PRELIMINARY SOILS INVESTIGATION
CLUB VIEW ESTATES TOWNHOUSES
AHUIMANU SUBDIVISION, OAHU, HAWAII
W.O. 141 - DECEMBER 11, 1970

GEOLABS-HAWAII, INC.
1553 COLBURN STREET, SUITE 203
HONOLULU, HAWAII 96817

TABLE OF CONTENTS

APPENDICES

GEOLABS-HAWAII, Inc.
Soils and Foundation Engineering, Geology
1553 Colburn Street, Suite 203 • Honolulu, Hawaii 96817 • (808) 841-5064

December 11, 1970

W. O. 141

Dan Ostrow Construction Company
2996 Koapaka Street
Honolulu, Hawaii 96819

Subject: Preliminary Soils Investigation for the Club View Estates Townhouses, Ahuimanu Subdivision, Oahu, Hawaii

Gentlemen:

The following report presents the results of a preliminary soils investigation completed at the site of the Club View Estates Townhouses, Ahuimanu Subdivision, Oahu, Hawaii. The site covered by this report includes approximately 65 acres as shown on the enclosed site plan. The conclusions and recommendations included in this report identify general areas where some problems are anticipated. Detailed recommendations for grading, slope gradients, and other pertinent data will be included in subsequent addenda for each phase of development.

SUMMARY OF SOIL CONDITIONS

1. The general soil profile in the lower areas covered by test pits 19 to 25 inclusive consists of loose Clayey SAND overlying highly compressible Silty CLAY.

2. In the ridge areas, the soils consist of loose to medium dense Clayey SILT with gravel and decomposed rock fragments.

3. Groundwater was encountered at a depth of -5 feet, -5.5 feet, and -4.5 feet in test pits number 19, 21 and 23 respectively.

4. Due to the high natural water content of the soil material, difficulty will be encountered in obtaining the required compaction. It will be necessary to dry the natural soil material to within the water content range as included in a later section of this report.

5. Since the soil material is moderately expansive when dried to the optimum moisture content, it is recommended that compaction requirements be reduced from 90% to 85% per AASHO-T-180-57.

SITE DESCRIPTION

The property included in this investigation consists of approximately 65 acres. The terrain varies from gentle to very steep

slopes. Generally, the area is divided topographically into two sections, one occupying a prominent ridge which runs north from Unit 2-B to the Kahekili Highway and the other a lower irregular shaped area along the original stream course. The overall project site is located between the previously developed Club View Estates on the west and the Valley of the Temples on the south in the Ahuimanu district.

The subject site was not cleared at the time of this investigation. Grass and small bushes covered two-thirds of the ridge area and a third of the ridge area was covered with waste fill material which has been stockpiled from about 5 to 20 feet above the original ground surface. The location of the previously placed waste material is as shown on the enclosed site plan. It will be necessary to remove the existing fill material prior to the start of construction. The ridge slopes are heavily timbered with moderate size trees and thick undergrowth of bushes and vines. The lower area is covered with heavy grass and a scattering of bushes and some large trees. A heavy growth of bushes, vines and trees also line the old stream channel. At the time of the field investigation, the old stream channel was carrying a small amount of water. The average elevation difference between the ridge and the low area is approximately 40 feet.

The top of the ridge area is fairly broad and has an undulating surface with an overall gradient of approximately 5 percent from south to a northerly direction. The natural ridge side slope gradients are in general on a 1 to 1 ratio. Along the west side of the site, a narrow ridge with steep slopes extends for more than 900 feet in a northerly direction.

The lower areas have a gentle gradient from south to north except in the areas where it merges with the steeper slopes from the ridge area. The old stream runs along the east and north sides of the low area and has cut banks 3 to 7 feet below the general terrain level.

PROPOSED DEVELOPMENT

The proposed development is to construct a series of townhouses along both the main and spur ridges as well as in the low area along the old stream bed. High density apartment buildings are proposed for the southwest portion of the site. Grading will consist of cuts and fills sufficient to provide level building areas. In addition, townhouses will be constructed in a tri-level fashion with portions of the building on the slopes. The approximate location and height of the cut and fills is as shown on the site plan. Should the enclosed siteplan be revised,

this office should be notified for a review of the cut and fill slopes.

Sewers are planned to handle the sewage disposal for the proposed tract. Storm drains are to be constructed to handle tract drainage.

FIELD EXPLORATION

Twenty six (26) test pits were excavated at the site using a hydraulically powered backhoe. The depths of the test pits were from 5 to 9 feet from the existing grade as shown on the enclosed test pit logs. Undisturbed samples were obtained in the test pits and representative bag samples were returned to the laboratory for more detailed analyses. The soil material encountered in the test pits does not necessarily represent subsurface conditions at other points on the site; however, sampling procedures are believed to be representative.

The test pit logs are shown in Appendix A. Also test pit locations are shown on the enclosed site plan.

LABORATORY TESTS

Various laboratory tests were performed on undisturbed and remolded samples to determine the necessary soil parameters. Particular attention was given to laboratory expansion, direct shear and consolidation tests being performed with varying moisture contents. The purpose of the foregoing was to determine the soil reaction to percent compaction and sensitivity to varying moisture contents from a wet to dry condition and from dry to wet.

Direct shear tests and consolidation tests were performed on undisturbed representative samples derived from the lower areas. The purpose of these tests were to determine the stability of the clay soils in the critical areas with regard to suitability as a foundation material.

Laboratory test results are presented in summary form in the appropriate Appendix.

DISCUSSION

The exploratory test pits and the field and laboratory test results indicate that the ridge area consists of medium dense Clayey SILT with some gravel and decomposed rock fragments. In the lower areas a more erratic soil material exists,

consisting of Silty GRAVEL and Gravelly CLAY with certain areas underlain by highly compressible soft Silty CLAY. The soil material in the area covered by this investigation in general consists of highly decomposed and deeply weathered volcanic rocks and basalt flows, which is classified as a soil. Excavation in this soil type can be accomplished using the appropriate heavy earth moving equipment.

Groundwater was encountered at a depth of -5.0 feet, -5.5 feet, and -4.5 feet in test pits number 19, 21 and 23 respectively. In general, the water level as measured is at the approximate same elevation as the old stream channel.

A large stockpile of waste fill material had been placed at the site at the time of this investigation. In general, the waste fill material is within the areas of test pits number 2, 3, 4, 8 and 11. The stockpile area has been outlined on the enclosed site plan. During the grading of another site in this area, the existing fill material was wasted due to its high moisture content and the inherent difficulty in obtaining the proper compaction. The suitability of the stockpiled waste fill material will be tested and recommendations will be made in a subsequent addendum. It will be necessary, however, to completely remove this material as an existing fill prior to the grading of the

area. The foregoing is in accordance with the Federal Housing Administration's Data Sheet No. 79G.

The soil material as occurring in the area covered by this investigation has a very high natural in-place moisture content. This condition along with the high rainfall which occurs in the area makes earth moving and compaction very difficult. A similar situation was encountered during the grading for Club View Estates Units 2a and 2b. Due to the high natural moisture content and the potential of the soil material to be moderately expansive when compacted to the normal 90% density, it is recommended that the compaction requirements for this area be reduced from the standard 90% to 85% in accordance with AASHO-T-180-57.

In general, the alluvial soil material throughout the site will present no particular foundation problem; however, foundation stability and settlement problems may be encountered in the lower areas which consist of soft clay soils. Additional field exploration and laboratory testing will be made and recommendations presented in subsequent addenda.

Depending upon the final grading plan, the "gulch or draw" which exists above or in the westerly direction from test pit 18 should have sufficient drainage to remove the water from the area. The drainage may consist of a culvert or a

series of subdrains to remove the water from this area. Also in the vicinity of test pits number 19, 21 and 23, it may be necessary to construct subdrains for the removal of subsurface water. During the time of the grading of the site, the Soils Engineer should verify the location of the necessary subdrains. The subdrains should be constructed in accordance with the standard specifications for public works construction for the City & County of Honolulu and the minimum property standards for the Federal Housing Administration. Subdrains should be constructed such that the subsurface water is removed from the site.

The soil material in its natural undisturbed condition exhibited no swelling using a 100 PSF surcharge loading. The moisture content of the natural soil material for the swell tests was approximately 74%. This moisture represents an excess of the optimum moisture content of 35%. When the material is dried back to the optimum moisture content and remolded to a 90% compaction, a percent swell ranged from 5% to 12.5%. Based on the enclosed test results, it is recommended that the material be dried to a sufficient moisture content such that the 85% compaction can be obtained. The moisture content of the foundation soil material should remain constant after the earthwork has been completed.

If the soil material dries prior to pouring of concrete, the footings and slab areas should be rewatered such that the moisture content is brought to the percentage where expansion will not occur.

RECOMMENDATIONS

1. The entire site covered by this investigation should be cleared and grubbed of all vegetation and organic matter in accordance with the enclosed earthwork specifications.

2. Cut and fill slopes will be analyzed for each phase of the proposed development.

3. Due to the high natural moisture content and the expansive qualities of the soil upon drying, it is recommended that the compaction requirements be reduced from 90% to 85% per AASHO-T-180-57.

4. Since the soil material is moderately expansive when going from a dry to wet condition, it is recommended that the moisture content be maintained in excess of optimum to the percentage at which the 85% compaction can be obtained and the resulting swell less than 4%.

5. Should the footing foundation and interior slab soil material

dry sufficiently, the areas should be rewatered such that the moisture is maintained at a percentage which will not cause further expansion directly prior to placement of concrete.

6. In general, the foundation soil material will be capable of supporting a total loading of 1500 PSF. The actual bearing value will be assigned to the addenda for each phase of development.

7. Subdrains and culverts should be constructed in accordance with the engineer's recommendations during construction. Field determinations for the necessity of subdrains and their locations will be determined by the Soils Engineer during the grading operation. Construction of subdrains and or culverts should be in accordance with the standard specifications for the City and County of Honolulu and the Federal Housing Administration's minimum property standards or as field conditions warrant.

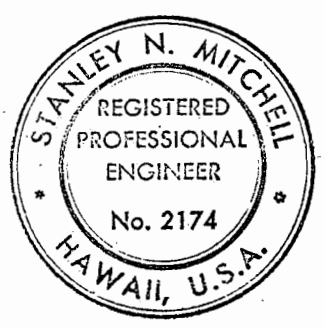
8. Grading specifications will be attached to the addenda for each phase of development.

Respectfully submitted,

GEOLABS-HAWAII, INC.

Stanley N. Mitchell

Stanley N. Mitchell, P.E.



Ronald A. Pickering
Vice President

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% material is larger than No. 200 Sieve Size)	GRAVELS (More than 50% of coarse fraction is larger than No 4 Sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel sand mixtures, little or no fines
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS (More than 50% of coarse fraction is smaller than No 4 Sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands, gravelly sands, little or no fines
		SANDS WITH FINES (Appreciable amt. of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (More than 50% material is smaller than No. 200 Sieve size)	SILTS AND CLAYS Liquid Limit less than 50%		ML	Inorganic silts & very fine sands, rock flour, silty or clayey fine sands, clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, silty clays, lean clays
			OL	Organic silts & organic silty clays of low plasticity
	SILTS AND CLAYS Liquid Limit Greater than 50%		MH	Inorganic Silts, micaceous and diatomaceous fine Sandy or Silty soils, elastic silts.
			CH	Inorganic clay of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils

PARTICLE SIZE LIMITS

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

3in 3/4in No.4 No.10 No.40 No.200 .074mm .005 mm

U.S STANDARD SIEVE SIZE

GEOLABS-HAWAII, INC.

1553 COLBURN ST., HONOLULU, H. I. TEL. 815-064

TABLE I

Test Pit No.	Elevation*	Depth (feet)	Description	Unified Soil Classification
1	174	0 - 1.5	Medium, brown Clayey SILT.	MH
		1.5 - 9.0	Stiff, brown Silty CLAY.	CL
2	181	0 - 2.0	Medium, brown Clayey SILT.	MH
		2.0 - 9.0	Very stiff, red and gray Silty CLAY.	CH
3	181	0 - 1.0	Existing fill - gray Silty CLAY (Adobe).	CH
		1.0 - 9.0	Stiff to very stiff, red and gray Silty CLAY.	CH
4	167	0 - 1.0	Medium, brown Clayey SILT.	MH
		1.0 - 9.0	Stiff, brown Clayey SILT.	MH
5	157	0 - 1.0	Medium, brown Clayey SILT.	MH
		1.0 - 9.0	Stiff, mottled brown Silty CLAY.	CL
6	141	0 - 1.0	Medium, brown Clayey SILT.	MH
		1.0 - 4.0	Stiff, mottled brown Silty CLAY.	CL
		4.0 - 9.0	Very stiff, red and gray Silty CLAY.	CH

Terms used to describe relative firmness or looseness of soils based upon field observations:

Soft, Medium, Stiff, Very Stiff) Silt or Clay

Loose, Dense) Sand or Gravel

TABLE I

Test Pit No.	Elevation*	Depth (feet)	Description	Unified Soil Classification
7	133	0 - 1.0	Medium, brown Clayey SILT.	MH
		1.0 - 5.0	Stiff, brown Silty CLAY with fragments of decomposed rock.	CL
		5.0 - 9.0	Stiff, gray Silty CLAY.	CH
8	164	0 - 2.5	Medium to stiff, brown Clayey SILT.	MH
		2.5 - 9.0	Stiff, brown Silty CLAY with fragments of decomposed rock.	CL
9	153	0 - 0.5	Medium, brown Clayey SILT.	MH
		0.5 - 4.0	Stiff, brown Silty CLAY.	CL
		4.0 - 9.0	Stiff, brown Silty CLAY with fragments of decomposed rock.	CL
10	145	0 - 1.0	Medium, brown Clayey SILT.	MH
		1.0 - 9.0	Stiff to very stiff, brown Silty CLAY with fragments of decomposed rock.	CL
11	163	0 - 1.0	Medium, brown Clayey SILT with roots.	MH
		1.0 - 9.0	Stiff, brown Silty CLAY with fragments of decomposed rock.	CL
12	139	0 - 1.0	Medium, brown Clayey SILT.	MH
		1.0 - 2.5	Stiff, brown Clayey SILT with fragments of decomposed rock.	MH
		2.5 - 9.0	Stiff, brown Silty CLAY.	CL

TABLE I

Test Pit No.	Elevation*	Depth (feet)	Description	Unified Soil Classification
13	147	0 - 0.5	Medium, brown Clayey SILT.	MH
		0.5 - 9.0	Stiff to very stiff, brown Silty CLAY with fragments of decomposed rock.	CL
14	139	0 - 1.0	Medium, brown Clayey SILT.	MH
		1.0 - 9.0	Stiff, brown Silty CLAY with fragments of decomposed rock.	CL
15	135	0 - 1.0	Medium, brown Clayey SILT.	MH
		1.0 - 4.0	Stiff, brown Silty CLAY.	CL
		4.0 - 8.0	Stiff, brown Silty CLAY with fragments of decomposed rock.	CL
16	129	0 - 8.0	Stiff, brown Silty CLAY with fragments of decomposed rock. Some boulders below 6 feet.	CL
17	126	0 - 1.0	Medium, brown Clayey SILT.	MH
		1.0 - 8.0	Stiff, brown Silty CLAY.	CL
18	129	0 - 2.5	Medium, brown Clayey SILT with some rocks.	MH
		2.5 - 7.0	Stiff, brown Silty CLAY.	CL
19	112	0 - 3.0	Loose, brown Clayey SAND and GRAVEL.	GC
		3.0 - 5.0	Medium, mottled brown Silty CLAY.	CH
		5.0 - 7.0	Soft, mottled gray Silty CLAY.	CH

TABLE I

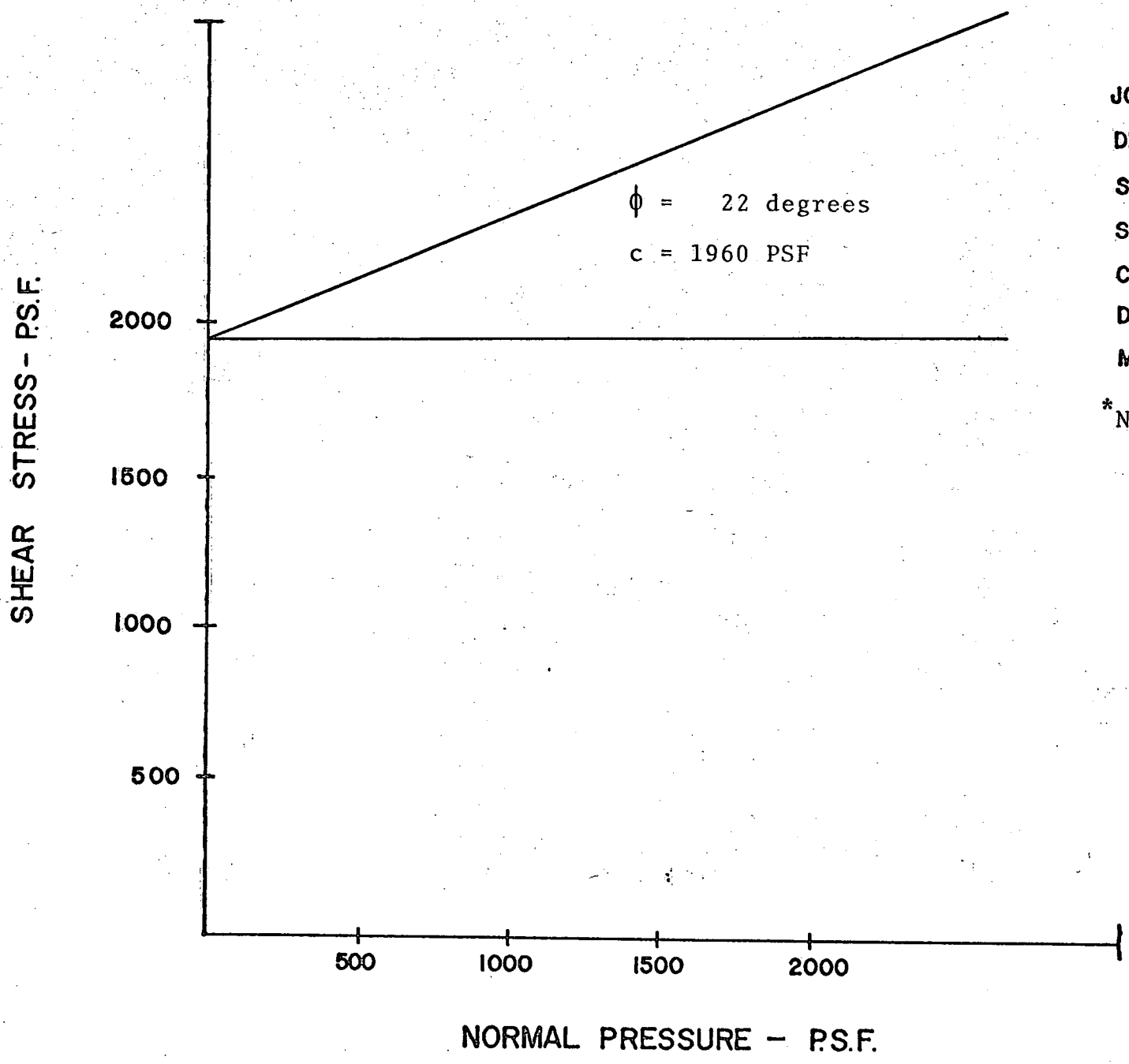
Test Pit No.	Elevation*	Depth (feet)	Description	Unified Soil Classification
20	108	0 - 3.0	Loose, brown Clayey SAND and GRAVEL.	GC
		3.0 - 6.0	Stiff, brown Silty CLAY.	CL
		6.0 - 8.0	Stiff, mottled gray Silty CLAY.	CH
21	100	0 - 3.0	Loose, brown Clayey SAND and GRAVEL.	GC
		3.0 - 5.5	Medium, mottled gray Silty CLAY with some organic material and lenses of silty sand.	OL
		5.5 - 7.0	Soft, mottled gray Silty CLAY with sand lenses. Water at 5.5 feet.	CH
22	98	0 - 2.0	Medium, gray Gravelly SILT and CLAY.	GM-CL
		2.0 - 4.0	Dense, brown Silty SAND and GRAVEL.	GM
		4.0 - 5.0	Dense, GRAVEL, COBBLES and BOULDERS up to 1 foot across.	GP
23	93	0 - 4.5	Medium,mottled gray Silty CLAY with some gravel.	CL
		4.5 - 5.0	Dense, GRAVEL and COBBLES. Water at 4.5 feet.	GP
24	88	0 - 4.5	Medium, gray-brown Gravelly SILT and CLAY.	CL
		4.5 - 6.0	Dense, Silty GRAVEL, COBBLES and BOULDERS up to 2 feet across.	GM

TABLE I

Test Pit No.	Elevation*	Depth (feet)	Description	Unified Soil Classification
25	81	0 - 1.0	Loose, gray-brown Clayey SAND and GRAVEL.	GC
		1.0 - 4.0	Dense, Silty SAND, GRAVEL and COBBLES.	GM
		4.0 - 4.5	Stiff, mottled gray Silty CLAY.	CL
		4.5 - 5.0	Dense, GRAVEL and BOULDERS.	GP
26	141	0 - 1.5	Medium, brown Clayey SILT.	MH
		1.5 - 4.0	Stiff, mottled gray Silty CLAY.	OH
		4.0 - 9.0	Stiff, mottled gray Silty CLAY with soft decomposed rocks.	OH

* Elevations taken from client's contour map.

DIRECT SHEAR TEST



JOB No. 141

DH/TP No. 3, 4, 5*

SAMPLE DEPTH 0-5 Feet

SOIL TYPE MH-CL-CH

CONDITION Remolded

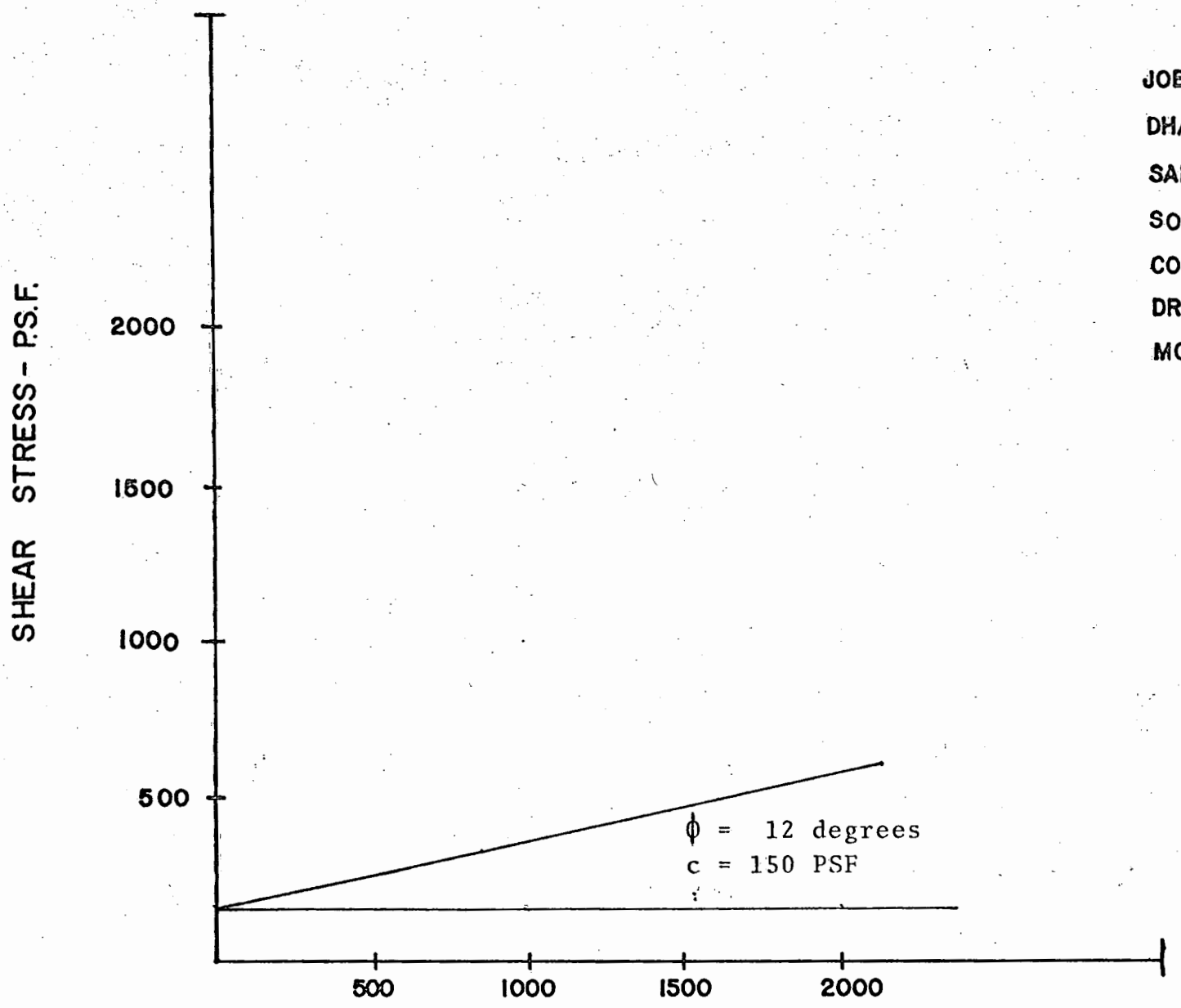
DRY UNIT WT. 70.5 PCF

MOISTURE 35%

*Note: Composite Sample

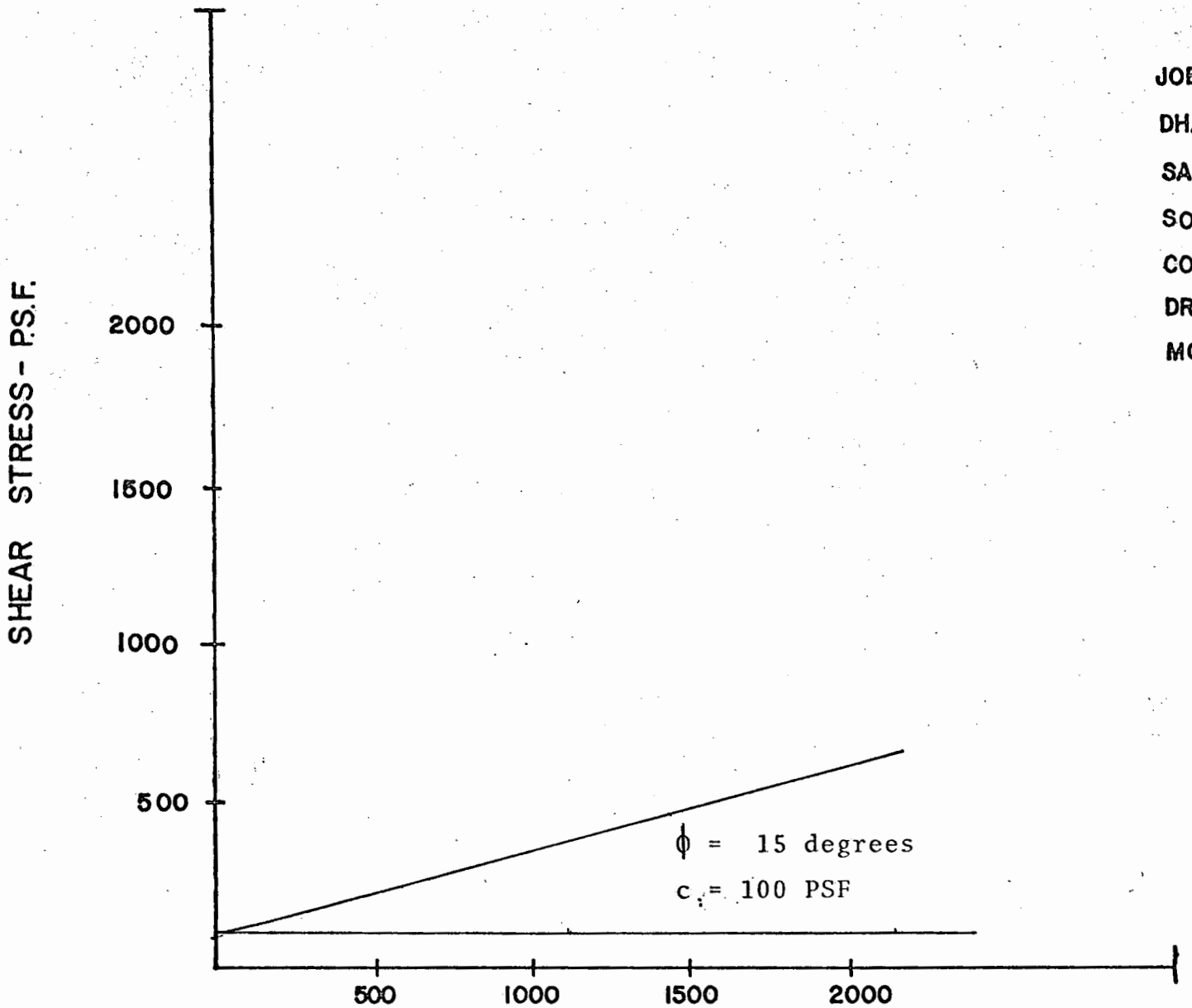
DIRECT SHEAR TEST

JOB No. 141
DH/TP No. 19
SAMPLE DEPTH 4'
SOIL TYPE CH
CONDITION UNDISTURBED
DRY UNIT WT. 52.5 PCF
MOISTURE 74.6%



DIRECT SHEAR TEST

JOB No. 141
DH/TP No. 21
SAMPLE DEPTH 4'
SOIL TYPE OL
CONDITION UNDISTURBED
DRY UNIT WT. 62.7 PCF
MOISTURE 59.0%



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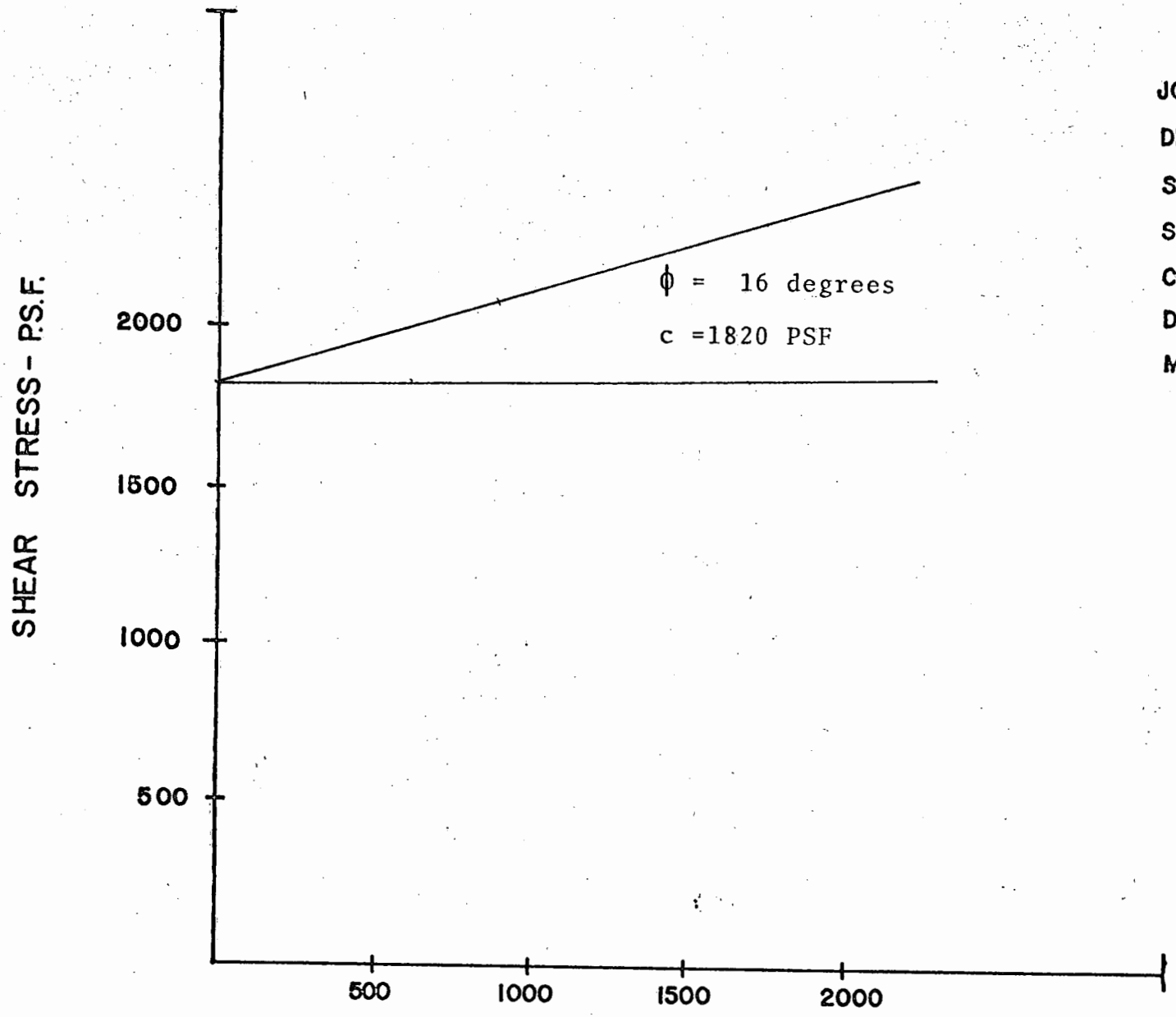


JOB No. 141

DH/TP No. 26

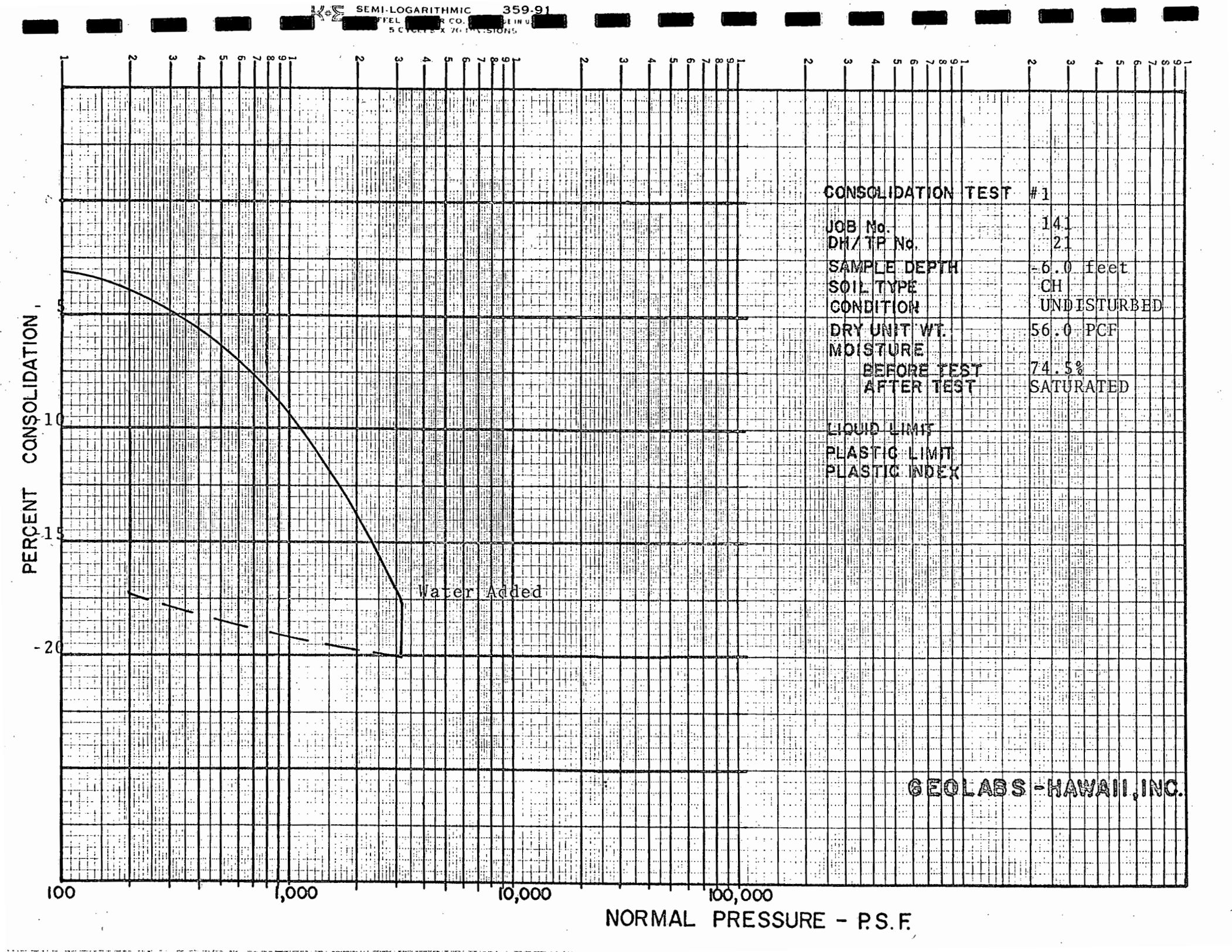
SAMPLE DEPTH 4'

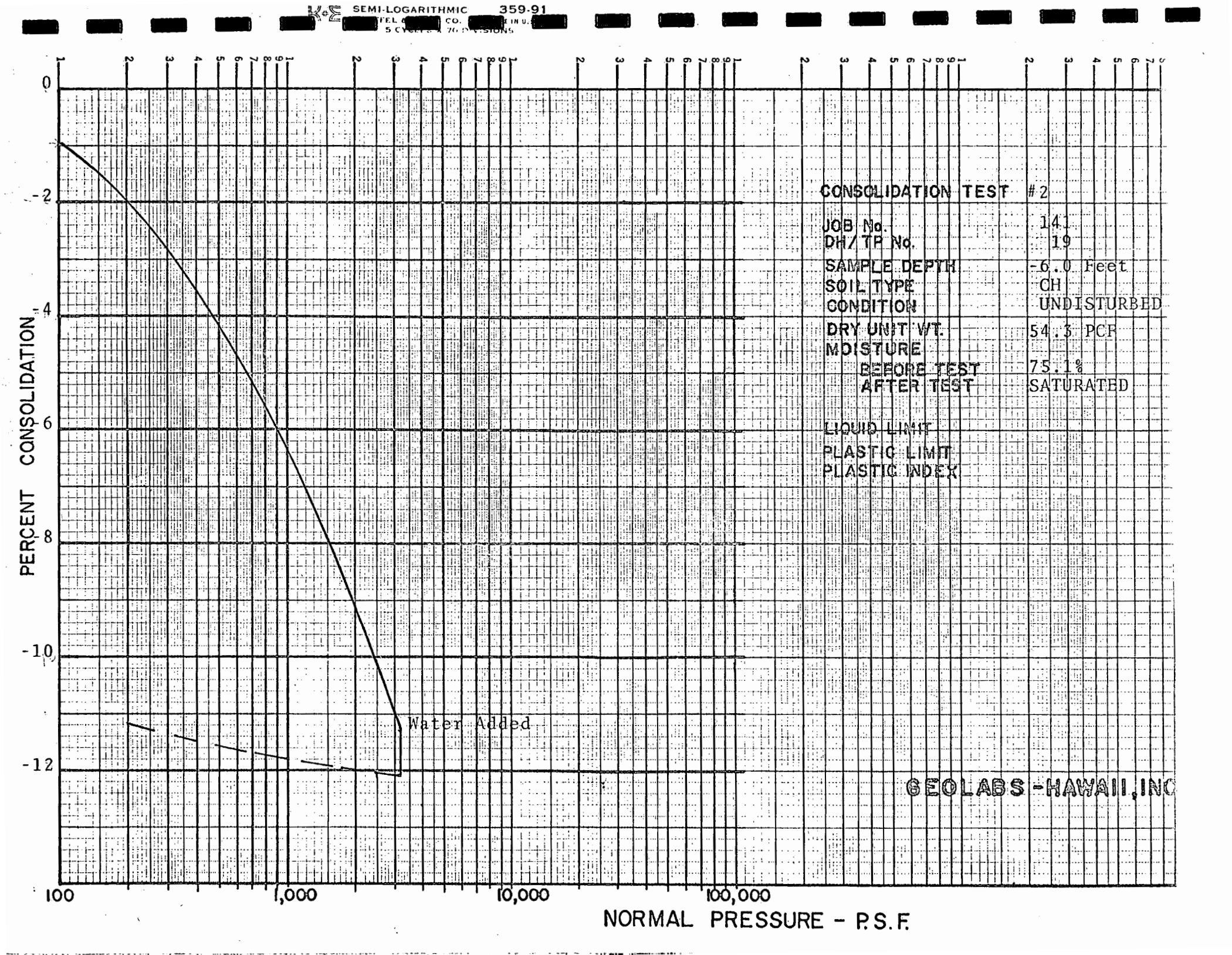
SOIL TYPE CH

CONDITION UNDISTURBED

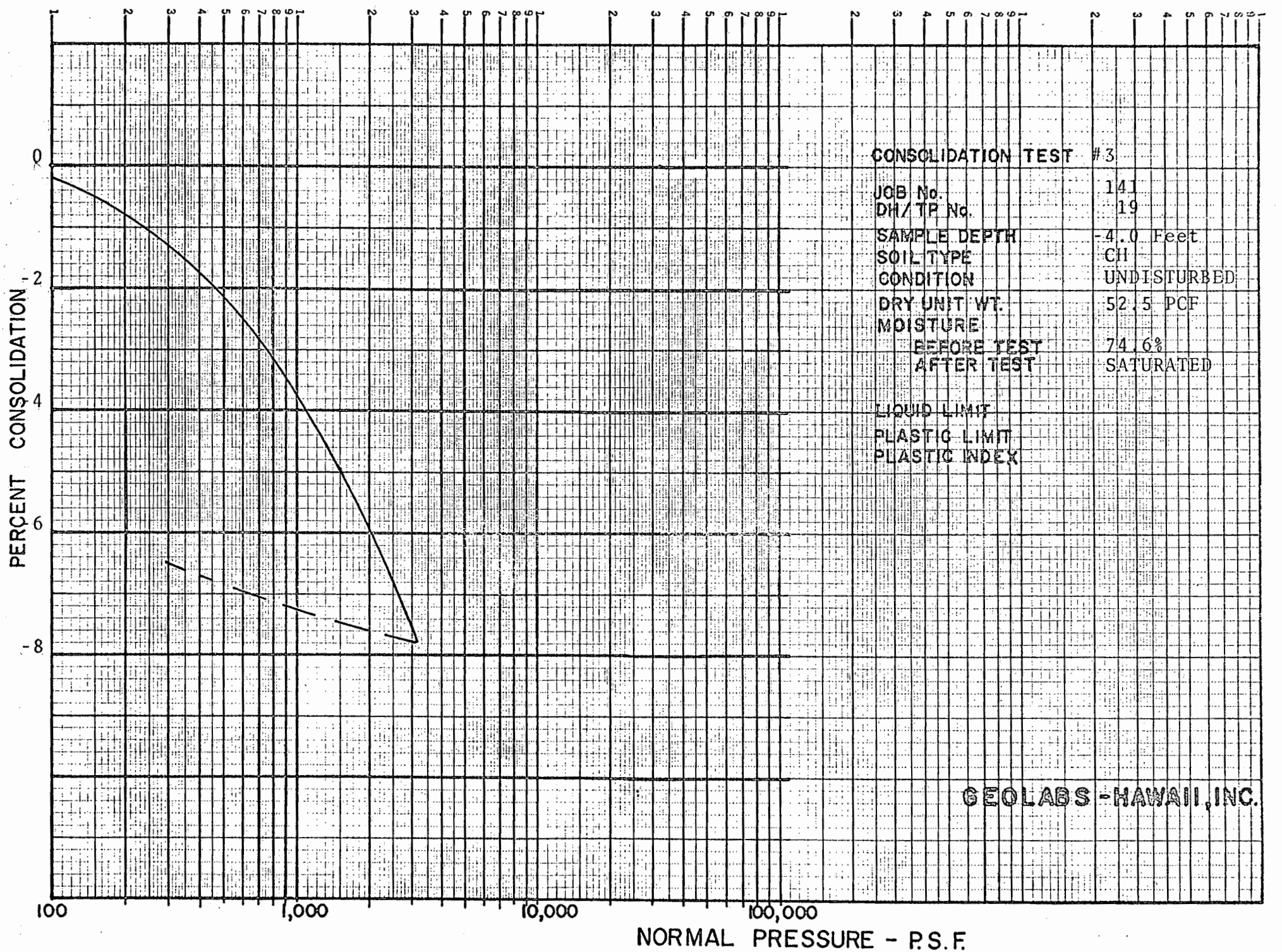
DRY UNIT WT. 62.7 PCF

MOISTURE 61.0%




SEMI-LOGARITHMIC 359-91
5 CYCLES X 70 DIVISIONS
0
-2
-4
-6
-8
-10
-12
PERCENT CONSOLIDATION
100
1,000
10,000
100,000
NORMAL PRESSURE - P.S.F.
Water Added
CONSOLIDATION TEST #2
JOB No. 141
DH/TP No. 19
SAMPLE DEPTH -6.0 Feet
SOIL TYPE CH
CONDITION UNDISTURBED
DRY UNIT WT. 54.3 PCF
MOISTURE
BEFORE TEST 75.1%
AFTER TEST SATURATED
LIQUID LIMIT
PLASTIC LIMIT
PLASTIC INDEX
GEOLABS-HAWAII, INC

SEMI-LOGARITHMIC 359-91



W.O. 141

LABORATORY MAXIMUM DENSITY TESTS

(AASHO-T-180-57)

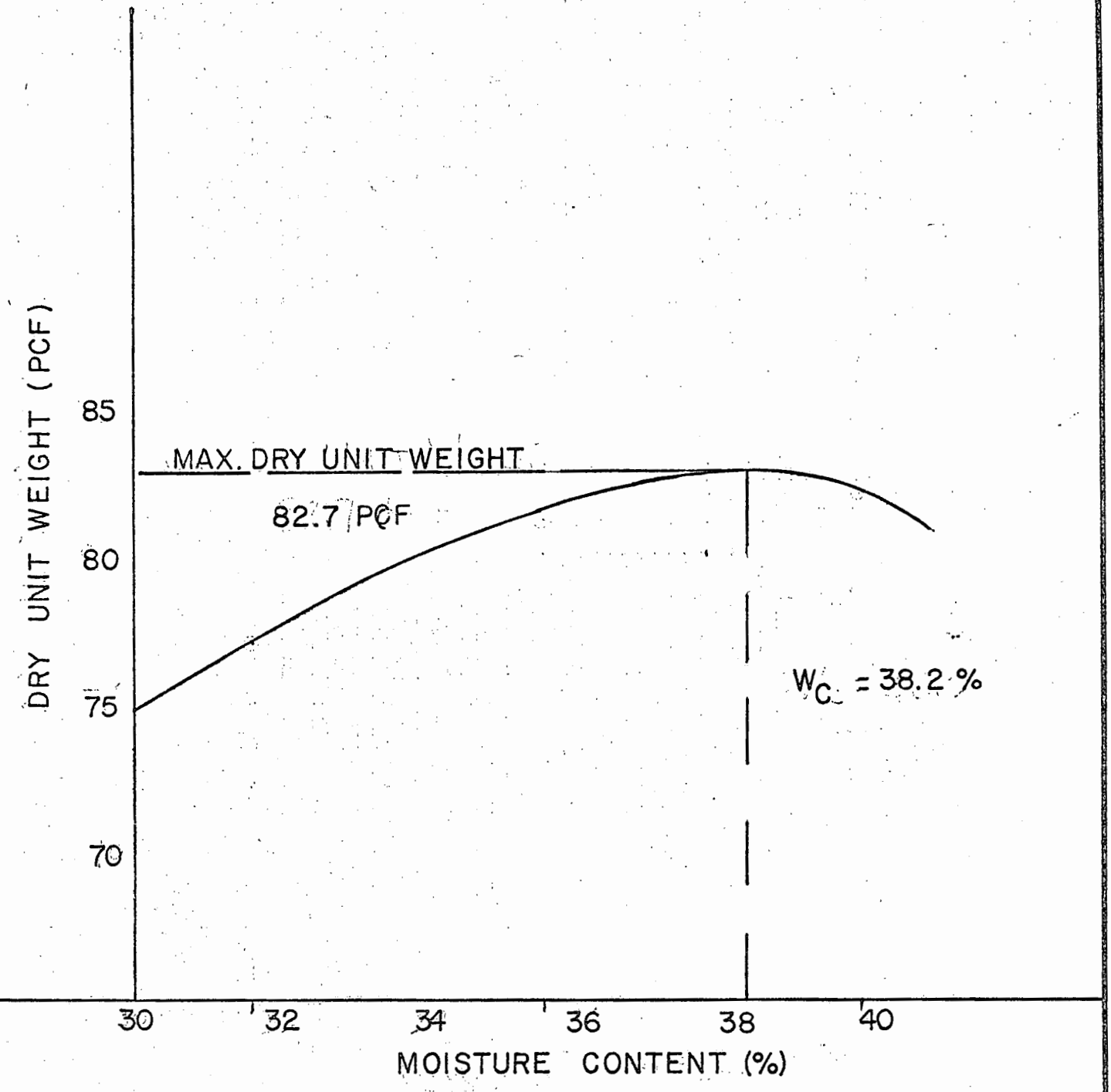
	I	II	III
Maximum Dry Unit Weight (PCF)	82.7	83.5	80.0
Optimum Moisture Content (%)	38.2	35.0	39.5
Soil Classification	CL	CL	CH
% Swell with 60 PSF Surcharge (Remolded to 90% @ Optimum Moisture)	7.8*	5.0*	12.5*

* No swell for undisturbed sample at natural moisture and 100 PSF surcharge.

LABORATORY TEST RESULTS

Project: Ahuimanu W. O. No. 141

Drill Hole No.	1	2	8		
Depth (ft.)	-7.0	-8.0	-5.0		
Hydrometer Tests					
% Sand					
% Silt					
% Clay					
Atterberg Limit Tests					
Liquid Limit (%)					
Plastic Limit (%)					
Plastic Index					
USCS	CL	CH	CL		
Specific Gravity					
Unconf. Str. (PSF)					
Proctor					
Max Dry Unit Wt (PCF)	82.7	80.0	83.5		
Optimum Water (%)	38.2	39.5	35.0		
Expansion (@ 60 PSF)					
Natural (%)					
Remolded (%)	7.8	12.5	5.0		
In-Place wet (PCF)	92.0	97.6			
In-Place Wc (%)	42.8	57.6			
CBR					
Sample dry (PCF)					
Sample Wc					
% Expansion					
CBR @ 0.1" Penet.					



SAMPLE LOCATION

T.P. # 1 @ 7.0 FT.

SOIL CLASS: CL

AASHO-T-180-57

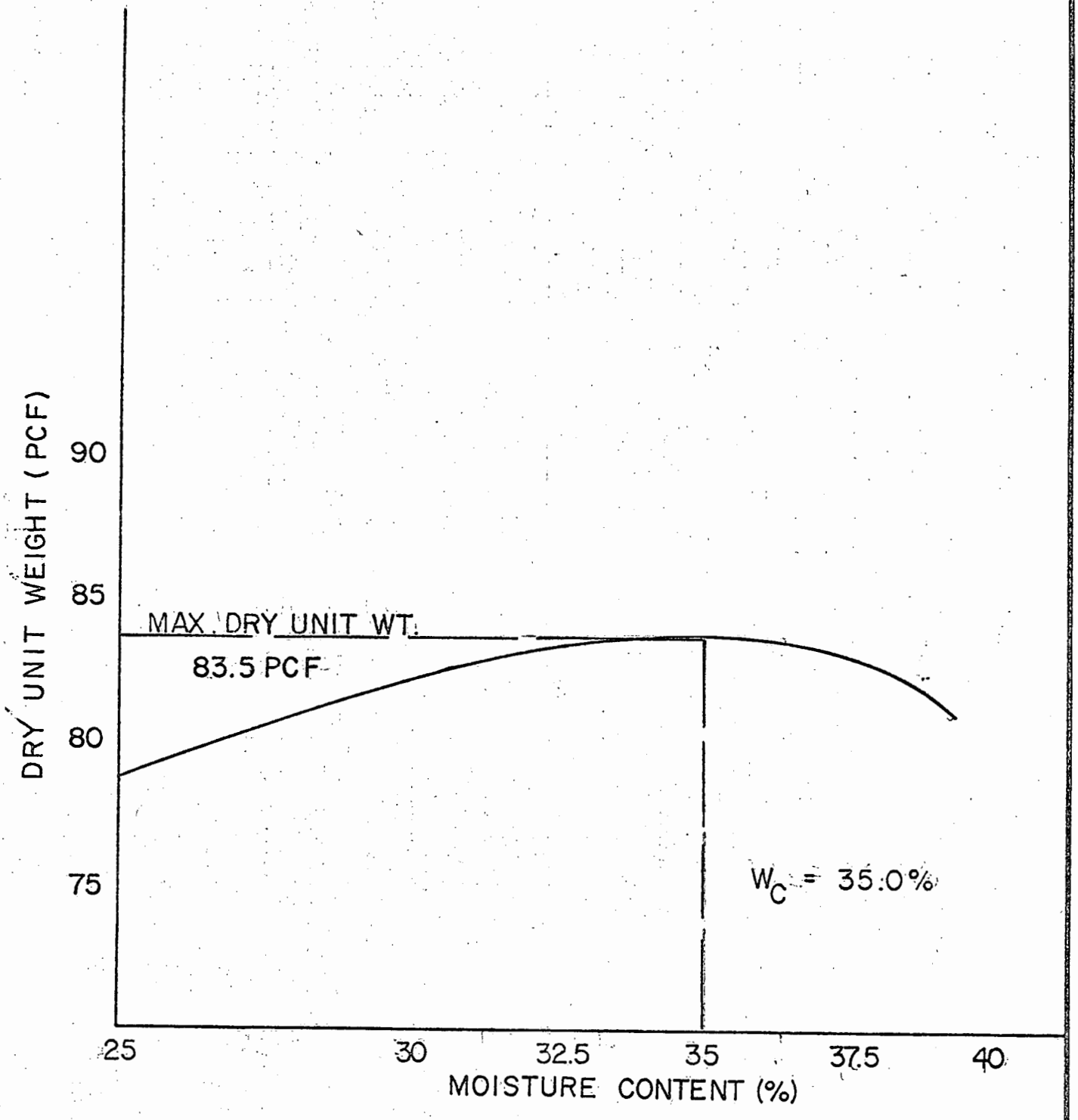
GEOLABS, INC.

GEOLOGY AND SOIL ENGINEERING

DATE 10-3-69 BY LML

SCALE _____ W.O. 141

PLATE 1



SAMPLE LOCATION
T.P. #8 @ 5.0FT.

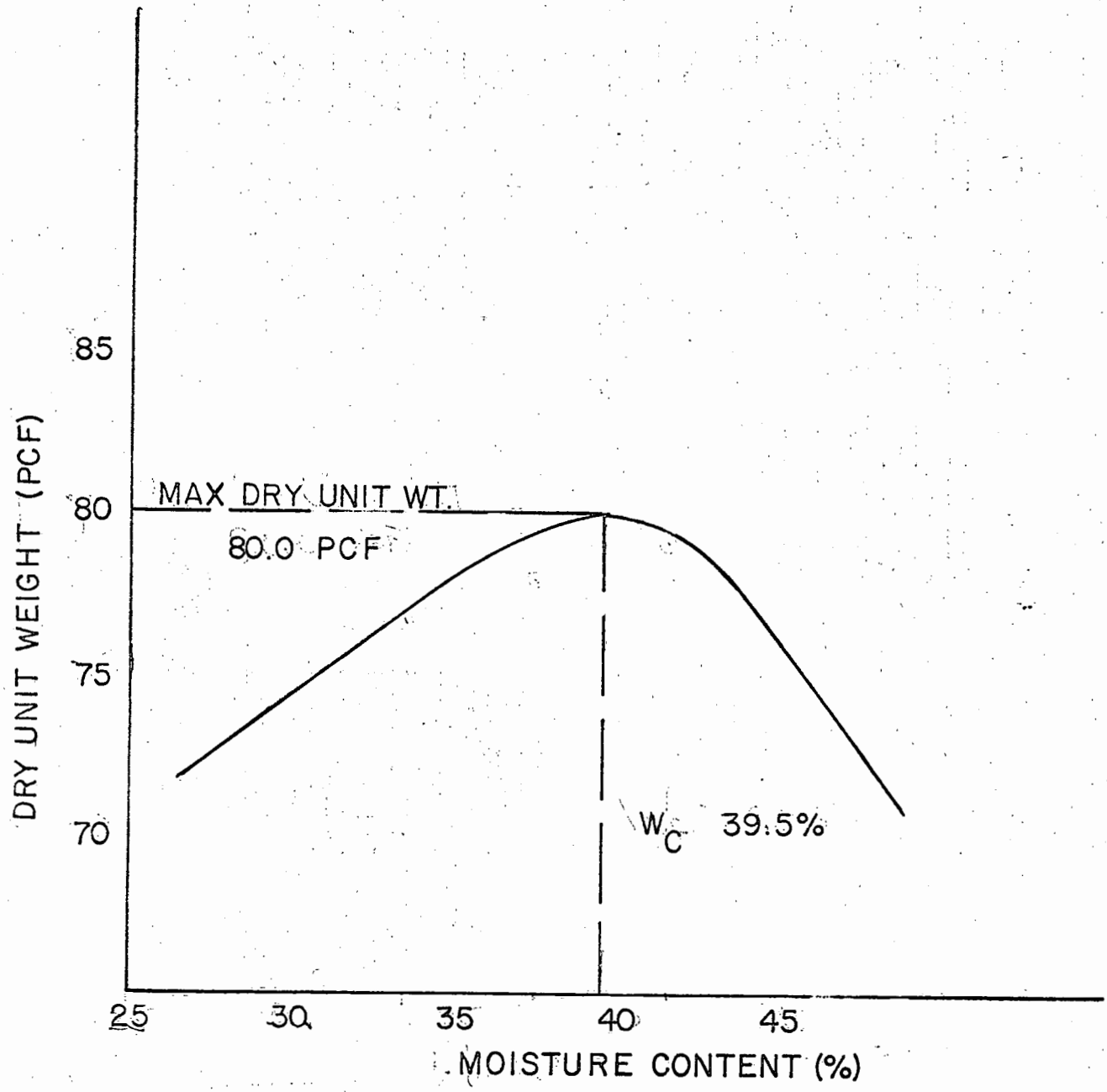
SOIL CLASS: CL

AASHO - T - 180 - 57

GEOLABS, INC.
GEOLOGY AND SOIL ENGINEERING

DATE 10-3-69 BY LML
SCALE _____ W.O. 141

PLATE 2



SAMPLE LOCATION
T.P.# 2 @ 8.0 FT.

SOIL CLASS: CH

AASHO-T-180-57

GEOLABS, INC.
GEOLOGY AND SOIL ENGINEERING

DATE 10-3-69 BY LMI
SCALE _____ W.O. 141

PLATE 3

Job Club View Townhouses DATA SUMMARY SHEET Work Order No. 141

TEST	LOCATION	ELEVATION FROM ORIGINAL GROUND	DRY DENSITY	MOISTURE CONTENT	MAXIMUM DRY DENSITY	OPTIMUM MOISTURE	FIELD COMPACTION PERCENT OF MAXIMUM	FINAL CONDITION	DATE
		In Feet	lb/cf	(Percent)	lb/cf	(Percent)	(Percent)		
No. 1	T.P. 2	-7.0	62.0	57.6	80.0	39.5	77.4	Not Applicable	
No. 2	T.P. 1	-5.5	64.8	42.8	82.7	37.7	78.4	" "	
No. 3	T.P. 7	-7.0	65.3	55.0	80.0	39.5	81.7	" "	
No. 4	T.P. 14	-5.0	71.0	39.0	83.5	35.0	85.1	" "	
No. 5	T.P. 17	-5.0	65.7	50.2	83.5	35.0	78.7	" "	
No. 6	T.P. 18	-4.0	64.5	50.6	83.5	35.0	77.3	" "	
No. 7	T.P. 19	-4.0	52.5	74.6	80.0	39.5	65.6	" "	
No. 8	T.P. 19	-6.0	54.3	75.1	80.0	39.5	67.9	" "	
No. 9	T.P. 21	-6.0	56.0	74.5	80.0	39.5	70.0	" "	
No.10	T.P. 26	-6.0	58.8	59.0	82.7	37.7	71.2	" "	
	NOTE:	OPTIMUM MOISTURE CONTENTS ARE AS FOLLOWS:							
	MAXIMUM DRY DENSITY (P.C.F.) =				80.0	83.5	82.7		
	OPTIMUM MOISTURE (%) =				39.5%	35.0%	38.2%		

SUMMARY OF FIELD MOISTURE CONTENTS

Test Pit No.	Depth of Sample (Ft.)	Average Moisture Content (%)	Soil Class
1	1.5 - 9.0	44.6	CL
2	2.5 - 9.0	50.0	CH
4	1.0 - 9.0	47.9	MH
6	1.0 - 4.0	48.6	CL
6	4.0 - 9.0	52.3	CH
7	1.0 - 5.0	51.0	CL
7	5.0 - 9.0	49.3	CH
8	2.5 - 9.0	50.5	CL
9	0.5 - 4.0	48.5	CL
9	4.0 - 9.0	53.6	CL
10	1.0 - 9.0	38.8	CL
11	1.0 - 9.0	47.4	CL
12	2.5 - 9.0	45.0	CL
13	0.5 - 9.0	45.7	CL
14	1.0 - 9.0	47.5	CL
16	1.0 - 8.0	42.1	CL
18	2.5 - 7.0	56.5	CL
19	4.0	74.6	CH
19	6.0	75.1	CH
20	3.0 - 6.0	60.5	CL
21	6.0	74.5	CH
23	0.0 - 4.5	41.7	CL
26	1.5 - 4.0	52.0	OH
26	4.0 - 9.0	61.6	OH

-SITE PLAN-

CLUBVIEW ESTATES UNITS 2c–2g

AHUIMANU, OAHU

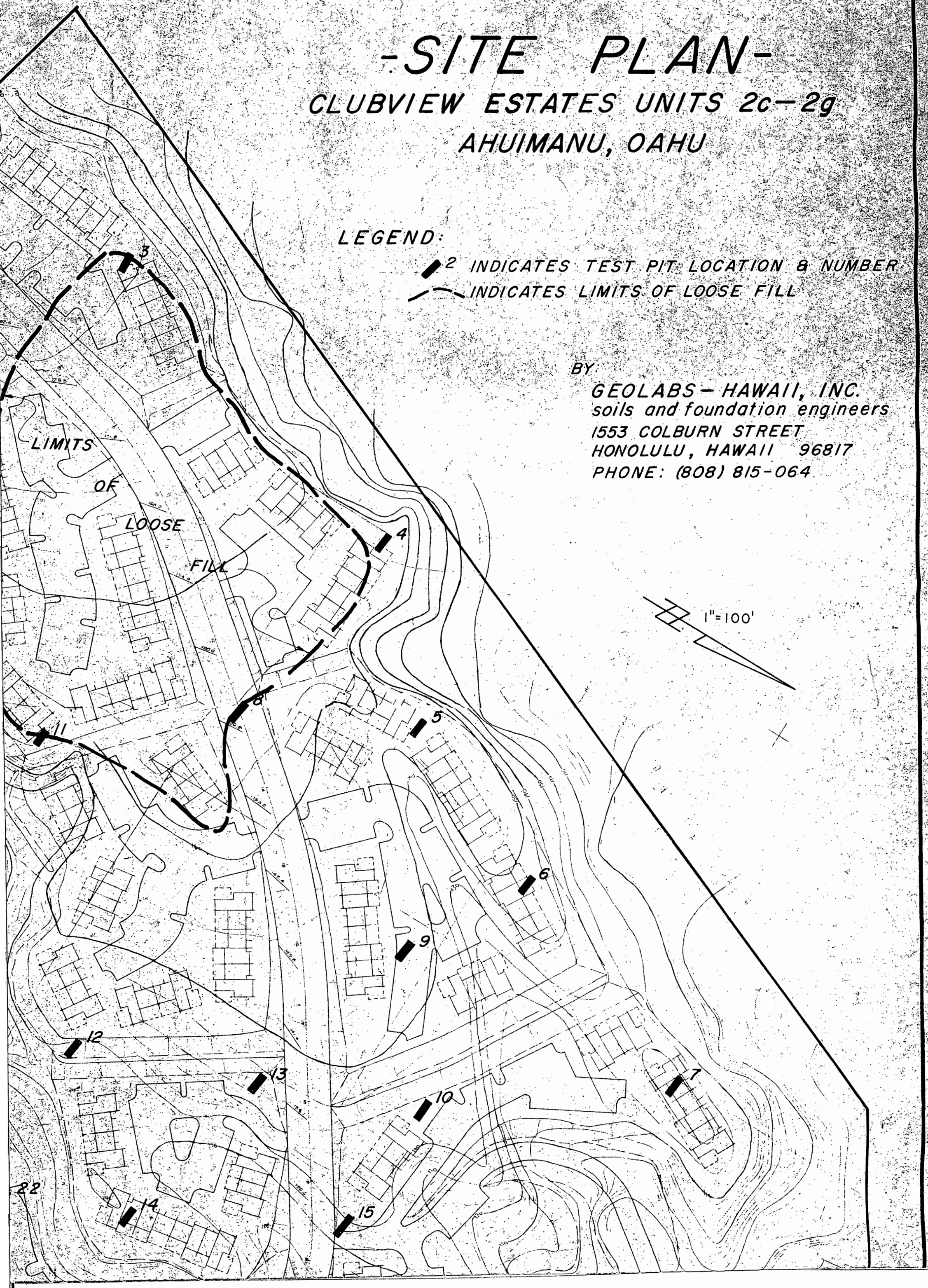
LEGEND:

2 INDICATES TEST PIT LOCATION & NUMBER

INDICATES LIMITS OF LOOSE FILL

BY:

GEOLABS – HAWAII, INC.
soils and foundation engineers
1553 COLBURN STREET
HONOLULU, HAWAII 96817
PHONE: (808) 815-064



W O 141 Oct 10 1969 FRA

BASE PLAN BY CHARLES YOON and ASSOC

BUILDING LINE

LAKEFIELD — NWY

25

16

24

23

CLUBVIEW UNITS 2a and 2b, AHUIMANU

REPORT / DATED 4-9-69

GEOLABS-HAWAII, Inc.
Soils and Foundation Engineering, Geology
1553 Colburn Street, Suite 203 • Honolulu, Hawaii 96817 • (808) 841-5064

September 6, 1972

W. O. 359-00

Dan Ostrow Construction Co., Inc.
745 Fort Street
Suite 1106
Honolulu, Hawaii 96813

Attention: Mr. Jim Wodehouse, V.P.

Subject: Grading Plan Review, Club View II

Reference: Preliminary Soils Report dated December 11, 1970
by Geolabs-Hawaii, Inc.
Our Work Order 141

Gentlemen:

As requested, we have reviewed our soils report for Club View Estates Townhouses dated December 11, 1970. It is our opinion that this report is still applicable for construction of this Unit (Club View II) as shown on the latest grading plan dated June 27, 1972 prepared by VTN-Pacific. Grading Specifications are attached and should be part of the report and should be followed during construction.

Should you have any questions or need additional clarification regarding this report, please do not hesitate to call.

Very truly yours,

GEOLABS-HAWAII, INC.

Paul H. Rice

Paul H. Rice, P.E.

PHR:yk

Encl: Grading Specifications

xc: (2) Addressee
(2) VTN-Pacific (with reports) ✓
Attn: Calvin Kim

GRADING SPECIFICATIONS
CLUB VIEW II
KANEOHE, OAHU, HAWAII

The work under this section includes:

1. Clearing and grubbing of site
2. Preparation of natural ground
3. Preparation of fill areas
4. Placement and control of fill operations
5. Compaction equipment
6. Removal and backfill of underground structures
7. Supervision of earthwork
8. Seasonal requirements

1. Clearing

All areas within contract limit lines shall be cleared of trash, debris and organic matter, and such material shall be burned and removed from the site.

2. Preparation of Natural Ground

In areas where the bottom of footings are designed on or below existing natural ground, the soils shall be scarified to a depth as determined by the soils engineer until the material is free of all uneven features and shall be precompacted as outlined in the following Section #4b.

3. Preparation of Fill Areas

All areas upon which fill is to be placed after clearing, as outlined in Section #1 of these specifications, shall be scarified until free of uneven features to a depth as determined by the soils engineer, and watered and compacted according to Section #4 of these specifications.

4. Placement of Fill

a. Material for fill shall consist of onsite soils. Fill material shall be free of all organic matter and other deleterious material, and shall not contain rocks or lumps in excess of four inches (4") in diameter.

b. Compaction of Fill

After the base for the fill has been prepared as described above, it shall be brought to the proper moisture content and compacted to not less than 90% of maximum density in accordance with Test ASTM D-1557-70.

c. Depth of Fill

Fill shall be placed in horizontal layers which,

when compacted, will not exceed six inches (6").

5. Compaction Equipment

The soils engineer shall determine the type of compacting equipment which will attain the specified results in the most efficient manner. Sheepsfoot, vibratory, or pneumatic tire rollers may be used in the test section and the equipment which produces the specified results in the most expedient manner as determined by the soils engineer shall be employed by the contractor. The equipment used in rolling shall be in good working condition, fully ballasted, and self cleaning. Fill material placed in an unsatisfactory condition and not within the enclosed specifications shall be rejected by the soils engineer and the contractor shall rework the fill placed such that the specifications are followed.

6. Removal and Backfill of Underground Structures

Any underground structures such as cesspools, cisterns, septic tanks, wells, pipe lines, etc. shall be removed under the direction of the soils engineer. Backfill of the excavation shall be in accordance with these specifications.

7. Supervision of Earthwork

Field density tests shall be made by the soils engineer during the earthwork operation such that he may certify that the fill was placed according to accepted specifications. In the event that field density tests of a layer or any portion thereof is less than the required density, the particular layer or portion shall be reworked until the required density is obtained.

8. Seasonal Requirements

No fill shall be placed during unfavorable weather conditions as determined by the soils engineer. After interruption of work due to heavy rain, the soils engineer shall approve previously placed fill before resumption of earthmoving operations.