#446

RICHARD MEW PROJECT
KANEOHE, KOOLAUPOKO, OAHU, HAWAII
TAX MAP KEY: 4-4-15: 3
PRELIMINARY SOIL EXPLORATION

BAY VIEW GARDENS

To:
PARK ENGINEERING, INCORPORATED

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

APRIL 6, 1972

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
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April 6, 1972

MR. CLARENCE TANONAKA
Park Engineering, Inc.
1149 Bethel Street, Room 710
Honolulu, Hawaii 96813

Dear Mr. Tanonaka:

Subject: Richard Mew Project
Kaneohe, Koolaupoko, Oahu, Hawaii
Tax Map Key: 4-4-15: 3
Preliminary Soil Exploration
Chapter 23, Revised Ordinances of
Honolulu, 1961 As Amended

In accordance with your request, soil explorations were made at the site for the proposed lot grading off Kaneohe Bay Drive in Kaneohe, Koolaupoko, Oahu, Hawaii.

SCOPE OF EXPLORATION

The purpose of the explorations was to determine general soil conditions for grading for residential development.

Borings and laboratory testing of soil samples were made in February 1968 for J. B. Guard.

For this report, our work consists of visual observations at the site by a soil engineer and the updating of the report made in 1968 to reflect the grading contemplated at this time.

FIELD EXPLORATION AND LABORATORY TESTS

Two borings were made at the site. The locations of these borings are shown on the Boring Location Plan.

The borings were made with a 3-in. auger thru surface soils and weathered rock to about 15-ft depth. Penetration tests were made with a 2-in. standard split spoon driven with a 140-lb hammer falling 30 inches and samples recovered for laboratory testing.

Soil samples were recovered from the field and subjected to appropriate tests in the laboratory. Soil classifications given on the logs are generally in accordance with the "Unified Soil Classification System."

Laboratory tests included: water content, Atterberg limit, gradation, expansion and CBR. A summary of the laboratory tests is given in Table IA.

GENERAL SITE CONDITIONS

The lot is located mauka of Kaneohe Bay Drive near Bayview Haven Place in Kaneohe, Oahu, Hawaii. The ground slopes up from Kaneohe Bay Drive at about 15 to 25 percent gradients.

Along Kaneohe Bay Drive, there is a 10 to 15-ft high bank formed by the roadway excavation for Kaneohe Bay Drive.

About 550 ft and 800 ft from Kaneohe Bay Drive, two drainage gullies or valleys cut across the lot and drain in the northeasterly direction.

There is a drainage channel, partly natural and partly artificial, running along the eastern boundary of the project.

The site is covered with grass and some trees. Trees seem to be growing mostly in the dips and gullies while grass seems to be growing more on the knobs and ridges.

INTERPRETATION OF SOIL CONDITIONS

The soils encountered in the borings can be generalized as follows:

A surface layer of medium to very stiff silty clay, a few inches to several feet in thickness, overlying decomposed brown and red weathered rock. The weathered rock grades downward into less weathered gray rock which is very difficult to drill with auger using a rock bit.

The gray, less weathered rock is exposed in the steep cut banks along Kaneohe Bay Drive.

For more detailed descriptions of soils encountered in the borings, refer to the boring logs.

DISCUSSION AND RECOMMENDATIONS

In general, the present plan is to cut down the high bank along Kaneohe Bay Drive and to fill in the gullies that cross the lot about 550 ft and 800 ft mauka of Kaneohe Bay Drive.

Cuts of about 15 ft and fills of about 20 ft or more are contemplated.

Before filling any of the gullies, the bottoms of the gullies should be cleared and grubbed and the topsoils stripped several feet to firm ground. The topsoils should be stockpiled and used later to finish grade the lots.

Trenches should be cut in a herringbone pattern and subdrains placed in the trenches to provide drainage paths for the bottoms and sides of the drainageways. The bottoms of the gullies should be filled with the more rocky materials from the excavations.

In addition, the fill banks along the eastern boundary will be hard to compact and will be subject to erosion. The more rocky materials from the excavations should be used to construct the eastern slopes. Because of erosion problems, the bank will require maintenance in the early stages of the project to keep clear the drainageway at the toe of slope along the eastern boundary.

Residential construction should be set back about 15 ft from the tops of any fill bank where some ground creep may occur. Otherwise the foundations should extend to firm ground.

Settlement gages should be installed to monitor the performance of fills over the drainageway.

After allowing the ground to consolidate for about 3 months or when settlement gages show negligible rates of settlement, building construction may proceed over the compacted fills placed over the deeper gullies.

Construction of retaining walls on side slopes should be avoided unless the underlying materials are very stiff or hard.

Site Grading

Grading work should be done as required by the Revised Ordinances of Honolulu, 1961 As Amended. Guidelines for site grading design follow:

1. The area should be cleared and grubbed. Surface vegetation and miscellaneous debris should be cleared and removed prior to site filling.

2. Localized soft pockets encountered during the site preparation should be excavated and backfilled with compacted select material.

3. Thin sidehill fills (sliver fills) on sloping areas should be avoided.

4. Where fills are proposed on sidehill areas and gullies, loose material of the bottom and sides should be stripped down to stiff natural ground before the placement of fills. Several feet of loose material may have to be stripped from the bottoms of gullies. New fills should be keyed into the stiff natural ground and compacted.

5. Before fills are placed in natural drainageways or gullies, trenches should be cut in a herring-bone pattern along the bottom and sides of the drainageway. Subdrains should be placed in the trenches. The locations of subdrains should be determined in the field after clearing and grubbing.

6. In general, the on-site subsoils may be used for the construction of the proposed fills.

   The more rocky material should be used to fill the bottoms of gullies and the eastern bank of the site.

   Fills should be constructed in approximately level layers starting at the lower end and working upward. Where fills are made on sloping areas steeper than about 5 horizontal to 1 vertical, the ground at the toe of the fill should be benched to a generally level condition. As the fill is brought up, it should continually be keyed into the stiff natural ground by cutting steps into the slopes and compacting the fill into these steps.

7. Fills should be laid in 6-in. compacted layers to 90% of the maximum density determined by the AASHO T-180-57 test method.

8. In general, the lots should be graded to drain away from the slope to minimize erosion of the slope.

   If lot drainage is toward the rear of the lot, positive lined drainage swales should be provided to minimize erosion and slumping of the rear slope.

Slopes

In general, cut slopes of 1-1/2 horizontal to 1 vertical and fill slopes of 2 horizontal to 1 vertical or flatter should be used.

If slope heights (top to toe) of greater than 15 ft are considered, 8-ft-wide benches should be placed at height intervals of about 15 to 20 ft.

The surface of fill slopes should be compacted by cat-tracking or with a sheepsfoot roller.

Slope planting is recommended on cut and fill slopes to minimize erosion.

Slope adjustments or other precautions may be necessary if seepage zones or soft spots are encountered in localized areas.

Roadway Pavement

In general, an estimated roadway pavement thickness for the light residential traffic anticipated is as follows:

1. Wearing course - 2-in. asphaltic concrete.

2. Base course - 6-in. base course over a prepared subgrade.

Provisions should be made in the contract documents to allow for local adjustments regarding subbase requirements in the field in accordance with the design standards of the City and County of Honolulu. In fill areas, the better materials should be saved to construct the subgrade and minimize possible subbase courses.

It is recommended that the subgrades of roadways be compacted and shaped to drain. Outlets should be placed at low points

of roadway profiles to avoid water pocketing by running bleeder pipes into catch basins at low points of the subgrade.

Unforeseen Conditions

Unforeseen or undetected conditions such as soft spots, seepage water or expansive soil pockets may occur in localized areas and will have to be adjusted and corrected in the field as they are detected.

Attached are the boring logs, laboratory test results, a Boring Location Plan and limitations.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

Ezra Koike

Ezra Koike
Professional Engineer
Hawaii No. 1450

EK:rmf

BORING LOGS

The stratification lines shown on each of the boring logs represent the approximate boundary between soil types and the transition may be gradual.

Symbols

Symbols used generally are in accordance with the Unified Soil Classification System.

Where a parenthesis "(MH)" is used, the soil sample was classified by visual observation of the sample recovered.

Where no parenthesis "MH" is used, the soil sample was classified from either the Atterberg limit or sieve analysis test results.

WALTER LUM ASSOCIATES 1019—A UNIVERSITY AVENUE • HONOLULU, HAWAII 96814 • PHONE: 990-471

Boring Log

PROJECT: MR. J. B. GUARD PROPERTY
LOCATION: KANEOHE, KOOLAUPOKO, OAHU, HAWAII
TMK 4-4-15:3

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2" S - 2" O.D. THIN WALL TUBE
2" SS - 2" STANDARD SPLIT SPOON

BORING NO. 1 Sheet No. 1 of 1
Driller: WALTER LUM ASSOC. Date: JAN. 20, 1968
Field Party: MAKAULA, MAESHIRO
Type of Boring: AUGER (MOBILE MINUTEMAN) Diam.: 3"
Elev.: 29' ± * Datum: —
Drill Bit: ROCK BIT

Water Level	NOT NOTICED			
Time	—			
Date	—			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	SAMPLER	Sample No.	Wet Dens. P.C.F.	Moist. Cont. %	Dry Dens. P.C.F.	Uncont. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: STANDARD PENETRATION TEST, Blows Per Foot (0 10 20 30 40)	PENETRATION DATA: 2" O.D. THIN WALL TUBE SAMPLER, Blows/0.5'
	ELEV. = 29' ± *	0									
	MEDIUM REDDISH BROWN SILTY CLAY		2"S	1-A	114	35	84	-	{1900 1900		1/5' 2/5' 2/5'
	STIFF, BROWN SILTY CLAY W/TRACES OF DECOMPOSED ROCK	5	2"SS	1-B	-	21	-	-	-		45/.7'
	VERY STIFF LIGHT BROWN SILTY CLAY W/ DECOMP. ROCK										
	GRAY DECOMPOSED ROCK	10	2"SS	1-C	ROCK FRAGMENTS						35/.2'

* ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP

WALTER LUM ASSOCIATES

1019—A UNIVERSITY AVENUE • HONOLULU, HAWAII 96814 • PHONE: 990-471

Boring Log

PROJECT: MR. J. B. GUARD PROPERTY

LOCATION: KANEOHE, KOOLAUPOKO, OAHU, HAWAII
TMK 4-4-15:3

HAMMER:
Weight: 140#
Drop: 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 2 Sheet No. 1 of 1
Driller: WALTER LUM ASSOC. Date: JAN. 17, 1968
Field Party: MEYER, FUJII
Type of Boring: AUGER (MOBILE MINUTEMAN) Diam.: 3"
Elev.: 85'± * Datum:
Drill Bit: ROCK BIT

Water Level	NOT NOTICED			
Time				
Date				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Elev.	Sample No.	Wet Dens. P.C.F.	Moist. Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Sheer P.S.F.	PENETRATION DATA: STANDARD PENETRATION TEST, Blows Per Foot (0 10 20 30 40)
	ELEV. = 85'± *	0								
	DENSE TO VERY DENSE LIGHT BROWN DECOMPOSED ROCK & MUDROCK			2-A	-	23	-	-	-	
		5		2-B	-	18	-	-	-	27/.5'
	LIGHT BROWN WEATHERED ROCK (MUDROCK)	10		2-C	-	12	-	-	-	26/.1'
		15		2-D	-	12	-	-	-	35/.4' (40/.1')
							CONTINUOUS PENETRATION TEST W/ 2" DIAMETER BLUNT POINT			

*ELEVATION ESTIMATED FROM TOPOGRAPHIC MAP

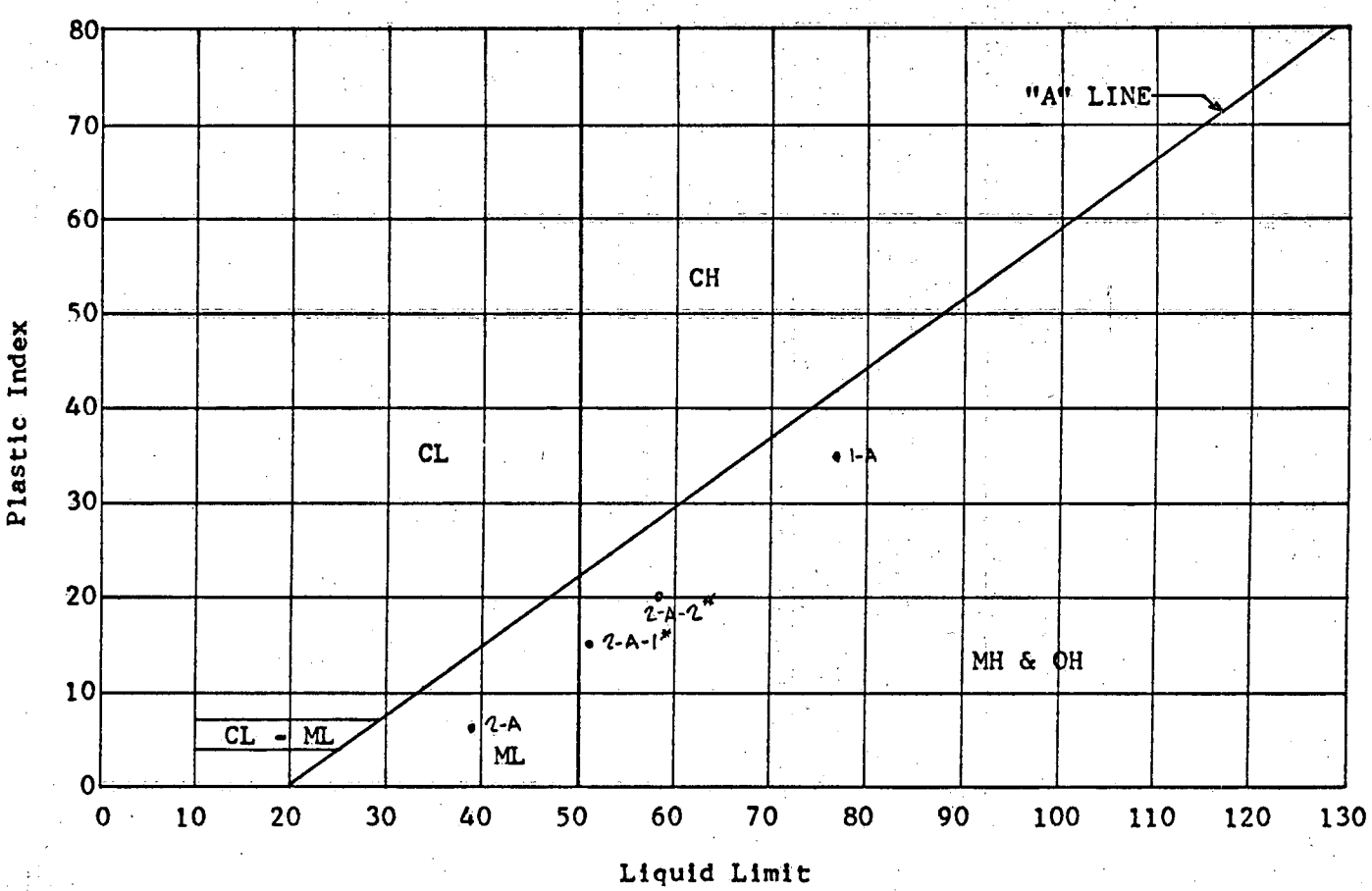
MR J.B. GUARD PROPERTY
KANEOHE, KOOLAUPOKO, OAHU, HAWAII

TABLE I A - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	BANK	1	2	2	2
SAMPLE NO.		A	A-1	A-2	A
DEPTH BELOW SURFACE	SURFACE		SURFACE	SURFACE	
DESCRIPTION	TANNISH-BROWN SILTY GRAVEL W/SAND	DARK BROWN SILTY CLAY	TAN CLAYEY SILT W/SAND & DECOMP. ROCK	TANNISH-RED CLAYEY SILT W/SAND & DECOMP. ROCK	TAN CLAYEY SILT W/SAND & DECOMP. ROCK
GRADING ANALYSIS (% Passing) Sieve					
1"	87.4		100	100	
½"	67.8		100	98.0	
#4	49.4		99.7	95.4	
#10	38.8		96.5	94.0	
#20	32.5		90.7	90.7	
#40	22.4		84.8	86.8	
#100	13.2		75.4	80.7	
#200	9.8		69.8	77.6	
ATTERBERG LIMITS					
Air Dried or Natural		NATURAL	NATURAL	NATURAL	NATURAL
Liquid Limit		76	51	58	39
Plastic Limit		41	36	38	33
Plasticity Index		35	15	20	6
Dilatancy		VERY SLOW	SLOW-MED.	SLOW-MED.	QUICK
Toughness		MEDIUM	SLIGHT-MED.	SLIGHT-MED.	SLIGHT
Dry Strength		MEDIUM	SLIGHT-MED.	SLIGHT-MED.	SLIGHT-MED.
UNIFIED SOIL CLASSIFICATION	GW-GM	MH	MH	MH	ML
SPECIFIC GRAVITY			2.67	2.70	
EXPANSION AND CBR TESTS (Surcharge-51 P.S.F.)					
Molding Moisture Content, %	16.9		26.8	39.0	
Molding Dry Density, P.C.F.	108.9		95.4	82.3	
Swell upon saturation, %	0.6		0.6	0.2	
CBR at 0.1" Penetration	27.5		17.5	7.5	
COMPACTION TEST (AASHO T-180-57 Method ___)			A	A	
Dry to Wet or Wet to Dry			WET TO DRY	WET TO DRY	
Max. Dry Density (P.C.F.)			95.5	88.1	
Optimum Moisture (%)			24.0	31.5	

JOB: MR. J. B. GUARD PROPERTY

LOCATION: KANEOHE, KOOLAUPOKO, OAHU, HAWAII



PLASTICITY CHART

* INDICATES SAMPLES TAKEN ADJACENT TO BORING.

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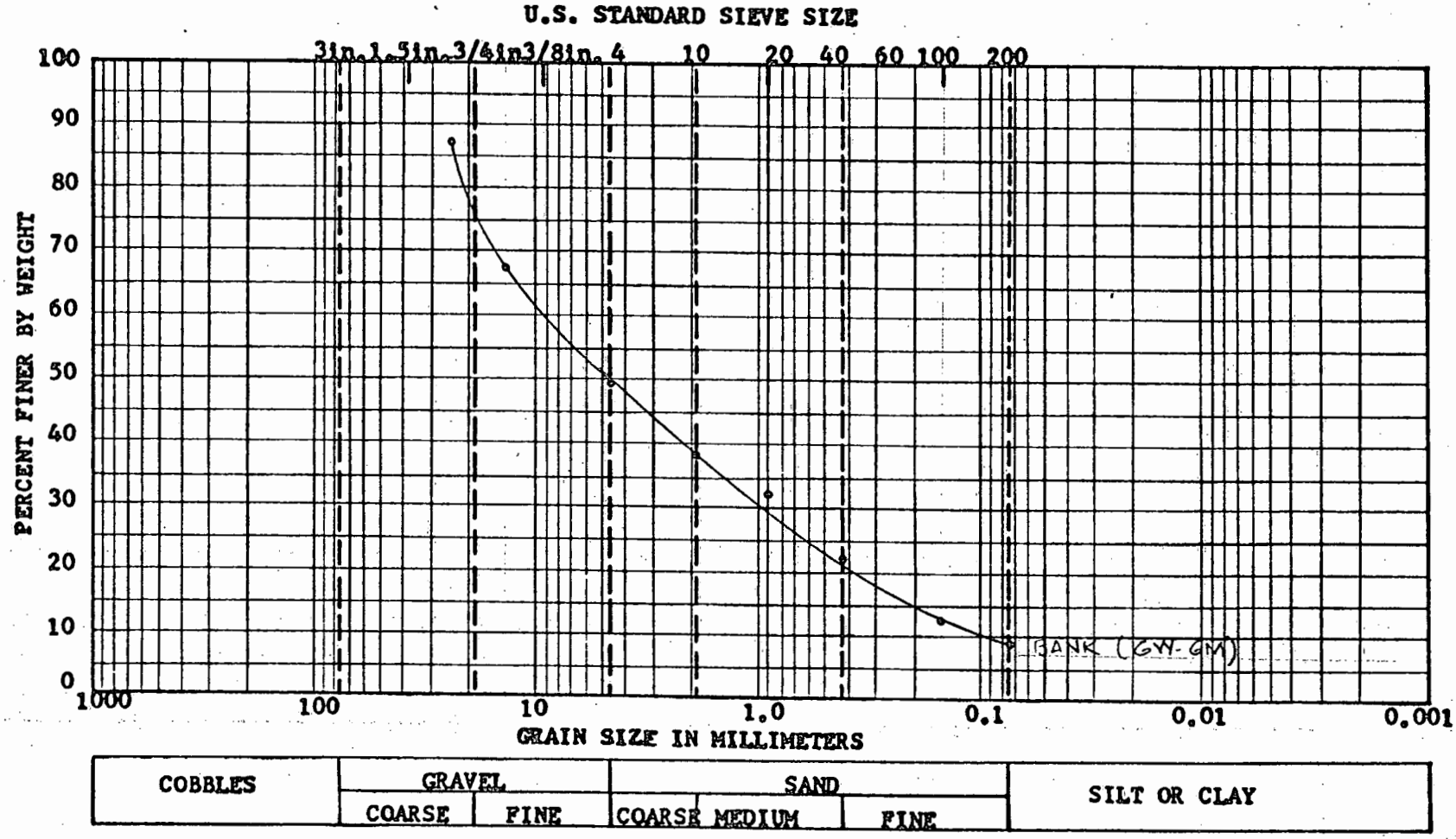

GRADATION CURVE

MR. J.B. GUARD PROPERTY
KANEOHE, KOOLAUPOKO, OAHU, HAWAII

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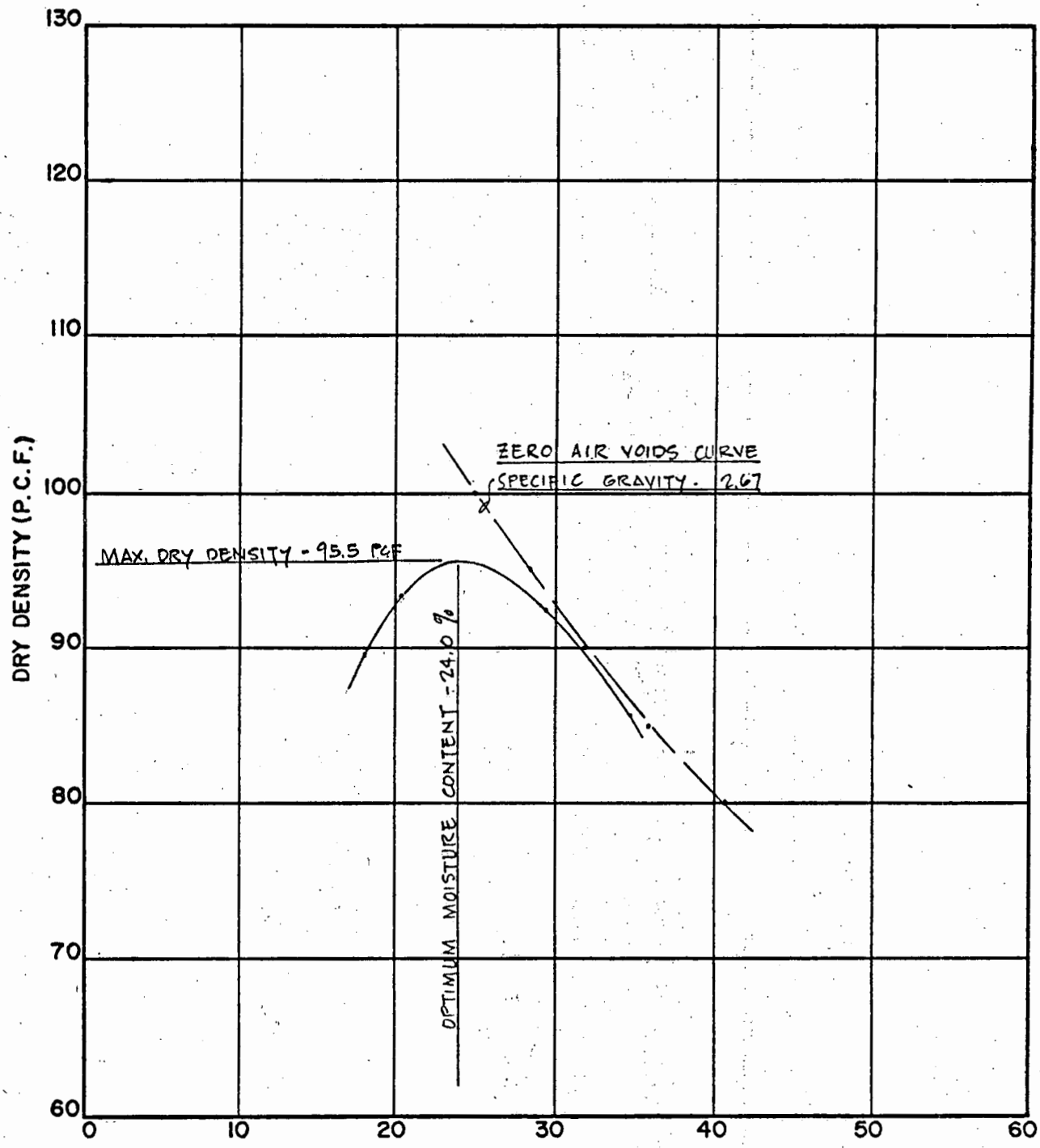
MOISTURE-DENSITY CURVE (AASHO T-180-57, METHOD__)

PROJECT: MR. J.B. GUARD PROPERTY

LOCATION: KANEOHE, KOOLAUPOKO, OAHU, HAWAII

SAMPLE NO: 2-A-1 SURFACE

SAMPLE DESCRIPTION: TAN CLAYEY SILT W/SAND & DECOMP. ROCK



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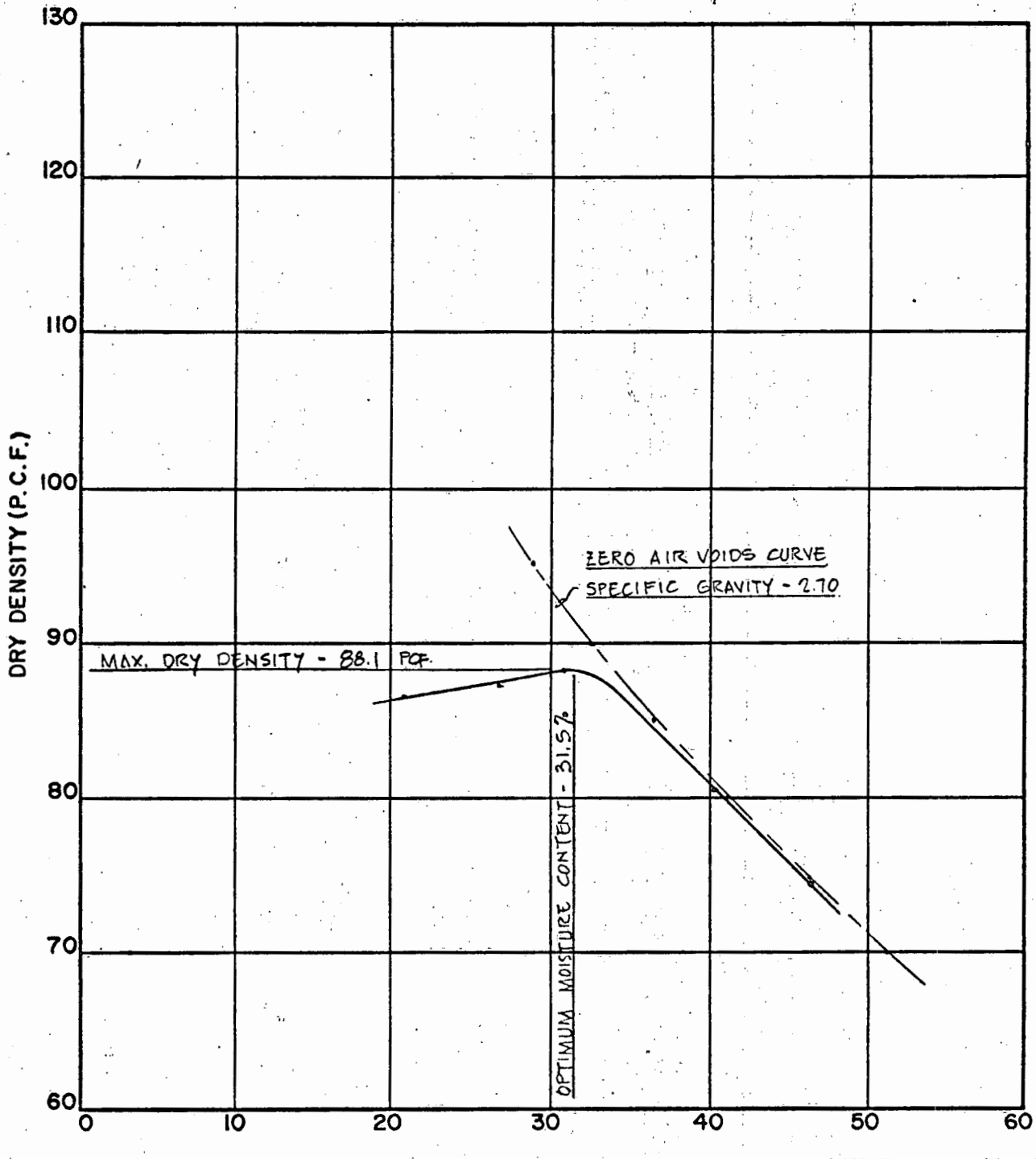
BY B.T. DATE 2-1-68

MOISTURE-DENSITY CURVE (AASHO T-180-57, METHOD A)

PROJECT: MR. J.B. GUARD PROPERTY
LOCATION: KANEOHE, KOOLAUPOKO, OAHU, HAWAII
SAMPLE NO: 2-A-2
SAMPLE DESCRIPTION: TANNISH-RED CLAYEY SILT W/SAND & DECOMP. ROCK.



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BY BT DATE 2-2-68

LIMITATIONS

In general, soil formations are commonly erratic and rarely uniform or regular. The boring logs indicate the approximate subsurface soil conditions encountered only at the drill holes where the borings were made at the times designated on the logs and may not represent conditions at other locations or at other dates. Soil conditions and water levels may change with the passage of time and construction methods or improvements at the site.

During construction, should subsurface conditions much different from those in the borings be observed, encountered, or otherwise indicated, we should be advised immediately to review or reconsider our recommendations in light of the new developments.

If there is a substantial lapse of time between the submission of this report and the start of work at the site, or if conditions have changed due to natural causes, plan changes, or construction operations at or adjacent to the site, it is recommended that this report be reviewed to determine the applicability of the recommendations considering the time lapse and the changed conditions.

Our professional services were performed, findings obtained and recommendations prepared in accordance with generally accepted engineering practices. This warranty is in lieu of all other warranties expressed or implied.