PROPOSED HECO MAKALAPA SUBSTATION
SOIL EXPLORATION REPORT

SALT LAKE BOULEVARD
HALAWA, EWA, OAHU, HAWAII
TAX MAP KEY: 9-9-02: 25 & POR. 2

To:
HAWAIIAN ELECTRIC COMPANY, INC.

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS
AUGUST 28, 1975
MR. HARRY STEWART  
Engineering Design Department  
Hawaiian Electric Company, Inc.  
900 Richards Street  
Honolulu, Hawaii  96813  

Dear Mr. Stewart:

Subject: Proposed HECO Makalapa Substation  
Soil Exploration Report  
(for site grading design guidelines  
and foundation design purposes)  
Salt Lake Boulevard  
Halawa, Ewa, Oahu, Hawaii  
Tax Map Key:  9-9-02: 25 & Por. 2

Transmitted herewith is our soil exploration report for site grading  
and foundation design purposes for the Proposed HECO Makalapa Substation  
at Salt Lake Boulevard, Halawa, Ewa, Oahu, Hawaii.

This report includes a Boring Location Sketch, boring logs, laboratory  
test results, general site grading and foundation design guidelines and  
limitations.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

By Edward K. Watanabe

August 28, 1975

CN/EKW:v1


**CONTENTS**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCOPE OF EXPLORATION</td>
<td>1</td>
</tr>
<tr>
<td>FIELD EXPLORATIONS</td>
<td>1</td>
</tr>
<tr>
<td>LABORATORY TESTS</td>
<td>2</td>
</tr>
<tr>
<td>SOIL CLASSIFICATION SYSTEM</td>
<td>2</td>
</tr>
<tr>
<td>GENERAL SITE CONDITIONS</td>
<td>2</td>
</tr>
<tr>
<td>INTERPRETATION OF SOIL CONDITIONS</td>
<td>3</td>
</tr>
<tr>
<td>DISCUSSION AND RECOMMENDATIONS</td>
<td>4</td>
</tr>
</tbody>
</table>

**APPENDICES:**

- A. LOGS OF BORINGS - Boring Nos. 1 thru 6
- B. SUMMARY OF LABORATORY TEST RESULTS - Table IA
- C. BORING LOCATION SKETCH
- D. SUGGESTED BOULDER FILL - Figure 1
- E. LIMITATIONS
PROPOSED HECO MAKALAPA SUBSTATION
SOIL EXPLORATION REPORT

SALT LAKE BOULEVARD
HALAWA, EWA, OAHU, HAWAII
TAX MAP KEY: 9-9-02: 25 & POR. 2

SCOPE OF EXPLORATION

The purpose of this exploration was to evaluate general soil conditions for site grading and foundation design considerations for the Proposed HECO Makalapa Substation on Salt Lake Boulevard, Halawa, Ewa, Oahu, Hawaii.

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

The site is located on the proposed Plantation Drive Industrial Park. A report, "Plantation Drive Industrial Park," dated May 28, 1974, was previously prepared for the industrial subdivision.

FIELD EXPLORATIONS

Six borings were made at the site. The approximate locations of these borings are shown on the Boring Location Sketch.

The borings were made with 4-in. diameter augers using finger type and drag bits.

Soil samples were recovered with a 2-in. standard split spoon sampler driven with a 140-lb hammer falling 30 inches.
LABORATORY TESTS

Laboratory tests included: natural water content and grain-size analysis.

A summary of laboratory test results is given in Table IA.

SOIL CLASSIFICATION SYSTEM

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

GENERAL SITE CONDITIONS

The proposed site is located on the southwestern corner of the intersection of Salt Lake Boulevard and the proposed Bougainville Drive. The site is between Radford High School (north) and Plantation Drive (south).

An existing Hawaiian Electric Co. substation is located on the southeastern corner of the site. A concrete slab and an existing A.C. pavement were noted along the easterly boundary. Some stockpiles of miscellaneous materials were noted in the southern portion.

Calcite deposits at the surface were noted in the western portion of the site. Mudrock outcrops were noted in some areas.

Waterline easements are located along the northern and eastern portions of the site.
The southern portion of the site generally slopes down toward the northwest at gradients of about 10 to 20%. The northern portion of the site is generally a depression or drainageway that slopes down toward the west at gradients of about 20 to 50%.

The elevation of the site generally varies from about 100 ft to 60 ft.

The site is generally covered with small brushes and trees.

**INTERPRETATION OF SOIL CONDITIONS**

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

A surface layer, about 0 to 6 ft, of clayey silt, and silty sand over mudrock (volcanic tuff) formation.

A drainageway cuts across the site in an east-west direction. The drainageway which covers over 1/3 of the site was filled with a soft calcite deposit. The deposit varies from little to more than 6 ft deep.

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

Variations to the above soil and water conditions should 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 to a fairly level condition and construct various pole foundations and equipment pads for an electric substation.

The lower, northern portion of the site will be filled while the southern portion will be in cut. Fills of up to about 30 ft and cuts of up to about 9 ft are planned.

Retaining walls up to about 12 ft in height are planned along the northern boundary of the site.

Soft "calcite" deposits were encountered in a drainageway that cuts across the lower, northern portion of the site.

Water line easements are located along the northern and eastern portions of the site. If practicable, foundations should be located outside of the easements due to possible construction or maintenance of the water lines.

Site Grading

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

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

The surface clayey soils and "calcite" should be stripped and removed before construction of fills.
Grading work should be done as required by the Revised Ordinances of Honolulu, 1969 As Amended; and the following additional guidelines:

1. The site should be cleared and grubbed.

2. Soft pockets encountered during the site preparations should be excavated and replaced with select soils compacted in thin lifts.

3. Hard surfaces, such as pavements, in localized areas should be scarified down to stiff soils and recompacted to match the density of the surrounding soil.

4. The soft calcite and other deposits in the drainageways should be stripped down to stiff natural ground before the placement of fills. Subdrains with laterals in a herringbone pattern should be placed along the bottoms of natural drainageways.

5. Thin sidehill fills (sliver fills) on sloping areas should be avoided.

6. 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.

7. Borrow material should generally be less than
6-in. maximum size with a plasticity index
generally less than 20.

8. If boulders are proposed to be used in the
construction of fills, they should generally
be placed along the toe sections of fill slopes
and outside of probable foundations. Before
placing any boulders, the subgrade should be
stripped to stiff natural ground and shaped to
drain. A transition layer of select granular
material (6-in. to dust sizes) should be
placed on the subgrade and the boulders placed
on the select material. Earth fill may be used
in the void spaces between boulders. A transition
layer of select granular material should also be
placed against the boulders before any earth fills
are placed against the boulders. See attached
sketch, Figure 1.
9. In general, fills should be laid in 6-in. compacted layers to 90% of the maximum density determined by the ASTM D-1557-70 test method.

10. Provisions to drain the site should be included during and after the completion of filling operations.

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

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

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

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

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

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

In general, for the proposed poles and equipment, spread footing, continuous footing, or pier foundations on mudrock or compacted fills may be considered.

Because of downhill creep effects of soils on a slope, some settlements may occur near the tops of slopes. Structures placed in the creep zone may be subjected to movements. To lessen the effects of creep, structures should generally be placed away from the tops of slopes as follows:

- Fills without retaining wall: Distance from top of slope equal to height of fill with a minimum of 5 ft.

- Fills with retaining wall: Distance from top of wall equal to total height of wall and fill.

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

Spread or continuous footing foundations

Guidelines for spread or continuous footing foundations follow:

1. The footings may bear on mudrock or compacted fill.
2. The following allowable bearing values may be considered:

Footing bearing on mudrock: 5000 p.s.f.
Footing bearing on compacted fill: 3000 p.s.f.

3. The bottoms of the excavations should be recompacted prior to placing of concrete.

Pier foundations

Guidelines for pier foundations follow:

1. Piers may be constructed in compacted fill or mudrock.

2. Filling operations should be completed prior to excavation of piers.

3. The piers should be poured against neatly excavated holes.

4. For pier foundations, the following allowable passive resistances (equivalent fluid) may be considered:

   Piers in mudrock: 500 p.c.f.
   Piers in compacted fill: 300 p.c.f.
Retaining Wall

About 245 ft of retaining walls, up to about 12 ft in height, are planned along the northern boundary of the site.

The bottoms of the walls may rest on mudrock or on compacted fill.

Subdrains should be placed behind the walls below the footing level and should be daylighted at low points.

Fairly well-graded granular material or select granular material should be used for backfilling against the wall.

For lateral earth pressures, assuming a select well-drained backfill and drains are provided, an equivalent fluid pressure of about 45 p.c.f. approximating "at rest" conditions plus allowances for surcharge loads for sloping backfills and vehicular traffic may be used for walls unrestrained at the top. For a sloping backfill, the lateral pressure may be increased according to earth pressure charts by Terzaghi and 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.

Bearing values of about 5000 p.s.f. may be used for wall foundations resting on mudrock and 3000 p.s.f. for compacted select fill. Toe pressure may be increased about 1/3 where a triangular pressure diagram is used along the base of the wall.
For sliding resistance between the base and subgrade, a coefficient of friction of 0.5 for mudrock and a coefficient of friction of 0.30 plus an ultimate cohesion of 250 p.s.f. for silty-clayey materials may be used provided the base of the wall is well drained, and there is sufficient (2 times the base) stiff material in front of the toe of the wall.

A.C. Driveway

For light automobile traffic and drained subgrade conditions, the driveway and parking area pavement section for the general soil conditions may be as follows:


2. Base course - 6-in. base course over a prepared subgrade.

The subgrade should be compacted and shaped to drain. Outlets should be provided at low points of the paved areas to avoid water pocketing at the subgrade level. Where catch basins are placed in low areas, weep holes should be placed at subgrade levels through the walls of catch basins.

Existing Cesspools

The site appears to have been previously developed and cesspools may exist on the site.

If cesspools are encountered within the site, they should be located on the plan.
Sludge should be removed from the bottom of the cesspool and replaced with fairly well-graded granular material. The granular material should be placed in thin layers and rammed into place or compacted with vibratory equipment. The top 5 ft of fill should be compacted in 6-in. compacted layers.

Foundations should be designed to span over the cesspool. Footings should extend below the bottom of the cesspool.

**Unforeseen Conditions**

Because of the variability of soil deposits, site improvements, designs and construction techniques, existing or changed 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 changed or undetected conditions such as soft spots, existing utility trenches, underground structures, pipes, voids or cavities, boulders, expansive soil pockets, seepage water or water level changes with weather, 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 grain-size analysis test results.
## Boring Log

**PROJECT:** PROPOSED HECO MAKALAPA SUBSTATION  
**LOCATION:** Salt Lake Boulevard, Halawa, Ewa, Oahu, Hawaii

**HAMMER:** Tax Map Key: 9-9-02: 25 & Por. 2  
**Weight:** 140#  
**Drop:** 30"  
**SAMPLER:** 2" STANDARD SPLIT SPOON

<table>
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<tr>
<th>Description</th>
<th>Depth (ft)</th>
<th>Plastic Limit</th>
<th>Liquid Limit</th>
<th>Undr. Compressibility</th>
<th>Vane Shear Test</th>
<th>N (Blows per foot)</th>
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<tr>
<td>Brown, Mudrock W/Silty Sand (Fill)</td>
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<td>12</td>
<td></td>
<td></td>
<td></td>
<td>10.0</td>
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<tr>
<td>Mottled Brown Mudrock</td>
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<td>18</td>
<td></td>
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<tr>
<td>MUDROCK FRAGMENTS</td>
<td>15.0</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO RECOVERY</td>
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**END OF BORING @ 20'**  
7-11-75

**ELEVATION ESTIMATED FROM TAX MAP**

**JULY 11, 1975**

**Driller:** W. LUM ASSOC. INC.
**Field Party:** KAKU, ASATO

**Type of Boring:** AUGER (VERS. DRILL)  
**Drill Bit:** T.C. DRAG

**Elev.:** 94' ± 4"  
**Datum:** 140 #

**Water Level:** Marked

**END OF INC.**

**HAMMER BOUNCES**

**50%**

**80%**

**50%**

**50%**

**50%**
**Boring Log**

**PROJECT**
PROPOSED HECO MAKALAPA SUBSTATION

**LOCATION**
Salt Lake Boulevard
Halawa, Ewa, Oahu, Hawaii

**HAMMER:**

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

**SAMPLER:** 2" STANDARD SPLIT SPOON

---

### PENETRATION DATA

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<th>Depth (ft)</th>
<th>N (Blows per foot)</th>
<th>Standard Penetration Test</th>
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<td>0</td>
<td>415.5</td>
<td>200/6</td>
</tr>
<tr>
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<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
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<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
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</table>

**HAMMER BOUNCES**

* ELEVATION ESTIMATED FROM TOPO MAP

---

**BORING NO.** 2
**Sheet No.** 1 of 1
**Driller:** WALTER LUM ASSOCIATES, INC.
**Date:** JULY 14, 1975

**Field Party:** METER, KAKU, CHIN

**Type of Boring:** AUGER (CME 65)
**Diam.:** 4"

**Datum:** W.A.H.

**Date:** 7-14-75
Boring Log

PROJECT: PROPOSED HECO MAKALAPA SUBSTATION

LOCATION: Salt Lake Boulevard
Halawa, Ewa, Oahu, Hawaii

Tax Map Key: 9-9-02: 25 & Por. 2

HAMMER: Weight 140#
Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

---

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Description</th>
<th>Sample</th>
<th>Plastic Limit</th>
<th>Water Cont.</th>
<th>Usual Limit</th>
<th>Uncut Comp.</th>
<th>VSFS</th>
<th>PFSF</th>
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<tbody>
<tr>
<td>0</td>
<td>SOFT, GRAYISH WHITE CALCITE W SODIUM</td>
<td>B-A</td>
<td>67</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>STIFF REDDISH BROWN CLAYEY SILT W MUDROCK &amp; TRACES OF CORAL</td>
<td>B-B</td>
<td>21</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>BROWN, SILTY SAND W MUDROCK</td>
<td>B-C</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>15</td>
<td>BROWN, MUDROCK</td>
<td>B-D</td>
<td>MUDROCK FRAGMENTS</td>
<td>45% 0.5</td>
<td>HAMMER BOUNCES</td>
<td>60% 0.2</td>
<td>HAMMER BOUNCES</td>
<td></td>
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</table>

END OF BORING @ 15.2'
7-11-75

---

* ELEVATION ESTIMATED FROM TOPO MAP
# Boring Log

**PROJECT.** PROPOSED HECO MAKALAPA SUBSTATION  
**LOCATION.** Salt Lake Boulevard  
Halawa, Ewa, Oahu, Hawaii  
**HAMMER:** Tax Map Key: 9-9-02: 25 & Por. 2  
**WEIGHT:** 140 #  
**DROP:** 30"  
**SAMPLER:** 2" STANDARD SPLIT SPOON

<table>
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<tr>
<th>Depth (f.t)</th>
<th>DESCRIPTION</th>
<th>Sample No.</th>
<th>Plastic Limit</th>
<th>Water Cont.</th>
<th>Liquid Limit</th>
<th>Vane Shear</th>
<th>Penetration Test</th>
</tr>
</thead>
</table>
| 0           | 1/2" A.C.  
DENSE, BROWN  
Silty Sand  
GRavel & Mudrock  
GRAY BROWN  
WHITE Mudrock | 4-A         | 15           | -             | 18          | -           | -            | 40 # |
| 5           | 4-B         | 14           | -             | -           | -           | -            | 45 # |
| 10          | 4-C         | 45 #         | -             | -           | -           | -            | 45 # |

END OF BORING @ 10', 7-14-75

*ELEVATION ESTIMATED FROM TOPO MAP*

**BORING NO.** 4  
**Sheet No.** of  
**Driller:** W. LUM ASSOC., INC.  
**Date:** JULY 14, 1975  
**Field Party:** MEYER, KAKU  
**Type of Boring:** AUGER (CM 55)  
**Diam:** 4"  
**Elev:** 100' + 0  
**Datum:**  
**Drill Bit:** FINGER TYPE  
**Water Level:** NOTICED  
**Time:**  
**Date:** 7-14-75

**PENETRATION DATA**

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<thead>
<tr>
<th>N (Blows per foot)</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
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<tbody>
<tr>
<td>HAMMER BOUNCES</td>
<td>40 #</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>HAMMER BOUNCES</td>
<td>45 #</td>
<td></td>
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<td>HAMMER BOUNCES</td>
<td>45 #</td>
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</table>
Boring Log

PROJECT: PROPOSED HECO NAKALAPA SUBSTATION
LOCATION: Salt Lake Boulevard
Halawa, Ewa, Oahu, Hawaii

HAMMER: T.C. DRAG
HAMMER: Weight 140#
Drop 30"

DATE: 7-14-75

SAMPLER: 2" STANDARD SPLIT SPOON

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample</th>
<th>Plastic Limit</th>
<th>Liquid Limit</th>
<th>Unconfined Compressibility</th>
<th>Standard Penetration Test</th>
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<tbody>
<tr>
<td>5</td>
<td>5-A</td>
<td>71</td>
<td>-</td>
<td>-</td>
<td>2 BLOWS/1.0</td>
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<tr>
<td>10</td>
<td>5-B</td>
<td>123</td>
<td>32</td>
<td>-</td>
<td>6/0.5</td>
</tr>
<tr>
<td>15</td>
<td>5-C</td>
<td>21</td>
<td>-</td>
<td>-</td>
<td>20/0.5</td>
</tr>
<tr>
<td>20</td>
<td>5-D</td>
<td>26</td>
<td>-</td>
<td>5%</td>
<td>50/0.4</td>
</tr>
<tr>
<td>20.4</td>
<td>5-E</td>
<td>24</td>
<td>-</td>
<td>5%</td>
<td>50/0.4</td>
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END OF BORING 7-14-75

SOFT, GRAYISH WHITE CALCITE W/SODIUM

BROWN TRACES OF WHITE MUROCK W/SILTY SAND

BROWN MUROCK W/SILTY SAND

* ELEVATION ESTIMATED FROM TOPO MAP.
Boring Log

PROJECT: PROPOSED HECO MAKALAPA SUBSTATION
LOCATION: Salt Lake Boulevard
Halawa, Ewa, Oahu, Hawaii

HAMMER:
Weight: 140 #
Drop: 30"

SAMPLER: 2" STANDARD SPLIT SPOON

ELEVATION: 94' ± 7" #

BROWN MUDROCK

END OF BORING @ 10'
7-14-75

* ELEVATION ESTIMATED FROM TOPO MAP
**TABLE 1A – 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>
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<tr>
<td></td>
<td></td>
<td>0' - 1.5'</td>
<td>Brown &amp; Traces of</td>
<td>100</td>
<td>Air Dried or Natural</td>
<td>GM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B (PIM)</td>
<td>Mudrock</td>
<td>100</td>
<td>Liquid Limit</td>
<td>SM</td>
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<tr>
<td></td>
<td></td>
<td>S (PTA)</td>
<td>Silty Sand</td>
<td>100</td>
<td>Plastic Limit</td>
<td>GM</td>
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<td></td>
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<td>White Mudrock</td>
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<td></td>
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<td>Websilt Sand</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(Fill)</td>
<td></td>
<td>Toughness</td>
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<td>1-1/2&quot;</td>
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**APPARENT SPECIFIC GRAVITY**

<table>
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<tr>
<th>CBR TEST</th>
<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>
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**MOISTURE-DENSITY RELATIONS OF SOILS**

<table>
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<th>(ASTM D-1557-70, Method__)</th>
<th>Dry to Wet or Wet to Dry</th>
<th>Max. Dry Density (P.C.F.)</th>
<th>Optimum Moisture (%)</th>
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**REMARKS:**

Date 0-11-75 By PT
SECTION
NOT TO SCALE

FIGURE 1
SUGGESTED BOULDER FILL
PROPOSED HECO MAKALAPA SUBSTATION
SALT LAKE BOULEVARD
HALAWA, EWA, OAHU, HAWAII
TAX MAP KEY: 9-1-02: 28 4 FOR 2

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS
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 between borings, at other locations, or at other dates. Soil conditions and water levels may change with the passage of time, 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.

This report was prepared only for the indicated use of the site. 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 soil engineering practices. This warranty is in lieu of all other warranties expressed or implied.
LIMITATIONS (cont'd.)

Contract documents and specifications often prescribe supervision by the soil engineer. It should be understood by all parties that the soil engineer's actual scope of work is very limited. We as the soil engineer do not assume the day to day physical direction of the works, nor minute examination of the elements, nor do we assume the responsibility for the safety of the contractor's workmen. Supervision, inspection, control, etc., by the soil engineer generally mean taking of soil tests and making visual observations, sometimes on only an intermittent basis relating to earthwork or foundations for the project. The soil engineer does not guarantee the contractors' performance, but rather looks for general conformance to the intent of the plans and soil report. Any discrepancy noted by the soil engineer regarding earthwork or foundations will be referred to the project engineer or architect or contractor for action.

Although the soil report may comment or discuss construction techniques or procedures for the design engineer's guidance, the report should not be interpreted to prescribe or dictate construction procedures or to relieve the contractor in anyway of his responsibility for the construction.