March 1, 1978
W.O. 738-00(A)

Civic Development
Room A, 1305 South King Street
Honolulu, Hawaii 96814

Attention: Mr. George H. Sakoda

Subject: Field Observation and Foundation Recommendations
Momilani Villa, Unit I

Gentlemen:

As requested, the site conditions at the above referenced lots were evaluated for foundation design purposes. As stated in our proposal, it is not the purpose of this investigation to check the compaction quality of the already completed grading work.

Our findings and recommendations are presented in this letter.

The soil report and site grading observations for the above project were made by others. The site grading plan by Park Engineering Inc. dated September 13, 1976 was used to determine the grading that had taken place at the site.

WITHDRAWN
FIELD EXPLORATION AND LABORATORY TESTING

2.4-Inch diameter ring samples of the top 1.5 feet below the existing building pads were obtained for visual inspection and laboratory testing to evaluate the expansive properties of the existing surface materials. Water contents and swell tests on 1 inch thick undisturbed ring samples with 55 p.s.f. surcharge loads were utilized in the evaluation of the soil properties.

The results of the laboratory tests are summarized in Table 1.

Portions of the building slabs for lots 51-52 and 53-54 are located within about 12 feet from the top of the stream lining. Probings were made in these lots to evaluate the condition of the fill that was placed in this area. The probings were made by driving a 2-inch diameter conical point with a 140-pound hammer falling 30 inches. The number of blows to drive the conical point was recorded and is presented on the logs. The approximate location of the probings is shown on the attached plot plans.

Based on the field exploration and laboratory test results, our recommendations are as follows:

Lots 21-22, 31-32, 37-38, 39-40 & 41-42

The laboratory tests indicated expansive soils in these lots.
To reduce the shrink-swell effects of these soils, deep perimeter footings are recommended around the house slabs on these lots. The perimeter footings should extend 2 feet below the outside ground elevation and have a minimum thickness of 9 inches. A #5 bar should be placed at the top and bottom of this cut-off wall footing.

The 6-inch base course layer should be compacted wet of optimum moisture content to a minimum of 90% maximum density. Prior to pouring the slab, the subgrade and base course layer should be kept continuously moist by sprinkling. The soils engineer should inspect the subgrade preparation and test compaction of the cushion layer prior to pouring of the slab and perimeter footing.

The bottom of the footing excavation should be neat and free of loose soils.

The concreting of footing and slab should be coordinated in such a way that the time period between the initial excavation and final concrete placement at each lot should be kept to a minimum. This is to avoid substantial drying of the underlying materials.
Lots 43-44 & 45-46
The laboratory tests indicated moderately expansive soils in these lots. To reduce the shrink-swell affects of these soils, the recommendations given above should be followed except that the perimeter footing should extend 1 foot below the outside ground elevation.

Lots 51-52 & 53-54
The rear portion of these units are located within about 6 to 12 feet from the top of the stream lining. The probings in this area generally indicated stiff underlying material.

Sections of the walkway slab extending beyond the 10-foot set-back line should be separated from the main building slab. It is anticipated that surface fill within 10 feet behind the top of the lined channel bank will experience some long-term settlement. Future additions should be avoided within the 10-foot set-back area behind the top of the lined channel or be designed by a soils engineer.

The laboratory tests also indicated expansive soils in these lots. To reduce the shrink-swell affects of these soils, a perimeter footing extending 2 feet below the outside
ground surface should be used for these units. Additional recommendations as given above should be followed.

Allowable bearing values of 3000 p.s.f. may be used for stiff natural ground or compacted fill subjected to soils engineer's inspection.

Drainage should be diverted away from the perimeter footing.

Should you have any questions concerning the contents of this report, please feel free to call us.

Respectfully submitted,

C.W. ASSOCIATES, INC.
dba GEOLABS-HAWAII

By Bob Y.K. Wong, P.E.

BYKW:CSM:cw

Enclosure: Plot Plans (Lots 51-52 & 53-54)
Boring Logs (Nos. 2, 3 & 4)
Table 1.
LANIKEHA PLACE

AREA: LOT 53: 6033 S.F.
LOT 54: 6005 S.F.
TNK: 9-6-04: POR.10

LEGEND

1407 FINISHED GRADE OF GROUND

LOT NUMBER

MODEL NUMBER

(93.37) LOT DIMENSIONS

APPROXIMATE LOCATION OF BORING

PLOT PLAN
MOMILANI VILLA
1" = 20'

GEORGE YOKOTA
REGISTERED PROFESSIONAL ENGINEER
NO. 1156
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.

PARK ENGINEERING, INC.

DATE: MAY 23, 1977
LANIKEHA PLACE

AREA: LOT 51 = 5,333 S.F.
LOT 52 = 6031 S.F.
THK: 9-6-04: FOR 10

1103 FINISHED GRADE OF GROUND

LOT NUMBER
MODEL NUMBER
LOT DIMENSIONS
APPROXIMATE LOCATION OF BORING

PLOT PLAN
MOMILANI VILLA
11' = 20'

DATE: MAY 23, 1977

PARK ENGINEERING, INC.

REGIMENTED PROFESSIONAL ENGINEER
HAWAII, U.S.A.
NO. 1156

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
Sample
Dry density (pcf)

Depth (feet)

Surface elevation 140' ±
(ELEVATION ESTIMATED FROM PLOT PLAN)

SOIL DESCRIPTION

CONTINUOUS PENETRATION TO 7.5 FEET

STIFF DRILLING WITH SOME COBBLES TO 14 FEET

STIFF REDDISH BROWN CLAYEY SILT

BORING TERMINATED AT 17 FEET ON 2-15-78

MOISTURE CONTENT

2.0" O.D. split-spoon sample
Undisturbed ring sample
Disturbed ring sample
Core sample
Sampler pushed

Plastic limit
Liquid limit
Natural water content

Driving energy 140 lb. wt., 30" drop
W.O. 738-00
FEBRUARY 1978
CONTINUOUS PENETRATION WITH A 2-INCH CONICAL POINT

PENETRATION TEST TERMINATED AT 10 FEET ON 2-15-78

LOG OF BORING
CIVIC DEVELOPMENT

MOMILANI VILLA - UNIT I

LEGEND

- Moisture content
- 2.0" O.D. split-spoon sample
- Undisturbed ring sample
- Disturbed ring sample
- Core sample
- Sampler pushed

Driving energy: 140 lb. wt., 30" drop
W.O. 738-00
FEBRUARY 1978
Boring

Sample

Dry density (pcf)

Blows per foot

50 40 30 20 10 0

Depth (feet)

Graph

Surface elevation 142' ±
(ELEVATION ESTIMATED FROM PLOT PLAN)

Soil Description

CONTINUOUS PENETRATION WITH A 2-INCH CONICAL POINT TO 6.9 FEET

STIFF DRILLING WITH INTERMITTENT BOULDERS

VERY STIFF MOTTLED BROWN SILTY CLAY & ROCK FRAGMENTS

BORING TERMINATED AT 9.6 FEET ON 2-16-78

Moisture content

LEGEND

I 2.0" O.D. split-spoon sample
II Undisturbed ring sample
III Disturbed ring sample
IV Core sample
P Sampler pushed

Driving energy 140 lb. wt., 30" drop

MOMILANI VILLA - UNIT I

LOG OF BORING
CIVIC DEVELOPMENT

GEOLABS-HAWAII
Geological Engineering & Soil Engineering in Canada
### TABLE 1

**SUMMARY OF MOISTURE CONTENT & RING SWELL TESTS**

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<th>Lot No.</th>
<th>Sample Depth</th>
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<th>After</th>
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