MR. GEORGE HOUGHTAILING
Community Planning, Inc.
Suite 602, 810 Richards Street
Honolulu, Hawaii  96813

Dear Mr. Houghtailing:

Subject: Ahuimanu Catholic Church Site
Preliminary Soil Report
(for mass grading purposes)
Ahuimanu, Koolaupoko, Oahu, Hawaii
Tax Map Key: 4-7-04
Chapter 23, Revised Ordinances of
Honolulu, 1961 As Amended

Eight borings were made at the site of the proposed Ahuimanu Catholic
Church site at Ahuimanu Valley, Oahu, Hawaii.

The borings were generally made within the "Approximate limits of grading"
shown on the Proposed Grading Plan, dated August 18, 1969.

PRELIMINARY FIELD EXPLORATION AND LABORATORY TESTS

The borings were made with 3-in. diameter augers. Soil samples were
recovered with 2 and 3-in. thin wall tubes and 2-in. standard split spoon
samplers driven with a 140-lb hammer falling 30 inches.

Laboratory tests included: natural water content determinations, Atterberg
limits, sieve analysis, consolidation, expansion and CBR.

GENERAL SITE AND SOIL CONDITIONS

The site is divided down the middle by a drainageway that flows in the
northerly direction. The soil conditions at the site may be generally sepa-
rated into 2 categories, the lower and upper areas. The lower area generally
consists of materials washed down from the upper areas and forms the bed of
the drainageway. The upper areas consist of residual soils that form the
eastern and western slopes along the drainageway.
Lower Area
The soils encountered in Boring Nos. 3 and 5 may be generally described as follows:

A surface layer of soft, brown and gray silty clay to about 13 to 19 ft, underlain by medium to stiff brown clayey silt to about 26 to 32-ft depths.

Decomposed rock was encountered in Boring No. 3 from 26 to 28 ft. A pocket of peaty material was noted in Boring No. 5 between 4 to 6-ft depths.

Water was noted near the surface at Boring No. 3 and at about 3-ft depth in Boring No. 5.

Upper Areas
The soils encountered in Boring Nos. 1, 2, 4, 6, 7 and 8 may be generally described as follows:

Medium to stiff, brown clayey silt with decomposed rock to about 23 to 41 ft, the depths drilled. Boulders or decomposed rock were encountered in Boring Nos. 2 and 8 at about 25-ft depth.

Water was noted in Boring No. 8 at about 1.5-ft depth at the time of the field exploration.

For more detailed descriptions of soils encountered in the borings, refer to the boring logs.

GENERAL DISCUSSION AND RECOMMENDATIONS
The present plan is to cut the western slope for material to fill the lower area. Fills up to about 25 ft in height may be placed in the lower area.

Before any fill construction is started in the lower area, trenches should be cut and subdrains installed along the bottom of the natural drainageway to drain the site.

Localized peaty material should be removed when encountered during clearing and grubbing.
Fills should be placed slowly in thin uniform lifts to minimize the build-up of pore pressures and possible failures that may be caused by heavy load concentrations of uncontrolled stockpiles of material.

Settlement observations should be made to monitor the performance of the fills. Settlements up to about a foot or more may occur in the lower area from the 25 or more feet of fill. After the fill is in place in the lower area, surface construction should be delayed as long as practicable to allow the subsoils to consolidate. Surface structures may start when settlement gages show negligible rates of settlement.

All grading should be done in accordance with the requirements of Chapter 23, Revised Ordinances of Honolulu, 1961 As Amended and the recommendations contained herein.

**Subdrains**

Subdrains should be placed in a herringbone pattern along the bottom and sides of the natural drainageway in the lower area. Trenches for subdrains should extend to the bottom of the muck soil and backfilled with granular filter material. The final locations of the subdrains should be determined in the field after clearing and grubbing.

There is an existing subdrain in the southern end of the lower area. This line should be located during construction and connected up to the subdrainage system that will be placed downstream of the existing line.

Proposed subdrainage details are shown on Figure 2.

**Fills**

In general, the on-site soils from the upper areas may be used for fill construction. It is slightly on the wet side for compaction purposes but may be used after drying.

The following may be used as a guide for fill construction:

1. Before placing any fill, all vegetation, decomposed organic matter, rubbish and other unsuitable material should be removed.

   Soft pockets should be excavated and replaced with select material.
It may be necessary to place a layer of fill over the lower area after clearing and grubbing to form a working platform. This fill should be placed and rolled in as thin lifts as practicable. At the north end of the drainageway, the working platform should be constructed of granular material where a fill slope will be constructed.

2. All loose surface soils along the existing slopes should be stripped and all new fills keyed into medium to stiff natural ground.

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

4. All fills above the working table and in the upper areas should be laid in 6-in. compacted layers with a relative density of at least 90% of AASHO T-180-57 density.

5. Settlement observations should be made periodically during and following the construction of fills in the lower area.

Slopes

Cut and fill slopes of 2 horizontal to 1 vertical or flatter are recommended.

Slope heights should be kept less than 10 ft in fill areas over the old natural drainageway.

Where slope heights greater than 20 ft are considered, 8-ft wide benches should be placed at height intervals of about 15 to 20 ft in both cuts and fills. The fills should be constructed on stiff underlying soils that are away from the lower natural drainageway.

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

For protection against erosion during construction, runoff water from rainstorms should be controlled by berms or other approved methods.

Slope planting is recommended on cut and fill slopes to minimize erosion.
Underground Utilities

Underground utilities should be placed after the fills are constructed and before the start of building construction.

Flexible connections are recommended where lines pass from compressible to rigid ground and for lines near structures.

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 - 12-in. subbase course over a prepared subgrade.

Local adjustments regarding subbase requirements can be made in the field in accordance with the design standards of the City and County of Honolulu as the various soil conditions are encountered at subgrade level. In fill areas, the use of select soils within the top 2 ft of the subgrade may be considered to eliminate or reduce the thickness of the subbase course.

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

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.

This report was made primarily for mass grading purposes. Additional soil explorations should be made for building foundation purposes as the building development progresses.
Attached are the boring logs, laboratory test results and Boring Location Plan.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

Ezra Koike
Professional Engineer
Hawaii No. 1450
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:** CATHOLIC CHURCH SITE - AHUIMANU

**LOCATION:** VALLEY OF THE TEMPLES

**AHUIMANU, OAHU, HAWAII**

**HAMMER:** TMK: 4-7-04

**Weight:** 140 #

**Drop:** 30 '

**SAMPLER:** 2" 6" - 2" THIN WALL TUBE

2" 6" - 2" STANDARD SPLIT SPOON

---

## Penetration Data

<table>
<thead>
<tr>
<th>STAND PENETRATION TEST</th>
<th>SAMP WALL TUBE SAMPLER</th>
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</thead>
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**BORED NO.** 1  **Sheet No.** of  **Date** SEPT. 29, 1969

**Driller** WALTER LUM ASSOC. **Date**  **Field Party** MAU, HASHIDA, ITAKAULA **Type of Boring** AUGER (MOBILE) Diam. 3 " **Elev.** 165' **Date** 9-29-69

**Water Level** NOT NOTED

**Time**

**Date** 9-29-69

---

## Penetration Descriptions

### (MH)

**STIFF, BROWN CLAYEY SILT w/ TRACES OF DECOMPOSED ROCK**

- ELEV. = 165'

### (MH)

**MEDIUM TO STIFF, BROWN SILTY CLAY w/ TRACES OF DECOMPOSED ROCK**

- 27'5

### (CH)

**STIFF, MOTTLED BROWN CLAY**

- 27'5

### (CH)

**MEDIUM, MOTTLED GRAY CLAY w/ TRACES OF DECOMPOSED ROCK**

- 27'5

---

**END OF BORING @ 21.5'**

---

*ELEVATION ESTIMATED FROM GRADING PLAN.*
**Boring Log**

**PROJECT**
CATHOLIC CHURCH SITE – AHUIMANU

**LOCATION**
VALLEY OF THE TEMPLES
AHUIMANU, OAHU, HAWAII

**HAMMER:**
TMK: 4 - 7- 04

**Weight:**
140 lbs

**Drop:**
30”

**SAMPLER:**
2” S - 2” THIN WALL TUBE

****

**Driller**
WALTER LUM

**Date**
OCT. 1, 1969

**Field Party**
MAIKAULU, HASHIDA

**Type of Boring**
ALGER (MUD HOLE) Diam. 3”

**Elev.**
150’

**Elev. No.**
150’

**Date**
OCT. 1, 1969

**Time**

**Water Level**
NOT NOTED

**LOCATION**
LOCATION = ALA MAI KULA, HANAI, OAHU, HAWAII

**Type of Boring**
ALGER (MUD HOLE)

**Hammer:**
TMK: 4 - 7 - 04

**Drop:**
30”

**SAMPLER:**
2” S - 2” THIN WALL TUBE

**Date**
OCT. 1, 1969

**Time**

**Water Level**
NOT NOTED

---

**Penetration Data**

**Penetration Data**

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**Elevation**

ELEVATION = 150’

**Description**

MEDIUM, MOTTLED BROWN CLAYEY SILT W/ DECOMPOSED ROCK

**END OF BORING @ 25’**

---

**Notes:**

*ELEVATION ESTIMATED FROM GRADING PLAN*
Boring Log

PROJECT: CATHOLIC CHURCH SITE-AHUIMANU
LOCATION: VALLEY OF THE TEMPLES
AHUIMANU, OAHU, HAWAII
HAMMER: THK: 4-T-04

Weight: 140#  Drop: 30°

SAMPLER: 2°- 8° THIN WALL TUBE

---

**SOFT REDDISH BROWN, CLAYEY SILT W/ DECOMPOSED ROCK.**

ELEV. = 110' ± *

**SOFT GRAY BROWN, SILTY CLAY W/SOME DECOMPOSED ROCK.**

**STIFF, GRAY-BROWN CLAYEY SILT W/ DECOMPOSED ROCK.**

**DECOMP. ORGANIC MATTER, GRAY, CLAYEY SILT.**

END OF BORING @ 28.5'

**ELEVATION ESTIMATED FROM GRADING PLAN.**
Boring Log

PROJECT: CATHOLIC CHURCH SITE - AHUIMANU

LOCATION: VALLEY OF THE TEMPLES

AHUIMANU, OAHU, HAWAII

TMK 4-7-04

HAMMER:

Weight

Drop

SAMPLER: 3" O.D. PISTON TUBE SAMPLER

Type of Boring: HAND AUGER

Diam: 4"

Elev. 110' + *

Datum

Water Level: 0-75'

Time: 9:15 A.M.

Date: 9-19-66

PENETRATION DATA

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SOFT, BROWN & GRAY SILTY CLAY

* ELEVATION ESTIMATED FROM GRADING PLAN
**Boring Log**

**PROJECT:** CATHOLIC CHURCH SITE-AHUMANU  
**LOCATION:** VALLEY OF THE TEMPLES  
AHUMANU, OAHU, HAWAII

**HAMMER:** TK: 4-7-04  
**Weight:** 140 lbs  
**Drop:** 30"  
**SAMPLER:** 3/8" - 2" TWINS WALL TUBE  
**Type of Boring:** AKER(MOBILE)  
**Dia:** 3"

---

**SAMPLER DATA**

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**END OF BORING AT 41.5'**

*ELEVATION ESTIMATED FROM GRADING PLAN.*

---

**Penetration Data**

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**DESCRIPTION**

- **MH:** MEDIUM TO STIFF, BROWN CLAYEY SILT W/ ONE DECOMPOSED ROCK  
- **(MH):** SOFT BROWN-GRAY, CLAYEY SILT  
- **(CH):** STIFF, TAN-GRAY CLAY

---

**ELEV. = 180'**
Boring Log

**PROJECT:** CATHOLIC CHURCH SITE - AHUIMANU  
**LOCATION:** VALLEY OF THE TEMPLES - AHUIMANU, OAHU, HAWAII  
**HAMMER:** TK 4-7-04  
**SAFETY:**  

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*ELEVATION ESTIMATED FROM GRADING PLAN*
## Boring Log

### PROJECT
CATHOLIC CHURCH SITE-AHUIMANU

### LOCATION
VALLEY OF THE TEMPLES, AHUIMANU, OAHU, HAWAII

### HAMMER
TMK: 4-7-04

### WEIGHT
140 lbs

### DROP
30'

### SAMPLER
2.5" - 2" O.D. THIN WALL TUBE

### BORING NO.
6

### DATE
SEP. 15, 1969

### Field Party
MAKAILA, MAU, HASHIDA

### Type of Boring
AUGER (MOULDED)

### Diam.
3"

### Elev.
135 + *

### Datum

### Drill Bit
T.C. DRAG

### Water Level
NOT NOTED

### Time
-

### Date
9-24-69

### PENETRATION DATA

<table>
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<tr>
<th>Soil Classification</th>
<th>DESCRIPTION</th>
<th>Sample No.</th>
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<td>MII</td>
<td>MEDIUM TO STIFF, MOTTLED BROWN, CLAYEY SILT W/GRAY CLAY POCKETS</td>
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### END OF BORING @ 26.5'

*ELEVATION ESTIMATED FROM GRADING PLAN*
Boring Log

PROJECT: CATHOLIC CHURCH SITE-AHUMANU
LOCATION: VALLEY OF THE TEMPLES
AHUMANU, OAHU, HAWAII

HAMMER: TKM: 4-7-04
Weight: 140#
Drop: 30"

Type of Boring: AUGER (MOBILE)
Datum: CLAY BIT

Elev. 175 ± *

STIFF, BROWN, CLAYEY SILT w/ TRACES DECOMPOSED ROCK

STIFF, MOTTLED BROWN CLAYEY SILT w/ DECOMPOSED ROCK

ELEV. = 175 ± *

END OF BORING @ 31.5'

*ELEVATION ESTIMATED FROM GRADING PLAN
Boring Log

PROJECT: CATHOLIC CHURCH SITE-AHUMANU

LOCATION: VALLEY OF THE TEMPLES
AHUMANU, OAHU, HAWAII

THK: 4-7-04

HAMMER: T.C.:DRAG

Weight: 140 *
Drop: 30".

SAMPLER: 2" THIN WALL TUBE

BORING NO. 8

Driller: WALTER LUM ASSOC.
Date: SEPT. 1E, 1969

Field Party: MAKAIKA, HIAHIDA, MAU

Type of Boring: AUGER (HUSSENEK) Diam: 3"

Elev.: 132 *

Datum: 32 *

Water Level: 1.3'

Time: 

Date: 9-24-69

MEDIUM REDDISH BROWN CLAYEY SILT

MEDIUM REDDISH BROWN W/GRAY, SILTY CLAY

(MH) MEDIUM TAN-BROWN, CLAYEY SILT

ROCK OR BOULDER END OF BORING @ 23.2'

*ELEVATION ESTIMATED FROM GRADING PLAN
# Catholic Church Site - Ahuimanu

## Table I - Summary of Laboratory Test Results

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<th>Sample No.</th>
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<td></td>
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<td>Boulders</td>
<td>Silty Clay</td>
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</tbody>
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### Grading Analysis (% Passing)

<table>
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<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>
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<td>100</td>
<td>99.0</td>
<td>95.4</td>
<td>86.5</td>
<td>77.0</td>
<td>62.2</td>
<td>58.6</td>
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### Atterberg Limits

<table>
<thead>
<tr>
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<th>Natural</th>
<th>Natural</th>
<th>Natural</th>
<th>Natural</th>
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<tbody>
<tr>
<td>Air Dried or Natural</td>
<td>66</td>
<td>124</td>
<td>148</td>
<td>131</td>
<td>100</td>
</tr>
<tr>
<td>Liquid Limit</td>
<td>46</td>
<td>49</td>
<td>52</td>
<td>53</td>
<td>51</td>
</tr>
<tr>
<td>Plastic Limit</td>
<td>20</td>
<td>105</td>
<td>90</td>
<td>78</td>
<td>49</td>
</tr>
<tr>
<td>Plasticity Index</td>
<td>SLOW</td>
<td>SLOW</td>
<td>VERY SLOW</td>
<td>QUICK</td>
<td>SLOW</td>
</tr>
<tr>
<td>Dilatancy</td>
<td>SIGHT</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>SIGHT-MED</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Toughness</td>
<td>SIGHT</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>SIGHT-MED</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Dry Strength</td>
<td>SIGHT</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>SIGHT-MED</td>
<td>MEDIUM</td>
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### Unified Soil Classification

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

### Specific Gravity

<p>| | | | | | |</p>
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<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

### Expansion and CBR Tests

(Surcharge-51 P.S.F.)

| Molding Moisture Content, % | 33.4 |     |     |     |     |
| Molding Dry Density, P.C.F. | 88.5 |     |     |     |     |
| Swell upon saturation, %    | 0.7  |     |     |     |     |
| CBR at 0.1" Penetration     | 36.0 |     |     |     |     |

### Compaction Test

(AASHO T-180-57 Method)

| Dry to Wet or Wet to Dry |     |     |     |     |     |
| Max. Dry Density (P.C.F.) |     |     |     |     |     |
| Optimum Moisture (%)     |     |     |     |     |     |

---

WALTER LUM ASSOCIATES
CIVIL, STRUCTURAL, SOILS ENGINEERS
### Summary of Laboratory Test Results

<table>
<thead>
<tr>
<th>Boring No.</th>
<th>Sample No.</th>
<th>Depth Below Surface</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>B-5' - C-0'</td>
<td>Brown Clayey Silt</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>C-5' - C-1'</td>
<td>Mottled Brown Clay</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>D-10' - D-1.5'</td>
<td>Mottled Gray-Brown</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>E-20' - E-2.5'</td>
<td>Mottled Gray-Brown</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>F-30' - F-3.5'</td>
<td>Mottled Gray-Brown</td>
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</tbody>
</table>

#### Grading Analysis (% Passing)

<table>
<thead>
<tr>
<th>Sieve</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>½&quot;</td>
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<td></td>
<td></td>
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<td>100</td>
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<td>#4</td>
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<td></td>
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<td>98.9</td>
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<td>#40</td>
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<td>#100</td>
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<td>97.7</td>
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#### Atterberg Limits

<table>
<thead>
<tr>
<th>Natural</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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Natural</td>
<td>Natural</td>
<td>Natural</td>
<td>Natural</td>
<td>SLOW</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
</tr>
<tr>
<td></td>
<td>104</td>
<td>104</td>
<td>82</td>
<td>86</td>
<td>QUICK-MED</td>
<td>SLIGHT-MED</td>
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<tr>
<td></td>
<td>50</td>
<td>49</td>
<td>52</td>
<td>55</td>
<td>QUICK-MED</td>
<td>SLIGHT-MED</td>
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<tr>
<td></td>
<td>54</td>
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<td>30</td>
<td>31</td>
<td>SLOW</td>
<td>MEDIUM</td>
<td>SLIGHT-MED</td>
</tr>
</tbody>
</table>

#### Unified Soil Classification

- M1 |
- M1 |
- M1 |
- M1 |

#### 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 (%)
JOB: CATHOLIC CHURCH SITE - AHUIMANU
VALLEY OF THE TEMPLES,
LOCATION: AHUIMANU, OAHU, HAWAII

PLASTICITY CHART
CONsolidation Test
Time-consolidation curves
Catholic Church site
Valley of the Temples
Ahuimanu, Oahu, Hawaii
Sample 3A-3 @ 5'-5'

P = 700 psi

P = 1200 psi

P = 2220 psi

P = 4260 psi
LIMITATIONS

In general, soil formations are commonly erratic and rarely uniform or regular. The borings indicate the subsurface soil conditions encountered only at the drill holes where the borings were made. 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. The owner, architect, or engineer should make certain that the recommendations are incorporated into the plans and are properly carried out during construction.


COMPACTED FILL

4" ± S4C
UNTREATED ROAD BASE COURSE OR EQUIVALENT MATERIAL.
(3/4" MAXIMUM / LESS THAN 5% PASSING NO. 200 SIEVE)
8" OR 4" PERFORATED PLASTIC TUBING OR EQUIVALENT
FOR SUBDRAIN LINES – NO PIPE IN SUBDRAIN LATERALS.
2" ± S4C

SUBDRAIN LINE (WITH PERFORATED PIPE)

SUBDRAIN LATERAL (WITHOUT PERFORATED PIPE)

NOT TO SCALE

WORKING TABLE

4" ± S4C
UNTREATED ROAD BASE COURSE OR EQUIVALENT MATERIAL.
(3/4" MAXIMUM / LESS THAN 5% PASSING NO. 200 SIEVE)
8" OR 4" PERFORATED PLASTIC TUBING OR EQUIVALENT
FOR SUBDRAIN LINES – NO PIPE IN SUBDRAIN LATERALS.
EXCAVATE TRENCHES THRU THE SOFT (PUSH) MATERIAL.
DOWN TO FIRM GROUND AND BACKFILL
WITH WELL-GRADED GRANULAR MATERIAL.

SUBDRAIN LINE THRU MARSHY AREA

NOT TO SCALE

FIGURE 2

PROPOSED SUBDRAINS

CATHOLIC CHURCH SITE - AHUIMANU
VALLEY OF THE TEMPLES
AHUIMANU, OAHU, HAWAII

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