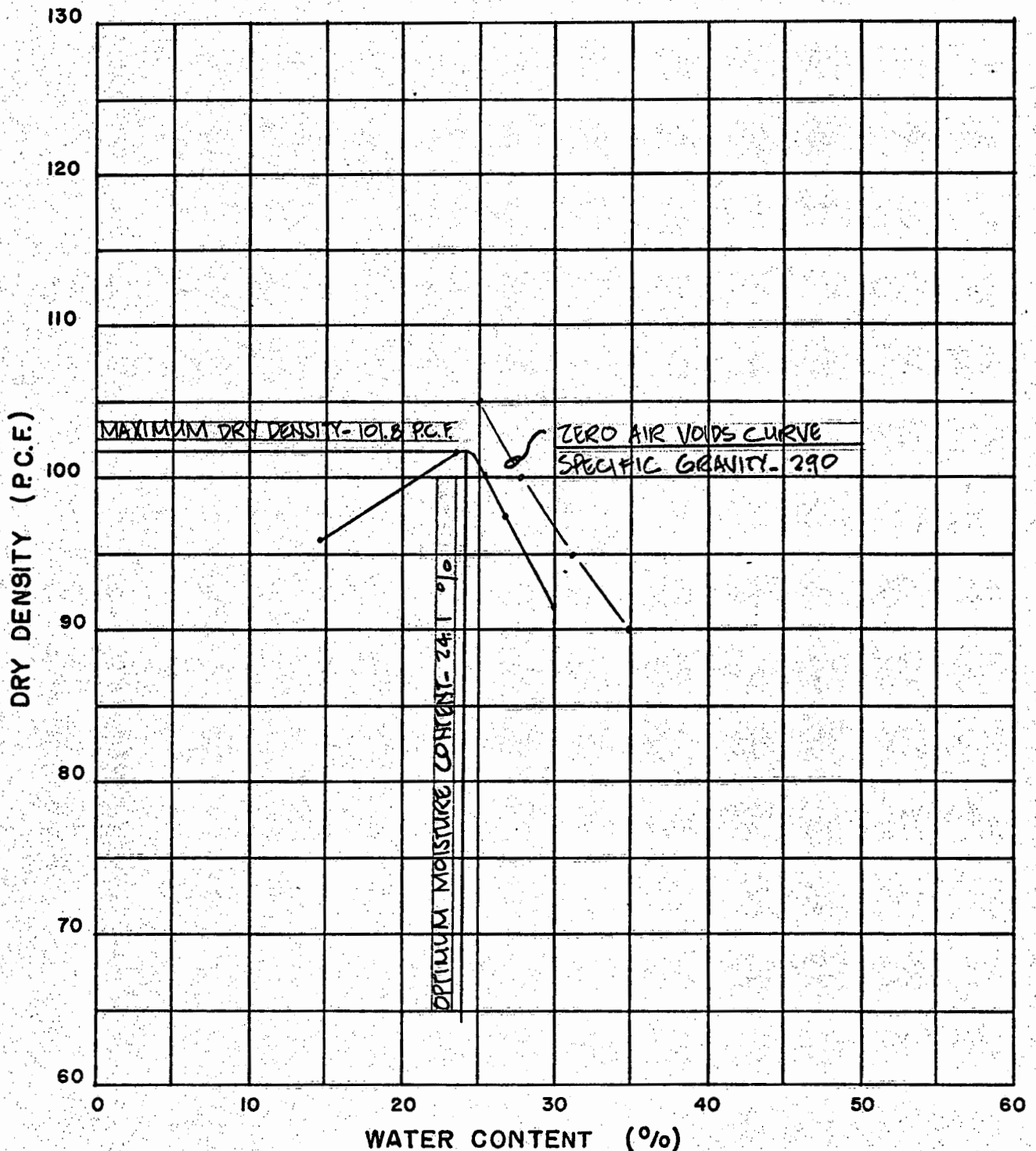
AGGREGATE: 3/4" MINUS

MOLD SIZE: 6" x 4.5" HIGH

HAMMER: 10 LBS, 18" DROP

LAYERS: 5

BLOWS: 56/LAYER

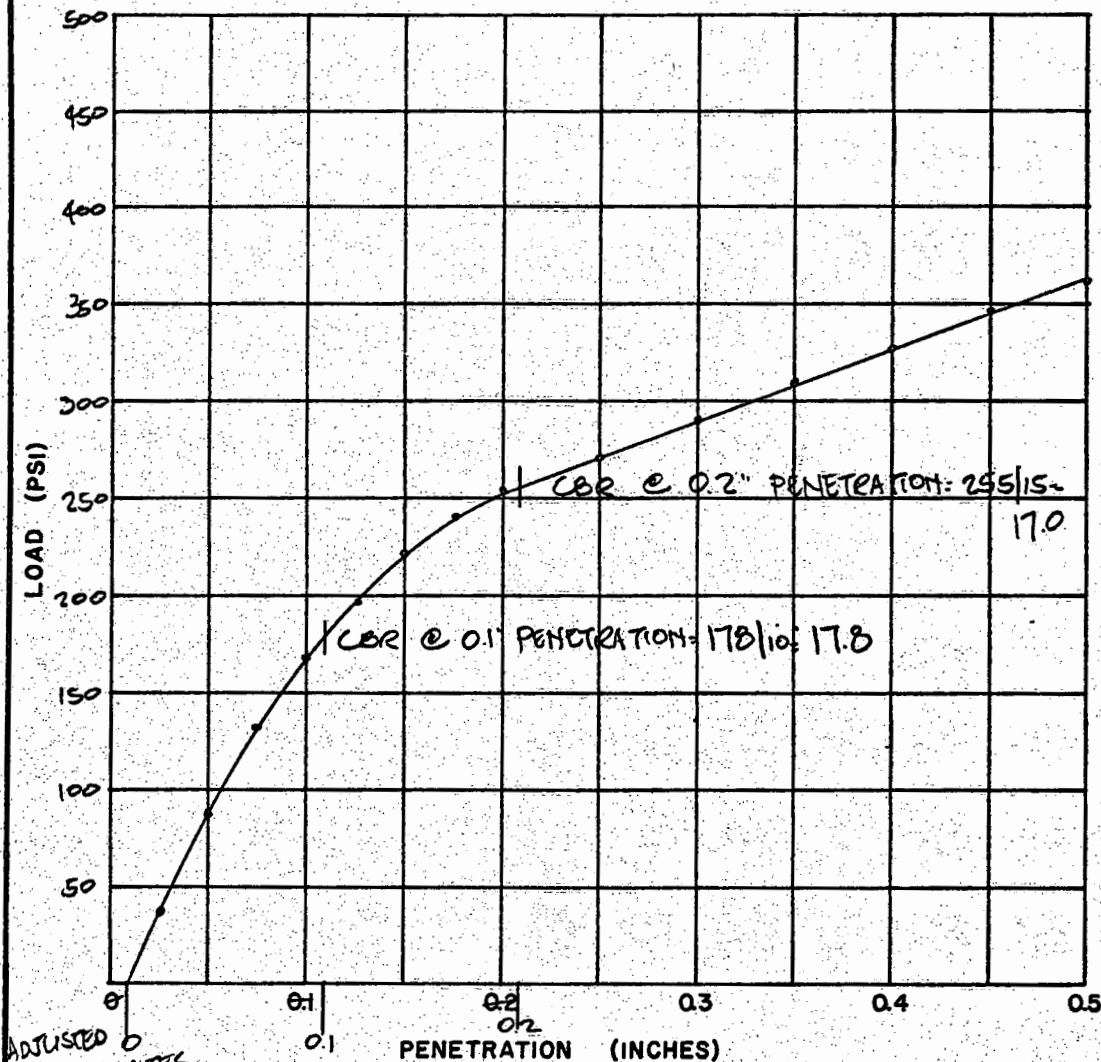


WALTER LUM ASSOCIATES, INC.
 CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 4-24-72 BY SK

CBR TEST

PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK
 LOCATION: WAIAWA, EWA, OAHU, HAWAII
 SAMPLE NO: 1 SURFACE
 SAMPLE DESCRIPTION: BROWN CLAYEY SILT W/DECOMPOSED ROCK
& TRACES OF CORAL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	110	37
0.050	265	88
0.075	400	133
0.100	510	170
0.125	590	197
0.150	665	222
0.175	725	242
0.200	760	253
0.250	815	272
0.300	870	290
0.350	930	310
0.400	985	328
0.450	1040	347
0.500	1085	362

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

TEST RESULTS:

MOLDING MOISTURE, % 23.9
 MOLDING DRY DENSITY, P.C.F. 102.6
 CBR @ 0.1" PENETRATION 17.8
 DAYS SOAKED 5

DATE 4-17-72 BY BH
 DATE 4-24-72 BY SK

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

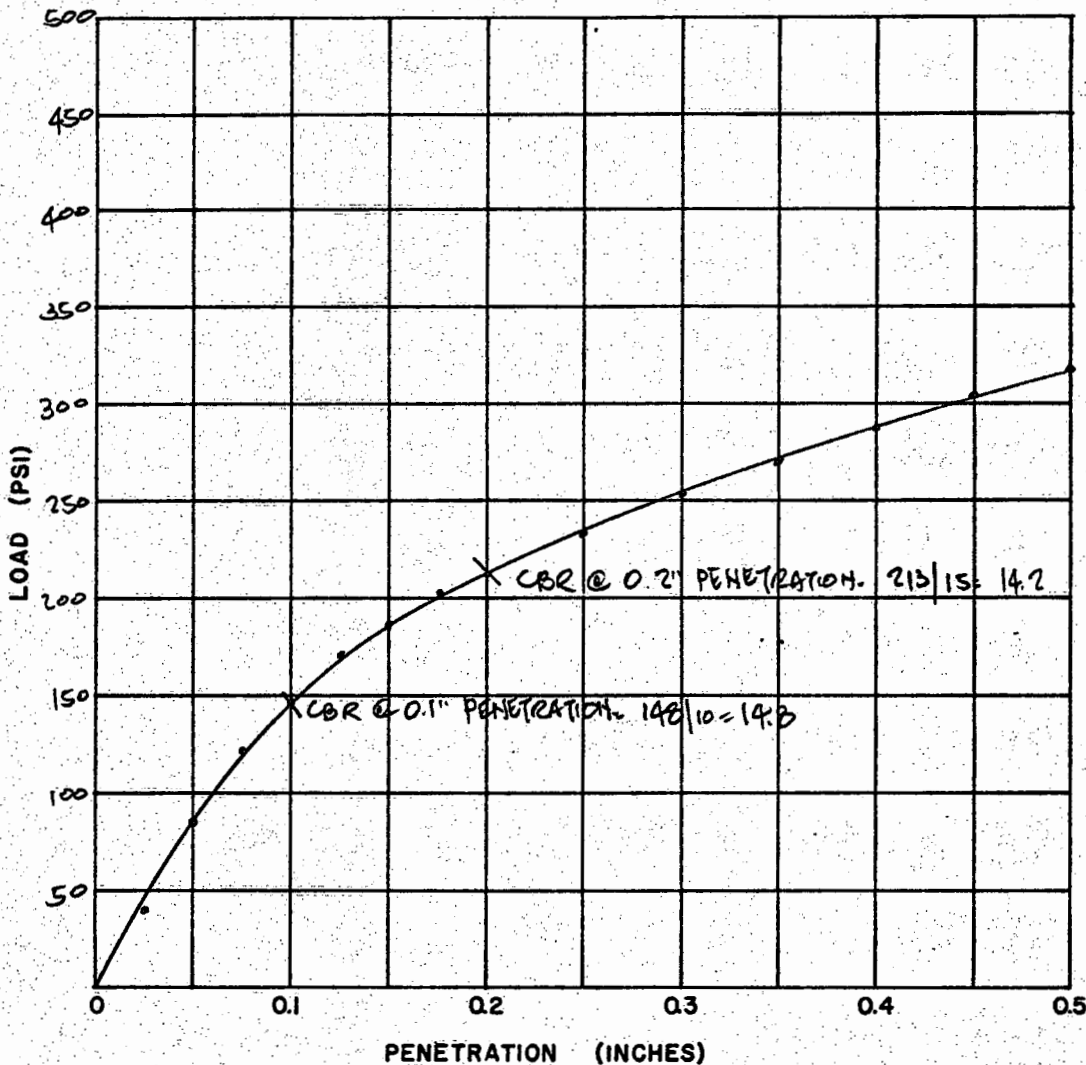
CBR TEST

PROJECT: PROPOSED DEVELOPMENT-
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: 3 SURFACE

SAMPLE DESCRIPTION: BROWN CLAYEY SILT W/DECOMP. ROCK,
GRAVEL & CORAL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	120	40
0.050	255	85
0.075	305	122
0.100	445	148
0.125	515	172
0.150	565	188
0.175	606	202
0.200	635	212
0.250	700	233
0.300	755	252
0.350	810	270
0.400	865	288
0.450	910	303
0.500	955	318

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

TEST RESULTS:

MOLDING MOISTURE, %. 26.0

MOLDING DRY DENSITY, P.C.F. 98.0

CBR @ 0.1" PENETRATION 14.3

DAYS SOAKED 5

DATE 4-17-72 BY BS

DATE 4-24-72 BY SK

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

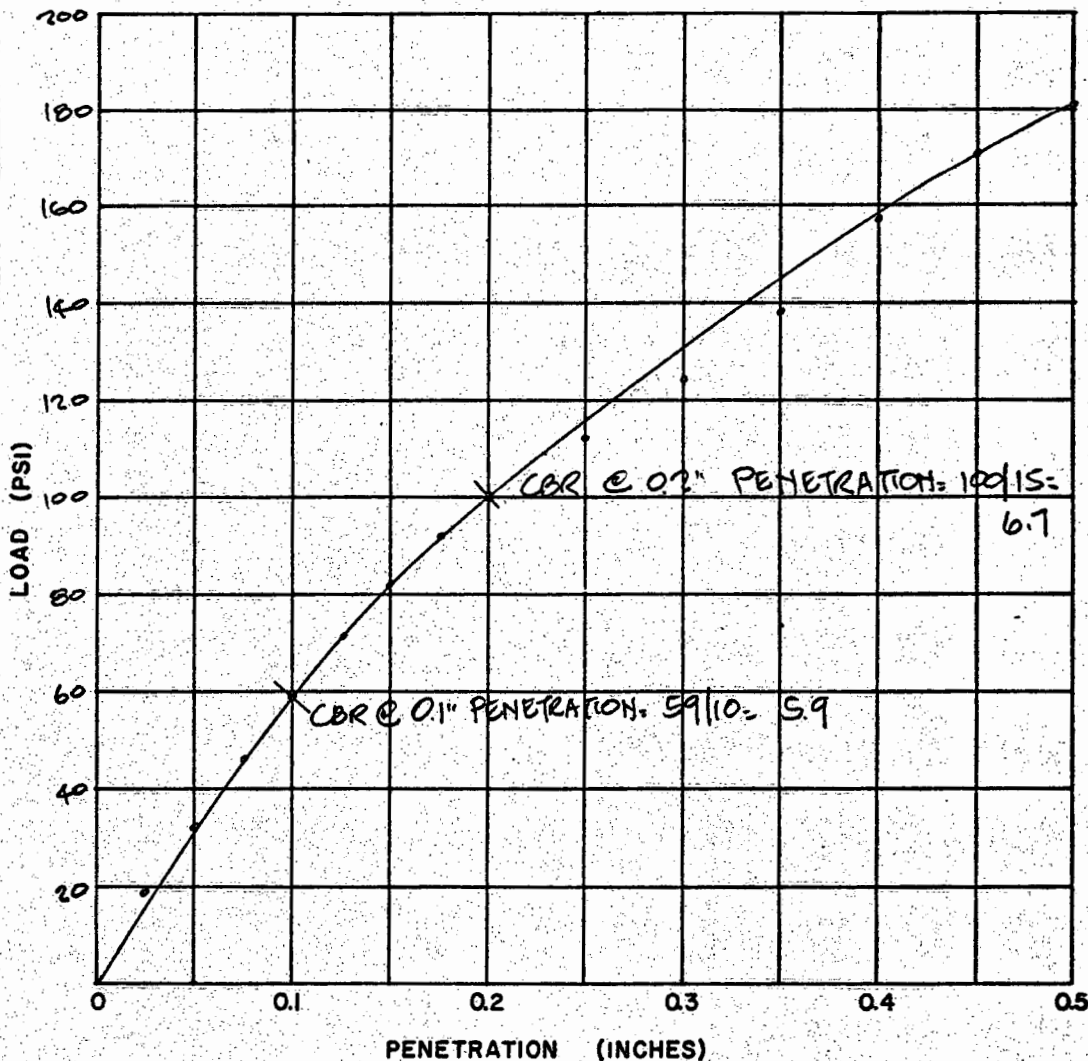
CBR TEST

PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: 5 SURFACE

SAMPLE DESCRIPTION: BROWN SILTY CLAY W/SAND,
GRAVEL & CORAL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	50	17
0.050	97	32
0.075	137	46
0.100	177	59
0.125	213	71
0.150	247	82
0.175	277	92
0.200	299	100
0.250	337	112
0.300	371	124
0.350	415	138
0.400	470	151
0.450	513	171
0.500	543	181

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

TEST RESULTS:

MOLDING MOISTURE, % 104.2
MOLDING DRY DENSITY, P.C.F. 22.4
CBR @ 0.1" PENETRATION 5.9
DAYS SOAKED 4

DATE 4-18-72 BY RG
DATE 4-24-72 BY SK

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

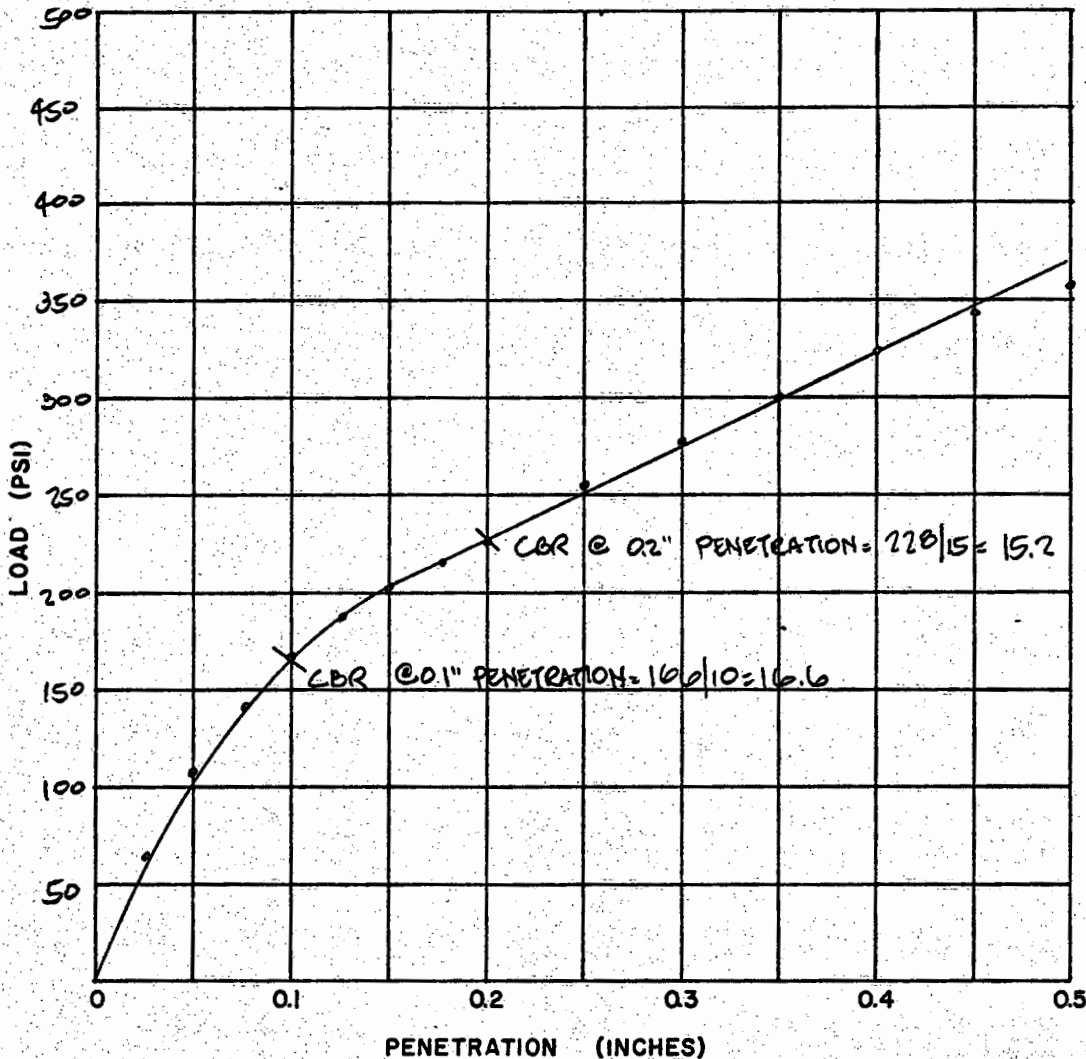
CBR TEST

PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: 7 SURFACE

SAMPLE DESCRIPTION: BROWN CLAY W/ GRAVEL & CORAL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	190	63
0.050	320	107
0.075	425	142
0.100	505	168
0.125	560	187
0.150	605	202
0.175	650	217
0.200	680	227
0.250	760	253
0.300	835	278
0.350	900	300
0.400	965	322
0.450	1025	342
0.500	1070	357

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

TEST RESULTS:

MOLDING MOISTURE, % 25.9
MOLDING DRY DENSITY, P.C.F. 98.7
CBR @ 0.1" PENETRATION 16.6
DAYS SOAKED 4

DATE 4-20-72 BY LT
DATE 4-25-72 BY SK

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

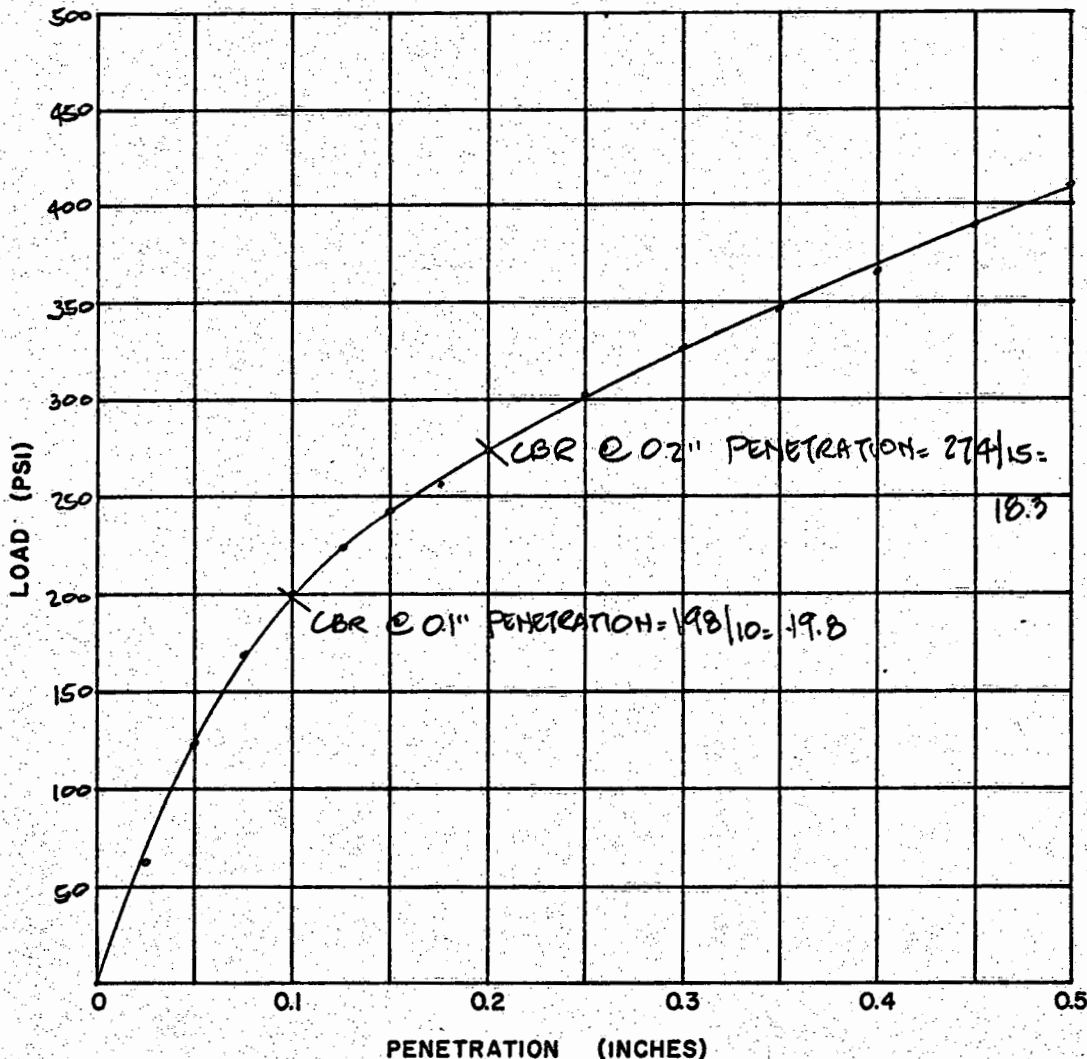
CBR TEST

PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: B SURFACE

SAMPLE DESCRIPTION: BROWN CLAY W/ GRAVEL & CORAL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	190	63
0.050	370	123
0.075	510	170
0.100	600	200
0.125	680	227
0.150	730	243
0.175	775	258
0.200	820	273
0.250	905	302
0.300	980	327
0.350	1040	347
0.400	1100	367
0.450	1170	390
0.500	1230	410

AGGREGATE 3/4" MINUS
HAMMER WEIGHT 10 LBS.
HAMMER DROP 18"
No. OF BLOWS 50 LAYER
No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, % 19.8
MOLDING DRY DENSITY, P.C.F. 105.5
CBR @ 0.1" PENETRATION 19.8
DAYS SOAKED 4

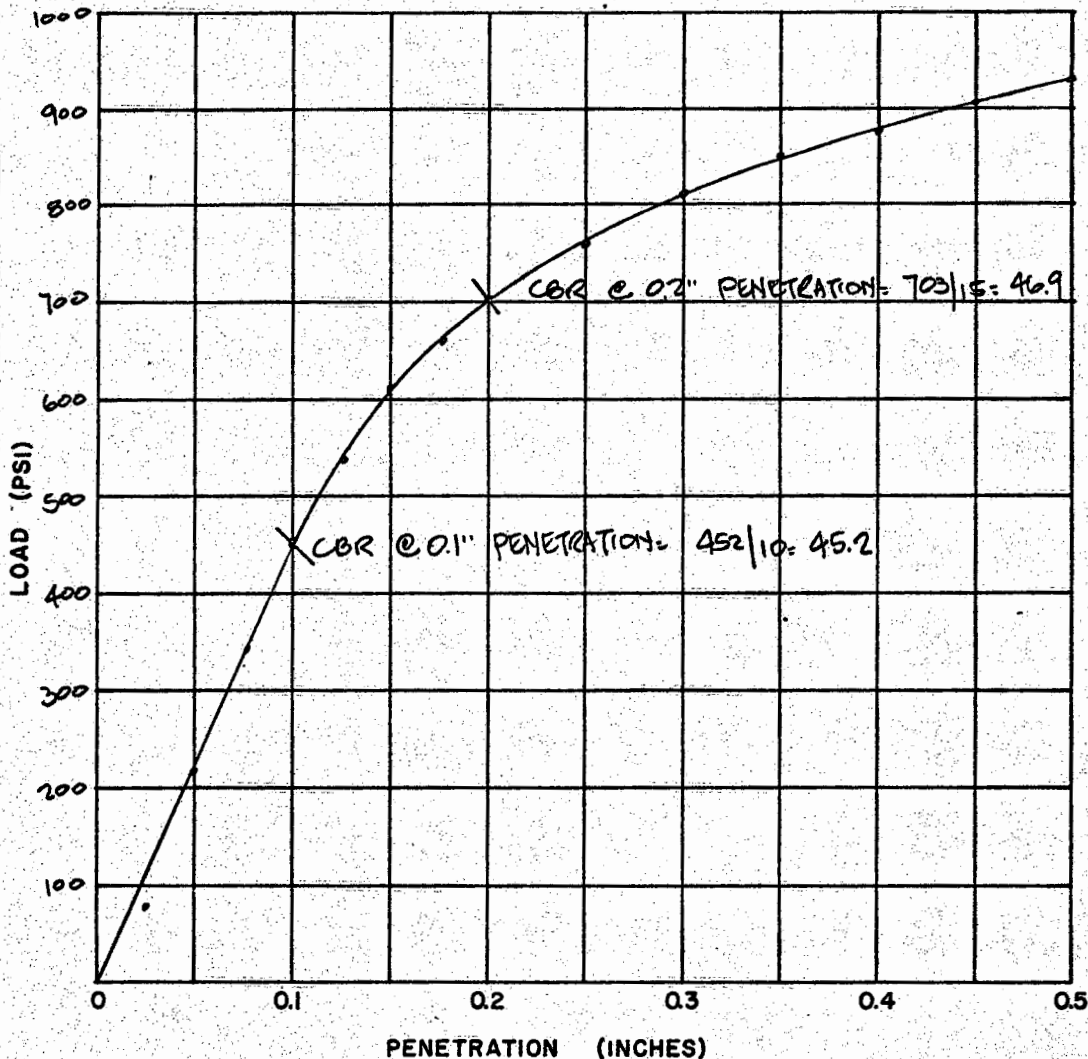
DATE 4-20-72 BY LT

DATE 4-25-72 BY SK

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

CBR TEST

PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK
 LOCATION: WAIAWA, EWA, OAHU, HAWAII
 SAMPLE NO: 11 SURFACE
 SAMPLE DESCRIPTION: BROWN CLAY W/ GRAVEL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	230	77
0.050	650	217
0.075	1030	343
0.100	1355	452
0.125	1610	537
0.150	1840	613
0.175	1980	660
0.200	2110	703
0.250	2280	760
0.300	2420	807
0.350	2550	850
0.400	2620	877
0.450	2715	905
0.500	2800	933

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

TEST RESULTS:

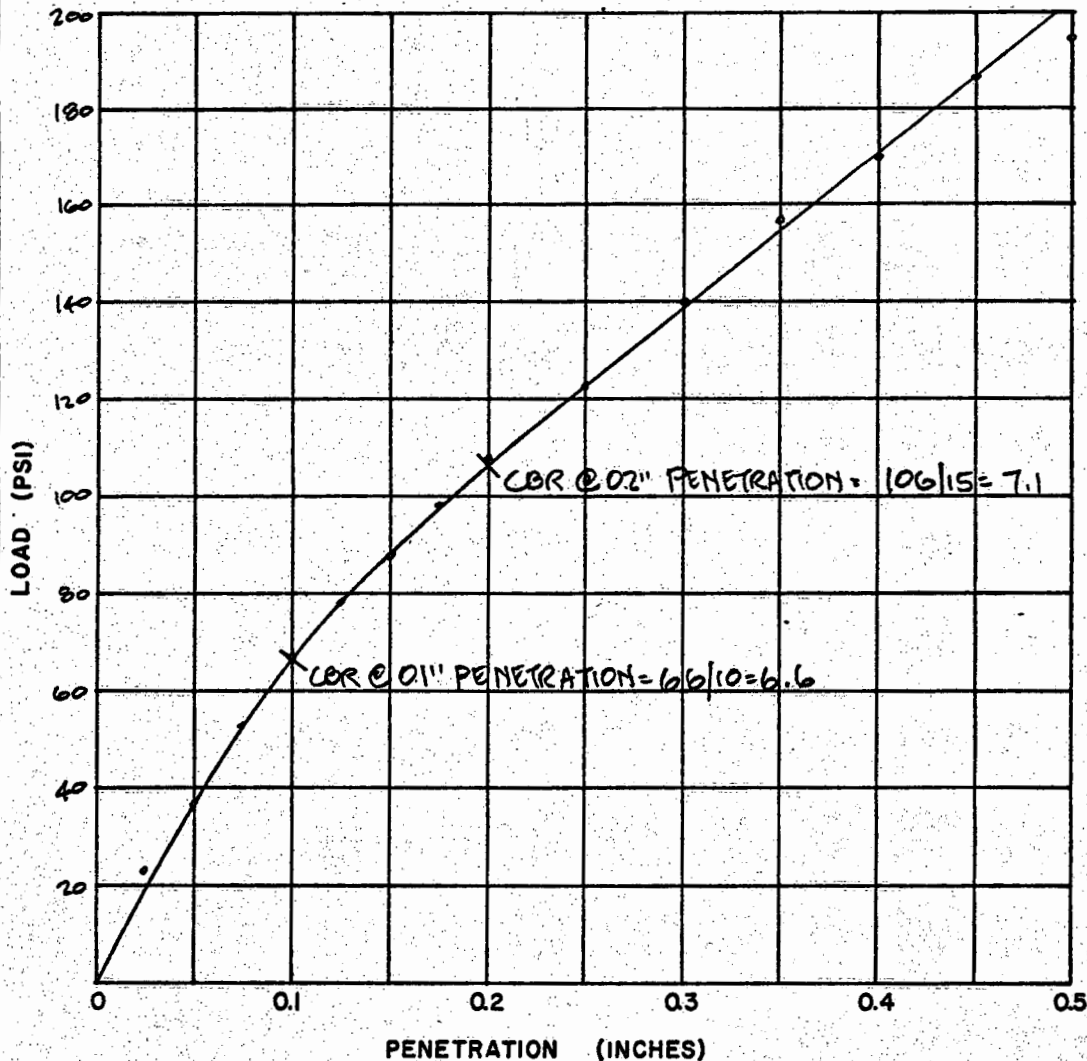
MOLDING MOISTURE, % 15.1
 MOLDING DRY DENSITY, P.C.F. 110.4
 CBR @ 0.1" PENETRATION 45.2
 DAYS SOAKED 4

DATE 4.18.72 BY LT
 DATE 4.24.72 BY SK

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

CBR TEST

PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK
 LOCATION: WAIAWA, EWA, OAHU, HAWAII
 SAMPLE NO: 13 SURFACE
 SAMPLE DESCRIPTION: BROWN SILTY SAND W/ GRAVEL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	70	23
0.050	110	37
0.075	160	53
0.100	200	67
0.125	235	78
0.150	265	88
0.175	295	98
0.200	325	108
0.250	370	123
0.300	420	140
0.350	470	157
0.400	510	170
0.450	550	183
0.500	585	195

AGGREGATE 3/4" MINUS
 HAMMER WEIGHT 10 LBS.
 HAMMER DROP 18"
 No. OF BLOWS 50/LAYER
 No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, % 19.2
 MOLDING DRY DENSITY, P.C.F. 105.9
 CBR @ 0.1" PENETRATION 6.6
 DAYS SOAKED 4

DATE 4-29-72 BY LT
 DATE 5-4-72 BY SK

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

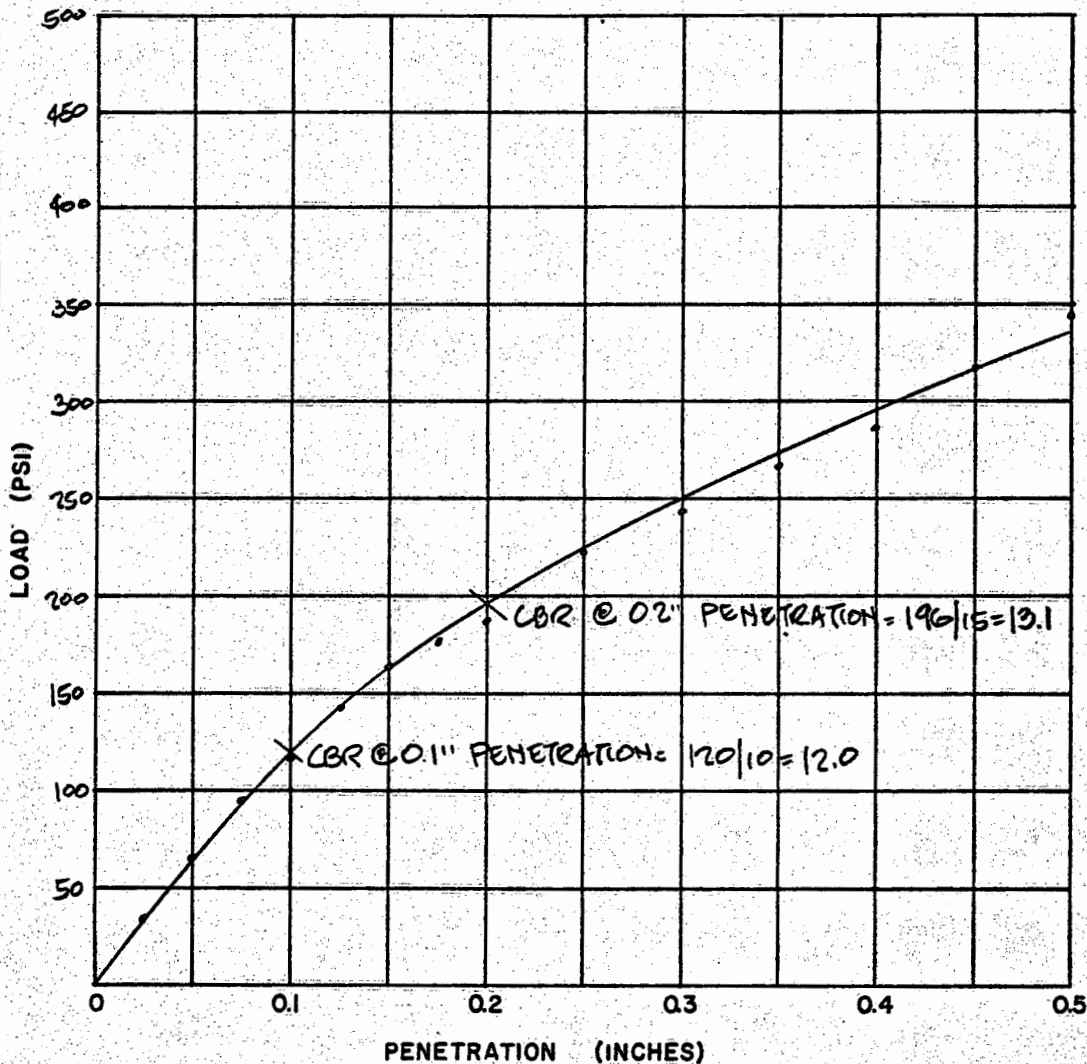
CBR TEST

PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: 15 SURFACE

SAMPLE DESCRIPTION: BROWN SANDY SILT W/ GRAVEL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	100	33
0.050	145	65
0.075	285	95
0.100	355	118
0.125	425	142
0.150	490	163
0.175	530	177
0.200	565	188
0.250	665	222
0.300	730	243
0.350	800	267
0.400	865	288
0.450	950	317
0.500	1030	343

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

TEST RESULTS:

MOLDING MOISTURE, % 20.6

MOLDING DRY DENSITY, P.C.F. 105.9

CBR @ 0.1" PENETRATION 12.0

DAYS SOAKED 4

DATE 4-29-72 BY FM

DATE 5-4-72 BY SK

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

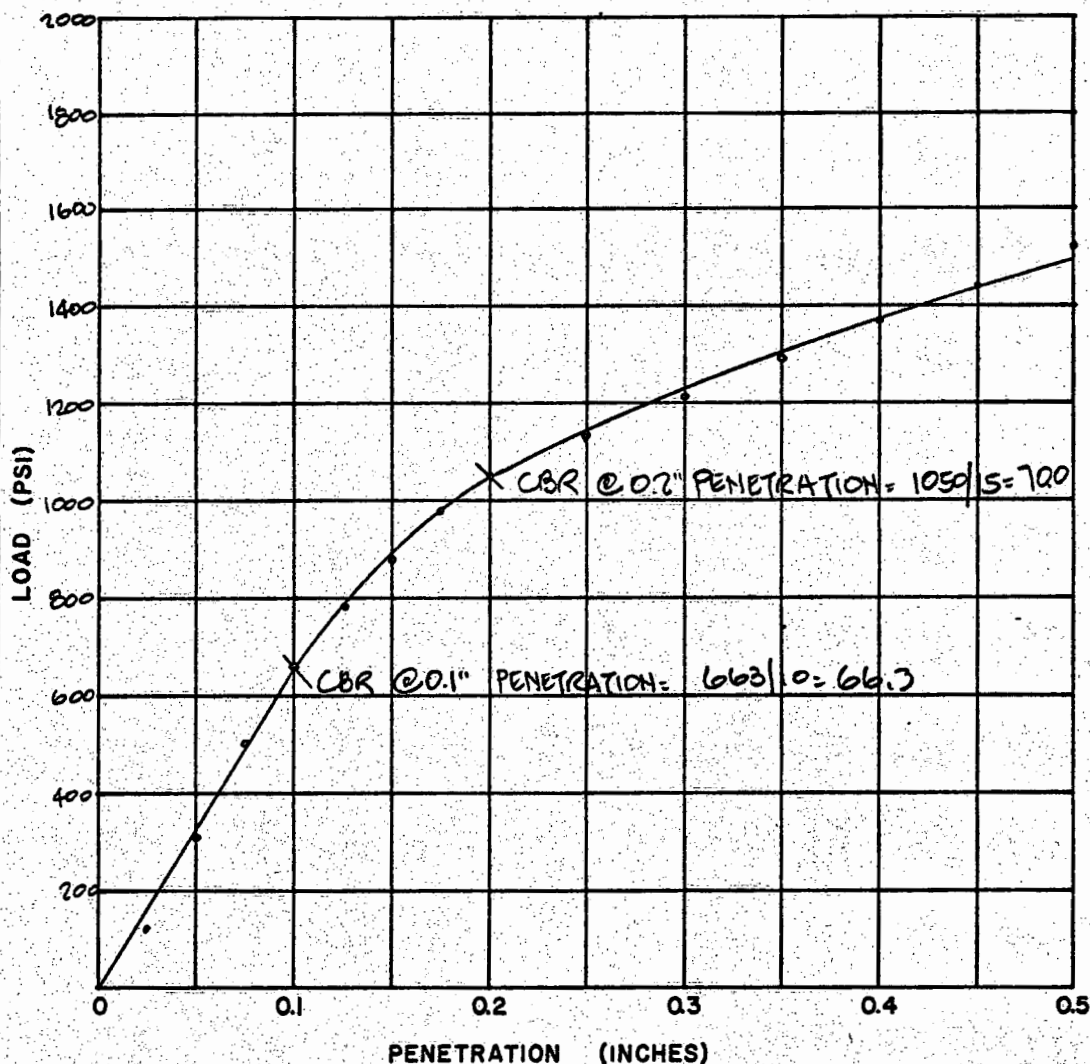
CBR TEST

PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: 17 SURFACE

SAMPLE DESCRIPTION: BROWN CLAYEY GRAVEL W/SAND & CORAL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	360	120
0.050	930	310
0.075	1520	507
0.100	1990	663
0.125	2360	787
0.150	2640	880
0.175	2940	980
0.200	3150	1050
0.250	3400	1133
0.300	3630	1210
0.350	3860	1287
0.400	4120	1373
0.450	4320	1440
0.500	4570	1523

AGGREGATE

HAMMER WEIGHT 10 LBS.

HAMMER DROP 18"

No. OF BLOWS 56/LAYER

No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, % 14.3

MOLDING DRY DENSITY, P.C.F. 119.5

CBR @ 0.1" PENETRATION 66.3

DAYS SOAKED 5

DATE 4-26-72 BY MO

DATE 9-2-72 BY SK

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

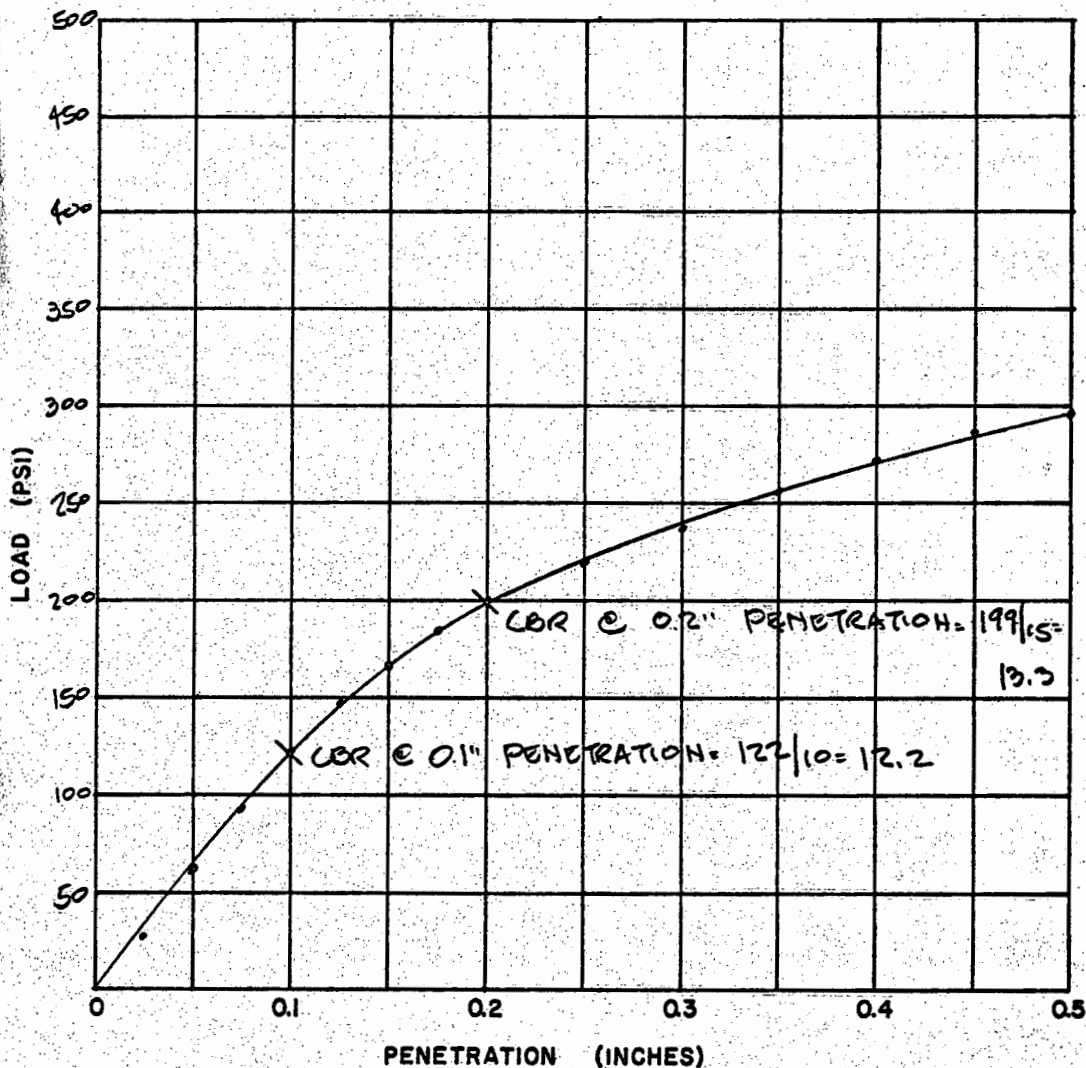
CBR TEST

PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: 20 SURFACE

SAMPLE DESCRIPTION: BROWN SILTY GRAVEL W/SAND



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	80	27
0.050	105	62
0.075	280	97
0.100	365	122
0.125	440	147
0.150	505	168
0.175	555	185
0.200	600	200
0.250	660	220
0.300	715	238
0.350	770	257
0.400	815	272
0.450	860	287
0.500	890	297

AGGREGATE 3/4" MINUS

HAMMER WEIGHT 10 LBS

HAMMER DROP 18"

No. OF BLOWS 50/LAYER

No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, % 23.8

MOLDING DRY DENSITY, P.C.F. 121.9

CBR @ 0.1" PENETRATION 12.2

DAYS SOAKED 4

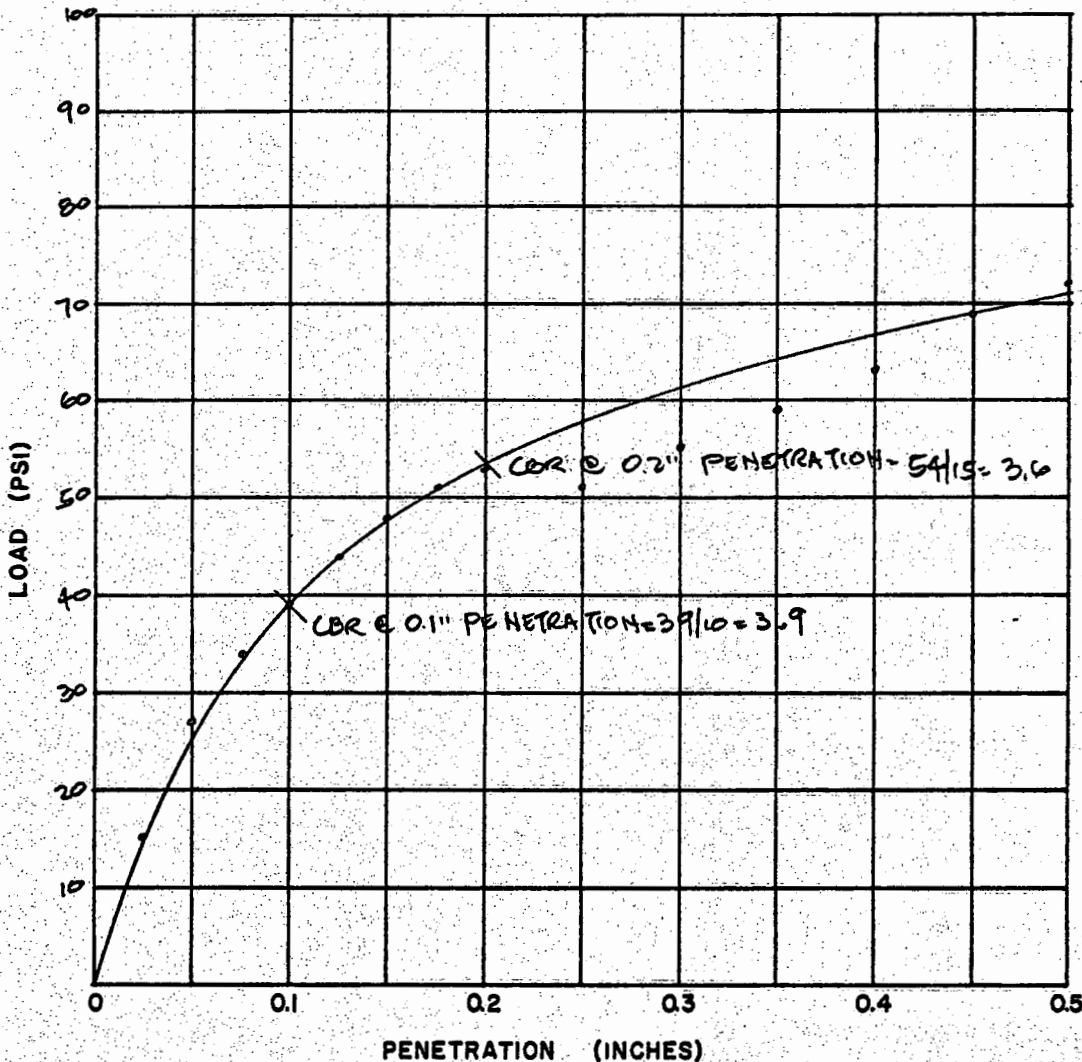
DATE 4-28-72 BY MO

DATE 5-3-72 BY SK

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

CBR TEST

PROJECT: PROPOSED DEVELOPMENT-
WAIAWA INDUSTRIAL PARK
 LOCATION: WAIAWA, EWA, OAHU, HAWAII
 SAMPLE NO: 29 SURFACE
 SAMPLE DESCRIPTION: REDDISH-BROWN SILTY CLAY



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	45	15
0.050	80	27
0.075	102	34
0.100	117	39
0.125	131	44
0.150	143	48
0.175	152	51
0.200	160	53
0.250	154	51
0.300	165	55
0.350	177	59
0.400	190	63
0.450	206	69
0.500	217	72

AGGREGATE 1/4" MINUS
 HAMMER WEIGHT 10 LBS.
 HAMMER DROP 18"
 No. OF BLOWS 50/LAYER
 No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, % 26.3
 MOLDING DRY DENSITY, P.C.F. 94.9
 CBR @ 0.1" PENETRATION 3.9
 DAYS SOAKED 4

DATE 4-29-72 BY RG
 DATE 5-4-72 BY SK

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

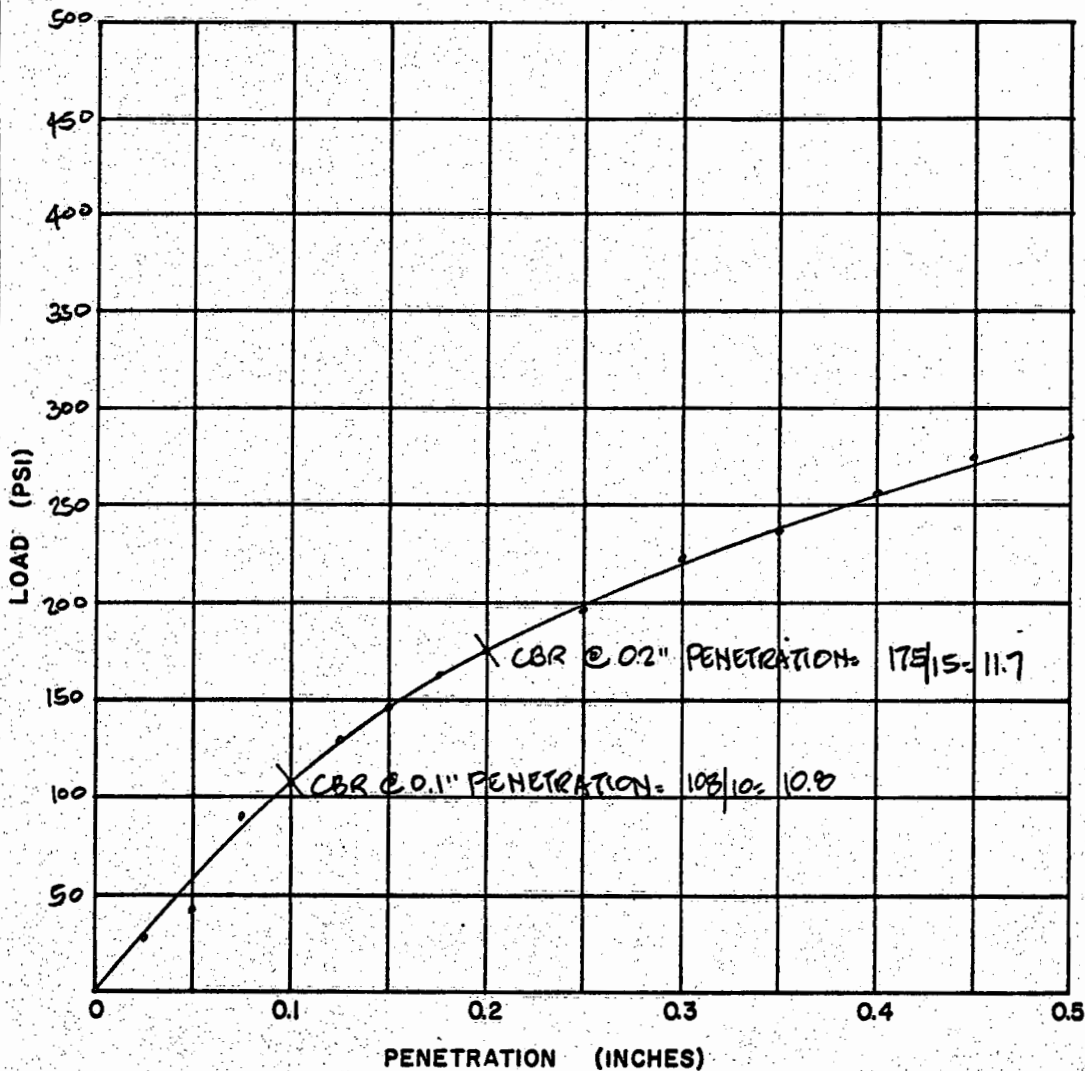
CBR TEST

PROJECT: PROPOSED DEVELOPMENT-
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: 30 SURFACE

SAMPLE DESCRIPTION: REDDISH-BROWN CLAYEY SILT W/DECOMP. ROCK



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	85	28
0.050	125	42
0.075	270	90
0.100	375	108
0.125	390	130
0.150	445	148
0.175	485	162
0.200	525	175
0.250	590	197
0.300	670	223
0.350	715	238
0.400	770	257
0.450	825	275
0.500	855	285

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

TEST RESULTS:

MOLDING MOISTURE, % 29.6
MOLDING DRY DENSITY, P.C.F. 94.8
CBR @ 0.1" PENETRATION 10.8
DAYS SOAKED 4

DATE 5-2-72 BY BS
DATE 5-8-72 BY SK

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

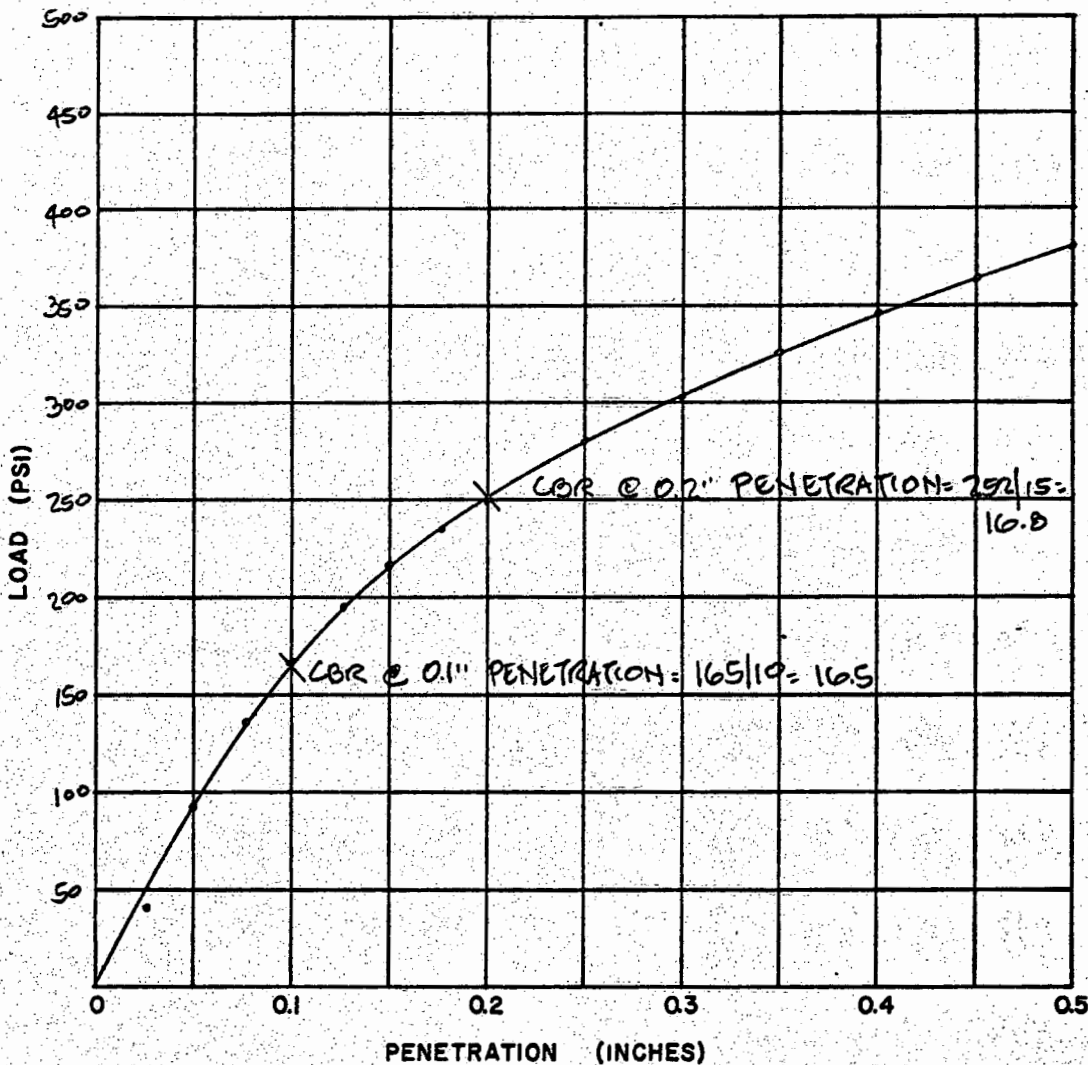
CBR TEST

PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: 36 SURFACE

SAMPLE DESCRIPTION: REDDISH-BROWN CLAYEY SILT W/DECOMP. ROCK
& GRAVEL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	120	40
0.050	280	93
0.075	405	135
0.100	500	167
0.125	585	195
0.150	660	217
0.175	705	235
0.200	750	250
0.250	840	280
0.300	905	302
0.350	975	325
0.400	1035	345
0.450	1090	363
0.500	1140	380

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

TEST RESULTS:

MOLDING MOISTURE, % 23.8

MOLDING DRY DENSITY, P.C.F. 101.8

CBR @ 0.1\"

DAYS SOAKED 4

DATE 5-2-72 BY BS

DATE 5-8-72 BY SK

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

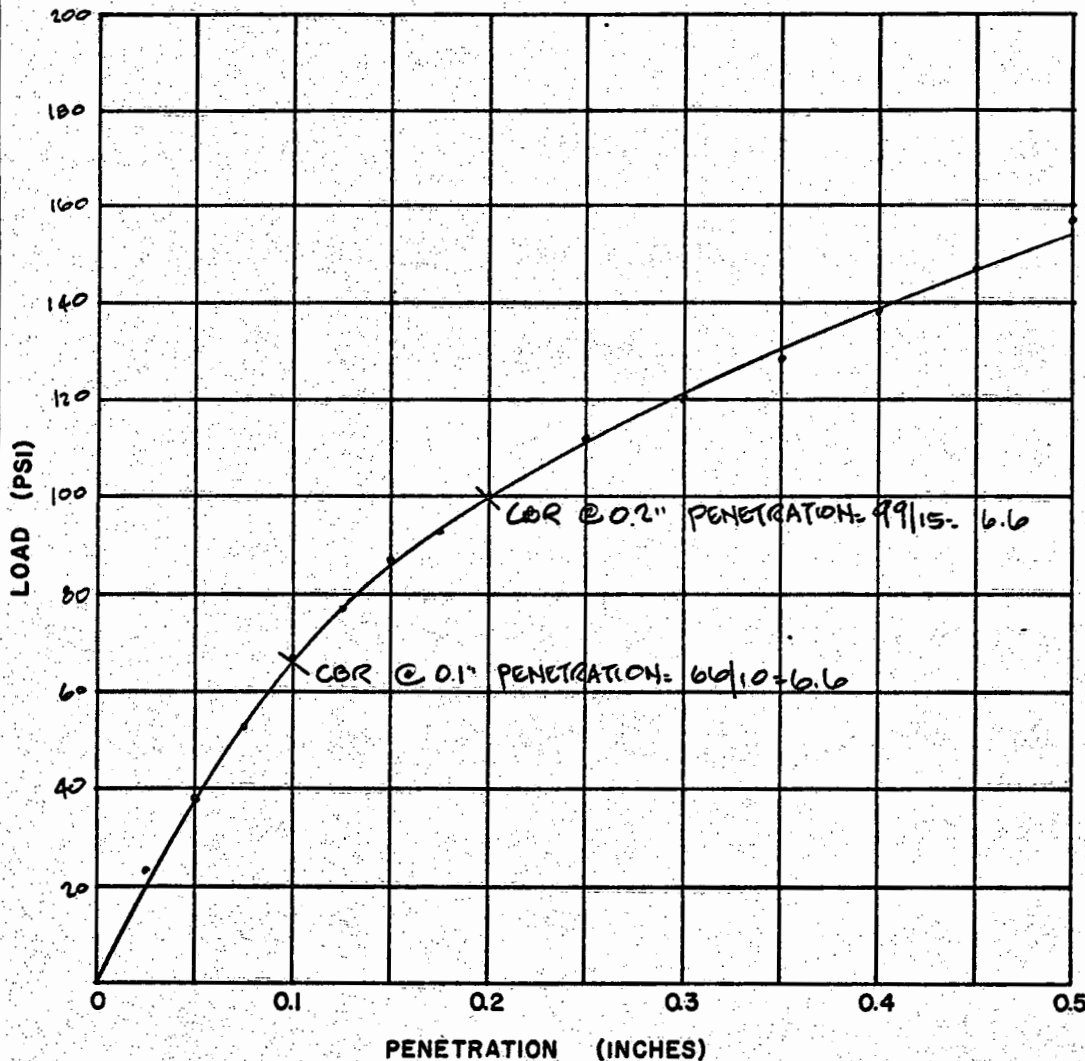
CBR TEST

PROJECT: PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: 39 SURFACE

SAMPLE DESCRIPTION: BROWN SANDY SILT W/ GRAVEL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	70	23
0.050	115	38
0.075	160	53
0.100	200	67
0.125	230	77
0.150	260	87
0.175	280	93
0.200	300	100
0.250	335	112
0.300	360	120
0.350	385	128
0.400	415	138
0.450	440	147
0.500	470	157

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

TEST RESULTS:

MOLDING MOISTURE, % 30.6
MOLDING DRY DENSITY, P.C.F. 92.3
CBR @ 0.1" PENETRATION 6.6
DAYS SOAKED 4

DATE 5-1-72 BY AF

DATE 5-8-72 BY SK

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

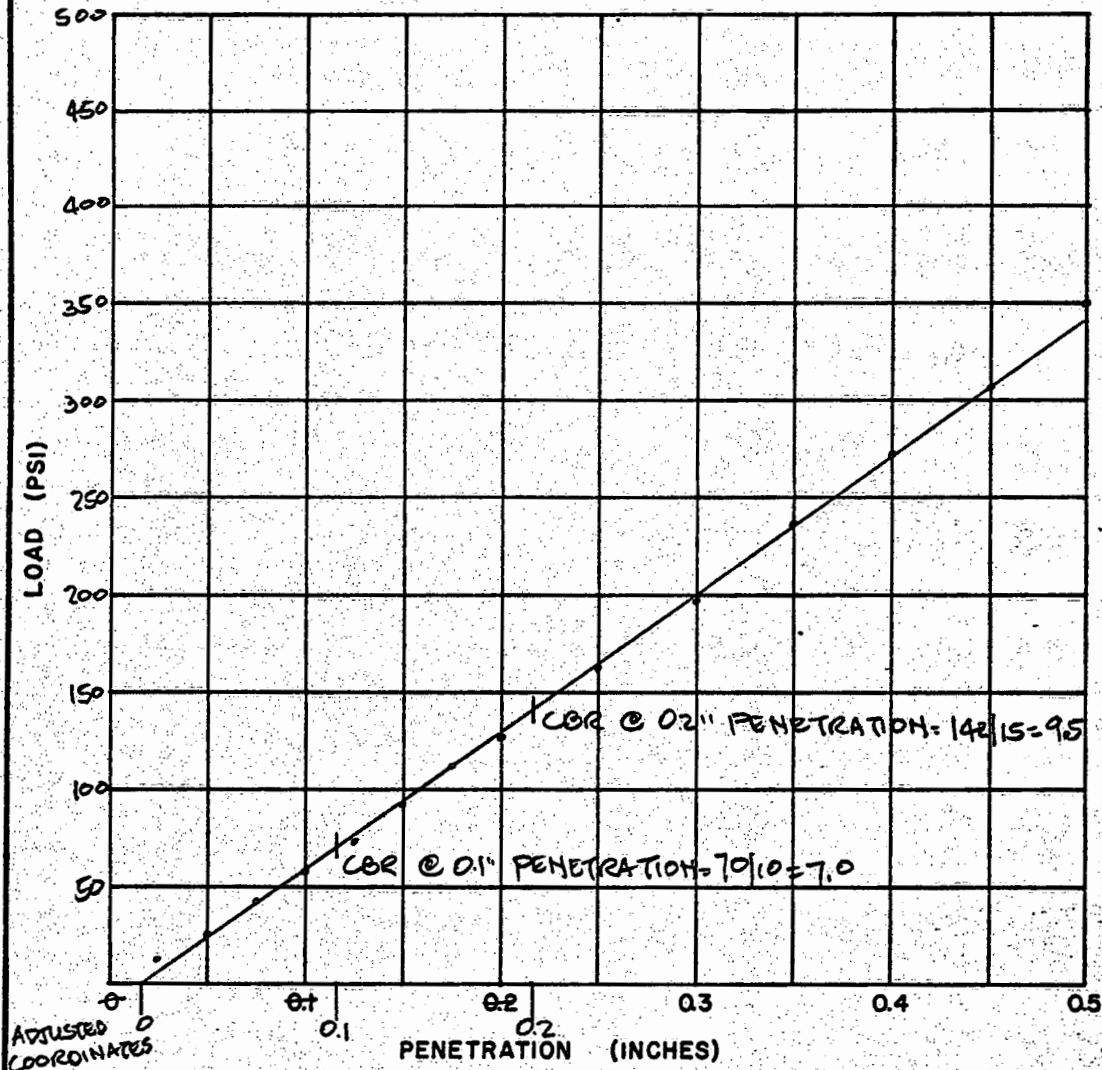
CBR TEST

PROJECT: PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: 43 SURFACE

SAMPLE DESCRIPTION: TAN CLAYEY SAND & CORAL



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	35	12
0.050	75	25
0.075	130	43
0.100	175	58
0.125	220	73
0.150	280	93
0.175	335	112
0.200	380	127
0.250	485	162
0.300	595	198
0.350	710	237
0.400	815	272
0.450	920	307
0.500	1050	350

AGGREGATE 3/4" MINUS

HAMMER WEIGHT 10LBS.

HAMMER DROP 18"

No. OF BLOWS 5/LAYER

No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, % 15.3

MOLDING DRY DENSITY, P.C.F. 111.7

CBR @ 0.1" PENETRATION 7.0

DAYS SOAKED 4

DATE 4-29-72 BY FM

DATE 5-4-72 BY SK

WALTER LUM ASSOCIATES, INC.
CIVIL STRUCTURAL SOILS ENGINEERS

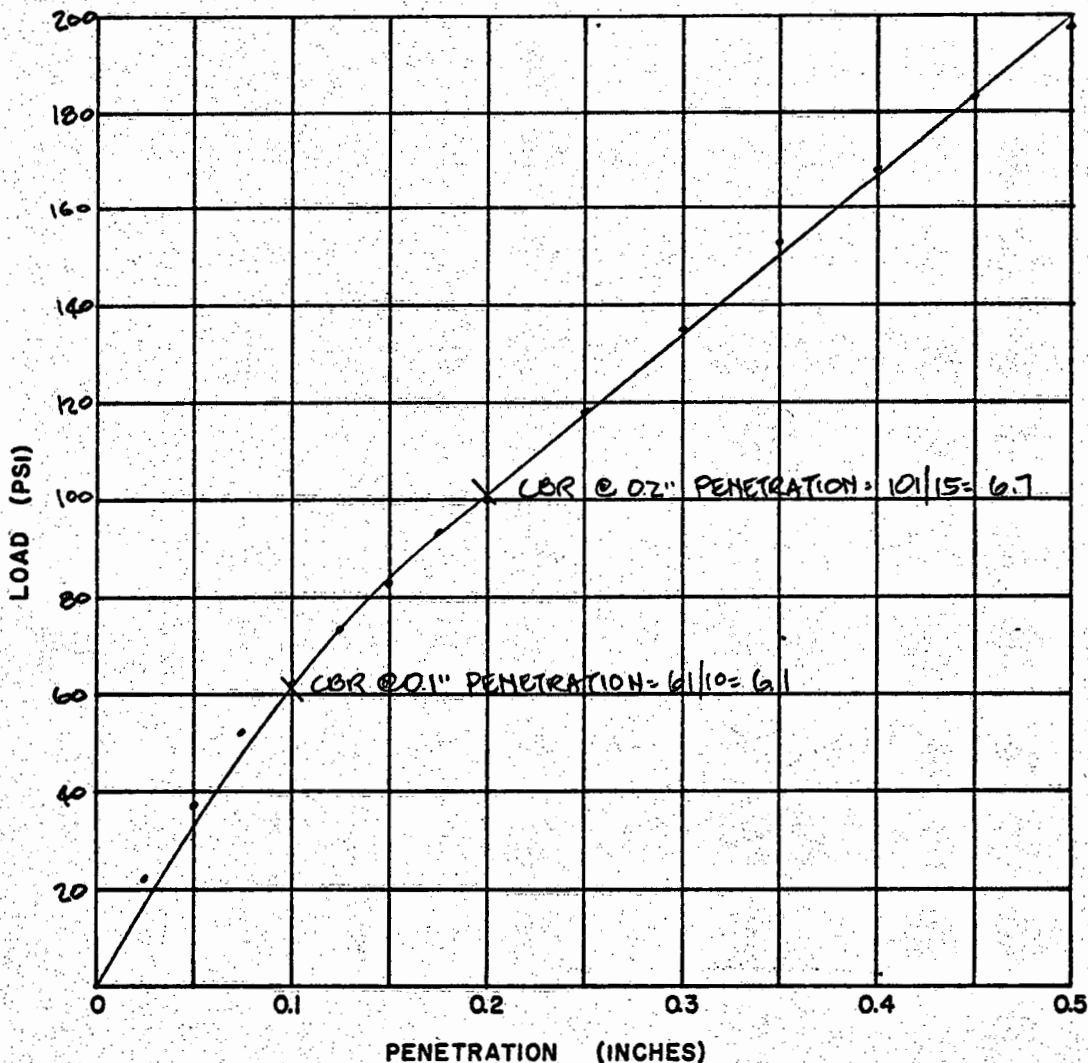
CBR TEST

PROJECT: PROPOSED DEVELOPMENT
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: 47 SURFACE

SAMPLE DESCRIPTION: REDDISH-BROWN SILTY CLAY W/TRACES OF
DECOMP. ROCK



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	65	22
0.050	110	37
0.075	155	52
0.100	185	62
0.125	210	73
0.150	250	83
0.175	280	93
0.200	300	100
0.250	355	118
0.300	405	135
0.350	460	153
0.400	505	168
0.450	550	183
0.500	595	198

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

TEST RESULTS:

MOLDING MOISTURE, % 30.2
MOLDING DRY DENSITY, P.C.F. 91.3
CBR @ 0.1" PENETRATION 6.1
DAYS SOAKED 4

DATE 4-29-72 BY LT

DATE 5-4-72 BY SK

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

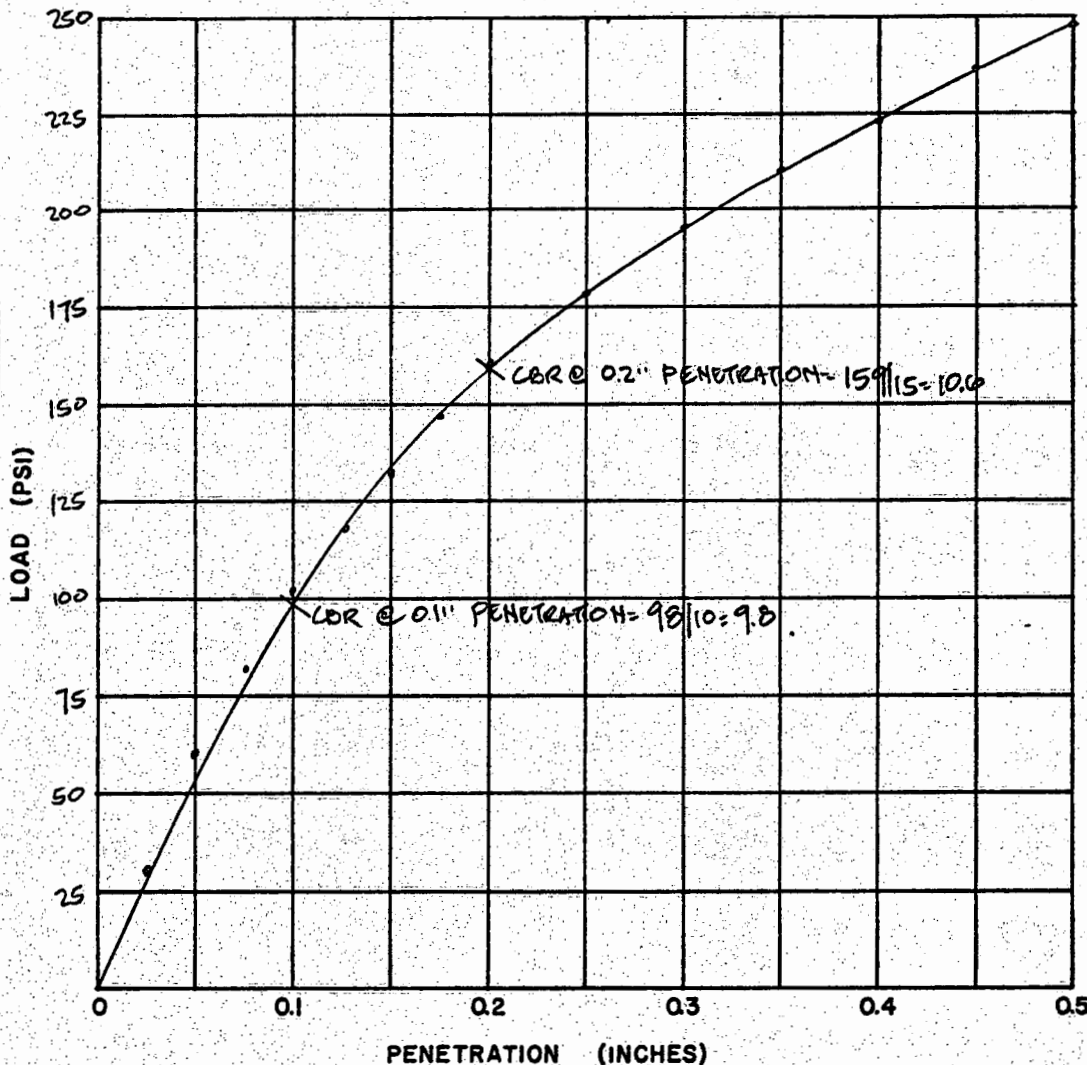
CBR TEST

PROJECT: PROPOSED DEVELOPMENT -
WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII

SAMPLE NO: 51 SURFACE

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



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	90	30
0.050	180	60
0.075	245	82
0.100	305	102
0.125	355	118
0.150	400	133
0.175	440	147
0.200	480	160
0.250	535	178
0.300	585	195
0.350	630	210
0.400	670	223
0.450	710	237
0.500	740	247

AGGREGATE 3/4" MINUS
HAMMER WEIGHT 10 LBS.
HAMMER DROP 18"
No. OF BLOWS 54 LAYER
No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, % 30.7
MOLDING DRY DENSITY, P.C.F. 86.7
CBR @ 0.1" PENETRATION 9.8
DAYS SOAKED 4

DATE 4-29-72 BY RG

DATE 5-4-72 BY SK

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

LOGS OF BORINGS
AND LABORATORY TEST RESULTS

FOR

DRAINAGE CHANNEL, WALAWA INDUSTRIAL PARK

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT DRAINAGE CHANNEL
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. DC-1 Sheet No. _____ of _____
 Driller W. LUM ASSOC., INC. Date SEPT. 16, 1972
 Field Party GAFFIN, MEYER, KAKU
 Type of Boring AUGER (MOBILE B-40) Diam. 4"
 Elev. 57' ± * Datum _____
 Drill Bit FINGER TYPE

HAMMER:

Weight 140#Drop 30"SAMPLER: 2" STANDARD SPLIT SPOONWater Level 7.4'Time 1:30 PMDate 9-16-72

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.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
(MH)	MEDIUM-STIFF REDDISH BROWN CLAYEY SILT			1-A	-	38	-	-	-					
(SM)	MEDIUM DENSITY MOTTLED BROWN & GRAY SILTY SAND W/ GRAVEL	5		1-B	-	24	-	-	-					
	COBBLES OR BOULDERS													
		10		1-C	-	24	-	-	-					
GW-GM	MEDIUM DENSITY TO DENSE GRAY-BROWN SILTY GRAVEL W/ SAND	15		1-D	-	32	-	-	-					43
	MOTTLED GRAY & BROWN DECOMPOSED ROCK (CRUSHES TO SILTY GRAVEL W/ SAND)	20		1-E	-	65	-	-	-					42
	END OF BORING @ 21.5'													

* ELEVATION ESTIMATED
 FROM CONTOUR MAP

**DRAINAGE CHANNEL
WAIAWA INDUSTRIAL PARK**

PROJECT WAIAWA INDUSTRIAL PARK
LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. DC-3 Sheet No. _____ of _____
Driller W. LUM ASSOC., INC. Date SEPT. 6, 1972

Field Party METER, KAKU, RADOVICH
Type of Boring ROTARY (CONCRE) 1218 Diam. 2 1/2"

Elev. 64' ± * Datum 1

Drill Bit ROLLER ROCK & DIAMOND CORING
TC PRAG

Water Level	4.7'				
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Time 3:30 PM				
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Date	9-8-72				
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HAMMER:

Weight 140

Drop 30"

2" SS-2" STANDARD SPLIT SPOON

SAMPLER: "BX" - BX DOUBLE TUBE CORE BARREL

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	N (Blows per foot)
										0	10 20 30 40
(MH)	ELEV. = 64' ± * 70 STIFF, DARK BROWN CLAYEY SILT W/ DEC. ROCK & TRACES OF ROOTS COBBLE OR BOULDER WATER : 9-8-72 GRAY GRAVEL & COBBLES W/ SOME CLAYEY SILT CLAY POCKET GRAY GRAVEL & COBBLES W/ SOME CLAYEY SILT BOULDER CLAY POCKET BLUE ROCK OR COBBLES & BOULDERS ? STIFF, MOTTLED BROWN CLAYEY SILT W/ DECOMPOSED ROCK END OF BORING @ 21'										

Boring Log

PROJECT DRAINAGE CHANNEL
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. DC-4 Sheet No. _____ of _____
 Driller W. LUM ASSOC. INC. Date SEPT. 11, 12 & 13, 1972

Field Party MEYER, KAKU, MAKALA
 Type of Boring ROTARY (CONCRETE) Diam. 3"

Elev. 65' ± * Datum _____

Drill Bit DIAMOND CORING, ROLLER ROCK, T.C. DRAG
& T.C. CORING

Water Level 4.0'

Time 3:30 PM

Date 9-12-72

HAMMER:

Weight 140#

Drop 30"

2" SS - 2" STANDARD SPLIT SPOON

SAMPLER: "BX" - BX DOUBLE TUBE CORE BARREL

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.	Standard Penetration Test N (Blows per foot)
	ELEV. = 65' ± * 70									0 10 20 30 40
(MH)	SOFT, DARK BROWN CLAYEY SILT W/ SAND GRAVEL & TRACES OF ROOTS	2.55	"BX"	4-A	24					3/1.0'
	WATER 9-12-72									
		5	"BX"	RUN #1	CORED = 1.0'	RECOV. = 0.9'				
			"BX"	RUN #2	CORED = 1.0'	RECOV. = 0.8'				
			"BX"	RUN #3	CORED = 0.5'	RECOV. = 0.6'				
			"BX"	RUN #4	CORED = 1.0'	RECOV. = 1.0'				
			"BX"	RUN #5	CORED = 1.5'	RECOV. = 1.5'				
		10	"BX"	RUN #6	CORED = 1.5'	RECOV. = 1.5'				
	GRAY & BROWN GRAYEL & COBBLES W/ SILTY CLAY POCKETS & DECOMPOSED ROCK									
MH	STIFF, GRAY - BROWN CLAYEY SILT W/ DECOMPOSED ROCK	15	2"SS	4-B	46	46	64			21/0.5'
(MH)	STIFF, MOTTLED BROWN SILTY CLAY W/ SAND, DECOMPOSED ROCK & GRAVEL	20	2"SS	4-C	54					7/0.5'
	END OF BORING @ 21.5'									16/0.5'

* ELEVATION ESTIMATED FROM CONTOUR MAP

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT DRAINAGE CHANNEL
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. DC-5 Sheet No. of
 Driller W. LUM ASSOC. INC. Date SEPT. 13 & 14, 1972
 Field Party MAKAULA, KAKU
 Type of Boring ROTARY (CONCORE) Diam. 3"
 Elev. 72' ± * Datum
 Drill Bit ROLLER ROCK

HAMMER:

Weight 140#
 Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level 5.0' 1.9'
 Time 9:00 AM 3:45 PM
 Date 9-13-72 9-14-72

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.	Standard Penetration Test N (Blows per foot)
	ELEV. = 72' ± * 70									0 10 20 30 40
(GM)	LOOSE, BROWN SILTY GRAVEL & SAND W/ TRACES OF ROOTS	0	WATER 1-14-72	5-A	-	27	-	-	-	2/1.0'
	COBBLE OR BOULDER W/ CLAY OR GRAVEL POCKETS	5		5-B	-	43	-	-	-	11/0.5'
(GM)	STIFF, MOTTLED BROWN CLAYEY SILT, GRAVEL & DECOMPOSED ROCK	10		5-C	43	50	66	-	-	23/0.5'
	COBBLES W/ CLAY OR GRAVEL POCKETS	15		5-D	-	44	-	-	-	
MH	STIFF MOTTLED GRAY-BROWN CLAYEY SILT W/ DECOMPOSED ROCK	20		5-E	-	37	-	-	-	
	END OF BORING @ 21.5'									

* ELEVATION ESTIMATED FROM CONTOUR MAP

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT DRAINAGE CHANNEL
WAIAWA INDUSTRIAL PARK
 LOCATION Waiawa, Ewa, Oahu, Hawaii

BORING NO. DC-G Sheet No. of
 Driller W. LUM ASSOC., INC. Date SEPT. 19 & 20, 1972
 Field Party KAKU, SETO, PICONE, MEYER M.
 Type of Boring ROTARY (CONCORE) Diam. 3"
 Elev. 78' ± X Datum
 Drill Bit ROLLER ROCK & T.C. CORING

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

Water Level
 Time
 Date

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.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
(MH)	REDDISH BROWN CLAYEY SILT W/ TRACES OF SAND & ROOTS			G-A	-	30	-	-	-					
	COBBLES, BOULDERS W/ CLAY POCKETS	5	2"SS	G-B	-	9	-	-	-					
	STIFF BROWN SILTY CLAY W/ GRAVEL	10	"BX"	RUN #1		CORED: 2.0' RECOV.: 1.0'								
			"BX"	RUN #2		CORED: 1.0' RECOV.: 0.2'								
	GRAY ROCK OR BOULDERS ?	15	2"SS	G-C	ROCK FRAGMENTS									
GM	MOTTLED BROWN SILTY GRAVEL & COBBLES W/ SAND	20	2"SS	G-D	-	25 36	-	-	-					
	END OF BORING @ 21.5'													

* ELEVATION ESTIMATED FROM CONTOUR MAP

* ELEVATION ESTIMATED FROM CONTOUR MAP

WAIAWA DRAINAGE CHANNEL

DRAINAGE CHANNEL - WAIAWA INDUSTRIAL PARK

TABLE 1A - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	DC-1	DC-2	DC-2	DC-4
SAMPLE NO.	D	C (TOP)	E	B
DEPTH BELOW SURFACE	15'-16.5'	10'-12'	20'-21.5'	15'-16'
DESCRIPTION	GRAY-BROWN SILTY GRAVEL W/SAND	DARK BROWN GRAY CLAYEY SILT W/SAND (SLIGHTLY ORGANIC)	MOTTLED REDDISH- BROWN SILTY CLAY W/DECOMP. ROCK	GRAY-BROWN CLAYEY SILT W/DECOMP. ROCK
GRAIN-SIZE ANALYSIS (% Passing)				
Sieve				
1"	100			
1/2"	59.0			
#4	42.2			
#10	30.1			
#20	20.7			
#40	16.0			
#100	11.4			
#200	9.6			
ATTERBERG LIMITS				
Air Dried or Natural		NATURAL	NATURAL	NATURAL
Liquid Limit		72	92	64
Plastic Limit		41	41	46
Plasticity Index		31	51	18
Dilatancy		QUICK	QUICK	QUICK
Toughness		MEDIUM	MED.-HIGH	MEDIUM
Dry Strength		MEDIUM	MED.-HIGH	MEDIUM
UNIFIED SOIL CLASSIFICATION	GW-GM	MH	MH	MH
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS (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-180-57 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 10-14-72 By BT

DRAINAGE CHANNEL - WAIWA INDUSTRIAL PARK

TABLE I B - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	DC-5	DC-6		
SAMPLE NO.	C	D		
DEPTH BELOW SURFACE	10'-11.5'	20'-21.5'		
DESCRIPTION	MOTTLED GRAY BROWN CLAYEY SILT W/DECOMP. ROCK	MOTTLED BROWN SILTY GRAVELS & COBBLES W/SAND		
GRAIN-SIZE ANALYSIS				
(% Passing)				
Sieve				
1"		75.6		
1/2"		64.5		
#4		51.5		
#10		39.3		
#20		30.7		
#40		25.5		
#100		20.8		
#200		18.4		
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL			
Liquid Limit	66			
Plastic Limit	43			
Plasticity Index	23			
Dilatancy	QUICK			
Toughness	MEDIUM			
Dry Strength	SLIGHT-MED.			
UNIFIED SOIL CLASSIFICATION	MH	GM		
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS				
(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				
(AASHO T-180-57 Method)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

REMARKS:

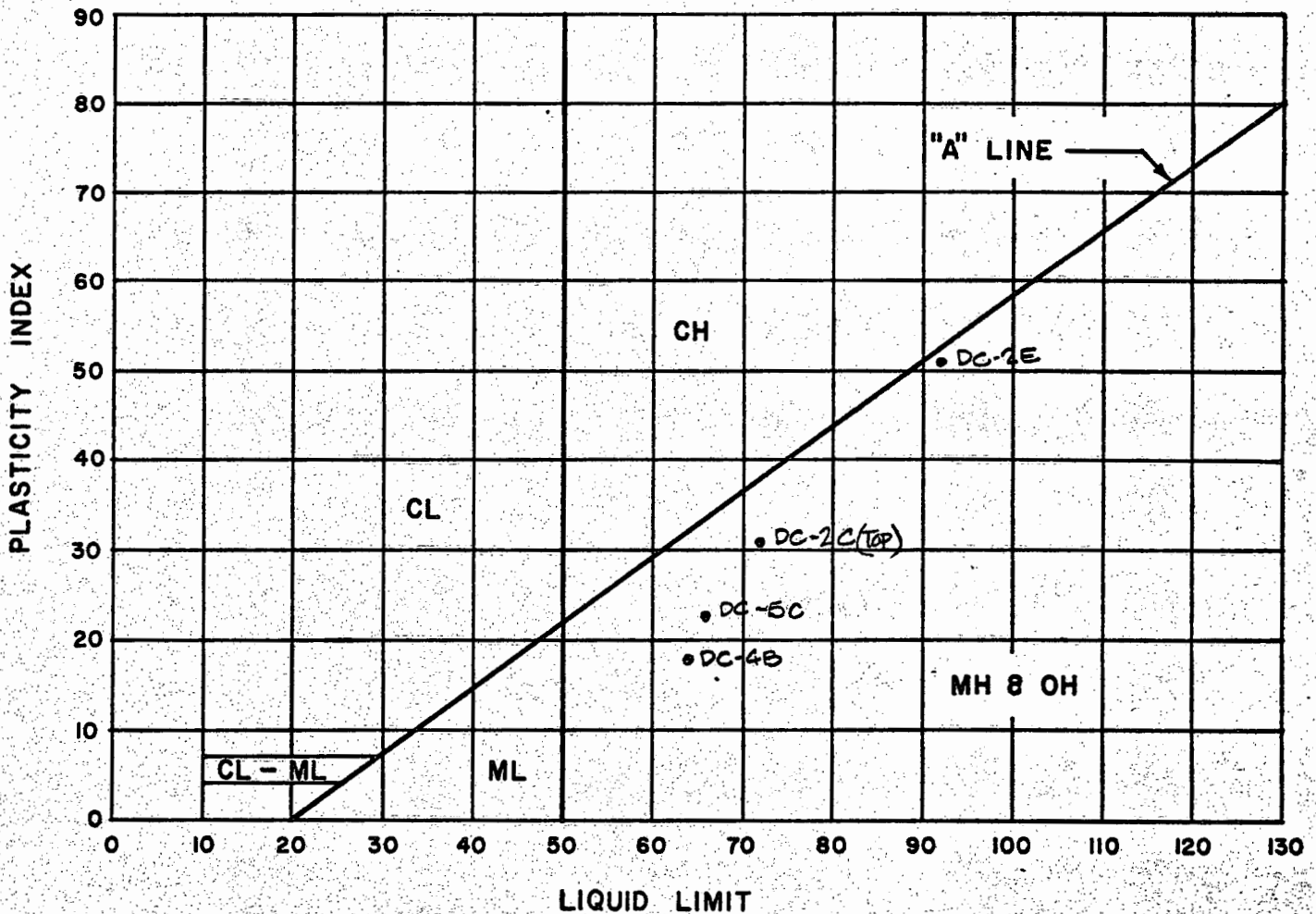
WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 10-14-72 By BT

PLASTICITY CHART

PROJECT: DRAINAGE CHANNEL - WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAKU, HAWAII



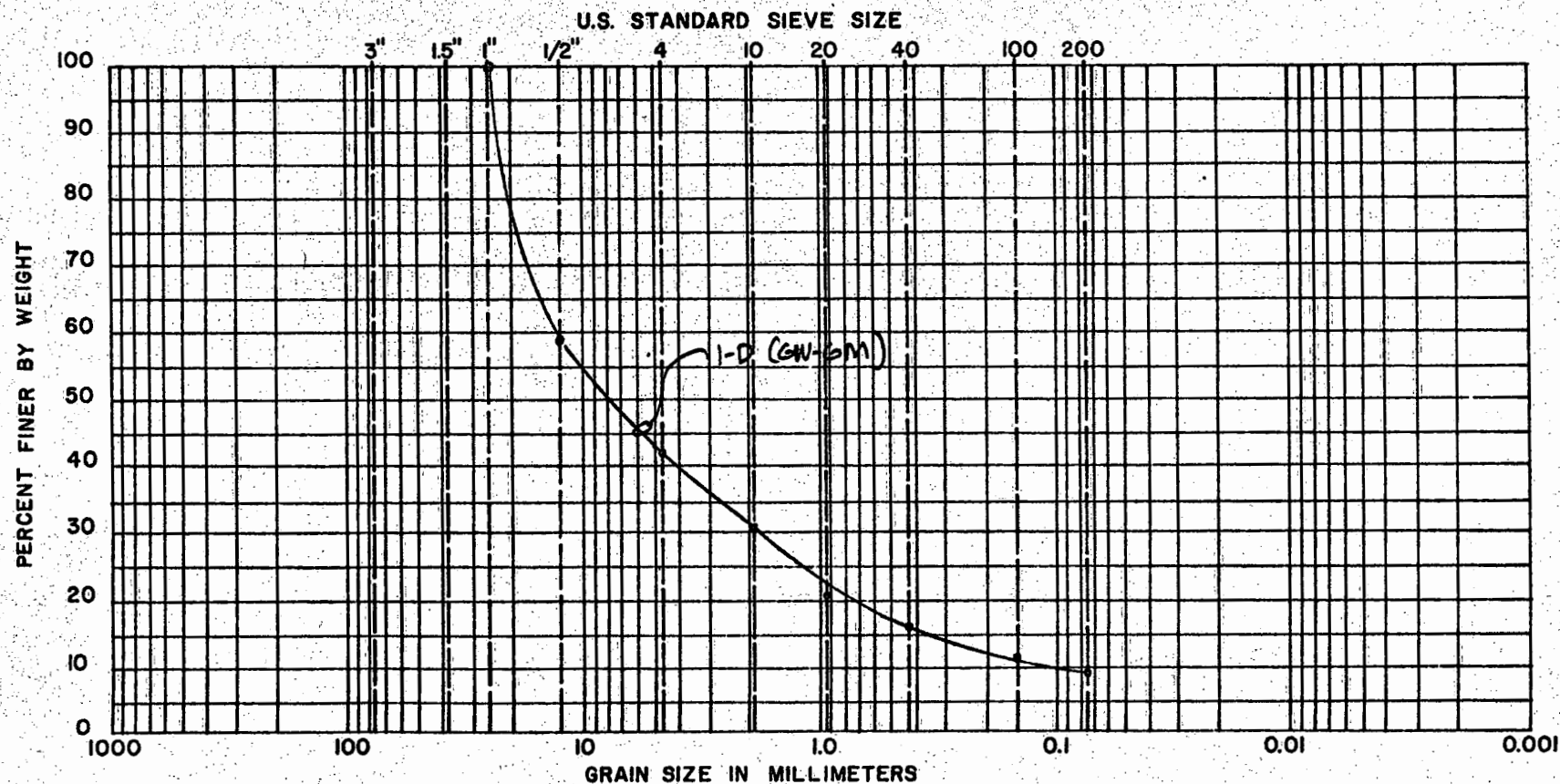
DATE 10-14-72 BY BT

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

GRAIN-SIZE ANALYSIS CURVE

PROJECT: DRAINAGE CHANNEL - WAIAWA INDUSTRIAL PARK

LOCATION: WAIAWA, EWA, OAHU, HAWAII



COBBLE	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

DATE 10-14-72 BY DT.

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 and the changed conditions.

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.