NEWTOWN ESTATES 2ND ACCESS ROAD - PHASE II
SOIL EXPLORATION REPORT

WAIMALU, OAHU, HAWAII
TAX MAP KEY: 9-8-02: POR. 2

FOR REFERENCE
not to be taken from this room

To:
COMMUNITY PLANNING, INCORPORATED

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

NOVEMBER 7, 1973

MUNICIPAL REFERENCE & RECORDS CENTER
City & County of Honolulu
City Hall Annex, P.O. Box 3, King Street
Honolulu, Hawaii 96813
November 7, 1973

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

Gentlemen:

Subject: Newtown Estates 2nd Access Road - Phase II
         Soil Exploration Report
         (for roadway grading and pavement thickness
         design purposes)
         Waimalu, Oahu, Hawaii
         Tax Map Key: 9-8-02: Por. 2

Transmitted herewith is our soil exploration report for roadway grading
and pavement thickness design purposes for the Newtown Estates 2nd Access
Road - Phase II at Waimalu, 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

CR/EK:ms
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SCOPE OF EXPLORATION

The purpose of this exploration was to evaluate general soil conditions for grading of the proposed Newtown Estates 2nd Access Road - Phase II at Waimalu, Oahu, Hawaii.

This report includes field exploration, laboratory test results, recommendations for roadway grading and pavement thickness design and limitations.

FIELD EXPLORATION AND LABORATORY TESTS

Nine borings were made along the proposed alignment of the roadway. The approximate boring locations are shown on the Boring Location Sketch. Also attached are logs of borings from "Newtown Estates 2nd Access Road - Phase I" and "Newtown Estates Recreation Center, Park and School Site."

Borings were made with 4-in. diameter augers using finger type, carbide drag and roller rock bits. Soil samples were recovered with a 2-in. standard split spoon sampler driven with a 140-lb hammer falling 30 inches. Rock samples were recovered with a "BX" double tube core barrel with carbide and diamond coring bits.
Laboratory tests included: natural water content, Atterberg limit, 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."

SOIL CLASSIFICATION BY OTHERS


   p. 79 - Lahaina silty clay (ML-CL soils)

   p. 119 - Rock land

GENERAL SITE CONDITIONS

The proposed access road alignment is planned on a ridge west (Ewa) of Waimalu Stream and north (mauka) of the Waimalu Viaduct of the H-1 freeway.

The ridge generally slopes down to the southwest at about 5 to 15% with variations in localized areas.

The side slopes of the ridge vary from about 50 to 90% with steeper slopes in localized areas. Some rock outcrops were noticed in the side slopes.
The roadway will cross a former sugarcane field. Haul roads were noted on the ridge and along the tops of slopes during the field explorations.

**INTERPRETATION OF SOIL CONDITIONS**

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

**About Sta. 9+00 (Beginning of Phase II) to About Sta. 20+00**

A surface layer about 8 to 10 ft thick of stiff to hard clayey silts (MH soils) underlain by decomposed rock and lava rock layers to about 40 ft, the maximum depth drilled.

**About Sta. 20+00 to About Sta. 36+00 (End of Phase II)**

A surface layer about 29 ft thick and decreasing to about 4 ft thick of stiff to hard, reddish-brown clayey silts (MH soils) and silty clays (ML-CL soils) underlain by decomposed rock layers to about 40 ft, the maximum depth drilled.

Lava rock was noted in Boring No. 8 from about 29 to 40-ft depths.

Brown clays (CH soils) were noted in Boring Nos. 9 and 10 from about 13 to 18-ft depths.
Decomposed rock was noted in Boring Nos. 11 and 12 from about 3.5 to 20-ft depths.

Occasional boulders were encountered.

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**

A 2nd Access Road is planned into the Newtown Estates Development from Moanalua Road near Waimalu Stream. The access road is planned along the top of the ridge on the Ewa (northwest) side of Waimalu Valley.

The Phase II portion of the access road extends the roadway in the northeastern direction about 2,700 ft in length (Sta. 9+00 to Sta. 36+00).

This section of the access roadway is generally planned in cuts of about 15 to 35 ft.

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

Sta. 9+00 (Beginning of Phase II) to Sta. 20+00

The borings generally indicated 8 to 10-ft thick clayey silts over decomposed rock and lava rock layers.

Cuts of about 35 ft are being considered.
Slope ratios of 2 horizontal to 1 vertical may be used for the surface soil and decomposed rock layers.

Slope ratios of 1 horizontal to 1 vertical may be used for cuts thru fairly continuous underlying rock formations.

Loose pockets of rock or clinker layers may be grouted in place as they are encountered in the field.

If slope heights (top to toe) of greater than 20 ft are being considered, 8-ft-wide benches should be placed at height intervals of about 15 ft. From Sta. 9+00 to Sta. 13+00, bench height intervals of about 20 ft may be considered in cuts if 2 horizontal to 1 vertical slope ratios are used and surface drainage is away from the top of slope.

Sta. 20+00 to Sta. 36+00 (End of Phase II)

The borings generally indicated clayey silts and silty clays with decomposed rock. Lava rock may be encountered in the lower half of excavations toward the end of the project.

Cuts of about 6 to 35 ft are being considered.

Slope ratios of 2 horizontal to 1 vertical may be used for the surface soil and decomposed rock layers.

Slope ratios of 1 horizontal to 1 vertical may be used for cuts thru fairly continuous underlying rock formations. Loose
pockets of rock or clinker layers may be grouted in place as they are encountered in the field.

If slope heights (top to toe) of greater than 20 ft are being considered, 8-ft-wide benches should be placed at height intervals of about 15 ft. From Sta. 21+25 to Sta. 22+75, bench height intervals of about 20 ft may be considered in cuts if 2 horizontal to 1 vertical slope ratios are used and surface drainage is away from the top of slope.

Roadway Pavement Design

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

2. Base course - 6-in. base course.
3. Subbase course - 0 in. over decomposed rock and rocky ground.

12-in. select borrow over a prepared subgrade of the on-site soils.

If pockets of "CH" soils are encountered, the subbase thickness may be adjusted out in the field.
Unforeseen Conditions

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

Unforeseen or undetected conditions such as soft spots, existing utility trenches, structure foundations, voids or cavities, boulders, expansive soil pockets or seepage water, etc., may occur in localized areas and will have to be adjusted and corrected in the field as they are detected.
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.
NEWSTON ESTATES
PROJECT: 2ND ACCESS ROAD - PHASE II
LOCATION: Waimalu, Oahu, Hawaii

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

HAMMER:
Weight: 140#
Drop: 30"

SAMPLER:
"BX" - BX DOUBLE TUBE CORE BARREL

BORING NO. 4
Driller: W. LUM ASSOC., INC.
Field Party: KAKU YAMAMOTO, RADOVICH
Type of Boring: MOBILE REBAR (5) DIAM. 4" BX DIAMOND CORING

Elev.: 100' Datum: Datum
Drill Bit: FINGER TYPE, ROLLER ROCK & DIAMOND CORING
Water Level: NOT NOTED
Time: --
Date: 7-30-72

Penetration Data

Depth (ft.) 0 10 20 30 40
Sample No. 4-A 4-B 4-C
Plastic Limit: 26 33 22
Liquid Limit: -- -- --
Unconf. Comp. P.S.F. Vane Shear P.S.F.

Note: First Attempt
Stop at 21.5' (10-6-72)
Second Attempt Located 3' DIAMOND HEAD
Begin Coring, 313' Depth (7-24-73)

End of Boring @ 30' 7-20-73

*Elevation Estimated From Topo Map
# Boring Log
## NEWTOWN ESTATES
### 2ND ACCESS ROAD - PHASE II
#### LOCATION
Waialul, Oahu, Hawaii

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

**HAMMER:**
- **Weight:** 140#
- **Drop:** 50" - 2" STANDARD SPLIT SPOON
  - "8X" - BX DOUBLE TUBE CORE BARREL

**Samplers:**
- Boring No. 5
- Sheet No. 5
- **Driller:** W. LUM ASSOC., INC.
- **Date:** JULY 27, 1972
- **Field Party:** MEYER, YAMAMOTO
- **Date:** JULY 27, 1972
- **Type of Boring:** MOBILE E-50 (2-40) Diam.
- **Date:** JULY 27, 1972
- **Datum:** 108' 1"
- **Drill Bit:** T.C.-DRAG, FINGER TYPE & DIAMOND CORING
- **Date:** JULY 27, 1972

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## Soil Classification
- **STIFF, REDDISH BROWN SANDY SILT**
- **BOULDER**
- **MEDIUM, REDDISH BROWN CLAYEY SILT**
- **END OF BORING @ 12' 9-20-72**
- **BLUE, DENSE LAVA ROCK**
- **BLUe, DENSE LAVA ROCK W. SOME SMALL VESICLES**
- **END OF BORING @ 21' 7-27-73**

*Elevation estimated from toto map*
Boring Log

**NEWTON ESTATES**

**PROJECT**: 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

**BOURING NO.** G

**Field Party**: KADOVICH, KUTAKA

**Type of Boring**: AUGER (MOBILE)

**Diam.** 4"

**Elev.**: 145 ± x

**Datum**: __

**Date of Drilling**: JULY 19, 20, 1973

**Driller**: W. LUM ASSOC., INC.

**T.C. DRAG**

**Penetration Data**

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**Description**

- Stiff, reddish brown silty clay w/ traces of roots
- Medium density mottled gray silty sand (decomposed rock)
- Mottled dark gray decomposed rock

**Penetrometer Test**

- 0 10 20 30 40
- N (blows per foot)
- 10 blow
- 40 blow

**End of Boring**: 25.2 ft

7-20-73

**Note**: Elevation estimated from top map.
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- **ELEVATION ESTIMATED FROM TOPO MAP**

- **BORED TOE: 19.5'**
- **1-19-13**

- **BORING NO. 7**
- **Sheet No.**
- **Newtown Estates**
- **Project 2nd Access Road - Phase II**
- **Location Waialu, Oahu, Hawaii**
- **Tax Map Key: 9-8-02: Por. 2**

- **Hammer:** Weight 140 lbs, Drop 8.0 ft
- **Sampler:** 2" Standard Split Spoon

- **Driller W Lum Associates, Inc.**
- **Date July 19, 1983**
- **Field Party: Radovich, Kutaka**
- **Type of Boring: Auger, Mobile**
- **Diam.: 4"**
- **Elev.: 177'**
- **Datum:**

- **Doll Bit:** 1.5" Drag
- **Water Level:**
- **Time:**
- **Date:** 1-19-13

- **Penetration Data**

  - **Standard Penetration Test**

  - **N (Blows per foot):**
    - **0**: 0
    - **10**: 0
    - **20**: 0
    - **30**: 0
    - **40**: 0
Boring Log

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

HAMMER:
Weight: 140 lbs
Drop: 20 ft

SAMPLER: 2" STANDARD SPLIT SPOON

UNITED STATES GEOL. SURVEY
UNITED STATES GAUGE
1.0 0.4

DESCRIPTION

ELEV. 1.21' T.M.

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END OF BORING AT 40.1' 10-2-73

ELEVATION ESTIMATED FROM TOPO MAP

Standard Penetration Test
N (Blows per foot)

0 10 20 30 40

Penetration Data

MH

HARD, BROWN, MOTTLED SILT (DECOMPOSED ROCK)

MH

HARD, BROWN, MOTTLED SILT (DECOMPOSED ROCK)

MH

HARD, BROWN, MOTTLED SILT

MH

HARD, BROWN, MOTTLED SILT

ML

HARD, REDDISH BROWN SILT CLAY

ML

HARD, REDDISH BROWN CLAYEY SILT

ML

HARD TO STIFF, BROWN CLAYEY SILT

ML

HARD, REDDISH BROWN SILT

ML

HARD, REDDISH BROWN CLAYEY SILT

ML

STIFF, REDDISH BROWN SILT CLAY

ML

STIFF, REDDISH BROWN SILT CLAY
**Boring Log**

**NEWTOWN ESTATES**  
**PROJECT** 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

**LOCATION**  
**ELEV. = 227' + 0''**

### PENETRATION DATA

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<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**MH**  
**STIFF, MOITLED, BROWN SILTY CLAY W/ CLAY STREAKS**  
**END OF BORING @ 21.5'**  
**JUL 18, 73**

**ELEVATION ESTIMATED FROM TOPO MAP**
**Boring Log**

NEWTON ESTATES  
2ND ACCESS ROAD - PHASE II

**LOCATION**  
Waimalu, Oahu, Hawaii

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

**HAMMER:**
- **Weight:** 140 lbs
- **Drop:** 30" 

**SAMPLER:** 2" STANDARD SPLIT SPOON

---

**ELEV. = 288'**

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Code</th>
<th>Plastic Limit (% plastic)</th>
<th>Water Content (%)</th>
<th>Liquid Limit (%)</th>
<th>Unified Comp. Group</th>
<th>Liquid Penetration Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>10-A</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td>4G</td>
</tr>
<tr>
<td>10</td>
<td>10-D</td>
<td>28</td>
<td>22</td>
<td>49</td>
<td></td>
<td>4G</td>
</tr>
<tr>
<td>15</td>
<td>10-G</td>
<td>34</td>
<td>25</td>
<td>53</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>20</td>
<td>10-D</td>
<td>36</td>
<td>28</td>
<td>87</td>
<td></td>
<td>80</td>
</tr>
</tbody>
</table>

** Additional Notes:****
- **End of Boring:** 4-23-73
- **Water Level:** Not Noticed
- **Date:** 4-23-73

---

*ELEVATION ESTIMATED FROM TOYO MAP*
**Boring Log**

**NEWTOWN ESTATES**

**PROJECT**
2ND ACCESS ROAD - PHASE II

**LOCATION**
Waimalu, Oahu, Hawaii

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

**HAMMER:**
- **Weight:** 140 lb
- **Drop:** 30".

**SAMPLER:** 2" STANDARD SPLIT SPOON

---

**PROJECT**
2ND ACCESS ROAD - PHASE II

**LOCATION**
Waimalu, Oahu, Hawaii

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

**Date:** 11-25-72

---

**BORING NO:** 11

**Driller:** W. LUM ASSOCIATES, INC.
**Date:** Nov. 25, 1972

**Field Party:** GAPPIN KAKU, ASATO

**Type of Boring:** LOG OF SLOPE (MOBILE P-50) Diam., 4"

**Elev.:** 720' +

**Drill Bit:** FINGER TYPE

**Time:** 10:45 AM

**Penetration Data**

<table>
<thead>
<tr>
<th>Unified Classification</th>
<th>Description</th>
<th>Depth (ft)</th>
<th>Sample No.</th>
<th>Plastic Limit</th>
<th>Water Cont.</th>
<th>Liquid Limit</th>
<th>P.S.E.</th>
<th>Vane Shear</th>
<th>Penetration Test</th>
<th>N (Blows per foot)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ML</strong></td>
<td>DARK REDDISH BROWN Silt</td>
<td>2'</td>
<td>14</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td><strong>(ML)</strong></td>
<td>REDDISH BROWN Silt</td>
<td>33'</td>
<td>12</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td><strong>(MH)</strong></td>
<td>MOTTLED REDDISH BROWN Clayey Silt</td>
<td>6'2&quot;</td>
<td>12</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>(MH)</strong></td>
<td>DARK REDDISH BROWN Clayey Silt w/ some roots &amp; decomposed rock</td>
<td>10'2&quot;</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
</tbody>
</table>

**Begin Boring:**

---

**MH**

**STIFF MOTTLED LIGHT BROWN Clayey Silt w/ decomposed rock & traces of roots**

**NIK**

**NIGHT & DAY CLAYEY Silt**

**GRAY, DECOMPOSED ROCK (CRUSHES TO SILT CLAY)**

**End of Boring:**

---

**Elevation Estimated from Topo Map**
# Boring Log

**NEWTOWN ESTATES**

**PROJECT**
2ND ACCESS ROAD - PHASE II

**LOCATION**
Waimalu, Oahu, Hawaii

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

**Date of Boring:** Nov. 25, 1972

**Field Party:** GAPFIN, KAKU, ASATO

**Type of Boring:** AUGER (MOBILE) Diam. 4"

**Elev:** 242 + 0

**Drill Bit:** FINGER TYPE

**Weight:** 140 #

**Drop:** 30"

**Sampler:** 2" STANDARD SPLIT SPOON

---

### PENETRATION DATA

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample No.</th>
<th>Plastic Limit</th>
<th>Water Content</th>
<th>Liquid Limit</th>
<th>Uncert Comp.</th>
<th>Vane Shear Test</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>12-A</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>12-B</td>
<td>39</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4.5</td>
<td>12-C</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>50%</td>
</tr>
<tr>
<td>5.0</td>
<td>12-D</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>50%</td>
</tr>
<tr>
<td>10.0</td>
<td>12-E</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>50%</td>
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</table>

**Standard Penetration Test**

<table>
<thead>
<tr>
<th>Penetration Test</th>
<th>N (Blows per foot)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
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<td></td>
<td>10</td>
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<td></td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>40</td>
</tr>
</tbody>
</table>

**ELEVATION ESTIMATED FROM TOPO MAP**

**END OF BORING @ 20.4'**

**11-25-72**

---

**STIFF, MOTTLED REDDISH BROWN CLAYEY SILT**

**STIFF, MOTTLED GRAY-BROWN CLAYEY SILT**

**MOTTLED GRAY-DECOMPOSED ROCK (CRUSHES TO CLAYEY SILT)**

**GRAY ROCK FRAGMENTS**

**MOTTLED GRAY, BROWN WEATHERED PUKA PUKA ROCK**
TABLE I.A - SUMMARY OF LABORATORY TEST RESULTS

<table>
<thead>
<tr>
<th>BORING NO.</th>
<th>SAMPLE NO.</th>
<th>DEPTH BELOW SURFACE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SURFACE</td>
<td>REDDISH - BROWN SILTY CLAY</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GRAIN-SIZE ANALYSIS ( % Passing)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve 1&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#20</td>
<td></td>
<td></td>
<td></td>
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<td>#40</td>
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<tr>
<td>#200</td>
<td></td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>ATTERBERG LIMITS</th>
<th>NATURAL</th>
<th>NATURAL</th>
<th>NATURAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Dried or Natural</td>
<td>51</td>
<td>46</td>
<td>49</td>
</tr>
<tr>
<td>Liquid Limit</td>
<td>2.8</td>
<td>2.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Plastic Limit</td>
<td>2.3</td>
<td>1.9</td>
<td>1.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DILATANCY</th>
<th>SLOW</th>
<th>MEDIUM</th>
<th>SLOW-MED.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toughness</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>SLIGHT-MED.</td>
</tr>
<tr>
<td>Dry Strength</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>SLIGHT-MED.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIFIED SOIL CLASSIFICATION</th>
<th>MH-CH</th>
<th>ML-CL</th>
<th>ML</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>APPARENT SPECIFIC GRAVITY</th>
<th>7.88</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>EXPANSION AND CBR TESTS (Surcharge-51 P.S.F.)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Molding Moisture, %</td>
<td>24.1</td>
<td>23.3</td>
<td></td>
</tr>
<tr>
<td>Molding Dry Density, P.C.F.</td>
<td>95.4</td>
<td>101.0</td>
<td></td>
</tr>
<tr>
<td>Swell upon saturation, %</td>
<td>2.7</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>CBR at 0.1&quot; Penetration</td>
<td>6.7</td>
<td>19.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MOISTURE-DENSITY RELATIONS OF SOILS (AASHO T-180-57 Method)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry to Wet or Wet to Dry</td>
<td>DRY TO WET</td>
<td>102.5</td>
<td></td>
</tr>
<tr>
<td>Max. Dry Density (P.C.F.)</td>
<td>102.5</td>
<td></td>
<td></td>
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<tr>
<td>Optimum Moisture (%)</td>
<td>23.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REMARKS:  

Date 10-27-73   By  ET
# SUMMARY OF LABORATORY TEST RESULTS

<table>
<thead>
<tr>
<th>BORING NO.</th>
<th>SAMPLE NO.</th>
<th>DEPTH BELOW SURFACE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>15'-16.5'</td>
<td>MOTTLED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16-16.5'</td>
<td>BROWN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25'-26.5'</td>
<td>GRAY CLAYY SILT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26-27.5'</td>
<td>(RECOMP. ROCK)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27'-28.5'</td>
<td>MOTTLED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>28-29.5'</td>
<td>BROWN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29'-30.5'</td>
<td>SILTY CLAY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>31'-32.5'</td>
<td>WICLAY STRIES</td>
</tr>
</tbody>
</table>

### GRAIN-SIZE ANALYSIS (% Passing)

<table>
<thead>
<tr>
<th>Sieve</th>
<th>1&quot;</th>
<th>1/2&quot;</th>
<th>#4</th>
<th>#10</th>
<th>#20</th>
<th>#40</th>
<th>#100</th>
<th>#200</th>
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<tbody>
<tr>
<td>E</td>
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### ATTERBERG LIMITS

<table>
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<tr>
<th>Naturally Dried</th>
<th>Natural</th>
<th>Natural</th>
<th>Natural</th>
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<tbody>
<tr>
<td>Liquid Limit</td>
<td>0.34</td>
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<td>Plastic Limit</td>
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<tr>
<td>Plasticity Index</td>
<td>0.14</td>
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### UNIFIED SOIL CLASSIFICATION

- MH
- ML
- MH

### APPARENT SPECIFIC GRAVITY

- NA

### EXPANSION AND CBR TESTS

<table>
<thead>
<tr>
<th>(Surcharge-51 P.S.F.)</th>
<th>Molding Moisture, %</th>
<th>Molding Dry Density, P.C.F.</th>
<th>Swell upon saturation, %</th>
<th>CBR at 0.1&quot; Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

### MOISTURE-DENSITY RELATIONS OF SOILS

<table>
<thead>
<tr>
<th>(AASHO T-180-57 Method)</th>
<th>Dry to Wet or Wet to Dry</th>
<th>Max. Dry Density (P.C.F.)</th>
<th>Optimum Moisture (%)</th>
</tr>
</thead>
<tbody>
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</table>

### REMARKS:

- By Walter Lum Associates, Inc.
- Civil, Structural, Soils Engineers

**Date:** 10-22-73  
**By:** BT
# TABLE I.C - SUMMARY OF LABORATORY TEST RESULTS

<table>
<thead>
<tr>
<th>BORING NO.</th>
<th>SAMPLE NO.</th>
<th>DEPTH BELOW SURFACE</th>
<th>DESCRIPTION</th>
<th>GRAIN-SIZE ANALYSIS (%) Passing</th>
<th>ATTERBERG LIMITS</th>
<th>UNIFIED SOIL CLASSIFICATION</th>
<th>APPARENT SPECIFIC GRAVITY</th>
<th>EXPANSION AND CBR TESTS</th>
<th>MOISTURE-DENSITY RELATIONS OF SOILS</th>
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<tr>
<td></td>
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<td>SURFACE 5'-6.5'</td>
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<td>ML-CL</td>
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<td>10</td>
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<td></td>
<td>NATURAL</td>
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<td></td>
</tr>
</tbody>
</table>

**Remarks:**

Date: 0-2-73
By: BT

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS
**NEWTOWN ESTATES 2ND ACCESS ROAD. PHASE II**

**TABLE 1D - SUMMARY OF LABORATORY TEST RESULTS**

| BORING NO. | 12 |
| SAMPLE NO. |    |
| DEPTH BELOW SURFACE | SURFACE MOTTLED REDDISH-BROWN CLAYY SILT |
| DESCRIPTION |          |

**GRAIN-SIZE ANALYSIS (Passing)**

<table>
<thead>
<tr>
<th>Sieve</th>
<th>1&quot;</th>
<th>1/2&quot;</th>
<th>#4</th>
<th>#10</th>
<th>#20</th>
<th>#40</th>
<th>#100</th>
<th>#200</th>
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</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ATTERBERG LIMITS**

- Air Dried or Natural: NATURAL
- Liquid Limit: 51
- Plastic Limit: 95
- Plasticity Index: 16
- Dilatancy: QUICK
- Toughness: MEDIUM
- Dry Strength: SLIGHT-MED.

**UNIFIED SOIL CLASSIFICATION**

<table>
<thead>
<tr>
<th>MH</th>
</tr>
</thead>
</table>

**APPARENT SPECIFIC GRAVITY**


**EXPANSION AND CBR TESTS** (Surcharge-51 P.S.F.)

- Molding Moisture, %: 29.3
- Molding Dry Density, P.C.F.: 92.2
- Swell upon saturation, %: 0.3
- CBR at 0.1" Penetration: 5.5

**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:**

Date 10-22-73, By JBT
PLASTICITY CHART

PROJECT: NEWTOWN ESTATES 2ND ACCESS ROAD - PHASE II
LOCATION: WAIKALU, EWA, OAHU, HAWAII

LOCATION: 

PLASTICITY INDEX

LIQUID LIMIT

"A" LINE

100

90

80

70

60

50

40

30

20

10

0

10 20 30 40 50 60 70 80 90 100 110 120 130

CL - ML

ML

CL

MG 8 OH

10 SURFACE

10B

6 SURFACE

6B

12 SURFACE

BE

QF

DATE 10-22-73 BY

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS
MOISTURE—DENSITY CURVE (AASHO T-180—51, METHOD A)

PROJECT:  NEWTOWN ESTATES 2ND ACCESS ROAD —
PHASE II

LOCATION:  WAIMANU, EWA, OAHU, HAWAII

SAMPLE NO.:  0 SURFACE

SAMPLE DESCRIPTION:  REDDISH-BROWN SILTY CLAY

AGGREGATE:  1/4" MUNUS
MOLD SIZE:  4" X 4" FOOTH HIGH
HAMMER:  10 LBS.  16" DROP
LAYERS:  5
BLOWS:  25/LAYER

MAX. DRY DENSITY:  102.5 PCF
OPTIMUM MOISTURE CONTENT:  2.5 T. %
SPECIFIC GRAVITY:  2.68
ZERO AIR VOIDS CURVE

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

DATE  9-6-73  BY  N.N.
MOISTURE—DENSITY CURVE (AASHTO T-180-57, METHOD A.)

PROJECT: NEWTOWN ESTATES 2ND ACCESS ROAD
PHASE II

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO.: 12 SURFACE
SAMPLE DESCRIPTION: MOTTLED REDDISH-BROWN CLAYEN Silt

AGGREGATE: 1/4" MINUS
MOLD SIZE: 4" x 4.5" HIGH
HAMMER: 10 LBS., 18" DROP
LAYERS: 5
BLOWS: 56/LAYER

MAXIMUM DRY DENSITY = 95.0 P.C.F.

OPTIMUM MOISTURE CONTENT = 28.0%

DRY DENSITY (P.C.F.)

WATER CONTENT (%)

DATE: 12-14-72
BY: L.L.
CBR TEST

PROJECT: NEWTOWN ESTATES 2ND ACCESS ROAD - PHASE II

LOCATION: WAIMALU, OAHU, HAWAII

SAMPLE NO: 0' SURFACE

SAMPLE DESCRIPTION: REDDISH-BROWN SILTY CLAY

TEST RESULTS:

MOLDING MOISTURE, %: 24.1
MOLDING DRY DENSITY, P.C.F. 95.4
CBR @ 0.1" PENETRATION: 67'

DAYS SOAKED: 4

DATE 8-7-73 BY LY

DATE 8-8-73 BY JS

CBR PENETRATION DATA

<table>
<thead>
<tr>
<th>PENETRATION (INCHES)</th>
<th>LOAD (LBS)</th>
<th>LOAD (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.025</td>
<td>44</td>
<td>15</td>
</tr>
<tr>
<td>0.050</td>
<td>90</td>
<td>30</td>
</tr>
<tr>
<td>0.075</td>
<td>147</td>
<td>39</td>
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<td>200</td>
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<td>0.125</td>
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<td>84</td>
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<td>349</td>
<td>116</td>
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<tr>
<td>0.200</td>
<td>389</td>
<td>150</td>
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<tr>
<td>0.250</td>
<td>457</td>
<td>152</td>
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<tr>
<td>0.300</td>
<td>530</td>
<td>177</td>
</tr>
<tr>
<td>0.350</td>
<td>600</td>
<td>200</td>
</tr>
<tr>
<td>0.400</td>
<td>640</td>
<td>215</td>
</tr>
<tr>
<td>0.450</td>
<td>709</td>
<td>236</td>
</tr>
<tr>
<td>0.500</td>
<td>768</td>
<td>256</td>
</tr>
</tbody>
</table>

AGGREGATE 1/4" MINUS
HAMMER WEIGHT 10 LBS
HAMMER DROP 18"

No. OF BLOWS 50/LAYER
No. OF LAYERS 5
CBR TEST

PROJECT: NEWTOWN ESTATES 2ND ACCESS ROAD - PHASE II

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO: 8 SURFACE

SAMPLE DESCRIPTION: REDDISH-BROWN SILTY CLAY

<table>
<thead>
<tr>
<th>PENETRATION (INCHES)</th>
<th>LOAD (LBS)</th>
<th>LOAD (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.025</td>
<td>110</td>
<td>37</td>
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<tr>
<td>0.050</td>
<td>240</td>
<td>60</td>
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<td>0.075</td>
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<td>123</td>
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<td>0.100</td>
<td>500</td>
<td>163</td>
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<td>0.125</td>
<td>625</td>
<td>212</td>
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<td>0.150</td>
<td>740</td>
<td>247</td>
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<td>0.175</td>
<td>850</td>
<td>288</td>
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<tr>
<td>0.200</td>
<td>935</td>
<td>312</td>
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<tr>
<td>0.250</td>
<td>1085</td>
<td>362</td>
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<tr>
<td>0.300</td>
<td>1225</td>
<td>412</td>
</tr>
<tr>
<td>0.350</td>
<td>1360</td>
<td>453</td>
</tr>
<tr>
<td>0.400</td>
<td>1495</td>
<td>495</td>
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<td>0.450</td>
<td>1610</td>
<td>529</td>
</tr>
<tr>
<td>0.500</td>
<td>1725</td>
<td>575</td>
</tr>
</tbody>
</table>

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

TEST RESULTS:

MOLDING MOISTURE, %: 28.3
MOLDING DRY DENSITY, P.C.F: 101.6
CBR @ 0.1" PENETRATION: 48.0
DAYS SOAKED: 4

DATE 8-7-73 BY L4
DATE 8-6-73 BY N1
CBR TEST

PROJECT: NEWTOWN ESTATES 22ND ACCESS ROAD - PHASE II

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO: 10 SURFACE

SAMPLE DESCRIPTION: DARK REddISH-BROWN SILTY CLAY

TEST RESULTS:

MOLDING MOISTURE, %: 28.5
MOLDING DRY DENSITY, P.C.F.: 93.5
CBR @ 0.1" PENETRATION: 4.0

DATE: 4-29-13 BY L.Y.
DATE: 10-19-13 BY B.T.

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

PROJECT: NEWTOWN ESTATES 2ND ACCESS RD.- PHASE II

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO: 12 SURFACE

SAMPLE DESCRIPTION: MOTTLED REDDISH-BROWN CLAYEY SILT

TEST RESULTS:

MOLDING MOISTURE, %: 29.3

MOLDING DRY DENSITY, P.C.F.: 92.2

CBR @ 0.1" PENETRATION: 5.5

DAYS SOAKED: 4

DATE: 12-16-72 BY L.Y. & T.K.

DATE: 12-16-72 BY M.I.
LOGS OF BORINGS
FROM
NEWTOWN ESTATES 2ND ACCESS ROAD -
PHASE I
DATED
DECEMBER 5, 1972
AND
NEWTOWN ESTATES RECREATION CENTER,
PARK AND SCHOOL SITE
DATED
JUNE 30, 1972
Boring Log

**NEWTOWN ESTATES**

**PROJECT:** 2ND ACCESS ROAD - PHASE I

**LOCATION:** Waimalu, Ewa, Oahu, Hawaii

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

**HAMMER:**
- **Weight:** 140 lb
- **Drop:** 20"

**SAMPLER:**
- "BX" - BX DOUBLE TUBE CORE BARREL

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Soil Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>MLLH</td>
<td>STIFF, REDDISH BROWN CLAYET SILT / TRACES OF DECOMPOSED ROCK &amp; ROOTS</td>
</tr>
<tr>
<td>5</td>
<td>MH</td>
<td>STIFF, MOTTLED REDDISH BROWN CLAYET SILT / DECOMPOSED ROCK</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>MOTTLED GRAY DECOMPOSED ROCK (SOME CRUSHES TO CLAYET SILT)</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>BOULDERS OR ROCK FORMATION?</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>BLUE, DENSE LAVA ROCK</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>REDDISH BROWN, CLINKER &amp; DECOMPOSED ROCK</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>GRAY WEATHERED CLINKER / RAIN CLAY</td>
</tr>
<tr>
<td>35</td>
<td></td>
<td>BLUE, DENSE LAVA ROCK</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>END OF BORING @ 40'</td>
</tr>
</tbody>
</table>

**BORING NO:** 3  
**Sheet No:** 1 of 4  
**Driller:** W. LUM ASSOC, INC.  
**Date:** SEPT 30 - OCT 7, 1972  
**Field Party:** GARRIN, KAKI, HORYUCHI, METER, RADONIC

**Type of Boring:** AUGER (MOBILE)  
**Diam.:** 4"  
**Elev.:** 95' 2"  
**Drill Bit:** FINGER TYPE, DIAMOND (T.C.)  
**Coring:**  
**Water Level:** NOT CRAWED  
**Time:**  
**Date:** 10-7-72

**Penetration Data**

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Sample no.</th>
<th>Sample line</th>
<th>Plastic Unit</th>
<th>Water Cont.</th>
<th>Liquid Cont.</th>
<th>Undist. Comp.</th>
<th>Penetration Test</th>
<th>Blows per foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>T-95</td>
<td>3-A</td>
<td>35</td>
<td>21</td>
<td>50</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>T-95</td>
<td>3-B</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>T-95</td>
<td>3-C</td>
<td>24</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>T-95</td>
<td>3-D</td>
<td>9 (CUTTING)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>T-95</td>
<td>RUN #1</td>
<td>CORED: 0.5'</td>
<td>RECOVER: 0.3'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>T-95</td>
<td>RUN #2</td>
<td>CORED: 3.5'</td>
<td>RECOVER: 3.2'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>T-95</td>
<td>RUN #3</td>
<td>CORED: 2.0'</td>
<td>RECOVER: 2.0'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>T-95</td>
<td>RUN #4</td>
<td>CORED: 2.0'</td>
<td>RECOVER: 1.0'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>T-95</td>
<td>RUN #5</td>
<td>CORED: 4.6'</td>
<td>RECOVER: 3.8'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>T-95</td>
<td>RUN #6</td>
<td>CORED: 1.5'</td>
<td>RECOVER: 1.5'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>T-95</td>
<td>RUN #7</td>
<td>CORED: 2.5'</td>
<td>RECOVER: 2.5'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*HAMMER BOUNCES*
**Boring Log**

**NEWTOWN ESTATES RECREATION CENTER, PARK AND SCHOOL SITE**

**LOCATION**
Waimalu, Ewa, Oahu, Hawaii

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

**Boring No.**
8

**Sheet No.**

**Driller**
W. LUM ASSOC., INC.

**Date**
MAY 12, 1972

**Field Party**
MAKAULA MAESHIRO, SETO

**Type of Boring**
AUGER (MOBILE)

**Diam.**
4"

**Elev.**
218' 2" *

**Datum**

**Hammer:**
Weight: 140#

**Drop:** 30"

**Sampler:**
2" S: 2" O.D. THIN WALL TUBE
2" S5: 2" STANDARD SPLIT SPOON

---

### PENETRATION DATA

<table>
<thead>
<tr>
<th>Unified Soil Classification</th>
<th>Description</th>
<th>Depth (ft)</th>
<th>Plastic Limit</th>
<th>Water Content</th>
<th>Liquid Limit</th>
<th>Standard Penetration Test</th>
<th>Vane Shear Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MH)</td>
<td>Stiff, Reddish Brown Silty Clay w/Roots</td>
<td>2'9&quot;</td>
<td>2.8</td>
<td>-</td>
<td>-</td>
<td>990</td>
<td>-</td>
</tr>
<tr>
<td>(MH)</td>
<td>Stiff, Reddish Brown &amp; Brown Clayey Silt</td>
<td>2'35&quot;</td>
<td>2.8</td>
<td>90</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Gray Decomposed Rock</td>
<td>10'</td>
<td>2'35&quot;</td>
<td>2.8</td>
<td>32</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Lava Rock Formation & Decomposed Rock**

**End of Boring @ 13.5'**

**Note:** Drill Time 12.0'-13.5' = 45 Min.

---

*ELEVATION ESTIMATED FROM SURVEY STAKES BY PARK ENGINEERING, INC.*
Boring Log

NEWTON ESTATES
RECREATION CENTER, PARK
AND SCHOOL SITE

LOCATION: Waimalu, Ewa, Oahu, Hawaii

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

HAMMER: Weight: 140*
Drop: 30"

SAMPLER: 2"5.2" STAND..ARD SPLIT SPOON

<table>
<thead>
<tr>
<th>Local Soil Classification</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MH)</td>
<td>STIFF, REDDISH BROWN CLAYEY SILT W/ SOME ROOTS</td>
</tr>
<tr>
<td></td>
<td>STIFF, BROWN CLAYEY SILT</td>
</tr>
<tr>
<td></td>
<td>STIFF, MOTTLED REDDISH BROWN CLAYEY SILT W/ TRACES OF DECOMPOSED ROCK</td>
</tr>
<tr>
<td></td>
<td>ROCK OR BOULDER</td>
</tr>
<tr>
<td></td>
<td>STIFF, MOTTLED GRAY-BROWN RED CLAYEY SILT</td>
</tr>
<tr>
<td></td>
<td>LAVA ROCK FORMATION W/ DECOMPOSED ROCK</td>
</tr>
<tr>
<td></td>
<td>STIFF, REDDISH BROWN CLAYEY SILT W/ DECOMPOSED ROCK</td>
</tr>
<tr>
<td></td>
<td>DENSE, MOTTLED BROWN SILT SAND (CINDER)</td>
</tr>
<tr>
<td></td>
<td>END OF BORING @ 36.5</td>
</tr>
</tbody>
</table>

ELEVATION ESTIMATED FROM TOPO MAP
Boring Log

**NEWTOWN ESTATES RECREATION CENTER, PARK AND SCHOOL SITE**

**LOCATION**: Waimalu, Ewa, Oahu, Hawaii

**Sheet No. of**: 9-8-02: Por. 2

**PROJECT**: Waialua, Ewa, Oahu, Hawaii

**Type of Boring**: AUGER (MOBILE)

**Diam.**: 4"

**Elevator**: 234' +

**Datum**: —

**Date**: MAY 12, 1972

**Driller**: MAKULA, MAESHIRO, SETO

**Field Party**: MAKULA, MAESHIRO, SETO

**Hammer**:
- **Weight**: 140#
- **Drop**: 20"

**Sampler**:
- **2" SPT THIN WALL TUBE (1) STANDARD SPLIT SPOON**

**Hammer**:
- **Weight**: 140#
- **Drop**: 20"

**Sampler**:
- **2" SPT THIN WALL TUBE (1) STANDARD SPLIT SPOON**

**Penetration Data**

<table>
<thead>
<tr>
<th>Unified Soil Classification</th>
<th>Description</th>
<th>Depth (Ft)</th>
<th>Sample</th>
<th>Plastic Limit</th>
<th>Water Content</th>
<th>Liquid Limit</th>
<th>Unconf. Compr.</th>
<th>Penetration Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ML)</td>
<td>STIFF, REDDISH BROWN CLAYETY SILT</td>
<td>2.5</td>
<td>10-A</td>
<td>25</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>7/0.5' 9/0.5'</td>
</tr>
<tr>
<td>(MH)</td>
<td>STIFF, BROWN CLAYETY SILT</td>
<td>5</td>
<td>2.55</td>
<td>10-B</td>
<td>94</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>(MH)</td>
<td>STIFF, MOTTLED REDDISH BROWN GRAY SILTY CLAY</td>
<td>10</td>
<td>2.55</td>
<td>10-C</td>
<td>99</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>(MH)</td>
<td>STIFF, MOTTLED GRAY CLAYETY SILT TRACES OF DECOMPOSED ROCK</td>
<td>15</td>
<td>2.55</td>
<td>10-D</td>
<td>45</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>(MH)</td>
<td>STIFF, MOTTLED GRAY CLAYETY SILT TRACES OF DECOMPOSED ROCK</td>
<td>20</td>
<td>2.55</td>
<td>10-E</td>
<td>99</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>(MH)</td>
<td>STIFF, MOTTLED GRAY CLAYETY SILT TRACES OF DECOMPOSED ROCK</td>
<td>25</td>
<td>2.55</td>
<td>10-F</td>
<td>45</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

**End of Boring @ 26.5'**

**Elevation Estimated from Topo Map**
**Boring Log**

**PROJECT AND SCHOOL SITE**

**LOCATION** Waimalu, Ewa, Oahu, Hawaii

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

**Hammer:**
- **Weight:** 140 lbs.
- **Drop:** 30" (1'-0"

**Sampler:**
- **2" 5' 2" o.d. Thin Wall Tube**
- **2" SS 2" Standard Split Spoon**

**Penetration Data**

<table>
<thead>
<tr>
<th>Unified Soil Classification</th>
<th>Description</th>
<th>Elevation (ft)</th>
<th>Depth (ft)</th>
<th>Sampler</th>
<th>Sample No.</th>
<th>Plastic Limit</th>
<th>Water Cont.</th>
<th>Unconfined Compressive Strength</th>
<th>Vane Shear P.S.E.</th>
<th>Standard Penetration Test</th>
<th>-</th>
<th>2&quot; O.D. Thin Wall Tube Sampler</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML</td>
<td>Stiff, brown clayey silt w/ traces of sand (fill?)</td>
<td>237' ± 0'</td>
<td>2' 5&quot;</td>
<td>11-A</td>
<td>25</td>
<td>1890</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10 20 30 40 50 BLOWS/0.5'</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lay rock formation</td>
<td>2' 5&quot;</td>
<td>11-B</td>
<td>25</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>20 30 40 50 60 BLOWS/0.5'</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gray, decomposed rock (some crushed to clayey silt)</td>
<td>2' 5&quot;</td>
<td>11-C</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>50 60 70 80 90 BLOWS/0.5'</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
- Drill time: 10.5 - 15.0' = 1 hour
- End of boring @ 15' 2' 5"

**Hammer:**
- **Weight:** 140 lbs.
- **Drop:** 30"

**Drill Bit:** Finger Type

**Type of Boring:** Auger (Mobile)

**Datum:**
- Elevation 237' ± 0'

**Elevation Estimated from Survey Stakes by Park Engineering, Inc.**
Boring Log

NEWTON 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" 

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

BORING NO. 11A Sheet No. of
Driller W. LUM ASSOC., INC. Date MAY 10, 1972
Field Party MAKAIJIU MAESHIRO, SETO
Type of Boring AUGER (MOBILE) Diem. 4"
Elev. 24'-7" Datum |

Water Level NOT NOTED

Penetration Data

<table>
<thead>
<tr>
<th>Soil Classification</th>
<th>Description</th>
<th>Depth (ft)</th>
<th>Sample No.</th>
<th>Plastic Limit</th>
<th>Water Cont.</th>
<th>Liquid Limit</th>
<th>Unconf. Comp.</th>
<th>Penetration Test</th>
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</thead>
<tbody>
<tr>
<td>(MH)</td>
<td>STIFF, REDDISH BROWN CLAYEY SILT WITH SOME ROOTS</td>
<td>2.5&quot;</td>
<td>11A-A</td>
<td>23</td>
<td>2780</td>
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<tr>
<td>(MH)</td>
<td>STIFF, BROWN CLAYEY SILT</td>
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<td>11A-B</td>
<td>30</td>
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<td>(MH)</td>
<td>STIFF, REDDISH BROWN CLAYEY SILT WITH DECOMPOSED ROCK</td>
<td>10</td>
<td>11A-C</td>
<td>32</td>
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<td>(MH)</td>
<td>STIFF, REDDISH BROWN CLAYEY SILT WITH TRACES OF DECOMPOSED ROCK</td>
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<td>11A-D</td>
<td>38</td>
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<td>(MH)</td>
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<td>11A-E</td>
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</tbody>
</table>

END OF BORING & 21' 1"

* ELEVATION ESTIMATED FROM TOPO MAP
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.