KAMLOIKI VALLEY SUBDIVISION - UNIT 3A
HAWAII KAI, MAUNALUA, OAHU, HAWAII
TAX MAP KEY: 3-9-10 & 3-9-14
PRELIMINARY SOIL REPORT

To:
PARK ENGINEERING, INCORPORATED

By:
WALTER LIM ASSOCIATES, INCORPORATED
CIVIL, STRUCTURAL, SOILS ENGINEERS
July 8, 1970
July 8, 1970

PARK ENGINEERING, INC.
1149 Bethel Street, Room 710
Honolulu, Hawaii 96813

Gentlemen:

Subject: Kamiloiki Valley Subdivision - Unit 3A
Preliminary Soil Report
(for residential development)
Hawaii Kai, Maunalua, Oahu, Hawaii
Tax Map Key: 3-9-10 & 3-9-14

Submitted herewith is our preliminary soil report for residential development for the proposed Kamiloiki Valley Subdivision - Unit 3A at Hawaii Kai, Maunalua, Oahu, Hawaii.

Surface soils at the site may be generally described as "CH" clays mixed with gravels and boulders. Tan silty clay, sand and coral underlies the clay in the lower (west) portion of the site.

Cuts along the eastern part of the site will be made generally thru clays with gravel and boulders. Some field adjustments may be required if deep clay pockets are encountered during excavation.

For light residential structures, conventional types of house foundations such as slab-on-ground or post-and-beam construction may be used. Slab-on-ground construction should be used only where the top 2 ft of finish grade is of low expansive soil. Special foundations should be considered where expansive soils occur near finish grade.

Unforeseen or undetected conditions such as soft spots or seepage water may occur in localized areas and will have to be adjusted and corrected in the field as they are detected.

Earthwork should be done in accordance with the requirements of Chapter 23, Revised Ordinances of Honolulu, 1961 As Amended and the recommendations contained herein.
The soil report containing a Boring Location Plan, the boring logs, laboratory test results and recommendations for site development is attached.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

Ezra Koike  
Professional Engineer  
Hawaii No. 1450
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KAMIKOIKI VALLEY SUBDIVISION - UNIT 3A

HAWAII KAI, MAUNALUA, OAHU, HAWAII
TAX MAP KEY: 3-9-10 & 3-9-14
PRELIMINARY SOIL REPORT

SCOPE OF EXPLORATION

The purpose of this exploration was to determine general soil conditions for the design of foundations for light, one and two-story residential structures at the proposed site, Kamikoiki Valley Subdivision - Unit 3A at Hawaii Kai, Maunalua, Oahu, Hawaii.

This report includes preliminary field exploration, laboratory tests and general recommendations for one and two-story house foundation design.

PRELIMINARY FIELD EXPLORATION

Eighteen exploratory borings and five open pits were made at the site. The locations of these borings and open pits are shown on Figure 1, Boring Location Plan. Descriptions of the underlying soils encountered are shown on Boring Logs Nos. 1 thru 21.

Borings were made with 3-in. diameter augers using tungsten carbide drag bits. Open pits were made with an International TD30 dozer with ripper. Soil samples were recovered with 2 and 3-in. thin wall tube and 2-in. standard split spoon samplers driven with a 140-lb hammer falling 30 inches.
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."

LABORATORY TESTS

Laboratory tests included: natural density, water content, unconfined compression, laboratory vane shear, Atterberg limits, specific gravity, sieve analysis, AASHO T-180-57 density, expansion and CBR.

A list of the standard field and laboratory test methods used for this project is given in the Appendix.

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

GENERAL SITE CONDITIONS

The project site is located on the eastern side of Kamiloiki Valley, north of the existing Kamiloiki Valley Subdivision - Unit 2 and east of the drainageway that runs up the middle of the valley. The existing ground generally slopes upward from the drainage channel toward Kamehame Ridge. The cut slopes along the eastern boundary will be made in the lower slopes of Kamehame Ridge.

Prior to the field exploration, the eastern boundary or lower slopes of Kamehame Ridge have been excavated and used as a borrow site. Boulders were stockpiled along the western side of the haul road.
The lower part of the site toward the center of the valley is covered with grass, brush and clusters of keawe trees.

INTERPRETATION OF SOIL CONDITIONS

From the boring logs, the soils encountered in the borings can be generalized as follows:

The Upper Portion (East Side)

The upper portion of the site along the lower slopes of Kamehame Ridge has been used as a borrow site and some of the surface soils have been removed. The open pits made on the existing slope generally indicated layers of talus material composed of clays with cobbles and gravel to about 8 to 13 ft, the depths of the open pits. Pockets of slickensided clays were noted in Pit Nos. 3, 4, and 5 at about 4 to 7-ft depths. Some sands and boulders were noted in Pit Nos. 1 and 2.

The Lower Portion (West Side)

Borings in the lower portion along the central valley of the site generally indicated a surface layer of dark brown clay or "adobe" soil with gravel and boulders underlain with light brown to tan silty clays and coral.

Water was noted in some of the drill holes at the lower portion of the site at about 10 to 13-ft depths.
For more detailed descriptions of the soils encountered in the drill holes, refer to the boring logs.

DISCUSSION AND RECOMMENDATIONS

The proposed plan is to grade the site for residential subdivision development.

Along the eastern boundary, cut slopes of up to about 45 ft in height are proposed at the lower slopes of Kamehame Ridge.

Fill slopes of up to about 20 ft in height are proposed along the central section of the site. The outer slope of the fill should be constructed of select material as shown on Figure 2.

A concrete lining is proposed along the drainageway that runs down the middle of the valley.

From the field exploration, the soils at the site should be able to support the proposed fills and light residential houses.

Some field adjustments may be required, particularly along the eastern boundary wherever slickensided clays may be observed or encountered during construction.

Unforeseen or undetected conditions such as soft spots or seepage water may occur in localized areas and will have to be adjusted and corrected in the field as they are detected.
It is essential that the site be cleared and grubbed, drained and localized soft spots removed.

Site Grading
The on-site clay, "CH", soils should generally be placed in fills away from the face of slopes and preferably outside of building pads. Silty or sandy soils and decomposed rocks or select borrow soils imported to the site should be used to construct the outer sections of the slopes and, if practicable, the upper 2 to 3 ft of fills for roadways, parking areas and building pads. If boulders are to be used to construct fills, they should generally be placed at the toe of slopes and outside the building areas.

Fill material imported to the site should be select soils generally less than 6-in. maximum size and the plasticity index generally less than 20.

The construction of fills should be done in accordance with F.H.A. Data Sheet 79-G and Chapter 23, Revised Ordinances of Honolulu, 1961 As Amended and the recommendations contained herein. The following may be used as a guide:

1. After clearing and grubbing, all topsoil and stockpiled soil should be stripped to stiff natural ground or scarified and recompacted before the placement of fills.
Soft pockets and pockets of unsuitable material should be excavated and replaced with select soils to match the density of the surrounding stiff soils.

2. Stockpiled or loose boulders should generally be removed and the area stripped or scarified and recompacted and shaped to a fairly level condition before the placement of fills.

3. All hard surfaces such as existing access roads should be scarified and recompacted to match the density of the surrounding soils.

4. Where fills are contemplated in dips or natural drainageways in the southwest section, the low spots should be drained, soft spots removed and replaced with select material.

Subdrains should be placed in a herringbone pattern along the bottom of the natural channel before the placement of fills. The lower 2+ ft of fill over the drainageway should be fairly well-graded granular material from about 1-1/2 in. to dust sizes with less than 10% passing the No. 200 sieve.

5. Old cesspools should be accurately located on the grading plan and backfilled before grading work is
started. The recommended procedure for backfilling is outlined in the attached "Proposed Specification for Earthwork."

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

7. All fills should be constructed in approximately level layers starting at the lower end and working upward.

8. All fills should be laid in 6-in. compacted layers with a relative density of at least 90% of AASHO T-180-57 density.

9. If boulders are used in the construction of fills, they should be placed along the toe of the fill slopes. The subgrade should be shaped to drain and covered with a layer of filter material. Boulders may then be placed on the filter layer. The void spaces between boulders should be filled with granular material. A blanket of filter material should be placed against the boulder fill before placing earth fills behind the boulders. See sketch on Figure 4.
Slopes

Where plastic clays, "CH", are encountered at the site, slope ratios generally about 3 horizontal to 1 vertical or flatter should be used. Where the face of fill slope is of adobe, the slope should be kept less than 6 ft in height.

For the cuts along the eastern boundary, the present plan is to use slopes of about 3 horizontal to 1 vertical ratio in the upper portion with a 15-ft wide bench at about mid-height and about a 2 horizontal to 1 vertical slope for the lower portion of the slope. Pockets of clay, "CH", soils with slickensides were noted in the exploration pits in this area. Slope adjustments may be necessary if such soils are exposed during construction.

In silty or granular soils, slopes of about 2 horizontal to 1 vertical or flatter may be used.

Adjustments or other precautions may be necessary if seepage zones or soft spots are encountered in localized areas.

For protection against erosion, the runoff from rainstorms should be controlled by berms or ditches that will divert water away from slopes.

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 and creep near the tops of slopes.

**Foundations**

If earthwork is carried out as recommended, the stiff natural ground and well-constructed fills should develop adequate bearing values to support the proposed light, short-span, residential structures.

Slab-on-ground construction and post-and-beam construction may be used where silty or granular soils, or select borrow soils occur within the top 2 ft of finish grade.

If slab-on-ground construction is used on "CH" clay soils, the footing excavations around the perimeter of the building should extend 18 in. below the bottom of the footing and backfilled with compacted, select coral or an equivalent material. The base course should be placed and wetted down 48 hours before the placement of slab on ground. See Figure 3.

Post-and-beam construction may be used where clayey soils, "CH", are near finish grade. To minimize the effects of heave and shrinkage of "CH" soils, excavations for the foot blocks should be made about 2 ft deep and about 1 ft 6 in. square or round and backfilled with compacted, select coral or an equivalent material. The foot blocks may be placed on top of the coral. See Figure 3.
The select coral should be well graded from 3/4-in. to dust sizes with about 10% passing the No. 200 sieve.

The following may be used as a guide for foundation design:

1. Bearing values for a given soil vary with the size and depth of footings. For light, one and two-story residential structures, bearing values of about 1500 p.s.f. on compacted fill and 2000 p.s.f. on stiff natural ground may be used.

2. All soft spots or pockets of loose material encountered in footing excavations or below a building area should be excavated and replaced with compacted select on-site soils or select borrow materials.

3. Concrete slab 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. The subgrade should be compacted and shaped to a level surface or to drain, if practicable, and generally should be kept slightly higher than the finish grade outside of the building.
4. Buildings and structures should be placed about 15 ft from the tops of slopes. This distance may be reduced for lower slope heights, e.g., 10 ft for 10-ft high slopes, but in no case closer than 5 ft from the top of a slope.

5. Construction of retaining wall on slopes should generally be avoided.

6. Good surface drainage away from the foundations of the proposed structures should be maintained and the site should be graded at all times to prevent ponding of water.

**Underground Utilities**

Underground utilities should be placed after the fills are constructed.

Utility line trenches should be daylighted to drain water, particularly in the upper (eastern) sections.

Flexible connections should be used.

**Roadway**

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

2. Base course - 6-in. base course.
3. Subbase course - 18-in. subbase course over a prepared subgrade.
Provisions should be made in the contract documents to allow for local adjustments regarding subbase requirements in the field as ground conditions are exposed at subgrade levels. In fill areas, the use of select soils within the top 3 ft of finish grade may be considered to reduce the thickness or eliminate the subbase course.

It is recommended that the subgrade be compacted and shaped to drain. To avoid the ponding of water and softening of the subgrade at low points, weep holes should be placed at subgrade levels through the walls of catch basins which are placed in these low areas.
PROPOSED SPECIFICATIONS FOR EARTHWORK
KAMIIKIKI VALLEY SUBDIVISION - UNIT 3A

General Description

This item shall consist of all clearing and grubbing, removing of existing structures, preparing of land to be filled, excavating and filling of the land, spreading, compacting and testing of the fill, and all subsidiary work necessary to complete the grading.

Clearing, Grubbing and Preparing Areas to be Filled

All vegetation, concrete slabs and rubbish shall be removed and disposed of, leaving the disturbed area with a neat, debris-free appearance.

All vegetable matter shall be removed from the surface upon which fill is to be placed. All topsoil and stockpiled soils shall be (1) stripped to stiff natural ground or (2) scarified and recompacted before the placement of fills. All topsoil encountered at finish grade shall be scarified and recompacted.

Stockpiled, nested and loose boulders shall be removed and the area stripped to stiff ground or scarified and recompacted to a fairly level condition before the placement of fills.

All hard surfaces along the existing access roads shall be scarified down to stiff soils and recompacted to match the density of the surrounding soil before the placement of fills.

Where fills are proposed in all sidehill areas and gullies, all loose material along the bottom and the sides shall be stripped down to stiff natural ground before the placement of fills. All new fills shall be keyed into the stiff natural ground.
Subdrains shall be placed along the bottom of the natural drainageways before the construction of fills. The final locations of subdrains shall be determined in the field after clearing and grubbing.

Where fills are made on sloping areas steeper than 4 horizontal to 1 vertical, the ground at the toe of the slope shall be benched to a generally level condition. As the fill is brought up, it shall be continually keyed into the stiff natural ground by the cutting of steps into the hillside and compacting the fill into these steps. Ground slopes which are flatter than 5 horizontal to 1 vertical shall be benched when considered necessary by the Soil Engineer.

**Materials**

Fill materials shall consist of approved on-site or borrow soils. The soils shall contain no more than a trace of organic matter and no particles larger than 6 in. in diameter. Also, it shall contain no more than 40% gravel (4 sieve to 3 in. sieve sizes) and no more than 10% cobbles larger than gravel and smaller than 6 in. in diameter. Fill material placed in the top 2 ft of fills shall contain no more than 30% gravel and any material larger than gravel.

**Placing, Spreading and Compacting Fill Material**

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

No rocks or cobbles shall be allowed to nest and all voids between rocks must be carefully filled and compacted with small stones or earth.
When the water content of the fill material is below that specified by the Soil Engineer, water shall be added until the water content is as specified and assures a thorough bonding during the compacting process.

When the water content of the material is above that specified by the Soil Engineer, the fill material shall be aerated by blading or by other satisfactory methods until the water content is as specified.

After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to no less than 90% of maximum density in accordance with AASHO Test No. T-180-57 or other comparable density tests. Compaction shall be with sheepsfoot rollers, multiple-wheel pneumatic-tired rollers or other acceptable rollers which shall be able to compact the fill to the specified density. Rolling shall be accomplished while the fill material is at the specified water content. The rolling of each layer shall be continuous over its entire area and the roller shall make sufficient passes to insure the obtainment of the desired density.

Field density tests shall be made by the Soil Engineer 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 as determined by the Soil Engineer. When these readings indicate that the density of any layer of fill or portion thereof is below the required 90% density, that layer or portion shall be reworked until the required density has been obtained.

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

The following procedures shall be followed for backfilling:

(1) Sludge Removal

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

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

Use granular material, graded from 6 to 0 inches. The fines passing the No. 200 sieve shall be less than 10%. The materials shall be placed in thin layers (12 in. maximum) and compacted with vibratory equipment to 90% of AASHO T-180-57 density. Ramming each layer into place with a clamshell bucket will be allowed. The granular fill shall be wetted before placement into the cesspools. Sufficient compaction tests shall be conducted to verify that 90% compaction is obtained by the construction method selected.

(3) Top 3 Ft of Fill

Linings encountered in the cesspools within the top 3 ft from finish grade shall be removed. The fill within the top 3 ft from finish grade shall be constructed from on-site soil in thin layers (6-in. compacted thickness) to 90% of AASHO T-180-57 density. The material at finish grade shall blend with the surrounding soil.
Excavation

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

Slope Adjustments

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

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

Boulder Fills

If boulders are proposed to be used in the construction of fills, they shall be generally placed along the toe section of slopes. The subgrade shall be stripped to stiff natural ground, shaped to drain and a layer of filter material shall be placed on it. All voids shall be filled with smaller granular soils. A blanket of filter material shall be placed against the boulder fill before the construction of fine soil fills against it.

Unforeseen Conditions

If unforeseen or undetected critical soil conditions such as soft spots or seepage water are encountered during the field operations, corrective measures shall be made in the field as they are detected.
Rainy Weather

No fill material shall be placed, spread or rolled during unfavorable conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests indicate that the moisture content and density are as previously specified.
BORING LOGS

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 limits or sieve analysis test results.
Boring Log

**PROJECT**
KAMIIKI VALLEY SUBD. - UNIT 3-A

**LOCATION**
Hawaii Kai, Maunalua, Oahu, Hawaii

Tax Map Key: 3-9-10 & 3-9-14

**HAMMER**

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**SAMPLER**
2"SS - 2" STANDARD SPLIT SPOON

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**DESCRIPTION**

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<td>GRAY BROWN, DECOMPOSED ROCK</td>
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<td>END OF BORING @ 2.5'</td>
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**NOTE:** HIT ROCK AT 2.5' DEPTH. ATTEMPTED ENCOUNTERED ROCKY MATERIAL AT 2.5' DEPTHS.

* Elevation Estimated from Topo Map
Boring Log

PROJECT: KANILOAII VALLEY SUBD. - UNIT 3-A
LOCATION: Hawaii Kai, Maunalua, Oahu, Hawaii

Tax Map Key: 3-9-10 & 3-9-14

HAMMER:
Weight
Drop

SAMPLER:

---

** Elevation by Park Engineering, Inc.
Boring Log

PROJECT: KAMLOKI VALLEY SUBD. - UNIT 3-A
LOCATION: Hawaii Kai, Maunalua, Oahu, Hawaii

Tax Map Key: 3-9-10 & 3-9-14

HAMMER:
Weight
Drop

SAMPLER:

ELEV. = 53.5' **

GRAY TO WHITE, SILTY CLAY MATRIX, COBBLES AND BOULDERS (MAX. SIZE 3'1; AVE. SIZE 6-8'; WHITE COATINGS)
DARK GRAY CLAY (SLICKENSIDED)
DARK GRAY SANDY OR SILTY CLAY WITH SOME POCKETS OF SAND W/ BOULDERS

END OF PIT @ 8'2

** Elevation by Park Engineering, Inc.
Boring Log

PROJECT: KAMIKOIKI VALLEY SUBD. - UNIT 3-A
LOCATION: Hawaii Kai, Maunalua, Oahu, Hawaii
Tax Map Key: 3-9-10 & 3-9-14

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

SAMPLER: 2" STANDARD SPLIT SPOON

**ELEV. = 50'**

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<td>BROWN, CLAY</td>
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<td>(CH)</td>
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* Elevation Estimated from Topo Map
### Boring Log

**PROJECT:** KANILIOKI VALLEY SUBD. - UNIT 3-A  
**LOCATION:** Hawaii Kai, Maunalua, Oahu, Hawaii  
**Tax Map Key:** 3-9-10 & 3-9-14

**HAMMER:**
- **Weight:**  
- **Drop:**

**SAMPLER:**

**OPEN PIT BORING NO.** 4  
**Driller** J. M. TAMAKA  
**Field Party** WALTER LUM ASSOC.  
**Date** JUNE 26, 1970

**Type of Boring** OPEN PIT  
**Diaem.** 56'1"

**Elev.** 56'1"  
**Datum**

**Drill Bit**

**Water Level**

**Time**

**Date** 6-26-70

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<td>LIGHT GRAY SANDY CLAY &amp; COBBLES W/ BOULDERS - TO 2'1</td>
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<td>BLACK CLAY (SLICKEN-SIDED)</td>
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<td>LIGHT GRAY-WHITE SANDY CLAY W/ COBBLES &amp; BOULDERS</td>
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**PENETRATION DATA**

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

**Project:** Kamiloiki Valley Subd. - Unit 3-A  
**Location:** Hawaii Kai, Maunalua, Oahu, Hawaii  
**Tax Map Key:** 3-9-10 & 3-9-14  

**Hammer:**  
- Weight: 140 lb  
- Drop: 30"  

**Sampler:**  
- 2.4" standard split spoon  
- 2.4" O.D. thin wall tube  

---

**Penetration Data**

<table>
<thead>
<tr>
<th>Soil Classification</th>
<th>Description</th>
<th>Elevation</th>
<th>P.C.F.</th>
<th>Water Content</th>
<th>Penetration</th>
<th>Time</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH</td>
<td>Loose, brown sandy silt</td>
<td>54'</td>
<td>15</td>
<td>41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH</td>
<td>Medium, brown clay</td>
<td>10</td>
<td>8</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH</td>
<td>Decomposed rock</td>
<td>15</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH</td>
<td>Dense, decomposed lava rock w/ some brown clay &amp; sand</td>
<td>20</td>
<td>56</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH</td>
<td>Soft to medium gray clay (slickensided)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH</td>
<td>Dense, light brown decomposed rock &amp; stiff brown clay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH</td>
<td>Dense, white coral &amp; red decomposed rock fragment w/ gray clay pockets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

* Elevation Estimated from Topo Map
** Elevation by Park Engineering, Inc.
**Elevation by Park Engineering, Inc.**
**Boring Log**

**PROJECT**  KAMILIOKI VALLEY SUBD. - UNIT 3-A

**LOCATION**  Hawaii Kai, Maunalua, Oahu, Hawaii

**Tax Map Key**  3-9-10 & 3-9-14

**HAMMER:**
- **Weight**  140 #
- **Drop**  30"  2" 5 - 2" O.D. THIN WALL TUBE
- **Sampler**  2.55 - 2" STANDARD SPLIT SPOON

<table>
<thead>
<tr>
<th>Unified Soil Classification</th>
<th>Description</th>
<th>Depth (ft)</th>
<th>Sampler</th>
<th>Sample No.</th>
<th>Wet Density</th>
<th>Water Cont.</th>
<th>Dry Density</th>
<th>Unconfined Compl.</th>
<th>Penetration Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CH)</td>
<td>Stiff, Mottled Brn. Gray Clay (Adobe)</td>
<td>2.55</td>
<td>7-A</td>
<td>33</td>
<td>44</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3/5 4/5 7/5</td>
</tr>
<tr>
<td>(CH)</td>
<td>Stiff Tan Silty Clay</td>
<td>2.55</td>
<td>7-B</td>
<td>9</td>
<td>93</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3/5 4/5 7/5</td>
</tr>
<tr>
<td>(SM)</td>
<td>Reddish Brn. Clayey Silt</td>
<td>2.55</td>
<td>7-C</td>
<td>17</td>
<td>24</td>
<td>32</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(SM)</td>
<td>Medium Density, Black &amp; Yellow Silty Sand</td>
<td>2.55</td>
<td>7-D</td>
<td>NO RECOVERY</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(SM)</td>
<td>Cemented, Yellow Silty Sand</td>
<td>2.55</td>
<td>7-D</td>
<td>NO RECOVERY</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(SM)</td>
<td>Medium Density, Black Sand</td>
<td>2.55</td>
<td>7-D</td>
<td>NO RECOVERY</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(SM)</td>
<td>Gray Clay (Adobe) Boulder Or. Rock</td>
<td>2.55</td>
<td>7-D</td>
<td>NO RECOVERY</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Elevation Estimated from Topo Map

**Date**  APRIL 13, 1970

**Driller**  SETO, CHAPMAN, GLORY

**Type of Boring**  AUGER

**Diam.**  3"  39"1 constructions

**Datum**  

**Water Level**  NOT NOTICED

**Time**  

**Date**  4-13-70

**Penetration Data**

**Standard Penetration Test**

**2" O.D. Thin Wall Tube**

<table>
<thead>
<tr>
<th>N (Blows per foot)</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>BLOWS/5'</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/5 4/5 7/5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**WALTER LUM ASSOCIATES**

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

Boring Log
**Boring Log**

**PROJECT**  
KAMLOIK VALLEY SUBD. - UNIT 3-A

**LOCATION**  
Hawaii Kai, Maunalua, Oahu, Hawaii

**Tax Map Key:** 3-9-10 & 3-9-14

**HAMMER:**

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

**SAMPLER:**

- 2"-5" - 2" O.D. THIN WALL TUBE
- 2"-5" - 2" STANDARD SPLIT SPOON

---

**DESCRIPTION**

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sampler</th>
<th>Sample No.</th>
<th>Wet Den.</th>
<th>Sampled Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2'-5&quot;</td>
<td>B-A</td>
<td>107</td>
<td>27'-40'</td>
</tr>
<tr>
<td>5</td>
<td>2'-5&quot;</td>
<td>B-B</td>
<td>40</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>2'-5&quot;</td>
<td>B-C</td>
<td>38</td>
<td>-</td>
</tr>
<tr>
<td>15</td>
<td>2'-5&quot;</td>
<td>B-D</td>
<td>ROCK, FRAGMENTS</td>
<td>30/3</td>
</tr>
<tr>
<td>20</td>
<td>2'-5&quot;</td>
<td>B-E</td>
<td>21</td>
<td>-</td>
</tr>
</tbody>
</table>

---

**ELEV. = 27'-1"**

**END OF BORING @ 21.0'**

---

* Elevation Estimated from Topo Map
## Boring Log

**PROJECT**: KAMIKOIKI VALLEY SUBD. - UNIT 3-A  
**LOCATION**: Hawaii Kai, Maunalua, Oahu, Hawaii  
**Tax Map Key**: 3-9-10 & 3-9-14

- **Driller**: WALTER LUM ASSOC.  
  **Date**: APRIL 10, 1970  
- **Field Party**: LUNING, MAESHIRO

### Hammer
- **Weight**: 14.0 lbs  
- **Drop**: 30"  
  - **Sampler**: 2.5 - 2" O.D. THIN WALL TUBE  
  - **2.5 - 2" STANDARD SPLIT SPOON**

### Penetration Data

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(CH) MEDIUM DARK GRAY CLAY (ADOBE)</td>
<td>2.75</td>
<td>9-A</td>
<td>103</td>
<td>56</td>
<td>41</td>
<td>64</td>
<td>2510</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2/5</td>
<td>4/5</td>
</tr>
<tr>
<td>ML MEDIUM TO STIFF TAN CLAYEY-SILT SAND &amp; GRAVELS</td>
<td>2.75</td>
<td>9-B</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>30 MINUTES OF DRILLING O.P.</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>BOULDER</td>
<td>2.75</td>
<td>9-C</td>
<td>NO RECOVERY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>END OF BORING 9.5'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

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

**PROJECT**  KAMILEIKI VALLEY SUBD. - UNIT 3-A

**LOCATION**  Hawaii Kai, Maunalua, Oahu, Hawaii

Tax Map Key: 3-9-10 & 3-9-14

---

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

**SAMPLER:**  2" 66 - 2" STANDARD SPIT SPoon

---

**ELEVATION ESTIMATED FROM TOPO MAP**

<table>
<thead>
<tr>
<th>Soil Classification</th>
<th>DESCRIPTION</th>
<th>Depth (ft)</th>
<th>Sample No.</th>
<th>P.C.F.</th>
<th>Water Cont. %</th>
<th>Dry Density (p.s.f.)</th>
<th>Unconfined Comp. (p.s.f.)</th>
<th>Penetration Test Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CH)</td>
<td>STIFF, DARK BROWN - GRAY CLAY W/ DECOMPOSED ROCK</td>
<td>5 2'-50&quot;</td>
<td>10-A</td>
<td>29</td>
<td>-</td>
<td>4600 1900</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(CH)</td>
<td>STIFF, GRAY CLAY</td>
<td>2'-55&quot;</td>
<td>10-B</td>
<td>108</td>
<td>45</td>
<td>74</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(CH)</td>
<td>SOFT TO VERY SOFT, TAN-GRAY CLAY W/ SAND</td>
<td>5'-15'-70' 2'-55&quot;</td>
<td>10-C</td>
<td>48</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(CH)</td>
<td>MEDIUM BROWN &amp; GRAY CLAY W/ CORAL</td>
<td>2'-25&quot;</td>
<td>10-D</td>
<td>48</td>
<td>-</td>
<td>2960 1660</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(CH)</td>
<td>MEDIUM LIGHT BROWN CLAY W/ DECOMPOSED CORAL</td>
<td>2'-25&quot;</td>
<td>10-E</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

---

* Elevation Estimated from Topo Map
# Boring Log

**PROJECT**  KAMIILOKI VALLEY SUBD. - UNIT 3-A

**LOCATION**  Hawaii Kai, Maunalua, Oahu, Hawaii

Tax Map Key:  3-9-10 & 3-9-14

---

**HAMMER:**

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

**SAMPLER:**

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

---

## PENETRATION DATA

<table>
<thead>
<tr>
<th>Standard Penetration Test</th>
<th>N (Blows per foot)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; O.D. THIN WALL TUBE</td>
<td>BLOWS/0.5'</td>
</tr>
</tbody>
</table>

---

## Tax Map Key:

- 3-9-10 & 3-9-14

---

## Type of Boring:

* AUGER (MOBILE)*

---

## Elevation Estimated: *Elevation Estimated from Topo Map*

---

*NOTE: BORING 11A WAS MADE 1 FT. AWAY. BORING "II" TO OBTAIN 3" TUBE SAMPLES FOR TESTING.*
**Boring Log**

**PROJECT**  KAMIKOIKI VALLEY SUBD. - UNIT 3-A  
**LOCATION**  Hawaii Kai, Maunalua, Oahu, Hawaii  
**Tax Map Key:**  3-9-10 & 3-9-14

**HAMMER:**
- **Weight:** 140 lb  
- **Drop:** 30"  
**SAMPLER:**  
- 2.5 - 2" O.D. THIN WALL TUBE  
- 2.55 - 2" STANDARD SPLIT SPOON

---

**SOIL CLASSIFICATION**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>MEDIUM, DARK GRAY, CLAY(ADOBE) W/ GRAVELS &amp; COBBLES</td>
<td>12-A</td>
<td>107</td>
<td>26.85</td>
<td>14000+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2.55</td>
<td>MEDIUM TO STIFF, DARK GRAY, CLAY W/ COBBLES</td>
<td>12-B</td>
<td>-</td>
<td>42</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2.55</td>
<td>COBBLE</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3.55</td>
<td>MEDIUM, DARK GRAY, CLAY</td>
<td>12-C</td>
<td>-</td>
<td>19</td>
<td>-</td>
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</tr>
</tbody>
</table>

*Elevation Estimated from Topo Map*
Boring Log

PROJECT: KAMLOIKI VALLEY SUBD. - UNIT 3-A
LOCATION: Hawaii Kai, Maunalua, Oahu, Hawaii

Tax Map Key: 3-9-10 & 3-9-14

BORING NO. 13
Field Party: MEYER, LUNING
Type of Boring: AUGER (MOBILE)
Type of Auger: 3"

Date: MAY 21, 1970
Driller: WALTER LUM ASSOCIATES

LOCATION: Hawaii Kai, Maunalua, Oahu, Hawaii

Tax Map Key: 3-9-10 & 3-9-14

HAMMER:
Weight: 140 #
Drop: 30 "

SAMPLER: 7" STANDARD SPLIT SPON

---

<table>
<thead>
<tr>
<th>Unified Soil Classification</th>
<th>Description</th>
<th>ELEV. = 28' *</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CH)</td>
<td>BROWN, CLAY w/ COBBLES</td>
<td>13-A - 19</td>
</tr>
<tr>
<td></td>
<td>STIFF, DARK BROWN CLAY w/ COBBLES</td>
<td>13-B - 33</td>
</tr>
<tr>
<td>(CH)</td>
<td>MEDIUM TO STIFF, BROWN-GRAY CLAY w/ DECOMPOSED ROCK</td>
<td>13-C - 44</td>
</tr>
<tr>
<td>(CH)</td>
<td>MEDIUM, GRAY-BROWN CLAY w/ CORAL, DECOMPOSED ROCK</td>
<td>13-D - 40</td>
</tr>
<tr>
<td>(CH)</td>
<td>STIFF, GRAY CLAY w/ CORAL</td>
<td></td>
</tr>
</tbody>
</table>

END OF BORING @ 16'

NOTE: DOZER DUG AN OPEN PIT TO 5' DEPTH

* Elevation Estimated from Topo Map
Boring Log

PROJECT  KAMLOIKI VALLEY SUBD. - UNIT 3-A
LOCATION  Hawaii Kai, Maunalua, Oahu, Hawaii

Tax Map Key:  3-9-10 & 3-9-14

HAMMER:
Weight  140 lb
Drop  30'

SAMPLER:  2" STANDARD SPLIT SPOON

LOCATION  Hawaii Kai, Maunalua, Oahu, Hawaii

Date  5-21-70

ELEV.  = 39' *

DESCRIPTION

VERY STIFF, LIGHT BROWN DECOMPOSED ROCK W/ GRAY CLAY POCKETS

DENSE, LIGHT TAN SILTY SAND W/ CORAL

END OF BORING @ 10'

* Elevation Estimated from Topo Map
# Boring Log

**PROJECT:** Kamiloiki Valley Subd. - Unit 3-A  
**LOCATION:** Hawaii Kai, Maunalua, Oahu, Hawaii  
**Tax Map Key:** 3-9-10 & 3-9-14

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

**SAMPLER:**  
- 2"S-2"D.D. Thin Wall Tube  
- 2"SS-2" Standard Split Spoon

## PENETRATION DATA

<table>
<thead>
<tr>
<th>Soil Classification</th>
<th>Description</th>
<th>ELEV. = 50'1&quot;</th>
<th>Depth (ft)</th>
<th>Sampler</th>
<th>Sample No.</th>
<th>Water Cont.</th>
<th>Dry Den.</th>
<th>P.C.F.</th>
<th>Unconf. Comp.</th>
<th>Penetration Test</th>
<th>B.L.W. WALL TUBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CH) MEDIUM DARK BROWN CLAY</td>
<td></td>
<td></td>
<td>0</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>STIFF LIGHT BROWN SANDY SILT (DECOMPOSED ROCK)</td>
<td></td>
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</tr>
<tr>
<td>WEATHERED ROCK</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(CH) MEDIUM TO STIFF, GRAY-BROWN CLAY</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>WEATHERED ROCK OR BOULDER</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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

**PROJECT**  
KAMILIKI VALLEY SUBD. - UNIT 3-A  

**LOCATION**  
Hawaii Kai, Maunalua, Oahu, Hawaii  

Tax Map Key: 3-9-10 & 3-9-14

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

**SAMPLER:**  
2" 4 - 2" O.D. THIN WALL TUBE  
2" 7/8 - 2" STANDARD SPLIT SPOON

**BORING NO.** 16  
**Sheet No.**  
**Date** APRIL 13, 1970  

**Driller** WALTER LUM ASSOC  
**Field Party** SETO, GLORY, CHAPMAN  
**Type of Boring** AUGER (MINUTEMAN)  
**Dia.** 3"  
**Elev.** 10'  
**Drill Bit** T.C. DRAG  
**Water Level** 11.5'  
**Time** 2:00 PM  
**Date** 4-13-70

**UNITED SOIL CLASSIFICATION**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOOSE, BROWN CLAY (ADOB) W/COBBLE &amp; BOULDER</td>
<td>2&quot; 4&quot;</td>
<td>16-A</td>
<td>35</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2/5 4/5 7/5</td>
</tr>
<tr>
<td></td>
<td>STIFF, BROWN-GRAY CLAY W/TRACES OF SAND</td>
<td>2&quot; 4&quot;</td>
<td>16-B</td>
<td>32</td>
<td>85</td>
<td>2440</td>
<td>-</td>
<td>-</td>
<td>2/5 4/5 7/5</td>
</tr>
<tr>
<td></td>
<td>VERY STIFF, MOTTLED DECOMPOSED ROCK W/GRAY CLAY POCKETS</td>
<td>2&quot; 4&quot;</td>
<td>16-C</td>
<td>36</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2/5 4/5 7/5</td>
</tr>
<tr>
<td></td>
<td>STIFF, GRAY CLAY (ADOB) W/TRACE OF CORAL &amp; DEC. ROCK</td>
<td>2&quot; 4&quot;</td>
<td>16-D</td>
<td>46</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2/5 4/5 7/5</td>
</tr>
<tr>
<td></td>
<td>MEDIUM, LIGHT GRAY CLAY W/DECOMPOSED CORAL</td>
<td>2&quot; 4&quot;</td>
<td>16-E</td>
<td>67</td>
<td>63</td>
<td>3930</td>
<td>1200</td>
<td>-</td>
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<td>MEDIUM, MOTTLED GRAY CLAY &amp; DECOMPOSED CORAL</td>
<td>2&quot; 4&quot;</td>
<td>16-F</td>
<td>60</td>
<td>-</td>
<td>-</td>
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<td>2/5 3/5 3/5</td>
</tr>
</tbody>
</table>

*Elevation Estimated from Topo Map*
**WALTER LUM ASSOCIATES**

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

---

### Boring Log

**PROJECT**  
KAMLOIKI VALLEY SUBD. - UNIT 3-A

**LOCATION**  
Hawaii Kai, Maunalua, Oahu, Hawaii

**Driller**  
WALTER LUM ASSOC.

**Date**  
MAY 14, 1970

**LOCATION**  
Hamakua Kai, Maunalua, Oahu, Hawaii

**Tax Map Key**  
3-9-10 & 3-9-14

---

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

**SAMPLER:**
- **2" 5-2" O.D. THIN WALL TUBE**
- **2" 6-2" STANDARD SPLIT SPOON**

---

<table>
<thead>
<tr>
<th>Unified Soil Classification</th>
<th>DESCRIPTION</th>
<th>Depth (Ft)</th>
<th>Sample No.</th>
<th>Sample P.C.F.</th>
<th>Wet Dist. %</th>
<th>Dry Dist. %</th>
<th>Water Cont. P.C.F.</th>
<th>Vane Shear (DS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CH)</td>
<td>MEDIUM, DARK BROWN CLAY</td>
<td>2.5</td>
<td>17-A</td>
<td>118</td>
<td>37</td>
<td>87</td>
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<td>(CH)</td>
<td>STIFF, GRAY-BROWN CLAY W/ DECOMPOSED ROCK</td>
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<td>17-B</td>
<td>-</td>
<td>33</td>
<td>-</td>
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<tr>
<td>(CH)</td>
<td>STIFF, GRAY BROWN CLAY</td>
<td>2.56</td>
<td>17-C</td>
<td>-</td>
<td>45</td>
<td>-</td>
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</tr>
<tr>
<td>(CH)</td>
<td>MEDIUM, TAN &amp; GRAY CLAY W/ DECOMPOSED CORAL</td>
<td>2.56</td>
<td>17-D</td>
<td>114</td>
<td>44</td>
<td>79</td>
<td>1820</td>
<td>1840</td>
</tr>
<tr>
<td>(CH)</td>
<td>END OF BORING @ 2.5'</td>
<td>2.56</td>
<td>17-E</td>
<td>-</td>
<td>73</td>
<td>-</td>
<td>-</td>
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**Elevation Estimated from Topo Map**

---

* PENETRATION DATA

<table>
<thead>
<tr>
<th>Standard Penetration Test</th>
<th>2&quot; O.D. THIN WALL TUBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (Blows per foot)</td>
<td>0 10 20 40</td>
</tr>
<tr>
<td>BLOWS/0.5'</td>
<td>3/5 5/5</td>
</tr>
</tbody>
</table>

---

* (C.H)
# Boring Log

**PROJECT:** KAMIROKI VALLEY SUBD. - UNIT 3-A  
**LOCATION:** Hawaii Kai, Maunalua, Gahu, Hawaii  
**Tax Map Key:** 3-9-10 & 3-9-14

## HAMMER:
- **Weight:** 14.0 #
- **Drop:** 30"
- **Sampler:** 2.5" - 2.0 D.O.D THIN WALL TUBE

## PENETRATION DATA:

<table>
<thead>
<tr>
<th>Depth (Ft.)</th>
<th>Sampler</th>
<th>Sample No.</th>
<th>Wet Density, P.C.F.</th>
<th>Water Cont. %</th>
<th>Dry Density, P.C.F.</th>
<th>Unconf. Comp. P.C.F.</th>
<th>Penetration Test</th>
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<tbody>
<tr>
<td>0</td>
<td>2.5&quot;</td>
<td>18-A</td>
<td>27</td>
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<td>5</td>
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<td>18-B</td>
<td>42</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>28/5</td>
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<tr>
<td>10</td>
<td>2.5&quot;</td>
<td>18-C</td>
<td>21</td>
<td>101</td>
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<td>-</td>
<td>4/5 - 10/5</td>
</tr>
<tr>
<td>15</td>
<td>2.5&quot;</td>
<td>18-D</td>
<td>57</td>
<td>69</td>
<td>2240</td>
<td>1200</td>
<td>3/5 - 4/5</td>
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<tr>
<td>20</td>
<td>2.5&quot;</td>
<td>18-E</td>
<td>59</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

**END OF BORING @ 21.5'**

* Elevation Estimated from Topo Map
### Boring Log

**PROJECT**  
KAMILIOKI VALLEY SUBD. - UNIT 3-A

**LOCATION**  
Hawaii Kai, Maunalua, Oahu, Hawaii

**Tax Map Key:** 3-9-10 & 3-9-14

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

**Sampler:**  
2" STANDARD SPLIT SPOON

**Driller:** WALTER LUM ASSOC.  
**Date:** MAY 26, 1970

**Type of Boring:** AUGER (MOBILE)  
**Diam.:** 3"

**Datum:**

**Water Level:** NOT NOTICED

**Date:** 5-26-70

---

| Elevation Estimated from Topo Map

#### Penetration Data

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<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>0</td>
<td>S</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>S</td>
<td>19-A</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

**Note:**  
Three other drill holes attempted, encountered rock or boulders at 5 to 20 feet.  
Hammer bouldered at 1/10 ft.
Boring Log

PROJECT  KAMILEI VALLEY SUBD. - UNIT 3-A
LOCATION  Hawaii Kai, Maunalua, Oahu, Hawaii

Tax Map Key: 3-9-10 & 3-9-14

HAMMER:
Weight: 140*
Drop: 30"

SAMPLER: 2"-3/4 - 2" STANDARD SPLIT SPOON

---

1. Soil Classification: ELEV. = 30' ± *

- Stiff, Dark Brown Clay w/ Gravel

- Boulder

- End of Boring @ 4'

* Elevation Estimated from Topo Map

---

2. Standard Penetration Test (SPT):

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2.55</td>
<td>20-A</td>
<td>19</td>
<td>-</td>
<td>-</td>
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<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

3. Other Notes:

- Hit Boulder at 4'
- Drilled for 30 min.
- Three drill holes attempted, encountered rocky material at 4' depth.
Boring Log

PROJECT: KAMIIOKI VALLEY SUBD. - UNIT 3-A
LOCATION: Hawai'i Kai, Maunalua, Oahu, Hawai'i
Tax Map Key: 3-9-10 & 3-9-14

HAMMER:
Weight: 140#
Drop: 30°

SAMPLER: 2-1/2" STANDARD SPLIT SPOON

United Soil Classification

ELEV. = 40' ±

CH)

STIFF, BROWN, CLAY W/ GRAVEL
BOULDER
END OF BORING @ 4'

NOTE: HIt BOULDER AT 4,' DRILLED FOR 15 MIN. THREE DRILL HOLES ATTEMPTED ENCOUNTERED ROCKY MATERIAL AT 4' DEPTHS.

* Elevation Estimated from Topo Map
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>
<th>GRADING ANALYSIS (% Passing)</th>
<th>ATTERBERG LIMITS</th>
<th>UNIFIED SOIL CLASSIFICATION</th>
<th>SPECIFIC GRAVITY</th>
<th>EXPANSION AND CBR TESTS (Surcharge-51 P.S.F.)</th>
<th>COMPACTION TEST (AASHO T-180-57 Method)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4A</td>
<td>C</td>
<td>10'-11'</td>
<td>DRY GREY</td>
<td>1&quot;  1/2  #4 #10 #20 #40 #100</td>
<td>200</td>
<td>ML</td>
<td></td>
<td>Slight</td>
<td>Slight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15'-16'</td>
<td>WITRACE CLAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4A</td>
<td>D</td>
<td>15'-16'</td>
<td>TAN CLAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>16'-17'</td>
<td>OF SAND</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>5'-6'</td>
<td>SAND &amp; GRAVEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**GRADING ANALYSIS**

- Sieve 1"
- Sieve 1/2"
- Sieve #4
- Sieve #10
- Sieve #20
- Sieve #40
- Sieve #100
- Sieve #200

**ATTERBERG LIMITS**

- Liquid Limit
- Plastic Limit
- Plasticity Index
- Dilatancy
- Toughness
- Dry Strength

**UNIFIED SOIL CLASSIFICATION**

- CH
- CH
- ML

**SPECIFIC GRAVITY**

-

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

- Molding Moisture Content, %
- Molding Dry Density, P.C.F.
- Swell upon saturation, %
- CBR at 0.1" Penetration

**COMPACTION TEST (AASHO T-180-57 Method)**

- Dry to Wet or Wet to Dry
- Max. Dry Density (P.C.F.)
- Optimum Moisture (%)
<table>
<thead>
<tr>
<th>BORING NO.</th>
<th>SAMPLE NO.</th>
<th>DEPTH BELOW SURFACE</th>
<th>DESCRIPTION</th>
<th>GRADING ANALYSIS (% Passing)</th>
<th>ATTERBERG LIMITS</th>
<th>SPECIFIC GRAVITY</th>
<th>EXPANSION AND CBR TESTS</th>
<th>COMPACTION TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>10'-11.5'</td>
<td>TAN-GRAY</td>
<td></td>
<td>NATURAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>15'-16'</td>
<td>TAN-BROWN</td>
<td></td>
<td>43</td>
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</tr>
<tr>
<td></td>
<td>10</td>
<td>10'-11.5'</td>
<td>CLAY</td>
<td></td>
<td>NATURAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>15'-16'</td>
<td>CLAY</td>
<td></td>
<td>74</td>
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<td></td>
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</tr>
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<td></td>
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<td>5'-6.5</td>
<td>W/CLAY</td>
<td></td>
<td>79</td>
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<tr>
<td></td>
<td>10</td>
<td>10'-11.5'</td>
<td>W/SANDO</td>
<td></td>
<td>NATURAL</td>
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<td>15'-16'</td>
<td>W/SANDO</td>
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<td>54</td>
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<td>5'-6.5</td>
<td>CORAL</td>
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<td>79</td>
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<td></td>
<td>10</td>
<td>10'-11.5'</td>
<td>CLAY</td>
<td></td>
<td>NATURAL</td>
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<td>15'-16'</td>
<td>CLAY</td>
<td></td>
<td>74</td>
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<td>5'-6.5</td>
<td>W/CLAY</td>
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<td>79</td>
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<td></td>
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<tr>
<td></td>
<td>10</td>
<td>10'-11.5'</td>
<td>W/SANDO</td>
<td></td>
<td>NATURAL</td>
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<td>15'-16'</td>
<td>W/SANDO</td>
<td></td>
<td>54</td>
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<td>5'-6.5</td>
<td>CORAL</td>
<td></td>
<td>79</td>
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</tbody>
</table>

**Note:**
- Grading Analysis includes sieves for different sizes.
- Atterberg Limits: Liquid Limit, Plastic Limit, Plasticity Index, Dilatancy, Toughness, and Dry Strength.
- Unified Soil Classification includes CL, CH, and CH.
- Expansion and CBR Tests include details about surcharge, molding moisture content, molding dry density, swell upon saturation, and CBR at 0.1" penetration.
- Compaction Test includes details about dry to wet or wet to dry, maximum dry density, and optimum moisture.

**Source:**
WALTER LUM ASSOCIATES
CIVIL, STRUCTURAL, SOILS ENGINEERS

**Location:**
KAMLOI KI VALLEY SUBDIVISION - UNIT 3-A
### TABLE I.C - SUMMARY OF LABORATORY TEST RESULTS

<table>
<thead>
<tr>
<th>BORING NO.</th>
<th>SAMPLE NO.</th>
<th>BORING</th>
<th>DESCRIPTION</th>
<th>GRADING ANALYSIS ( % Passing)</th>
<th>ATTERBERG LIMITS</th>
<th>UNIFIED SOIL CLASSIFICATION</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SURFACE</td>
<td>DARK BROWN CLAY</td>
<td>Sieve</td>
<td>Air Dried or Natural</td>
<td>Plastic Limit</td>
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<tr>
<td></td>
<td></td>
<td>1'-2.5'</td>
<td>DARK BROWN CLAY</td>
<td>Sieve</td>
<td>Liquid Limit</td>
<td>Plastic Limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10'-11.5'</td>
<td>GRAY-BROWN CLAY WITH CLAY</td>
<td>Sieve</td>
<td>Liquid Limit</td>
<td>Plastic Limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1'-2.5'</td>
<td>GRAY-BROWN SAND</td>
<td>Sieve</td>
<td>Liquid Limit</td>
<td>Plastic Limit</td>
</tr>
</tbody>
</table>

**Notes:**
- **BORING NO.**
- **SAMPLE NO.**
- **DEPTCH BELOW SURFACE**
- **DESCRIPTION**
- **GRADING ANALYSIS ( % Passing) Sieve**
  - 1"
  - 1/2"
  - #4
  - #10
  - #20
  - #40
  - #100
  - #200
- **ATTERBERG LIMITS**
  - Air Dried or Natural
  - Liquid Limit
  - Plastic Limit
  - Plasticity Index
  - Dilatancy
  - Toughness
  - Dry Strength
- **UNIFIED SOIL CLASSIFICATION**
- **SPECIFIC GRAVITY**
- **EXPANSION AND CBR TESTS**
  - (Surcharge-51 P.S.F.)
  - Molding Moisture Content, %
  - Molding Dry Density, P.C.F.
  - Swell upon saturation, %
  - CBR at 0.1" Penetration
- **COMPACTION TEST**
  - (AASHO T-180-57 Method)
  - Dry to Wet or Wet to Dry
  - Max. Dry Density (P.C.F.)
  - Optimum Moisture (%)
# Table I.D - Summary of Laboratory Test Results

<table>
<thead>
<tr>
<th>Boring No.</th>
<th>Sample No.</th>
<th>Description</th>
<th>Grading Analysis (% Passing)</th>
<th>Atterberg Limits</th>
<th>Unified Soil Classification</th>
<th>Specific Gravity</th>
<th>Expansion and CBR Tests</th>
<th>Compaction Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1G</td>
<td>C (Top)</td>
<td>10'-11.5'</td>
<td>Gray-Brown Clay with traces of sand</td>
<td>Natural</td>
<td>CH</td>
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</tr>
<tr>
<td>1G</td>
<td>D (Bottom)</td>
<td>15'-16.5'</td>
<td>Gray Clay with traces of coral &amp; rock</td>
<td>Natural</td>
<td>CH</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Air Dried or Natural</td>
<td>Liquid Limit</td>
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<td>Molding Moisture Content, %</td>
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<td>Plastic Limit</td>
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<td>Molding Dry Density, P.C.F.</td>
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<td>Plasticity Index</td>
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<td>Swell upon saturation, %</td>
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<td>Dilatancy</td>
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<td>Dry Strength</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE I.  SUMMARY OF LABORATORY TEST RESULTS

<table>
<thead>
<tr>
<th>BORING NO.</th>
<th>K</th>
<th>OPEN PITS</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAMPLE NO.</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>DEPTH BELOW SURFACE</td>
<td>5'-8'</td>
<td>7'-8'</td>
<td>8'-9'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>GRAY</th>
<th>SILTY CLAY</th>
<th>GRAY</th>
<th>SILTY CLAY</th>
</tr>
</thead>
</table>

#### GRADING ANALYSIS (% Passing)

<table>
<thead>
<tr>
<th>Sieve</th>
<th>K</th>
<th>OPEN PITS</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>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>
</tr>
<tr>
<td>#40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#200</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### ATTERBERG LIMITS

<table>
<thead>
<tr>
<th>Method</th>
<th>Air Dried or Natural</th>
<th>Liquid Limit</th>
<th>Plastic Limit</th>
<th>Plasticity Index</th>
<th>Dilatancy</th>
<th>Toughness</th>
<th>Dry Strength</th>
<th>CBR at 0.1&quot; Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NATURAL</td>
<td>61</td>
<td>55</td>
<td>22</td>
<td>SLOW</td>
<td>MED-HIGH</td>
<td>SLIGHT-MED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NATURAL</td>
<td>61</td>
<td>40</td>
<td>27</td>
<td>SLOW</td>
<td>MED-HIGH</td>
<td>MEDIUM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NATURAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### UNIFIED SOIL CLASSIFICATION

| SPECIFIC GRAVITY | 2.68 | 2.87 | 2.86 |

#### EXPANSION AND CBR TESTS

<table>
<thead>
<tr>
<th>(Surcharge-51 P.S.F.)</th>
<th>Molding Moisture Content, %</th>
<th>34.0</th>
<th>39.4</th>
<th>28.6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Molding Dry Density, P.C.F.</td>
<td>69.4</td>
<td>81.0</td>
<td>96.1</td>
</tr>
<tr>
<td>Swell upon saturation, %</td>
<td>6.1</td>
<td>3.1</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>CBR at 0.1&quot; Penetration</td>
<td>2.0</td>
<td>4.1</td>
<td>1.3</td>
<td></td>
</tr>
</tbody>
</table>

#### COMPACTION TEST

<table>
<thead>
<tr>
<th>(AASHO T-180-57 Method)</th>
<th>Dry to Wet or Wet to Dry</th>
<th>A</th>
<th>WET TO DRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Dry Density (P.C.F.)</td>
<td>93.7</td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td>Optimum Moisture (%)</td>
<td>26.5</td>
<td></td>
<td>20.9</td>
</tr>
</tbody>
</table>
JOB: KAMILIOKI SUBDIVISION - UNIT 3-A
LOCATION: HAWAII KAI, MAUNALUA, OAHU, HAWAII

PLASTICITY CHART

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS
MOISTURE-DENSITY CURVE (AASHO T-180-57, METHOD A)

PROJECT: KAMILIOKI VALLEY SUBDIVISION - UNIT 3-A

LOCATION: HAWAII-KAI, MAUNALUA, OAHU, HAWAII

SAMPLE NO.: OPEN PIT * 3

SAMPLE DESCRIPTION: GRAY SILTY CLAY W/SAND (MH)

AGGREGATE: 1/4" MINUS
MOLD SIZE: 4.8" X 4.69"
HAMMER: 10 LBS, 16" DEEP
LAYERS: 3
BLOWS: 25 PER LAYER

DRO DENSITY (P.C.F.)

0 10 20 30 40 50 60 70 80 90 100 110 120 130

WATER CONTENT (%)

MAXIMUM DRY DENSITY - 92.7 P.C.F.

OPTIMUM MOISTURE CONTENT - 6.85%
MOISTURE-DENSITY CURVE (AASHO T-180-57, METHOD A)

PROJECT: KAMIOKI VALLEY SUBDIVISION - UNIT 3-A

LOCATION: HAWAII-KAI, MAUNALUA, OAHU, HAWAII

SAMPLE NO.: OPEN PIT 4-5

SAMPLE DESCRIPTION: GRAY SILTY CLAY W/CAND (MH)

AGGREGATE: 1/4- MINUS
MOLD SIZE: 4 X 4.5
HAMMER: 10 LBS., 18" DROP
LAYERS: 5
BLOWS: 35 PER LAYER

MAX. DRY DENSITY - 100.0 P.C.F.

OPTIMUM MOISTURE CONTENT - 30-39.9%

ZERO AIR VOIDS CURVE
SPECIFIC GRAVITY - 2.86

DATE 9-21-70  BY  S.T.

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS
GENERAL TESTING METHODS

EXPLORATORY BORINGS AND SAMPLING

Method for soil investigation and sampling by auger borings (Tentative)

Method for thin wall tube sampling of soils (Tentative)

Method for penetration test and split barrel sampling of soils (Tentative)

LABORATORY TESTING

Grading Analysis

Sieve analysis of fine and coarse aggregates

Amount of material finer than No. 200 sieve in aggregate

Atterberg Limits

Determining the liquid limit of soils Modified as follows: Substitute Casagrande grooving tool. Tests conducted from natural moisture content unless noted otherwise.

Determining the plastic limit of soils

Calculating the plasticity index of soils

Specific Gravity

Specific gravity of soils Modified as follows: 500 ML Pycnometer

Expansion and CBR Tests

Expansion test and California Bearing Ratio (CBR)

Compaction Test

Moisture-Density relations of soils using a 10# rammer and an 18" drop

Unified Soil Classification

ASTM Designation: D 1452-63T

ASTM Designation: D 1587-63T

ASTM Designation: D 1586-64T

AASHO Designation: T 27-60

AASHO Designation: T 11-60

AASHO Designation: T 89-60

AASHO Designation: T 90-56

AASHO Designation: T 91-54

AASHO Designation: T 100-60

Section VIII - TM 5-530

"Materials Testing" by Headquarters, Dept. of the Army

AASHO Designation: T 180-57

Designation E-3 from "Earth Manual" by the United States Department of the Interior Bureau of Reclamation
GENERAL TESTING METHODS

Consolidation Test

Laboratory Shear Test

Laboratory shear test using the Torvane

Chapter IX
"Soil Testing for Engineers"
by T. William Lambe
The Massachusetts Institute of Technology

Brochure by Soiltest, Inc.
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.

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.
SECTION

NOT TO SCALE

FIGURE 2

PROPOSED SLOPE TREATMENT
FOR CUTS & FILLS IN ADOBE
GREATER THAN 6' IN HEIGHT

KAMILEIKI VALLEY SUBDIVISION - UNIT 3A
HAWAII KAIL, MAUNALUA, OAHU, HAWAII

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS
NOTE: The base course should be placed and wetted down for 2 days before pouring slab.

COMPACTED CORAL OR GRANULAR MATERIAL (well-graded from 3/4" to dust sizes with 10 to 15% passing the No. 200 sieve)

PROPOSED FOOTING FOR SLAB-ON-GROUND ON EXPANSIVE SOIL

NOT TO SCALE

SLOPE AWAY FROM FOUNDATION

TOPSOIL

FIN. GENERAL GRADE

CONCRETE FOOTING

COMPACTED CORAL OR GRANULAR MATERIAL (well-graded from 3/4" to dust sizes with 10 to 15% passing the No. 200 sieve)

PROPOSED FOOTING FOR POST-AND-BEAM ON EXPANSIVE SOIL

NOT TO SCALE

FIGURE 3

PROPOSED FOOTING DETAILS FOR ONE-STORY LIGHT STRUCTURES ON EXPANSIVE SOILS

KAMALOIKI VALLEY SUBDIVISION - UNIT 3A
HAWAII KAI, MAUNALUA, OAHU, HAWAII

WALTER LUM ASSOCIATES, INC.
civil, structural, soils engineers
FIGURE 4
PROPOSED BOULDER FILL
KAMILIOKI VALLEY SUBDIVISION, UNIT 3A
HAWAIN KAI, MAUNALUA, OAHU, HAWAII

SECTION
NOT TO SCALE

COMPACTED FILL
FILL voids between boulders with granular soils.

18" x FILTER MATERIAL
(Well-graded granular material 3/4" maximum to dust sizes, less than 10% passing No. 200 sieve.)

STRIP off loose material down to stiff ground and slope to drain.
July 16, 1970

Division of Engineering
City and County of Honolulu
Honolulu, Hawaii

Gentlemen:

Subject: Kamiloiki Valley Subdivision, Unit 3-A
at Maunalua, Honolulu, Oahu, Hawaii
Tax Map Key: 3-9-10 and 3-9-14

We are transmitting herewith for your review and comments the following items to expedite your approval of the subject subdivision plans when the tracings are submitted to you at a later date:

1. Two (2) sets of the revised Construction Plans (please note the major revision which has been made on sheet No. 2, 3, 6, 7, 8, 9, 10, 11, 12, 14, 16 and 17)

2. Two (2) prints each of the revised Grading Plans, sheet No. 2 and 4.


4. A set of the Structural Calculation for the drainage channel.

5. A set each of the Revised Hydraulic Calculation for the pipe drainage system and Storm Run-Off Calculation to catch basins.

6. Your check print each of the On-Site and Off-Site Drainage Maps which have been revised by us.

7. Two (2) sets each of your Construction and Grading Plan check prints.
Division of Engineering  
Kamiloiki Valley Subdivision, Unit 3-A  
July 16, 1970  
Page 2  

8. Your check set of the Pipe Hydraulic Calculation.  
Your forthwith review and comments will be appreciated.  

Sincerely yours,  

[Signature]  

George Hiraoka  
Project Engineer  

GH: sy  

Enclosures
From: H. J. Young, Chief
To: •

Appropriate action and action

Arrange meeting

Signature

Comments & recommendations

See WC

Work order

Log no. _______ Suspense

There was a question in the City and County of Honolulu Department of Public Works Division of Engineering. The question was about a work order. The recommendation was to arrange a meeting to discuss the issue further.