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GEOLABS-HAWAII

Geology. Soils and Foundation Engineering

1553 Colburn Street, Suite 202

Honolulu, Hawaii 96817

(808) 841-5064

August 20, 1980

W.O. 771-10

REC'D AUG 21 1980

Gray, Rhee & Associates, Inc.
116 S. King Street, Room 508
Honolulu, Hawaii 96813

#39

Date Received _____

File: 626

To: DR / RA

Action: _____

Attention: Mr. Dail Rhee

#39

Subject: Final Compaction Report
Kamiloiki Estates Subdivision, Phase II
Hawaii Kai, Oahu, Hawaii

Gentlemen:

This final report summarizes our inspection, compaction and laboratory tests performed from April 3, 1979 to-date during the earthwork and grading operations for Phase II at the above referenced project.

As of this date, the lots in Phase II have been constructed to final grade and compacted adequately. The compaction test results for the in-place fill are presented in the attached compaction test summary. A compaction report was issued for the Phase I portion of the project on September 11, 1979. Subsequent to the compaction report, additional lot fill was placed over Lots 63, 64, 66 to 71 and 80 to 87 (Phase I) to provide a capping layer over the expansive adobe soils which were encountered at these lot finished grades. The compaction test results for these fills are also included in this report.

The general site grading concept for Phase II consisted of removing the surface 'adobe' clay for use in the deeper fill areas or hauling off site. The better, underlying colluvial material could then be utilized for the construction of the upper lot fills.

Prior to fill placement, the existing vegetation was removed and the existing ground scarified and recompacted. The fill

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Honolulu, Hawaii 96813

WITHDRAWN

was then placed in horizontal lifts and compacted to a minimum of 85% (adobe clay) or 90% (boulder colluvium) of its maximum dry density.

During the fill placement operations, periodic field density tests were done in accordance with the American Society for Testing and Materials (ASTM) Test Designation D-1556 (Sand Cone Method).

During the grading period, various on-site soils were tested prior to being used in the field. The maximum dry densities and optimum moisture contents were established in our laboratory in accordance with ASTM Test Designation D-1557 (modified Proctor) and test results are as follows:

<u>Soil Type</u>	<u>Maximum Dry Density (p.c.f.)</u>	<u>Optimum Moisture Content (%)</u>
Tannish brown clayey silt w/ some gravel	111.0	17.0
Brown coral sand	133.0	8.0
Gray silty clay	91.0	30.0
Gray clay mixed with brown silty sand	112.0	14.0
Gray brown silty clay with gravel	89.0	35.0
Brown sandy silt with some gravel	91.0	31.8

During the course of the grading work, some of the lot grades, as shown on the grading plans, were revised to accommodate the proposed house construction. Generally, the new lot grading design consisted of raising the lower level split-level lots along the drainage channel. Due to the revised grading, many of the existing final lot grades may differ from those shown on the approved grading plans. To

avoid later confusion regarding the actual final level of the fill which has been placed and adequately compacted by the grading contractor, we have recommended that a surveyed 'as-built' plan should be made.

During the mass grading operations, the planned slope drainage bench in the rear portion of Lots 160 to 165 was inadvertently left out by the grading contractor. A new drainage bench was subsequently installed at a lower elevation, about 5 feet above the toe of the cut slope. After heavy rains, erosion was noted at the exit of the revised slope bench, at Lot 165. In an effort to reduce the concentration of surface runoff at the end of the bench, the bench has recently been reshaped to drain surface runoff over the slopes behind Lots 160 to 165. The performance of this slope should be observed after heavy rains to determine if additional erosional protection may be required.

RECOMMENDATIONS

Building Foundation and Slab-On-Grade

Foundations and slabs should be setback a minimum of 5 feet away from the top of cut or fill slopes to reduce the detrimental effects of slope creep and erosion. Where foundations are located within 5 feet from the top of slope, the footings should be extended a sufficient depth to obtain a minimum 5 foot horizontal setback distance from the outer edge of the footing to the slope face and bear on stiff soil.

Based on field observations and periodic laboratory ring swell test results, the existing soils near finished grade appear to have low to moderate swell potential. Foundation recommendations had been presented previously on a lot-by-lot basis. The foundation excavation and subgrade preparation should be inspected by a qualified soils engineer during construction to see that the actual soil conditions are consistent with the assumed design conditions.

Lot Drainage

The finish lot grade outside the slab, pavement and footings should be shaped to shed water away from the foundations and to avoid ponding condition. The foundation excavations should be backfilled immediately after setting of the concrete to prevent ponding condition.

Drainage swales must be provided as soon as possible to drain all surface run-off away from the slab and footing foundation.

Retaining Walls

Retaining walls will be required for some of the units.

All retaining walls should be properly designed by a licensed structural engineer.

Special design would be required when 'adobe' clay soils are encountered behind the proposed walls.

Future Construction and Site Regrading

Due to the moderately expansive nature of the on-site soils, future building additions, patio slabs and retaining walls should be designed by a soils engineer to minimize the shrink-swell effects of the underlying soils.

Swimming pools should be constructed with care as they may extend into the 'adobe' material and be subjected to the heaving and swelling movements and large forces generally associated with this type of soil.

Subsequent to completion of lot grading, utility trenches within the lot pad should be properly backfilled and compacted under the observation of a soils technician.

This office assumes no responsibility for any alterations made to slopes or pads on the subject lots subsequent to the issuance of this report without our knowledge and written approval.

Gray, Rhee & Associates, Inc.
W.O. 771-10
Page 5

We strongly suggest that all of the above referenced recommendations and restrictions be made available to all future lot and home purchasers of this subdivision, so that they be advised to include the consultation of a qualified professional in the planning, design and construction of any improvements. Home owners should also be advised not to block or alter surface drainage.

We trust that this report is self-explanatory. Should you have any questions, please feel free to call this office.

Respectfully submitted,

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

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

BYKW:CSM:dmb

Attachments: Summary of Density Tests
(Nos. 37 to 124)

xc: Chanuta Development, Inc.

SUMMARY OF DENSITY TESTS
CONTROL OF COMPACTED FILL

W.O. NO. 771-10
PAGE 1 OF 4

OWNER Chanuta Development
JOB Kamiloiki Estates

TEST	DATE	TEST LOCATION	ELEV. FT.	% COMP. REQ'D	MAX. DRY DENSITY P.C.F.	FILL MOISTURE %	TEST DRY DENSITY P.C.F.	% MAX. DRY DENSITY	REMARKS
37	7/20/79	Rd. 'B' St. 1+00	-2F.G.	95	111.0	27.5	105.3	95.0	Pass
38	"	"	-14"	"	"	27.8	106.4	95.8	"
39	"	Rd. 'B' Sta. 2+00		"	"	19.2	105.3	95.0	"
40	7/31/79	Channel Sta. 61+50	136.0	"	91.0	25.4	86.4	94.9	"
41	"	"	138.0	"	"	"	85.7	94.2	"
42	8/1/79	Channel Sta. 62+00	F.Subg.	"	"	27.5	85.4	93.8	"
43	8/2/79	Lot 145	144	90	"	29.3	82.7	90.9	"
44	"	Lot 146	146	"	"	"	82.7	90.9	"
45	8/3/79	Lot 146	148	"	"	27.3	82.7	90.8	"
46	"	Lot 147	150	"	"	"	84.5	92.9	"
47	8/13/79	Lunalilo Sta. 50+30	-2'	95	111.0	19.5	107.0	96.4	"
48	"	Rd. 'A' Sta. 3+80	"	"	"	"	105.7	95.2	"
49	"	Lunalilo Sta. 50+25	-14"	"	"	18.2	107.6	97.0	"
50	"	Rd. 'A' Sta. 2+90	"	"	"	"	106.2	95.7	"
51	8/14/79	Lunalilo Sta. 54+00	-20"	"	"	16.7	106.3	95.8	"
52	"	" Sta. 54+10	-14"	"	"	"	106.5	95.9	"
53	8/15/79	" Sta. 53+35	-8"	"	133.0	4.7	125.4	94.3	"
54	8/17/79	Rd. 'B' Sta. 1+65	"	"	"	3.6	128.8	96.8	"
55	8/21/79	Lunalilo Sta. 51+00	"	"	"	7.1	127.5	95.9	"
56	8/23/79	Rd. 'B' Sta. 2+00	-2"	"	"	3.8	126.3	95.0	"
57	"	Lunalilo Sta. 50+00	"	"	"	6.1	127.7	96.0	"
58	"	Rd. 'A' Sta. 2+75	-8"	"	"	"	126.9	95.4	"
59	"	Lot 126	117.0	90	89.0	23.3	83.5	93.8	"

SUMMARY OF DENSITY TEST
CONTROL OF COMPACTED FILL

W.O. NO. 771-10

OWNER Chanuta Development

PAGE 2 OF 4

JOB Kamiloiki Estates

TEST NO.	DATE	TEST LOCATION	ELEV. FT.	% COMP. REQ'D	MAX. DRY DENSITY P.C.F.	FILL MOISTURE %	TEST DRY DENSITY P.C.F.	% MAX. DRY DENSITY	REMARKS
60	8/24/79	Lot 125	F.G.	90.0	89.0	28.0	80.2	90.1	Pass
61	8/28/79	Lunalilo Sta. 79+00	-2'FG	95.0	111.0	16.9	124.4	95.9	"
62	"	" Sta. 76+00	"	"	"	16.9	125.1	96.4	"
63	8/30/79	" Sta. 79+85	-14"FG	"	"	18.9	105.0	94.6	"
64	"	" Sta. 76+20	"	"	"	"	106.5	96.0	"
65	9/11/79	" Sta. 79+50	-8"FG	"	133.0	10.6	129.0	97.0	"
66	"	" Sta. 76+50	"	"	"	"	130.2	97.9	"
67	9/21/79	Rd. 'C' Sta. 1+50	"	"	"	8.5	127.5	95.9	"
68	9/24/79	Lot 135	106	90.0	91.0	22.8	83.5	91.8	"
69	"	Lot 134	108	"	"	"	81.9	90.0	"
70	9/25/79	Lot 134	110	"	"	23.6	82.9	91.1	"
71	10/1/79	Lot 133	115	"	"	24.8	81.9	90.0	"
72	10/2/79	Lot 134	115	"	"	24.5	82.8	90.9	"
73	"	Lot 135	116	"	"	"	83.8	92.1	"
74	10/3/79	Lot 133	118	"	"	23.1	82.7	91.0	"
75	10/4/79	Lot 134	119	"	"	23.1	82.7	91.0	"
76	10/5/79	Lot 135	F.G.	"	"	23.1	88.1	96.8	"
77	"	Lot 134	"	"	"	23.1	86.4	94.9	"
78	10/9/79	Lot 133	122	"	"	26.4	84.7	93.0	"
79	10/10/79	Lot 133	F.G.	"	"	23.8	85.6	94.0	"
80	"	Lot 132	128.0	"	"	"	83.7	92.0	"
81	10/11/79	Lot 131	130.0	"	"	25.5	82.8	91.1	"
82	"	Lot 132	133.0	"	"	"	83.4	91.6	"

SUMMARY OF DENSITY TESTS
CONTROL OF COMPACTED FILL

W.O. NO. 771-10

OWNER Chanuta Development

PAGE 3 OF 4

JOB Kamiloiki Estates

TEST NO.	DATE	TEST LOCATION	ELEV. FT.	% COMP. REQ'D	MAX. DRY DENSITY P.C.F.	FILL MOISTURE %	TEST DRY DENSITY P.C.F.	% MAX. DRY DENSITY	REMARKS
83	10/12/79	Lot 131	135.0	90.0	91.0	21.7	83.7	92.0	Pass
84	10/15/79	Lot 39	115.0	"	"	30.5	89.0	97.8	"
85	"	Lot 39	F.G.	"	"	30.5	86.5	95.0	"
86	"	Lot 114	140	"	"	25.5	83.7	92.0	"
87	11/9/79	Lot 86	1½'FG	"	"	23.8	85.6	94.0	"
88	11/28/79	Lot 112	1½'FG	"	"	22.9	85.3	93.7	"
89	11/30/79	Lot 112	F.G.	"	"	22.9	84.2	92.5	"
90	12/17/79	Lot 121 (Upper)	F.G.	"	"	25.4	83.6	91.9	"
91	12/19/79	Lot 50	1½'FG	"	"	26.2	83.0	91.2	"
92	"	Lot 63	F.G.	"	"	25.5	82.4	91.0	"
93	12/27/79	Lot 121	1½'FG	"	"	24.0	83.6	91.9	"
94	"	Lot 122	F.G.	"	"	24.0	83.6	91.9	"
95	12/28/79	Lot 120	1½'FG	"	"	25.0	82.9	91.1	"
96	1/15/80	Lot 113	155.0	"	"	26.8	81.1	89.1	"
97	1/16/80	Lot 11	F.G.	"	"	26.8	82.4	90.5	"
98	1/28/80	Lot 113	-4FG	"	"	24.5	83.7	92.0	"
99	2/1/80	Lot 111	160	"	"	25.0	84.7	93.1	"
100	"	Lot 111	F.G.	"	"	"	85.4	93.9	"
101	2/4/80	Lot 139	133.0	"	"	"	72.0	79.0	Fail
102	"	Lot 139 (retest)	133.0	"	"	"	83.2	91.4	Pass
103	2/5/80	Lot 106	160.0	"	"	"	81.8	89.9	"
104	"	Lot 107	161.0	"	"	"	83.8	92.1	"
105	"	Lot 108	164.5	"	"	"	83.0	91.2	"

SUMMARY OF DENSITY TESTS
CONTROL OF COMPACTED FILL

W.O. NO. 771-10

OWNER Chanuta Development

PAGE 4 OF 4

JOB Kamiloiki Estates

TEST	DATE	TEST LOCATION	ELEV. FT.	% COMP. REQ'D	MAX. DRY DENSITY P.C.F.	FILL MOISTURE %	TEST DRY DENSITY P.C.F.	% MAX. DRY DENSITY	REMARKS
106	2/7/80	Lot 147	152.0	90	91.0	25.0	80.7	89.0	Pass
107	2/7/80	Lot 146	146.0	"	"	25.0	85.9	94.4	"
108	2/11/80	Lot 149	161.5	"	"	34.8	80.2	88.1	" *
109	2/11/80	Lot 146	152.0	"	"	27.3	82.2	90.4	"
110	2/12/80	Lot 139	136.0	"	"	28.0	84.8	93.0	"
111	2/19/80	Lot 138	133.5	"	"	25.0	82.6	90.7	"
112	2/20/80	Lot 140	142.0	"	"	23.0	82.7	90.9	"
113	2/21/80	Lot 139	140.0	"	"	26.5	84.7	93.0	"
114	2/21/80	Lot 141	142.0	"	"	26.5	82.6	90.8	"
115	2/26/80	Lot 69	117.0	"	"	25.0	86.7	95.3	"
116	"	Lot 67	111.0	"	"	25.0	83.8	92.0	"
117	"	Lot 72	126.0	"	"	25.0	88.2	96.9	"
118	"	Lot 81	106.0	"	"	21.4	83.9	92.2	"
119	3/21/80	Lot 125	122.0	"	"	21.5	82.5	90.7	"
120	"	Lot 127	126.0	"	"	18.2	91.3	100.3	"
121	"	Lot 138	138.5	"	"	27.3	90.5	99.5	"
122	3/26/80	Lot 140	142.3	"	"	31.7	84.4	92.7	"
123	"	Lot 142	145.5	"	"	29.7	84.6	92.9	"
124	"	Lot 144	148.3	"	"	28.8	81.4	89.5	"

* Passed after additional compaction GEOLABS-HAWAII

TOWILL, SHIGEOKA & ASSOCIATES, INC.
LAND SURVEYORS
850 RICHARDS STREET, SUITE 302
HONOLULU, HAWAII 96813

July 28, 1980

Mr. Dennis Kinoshita
Hood Corporation
P. O. Box 701
Honolulu, Hawaii 96809

Dear Mr. Kinoshita:

Subject: Kamiloiki Estates Subdivision
Increment II
Maunaloa, Honolulu, Oahu, Hawaii

We have made final checks on the toe cut of the main slope of the above subject project and certify that the cut substantially complies with the Grading Plans 2 and 3, Sheets 5 and 6.

Very truly yours,

TOWILL, SHIGEOKA & ASSOCIATES, INC.



Lester T. Shimabukuro
Vice President