FINAL COMPACTION REPORT

HALAWA HEIGHTS SUBDIVISION

LOTS 1 TO 18

HALAWA, EWA, OAHU, HAWAII

W.O. 1050-10 JULY 19, 1982

Prepared for:

R.K. Development Inc.

GEOLABS-HAWAII

2006 KALIHI STREET

HONOLULU, HAWAII 96819

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July 19, 1982
W.O. 1050-10

R.K. Development Inc.
c/o Community Planning Inc.
700 Bishop St., Suite 608
Honolulu, Hawaii 96813

Attention: Mr. Bernard P. Kea

Subject: Final Compaction Report
Halawa Heights Subdivision
Lots 1 to 18
Halawa, Ewa, Oahu, Hawaii

Gentlemen:

During the period November 3, 1981 to May 12 1982, the mass grading work performed by the contractor was inspected intermittently by our representative. This final report summarizes our inspection and compaction tests performed on the above referenced project.

In general, the grading operations consisted of cutting the central portion of the site (Lot Nos. 9 to 15) from about 2 to 7 feet, and filling about 2 to 5 feet in the western portion (Lot Nos. 1 to 8 and 16 to 18) of the site.

The soils encountered at the cut pad finished grade, generally consisted of stiff brown clayey silt with cobbles and gravel. Field observations and laboratory test indicate that, with proper foundation design, these soils could provide adequate support for the proposed single family residences.

Imported soil from the Royal Summit Subdivision was utilized for fill. Laboratory swell tests indicate that it generally has low swelling potential.

Prior to fill placement, the existing vegetation and stockpiles were removed, the existing ground scarified and then recompacted. The fill was then placed in horizontal lifts and compacted to a minimum of 90% of its maximum 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). It is our opinion that the above referenced fill lots have been constructed to final grade and compacted adequately. The compaction test results for the in-place fills are listed in the Compaction Test Summary.

During the grading period, the on-site soil was tested prior to being used in the fill. The maximum soil density and optimum moisture content was established in our laboratory in accordance with ASTM D-1557 test designation, and the results are as follows:

Type	Soil Description	Maximum Density (pcf)	Optimum Moisture (%)
On-Site Material	Brown Silty Clay	109.0	20.5
Import Material	Brown Clayey Silt	103.0	26.0
Import Material	Brown Clayey Silt	99.5	28.0
Import Material	Brown Clayey Silt	95.0	29.0
Import Material	Brown Clayey Silt	95.5	28.0
Import Material	Brown Clayey Silt	105.0	21.0
Halawa Base Course	Gray Sandy Gravel	133.0	11.0

RECOMMENDATIONS

House Foundations

To minimize the effects of slope creep and erosion, slabs should be set back away from the tops of slopes a minimum distance of 5 feet. In addition, post footings located close to the tops of slopes should be embedded a sufficient depth to obtain a minimum horizontal set-back distance of 5 feet, measured from the edge of the footing out to the slope face. Post footings should be placed a minimum of 12 inches below the finish grade.

Slab-on-grade should be placed over a 4-inch layer of compacted base course. The thickened edge around the slab-on-grade located away from the 5-foot set-back from the slope should also extend downward a minimum of 12 inches below the adjacent ground surface. Where slab-on-grade is located within the 6-foot slope set-back, it should be evaluated on an individual basis by a qualified soils engineer.

The subgrade material generally exhibits a low to moderate expansion as shown on the Summary of One-Inch Ring Swell Test, therefore surface water should be diverted away and not allowed to pond next to foundations.

The subgrade soils should be kept moist and protected from drying prior to concrete placement. Subgrade should be compacted to about of 90% of its maximum dry density.

Lots 17 and 18

These lots are situated next to the unlined portion of the drainage channel. The existing side slopes along this portion of the channel are about 10 to 12 feet high and at about 1:1 (H:V) slope ratio. In order to minimize the detrimental effects of down-hill slope creep adjacent to this steep slope, we recommend that the future house be set-back a minimum distance of 10 feet away from the top of the slope.

Alternatively, deeper foundations designed by a licensed engineer would be required for the portion of the structures within the 10-foot set-back area.

Site Grading

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

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

Should you have any questions concerning the above contents, please feel free to contact us.

Respectfully submitted,

C.W. ASSOCIATES INC.
dba GEOLABS-HAWAII

By Clayton S. Mimura
Clayton S. Mimura, P.E.

BYKW:CSM:cw

Enclosure: Summary of Density Tests (3)
Summary of One-Inch Swell Tests (1)
Location Plan

SUMMARY OF DENSITY TESTS
CONTROL OF COMPACTED FILL

W.O. NO. 1050-10
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OWNER R.K. Development
JOB HALAWA HEIGHTS SUBDIVISION

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
1	11-18-81	LOT 15	92.5	90.0	109	17.8	84.6	77.6	FAIL; SEE #3
2	"	" 18	99.6	"	"	19.6	88.0	80.7	
3	11-19-81	" 15	92.5	"	"	20.2	100.3	92.0	PASS
4	"	" 17	96.4	"	"	12.6	101.8	93.4	"
5	"	" 2	86.0	"	"	22.5	84.6	77.6	FAIL; SEE #29
6	"	" 6	88.4	"	"	11.0	99.6	91.4	PASS
7	"	" 5	85.8	"	"	17.5	100.8	92.4	"
8	"	" 10	F.G. 94.5	"	"	13.5	98.6	90.5	"
9	11-25-81	" 17	99.8	"	"	18.6	95.3	87.4	PASS*
10	12-2-81	IN ROAD OPPOSITE LOT 2	81.2	"	99.5	21.8	89.6	90.0	"
11	12-4-81	IN AREA OF LOT 3	78.0	90.0	95.0	23.0	86.0	90.5	"
12	12-7-81	TRENCH BACKFILL 30" DIA RCP	80.0	"	95.5	21.9	87.8	91.8	"
13	"	"	96.0	"	103.0	20.6	98.3	95.5	"
14	"	LOT 7	90.0	"	"	22.8	95.1	92.3	"
15	12-10-81	" 6	88.0	"	95.0	24.8	88.4	93.0	"
16	"	" 7	91.0	"	103.0	23.2	94.2	91.0	"
17	"	" 8	89.0	"	95.0	26.6	86.6	91.0	"
18	12-15-81	" 18	101.0	"	95.5	31.6	90.9	95.0	"
19	"	" 17	100.0	"	"	30.6	85.4	90.0	"
20	"	" 18	F.G. 102.0	"	"	30.2	92.8	97.0	"
21	"	" 17	F.G. 101.0	"	"	19.3	92.6	97.0	"
22	"	ACCESS ROAD FILL TO LOT 6	88.0	95.0	103.0	30.2	98.1	95.0	"
23	12-16-81	LOT 16	F.G 100.0	90.0	"	25.0	100.9	98.0	"

* PASS AFTER ADDITIONAL ROLLING

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SUMMARY OF DENSITY TESTS
ONTROL OF COMPACTED FILL

W.O. NO. 1050-10
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OWNER R. K. DEVELOPMENT
JOB HALAWA HEIGHTS SUBDIVISION

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
24	12-16-81	ROAD TO FLAG LOT 16	99.0	95.0	103.0	21.9	97.3	95.0	PASS
25	"	"	98.0	90.0	"	25.5	102.6	100.0	"
26	12-17-81	LOT 9	89.0	"	"	29.0	96.7	94.0	"
27	"	" 8	89.0	"	95.5	19.8	88.5	93.0	"
28	12-29-81	" 2	86.0	"	"	32.6	80.5	84.3	FAIL, see #34
29	"	" 1	79.0	"	"	39.1	79.8	83.5	FAIL, see #32
30	"	" 14	F.G. 85.0	"	103.0	36.0	96.3	93.5	PASS
31	"	" 13	F.G. 86.0	"	95.5	21.9	90.9	95.0	"
32	"	" 1	77.0	"	"	26.1	91.3	95.0	"
33	12-30-81	RETEST OF LOT 1	79.0±	"	103.0	25.3	99.2	96.3	"
34	"	" " " 2	86.0±	"	"	24.0	97.4	94.5	"
35	"	LOT 7	91.0	"	95.5	38.4	76.7	80.0	see #7 FAILED
36	"	" 8	F.G. 91.0	"	103.0	22.1	103.9	100.0	PASS
37	12-31-81	" 7 (RETEST)	F.G. 91.0	"	"	25.2	93.8	90.9	PASS; RETEST #35
38	"	" 1	79.0	"	"	19.6	95.5	92.7	"
39	"	" 3	81.0	"	109.0	23.7	105.3	96.6	"
40	1-5-82	TRENCH BACKFILL SUB-GRADE IN HALAWA HTS. RD	93.0	90.0	105.0	27.6	95.8	91.2	"
41	1-15-82	HALAWA HEIGHTS RD. STA. 110+39 ±	SUB-GRADE	95.0	133.0	13.0	128.0	96.2	"
42	2-1-82	LOT 2	80.2	90.0	95.0	33.0	79.5	83.7	see #44 FAILED
43	2-3-82	" 1	79.8	"	"	19.3	94.0	99.0	PASS
44	"	" 2	80.2	"	"	14.8	87.9	93.0	PASS; RETEST #42
45	2-4-82	" 3	82.7	"	"	18.9	98.6	104.0	PASS
46	"	" 2	81.9	"	"	21.8	91.0	95.0	"

SUMMARY OF DENSITY TESTS
CONTROL OF COMPACTED FILL

W.O. NO. 1050-10
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OWNER R.K. DEVELOPMENT
JOB HALAWA HEIGHTS SUBDIVISION

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
47	2-9-82	LOT 3, SOUTH END	83.0	90.0	95.0	32.6	87.0	91.6	PASS
48	"	" 2, " "	83.0	"	"	33.8	88.9	93.6	"
49	2-10-82	" 3, NORTH END	83.5	"	"	34.5	86.9	91.6	"
50	"	HALAWA HTS. RD. BETWEEN STA. 112+90 & FIRE HYDRANT	87.0	95.0	133.0	10.6	127.3	95.7	"
51	"	LOT 4, WEST END	83.0	90.0	95.0	36.3	85.1	89.6	"
52	2-16-82	WATERLINE; RD. 'A' STA. 0+50	80.5	95.0	109.0	26.6	92.8	85.2	see #54 FAILED
53	"	LOT 1, NORTH END	81.0	90.0	90.0	38.2	85.2	98.7	PASS
54	2-17-82	WATERLINE RD. 'A' STA. 0+50 (RETEST)	80.5	95.0	109.0	25.6	105.3	96.6	"
55	"	LOT 1, WEST END	81.0	90.0	95.0	23.7	90.6	95.3	"
56	2-18-82	" 3, SOUTH END	F.G.	"	"	39.8	83.2	87.6	see #57 FAILED
57	2-19-82	" 3, SOUTH END (RETEST)	F.G. 84.7	"	"	36.2	88.3	92.9	PASS; RETEST #56
58	2-22-82	" 4, NORTH END	84.5	"	"	31.4	94.4	99.4	"
59	2-26-82	" 2, NORTH END	85	"	"	29.4	91.9	96.7	"
60	5-12-82	" 4	F.G.	"	"	21.7	95.5	100.5	"
61	"	" 3	F.G.	"	"	21.2	94.9	99.9	"
62	"	" 2	F.G.	"	"	20.6	95.5	100.5	"
63	"	" 1	F.G.	"	"	20.1	89.9	94.6	"

SUMMARY OF ONE-INCH RING SWELL TESTS

HALAWA HEIGHTS SUBDIVISION

LOCATION	DEPTH (FEET)	SOIL DESCRIPTION	DRY DENSITY (PCF)	INITIAL MOISTURE CONTENT (%)	AIR-DRIED MOISTURE CONTENT (%)	FINAL MOISTURE CONTENT (%)	RING SWELL (%)
Royal Summit Import	Stockpile	Brown Mottled Silty Clay	89.6	26.4	Tested at Initial	32	2.4
"	"	Brown Mottled Silty Clay	89.7	25.2	17.0	31.2	4.6
"	"	Brown Mottled Silty Clay	87.8	26.0	21.1 (Two-Day)	33.3	3.8
"	"	Reddish Brown Silty Clay	79.1	29.5	25.5	43.5	2.6
"	"	Reddish Brown Silty Clay	82.5	29.0	24.9	42.0	3.7
"	"	Reddish Brown Silty Clay	83.0	32	23.2	37.5	5.2
"	"	Brown Silty Clay	82.5	33.4	21.8	36.8	3.5
"	"	Brown Silty Clay	88.3	25.7	17.6	30.1	1.8
"	"	Reddish Brown Silty Clay	84.7	28.2	23.2	35.1	3.2
Lot #18	2'	Brown Silty Clay (Natural)	86.3	30.0	18.1	33.3	3.6
Lot #18	3'	Brown Silty Clay (Natural)	81.1	30.6	23.5	40.1	4.3

NOTE: Samples were remolded, air-dried overnight, then saturated for 24 hrs. under a 55 PSF surcharge load.