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HARDING-LAWSON ASSOCIATES

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SOIL ENGINEERING SERVICES  
DURING CONSTRUCTION  
WAI'AU GARDENS KAI, UNITS A & B  
WAI'AU, EWA, OAHU, HAWAII

TMK 9-8-02:3

H-LA Job No. 3904,014.06

Prepared for

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by



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

UNRECORDED

## INTRODUCTION

This report summarizes the soil engineering services that we performed during construction of Units A and B of the Waiiau Gardens Kai Subdivision. Units A and B were the first of seven units that are being developed in the Waiiau Ridge area, located west of Kaahumanu Street, south of Hookanike Street and north of the H-1 Freeway.

We performed a soil investigation for the development; the results, including recommendations for foundation support and suggested earthwork specifications, were presented in our report dated October 22, 1971.

Unit A consists of 108 townhouse units developed over an area of 25 acres. Unit B has 114 units on 10 acres. Approximately 69,000 cubic yards of fill material were placed in Unit A and about 20,000 cubic yards were placed in Unit B.

The plans and specifications prepared by Community Planning, Inc. dated October 16, 1972 (Unit A) and November 8, 1972 (Unit B) and our recommendations served as the guidelines for the work.

The scope of our work was to provide inspection, consultation and testing during the earthwork, pavement construction and foundation installation. This work was done intermittently during the period from September 22, 1972 through September 20, 1973. The results of testing and inspection of subgrade compaction on Hookanike and Kaahumanu Streets were summarized in our letter to you dated October 2, 1973.

## EARTHWORK

Site Preparation and Grading

The contractor stripped the site of vegetation and debris, along with a few inches of surface soil which contained organic matter, before fill was placed. These materials were removed from the site. Within areas to be filled, the exposed soils were scarified, moisture conditioned, and compacted by a self-propelled, sheepsfoot roller. Where fill was placed on slopes steeper than five horizontal to one vertical (5:1), level benches were cut into the natural slopes as the fill was placed. The fill was placed in thin lifts, moisture conditioned and compacted. Fill material came from site excavations on Noelani Street (where it passes through the Waiiau Gardens Kai Development) and from a proposed park site in the west end of Waiiau Gardens Kai. Fill slopes were overfilled and cut back to compacted material.

Parking Lot Areas

Parking lot subgrade soils were compacted with a smooth-wheel roller. Where the subgrade soils were insufficiently moist for compaction, the subgrade was scarified and moisture conditioned before it was compacted. The same compactive procedures were used for imported aggregate base materials. Aggregate base material used in Unit A parking lots on Hookanike and Kaahumanu Streets

was crushed coral. Base material used in the remaining parking lots in Unit A and in all of those in Unit B was crushed basalt rock.

### SOIL ENGINEERING SERVICES

Our field engineer was present at the site periodically during construction to inspect the work, perform field tests and obtain samples for laboratory testing.

We approved the fill materials for use based on our visual inspections and on our experience with the soils in the general area.

Representative samples of the fill, aggregate base and subgrade materials were compacted in our laboratory in accordance with the ASTM D 1557-70(C) Compaction Test Method to determine their optimum moisture contents and maximum dry densities. Laboratory compaction test data are presented on Plates 1 through 4.

Our engineer performed field density tests at representative locations in the fills, pavement subgrades and aggregate base courses, as the materials were placed, to evaluate their relative compaction. Relative compaction refers to the in-place dry density of the material expressed as a percentage of the maximum dry density determined in our laboratory. When density tests showed

unsatisfactory compactive effort, the contractor was notified and the material was moisture conditioned and recompactd. Approval by our engineer, based on testing or visual inspection, was given before additional fill was placed. A summary of field density tests is presented on Plates 5 through 16.

Our engineer periodically inspected backfill procedures during construction of the project. Utility lines that passed under foundations, walkways and parking areas were randomly checked during backfilling operations.

Before concrete was placed, all footings were inspected by our engineer to check for any loose material and firm supporting soil. Footing excavations were deepened to supporting soils where soft or loose material was encountered.

#### CONCLUSION

Based on the results of our inspections and tests, we conclude that work performed for Waiiau Gardens Kai, Units A and B, has generally been satisfactorily completed in accordance with project plans and specifications. Field density tests indicate that fills have been compacted to at least 90 percent relative compaction and that the subgrade soils and aggregate base for most parking lots has been compacted to at least 95 percent.

The two parking lots in Unit A on Noelani Street were paved without proper base course compaction, but were approved by your project engineer. Maximum pavement performance cannot be expected in these two areas; however, we do not anticipate extensive pavement failures.

We conclude that building foundations are bottomed on firm soil and will provide good support for the structures.

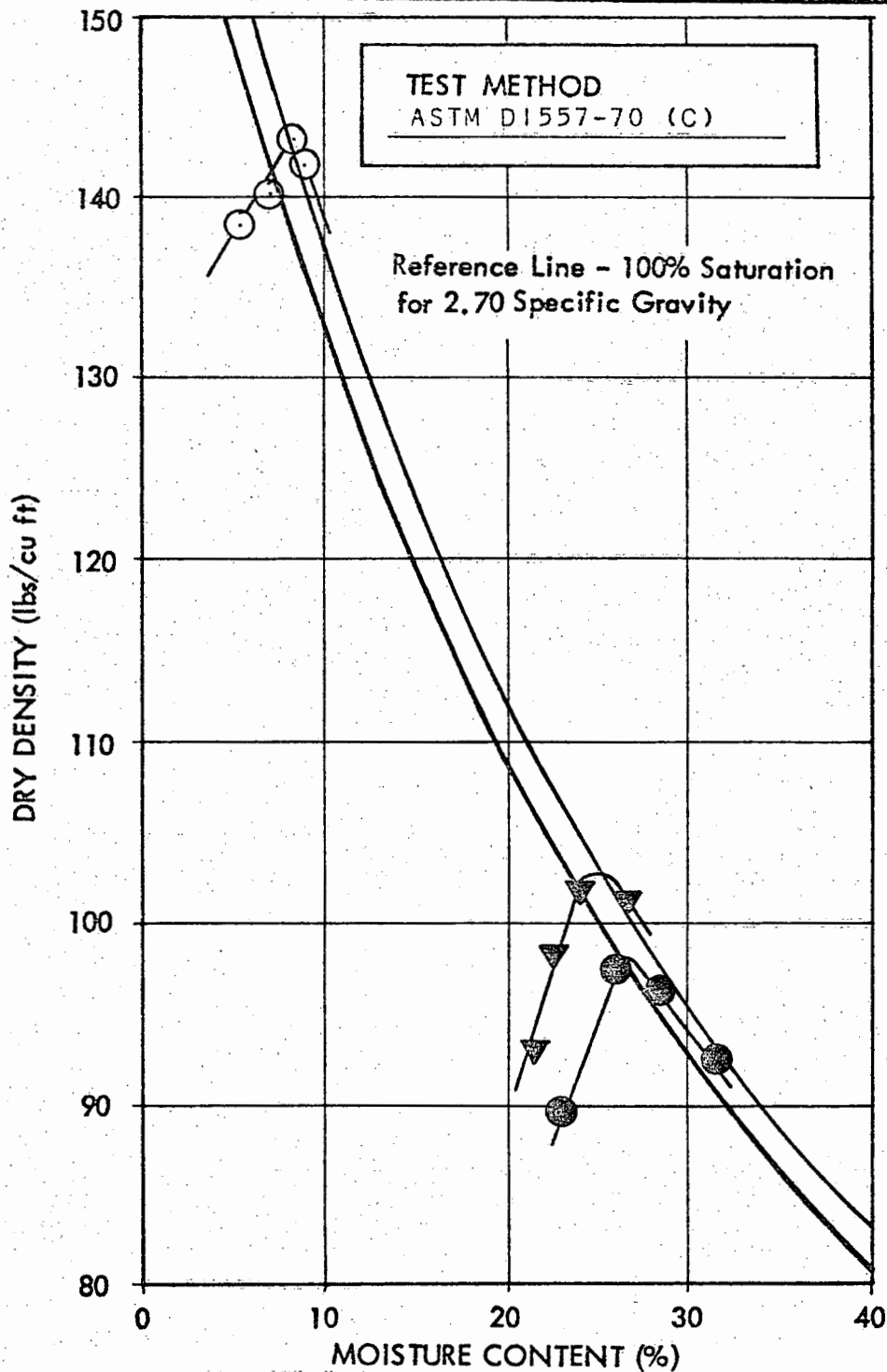
PLATES

Plates 1  
through 4

Compaction Test Data

Plates 5  
through 16

Summary of Field Density Test Data



Symbol	Sample Source	Classification	Optimum Moisture (%)	Maximum Dry Density (pcf)
○	Halawa Quarry	GREY SANDY GRAVEL (GM) (base rock)	8.6	143
▼	Northeast Corner of Unit "A"	RED-BROWN CLAYEY SILT (ML)	25.0	102
●	Northwest Corner of Unite "B"	RED CLAYEY SILT (ML)	26.7	98

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**COMPACTION TEST DATA**

Waiau Gardens Kai

Unit A & B

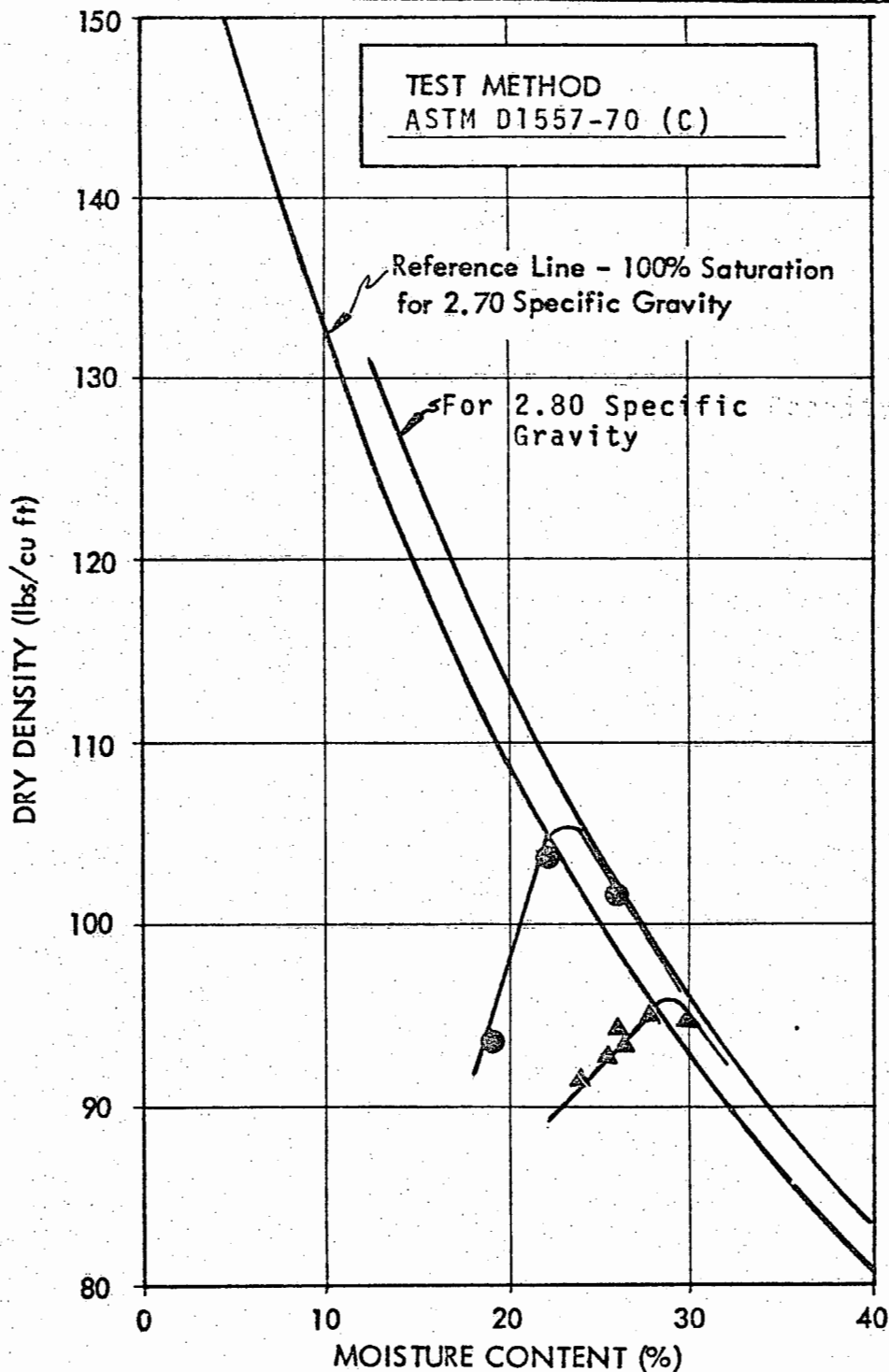
Waiau, Ewa, Oahu, Hawaii

**PLATE**


**1**

Job No. 3904,014.06 Appr. *BC* Date 2/12/74





Symbol	Sample Source	Classification	Optimum Moisture (%)	Maximum Dry Density (pcf)
●	Near Boring 17	RED CLAYEY SILT (ML)	23.0	106
▲	Field density test check points	RED-BROWN SANDY SILT (ML)	28.5	96

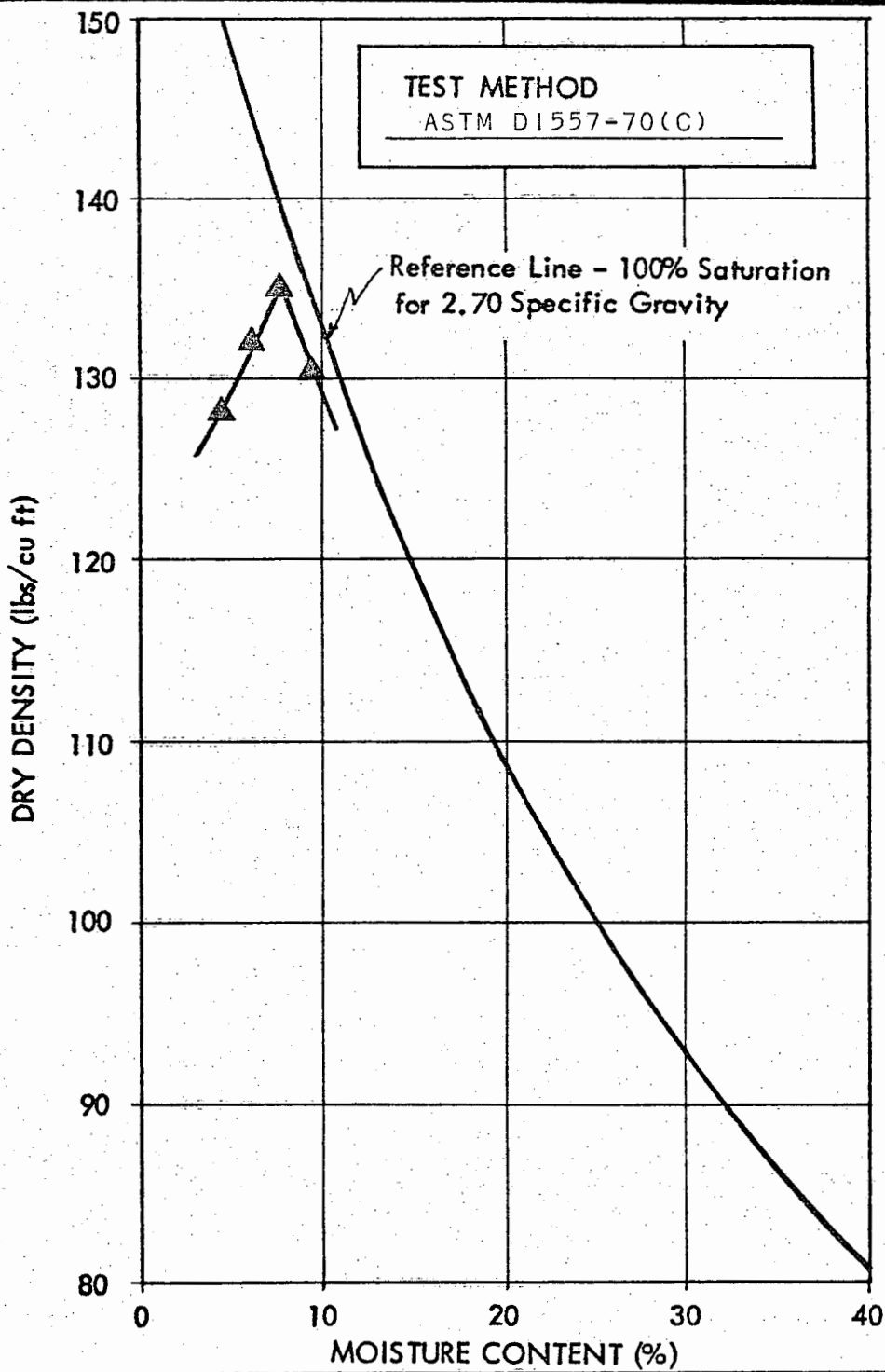
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**COMPACTION TEST DATA**

Waiiau Gardens Kai -  
 Unit A & B  
 Waiiau, Ewa, Oahu, Hawaii

**PLATE**  
**2**



Symbol	Sample Source	Classification	Optimum Moisture (%)	Maximum Dry Density (pcf)
▲	Aggregate Base	WHITE CORAL	7.6	135

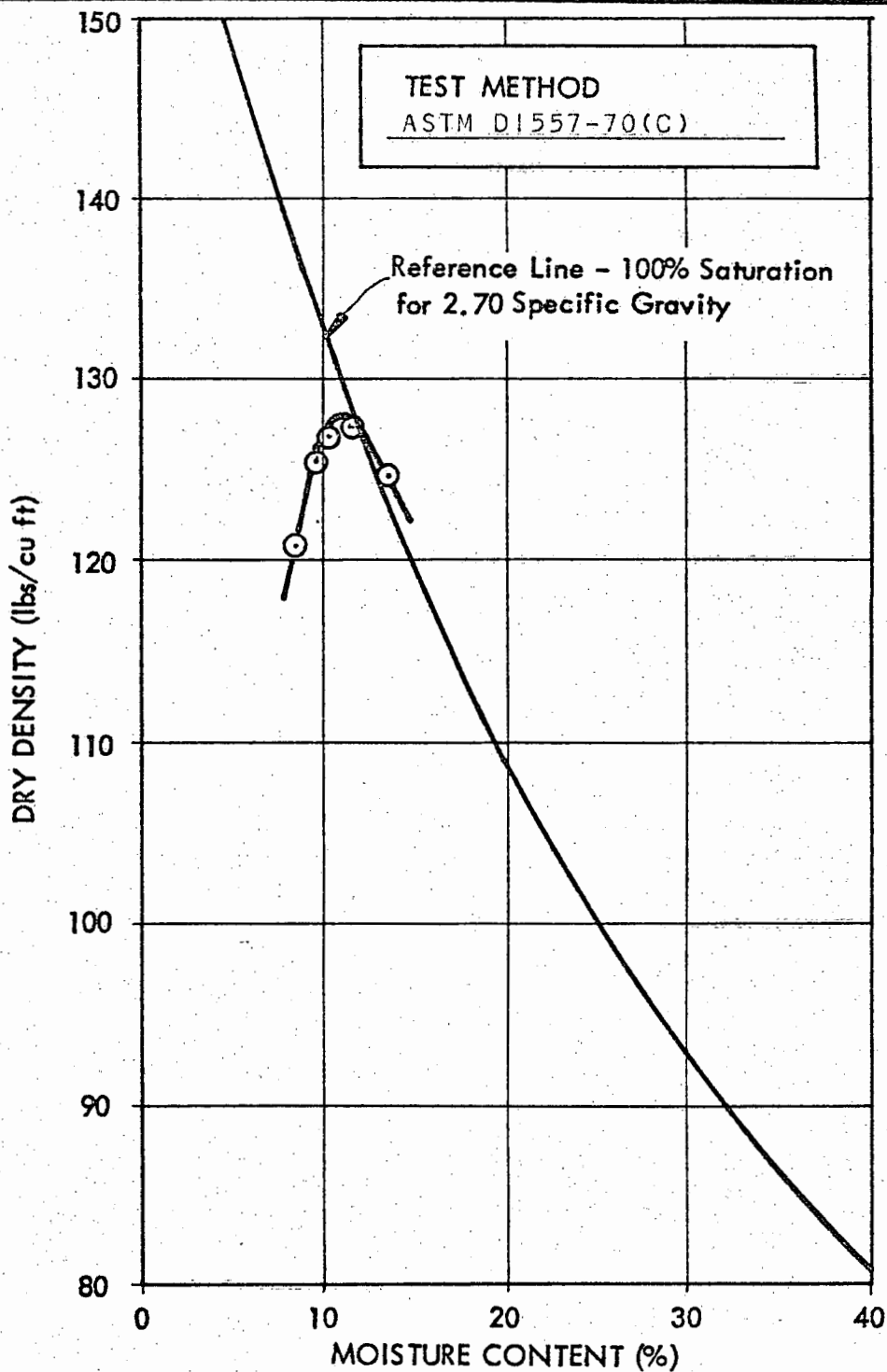
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Job No. 3904,014.06 Appr. 7.1c Date 1/25/74


**COMPACTION TEST DATA**

Waiau Gardens Kai  
 Units "A & B"  
 Waiau, Ewa, Oahu, Hawaii

**PLATE**  
**3**



Symbol	Sample Source	Classification	Optimum Moisture (%)	Maximum Dry Density (pcf)
⊙	Pacific Concrete and Rock Barbers Point Quarry	GREY SANDY GRAVEL (GM) (aggregate base)	11.2	128

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**COMPACTION TEST DATA**

Waiau Gardens Kai  
 Units A & B  
 Waiau, Ewa, Oahu, Hawaii

**PLATE**  
**4**

LOCATION

Origin of coordinates at intersection of property lines of west side Kaahumanu Street and south side of Hookanike Street

Test No.

\*  
Elevation  
(Feet)

Moisture Content (%)

Dry Density (pcf)

Maximum Dry \*  
Density (pcf)

Relative  
Compaction (%)

Remarks

1	W112, S132	194.0	14.9	96	106	89	Rerolled
2	W365, S 75	191.0	18.8	93	102	91	
3	W222, S 25	196.0	19.9	88	102	86	Test of Natural Ground
4	W 20, S 47	198.0	18.2	96	106	90	
5	W193, S113	193.5	19.4	96	106	90	
6	W242, S100	193.0	24.0	82	102	80	Recompacted, See #9
7	W120, S100	195.5	23.7	94	106	88	Recompacted, See #9
8	W242, S 92	192.0	17.7	101	106	95	
9	W310, S 30	195.0	17.0	96	106	90	
10	W382, S100	189.5	18.8	89	98	91	
11	W377, S 97	189.5	19.4	96	98	98	
12	W105, S115	197.0	23.0	88	98	90	
13	W412, S 80	190.5	18.2	103	106	97	
14	W245, S112	195.0	21.8	98	106	92	
15	W382, S 40	193.7	18.4	88	106	83	Recompacted, See #34
16	W495, S480	146.5	23.0	96	106	90	
17	W500, S595	136.0	24.4	89	106	84	Recompacted, See #18
18	W500, S620	138.0	20.6	96	106	90	
19	W495, S410	154.5	23.4	97	106	91	
20	W505, S685	144.0	20.6	95	106	90	
21	W500, S760	137.0	23.6	92	102	90	
22	W500, S600	141.5	24.2	94	102	92	

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Job No: 3904,014 Appr: *BV/jc* Date 7/11/73

SUMMARY OF  
FIELD DENSITY TEST DATA

Waiuu Gardens Kai  
Unit A & B  
Waiuu, Oahu, Hawaii

PLATE

**5**

Test No.	Location	Elevation (Feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
23	W490, S740	135.0	19.4	90	98	92	
24	W505, S465	151.5	19.0	93	102	91	
25	W498, S675	139.5	19.7	92	98	93	
26	W515, S695	136.5	22.9	84	98	86	Recompacted, See #27
27	W520, S740	134.5	22.2	92	98	94	
28	W490, S610	140.5	23.4	84	102	82	Recompacted, See #29
29	W490, S600	142.0	24.3	95	102	93	
30	W510, S640	139.5	22.7	90	98	92	
31	W490, S695	140.0	21.0	88	98	90	
32	W530, S630	144.5	21.2	95	102	93	
33	W530, S508	152.5	25.4	90	98	92	
34	W385, S 40	194.0	21.1	96	106	90	
35	W445, S745	137.0	22.2	96	102	94	
36	W350, S675	145.0	22.9	93	102	91	
37	W390, S700	142.5	24.6	95	102	93	
38	W300, S638	146.0	24.9	95	102	93	
39	W465, S655	141.5	24.2	90	102	89	Recompacted, See #40
40	W645, S680	139.5	21.4	92	102	90	
41	W295, S105	194.0	18.0	83	102	81	Recompacted, See #55
42	W320, S635	150.0	21.2	92	102	90	
43	W130, S115	195.5	17.4	82	102	80	Recompacted, See #55

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Job No: 3904,014 Appr: *g/jc* Date 7/11/73

SUMMARY OF  
FIELD DENSITY TEST DATA

Waiuu Gardens Kai  
Unit A & B  
Waiuu, Oahu, Hawaii

PLATE

6

Test No.	Location	Elevation (Feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
44	W565, S640	137.5	22.6	92	102	90	
45	W295, S640	156.0	25.6	97	102	95	
46	W475, S185	173.5	18.3	87	102	85	Recompacted, See #50
47	W570, S565	143.0	25.0	93	102	91	
48	W350, S650	141.0	22.3	98	102	96	
49	W575, S560	145.5	22.6	96	102	94	
50	W475, S185	173.5	21.8	96	102	94	
51	W600, S420	153.5	23.4	96	102	94	
52	W540, S595	142.5	27.2	97	102	95	
53	W550, S485	149.0	24.5	93	102	91	
54	W670, S460	151.8	28.0	90	102	88	Recompacted, See #57
55	W350, S 55	195.0	15.0	92	102	90	
56	W700, S710	144.5	24.8	96	102	94	
57	W685, S435	151.5	28.9	92	102	90	
58	W620, S440	151.5	24.9	85	98	87	Recompacted, See #59
59	W625, S400	154.0	25.3	93	98	95	
60	W750, S680	153.0	15.3	93	102	91	
61	W650, S380	154.5	24.8	99	102	97	
62	W100, S610	163.0	26.4	95	102	93	
63	W237, S270	163.0	24.7	91	102	89	Rerolled
64	W150, S565	166.0	20.2	81	102	79	Recompacted, See #70

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SUMMARY OF  
FIELD DENSITY TEST DATA

Waiuu Gardens Kai  
Unit A & B  
Waiuu, Oahu, Hawaii

PLATE

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Test No.	Location	Elevation (Feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
65	W375, S520	164.3	24.4	87	102	85	Recompacted, See #67
66	W258, S570	163.5	25.0	93	102	91	
67	W325, S505	164.8	25.8	97	102	95	
68	W438, S200	173.0	24.0	92	102	90	
69	W458, S285	165.5	21.4	92	102	90	
70	W135, S580	167.0	24.2	91	102	89	Rerolled
71	W635, S420	156.1	25.7	98	102	96	
72	W647, S550	150.0	23.7	83	102	81	Recompacted, See #73
73	W625, S520	151.0	27.6	95	102	93	
74	W650, S585	150.5	27.6	95	102	93	
75	W575, S285	166.0	24.0	94	102	92	
76	W185, S542	165.5	24.2	93	102	91	
77	W360, S650	148.0	26.4	98	102	96	
78	W655, S385	151.5	28.0	93	102	91	
79	W612, S385	156.5	29.0	94	102	92	
80	W650, S290	167.0	25.9	92	102	90	
81	W560, S292	166.2	23.8	95	102	93	
82	W363, S515	156.5	25.8	91	102	89	Rerolled
83	W650, S482	154.0	22.5	96	102	94	
84	W643, S370	158.4	26.4	93	102	91	
85	W575, S275	168.2	25.2	96	102	94	
86	W547, S480	152.2	21.8	92	102	90	

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Job No: 3904,014 Appr: *GV/jc* Date 7/11/73

SUMMARY OF  
FIELD DENSITY TEST DATA

Waiau Gardens Kai  
Unit A & B  
Waiau, Oahu, Hawaii

PLATE

8

Test No.	Location	Elevation (Feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
87	W415, S540	150.0	22.6	98	102	96	
88	W668, S465	153.5	23.4	94	102	92	
89	W405, S463	160.0	24.0	93	102	91	
90	W180, S565	165.5	23.1	96	102	94	
91	W430, S565	150.0	23.9	85	102	83	Recompacted, See #92
92	W440, S538	151.5	27.7	92	102	90	
93	W546, S580	151.0	27.4	96	102	94	
94	W350, S510	161.0	24.8	94	102	92	
95	W535, S258	170.0	25.7	90	102	88	Recompacted, See #96
96	W547, S258	170.0	27.2	90	98	92	
97	W385, S625	149.0	26.9	88	102	86	Recompacted, See #99
98	W450, S610	149.0	23.8	93	98	95	
99	W395, S634	147.5	28.8	95	102	93	
100	W550, S563	151.0	23.7	88	102	86	Recompacted, See #103
101	W170, S565	167.0	31.6	90	102	88	Recompacted, See #106
102	W245, S560	166.5	28.6	88	102	86	Recompacted, See #106
103	W525, S575	151.0	22.3	91	102	89	Rerolled
104	W506, S250	173.0	28.6	95	102	93	
105	W443, S293	171.0	24.5	96	102	94	
106	W143, S573	167.0	26.6	92	102	90	
107	W493, S248	173.0	23.8	86	102	84	Recompacted, See #110

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Job No: 3904,014 Appr: *gvl*/jc Date 7/11/73

SUMMARY OF  
FIELD DENSITY TEST DATA

Waiiau Gardens Kai  
Unit A & B  
Waiiau, Oahu, Hawaii

PLATE

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Test No.	Location	Elevation (Feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
108	W120, S570	171.0	24.9	100	102	98	
109	W300, S492	167.5	25.1	94	102	92	
110	W523, S260	173.0	23.7	97	102	95	
111	W438, S330	169.0	23.8	91	102	89	Rerolled
112	W325, S438	167.5	25.2	91	102	89	Rerolled
113	W590, S360	161.0	18.2	86	102	84	Recompacted, See #129
114	W534, S484	154.0	21.6	90	102	88	Recompacted, See #139
115	W536, S527	152.0	23.2	87	102	85	Recompacted, See #139
116	W560, S220	177.0	24.4	96	102	94	
117	W527, S250	176.0	24.2	89	102	87	Recompacted, See #127
118	W433, S315	175.0	25.6	89	102	87	Recompacted, See #123
119	W330, S485	169.5	24.3	91	98	93	
120	W182, S570	168.0	22.7	88	102	86	Recompacted, See #122
121	W542, S213	178.5	25.0	86	102	84	Recompacted, See #127
122	W138, S566	168.5	22.0	91	102	89	Rerolled
123	W428, S275	177.5	27.2	94	102	92	
124	W425, S855	134.0	25.9	92	102	90	
125	W300, S520	168.5	20.6	90	98	92	
126	W300, S870	137.0	25.1	92	98	94	
127	W550, S225	178.0	22.8	92	102	90	
128	W455, S962	123.0	25.2	90	98	92	
129	W590, S342	161.5	24.2	93	102	91	

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SUMMARY OF  
FIELD DENSITY TEST DATA

Waiiau Gardens Kai  
Unit A & B  
Waiiau, Oahu, Hawaii

PLATE

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Test No.	Location	Elevation (Feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
130	W370, S850	134.5	25.2	89	98	91	
131	W469, S908	126.0	24.1	94	98	96	
132	W300, S744	140.5	26.8	82	98	84	Recompacted, See #133
133	W312, S744	140.0	24.5	91	98	93	
134	W300, S910	131.5	27.6	90	98	92	
135	W690, S927	126.0	25.6	93	102	91	
136	W300, S837	140.5	23.1	93	102	91	
137	W408, S735	137.0	23.5	95	102	93	
138	W350, S900	139.0	21.3	88	98	90	
139	W540, S490	154.0	22.1	94	102	92	
140	W403, S797	135.0	24.2	91	102	89	Rerolled
141	W403, S797	136.0	22.8	95	102	93	
142	W432, S866	132.0	24.2	91	102	89	Rerolled
143	W2082, S1592	101.5	23.8	85	98	87	Recompacted, See #144
144	W2085, S1608	101.5	23.8	92	98	94	
145	W1031, S678	170.0	25.9	93	102	91	
146	W455, S987	124.0	26.2	81	98	83	Recompacted, See #149
147	W460, S1018	119.0	23.9	86	98	86	Recompacted, See #149
148	W475, S780	137.0	26.5	94	102	92	
149	W450, S1000	121.5	21.8	91	98	93	
150	W453, S785	136.5	25.0	96	102	94	
151	W519, S855	131.5	24.4	91	98	93	

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SUMMARY OF  
FIELD DENSITY TEST DATA

Waiau Gardens Kai  
Unit A & B  
Waiau, Oahu, Hawaii

PLATE

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Job No: 3904,014 Appr: EC/jc Date 7/11/73

Test	Location	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
152	W585, S762	135.0	25.5	88	98	90	
153	W535, S900	130.5	24.6	92	98	94	
154	W573, S881	130.5	29.3	91	98	93	
155	W492, S836	133.0	20.2	84	96	88	Recompacted, See #157
156	W590, S850	131.5	25.0	86	98	88	Recompacted, See #157
157	W586, S859	131.5	28.4	92	98	94	
158	W 75, S1058	137.5	25.5	97	102	95	
159	W 63, S1705	129.0	20.4	86	96	89	Rerolled
160	W 54, S1290	125.0	26.6	97	102	95	
161	W462, S140	186.0	20.2	77	96	80	Recompacted, See #162
162	W458, S138	185.0	21.2	87	96	91	
163	W425, S225	178.5	24.2	84	98	86	Recompacted, See #165
164	W475, S133	187.5	25.9	96	102	94	
165	W425, S240	178.0	24.3	94	98	96	
166	W507, S215	179.0	23.8	92	98	94	
167	W475, S48	189.0	27.0	89	98	91	
168	W485, S116	186.5	24.3	91	98	93	
169	W550, S185	179.5	21.8	90	98	92	
170	W482, S130	184.0	25.0	97	102	95	
171	W480, S140	188.0	26.5	94	98	96	
172	W450, S125	188.5	23.8	95	98	97	
173	W180, S1305	124.0	26.6	100	102	98	

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*Consulting Engineers and Geologists*

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SUMMARY OF  
FIELD DENSITY TEST DATA

Waiiau Gardens Kai  
Unit A & B  
Waiiau, Oahu, Hawaii

PLATE

**12**

Test	Location	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
174	W250, S1288	122.0	26.0	95	102	93	
175	W272, S1280	123.0	23.5	99	102	97	
176	W268, S1300	125.0	24.6	97	102	95	
177	W220, S1318	126.0	24.7	95	102	93	
178	W231, S1320	124.5	23.4	99	102	97	
179	W107, S1260	128.3	22.1	94	102	92	
180	W177, S1277	126.7	25.8	96	102	94	
181	W 56, S1283	129.5	26.8	93	102	91	
182	W 78, S1205	132.9	28.4	87	98	89	Rerolled
183	W490, S1015	119.1	22.5	101	102	99	
184	W508, S908	127.3	23.1	96	102	94	
185	W536, S1165	111.5	21.6	88	102	86	Recompacted, See #189
186	W544, S1123	111.8	25.0	86	102	84	Recompacted, See #189
187	W507, S900	128.3	22.9	91	98	93	
188	W513, S1017	122.1	20.5	88	98	90	
189	W545, S1167	111.5	23.3	92	102	90	
190	W550, S825	133.8	25.8	94	102	92	
191	W566, S909	130.0	25.5	91	102	89	Rerolled
192	W538, S895	131.0	26.3	88	98	90	
193	W437, S807	139.3	22.4	100	102	98	
194	W504, S891	132.5	25.4	99	102	97	
195	W512, S893	133.6	27.0	88	98	90	

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*Consulting Engineers and Geologists*

Job No. 3904.014.06 Appr. bc/jc Date 7/11/73

SUMMARY OF  
FIELD DENSITY TEST DATA  
Waiau Gardens Kai  
Unit A & B  
Waiau, Oahu, Hawaii

PLATE

**13**

Test	Location	Elevation (feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
196	W594, S893	140.0	28.0	94	102	92	
197	W545, S982	125.0	26.0	87	98	89	Rerolled
198	W513, S589	148.8	25.4	94	102	92	
199	W338, S800	140.6	22.6	90	98	92	
200	W445, S1100	116.0	25.2	90	98	92	
201	W 33, S1150	135.5	29.0	92	102	90	
202	W600, S1110	120.3	25.3	93	102	91	
203	W508, S896	139.8	22.8	91	102	89	Rerolled
204	W113, S1202	134.0	23.4	99	102	97	
205	W200, S 50	196.5	24.9	98	102	96	
206S	W490, S120	187.5	18.1	89	102	85	Recompacted, See #210
207S	W525, S115	185.5	25.7	88	102	86	Recompacted, See #208
208S	W520, S100	186.5	18.7	97	102	95	
209S	W475, S124	189.5	20.4	91	102	89	Recompacted, See #210
210S	W474, S125	188.5	20.0	97	102	95	
211B	W193, S 25	197.5	5.0	117	135	87	Recompacted, See #219
212B	W289, S 45	196.0	4.7	119	135	88	Recompacted, See #219
213S	W 39, S347	180.0	26.0	96	102	94	Rerolled
214S	W125, S470	168.5	19.8	99	102	97	
215B	W550, S 20	185.0	4.7	128	135	95	
216B	W430, S 97	190.0	4.8	129	135	96	
217	W205, S677	155.0	30.9	98	102	96	

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Job No. 3904.014.06 Appr: *bc/jc* Date 7/11/73

SUMMARY OF  
FIELD DENSITY TEST DATA

Waiiau Gardens Kai  
Unit A & B  
Waiiau, Ohau, Hawaii

PLATE

**14**

Test	Location	Elevation (Feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry Density (pcf)	Relative Compaction (%)	Remarks
218	W176, S637	155.6	28.2	100	102	98	
219B	W190, S 62	197.0	4.4	128	135	95	
220B	W 90, S350	179.0	4.3	120	131*	91	Recompacted, See #221
221B	W 88, S350	179.0	5.5	125	131*	95	
222S	W590, S1106	153.0	24.2	102	106	96	
223	W435, S200	172.0	25.5	85	98	87	
224B	W125, S430	169.8	6.2	127	135	94	Rerolled
225B	W 35, S416	171.8	5.0	127	135	94	Rerolled
226S	W422, S525	152.3	21.3	97	102	95	
227B	W587, S465	154.8	4.3	128	143	89	No Retest, See Text - Parking Areas
228S	W475, S1020	121.3	19.3	92	102	90	Recompacted, See #235
229S	W527, S720	135.3	18.1	93	102	91	Recompacted, See #239
230S	W447, S1270	110.7	20.9	84	98	86	Recompacted, See #231
231S	W415, S1262	109.0	22.5	96	98	98	
232B	W440, S442	153.0	5.2	131	143	92	No Retest, See Text - Parking Areas
233S	W225, S1108	130.7	21.9	90	98	92	Recompacted, See #243
234S	W200, S1210	127.0	19.4	94	98	96	
235S	W520, S1040	121.0	17.7	101	102	99	
236S	W390, S995	123.0	11.0	95	102	93	Recompacted, See #245
* Maximum Dry Density established from field density check points.							

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Job No. 3904,014.06 Appr. *[Signature]* / j.c. Date 7/11/73

SUMMARY OF  
FIELD DENSITY TEST DATA

Wai'au Gardens Kai  
Unit A & B  
Wai'au, Oahu, Hawaii

PLATE


**15**

Test	LOCATION		Elevation * (Feet)	Moisture Content (%)	Dry Density (pcf)	Maximum Dry * * Density (pcf)	Relative Compaction (%)	Remarks
	Origin of coordinates at intersection of property lines of west side Kaahumanu Street and south side of Hookanike Street							
237S	W155,	S1045	134.0	21.2	86	98	88	Recompacted, See #243
238S	W230,	S1075	137.3	23.4	87	98	89	
239S	W290,	S805	140.5	20.7	99	102	97	Recompacted, See #243
240S	W556,	S867	134.5	25.2	89	98	91	Recompacted, See #244
241S	W535,	S823	135.3	24.2	89	98	91	
242S	W207,	S1065	130.3	28.9	86	98	88	Recompacted, See #243
243S	W215,	S1067	131.0	26.4	94	98	96	
244S	W523,	S805	136.0	22.8	95	98	97	
245S	W442,	S1004	122.0	21.0	98	102	96	
246B	W277,	S820	139.8	6.7	120	128	94	Rerolled
247B	W250,	S1061	129.6	9.2	110	128	86	Recompacted, See #251
248B	W390,	S815	139.8	9.0	120	128	94	
249B	W175,	S1063	133.0	11.5	111	128	87	Recompacted, See #251
250B	W203,	S1195	127.4	12.8	115	128	90	
251B	W195,	S1061	132.0	8.9	122	128	95	
252B	W200,	S1200	127.4	8.4	120	128	94	Rerolled
253B	W490,	S1028	121.3	9.9	120	128	94	Rerolled
254B	W530,	S825	135.8	9.5	111	128	87	Recompacted, See #256
255B	W415,	S1280	110.8	13.7	125	128	97	
256B	W512,	S815	136.5	10.3	121	128	95	

S = Subgrade Test B = Base Rock Test

\* Elevation: Development Plans for Wai'au Gardens Kai, Units "A" and "B" prepared by Community Planning, Inc.

\*\* Maximum Dry Density established with ASTM D1557-70(C) test method

 <b>HARDING - LAWSON ASSOCIATES</b> Consulting Engineers and Geologists	<b>SUMMARY OF</b> <b>FIELD DENSITY TEST DATA</b> Wai'au Gardens Kai Unit A & B Wai'au, Oahu, Hawaii		PLATE <b>16</b>
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