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REPORT
SOIL ENGINEERING SERVICES
DURING MASS GRADING
KAHALUU COLONY VILLAGE, PHASE II
HEEIA, OAHU, HAWAII

Grading Permit No. 4975

HML&A Job No. 3902,002.06

Prepared for

Ahuimanu Investment Co.
200 Halau Building
International Market Place
Honolulu, Hawaii 96815

by

Donald L. Schreuder
Civil Engineer - 2531

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1259 South Beretania Street
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April 24, 1972

WITHDRAWN
MUNICIPAL REFERENCE & RECORDS CENTER
City & County of Honolulu
City Hall Annex, 558 S. King Street
Honolulu, Hawaii 96813

INTRODUCTION

This report summarizes the engineering services we have provided during mass grading for the Kahaluu Colony Village in Heeia, Oahu, Hawaii.

Our services were provided from the week of October 5, 1970, when grading work was started, through January 14, 1972, when the mass grading was completed. The work accomplished by the contractor during this period included clearing and stripping the site, installing subsurface drains, and placing around 900,000 yards of compacted fill (contractor's quantity estimate--some of this material was placed in adjacent shopping center area). Plans and specifications prepared by Community Planning, Inc. served as guidelines for the work.

This report does not cover the services we have provided, or are providing, during (1) installation of utilities and foundations and construction of pavements in Unit I, (2) construction of the two lined channels which run through the site, (3) backfilling behind channel walls, and (4) grading in the adjacent commercial site (shopping center area).

PREVIOUS CORRESPONDENCE

The results of the soil and foundation investigation we performed for the project were submitted in our report dated July 21, 1970. A progress report on our services during construction was submitted on June 25, 1971. Other correspondence

and reports submitted during the construction phase of the work, and pertinent to the mass grading, are summarized as follows:

Date(s) of Correspondence	Subject
October 22, 26, and 28, 1970	Letters to Ahuimanu Investment Company and the City and County of Honolulu regarding our recommendation to lower the compaction requirement for the project
July 29, 1971	Letter of transmittal to Federal Housing Administration submitting field test data through October 6, 1971
November 1, 1971	Letter to Ahuimanu Investment Company regarding installation of subsurface drains

SITE GRADING

Before grading was begun, all brush and trees were cleared from the site. As cut and fill areas were expanded the grass cover and top few inches of soil containing roots and organic matter were removed. The cleared and stripped material was removed from the site.

The natural ground in fill areas was scarified, moisture conditioned and compacted. Fill material was placed in thin 6" (?) lifts, scarified with disc-type plows and allowed to dry to a moisture content suitable for compaction. Compaction was achieved by rolling with self-propelled rollers. Fill surfaces and slopes were constructed "fat" and trimmed back to expose a dense, compacted surface.

Before fill was placed, subsurface drains were installed. The installation of subdrains was summarized in previous correspondence.

TESTING AND INSPECTION

Samples of the on-site soils were compacted in our laboratory in accordance with the ASTM D1557-70(C) compaction test method to determine their optimum moisture contents and maximum dry densities. The results of these tests are presented on Plate 1.

Our field engineer was present at the site intermittently to inspect the earthwork and to perform field density tests to evaluate fill compaction. The fill densities were compared with the corresponding maximum dry densities determined in the laboratory in order to determine the relative compaction. When the required relative compaction was not achieved, the material was reworked and recompacted by the contractor until satisfactory results were obtained. The results of the field density tests performed through the completion of the mass grading (through January 14, 1972) are summarized on Plates 2 through 18.

CONCLUSIONS

On the basis of our site inspections and tests, we conclude that the work reported has been completed satisfactorily and in accordance with the project specifications and plans. Our tests indicate that the fill placed during the mass grading in the residential area has been compacted to at least 85 percent relative compaction.

PLATES

Plate 1	Compaction Test Data
Plates 2 through 18	Summary of Field Density Test Data

DISTRIBUTION

2 copies: Ahuimanu Investment Company
200 Halau Building
International Market Place
Honolulu, Hawaii 96815

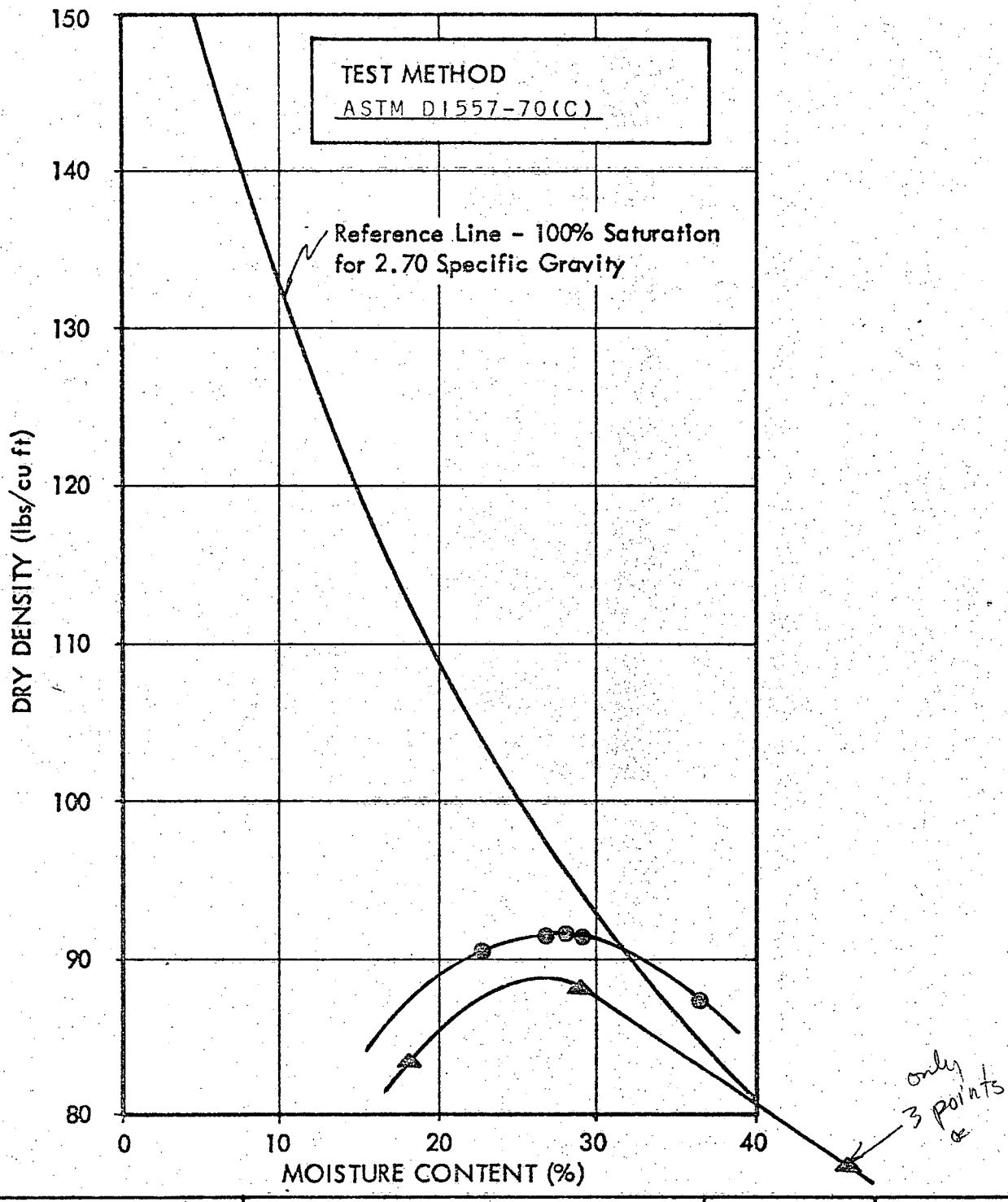
Attention: Mr. W. Lawrence Clapp

2 copies: Community Planning, Inc.
700 Bishop Street, Suite 608
Honolulu, Hawaii 96813

Attention: Mr. George K. Houghtailing

1 copy: Hawaiian Pacific Industries, Inc.
1020 E. Keolu Drive
Kailua, Hawaii 96734

Attention: Mr. William P. Rus



Symbol	Sample Source	Classification	Optimum Moisture (%)	Maximum Dry Density (pcf)
●	On-Site	RED-BROWN CLAYEY SILT (MH)	28.0	92
▲	On-Site	RED-BROWN CLAYEY SILT (MH)	26.5	89

HARDING, MILLER, LAWSON & ASSOCIATES
Consulting Engineers

Job No: 3902, 2 Appr: DLS /gs Date: 6/25/71

COMPACTION TEST DATA

Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE 1

Test	Location *	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
1	3810S, 680W	10/8/70	140	44.5	76	92	83	Recompacted, See #9
2	3698S, 866W	10/8/70	131	40.4	79	92	86	
3	3427S, 1250W	10/8/70	107	49.6	73	92	79	Recompacted, See # 12
4	3689S, 884W	10/8/70	131	42.3	78	92	85	
5	3706S, 864W	10/9/70	131	44.0	78	92	85	
6	3782S, 730W	10/13/70	138	41.0	81	92	88	
7	3414S, 1267W	10/13/70	107	48.5	77	92	84	Recompacted
8	3570S, 1022W	10/13/70	120	46.0	78	92	85	
9	3766S, 676W	10/20/70	140	43.5	79	92	86	
10	3763S, 662W	10/22/70	140	43.0	78	92	85	
11	3566S, 1027W	10/23/70	120	40.8	81	92	88	
12	3410S, 1237W	10/26/70	107	47.7	78	92	85	
13	3749S, 695W	10/26/70	141	46.3	78	92	85	
14	3565S, 1037W	10/26/70	121	44.0	79	92	86	
15	3233S, 1536W	10/27/70	102	49.6	77	92	84	Recompacted
16	2706S, 955W	10/27/70	122	45.2	78	92	85	
17	2138S, 930W	10/27/70	151	48.0	73	92	80	Recompacted, See #20
18	3665S, 620W	10/28/70	140	48.0	75	92	82	Recompacted, See #33
19	3590S, 1054W	10/28/70	120	48.6	76	92	83	Recompacted, See #41
20	2244S, 974W	10/28/70	140	49.6	77	92	84	Recompacted

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Job No: 3902.2 Appr: DS /gs Date 6/25/71

SUMMARY OF
FIELD DENSITY TEST DATA
Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE
2

Test	Location	Date	Elevation (feet	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
21	2370S, 1120W	10/28/70	131	50.0	75	92	82	Recompacted, See #44
22	3714S, 685W	10/28/70	140	48.0	76	92	83	
23	3680S, 872W	10/28/70	132	47.5	77	92	84	Recompacted
24	3563S, 1058W	10/28/70	120	51.7	73	92	80	Recompacted, See #41
25	3389S, 1290W	10/28/70	108	49.4	76	92	83	
26	3714S, 685W	11/2/70	140	53.9	68	92	74	Recompacted, See #27
27	3709S, 680W	11/3/70	140	46.3	78	92	85	
28	3548S, 1058W	11/3/70	120	53.3	73	92	79	Recompacted, See #41
29	3380S, 1248W	11/3/70	109	50.4	73	92	79	Recompacted, See #30
30	3370S, 1240W	11/4/70	109	47.5	78	92	85	
31	3234S, 1517W	11/4/70	103	50.7	77	92	84	Recompacted
32	2420S, 1190W	11/4/70	123	53.6	76	92	83	Recompacted, See #46
33	3575S, 600W	3/15/71	143	39.4	83	92	90	
34	3638S, 655W	3/15/71	144	43.1	79	92	86	
35	3666S, 825W	3/16/71	133	45.2	80	92	87	
36	3420S, 965W	3/16/71	119	51.8	76	92	82	Recompacted, See #41
37	3448S, 1300W	3/16/71	110	44.5	77	92	84	Recompacted, See #42
38	2017S, 862W	3/17/71	152	42.7	81	92	88	
39	2177S, 958W	3/17/71	142	50.5	72	92	78	Recompacted, See #43
40	2337S, 1145W	3/17/71	137	47.5	76	92	83	Recompacted, See #44

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SUMMARY OF
FIELD DENSITY TEST DATA

Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE
3

Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
41	3416S, 1060W	3/17/71	118	42.5	80	92	87	
42	3447S, 1243W	3/17/71	109	40.9	82	92	89	
43	2198S, 1032W	3/19/71	142	45.2	81	92	88	Recompacted, See #46
44	2294S, 1170W	3/19/71	137	48.6	76	92	83	Recompacted, See #49
45	2022S, 837W	4/14/71	155	48.0	74	92	80	Recompacted, See #47
46	2363S, 1268W	5/3/71	130	41.5	80	92	87	
47	2100S, 972W	5/3/71	144	39.0	81	92	88	
48	1900S, 725W	5/3/71	162	46.5	78	92	85	
49	2265S, 1145W	5/4/71	139	43.1	78	92	85	
50	2432S, 1278W	5/4/71	129	Wet Density Determination				Recompacted, See #54
51	2432S, 1278W	5/5/71	129	46.0	76	92	82	Recompacted, See #54
52	3570S, 662W	5/5/71	144	42.8	80	92	87	
53	1842S, 649W	5/5/71	167	49.5	73	92	79	Recompacted, See #68
54	2432S, 1292W	5/6/71	129	44.5	78	92	85	
55	1866S, 694W	5/6/71	165	38.0	79	92	86	
56	3654S, 645W	5/7/71	146	47.5	75	92	82	Recompacted, See #58
57	2044S, 596W	5/7/71	160	44.5	79	92	86	
58	3654S, 645W	5/7/71	146	42.0	79	92	86	
59	1803S, 588W	5/7/71	168	Wet Density Determination				Recompacted, See #68
60	2258S, 1440W	5/7/71	115	48.0	75	92	81	Recompacted, See #69

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SUMMARY OF FIELD DENSITY TEST DATA

Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE 4

Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
61	3492S, 1212W	5/8/71	109	43.0	81	92	88	
62	2538S, 330W	5/13/71	150	40	82	92	89	
63	3611S, 660W	5/15/71	150	42.5	76	92	83	Recompacted, See #64
64	3624S, 669W	5/17/71	150	43.0	79	92	86	
65	2305S, 1226W	5/21/71	140	47.5	79	92	86	
66	3622S, 620W	5/24/71	154	54.0	71	89	79	Recompacted, See #71
67	3611S, 660W	5/24/71	141	44.3	76	89	86	
68	3624S, 669W	5/25/71	175	49.0	77	89	86	
69	2305S, 1226W	5/25/71	114	42.0	77	89	86	
70	3622S, 620W	5/25/71	140	46.0	77	89	86	
71	3721S, 670W	5/27/71	144	47.5	76	89	85	
72	3505S, 990W	5/27/71	128	40.0	79	89	89	
73	3674S, 644W	5/28/71	149	38.0	79	92	86	
74	2470S, 1418W	5/29/71	113	48.1	74	89	83	Recompacted, See #78
75	2018S, 557W	5/29/71	163	41.3	84	92	90	
76	2300S, 1180W	6/1/71	143	43.0	77	89	87	
77	3660S, 705W	6/1/71	149	45.0	77	92	84	
78	2458S, 1422W	6/1/71	113	48.0	76	89	86	
79	3702S, 600W	6/3/71	155	42.5	78	92	85	
80	3390S, 1100W	6/3/71	123	47.0	74	92	80	Recompacted, See #84

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SUMMARY OF
FIELD DENSITY TEST DATA

Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE
5

Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
81	2382S, 1427W	6/4/71	115	47.0	77	89	86	
82	2620S, 279W	6/4/71	142	46.5	76	89	85	
83	3638S, 620W	6/5/71	153	49.0	74	89	83	Recompacted, See #85
84	3390S, 1100W	6/5/71	123	43.5	78	92	85	
85	3638S, 620W	6/5/71	153	47.5	76	89	85	
86	1880S, 646W	6/5/71	169	45.0	77	89	87	
87	2394S, 1249W	6/5/71	138	53.0	70	89	78	Recompacted, See #90
88	2607S, 890W	6/7/71	152	45.0	76	89	85	
89	2409S, 1232W	6/7/71	139	48.5	74	89	83	Recompacted, See #90
90	2431S, 1225W	6/8/71	139	39.3	81	89	91	
91	3670S, 660W	6/8/71	153	33.0	86	92	93	
92	2413S, 373W	6/9/71	145	47.5	75	89	84	
93	2285S, 1440W	6/9/71	120	41.0	80	92	87	
94	1858S, 600W	6/11/71	173	43.5	79	89	89	
95	2673S, 930W	6/12/71	153	44.0	77	89	87	
96	2673S, 321W	6/12/71	146	53.0	70	89	79	
97	2435S, 1418W	6/12/71	120	34.0	86	92	93	

* Location by coordinates shown on Ahuimanu topographic map by Maitland C. Dease and Associates (No date).

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Job No: 3902.2 Appr: DS /gs Date 6/25/71

SUMMARY OF
FIELD DENSITY TEST DATA

Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE
6

Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
98	2420S, 1320W	6/14/71	130	45.2	77	89	86	
99	2520S, 220W	6/14/71	142	47.5	73	89	82	Recompacted, See #102
100	1820S, 590W	6/14/71	176	47.0	74	89	83	Recompacted, See #108
101	3600S, 580W	6/21/71	161	43.3	81	92	88	
102	2560S, 300W	6/21/71	143	48.0	76	89	86	
103	2375S, 1440W	6/22/71	123	43.5	80	92	87	
104	2620S, 920W	6/23/71	132	47.5	77	89	86	
105	2400S, 1440W	6/23/71	124	53.0	70	89	79	Recompacted, See #116
106	3380S, 900W	6/25/71	139	45.3	81	92	88	
107	2335S, 1120W	6/26/71	140	50.0	72	89	81	Recompacted, See #117B
108	2200S, 975W	6/26/71	153	46.0	78	89	88	
109	1865S, 675W	6/26/71	164	46.5	78	89	87	
110	2200S, 925W	6/26/71	138	53.0	73	89	82	Recompacted, See #115
111	2530S, 445W	6/26/71	140	51.5	74	89	83	Recompacted, See #113
112	3000S, 1830W	6/29/71	99	38.0	80	92	87	
113	2800S, 400W	6/30/71	143	49.5	76	89	85	
114	3200S, 800W	6/30/71	137	43.0	79	92	86	
115	2200S, 925W	6/30/71	134	48.5	79	89	88	
116	2400S, 1600W	6/30/71	125	41.5	84	92	91	
117a	2970S, 1820W	6/30/71	100	45.0	79	92	85	

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Job No: 3902.2 Appr: JKS / gs Date: 10/7/71

SUMMARY OF
FIELD DENSITY TEST DATA

Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE
7

Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
117b	2200S, 1100W	7/1/71	144	46.0	80	92	87	
118	2800S, 1600W	7/1/71	108	43.5	77	89	86	
119	2400S, 1600W	7/1/71	125	37.3	86	92	93	
120	2990S, 1815W	7/2/71	101	45.0	76	89	85	
121	2700S, 950W	7/6/71	134	48.5	76	89	85	
122	2150S, 1470W	7/6/71	126	47.5	77	89	86	
123	2250S, 1000W	7/6/71	153	46.5	76	89	85	
124	1850S, 440W	7/7/71	161	46.0	76	89	85	
125	2000S, 530W	7/7/71	154	43.5	76	89	86	
126	2970S, 1800W	7/8/71	102	40.5	77	89	87	
127	2600S, 950W	7/8/71	138	43.0	76	89	86	
128	2500S, 625W	7/8/71	143	44.0	80	89	89	
129	2550S, 710W	7/8/71	140	48.0	77	89	86	
130	2975S, 1810W	7/9/71	103	45.8	76	89	86	
131	2540S, 180W	7/12/71	155	46.0	80	89	89	
132	2560S, 30W	7/12/71	163	47.0	77	89	87	
133	2520S, 570W	7/13/71	145	53.0	71	89	80	Recompacted, See #136
134	2640S, 940W	7/13/71	133	40.0	78	89	88	
135	2520S, 875W	7/13/71	138	44.0	77	89	87	
136	2540S, 570W	7/13/71	145	47.0	76	89	85	

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Job No 3902,2 Appr: JLS /gs Date: 10/7/71

SUMMARY OF
FIELD DENSITY TEST DATA

Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE
8

Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
137	2550S, 725W	7/13/71	140	46.0	77	89	86	
138	2325S, 750W	7/14/71	141	41.6	78	89	87	
139	2100S, 600W	7/14/71	160	42.5	77	89	86	
140	3400S, 875W	7/14/71	140	40.0	80	89	89	
141	3310S, 980W	7/14/71	137	44.0	76	89	85	
142	2460S, 50W	7/16/71	174	43.0	78	89	88	
143	2550S, 90W	7/16/71	172	44.0	76	89	85	
144	2570S, 885W	7/17/71	146	52.3	71	89	80	Recompacted, See #155
145	2700S, 990W	7/17/71	144	44.8	75	89	84	Recompacted, See #149
146	2805S, 1380W	7/17/71	109	45.5	74	89	83	Recompacted, See #165
147	2770S, 1385W	7/17/71	110	50.0	73	89	82	Recompacted, See #166
148	2575S, 880W	7/17/71	146	45.6	73	89	83	Recompacted, See #150
149	2690S, 1000W	7/19/71	144	43.5	77	89	86	
150	2550S, 900W	7/19/71	146	45.0	77	89	86	
151	2510S, 130W	7/20/71	169	44.5	76	89	85	
152	2610S, 60W	7/20/71	181	32.0	84	92	91	
153	2600S, 240W	7/20/71	173	43.7	77	89	86	
154	2720S, 970W	7/20/71	139	42.0	80	92	87	
155	2490S, 870W	7/20/71	144	36.4	84	92	91	
156	2300S, 720W	7/20/71	151	44.6	77	89	86	

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Consulting Engineers

Job No 3902.2 Appr: DLS/gs Date: 10/7/71

SUMMARY OF
FIELD DENSITY TEST DATA

Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE
9

Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
157	2600S, 550W	7/21/71	152	50.0	74	89	83	Recompacted, See #160
158	2600S, 300W	7/21/71	165	48.0	75	89	84	Recompacted, See #161
159	2500S, 450W	7/21/71	159	46.0	77	89	87	
160	2600S, 500W	7/21/71	152	48.0	76	89	86	
161	2630S, 320W	7/21/71	165	47.0	76	89	85	
162	2600S, 940W	7/22/71	144	42.0	78	92	85	
163	2710S, 1010W	7/22/71	138	34.0	84	92	91	
164	2075S, 1250W	7/22/71	139	39.0	83	92	90	
165	2800S, 1380W	7/23/71	109	39.0	79	89	88	
166	2750S, 1390W	7/23/71	110	43.0	77	89	86	
167	2620S, 320W	7/24/71	166	43.6	77	89	87	
168	2460S, ØW	7/24/71	178	43.0	77	89	87	
169	3260S, 1550W	7/26/71	105	44.5	74	89	83	Recompacted, See #174
170	3375S, 1425W	7/26/71	107	40.0	82	89	92	
171	3420S, 1300W	7/26/71	109	44.5	72	89	81	Recompacted, See #175
172	3400S, 860W	7/26/71	140	44.5	78	89	88	
173	3350S, 940W	7/26/71	141	44.5	78	89	87	
174	3270S, 1550W	7/26/71	105	44.5	76	89	86	
175	3425S, 1310W	7/26/71	109	45.0	77	89	86	
176	2900S, 1555W	7/27/71	105	36.4	80	89	90	

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SUMMARY OF
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Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE
10

Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
177	2865S, 1425W	7/27/71	109	43.8	77	89	87	
178	2790S, 1389W	7/27/71	120	38.7	80	89	89	
179	2285S, 1025W	7/28/71	154	37.4	79	92	85	
180	2340S, 1095W	7/28/71	141	35.4	84	92	91	
181	2525S, 95W	7/28/71	188	43.6	78	89	88	
182	2625S, 90W	7/28/71	190	40.7	81	89	91	
183	2030S, 1090W	7/31/71	158	48.0	73	89	82	Recompacted, See #203
184	2300S, 1015W	7/31/71	155	40.0	85	92	92	
185	2540S, 410W	7/31/71	178	42.9	80	89	90	
186	2550S, 180W	7/31/71	182	39.4	80	89	90	
187	2560S, 530W	7/31/71	175	41.3	84	89	93	
188	2480S, 520W	7/31/71	175	49.3	75	89	84	Recompacted, See #193
189	2640S, 980W	8/3/71	139	37.0	82	92	89	
190	2575S, 875W	8/3/71	145	33.0	90	92	97	
191	2475S, 820W	8/3/71	150	27.0	92	92	100	
192	2460S, 885W	8/3/71	155	47.0	73	89	82	Recompacted, See #194
193	2475S, 520W	8/4/71	175	45.0	76	89	85	
194	2460S, 890W	8/4/71	155	44.0	77	89	87	
195	2880S, 1450W	8/4/71	109	41.5	78	89	88	
196	2890S, 1600W	8/4/71	107	43.0	76	89	85	

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SUMMARY OF
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Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE
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Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
197	2790S, 1400W	8/4/71	112	44.0	78	89	87	
198	2650S, 25W	8/5/71	182	44.0	77	89	87	
199	2490S, 250W	8/5/71	174	48.0	74	89	83	Recompacted, See #201
200	2440S, 520W	8/5/71	161	47.0	74	89	83	Recompacted, See #202
201	2510S, 235W	8/6/71	174	36.5	83	92	89	
202	2420S, 520W	8/6/71	162	42.0	79	92	86	
203	2030S, 1090W	8/7/71	158	48.0	78	89	87	
204	2530S, 840W	8/7/71	140	41.5	79	92	86	
205	2660S, 980W	8/7/71	147	43.0	80	92	87	
206	2575S, 700W	8/12/71	154	50.0	77	89	87	
207	2500S, 600W	8/12/71	155	45.0	81	89	91	
208	2540S, 830W	8/19/71	142	43.0	79	92	86	
209	2400S, 830W	8/19/71	153	46.0	76	89	85	
210	2820S, 1320W	8/19/71	115	45.0	77	89	87	
211N	2915S, 1580W	8/20/71	108	54.0 (55.0)	70	89	78 (78)	Recompacted, See #217
212	2860S, 1500W	8/20/71	113	45.0	77	89	87	
213	2610S, 170W	8/21/71	181	41.5	78	89	87	
214	2650S, 90W	8/21/71	187	39.0	84	92	91	
215	2600S, -20W	8/21/71	189	41.0	83	92	90	
216	2460S, 245W	8/21/71	175	42.0	78	89	87	

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Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE
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Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
217	2895S, 1580W	8/23/71	110	44.6	79	92	86	
218	2900S, 1700W	8/23/71	113	44.7	83	92	90	
219N	2670S, 360W	8/24/71	172	40.5 (41.0)	81 (81)	92 (92)	88 (88)	
220N	2580S, 570W	8/24/71	155	41.7	81	92	88	
221N	2525S, 775W	8/24/71	152	44.2	80	89	89	
222N	2385S, 780W	8/24/71	154	42.8	80	89	89	
223N	2570S, 830W	8/24/71	152	48.0	74	89	83	Recompacted, See #225
224N	2500S, 800W	8/25/71	151	47.0 (48.0)	75	89	85 (84)	
225N	2570S, 830W	8/25/71	149	46.5 (47.5)	75	89	85 (85)	
226N	2560S, 890W	8/25/71	148	40.2 (38.0)	84	89	93 (95)	
227	2810S, 1380W	8/31/71	117	48.4	75	89	85	
228	2890S, 1425W	8/31/71	114	43.5	79	89	88	
229	2865S, 1540W	8/31/71	110	44.0	82	89	92	
230	2605S, 70W	8/31/71	188	41.0	88	89	99	
231	2670S, -20W	8/31/71	191	34.0	87	89	98	
232	2480S, 180W	9/2/71	182	47.0	75	89	85	
233	2560S, 320W	9/2/71	177	44.0	77	89	87	
234	2480S, 435W	9/2/71	170	44.5	78	89	87	
235	2545S, 545W	9/2/71	165	51.6	68	89	77	Recompacted, See #237
236	2455S, 500W	9/13/71	165	41.5	83	92	90	

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Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE
13

Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
237N	2550S, 640W	9/14/71	162	44.7	79	89	88	
238N	2580S, 740W	9/14/71	156	42.5	80	92	87	
239N	2455S, 190W	9/14/71	180	43.2	78	89	87	
240N	2450S, 70W	9/14/71	187	42.1	78	89	87	
241	VOID							
242	VOID							
243	VOID							
244	VOID							
245	2780S, 1340W	9/17/71	126	43.4	77	89	86	
246	2880S, 1420W	9/17/71	115	46.0	76	89	85	
247	2860S, 1580W	9/17/71	110	50.5	70	89	79	
248N	2525S, 920W	9/18/71	157	43.0	79	89	89	
249N	2460S, 915W	9/18/71	157	42.5	77	89	87	
250N	2615S, 1115W	9/18/71	146	43.2	82	92	89	
251N	2525S, 1125W	9/18/71	145	45.6	74	89	83	Recompacted, See #254
252N	2650S, 900W	9/18/71	149	40.4	80	89	90	
253N	2645S, 960W	9/18/71	149	41.2	84	92	92	
254N	2520S, 1125W	9/18/71	145	43.5	76	89	85	
255N	2520S, 900W	9/20/71	158	43.4	80	89	90	
256N	2455S, 930W	9/20/71	158	44.2	79	89	89	

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Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

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Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
257N	2595S, 1050W	9/20/71	147	44.0	79	89	89	
258N	2540S, 1130W	9/20/71	147	43.1	79	89	89	
259N	2880S, 1560W	9/20/71	109	48.5	77	89	86	
260N	2590S, 135W	9/21/71	186	44.0	80	89	90	
261N	2510S, 170W	9/21/71	182	43.8	79	89	89	
262N	2620S, 235W	9/21/71	177	47.5	79	89	88	
263N	2500S, 270W	9/21/71	172	45.5	76	89	85	
264N	2500S, 420W	9/21/71	165	39.0	81	89	91	
265N	2620S, 410W	9/21/71	165	41.4	79	89	89	
266N	2515S, 690W	9/21/71	156	39.2	82	92	89	
267	2440S, 525W	9/22/71	162	45.5	76	89	85	

(1) Location by coordinates shown on Ahuimanu topographic map by Maitland C. Dease and Associates (No date).
(2) Maximum Dry Density established in our laboratory in accordance with the ASTM D1557-70(C) compaction test method.
(3) Suffix 'N' indicates field moisture and density determined by nuclear moisture density gauge.
(4) Parenthetical values indicate sand cone correlation tests taken simultaneously with nuclear tests.

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Kahaluu Colony Village, Phase II
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15

Test	Location	Date	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
268N	2825S, 1250W	10/5/71	128	42.0	78	89	88	
269N	2825S, 1450W	10/5/71	119	40.0	80	89	89	
270N	2890S, 1530W	10/5/71	110	42.6	79	89	88	
271N	2895S, 1380W	10/5/71	115	36.3	84	89	94	
272N	2869S, 1145W	10/5/71	132	35.5	83	89	92	
273N	1940S, 760W	10/6/71	169	33.7 (36.3)	88 (89)	92	95 (97)	
274N	1820S, 640W	10/6/71	174	36.8 (37.0)	80 (80)	92	87 (87)	
275N	2640S, 880W	10/6/71	159	52.4 (52.2)	72 (70)	89	81 (79)	
276N	2580S, 340W	10/6/71	171	55.4 (53.3)	71 (72)	89	80 (81)	

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Kahaluu Colony Village, Phase II
Heeia, Oahu, Hawaii

PLATE
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Test	Location	Date	Elevation (feet)	Moisture Content (%)	Moisture Content (%) Relative to optimum moisture)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
277	2850S, 1200W	10/8/71	133	48.4		76	89	85	
278	2880S, 1330W	10/8/71	116	45.0		77	89	86	
279	2900S, 1450W	10/8/71	114	45.6		76	89	85	
280N	2660S, 890W	10/8/71	159	46.8		76	89	86	
281N	2570S, 850W	10/8/71	160	(45.6) 56.0		(76) 70	89	(85) 79	Recompacted, See #293
282N	2525S, 820W	10/8/71	160	(56.8) 69.6		(68) 63	89	(77) 71	Recompacted, See #292
283N	2550S, 690W	10/8/71	166	(61.0) 49.4		(66) 73	89	(74) 82	Recompacted, See #291
284N	2560S, 600W	10/8/71	178	(51.2) 75.2		(70) 61	89	(79) 68	Recompacted, See #290
285N	2525S, 500W	10/8/71	183	(53.9) 37.9		(69) 79	89	(78) 88	
286N	2560S, 600W	10/8/71	178	(37.1) 56.0		(83) 70	89	(93) 78	Recompacted, See #290
287N	2550S, 690W	10/8/71	166	52.0		73	89	82	Recompacted, See #291
288N	2525S, 820W	10/8/71	160	51.8		73	89	82	Recompacted, See #292
289N	2570S, 850W	10/8/71	160	57.0		70	89	79	Recompacted, See #293
290N	2560S, 600W	10/11/71	178	41.0		81	89	89	
291N	2550S, 690W	10/11/71	166	43.0		79	89	88	
292N	2525S, 820W	10/11/71	160	43.5		80	89	89	
293N	2570S, 850W	10/11/71	160	36.0		84	89	93	
294N	2760S, 1000W	10/12/71	146	39.6		85	89	95	
295N	2825S, 1230W	10/12/71	130	53.5		74	89	83	Recompacted, See #299
296N	3000S, 1470W	10/12/71	113	66.7		68	89	76	Recompacted, See #298

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SUMMARY OF
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Heeia, Oahu, Hawaii

PLATE
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Test	Location	Date	Elevation (feet)	Moisture Content (%)	Moisture Content (%) Relative to optimum moisture)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
297N	2830S, 1550W	10/12/71	114	50.5		75	89	85	
298N	3000S, 1470W	10/13/71	112	43.4		80	89	89	
299N	2825S, 1230W	10/13/71	130	46.0		78	89	88	
300N	2440S, 420W	10/13/71	177	42.5		79	89	88	
301N	2640S, 420W	10/13/71	182	46.0		76	89	85	
302N	2950S, 1645W	10/13/71	106	50.0		75	89	84	Recompacted
303N	3030S, 1670W	10/13/71	102	43.0		77	89	87	
304N	3060S, 1795W	10/13/71	101	36.0		78	89	88	
305N	2670S, 890W	10/18/71	160	37.7 (41.0)		79 (77)	89	88 (86)	
306N	2720S, 925W	10/18/71	155	43.4 (43.7)		76 (76)	89	85 (85)	
307N	2425S, 450W	10/25/71	176	48.5		75	89	85	
308N	2440S, 390W	10/25/71	179	45.5		77	89	87	
309N	2450S, 390W	10/29/71	180	39.0		82	92	89	
310N	2460S, 450W	10/29/71	178	30.0		88	92	95	
311N	2250S, 470W	10/29/71	166	41.0		79	89	88	
312N	2600S, 600W	11/2/71	166	33.5		87	92	94	
313N	2625S, 700W	11/2/71	165	40.0		84	92	91	

(1) Location by coordinates shown on Ahuimanu topographic map by Maitland C. Dease and Associates (No Date).
(2) Maximum Dry Density established in our laboratory in accordance with the ASTM D1557-70(C) compaction test method.
(3) Suffix 'N' indicates field moisture and density determined by nuclear moisture density gauge.
(4) Parenthetical values indicate sand cone correlation tests taken simultaneously with nuclear tests.

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