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NEWTOWN SITE "D"

FOR REFERENCE

PRELIMINARY SOIL REPORT not to be taken from this room

WAIMALU, EWA, OAHU, HAWAII

TAX MAP KEY: 9-8-02: POR. 9

To:
COMMUNITY PLANNING, INC.

WALTER LUM ASSOCIATES, INC.

CIVIL, STRUCTURAL, SOILS ENGINEERS

MARCH 4, 1974

MUNICIPAL REFERENCE & RECORDS CENTER
City & County of Honolulu
City Hall Annex 558 S. King Street
Honolulu, Hawaii 96813

WITHDRAWN

WALTER LUM ASSOCIATES, INC.

CIVIL, STRUCTURAL, SOILS ENGINEERS

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

March 4, 1974

MR. GEORGE HOUGHTAILING
Community Planning, Inc.
700 Bishop Street, Suite 608
Honolulu, Hawaii 96813

Dear Mr. Houghtailing:

Subject: Newtown Site "D"
Preliminary Soil Report
(for site grading for townhouse
development)
Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

Transmitted herewith is our preliminary soil exploration report for site grading design considerations for the proposed townhouse development site for Newtown Site "D" at Waimalu, 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

CR/EK:rmf

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NEWTOWN SITE "D"
PRELIMINARY SOIL REPORT

WAIMALU, EWA, OAHU, HAWAII
TAX MAP KEY: 9-8-02: POR. 9

SCOPE OF EXPLORATION

The purpose of this exploration was to evaluate general soil conditions for site grading design for townhouse development for the proposed Newtown Site "D" at Waimalu, Ewa, Oahu, Hawaii.

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

This report does not include swimming pool work and conditions resulting from pool construction.

FIELD EXPLORATION

Twenty-six exploratory borings were made at the site. The locations of these borings are shown on the Boring Location Sketch. Descriptions of the underlying soils encountered are shown on the boring logs.

Also attached are logs of borings previously made for "Newtown Estates 2nd Access Road - Phase I"; "Newtown Estates 2nd Access Road - Phase II"; and "Newtown Estates Recreation Center, Park and School Site."

Borings were made with 3 and 4-in. diameter augers using carbide drag and finger type bits. Soil samples were recovered with 2-in. thin-wall tube samplers and a standard split spoon sampler driven with a 140-lb hammer falling 30 inches.

LABORATORY TESTS

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

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

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."

SOIL DESCRIPTION BY OTHERS

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

U. S. Soil Conservation Service, "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii," August 1972:

LaB, Lahaina silty clay (CL-ML soils)

3 to 7 percent slopes

LaC, Lahaina silty clay (CL-ML soils)

7 to 15 percent slopes.

GENERAL SITE CONDITIONS

The proposed site is located on a ridge about 1/4 mile north of the H-1 Freeway and between Waimalu Stream and Punanani Stream in Waimalu, Ewa, Oahu, Hawaii.

The site is an abandoned sugarcane field. Lined and unlined ditches and access roads cross the site.

The existing ground generally slopes down toward the southwest at about 10 to 25% grades. Steeper slopes to about 50% were noted along the east and west boundaries of the site.

INTERPRETATION OF SOIL CONDITIONS

From the field exploration and laboratory test results, the soils may be generally approximated as follows:

Stiff to hard reddish-brown clayey silts and silty clays (MH soils) to about 15 to 30 ft, the depths drilled.

Decomposed rock or boulders were encountered in several borings.

Pockets of clay "CH" soils were encountered in several borings.

Water was not noted in the borings during the field explorations.

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

DISCUSSION AND RECOMMENDATIONS

In general, the proposed plan is to clear and grade the site for a townhouse development.

Cuts from little to about 30 ft are planned generally in the upper areas and fills from little to about 10 ft in height are planned generally in the lower areas.

The preliminary site plans indicate that some of the buildings may be situated on cut and/or fill slopes. Because surface soils on slopes tend to creep, building on slopes should generally be avoided, otherwise, they should be designed on an individual basis for each building.

The plans also indicate that some of the buildings will be located along the existing cane haul road near the south boundary. Because miscellaneous fill may have been placed in localized sections along the roadway or shoulder areas, hard and soft pockets and boulders may be encountered. Field adjustments may be made as such conditions occur.

Two retaining walls about 60 to 90 ft in length and about 1 to 4 ft in height are proposed along the roadway near the east boundary. The walls will be located on slopes with about 2 to 3 horizontal to 1 vertical ratios.

If practicable, walls on slopes should generally be avoided. If they are unavoidable, substantial, well-drained, flexible type walls should be considered. Maintenance and future adjustments should be allowed for.

Because of decomposed rocks encountered in some borings, boulders may be anticipated in the excavations. Boulders may be used to construct fill slopes or open areas outside of probable building sites.

If boulder fill areas are not available or are filled up during construction, other provisions should be made for the disposal of excess boulders.

Site Grading

In general, the on-site soils may be used for the construction of the proposed fills. Grading work should be done as required by the Revised Ordinances of Honolulu, 1969 As Amended and as recommended below:

1. The area should be cleared and grubbed.

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 placement of fills. Loose surface soils at finish grades should be scarified and recompactd.
3. Localized soft pockets encountered during site preparation should be excavated and replaced with select material compacted in thin lifts.
4. Hard surfaces of existing haul roads should be scarified down to stiff soils and recompactd to match the density of the surrounding soil.
5. Where fills are proposed on sidehill areas, gullies and in drainage and irrigation ditches, loose material at the bottom and sides should be stripped down to stiff natural

ground. Rock blankets with subdrains and/or buttress fills should be considered before the placement of fills.

6. Thin sidehill fills (sliver fills) on sloping areas should be avoided.
7. Trenches should be cut in a herringbone pattern along the bottom and sides of natural drainage-ways or dips 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. If boulders are proposed to be used in the construction of fills, they should be generally placed along the toe sections of fill slopes and outside of probable building sites. Before placing the boulders, the subgrade should be stripped to stiff natural ground and shaped to drain. A transition layer of select granular material (6 in. to dust sizes) should be placed on the subgrade and the boulders placed on the select material. A transition layer of select granular material should also be placed against the boulders before earth fills are placed against the boulders. Earth fill may be used in the void spaces between boulders. See attached sketch, Figure 1.
10. Fills should be laid in 6-in. compacted layers to 90% of the maximum density determined by the AASHTO T-180-73I test method. In roadway areas, the top 2 ft of fill should be compacted to 95% of the maximum density.
11. Provisions should be included to drain the site during and after filling operations.

Slopes

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

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

To minimize erosion, the runoff from rainstorms should be diverted 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.

Slope adjustments or other precautions may be necessary if seepage zones, expansive clay pockets or soft spots are encountered in localized areas. In general, when clay pockets are encountered in slopes, they should be removed and replaced with select material compacted in thin lifts.

Foundations

In general, light, 2-story wood-frame townhouse structures are proposed.

The preliminary grading plan indicates that some units would be located on fairly level ground and others on sloping ground or near the tops of slopes.

In general, buildings should be avoided on sloping hillsides where the slopes are steeper than 3 horizontal to 1 vertical ratio. For building sites steeper than 3 to 1, the building site foundations should be evaluated on an individual site basis.

Low, basement type retaining walls are planned for the 2-story wood-frame structures. Some movements should be anticipated. Structural members, where practicable, should be designed with connections or joints that would allow for some movements. Substantial well-drained walls should be considered.

If foundations are located over or adjacent to a utility trench, the foundations should be designed to span over the trench and the footings should extend below the bottom of the trench.

Buildings on fairly level ground

On fairly level sites, where the proposed buildings are located 15 ft away from the top of slopes, conventional foundations such as slab-on-ground and post-and-beam construction may be used.

Where clay "CH" soils occur near finish grade, the area below the building and to about 5 ft beyond the perimeter of the building should be graded such that there is about 3 ft of selected non-expansive soils below finish grade and bottoms of footings.

Buildings on sloping ground

On sloping sites and near the tops of slopes, post-and-beam type foundation construction is recommended.

Where the lot grades are steeper than about 5 to 1 or where the building is located within 15 ft from the top of a slope or retaining wall, deep foundations are recommended.

Where the lot grades are flatter than 5 to 1, deep foot blocks may be considered (see Figure 2).

Deep foundations for light, 2-story wood-frame townhouse structures may be designed with small diameter pipe piles. The piles should generally extend below an imaginary plane drawn upward from the toe of slope at about a 4 horizontal to 1 vertical slope with a minimum pile length of about 6 ft. A maximum pile length of about 20 ft may be considered for most situations. The foot blocks should be tied in the up and down direction of the slope to counteract the downhill creep effects of the surface soils (see Figure 2). For 2-1/2 in. or 3 in. diameter pipe piles, allowable loads of about 6 kips per pile may be used.

In general, the light townhouse structures should be designed to accommodate and resist some creep of the ground surface. Odd-shaped and split level structures should be minimized or designed to tolerate surface creep of the ground. The use of masonry walls should be discouraged or used with care and designed to tolerate surface creep of the ground.

General foundation guidelines for light residential structures

1. Because of the downhill creep effect of soils on a slope, some settlements may occur near

the tops of slopes. Buildings and retaining walls should generally be placed about 15 ft or more from the tops of slopes.

2. Next to or along the tops of slopes, structures should be designed as small units or floating platforms or decks resting on posts and beams that will allow the floors to be releveled should settlements occur. Odd-shaped and split level structures should be minimized or designed to float as a unit.

3. Bearing values for a given soil usually vary with the size and depth of footings. For the proposed light, wood-frame structures, bearing values of about 2000 p.s.f. may be used for footings on stiff natural ground or on compacted fill.

Loads of about 6,000 pounds per pipe pile or per deep footing may be considered.

4. If foundations are located over or near a utility trench, they should be designed to span over the trench and the bottoms of footings should extend below the bottom of the trench.
5. Soft spots, clay "CH" soils and pockets of loose material encountered in footing

excavations or below the building area should be excavated and replaced with selected on-site soils, fairly well-graded granular material such as S4C or other approved material compacted in thin lifts.

6. The bottom of footing excavations should be recompactd before pouring of concrete.
7. Construction of retaining walls on slopes should generally be avoided or designed with care.
8. Good surface drainage away from the structures should be maintained and the site should be graded to prevent the ponding of water.

Residential Retaining Walls

According to the preliminary plans, retaining walls are planned within the residential structures. The walls will retain the soils beneath the garages and support parts of the structures.

The use of masonry walls should be discouraged or used with care. The walls should be designed to tolerate surface creep of the ground.

The excavation for walls should be made preferably after the site has been graded and compacted. Where walls occur, the slopes should be overfilled, compacted and then excavated for retaining walls.

In general, the bottom of walls should rest on stiff natural ground or on compacted select material. Soft or loose pockets at the bottom of wall footing excavations should be removed and replaced with well-graded granular material or low grade concrete.

On compacted fills on sloping ground, deep foundations are recommended (see Figure 2).

Fairly well-graded granular material or select granular material should be used for backfilling behind the walls. Backfill behind masonry walls should not be compacted by water tamping.

To minimize the effects of ground moisture, subdrains behind and below the bottom of walls and waterproofing of the walls are recommended.

Bearing values of about 3000 p.s.f. may be used for wall foundations resting on stiff natural ground or on compacted

select fill. The bearing values may be somewhat increased for the toe pressures.

For lateral earth pressures, assuming select well-drained backfill, the following equivalent fluid pressure may be used:

60 p.c.f. for retaining walls restrained at top.

In addition, lateral earth pressures should be added for anticipated vehicular loads. The center of pressure should be considered to act somewhat above the lower third of the triangular fluid pressure diagram, assuming that subdrainage and drainage of the backfill are provided.

For sliding resistance between the base and subgrade, a coefficient of friction of 0.40 may be used provided the base of the wall is well drained, and there is sufficient (2 times the base) stiff natural ground or compacted select material in front of the toe of the wall (see Figure 2).

Roadway Retaining Walls

Two retaining walls about 60 and 90 ft in length with heights varying from about 1 to 4 ft are proposed along the roadway at the east boundary of the site.

The existing ground slopes down at about 2 to 3 horizontal to 1 vertical slopes and is covered with haole koa, brush and boulders. Boring No. 11 indicated about 4 ft of soil over decomposed rock.

The walls will retain fills about 2 to 6 ft high and sloping upward from the top of the walls at 2 horizontal to 1 vertical slopes.

In general, surface soils along a slope tend to creep. To minimize creep effects, the wall foundations should extend below the creep zone of the surface soils. The foundations should extend down to rocky material or 2 footing widths horizontally away from the slope face (see Figure 3).

Fairly well-graded material or select granular material should be used for backfilling behind the walls.

Bearing values of about 3000 p.s.f. may be used for wall foundations resting on stiff natural ground or on rocky material. The bearing values may be somewhat increased for the toe pressures.

For lateral earth pressures, assuming select well-drained backfill, the following equivalent fluid pressure may be used:

45 p.c.f. for retaining walls unrestrained at top.

In addition, lateral earth pressures should be added for anticipated vehicular loads. For a sloping backfill, the lateral pressure should be increased according to the Rankine theory, or the earth pressure charts by Terzaghi & Peck, or other similar accepted theory. The center of pressure should be considered to act somewhat above the lower third of the triangular fluid pressure diagram, assuming that subdrainage and drainage of the backfill are provided.

For sliding resistance between the base and subgrade, a coefficient of friction of 0.40 may be used provided the base of the wall is well drained, and there is sufficient (2 times the base) stiff natural ground or rocky material in front of the toe of the wall (see Figure 3).

Subdrains should be placed behind the walls below the foundation level and daylighted to drain.

Slab on Ground

Capillary moisture

To minimize the capillary rise of water from underlying soils, concrete slabs on ground should be placed over a base course of 4 in. of well-graded gravel less than

3/4-in. and greater than 1/4-in. in size or some form of capillary break. If practicable, the subgrade generally should be kept slightly higher than the finish grade outside the building and shaped to drain.

Expansive soils

The soils may be slightly expansive. To minimize the expansive effects, the subgrade below slabs on ground should be scarified and recompactd on the wet side of optimum and pre-wetted several days prior to pouring of concrete.

To minimize the heave or wavy surface effects at the ground floor level, non-bearing partitions, doors, cabinets, etc., should be designed with loose fits and other precautions taken to allow for some future adjustments or maintenance.

Roadway and Parking Area

In general, for light automobile traffic and drained subgrade conditions, an estimate of the roadway pavement thickness may be as follows:

1. Wearing course - 2-in. asphaltic concrete.
2. Base course - 6-in. base course.
3. Subbase - 6-in. select borrow over
a prepared subgrade.

Provisions should be made in the contract documents to allow for local adjustments regarding select borrow subbase and borrow material 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 select borrow subbase or borrow courses.

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 thru the walls of the catch basins or subdrains that daylight should be placed at subgrade levels in these low areas.

Underground Utilities

Underground utilities should be placed after the fills are constructed.

The bottom of utility trenches should be daylighted and graded to shed water, particularly near the tops and toes of slopes. The backfill and drainage of these utility trenches should be carefully designed.

Flexible connections should be used.

Unforeseen Conditions

Because of the variability of soil deposits, site improvements, designs and construction techniques, conditions may be encountered that cannot be foreseen with even the most exhaustive studies of site and project conditions. These unforeseen conditions should be recognized and then evaluated so that the designs or the construction methods may be modified accordingly, if necessary.

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

Site Regrading

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

PROPOSED SPECIFICATION FOR EARTHWORK

NEWTOWN SITE "D"

General Description

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

Clearing, Grubbing and Preparing Areas to be Filled

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

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

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

The bottom and sides of gullies or natural drainageways shall be stripped down to stiff natural ground before the placement of fills.

Trenches shall be cut in a herringbone pattern and subdrains placed in the trenches to provide drainage paths for the bottom and sides of natural drainageways or dips before the placement of fills.

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

Materials

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

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

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

Placing, Spreading and Compacting Fill Material

The selected fill material shall be placed in level layers which, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and blade-mixed during the spreading to attain uniformity of material and water content within each layer.

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

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

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

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

Field density tests shall be made to get an indication of the compaction of the fill. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density readings shall be taken as often as necessary in the compacted material below the disturbed surface. When these readings indicate that the density of a layer of fill or portion thereof is below the required density, that layer or portion shall be reworked until the required density has been obtained.

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

Boulder Fills

If boulders are used for the construction of fills, they shall be generally placed along the toe section of slopes and outside of probable building sites. The subgrade shall be stripped to stiff natural ground,

shaped to drain and a transition layer of select granular material (6 in. to dust sizes) shall be placed on it. The boulders shall be placed on the select granular material. A transition layer of select granular material shall be placed against the boulders before construction of earth fills against the boulders. Earth fill may be used in the void spaces between boulders.

Excavation

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

Unforeseen Conditions

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

Rainy Weather

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

BORING LOGS

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

Symbols

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

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

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

NEWTOWN SITE "D"

1000

Boring Log

PROJECT NEWTOWN SITE "D"

LOCATION Waimalu, Ewa, Oahu, Hawaii

Tax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#

Drop 30'

SAMPLER:

2" STANDARD SPLIT SPOON

BORING NO.

Sheet No.

of

Driller W. LIM ASSOC., INC.

Date NOV. 21 & 26, 1973

Field Party KAKU, OSHIRO, SHIGENAGA

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

Elev. 187' ± *

Datum _____

Drill Bit T.C. DRAG

Baron: _____

Water Level ^{NOT} NOTICED

Time —

Date 11-21-72

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA				
										Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
(ML)	STIFF, DARK BROWN CLAYEY SILT W/ TRACES OF ROOTS			1-A	-	22	-	-	-					
(ML-MH)	STIFF, REDDISH BROWN CLAYEY SILT					20								
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT W/ DECOMPOSED ROCK	5		1-B	-	21	-	-	-					51
(MH)	STIFF MOTTLED GRAY CLAYEY SILT W/ DECOMPOSED ROCK	10		1-C	-	24 34	-	-	-					41
	MOTTLED BROWN DECOMPOSED ROCK W/ CLAYEY SILT	15		1-D	-	21	-	-	-					40% HAMMER BOUNCES
		20		1-E	-	ROCK FRAGMENT	-	-	-					40% HAMMER BOUNCES
	GRAY DECOMPOSED ROCK (PUKA PUKA ROCK)	25		1-F	-	18	-	-	-					41/0.3 HAMMER BOUNCES
	END OF BORING @ 30.2' 11-26-73	30		1-G	-	15	-	-	-					45/0.2 HAMMER BOUNCES
* ELEVATION ESTIMATED FROM TOPO MAP BY COMMUNITY PLANNING, INC. REC'D. NOVEMBER, 1973														

Boring Log

PROJECT NEWTOWN SITE "D"
 LOCATION Waimalu, Ewa, Oahu, Hawaii
 Tax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140 #Drop 30"

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

SAMPLER:

2" SS - 2" STANDARD SPLIT SPOON

BORING NO. 2 Sheet No. _____ of _____
 Driller W. LUM ASSOC. INC. Date Nov. 8, 1973
 Field Party MEYER, SHIGENAGA, KAKU
 Type of Boring AUGER (MOBILE) Diam. 4"
 Elev. 223' ± Datum _____
 Drill Bit FINGER TYPE
 Water Level NOT NOTICED
 Time _____
 Date 11-8-73

PENETRATION DATA

Standard
Penetration Test2" 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.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test	2" O.D. THIN WALL TUBE SAMPLER
	ELEV. = 223' ±	0									
(MH)	STIFF, REDDISH BROWN SILTY CLAY w/ TRACES OF ROOTS	2"	2" S	2-A	110	25	88	12300	-		4/0.5' 9/0.5'
(MH)	STIFF, BROWN CLAYEY SILT	5	2" SS	2-B	-	25	-	-	-		30/0.5'
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT w/ TRACES OF DECOMPOSED ROCK	10	2" S	2-C	123	26	98	-	-		12/0.5'
MH-CH	HARD, DARK BROWN SILTY CLAY	15	2" SS	2-D	PL: 38 LL: 87	28 30	-	-	-		48/0.5'
(MH-CH)	HARD, MOTTLED BROWN SILTY CLAY w/ DECOMPOSED ROCK	20	2" SS	2-E	-	27 29	-	-	-		40/0.5'
(MH)	HARD MOTTLED GRAY w/ BROWN SILTY CLAY w/ DECOMPOSED ROCK & COBBLES	25	2" SS	2-F	-	38	-	-	-		73
(MH)	COBBLES OR DECOM. ROCK HARD, MOTTLED GRAY w/ BROWN, SILTY CLAY w/ DECOMPOSED ROCK & COBBLES END OF BORING @ 30.5' 11-8-73	30	2" SS	2-G	-	27	-	-	-		50/0.5'
NOTE:					PL = PLASTIC LIMIT LL = LIQUID LIMIT						

*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

NEWTOWN SITE "D"

PROJECT NEWTOWN SITE "D"

LOCATION Waimalu, Ewa, Oahu, Hawaii

Tax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#

Drop 30"

SAMPLER:

2" SS-2" STANDARD SPLIT SPOON

BORING NO.

Sheet No.

of

Driller W. LUM ASSOC., INC.

Date Nov. 8, 1973

Field Party METER, SHIGENAGA, KAKU

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

Elev. 225' ±*

Datum _____

Elev. _____
Drill Bit FINGER TYPE

Date: _____

Water Level NOT
NOTICED

Time

Date _____

Unified Soil Classification	DESCRIPTION	Depth (ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA							
										Standard Penetration Test				2" O.D. THIN WALL TUBE SAMPLER			
										N (Blows per foot)				BLOWS/0.5'			
										0	10	20	30	40			
(MH)	STIFF, REDDISH BROWN SILTY CLAY W/TRACES OF ROOTS	0	2" S	3-A	120	24	97	15270	-							8/0.5'	10/0.1'
(MH)	STIFF, BROWN CLAYEY SILT	5	2" SS	3-B	-	24	-	-	-							30/0.5'	
MH	STIFF, BROWN CLAYEY SILT	10	2" S	3-C	95 PL= 36 LL= 50	28	74	-	-							8/0.5'	8/0.5'
(MH-CH)	HARD, MOTTLED BROWN SILTY CLAY	15	2" SS	3-D	-	29	-	-	-							35/0.5'	
CH	STIFF MOTTLED BROWN CLAY W/GRAY DECOMPOSED ROCK	20	2" S	3-E	114 PL= 35 LL= 114	31	87	24870	-							15/0.5'	
ML	STIFF, GRAY W/ BROWN CLAYEY SILT (DECOMPOSED ROCK)	25	2" SS	3-F	-	21	-	-	-							50/0.5'	
	END OF BORING @ 26'				PL= 36 LL= 49												
	11-8-73																
*ELEVATION ESTIMATED FROM TOPO MAP BY COMMUNITY PLANNING, INC. REC'D. NOVEMBER, 1973					NOTE: PL= PLASTIC LIMIT LL= LIQUID LIMIT												

Boring Log

PROJECT NEWTOWN SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#Drop 30"2" S-2" O.D. THIN WALL TUBESAMPLER: 2" SS-2" STANDARD SPLIT SPOONBORING NO. 4

Sheet No. _____ of _____

Driller W. LUM ASSOC., INC.Date Nov. 8, 1973Field Party METER, SHIGENAGA, KAKUType of Boring AUGER (MOBILE)Diam. 4"Elev. 232' ± *

Datum _____

Drill Bit FINGER TYPEWater Level NOT NOTICED

Time _____

Date 11-8-73

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.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test	2" O.D. THIN WALL TUBE SAMPLER
	ELEV. = 232' ± *	0									
(ML-MH)	STIFF, REDDISH BROWN CLAYEY SILT w/ TRACES OF ROOTS	0	2" SS	4-A	-	22	-	-	-		74
		5	2" S	4-B	92	21	76	-	-		10/0.5' 12/0.5'
(MH)	STIFF, DARK BROWN CLAYEY SILT	10	2" SS	4-C	-	25	-	-	-		58
(MH)	STIFF, BROWN SILTY CLAY	15	2" S	4-D	108	21	85	-	-		12/0.5' 20/0.5'
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT w/ DECOMPOSED ROCK	20	2" SS	4-E	-	27	-	-	-		54
(MH)	HARD GRAY w/ TRACES OF BROWN SILTY CLAY (DECOMPOSED ROCK) END OF BORING @ 26.5' 11-8-73	25	2" SS	4-F	-	35	-	-	-		66

* ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

NEWTOWN SITE "D"

Boring Log

PROJECT NEWTOWN SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#Drop 30"SAMPLER: 2" STANDARD SPLIT SPOONBORING NO. 5 Sheet No. of Driller W. LUM ASSOC., INC. Date DEC. 13 & 14, 1973Field Party ASATO, OSHIROType of Boring AUGER (MOBILE B-50) Diam. 4"Elev. 171' ± * Datum Drill Bit FINGER TYPEWater Level NOT NOTICEDTime Date 12-13-73

PENETRATION DATA

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
(MH)	STIFF, REDDISH BROWN SILTY CLAY	0		5-A	-	24	-	-	-					
(MH-CH)	HARD REDDISH BROWN & GRAY SILTY CLAY	5		5-B	-	28	-	-	-					60
	COBBLES OR BOULDERS	10												
		15		5-C	-	17	-	-	-					50/0.5
	MOTTLED GRAY DECOMPOSED ROCK	20		5-D	-	15	-	-	-					50/0.3
		25		5-E	-	NO RECOVER	-	-	-					HAMMER BOUNCES
	END OF BORING @ 25'													50/0.0
	12-14-73													HAMMER BOUNCES

* ELEVATION ESTIMATED FROM TOP MAP BY COMMUNITY PLANNING, INC. REC'D. NOVEMBER, 1973

NEWTOWN SITE "D"

Boring Log

PROJECT NEWTOWN SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#Drop 30"2" S - 2" O.D. THIN WALL TUBESAMPLER: 2" SS - 2" STANDARD SPLIT SPOONBORING NO. G Sheet No. of Driller W. LUM ASSOC. INC. Date NOV. 8 1973Field Party METER SHIGENAGA KAKUType of Boring AUGER (MOBILE B. 40) Diam. 4"Elev. 211' ± Datum Drill Bit FINGER TYPEWater Level NOT NOTICEDTime Date 11-9-73

PENETRATION DATA

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

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test	2" O.D. THIN WALL TUBE SAMPLER
	ELEV. = 211' ±	0									
(ML-MH)	STIFF, REDDISH BROWN CLAYEY SILT w/ TRACES OF ROOTS		2" S	G-A	103	21	85	4190	-		8/0.5' 10/0.5'
(ML)	STIFF, TAN BROWN CLAYEY SILT	5									
(MH)	STIFF, MOTTLED REDDISH BROWN, CLAYEY SILT		2" SS	G-B	-	22 26 21	-	-	-		
(MH)	STIFF, MOTTLED BROWN SILTY CLAY w/ TRACES OF DECOMPOSED ROCK										
MH	HARD MOTTLED REDDISH BROWN SILTY CLAY w/ TRACES OF DECOMPOSED ROCK	10	2" SS	G-C	-	31 PL= 38 LL= 70	-	-	-		50
		15	2" SS	G-D	-	36	-	-	-		65
(MH)	STIFF, MOTTLED GRAY & BROWN, CLAYEY SILT (DECOMPOSED ROCK)	20	2" SS	G-E	-	31	-	-	-		32/0.5'
		25	2" SS	G-F	-	43 PL= 45 LL= 72	-	-	-		40/0.5'
MH	STIFF, MOTTLED BROWN CLAYEY SILT & DECOMPOSED ROCK	30	2" SS	G-G	-	33	-	-	-		45/0.5'
	END OF BORING @ 30.5' 11-9-73										
* ELEVATION ESTIMATED FROM TOPO MAP BY COMMUNITY PLANNING, INC. REC'D. NOVEMBER, 1973					NOTE: PL= PLASTIC LIMIT LL= LIQUID LIMIT						

NEWTOWN SITE "D"

Boring Log

PROJECT NEWTOWN SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#Drop 30"SAMPLER: 2" STANDARD SPLIT SPOONBORING NO. 7

Sheet No. _____ of _____

Driller W. LUM ASSOC., INC.Date NOV. 21, 1973Field Party KAKI, OSHIRO, SHIGENAGAType of Boring AUGER (VERSA DRILL)Diam. 4"Elev. 210' ± *

Datum _____

Drill Bit T.C. DRAGWater Level NOT NOTICED

Time _____

Date 11-21-73

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified
Soil
Classification

DESCRIPTION

Depth (Ft.)

Sampler

Sample No.

Wet Dens.
P.C.F.Water Cont.
%Dry Dens.
P.C.F.Unconf. Comp.
P.S.F.Vane Shear
P.S.F.

(MH)

STIFF, MOTTLED BROWN
SILTY CLAY w/
DECOMPOSED ROCK &
TRACES OF ROOTS

0

7-A

-

26

-

-

-

10/0.5

(MH)

STIFF, MOTTLED BROWN-GRAY
CLAYEY SILT w/ROOTS
(DECOMPOSED ROCK)

5

7-B

-

27

-

-

-

55

7-C

-

25

-

-

-

40/0.5

NOTE: GO' TO
20 MIN. DRILL
MOVED HOLE 2' AWAY.DECOMPOSED ROCK
w/COBBLES OR BOULDERS

10

7-D

-

NO

RECOVERY

-

-

40/0.1

HAMMER
BOUNCES

15

7-E

-

NO

RECOVERY

-

-

40/0.0

HAMMER
BOUNCESEND OF BORING @ 17'
11-21-73*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

NEWTOWN SITE "D"

Boring Log

PROJECT NEWTOWN SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#Drop 30"SAMPLER: 2" O.D. THIN WALL TUBEBORING NO. 8 Sheet No. _____ of _____Driller W. LUM ASSOC., INC. Date JAN. 5, 1974Field Party KAKU SHIROMA, PICONEType of Boring AUGER (MOBILE MINUTEMAN) Diam. 3"Elev. 212' ± * Datum —Drill Bit I.C. DRAGWater Level NOT NOTICEDTime —Date 1-5-74

PENETRATION DATA

Standard
Penetration Test2" O.D. THIN
WALL TUBE
SAMPLER

N (Blows per foot)

0 10 20 30 40

BLOWS/10.5'

4/0.5' 23/0.3'

Unified
Soil
Classification

DESCRIPTION

Depth (Ft.)

Sampler

Sample No.

Wet Dens.
P.C.F.Water Cont.
%Dry Dens.
P.C.F.Unconf. Comp.
P.S.F.Vane Shear
P.S.F.

(MH)

ELEV. = 212' ± *

MEDIUM, REDDISH BROWN
CLAYEY SILT
GRAY, DECOMPOSED ROCK
W/CLAYEY SILT
BLUE, ROCK ?

END OF BORING @ 3'
1-5-74

NOTE: ROUGH DRILLING

*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

NEWTOWN SITE "D"

Boring Log

PROJECT NEWTOWN SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#Drop 30"2" S - 2" O.D. THIN WALL TUBESAMPLER: 2" S.S. - 2" STANDARD SPLIT SPOONBORING NO. 9 Sheet No. _____ of _____Driller W. LUM ASSOC., INC. Date JAN. 5, 1973Field Party KAKU, SHIROMA, PIGONEType of Boring AUGER (MOBILE MINUTEMAN) Diam. 3"Elev. 102' ±* Datum _____Drill Bit T.C. DRAGWater Level NOT NOTICED

Time _____

Date 1-5-74

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA									
										Standard Penetration Test					2" O.D. THIN WALL TUBE SAMPLER				
										N (Blows per foot)					BLOWS/0.5'				
										0	10	20	30	40					
(MH)	ELEV. = 182' ± * 20 STIFF, RED BROWN CLAYEY SILT		2" S	9-A	118	29	92	8430	-							5/0.5 7/0.5 5/0.5			
	TAN, DECOMPOSED ROCK																		
(MH)	HARD, MOTTLED GRAY BROWN SILTY CLAY W/ TRACES OF DECOMPOSED ROCK	5	2" SS	9-B	-	22	-	-	-							43/0.5			
(MH)	STIFF, GRAY BROWN CLAYEY SILT w/ DECOMPOSED ROCK					22	-	-	-										
	GOBBLE, BOULDER OR ROCK																		
	END OF BORING @ 6.4'																		
	1-5-74																		
*ELEVATION ESTIMATED FROM TOPO MAP BY COMMUNITY PLANNING, INC. REC'D. NOVEMBER, 1973																			

*ELEVATION ESTIMATED FROM TOPO MAP BY COMMUNITY PLANNING, INC. REC'D. NOVEMBER, 1973

NEWTOWN SITE "D"

Boring Log

PROJECT NEWTOWN SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#Drop 30"

SAMPLER:

2" STANDARD SPLIT SPOONBORING NO. 10 Sheet No. of Driller W. LUM ASSOC. INC. Date Nov. 17, 1973Field Party METER, SHIGENAGA, KAUType of Boring AUGER (VERSA DRILL) Diam. 4"Elev. 206' ± * Datum Drill Bit T.O. DRAGWater Level NOT NOTICEDTime Date 11-17-73

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test N (Blows per foot)
	ELEV. = 206' ± *	0								
(MH)	STIFF, BROWN CLAYEY SILT w/ TRACES OF ROOTS	5		10-A	-	21	-	-	-	
(MH)	HARD, MOTTLED BROWN SILTY CLAY w/ GRAY DECOMPOSED ROCK	10		10-B	-	24	-	-	-	
	GRAY, BROWN & RED DECOMPOSED ROCK w/ COBBLES OR BOULDERS	15		10-C	-	29	-	-	-	57
		20		10-D	-	NOT ENOUGH RECOVER	-	-	-	50/0.4 HAMMER BOUNCES
		25		10-E	-	ROCK FRAGMENTS	-	-	-	50/0.3 HAMMER BOUNCES
				10-F	-	NO RECOVERY	-	-	-	10/0.0

* ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

NEWTOWN SITE "D"

Boring Log

PROJECT NEWTOWN SITE "D"BORING NO. 11 Sheet No. of LOCATION Waimalu, Ewa, Oahu, HawaiiDriller W. LUM ASSOC., INC. Date Nov. 15, 1973Tax Map Key: 9-8-02: Por. 9Field Party RADOVICH, OSHIRO, OMORIType of Boring AUGER (MOBILE B-50) Diam. 4"

HAMMER:

Elev. 200' ± * Datum Weight 140 #Drill Bit FINGER TYPEDrop 30"Water Level NOT NOTICEDSAMPLER: 2" STANDARD SPLIT SPOONTime Date 11-15-73

PENETRATION DATA

Standard Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified Soil Classification

DESCRIPTION

Depth (Ft.)

Sampler

Sample No.

Wet Dens. P.C.F.

Water Cont. %

Dry Dens. P.C.F.

Unconf. Comp. P.S.F.

Vane Shear P.S.F.

(ML-MH)

STIFF, REDDISH BROWN
CLAYEY SILT
W/ TRACES OF ROOTSROCK OR BOULDER
W/ CLAYEY SILT

MH

STIFF, MOTTLED BROWN
SILTY CLAY W/
DECOMPOSED ROCKGRAY
DECOMPOSED ROCK
(SOME CRUSHES TO)
CLAYEY SILTEND OF BORING @ 15.4'
11-15-73

NOTE:

PL = PLASTIC LIMIT
LL = LIQUID LIMIT

NEWTOWN SITE "D"

Boring Log

PROJECT NEWTOWN SITE "D"BORING NO. 12 Sheet No. of Driller W. LUM ASSOC., INC. Date JAN. 4 & 5, 1974LOCATION Waimalu, Ewa, Oahu, HawaiiField Party SHIROMA, PIONE, KAKUTax Map Key: 9-8-02: Por. 9Type of Boring ALGER (MOBILE MINUTEMAN) Diam. 3"

HAMMER:

Elev. 153 ± * Datum Weight 140#Drill Bit I.O. DRAGDrop 30"Water Level NOT NOTICEDTime SAMPLER: 2" STANDARD SPLIT SPOONDate 1-5-74

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test				
	ELEV. = 153 ± *									N (Blows per foot)				
										0	10	20	30	40
(MH)	STIFF, RED BROWN CLAYEY SILT			12-A	-	33	-	-	-					
(MH)	STIFF, BROWN SILTY CLAY W/ TRACES OF DECOMPOSED ROCK	5		12-B	-	20 31	-	-	-					
	MOTTLED BROWN DECOMPOSED ROCK													
	MOTTLED GRAY DECOMPOSED ROCK W/ SILTY SAND	10		12-C	-	26	-	-	-					4% .5'
	MOTTLED BROWN & GRAY DECOMPOSED ROCK W/ SILTY SAND	15		12-D	-	29	-	-	-					
	END OF BORING @ 16.5 1-5-74													

*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

NEWTOWN SITE "D"

Boring Log

PROJECT NEWTOWN SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#Drop 30"SAMPLER: 2" STANDARD SPLIT SPOONBORING NO. 13 Sheet No. _____ of _____Driller W. LUM ASSOC., INC. Date Nov. 17, 1973Field Party MEYER, SHIGENAGA, KAUType of Boring AUGER (VERSA DRILL) Diam. 4"Elev. 185 ± *

Datum _____

Drill Bit T.C. DRAGWater Level NOTNOTICED

Time _____

Date 11-17-73

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test N (Blows per foot)
(ML-MH)	STIFF, BROWN CLAYEY SILT W/ TRACES OF TAN. DECOMPOSED ROCK	0		13-A	-	21	-	-	-	
(MH)	STIFF, REDDISH BROWN SILTY CLAY W/ TRACES OF ROOTS	5		13-B	-	30	-	-	-	42
(MH)	STIFF, GRAY BROWN, LIGHT BROWN & RED CLAYEY SILT (DECOMPOSED ROCK)	10		13-C	-	32	-	-	-	
(MH)	STIFF LIGHT BROWN & GRAY CLAYEY SILT (DECOMPOSED ROCK)	15		13-D	-	11	-	-	-	50/0.3
	DECOMPOSED ROCK W/ COBBLES	20		13-E	-	NO	RECOVERY	-	-	10/0.0
	END OF BORING @ 20' 11-17-73									

*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

NEWTOWN SITE

Boring Log

PROJECT NEWTOWN SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#Drop 30"SAMPLER: 2" STANDARD SPLIT SPOONBORING NO. 14 Sheet No. of Driller W. LUM ASSOC., INC. Date Nov. 16, 1973Field Party OSHIRO, KAUType of Boring AUGER (MOBILE B-50) Diam. 4"Elev. 178' ± * Datum Drill Bit FINGER TYPEWater Level NOT NOTICEDTime Date 11-16-73

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA				
	ELEV. = 178' ± *	0												
(MH)	STIFF TO HARD REDDISH BROWN SILTY CLAY w/ROOTS	0		14-A	-	22	-	-	-					
		5		14-B	-	19	-	-	-					56
(MH-CH)	HARD, DARK BROWN SILTY CLAY	5		14-C	-	25	-	-	-					73
		10		14-D	-	21	-	-	-					50/0.3
	GRAY, BROWN & RED DECOMPOSED ROCK w/COBBLES & Boulders	15		14-E	-									50/0.2
		20		14-F	-									50/0.3
	END OF BORING @ 20.8'													
	11-16-73													

*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

NEWTOWN SITE "D"

Boring Log

PROJECT NEWTOWN SITE "D"BORING NO. 15 Sheet No. of Driller W. LUM ASSOC., INC. Date JAN. 4, 1974LOCATION Waimalu, Ewa, Oahu, HawaiiField Party SHIROMA, PICONETax Map Key: 9-8-02: Por. 9Type of Boring Auger (MOBILE MANTLEMAN) Diam. 3"

HAMMER:

Elev. 125' ± * Datum Weight 140 #Drill Bit T.C. DRAGDrop 30"Water Level NOT NOTICED

SAMPLER:

Time 1:50 PM2" S - 2" O.D. THIN WALL TUBE
2" SS - 2" STANDARD SPLIT SPOONDate 1-4-74

PENETRATION DATA

Standard
Penetration Test2" O.D.
THIN WALL
TUBEN (Blows per foot)
0 10 20 30 40

BLOWS/0.5'

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test	2" O.D. THIN WALL TUBE
	ELEV. = 125' ± *	0									
(MH)	MEDIUM, RED BROWN CLAYEY SILT W/ TRACES OF ROOTS	0	2" SS	15-A	-	33	-	-	-		
(MH-CH)	MEDIUM-STIFF MOTTLED RED BROWN & GRAY, SILTY CLAY	5	2" S	15-B	125	29	97	32, 110	-		5/0.5 7/0.5 8/0.5
(MH)	HARD, MOTTLED BROWN CLAYEY SILT W/ SAND & TRACES OF DECOMPOSED ROCK	10	2" SS	15-C	-	33	-	-	-		56
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT W/ SAND & BLUE GRAY DECOMPOSED ROCK	15	2" SS	15-D	-	33	-	-	-		62
	END OF BORING @ 16.5 1-4-74										

*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

NOTE:

PL = PLASTIC LIMIT
LL = LIQUID LIMIT

Boring Log

PROJECT NEWTOWN SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140 #Drop 30"

SAMPLER:

2" STANDARD SPLIT SPOONBORING NO. 1G Sheet No. of Driller W. LUM ASSOC., INC. Date DEC. 14, 1973Field Party ASATO, OSHIROType of Boring AUGER (MOBILE) Diam. 4"Elev. 155 ± * Datum Drill Bit FINGER TYPEWater Level NOTICEDTime Date 12-14-73

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified Soil Classification	DESCRIPTION	Depth (ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test N (Blows per foot)				
	ELEV. = 155 ± *	0								0	10	20	30	40
(MH)	STIFF, REDDISH BROWN SILTY CLAY			1G-A	-	25	-	-	-					
	COBBLE OR BOULDER			1G-B	-	25	-	-	-					40/0.2
(MH)	STIFF, TAN BROWN CLAYEY SILT W/ TRACES OF DECOMPOSED ROCK	5		1G-C	-	24	-	-	-					
	MOTTLED GRAY BROWN DECOMPOSED ROCK	10		1G-D	-	20	-	-	-					50/0.5
		15		1G-E	-	29	-	-	-					50/0.3
		20		1G-F	-	17	-	-	-					50/0.5
	END OF BORING @ 20.5' 12-14-73													

*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

NEWTOWN SITE "D"

Boring Log

PROJECT NE TO N SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140 #Drop 30"

SAMPLER:

2" STANDARD SPLIT SPOONBORING NO. 17

Sheet No. _____ of _____

Driller W. LUM ASSOC., INC.Date DEC. 14, 1973Field Party ASATO, OSHIROType of Boring AUGER (MOBILE)Diam. 4"Elev. 164' ± *

Datum _____

Drill Bit FINGER TYPEWater Level NOT

Time _____

Date 12-14-73

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified
Soil
Classification

DESCRIPTION

ELEV. = 164' ± *

Depth (Ft.)

Sampler

Sample No.

Wet Dens.
P.C.F.Water Cont.
%Dry Dens.
P.C.F.Unconf. Comp.
P.S.F.Vane Shear
P.S.F.

(MH)

STIFF, REDDISH BROWN
SILTY CLAY

COBBLE OR BOULDER ?

GRAY, DECOMPOSED
ROCK FRAGMENTSMOTTLED GRAY BROWN
DECOMPOSED ROCKGRAY
ROCK FRAGMENTSEND OF BORING @ 20'
12-14-73*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

17-A

17-B

17-C

17-D

17-E

17-F

25

23

28

ROCK FRAGMENT

22

ROCK FRAGMENT

44

4% .1'

HAMMER
BOUNCES

50% .5'

4% .0'

HAMMER
BOUNCES

Boring Log

PROJECT NEWTOWN SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#Drop 30"

SAMPLER:

2" STANDARD SPLIT SPOONBORING NO. 18 Sheet No. of Driller W. LUM ASSOC., INC. Date Nov. 19, 1973Field Party MEYER, KAU, OSHIROType of Boring AUGER (MOBILE) Diam. 4"Elev. 167'± Datum Drill Bit T.C. DRAGWater Level NOT NOTICEDTime Date 11-19-73

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified
Soil
Classification

DESCRIPTION

ELEV. = 167'±²

Depth (Ft.)

Sampler

Sample No.

Wet Dens.
P.C.F.Water Cont.
%Dry Dens.
P.C.F.Unconf. Comp.
P.S.F.Vane Shear
P.S.F.

(MH-CH)

STIFF TO HARD
REDDISH BROWN
SILTY CLAY
w/TRACES OF ROOTS0
518-A
18-B

-

19

-

-

-

-

(MH)

HARD, REDDISH BROWN
SILTY CLAY5
10

18-C

-

20

-

-

-

-

(MH)

STIFF, GRAY
CLAYEY SILT w/
DECOMPOSED ROCK10
15

18-D

-

33

-

-

-

-

(MH)

GRAY, DECOMPOSED ROCK
w/LOBBLES OR BOULDERS15
2018-E
18-F

-

NO RECOVERY

-

-

-

-

-

NO RECOVERY

-

-

-

-

END OF BORING @ 20'
11-19-73*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

30%0.5'

70

55

20%0.0'

20%0.0'

NEWTOWN SITE "D"

Boring Log

PROJECT NEWTOWN SITE "D"BORING NO. 19 Sheet No. _____ of _____Driller W. LUM ASSOC., INC. Date NOV. 15, 1973LOCATION Waimalu, Ewa, Oahu, HawaiiField Party RADOVICH, OSHIRO, OMORITax Map Key: 9-8-02: Por. 9Type of Boring AUGER (MOBILE B-50) Diam. 4"

HAMMER:

Elev. 175' ± Datum _____Weight 140 #Drill Bit FINGER TYPEDrop 30"Water Level NOT NOTICED

Time _____

SAMPLER: 2" STANDARD SPLIT SPOONDate 11-15-73

PENETRATION DATA

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

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.					
	ELEV. = 175' ±	0												
(MH)	STIFF, REDDISH BROWN CLAYEY SILT			19-A	-	21	-	-	-					
(MH)	HARD, REDDISH BROWN SILTY CLAY w/ TRACES OF DECOMPOSED ROCK	5		19-B	-	28	-	-	-				45	
		10		19-C	-	21	-	-	-				65	
	GRAY DECOMPOSED ROCK (CRUSHES TO CLAYEY SILT)	15		19-D	-	18	-	-	-				40/0.3	
	END OF BORING @ 15.3' 11-15-73													

*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

NEWTOWN SITE "D"

PROJECT NEWTOWN SITE "D"

LOCATION Waimalu, Ewa, Oahu, Hawaii

Tax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140[#]

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 20 Sheet No. _____ of _____
 Driller W. LUM ASSOC., INC. Date JAN. 16, 1974
 Field Party OSHIRO, OMORI, SHIROMA
 Type of Boring AUGER (MOBILE MINUTEMAN) Diam. 3"
 Elev. 136' ±* Datum —
 Drill Bit T.C. DRAG

Water Level	<u>NOT NOTICED</u>			
Time	<u>—</u>			
Date	<u>1-16-74</u>			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA				
										Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
(MH)	ELEV. = 136 ± * MEDIUM, REDDISH BROWN SILTY CLAY			20-A	-	32	-	-	-					
(MH)	STIFF, MOTTLED RED-BROWN SILTY CLAY 1/2 GRAVEL (DECOMPOSED ROCK)			20-B	-	32 33	-	-	-					
(MH)	STIFF, MOTTLED RED-BROWN CLAYEY SILT	5		20-C	-	30	-	-	-					43
(MH)	STIFF, MOTTLED GRAY-BROWN CLAYEY SILT w/ TRACES OF DECOMPOSED ROCK			20-D	-	29 ROCK FRAGMENT	-	-	-					30/0.5'
(CH)	COBBLE OR BOULDER	10												
(CH)	HARD, BROWN CLAY	15		20-E	-	29 33	-	-	-					30/0.5'
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT w/ TRACES OF DECOMPOSED ROCK	20		20-F	-	24	-	-	-					34/0.5'
(MH)	COBBLE OR BOULDER													
(MH)	STIFF, BROWN SANDY SILT w/ DECOMPOSED ROCK	25		20-G	-	35	-	-	-					50/0.5'
	END OF BORING @ 25.5' 1-16-74													
* ELEVATION ESTIMATED FROM TOPD MAP BY COMMUNITY PLANNING, INC. REC'D. NOVEMBER, 1973														

Boring Log

PROJECT NEWTOWN SITE "D"

LOCATION Waimalu, Ewa, Oahu, Hawaii

Tax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 21 Sheet No. of

Driller W. LUM ASSOC. INC. Date NOV. 23 & DEC. 3, 1973

Field Party KAKU, SHIGENAGA, KAU, RAEDVICAL

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

Elev. 115' ± Datum

Drill Bit FINGER TYPE

Water Level	NOT NOTICED	NOT NOTICED			
Time					
Date	11-28-73	12-3-73			

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test
	ELEV. = 115' ± *2	0								
(MH)	STIFF, DARK REDDISH BROWN SILTY CLAY w/ TRACES OF ROOTS			21-A	-	29	-	-	-	
(MH)	STIFF, REDDISH BROWN CLAYEY SILT w/ TRACES OF ROOTS			21-B	-	25	-	-	-	54
MH	STIFF, BROWN CLAYEY SILT			21-C	-	29	-	-	-	77
CH	HARD, DARK BROWN CLAY			21-D	PL = 40 LL = 63 PL = 41 LL = 120	31 32	-	-	-	59/0.4'
(MH)	HARD, MOTTLED BROWN SILTY CLAY w/ TRACES OF ROOTS & DECOMPOSED ROCK			21-E	-	28	-	-	-	42/0.5'
				21-F	-	29	-	-	-	59/0.5'
	GRAY DECOMPOSED ROCK (CRUSHES TO CLAYEY SILT)			21-G	-	18	-	-	-	59/0.1'
	END OF BORING @ 25.1'									
	12-3-73									
*ELEVATION ESTIMATED FROM TOPO MAP BY COMMUNITY PLANNING, INC. REC'D. NOVEMBER, 1973					NOTE: PL = PLASTIC LIMIT LL = LIQUID LIMIT					

Boring Log

PROJECT NEWTOWN SITE "D"BORING NO. 22 Sheet No. _____ of _____LOCATION Waimalu, Ewa, Oahu, HawaiiDriller W. LUM ASSOC., INC. Date NOV. 28, 1973Tax Map Key: 9-8-02: Por. 9Field Party KAKU, SHIGEMURA, KAUType of Boring AUGER (B-50) Diam. 4"

HAMMER:

Elev. 129' ± * Datum _____Weight 140#Drill Bit FINGER TYPEDrop 30"Water Level NOT NOTICED

Time _____

SAMPLER: 2" STANDARD SPLIT SPINDate 11-28-73

PENETRATION DATA

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

DESCRIPTION

Depth (Ft.)

Sampler

Sample No.

Wet Dens.
P.C.F.Water Cont.
%Dry Dens.
P.C.F.Unconf. Comp.
P.S.F.Vane Shear
P.S.F.

(MH)

STIFF, DARK REDDISH BROWN
SILTY CLAY w/ TRACES OF ROOTS

(MH)

STIFF, REDDISH BROWN
SILTY CLAY

(MH)

STIFF, MOTT. REDDISH BROWN
SILTY CLAY w/ TRACES OF ROOTS
& DECOMPOSED ROCK

(CH)

HARD, BROWN
CLAY

(SM)

GRAY-BROWN
DECOMPOSED ROCK
(CRUSHES TO
SILTY CLAY)DENSE, MOTTLED BROWN
SILTY SAND
& DECOMPOSED ROCKEND OF BORING @ 21.0'
11-28-73*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 197345/0.5'
HAMMER
BOUNCES71
HAMMER
BOUNCES

50/0.5'

Boring Log

PROJECT NEWTOWN SITE "D"LOCATION Waimalu, Ewa, Oahu, HawaiiTax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140 #Drop 30"SAMPLER: 2" STANDARD SPLIT SPOONBORING NO. 23 Sheet No. _____ of _____Driller W. LUM ASSOC., INC. Date NOV. 19, 1973Field Party METER, KAU, OSHIROType of Boring AUGER (MOBILE) Diam. 4"Elev. 130' ± * Datum —Drill Bit T.C. DRAGWater Level NOT NOTICEDTime —Date 11-19-73

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified
Soil
Classification

DESCRIPTION

ELEV. = 130' ± *

Depth (Ft.)

Sampler

Sample No.

Wet Dens.
P.C.F.Water Cont.
%Dry Dens.
P.C.F.Unconf. Comp.
P.S.F.Vane Shear
P.S.F.

(MH)

STIFF, REDDISH BROWN
CLAYEY SILT
w/ TRACES OF ROOTS

5

(MH)

HARD, MOTTLED BROWN
SILTY CLAY w/
DECOMPOSED ROCK

10

MOTTLED LIGHT BROWN
DECOMPOSED ROCK
(CRUSHES TO
CLAYEY SILT)

15

DECOMPOSED ROCK
OR BOULDER

20

END OF BORING @ 20'
11-19-73

23-A

-

22

23-B

-

25

PL =

43

LL =

91

23-C

-

31

23-D

-

12

45

40/0.5

50/0.2

* ELEVATION ESTIMATED
FROM TOP MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

NOTE:

PL = PLASTIC LIMIT
LL = LIQUID LIMIT

Boring Log

PROJECT NEWTOWN SITE "D"BORING NO. 24 Sheet No. _____ of _____Driller W. LUM ASSOC., INC. Date Nov. 19, 1973LOCATION Waimalu, Ewa, Oahu, HawaiiField Party METER, KAU, OSHIROTax Map Key: 9-8-02: Por. 9Type of Boring AUGER (MOBILE) Diam. 4"

HAMMER:

Elev. 137' ± Datum _____Weight 140#Drill Bit T.C. DRAGDrop 30"Water Level NAT. TIDESAMPLER: 2" STANDARD SPLIT SPOON

Time _____

Date 11-19-73

PENETRATION DATA

Standard
Penetration Test

N (Blows per foot)

0 10 20 30 40

Unified
Soil
Classification

DESCRIPTION

ELEV. = 137' ±

Depth (Ft.)

Sampler

Sample No.

Wet Dens.
P.C.F.Water Cont.
%Dry Dens.
P.C.F.Unconf. Comp.
P.S.F.Vane Shear
P.S.F.

(ML)

STIFF, REDDISH BROWN
CLAYEY SILT

24-A

20

(MH)

HARD, REDDISH BROWN
SILTY CLAY

24-B

22

45

TAN GRAY BROWN
DECOMPOSED ROCK
(CRUSHES TO
SILTY SAND)

24-C

32

25% 0.2'

DECOMPOSED ROCK
OR BOULDER

24-D

NO RECOVERY

40% 0.2'

END OF BORING @ 17'
11-19-73*ELEVATION ESTIMATED
FROM TOPO MAP BY
COMMUNITY PLANNING, INC.
REC'D. NOVEMBER, 1973

Boring Log

PROJECT NEWTOWN SITE "D"

LOCATION Waimalu, Ewa, Oahu, Hawaii

Tax Map Key: 9-8-02: Por. 9

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 25 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date Nov. 16 & 19, 1973

Field Party OSHIRO, KAU, MEYER

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

Elev. 139' ± * Datum _____

Elev. _____

Drill Bit FINGER TYPE

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

Time					
------	--	--	--	--	--

Date	11-16-73				
------	----------	--	--	--	--

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA				
										Standard Penetration Test				
										N (Blows per foot)				
										0	10	20	30	40
(MH)	MEDIUM TO STIFF. REDDISH BROWN SILTY CLAY w/ TRACES OF ROOTS	0		25-A	-	22	-	-	-					
		5		25-B	-	32	-	-	-					44% _{0.5}
		10		25-C	-	22	-	-	-					48% _{0.3}
		15		25-D	-	20	-	-	-					50% _{0.3}
		20		25-E	-									39% _{0.0}
	END OF BORING @ 25' 11-19-73	25												
*ELEVATION ESTIMATED FROM TOPO MAP BY COMMUNITY PLANNING, INC. REC'D. NOVEMBER, 1973														

NEWTOWN - SITE "D"

BORING NO. 26 Sheet No. _____ of _____

Driller W. LHM ASSOC., INC. Date Nov. 15 & 16, 1973

Field Party RADOVICH, OSHIRO, OMORI

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

Elev. 144' ± * Datum —

Drill Bit FINGER TYPE

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

Time	1	2	3	4	5
------	---	---	---	---	---

Date	11-16-73				
------	----------	--	--	--	--

Unified Soil Classification	DRILL RATE	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA				
											Standard Penetration Test				
											N (Blows per foot)				
											0	10	20	30	40
CL-CH		STIFF, REDDISH BROWN SILTY CLAY W/ TRACES OF ROOTS	0		26-A	-	22	-	-	-					
CH		HARD, BROWN CLAY	5		26-B	-	20	-	-	-					66
(MH)		STIFF, REDDISH BROWN CLAYEY SILT W/ DECOMPOSED ROCK	10		26-C	-	32	-	-	-					
		MOTTLED BROWN DECOMPOSED ROCK	15		26-D										40/10.3
		ROCK OR BOULDER END OF BORING @ 16' 11.16.73	20		26-E										50/0.1
											HAMMER BOUNCES				
											NOTE				
											LL = LIQUID LIMIT PL = PLASTIC LIMIT				
*ELEVATION ESTIMATED FROM TOPO MAP BY COMMUNITY PLANNING, INC. REC'D. NOVEMBER, 1973															

NEWTOWN SITE "D"

TABLE I A - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	1	2
SAMPLE NO.	SURFACE	D
DEPTH BELOW SURFACE		15'-16'
DESCRIPTION	DARK BROWN CLAYEY SILT	DARK BROWN SILTY CLAY
GRAIN-SIZE ANALYSIS (% Passing)		
Sieve		
1"		
1/2"		
#4		
#10		
#20		
#40		
#100		
#200		
ATTERBERG LIMITS		
Air Dried or Natural	NATURAL	NATURAL
Liquid Limit	51	87
Plastic Limit	32	38
Plasticity Index	19	49
Dilatancy	MEDIUM	SLOW
Toughness	MEDIUM	MEDIUM
Dry Strength	SLIGHT-MED.	MED.-HIGH
UNIFIED SOIL CLASSIFICATION	MH	MH-CH
APPARENT SPECIFIC GRAVITY	2.89	
EXPANSION AND CBR TESTS (Surcharge-51 P.S.F.)		
Molding Moisture, %	29	
Molding Dry Density, P.C.F.	94	
Swell upon saturation, %	0.3	
CBR at 0.1" Penetration	9.3	
MOISTURE-DENSITY RELATIONS OF SOILS (AASHTO T-180-73I Method)	A	
Dry to Wet or Wet to Dry	DRY TO WET	
Max. Dry Density (P.C.F.)	97	
Optimum Moisture (%)	27	

REMARKS:

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

Date 2-5-74 By BT

NEWTOWN SITE "D"

TABLE I B - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	3	3	3	3
SAMPLE NO.	SURFACE	C	E (JDP)	F
DEPTH BELOW SURFACE		10.0'-11.0'	20.0'-20.5'	25.0'-26.0'
DESCRIPTION	BROWN SILTY CLAY	BROWN CLAYEY SILT	MOTTLED BROWN CLAY W/GRAY DECOMP. ROCK	GRAY W/BROWN CLAYEY SILT (DECOMP. ROCK)
GRAIN-SIZE ANALYSIS				
(% Passing)				
Sieve				
1"	100.0			
1/2"	100.0			
#4	100.0			
#10	99.5			
#20	97.9			
#40	96.6			
#100	95.4			
#200	94.6			
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL	NATURAL	NATURAL
Liquid Limit	50	58	114	49
Plastic Limit	29	36	35	36
Plasticity Index	21	22	79	13
Dilatancy	MEDIUM	MED.-SLOW	SLOW	MEDIUM
Toughness	MEDIUM	MEDIUM	MED.-HIGH	MED.-SLIGHT
Dry Strength	MEDIUM	SLIGHT-MED	HIGH	MEDIUM
UNIFIED SOIL CLASSIFICATION				
	ML - MH	MH	CH	ML
APPARENT SPECIFIC GRAVITY				
	2.97			
EXPANSION AND CBR TESTS				
(Surcharge-51 P.S.F.)				
Molding Moisture, %	24.9			
Molding Dry Density, P.C.F.	97.4			
Swell upon saturation, %	1.3			
CBR at 0.1" Penetration	7.4			
MOISTURE-DENSITY RELATIONS OF SOILS				
(AASHTO T-180-73I Method)	A			
Dry to Wet or Wet to Dry	WET TO DRY			
Max. Dry Density (P.C.F.)	101			
Optimum Moisture (%)	25			

REMARKS:

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

Date 2-5-74 By BT

NEWTOWN SITE "D"

TABLE I C - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	6	6	11	13
SAMPLE NO.	C	F	C	SURFACE
DEPTH BELOW SURFACE	10.0'-11.5'	25.0'-26.0'	5.0'-6.5'	
DESCRIPTION	MOTTLED REDDISH- BROWN SILTY CLAY	MOTTLED BROWN CLAYEY SILT & DECOMPOSED ROCK	MOTTLED BROWN SILTY CLAY W/DECOMPOSED ROCK	REDDISH- BROWN SILTY CLAY
GRAIN-SIZE ANALYSIS (% Passing)				
Sieve				
1"				100.0
1/2"				99.7
#4				98.5
#10				97.3
#20				95.3
#40				93.6
#100				91.1
#200				90.0
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL	NATURAL	NATURAL
Liquid Limit	70	72	67	53
Plastic Limit	38	45	40	33
Plasticity Index	32	27	27	20
Dilatancy	SLOW-NONE	MEDIUM	SLOW	MEDIUM
Toughness	MEDIUM	MEDIUM	MEDIUM	MEDIUM
Dry Strength	MED-HIGH	MEDIUM	MED-HIGH	MEDIUM
UNIFIED SOIL CLASSIFICATION	MH	MH	MH	MH
APPARENT SPECIFIC GRAVITY				2.82
EXPANSION AND CBR TESTS (Surcharge-51 P.S.F.)				
Molding Moisture, %				25.8
Molding Dry Density, P.C.F.				95.9
Swell upon saturation, %				1.8
CBR at 0.1" Penetration				5.7
MOISTURE-DENSITY RELATIONS OF SOILS (AASHTO T-180-73I Method)				A
Dry to Wet or Wet to Dry				DRY TO WET
Max. Dry Density (P.C.F.)				98
Optimum Moisture (%)				26

REMARKS:

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

Date 2-5-74 By RT

NEWTOWN SITE "D"

TABLE I D - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	15	21	21
SAMPLE NO.	C	C	D (TOP)
DEPTH BELOW SURFACE	10'-11.5'	5'-6.5'	10'-10.9'
DESCRIPTION	MOTTLED BROWN CLAYEY SILT W/ SAND & TRACES OF DECOMP. ROCK	BROWN CLAYEY SILT	DARK BROWN CLAY
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	62	63	120
Plastic Limit	39	40	41
Plasticity Index	23	23	79
Dilatancy	MEDIUM	MEDIUM	SLOW
Toughness	MEDIUM	MEDIUM	MED-HIGH
Dry Strength	MEDIUM	MEDIUM	HIGH
UNIFIED SOIL CLASSIFICATION	MH	ML	CH
APPARENT SPECIFIC GRAVITY			
CBR TEST			
(Surcharge-51 P.S.F.)			
Molding Moisture, %			
Molding Dry Density, P.C.F.			
Swell upon saturation, %			
CBR at 0.1" Penetration			
MOISTURE-DENSITY RELATIONS OF SOILS			
(AASHTO T-180-73I, Method)			
Dry to Wet or Wet to Dry			
Max. Dry Density (P.C.F.)			
Optimum Moisture (%)			

REMARKS:

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

Date 7-9-74 By BT

NEWTOWN SITE "D"

TABLE I E - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	23	23	26	26
SAMPLE NO.	SURFACE	B	A	B
DEPTH BELOW SURFACE		5'-6.5'	0.5'-2.0'	2.5'-4.0'
DESCRIPTION	REDDISH-BROWN SILTY CLAY	MOTTLED BROWN SILTY CLAY W/ DECOMP. ROCK	REDDISH-BROWN SILTY CLAY W/ TRACES OF ROOTS	BROWN CLAY
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	57	91	50	66
Plastic Limit	32	43	27	27
Plasticity Index	25	48	23	39
Dilatancy	MED. - SLOW	MED. - SLOW	MEDIUM	SLOW
Toughness	MEDIUM	MED. - SLIGHT	MEDIUM	SLIGHT - MED.
Dry Strength	MEDIUM	MED. - HIGH	MEDIUM	MED. - HIGH
UNIFIED SOIL CLASSIFICATION				
	MH	MH	CL - CH	CH
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS				
(Surcharge-51 P.S.F.)				
Molding Moisture, %	24.1			
Molding Dry Density, P.C.F.	98.8			
Swell upon saturation, %	2.2			
CBR at 0.1" Penetration	5.7			
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:

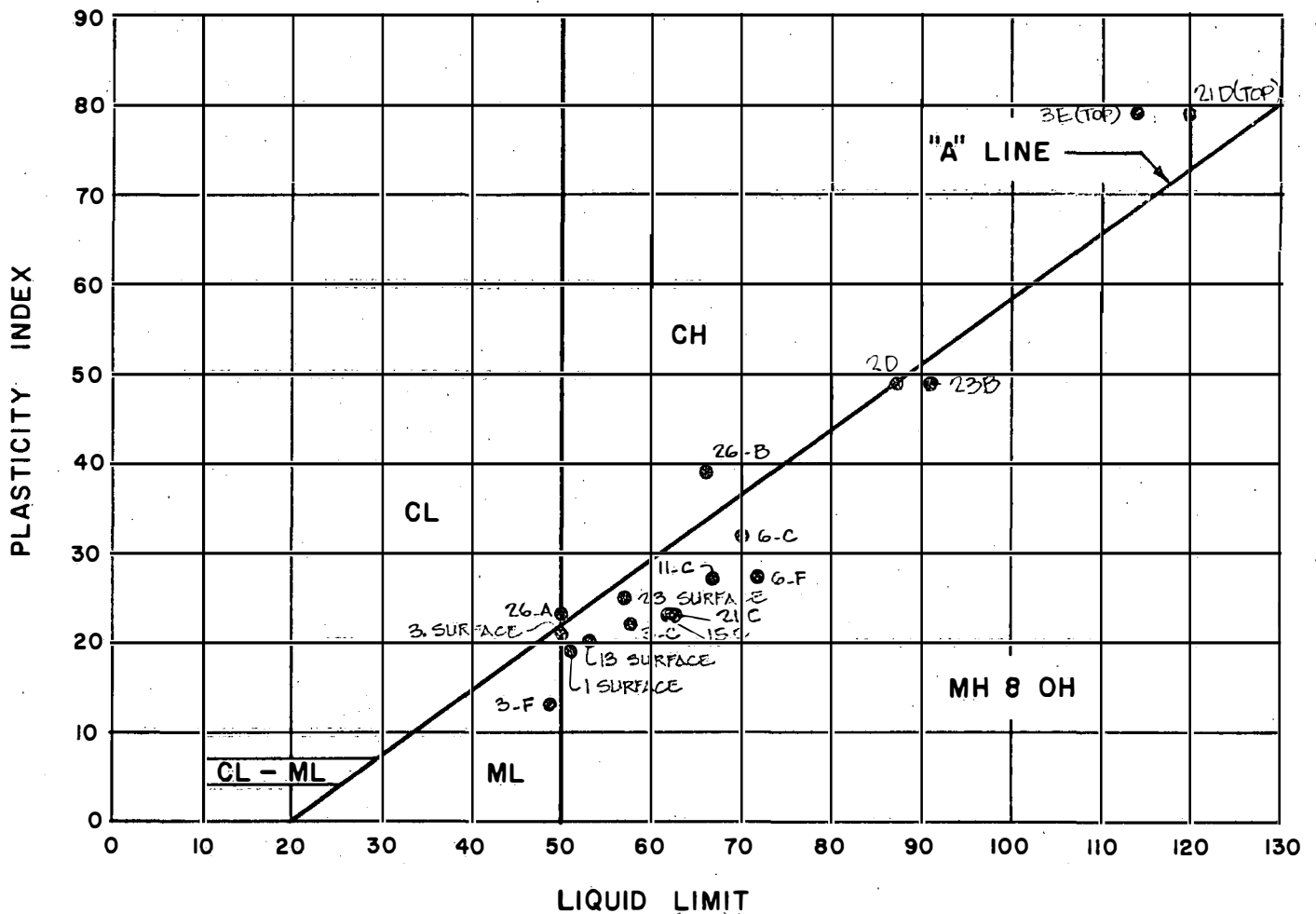
WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 2-5-74 By BT

PLASTICITY CHART

PROJECT: NEWTOWN SITE "D"

LOCATION: WAIMALEU, EWA, OAHU, HAWAII



DATE JAN. 15, 1974 BY C. RACUYA

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

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

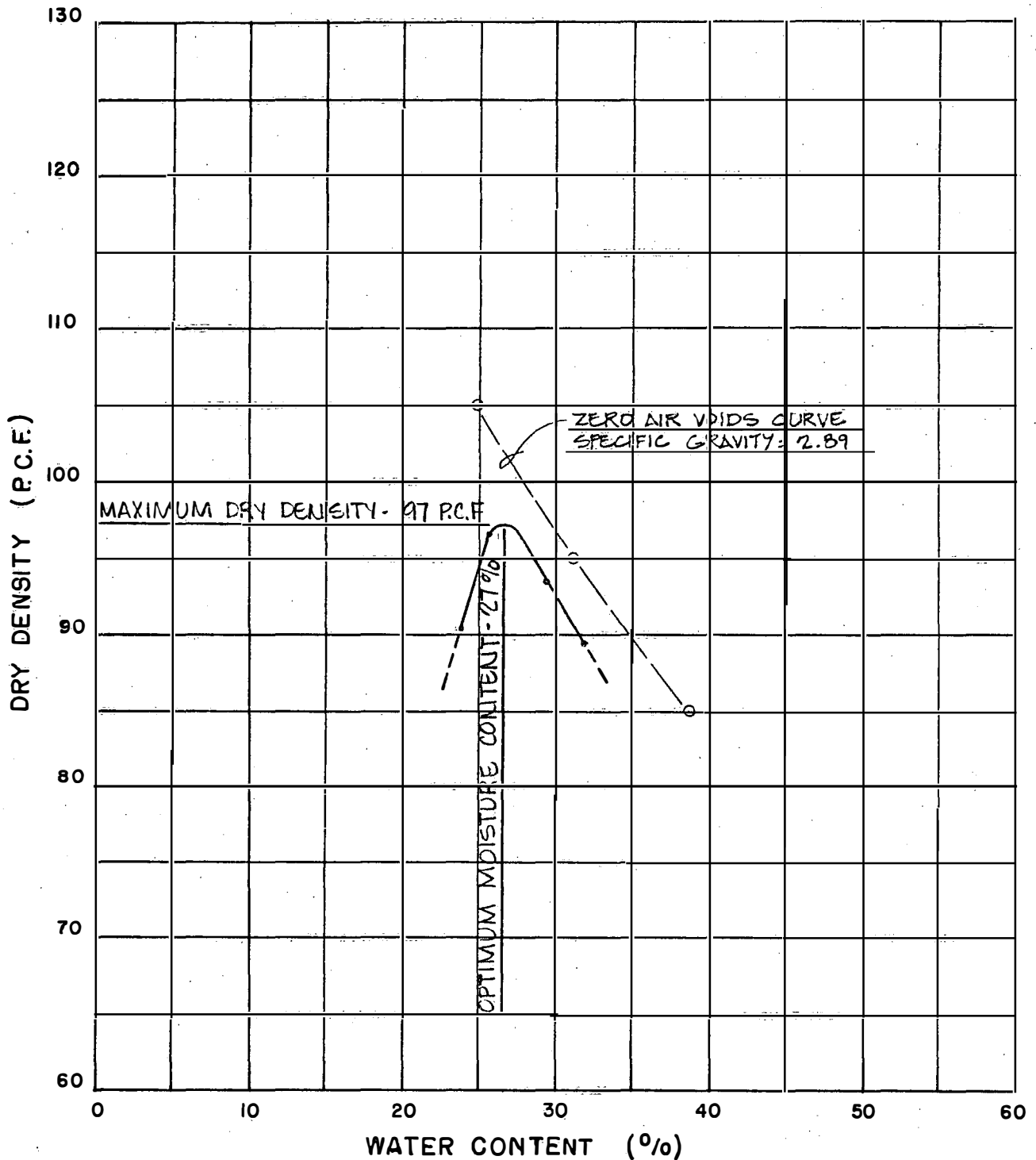
PROJECT: NEWTOWN SITE "D"

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO.: 1 SURFACE

SAMPLE DESCRIPTION: DARK BROWN CLAYEY SILT

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



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

DATE 12-18-73 BY ML

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

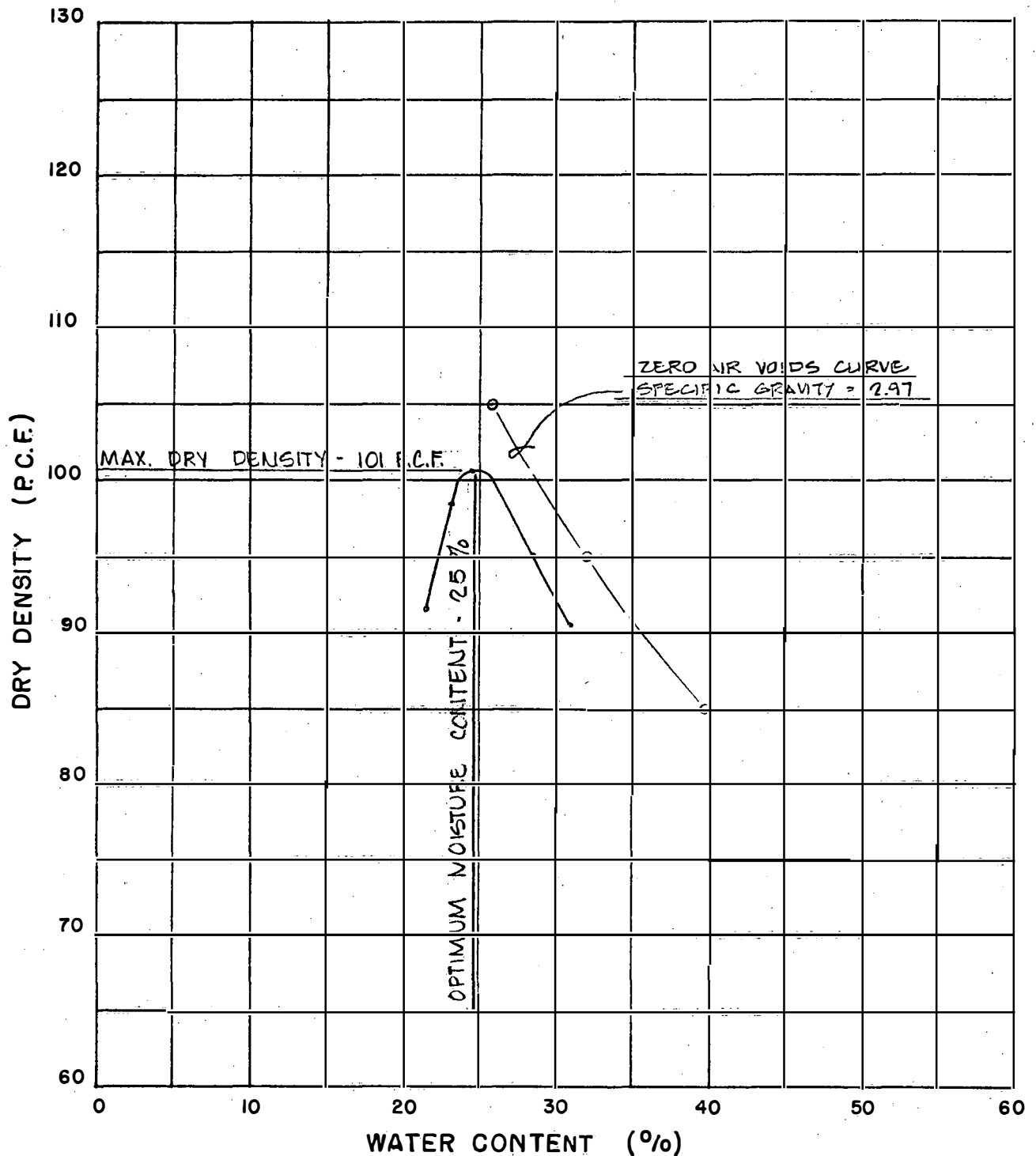
PROJECT: NEWTOWN SITE "D"

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO.: 3 SURFACE

SAMPLE DESCRIPTION: BROWN SILTY CLAY

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



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

DATE 12-4-73 BY MI

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

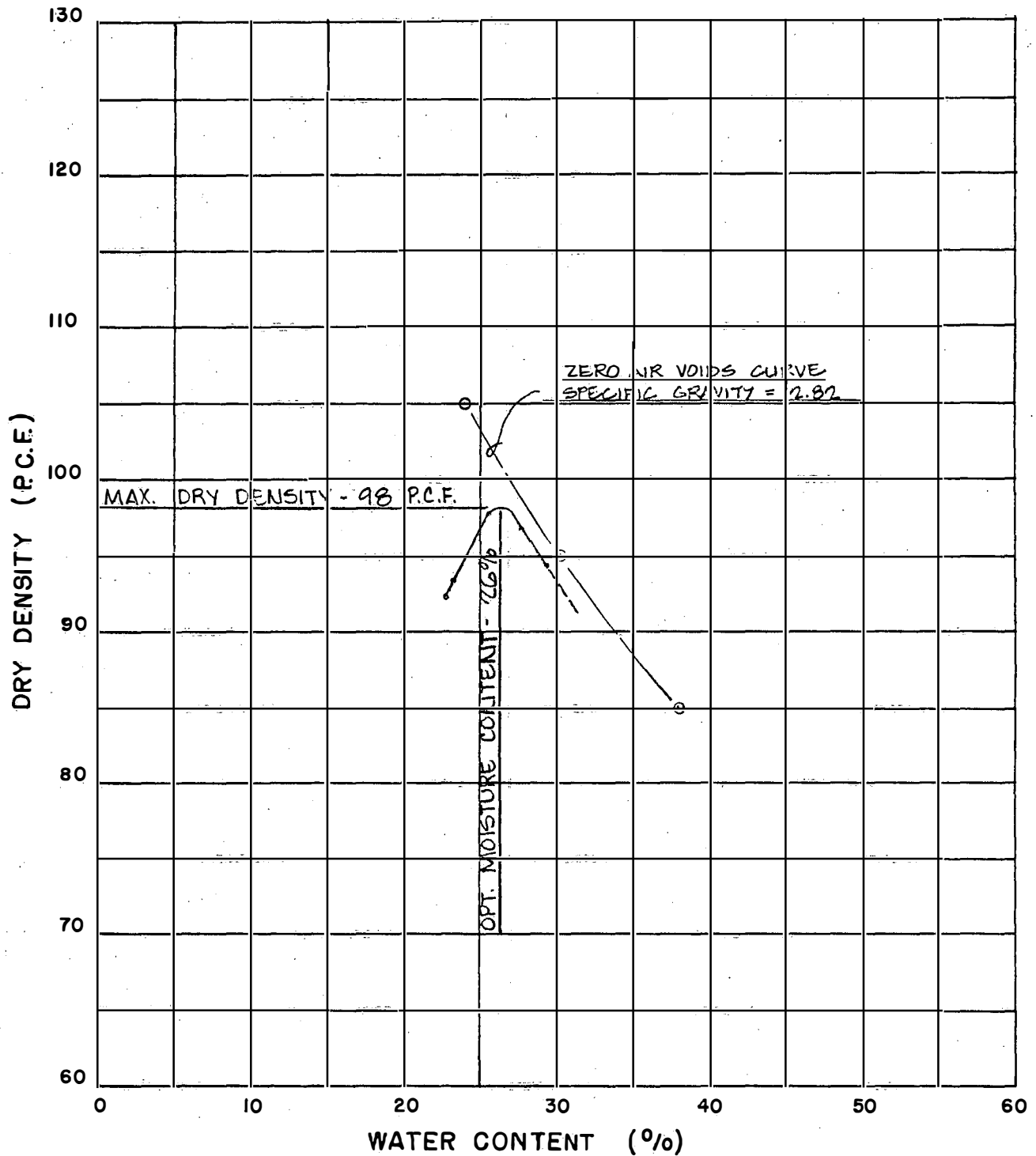
PROJECT: NEWTOWN SITE "D"

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO.: 13 SURFACE

SAMPLE DESCRIPTION: REDDISH-BROWN SILTY CLAY

AGGREGATE: 1/4" MINUS
MOLD SIZE: 4" Ø x 4.534" HIGH
HAMMER: 10 LBS. 18" DROP
LAYERS: 5
BLOWS: 25/LAYER



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

DATE 12-3-73 BY NI

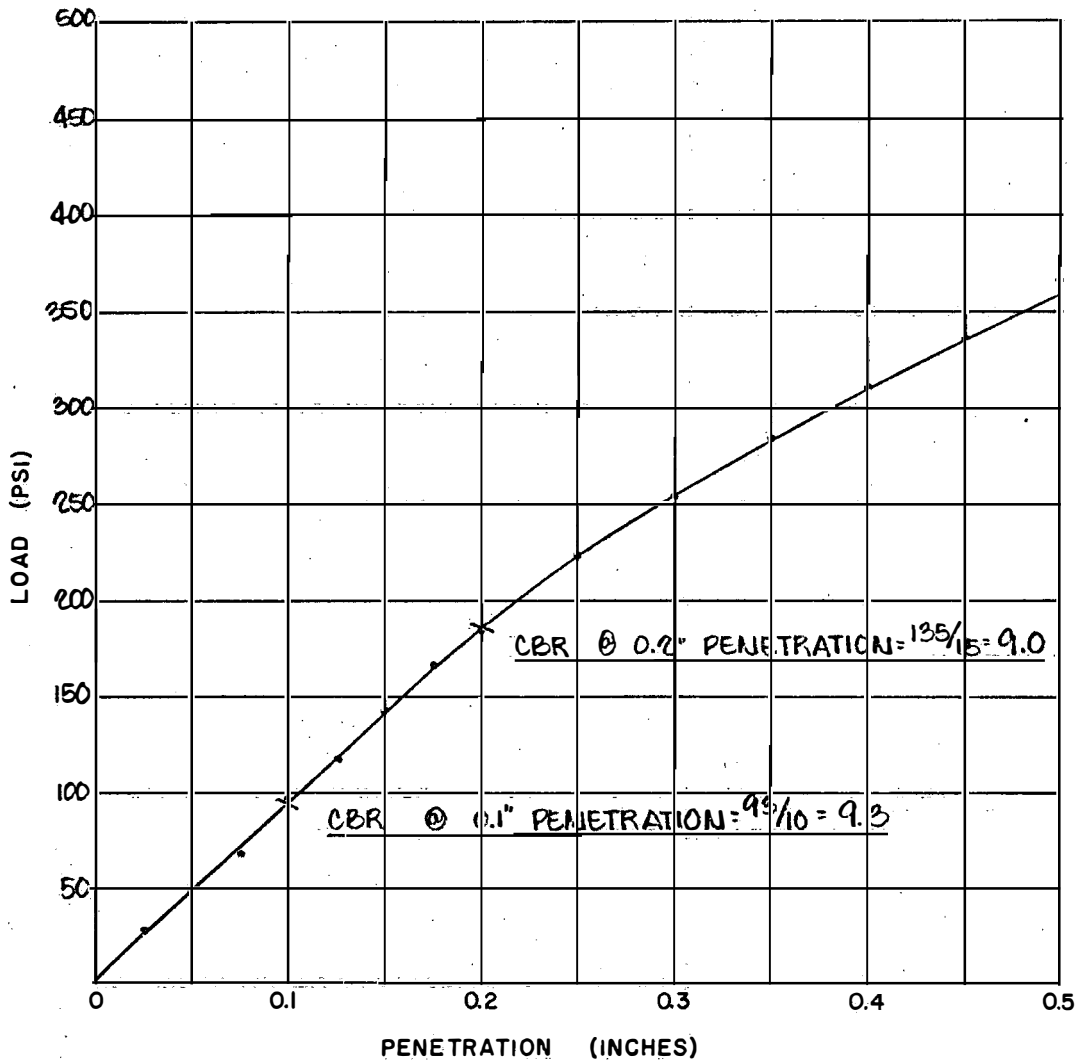
CBR TEST

PROJECT: NEWTOWN SITE "D"

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO: 1 SURFACE

SAMPLE DESCRIPTION: DARK BROWN CLAYEY SILT



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	80	27
0.050	150	50
0.075	200	67
0.100	290	97
0.125	350	117
0.150	430	143
0.175	500	167
0.200	550	183
0.250	670	223
0.300	760	253
0.350	850	283
0.400	930	310
0.450	1010	337
0.500	1100	367

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

TEST RESULTS:

MOLDING MOISTURE, % 28.6
MOLDING DRY DENSITY, P.C.F. 94.3
CBR @ 0.1" PENETRATION 9.3
DAYS SOAKED 4

DATE 12-21-73 BY GS
DATE 12-26-73 BY NI

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

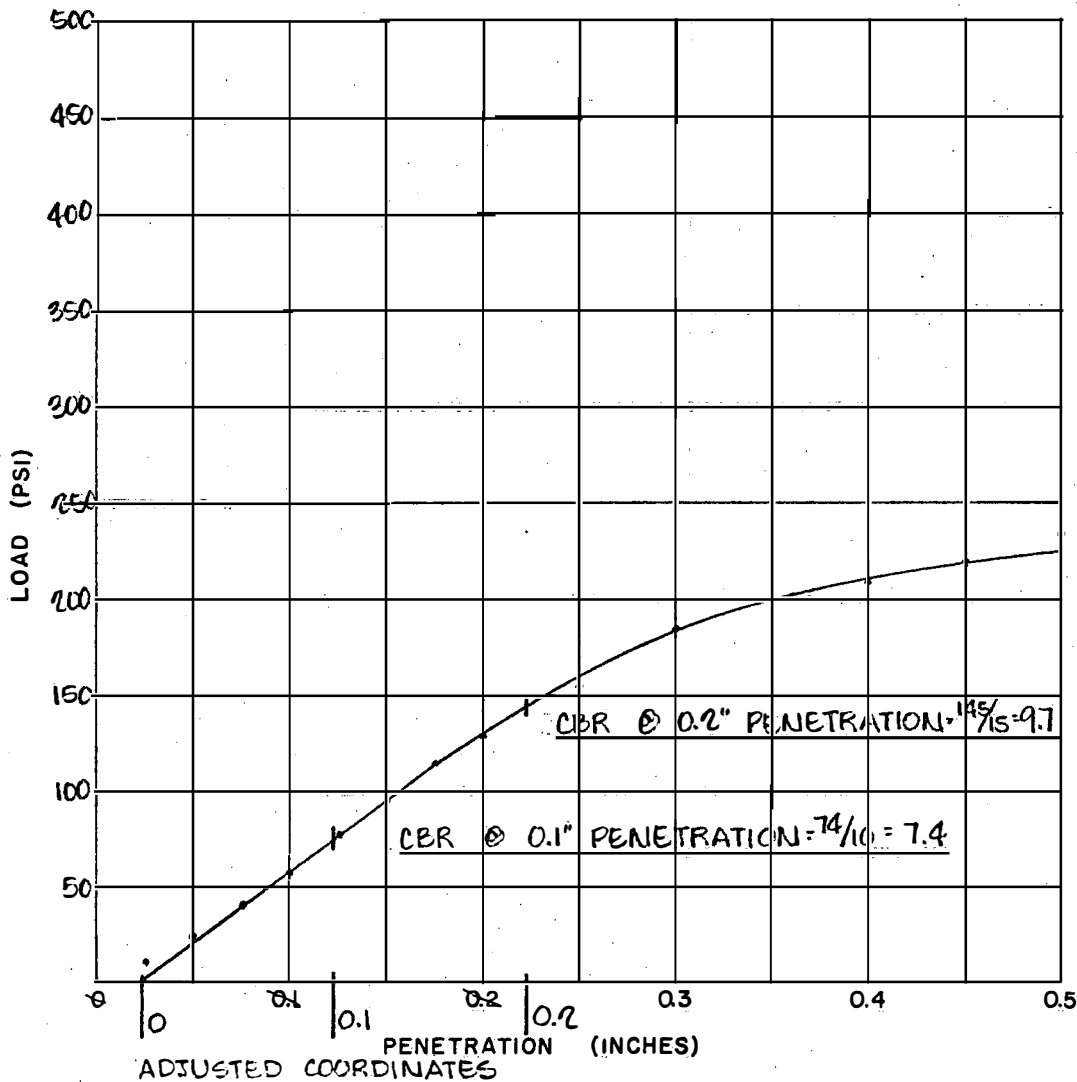
CBR TEST

PROJECT: NEWTOWN SITE "D"

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO: 3 SURFACE

SAMPLE DESCRIPTION: BROWN SILTY CLAY



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	30	10
0.050	68	23
0.075	119	40
0.100	173	58
0.125	230	77
0.150	285	95
0.175	339	113
0.200	383	128
0.250	463	154
0.300	546	182
0.350	599	200
0.400	620	207
0.450	658	219
0.500	671	232

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

TEST RESULTS:

MOLDING MOISTURE, % 24.9
MOLDING DRY DENSITY, P.C.F. 97.4
CBR @ 0.1" PENETRATION 7.4
DAYS SOAKED 5

DATE 12-3-73 BY LY
DATE 12-4-73 BY NI

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

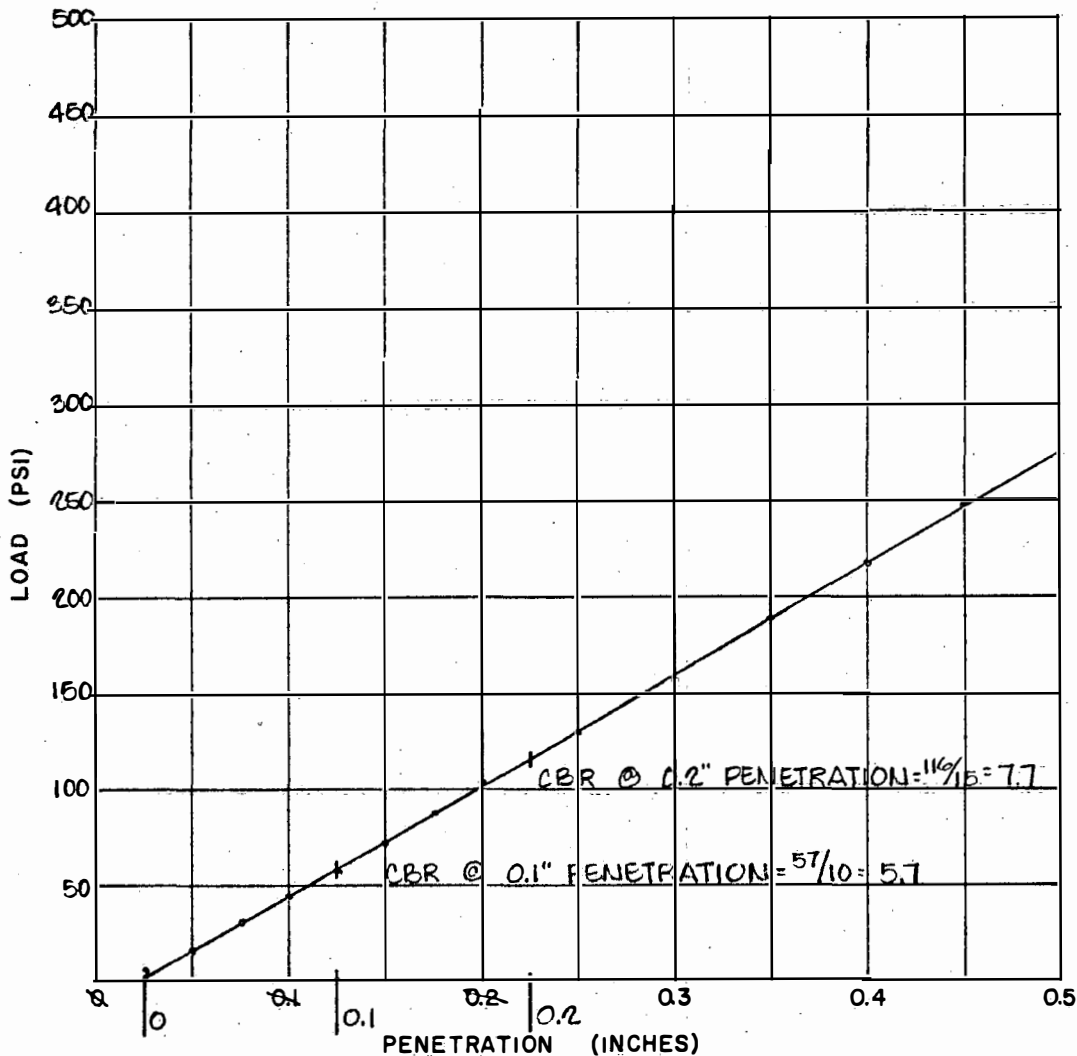
CBR TEST

PROJECT: NEWTOWN SITE "D"

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO: 13 SURFACE

SAMPLE DESCRIPTION: REDDISH-BROWN SILTY CLAY



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	14	5
0.050	49	16
0.075	89	30
0.100	129	43
0.125	172	57
0.150	214	71
0.175	260	87
0.200	306	102
0.250	390	130
0.300	470	157
0.350	567	189
0.400	653	218
0.450	746	249
0.500	819	273

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

TEST RESULTS:

MOLDING MOISTURE, % 25.8
MOLDING DRY DENSITY, P.C.F. 95.9
CBR @ 0.1" PENETRATION 5.7
DAYS SOAKED 4

DATE 12-5-73 BY ML

DATE 12-6-73 BY NI

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

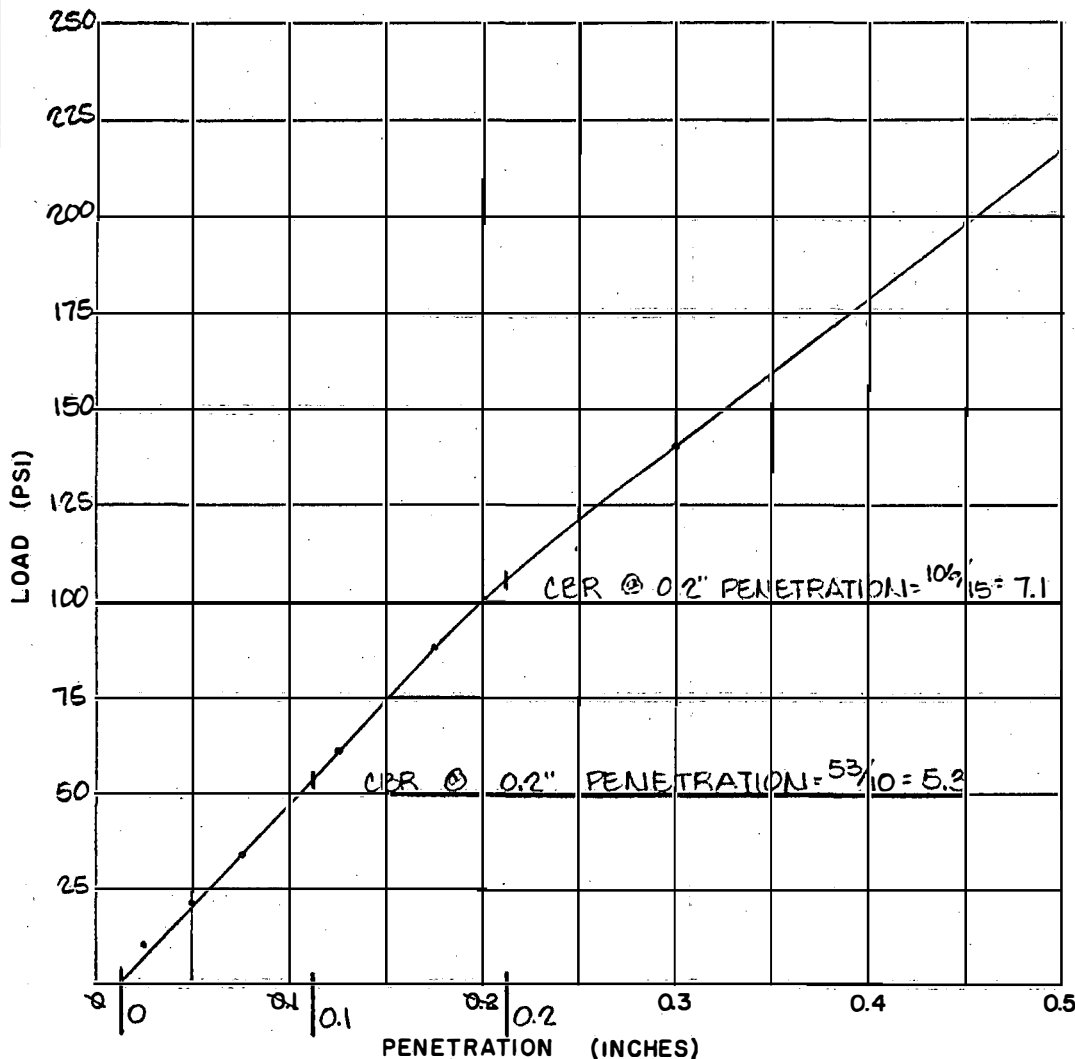
CBR TEST

PROJECT: NEWTOWN SITE "D"

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO: 23 SURFACE

SAMPLE DESCRIPTION: REDDISH-BROWN SILTY CLAY



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	29	10
0.050	63	21
0.075	103	34
0.100	144	48
0.125	183	61
0.150	223	74
0.175	263	88
0.200	300	100
0.250	370	123
0.300	421	140
0.350	472	157
0.400	515	172
0.450	593	198
0.500	651	217

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

ADJUSTED COORDINATES

TEST RESULTS:

MOLDING MOISTURE, % 24.1
MOLDING DRY DENSITY, P.C.F. 98.8
CBR @ 0.1" PENETRATION 5.3
DAYS SOAKED 4

DATE 12-7-73 BY CL

DATE 12-10-73 BY NI

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

LOGS OF BORINGS

FROM

NEWTOWN ESTATES 2ND ACCESS ROAD - PHASE I

REPORT DATED DECEMBER 5, 1972

AND

NEWTOWN ESTATES 2ND ACCESS ROAD - PHASE II

REPORT DATED NOVEMBER 7, 1973

AND

NEWTOWN ESTATES RECREATION CENTER,

PARK AND SCHOOL SITE

REPORT DATED JUNE 30, 1972

Boring Log

PROJECT NEWTOWN ESTATES
2ND ACCESS ROAD - PHASE I

LOCATION Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 2

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

BORING NO. 3 Sheet No. of
Driller W. LUM ASSOC., INC. Date SEPT. 30 / OCT. 7 1972
Field Party GAFFIN, KAKU, HORIUCHI, METER, RAPONIC
Type of Boring AUGER (MOBILE) Diam. 4"
Elev. 93' ± Datum
Drill Bit FINGER TYPE, DIAMOND & T.C.
CORING
Water Level NOT NOTICED
Time
Date 10-1-72

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				
DRILL RATE	ELEV. = 93' ±									N (Blows per foot)				
										0	10	20	30	40
ML-MH	STIFF, REDDISH BROWN CLAYEY SILT w/ TRACES OF DECOMPOSED ROCK & ROOTS	0	2" SS	3-A	35	21	50	-	-					
(MH)	STIFF, MOTTLED REDDISH BROWN CLAYEY SILT w/ DECOMPOSED ROCK	5	2" SS	3-B	-	27	-	-	-					
	MOTTLED GRAY DECOMPOSED ROCK (SOME CRUSHES TO CLAYEY SILT)	10	2" SS	3-C	-	24	-	-	-					45
	BOULDERS OR ROCK FORMATION?	15	2" SS	3-D	-	9 (CUTTING)	-	-	-					40/0.3'
	BLUE, DENSE LAVA ROCK	20	"BX"	RUN #1		CORED: 0.5'								HAMMER BOUNCES
			"BX"	RUN #2		RECOV.: 0.3'								
			"BX"	RUN #3		CORED: 3.5'								
			"BX"	RUN #4		RECOV.: 3.2'								
			"BX"	RUN #5		CORED: 3.0'								
			"BX"	RUN #6		RECOV.: 2.8'								
			"BX"	RUN #7		CORED: 2.0'								
			"BX"	RUN #8		RECOV.: 1.0'								
	REDDISH BROWN, CLINKER & DECOMPOSED ROCK	30	"BX"	RUN #9		CORED: 3.5'								
			"BX"	RUN #10		RECOV.: 1.2'								
			"BX"	RUN #11		CORED: 1.0'								
			"BX"	RUN #12		RECOV.: 0.6'								
	GRAY WEATHERED CLINKER w/ TAN CLAY	35	"BX"	RUN #13		CORED: 4.5'								
			"BX"	RUN #14		RECOV.: 3.5'								
	BLUE, DENSE LAVA ROCK	40	"BX"	RUN #15		CORED: 1.5'								
			"BX"	RUN #16		RECOV.: 1.3'								
	END OF BORING @ 40'		"BX"	RUN #17		CORED: 2.5'								
			"BX"	RUN #18		RECOV.: 2.5'								

Boring Log

PROJECT NEWTOWN ESTATES
2ND ACCESS ROAD - PHASE II
 LOCATION Waimalu, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 2

BORING NO. 4 Sheet No. SEPT 30, Oct. 4, 1972
 Driller W. LUM ASSOC., INC. Date JULY 24, 25 & 26, 1973
 Field Party KAKU, YAMAMOTO, RADOVICH
METER, SHIBAMA, KUTAKA
 Type of Boring AUGER, ROTARY CORING
(MOBILE B-504B40) Diam. 4" & "BX"
 Elev. 100' ± Datum —
 Drill Bit FINGER TYPE ROLLER ROCK &
DIAMOND CORING
 Water Level NOT NOTICED NOT NOTICED NOT NOTICED
 Time — — —
 Date 9-30-72 7-24-73 7-26-73

HAMMER:

Weight 140#Drop 30"

SAMPLER:

2" SS - 2" STANDARD SPLIT SPOON
"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.	PENETRATION DATA				
	ELEV. = 100' ±	0												
	STIFF, REDDISH BROWN SANDY SILT w/ SOME CLAY	2"	2" SS	4-A	—	26	—	—	—					
	STIFF, RED & LIGHT BROWN SILTY CLAY (DECOMPOSED ROCK)	5"	2" SS	4-B	—	33	—	—	—					
	LIGHT BROWN DECOMPOSED ROCK	10"	2" SS	4-C	—	22	—	—	—					
	COBBLE OR BOULDER CLAY POCKET													79
		15'	"BX"	RUN # 1		CORED - 4.5' RECOV - 4.3'								
			"BX"	RUN # 2		CORED - 0.8' RECOV - 0.8'								
		20'	"BX"	RUN # 3		CORED - 4.4' RECOV - 4.2'								
		25'	"BX"	RUN # 4		CORED - 4.8' RECOV - 4.8'								
		30'	"BX"	RUN # 5		CORED - 2.5' RECOV - 1.7'								
	NOTE: FIRST ATTEMPT STOP @ 21.5' (10-4-72) SECOND ATTEMPT LOCATED 3" DIAMOND HEAD. BEGIN CORING @ 13' ± DEPTH (7-24-73).													
	END OF BORING @ 30' 7-26-73													
	*ELEVATION ESTIMATED FROM TOP. MAP													

HAMMER BOUNCES

Boring Log

PROJECT NEWTOWN ESTATES
2ND ACCESS ROAD - PHASE II
 LOCATION Waimalu, Oahu, Hawaii
 Tax Map Key: 9-8-02: Por. 2

BORING NO. 5 Sheet No. SEPT. 30, 1972 of 4
 Driller W. LUM ASSOC., INC. Date JULY 27, 1973
 Field Party MEYER, TAMAMOTO
RADOVICH, KUTAKA, SHIROMA
 Type of Boring AUGER & CORING (MOBILE B-50 & B-40) Diam. 4" & "BX"

HAMMER:

Weight 140 #Drop 30"

SAMPLER:

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

Elev. 108 ± * Datum -
 Drill Bit T.C. DRAG, FINGER TYPE & DIAMOND CORING

Water Level	NOT NOTICED	NOT NOTICED			
Time	-	-			
Date	9-30-72	7-27-73			

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. = 108 ± *	0								
	STIFF, REDDISH BROWN SANDY SILT	2' 55"		5-A	-	20	-	-	-	
	Boulder	5		5-B	-	ROCK	FRAGMENT	-	-	20/0.2'
	MEDIUM, REDDISH BROWN CLAYEY SILT	10		5-C	-	24	-	-	-	23/0.3'
	END OF BORING @ 12' 9-30-72 BLUE, DENSE LAVA ROCK	15	"BX"	RUN #1						HAMMER BOUNCES
	BLUE, DENSE LAVA ROCK W/ SOME SMALL VESICLES	20	"BX"	RUN #2						
	END OF BORING @ 21' 7-27-73									

*ELEVATION ESTIMATED
FROM TOPO MAP

NEWTOWN 2ND ACCESS ROAD

Boring Log

NEWTOWN ESTATES

PROJECT 2ND ACCESS ROAD - PHASE II

LOCATION Waimalu, Oahu, Hawaii

Tax Map Key: 9-8-02: Por. 2

BORING NO. 6

Sheet No. _____ of _____

Driller W. LUM ASSOC., INC.

Date JUL 19 20, 1973

Field Party KADOVICH, KUTAKA

Type of Boring AUGER (MOBILE)

Diam. 4"

Elev. 145' ±

Datum _____

Drill Bit T.C. DRAG

HAMMER:

Weight 140#

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

NOT NOTICED

Time _____

Date 7-19-73 7-20-73

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				
DRILL RATE	ELEV. = 145' ±									N (Blows per foot)				
(MH-4H)	STIFF, REDDISH BROWN SILTY CLAY W/TRACES OF ROOTS	0		G-A	-	23	-	-	-					
		5		G-B	-	22	-	-	-					
		7-19-73		G-C	-	19	-	-	-					48
(SM)	MEDIUM DENSITY MOTTLED GRAY SILTY SAND (DECOMPOSED ROCK)	10		G-D	-	34	-	-	-					
		15		G-E	-	14	-	-	-					50/0.3
	MOTTLED DARK GRAY DECOMPOSED ROCK	20		G-F	-	ROCK FRAGMENT	-	-	-					50/0.1
	END OF BORING @ 23.2' 7-20-73													

*ELEVATION ESTIMATED FROM TOPO MAP

NEWTOWN 2ND ACCESS ROAD

Boring Log

PROJECT NE TO N ESTATES
2ND ACCESS ROAD - PHASE II
 LOCATION Waimalu, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 2

HAMMER:

Weight 140#Drop 30"

SAMPLER:

2" STANDARD SPLIT SPOONBORING NO. 7 Sheet No. _____ of _____Driller W. LUM ASSOC., INC. Date JULY 19, 1973Field Party RADOVICH, KUTAKAType of Boring AUGER (MOBILE) Diam. 4"Elev. 177' ± Datum _____Drill Bit I.C. DRAGWater Level Not Noticed

Time _____

Date 7-19-73

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				
DRILL RATE	ELEV. = 177' ± *													
(ML-CL)	STIFF, DARK BROWN SILTY CLAY W/ TRACES OF ROOTS	0		7-A	-	21	-	-	-					
		5		7-B	-	19	-	-	-				52	
(MH)	STIFF, MOTTLED BROWN SILTY CLAY			7-C	-	24	-	-	-					
5.0' - 10.0' 5 MIN.														
	PUKA PUKA ROCK FRAGMENTS W/ SOME BROWN CLAYEY SILT	10		7-D	-	19	-	-	-			10/0.5'		50/0.1'
10.0' - 15.0' 15 MIN.														
	DENSE, GRAY SILTY SAND W/ DECOMPOSED ROCK & CLAYEY SILT	15		7-E	-	19	-	-	-					50/0.4'
15.0' - 19.5' 25 MIN.														
	END OF BORING @ 19.5'	20												
	7-19-73													

*ELEVATION ESTIMATED
FROM TOPO MAP

NEWTOWN 2ND ACCESS ROAD

NEWTOWN 250 LESS ROAD

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT NEWTOWN ESTATES
2ND ACCESS ROAD - PHASE II
LOCATION Waimalu, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 2
HAMMER:
Weight 140 #
Drop 30"
SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 8 Sheet No. JULY 18 & 19, 1973
Driller W. LUM ASSOC., INC. Date OCT. 2, 1973
Field Party RADOVICH, KUTAKA, KAU
Type of Boring AUGER (MOBILE) B-30 Diam. 4"
Elev. 217' ± * Datum -
Drill Bit T.C. DRAG
Water Level NOT NOTICED
Time -
Date 7-19-73

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
(ML-CL)	STIFF, REDDISH BROWN SILTY CLAY	0		8-A	-	21	-	-	-					
(ML)	HARD, REDDISH BROWN CLAYEY SILT	5		8-B	-	19	-	-	-					64
				8-C	34	23	49	-	-					55
ML	HARD TO STIFF, BROWN CLAYEY SILT	10		8-D	-	24	-	-	-					
				8-E	34	26	63	-	-					80
MH	HARD, MOTTLED BROWN SILTY CLAY W/ DECOMPOSED ROCK	15		8-F	-	27	-	-	-					50/0.2
				8-G	35	26	49	-	-					50/0.3
ML	GRAY CLAYEY SILT (DECOMPOSED ROCK)	25		8-H	NO RECOVERY				-					50/0.0
				8-I	NO RECOVERY				-					50/0.1
				8-J	NO RECOVERY				-					50/0.1

29.0'-30.0'
15 MIN.

25.0'-29.0'
20 MIN.

30.0'-35.0'
40 MIN.

35.0'-40.0'
45 MIN.

Rock

END OF BORING @ 40.1'
10-2-73

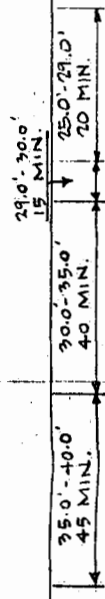
7-18-73

7-19-73

10-2-73

*

ELEVATION ESTIMATED FROM TOPO MAP



* ELEVATION ESTIMATED FROM TOPO MAP

NEWTOWN ESTATES

BORING NO. 9 Sheet No. _____ of _____

Driller W. LUM ASSOC., INC. Date JULY 18, 1973

Field Party RADOVICH, KAU, KUTAKA

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

Elev. 2274.4 Datum

Drill Bit T.C. DRAG

Water Level	NOT NOTICED			
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Time	—				
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Date 7-18-13

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	
(ML-CL)	STIFF, REDDISH BROWN SILTY CLAY	0		9-A	-	21	-	-	-				10	0.5	20/0.5'
				9-B	-	22	-	-	-						
		5		9-C	-	30	-	-	-						
(MH)	STIFF, BROWN CLAYEY SILT	10		9-D	-	29	-	-	-						
(GH)	STIFF, MOTTLED BROWN CLAY	15		9-E	-	36	-	-	-						
MH	STIFF, MOTTLED BROWN SILTY CLAY W/ CLAY STREAKS	20		9-F	39	44	75	-	-						
	END OF BORING @ 21.5'														
	7-18-73														
	</														

NEWTOWN 2ND ACCESS ROAD PHASE II

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT NEWTOWN ESTATES
2ND ACCESS ROAD - PHASE II
 LOCATION Waimalu, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 2

BORING NO. 10 Sheet No. of

Driller W. LUM ASSOC., INC. Date APRIL 23, 1973

Field Party ASATO, K. MEYER

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

Elev. 238' ± Datum

Drill Bit FINGER TYPE

HAMMER:

Weight 140 #

Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

Water Level NOT NOTICED

Time

Date 4-23-73

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. = 233' ±	0												
ML-CL	HARD DARK REDDISH BROWN SILTY CLAY	5		10-A	-	20	-	-	-	46				
				10-B	28	22	49	-	-	46				
MH	STIFF, DARK BROWN CLAYEY SILT	10		10-C	34	22	53	-	-	42				
CH	HARD, BROWN CLAY	15		10-D	36	28	87	-	-	80				
	COBBLE													
(MH)	HARD, MOTTLED BROWN SILTY CLAY	20		10-E	-	36	-	-	-	52				
	END OF BORING @ 21.5													
	4-23-73													

* ELEVATION ESTIMATED FROM TOPO MAP

NEWTOWN 2ND ACCESS ROAD - PHASE II

WALTER LUM ASSOCIATES, INC.

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

Boring Log

PROJECT NEWTOWN ESTATES
2ND ACCESS ROAD - PHASE II
 LOCATION Waimalu, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 2

BORING NO. 11 Sheet No. _____ of _____
 Driller W. LUM ASSOC., INC. Date NOV. 25, 1972
 Field Party GAFFIN, KAKU, ASATO
 Type of Boring LOG OF SLOPE & AUGER Diam. 4"
 Elev. 230' ± Datum _____
 Drill Bit FINGER TYPE

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

Water Level NOT NOTICED
 Time 10:45 AM
 Date 11-25-72

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	N (Blows per foot)			
											0	10	20	30 40
(ML-CL)	DARK REDDISH BROWN SILTY CLAY		LOG OF SLOPE	2' ±	-	19	-	-	-					
(ML)	REDDISH BROWN CLAYEY SILT			3.5' ±	-	7	-	-	-					
	MOTTLED REDDISH BROWN & GRAY, DECOMPOSED ROCK (BOULDER)			6' ±	-	12	-	-	-					
(MH)	DARK REDDISH BROWN CLAYEY SILT W/SOME ROOTS & DECOMPOSED ROCK BEGIN BORING 2	0		10' ±	-	20	-	-	-					ELEV. = 230' ±
(MH)	STIFF MOTTLED LIGHT BROWN CLAYEY SILT, W/ DECOMPOSED ROCK & TRACES OF ROOTS		LOG OF SLOPE	11-A	-	24 23	-	-	-					
	MOTTLED REDDISH BROWN & GRAY, DECOMPOSED ROCK (SOME CRUSHES TO CLAYEY SILT)	5		11-B	-	23	-	-	-				41	
	GRAY, DECOMPOSED ROCK (CRUSHES TO SILTY CLAY)	10		11-C	-	28	-	-	-					4 1/2
	END OF BORING @ 11'													

*ELEVATION ESTIMATED FROM TOPD MAP

Boring Log

NEWTO N ESTATES
RECREATION CENTER, PARK
AND SCHOOL SITE

PROJECT

LOCATION

Waimalu, Ewa, Oahu, Hawaii

Tax Map Key: 9-8-02: Por. 2

HAMMER:

Weight 140 #

Drop 30"

SAMPLER:

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

BORING NO. 9

Sheet No. of

Driller

W. LUM ASSOC., INC. Date MAY 11, 1972

Field Party

MAKAULA MAESHIRO, SETO

Type of Boring

AUGER (MOBILE B-50)

Diam.

4"

Elev.

223' ± *

Datum

Drill Bit

FINGER TYPE

Water Level

Time

Date

PENETRATION DATA

Standard Penetration Test

2" O.D. THIN WALL TUBE SAMPLER

N (Blows per foot)

0 10 20 30 40

BLOWS/0.5'

ELEV. = 223' ± *

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)	0	10	20	30	40	BLOWS/0.5'
(MH)	STIFF, REDDISH BROWN CLAYEY SILT W/ SOME ROOTS	0	2" S	9-A	-	24	-	8390	-							7/0.5' 7/0.5'
(MH)	STIFF, BROWN CLAYEY SILT	5	2" SS	9-B	-	30	-	-	-							
MH	STIFF MOTTLED REDDISH BROWN CLAYEY SILT W/ TRACES OF DECOMPOSED ROCK	10	2" SS	9-C	39	41	52	-	-							
	ROCK OR BOULDER															
ML-MH	STIFF, MOTTLED GRAY-BROWN RED CLAYEY SILT	15	2" SS	9-D	36	43	50	-	-							13/0.5' 22/0.5'
		20	2" SS	9-E	ROCK	FRAGMENTS										50/0.2'
	LAVA ROCK FORMATION & DECOMPOSED ROCK	25	2" SS	9-F	ROCK	FRAGMENTS										60/0.2'
(MH)	STIFF, REDDISH BROWN CLAYEY SILT W/ DECOMPOSED ROCK	30	2" SS	9-G	-	35	-	-	-							
(SM)	DENSE, MOTTLED BROWN SILTY SAND (CINDERS)	35	2" SS	9-H	-	31	-	-	-							
	END OF BORING @ 36.5															

* ELEVATION ESTIMATED FROM TOPO MAP

Boring Log NEWTOWN ESTATES
RECREATION CENTER, PARK
PROJECT AND SCHOOL SITE

LOCATION Waimalu, Ewa, Oahu, Hawaii

Tax Map Key: 9-8-02: Por. 2

HAMMER:

Weight 140*

Drop 30"

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

SAMPLER: 2" 55 - 2" STANDARD SPLIT SPOON

BORING NO. 10 Sheet No. of

Driller W. LUM ASSOC., INC. Date MAY 12, 1972

Field Party MAKAULA, MAESHIRO, SETO

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

Elev. 234' ± *

Datum

Drill Bit FINGER TYPE

Water Level NOT NOTICED

Time

Date 5-12-72

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.	Standard Penetration Test	2" O.D. THIN WALL TUBE SAMPLER
	ELEV. = 234' ± *	0									
(ML)	STIFF, REDDISH BROWN CLAYEY SILT	2'S	10-A	-	25	-	-	-	-		7/0.5' 9/0.5'
		5	2'S5	10-B	-	34	-	-	-		51
(MH)	STIFF, BROWN CLAYEY SILT	10	2'S5	10-C	-	33	-	-	-		60
		15	2'S5	10-D	-	43	-	-	-		
(MH)	STIFF, MOTTLED REDDISH BROWN & GRAY SILTY CLAY	20	2'S5	10-E	-	39	-	-	-		51
(MH)	STIFF, MOTTLED GRAY CLAYEY SILT W/TRACES OF DECOMPOSED ROCK	25	2'S5	10-F	-	45	-	-	-		48
	END OF BORING @ 26.5'										
* ELEVATION ESTIMATED FROM TOPO MAP											



LEGEND:

- ✦ BORING FOR THIS REPORT
- ✦ BORING FOR "NEWTOWN ESTATES 2ND ACCESS ROAD - PHASE II" DATED NOVEMBER 7, 1973
- ✦ BORING FOR "NEWTOWN ESTATES 2ND ACCESS ROAD - PHASE I" DATED DECEMBER 5, 1972
- ✦ BORING FOR "NEWTOWN ESTATES RECREATION CENTER, PARK AND SCHOOL SITE" DATED JUNE 30, 1972

BORING LOCATION SKETCH
NEWTOWN SITE "D"
WAIMALU, EWA, OAHU, HAWAII
TAX MAP KEY: 9-8-02: POR. 9

Dr. _____	WALTER LUM ASSOCIATES, INC. 3030 WAIKALAE AVE. CIVIL ENGINEERS PHONE 737-7931	Sheet _____
Date _____		of _____
Rev. _____		

B-5

B-4

KAAHELE ST. (PROPOSED)

CHATEAU RD.
(UNDER CONSTRUCTION)

B-15

B-20

B-16

B-17

B-21

B-22

B-23

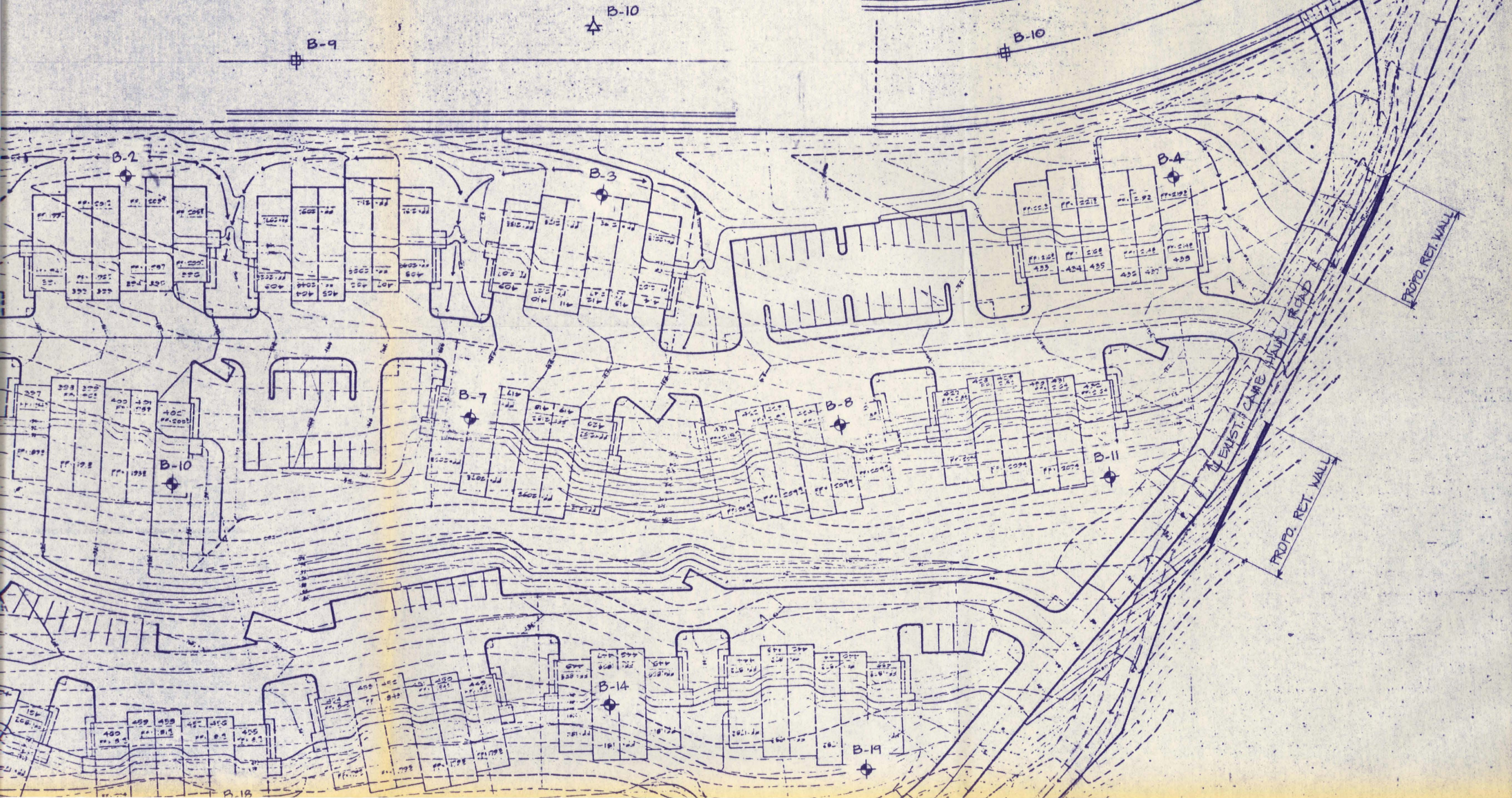
B-24

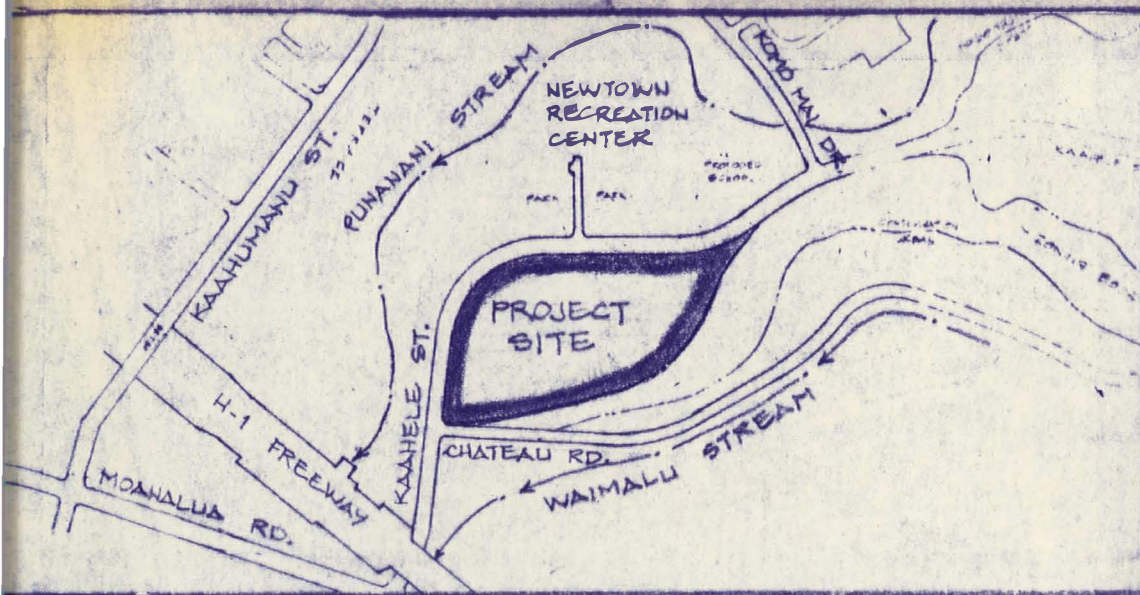
EXIST. CANE HAUL ROAD

B-3



STES RECREATION CENTER, PARK AND SCHOOL SITE ↗



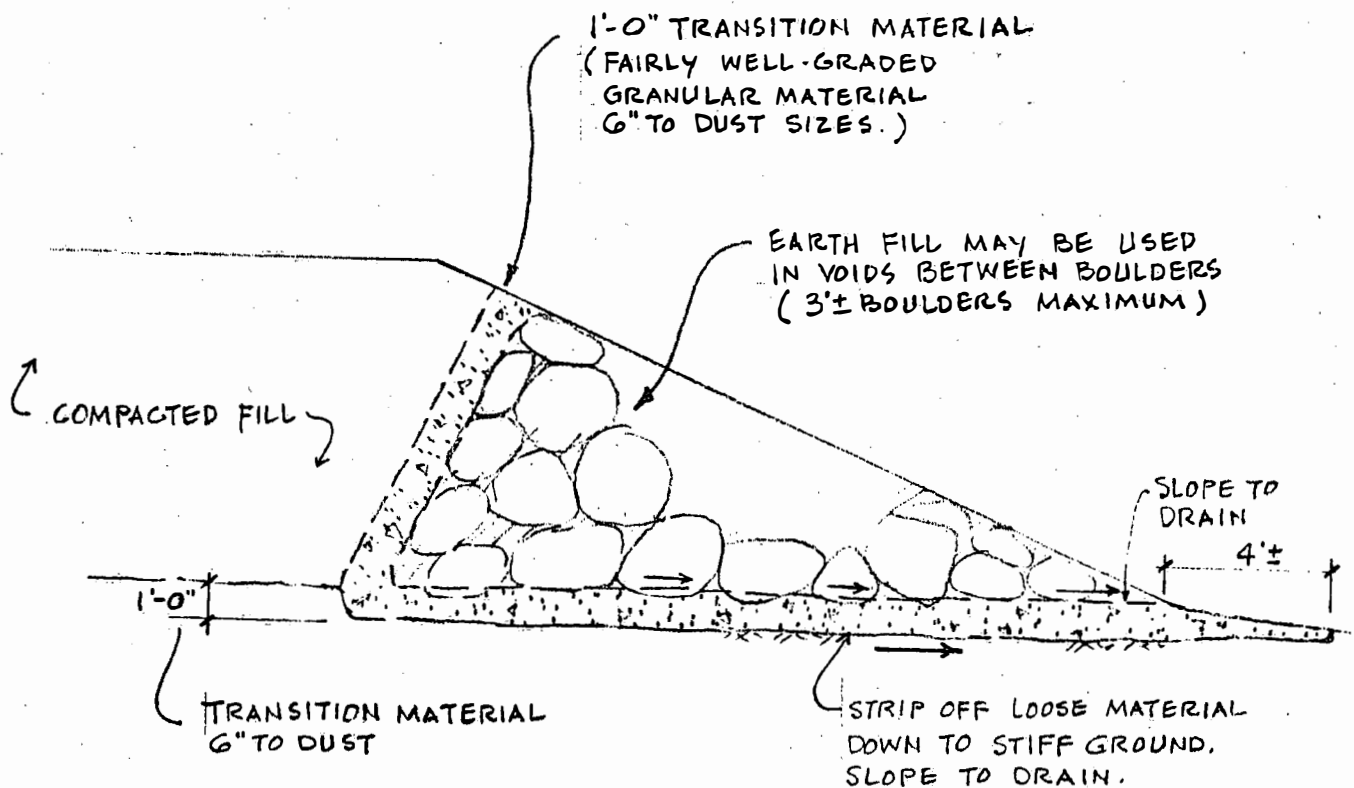


PROJECT LOCATION SKETCH
NOT TO SCALE



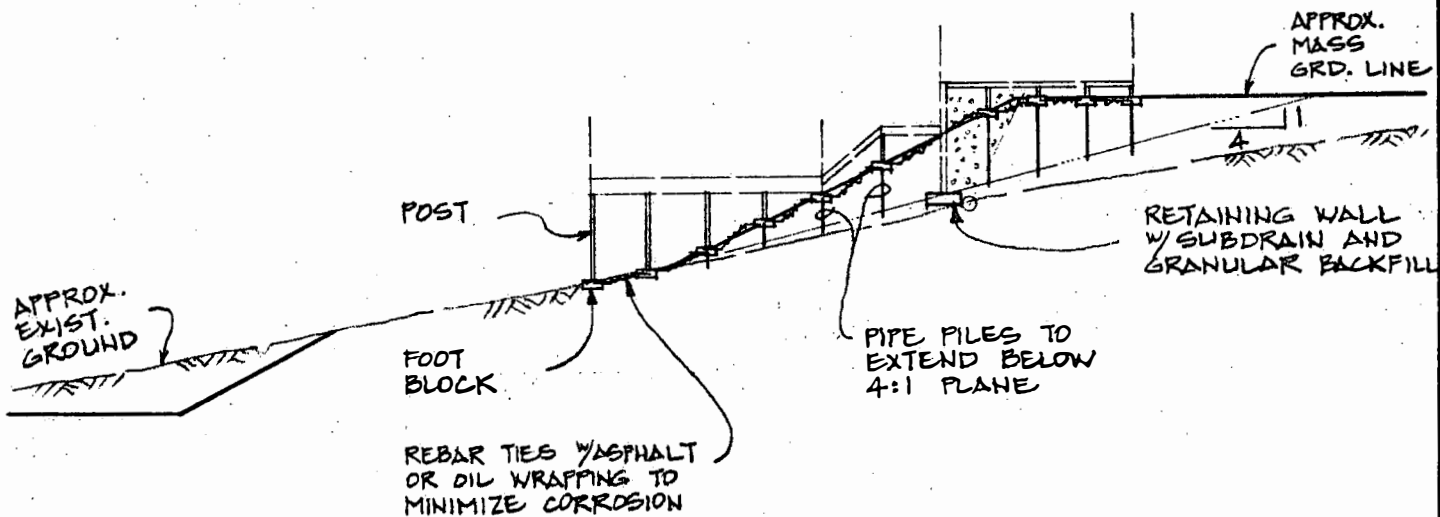
NEWTOWN ESTATES RECREATION



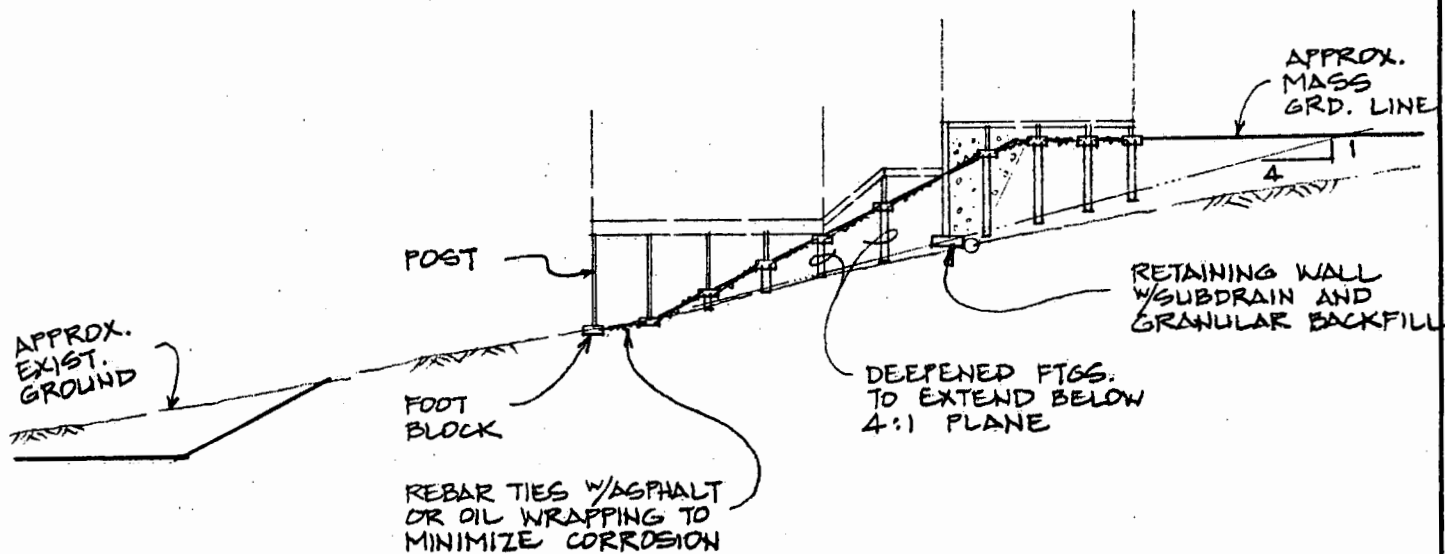


SCHEMATIC SECTION
NOT TO SCALE

FIGURE 1
SCHEMATIC SECTION - BOULDER FILL
NEWTOWN SITE "D"
WAIMALU, EWA, OAHU, HAWAII
TAX MAP KEY: 9-B-02: POR. 9



NOT TO SCALE



NOT TO SCALE

FIGURE 2

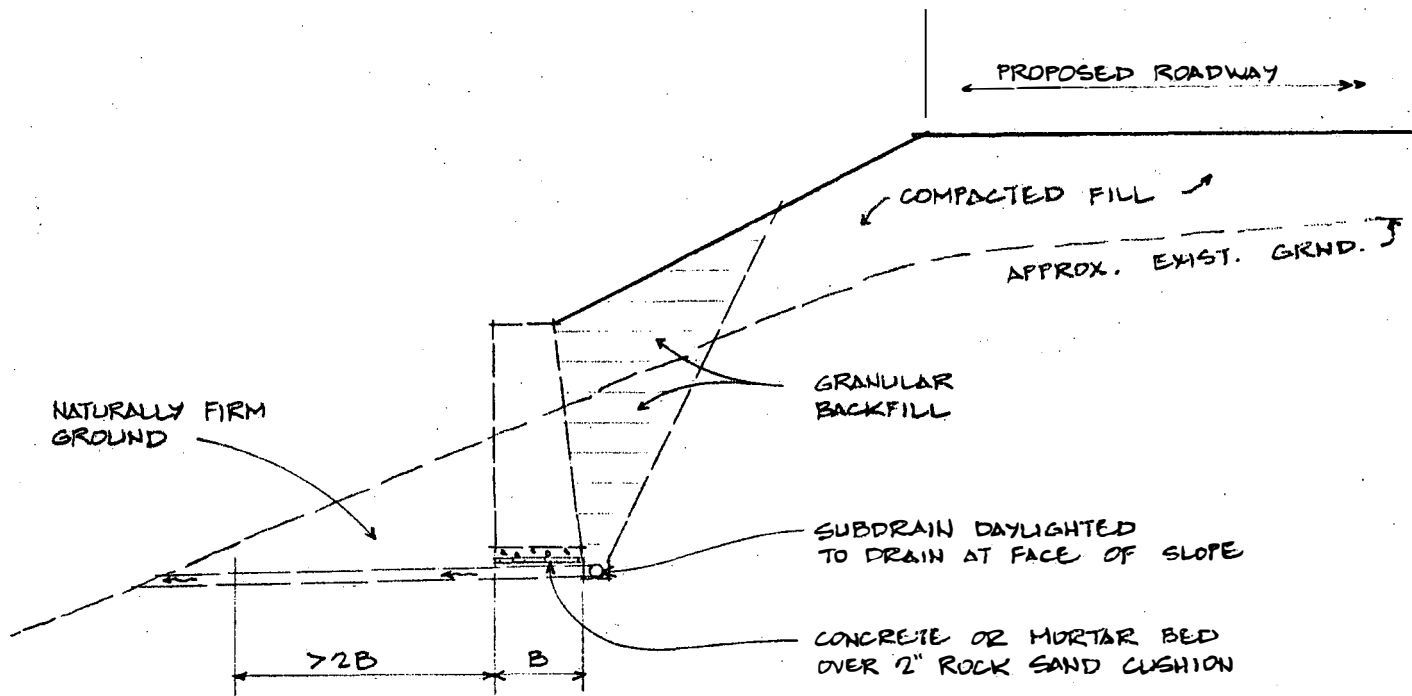
FOOTINGS ON SLOPING GRND.

NEWTOWN SITE "D"

WAIMALU, EWA, OAHU, HAWAII

TAX MAP KEY: 9-8-02: POR. 9

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



ROADWAY RETAINING STRUCTURES -
BASE CONDITION
 NOT TO SCALE

FIGURE 3
SCHEMATIC SECTION. RETAINING STRUCTURES
NEWTOWN SITE "D"
WAIMALU, EWA, OAHU, HAWAII
TAX MAP KEY: 9-B-02: POR. 9

LIMITATIONS

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

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

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

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