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PRELIMINARY FOUNDATION INVESTIGATION

Proposed East Entrance Gate Structure

University of California Santa Barbara

Santa Barbara County

California

CLIENT

University of California at Santa Barbara
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December 1, 2005
Lab No: 66426-2
File No: 05-12279-2

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INTRODUCTION

This report presents the results of a preliminary foundation investigation performed at the east entrance gate of the University of California at Santa Barbara, in the Isla Vista area of Santa Barbara County, California. Presently existing at the site is a kiosk structure on the center lane divider of the entrance road. The paved road is the southwest terminus of Ward Memorial Boulevard, which is Highway 217. The site is approximately level and surface vegetation consists of a manicured lawn.

SCOPE OF WORK

It is the purpose of this investigation to classify the soil disclosed by the exploratory borings and excavations by observation and tests on selected samples. In addition, this study includes laboratory tests to evaluate soil strength, the effect of moisture variation on the soil-bearing capacity, compressibility, liquefaction, and expansiveness. Based upon this information, we will provide preliminary grading and foundation recommendations for the proposed east entrance gate structure.

The scope of this investigation does not include the analyses of the corrosive potential of the soil, previous site construction, or analyses of geologic structures and their associated features, such as faults, fractures, bedding planes, strike and dip angles, ancient landslides, potential for earth movement in undisturbed or natural soil formations sloped or level, or other sources of potential instability which relate to the geologic conditions, as these items should be addressed by a qualified Engineering Geologist.

This study is a soil engineering report. It is not a geology report as referenced in Section 3309.4 and 3309.6 of Chapter 33 of the Uniform Building Code (UBC). It is the intent of this report to comply with Section 3309.5 of Chapter 33 and Section 1804 of Chapter 18 of the UBC. This exploration was conducted in accordance with presently accepted geotechnical engineering procedures currently applied in the local community in order to provide the appropriate geotechnical design characteristics of the foundations soils and of the proposed fill soils in order to properly evaluate the proposed structure with respect to differential settlement based upon the anticipated soil characteristics at the time of construction.

LIMITATIONS

This Laboratory's basic assumption is that the soil boring presented herein is representative of the entire footprint of the proposed development, however, no warranty is implied. If, during the course of construction, soil conditions are encountered which vary from those presented herein, please contact this Laboratory immediately so appropriate field modifications may be expeditiously proposed.

It is your responsibility to contact our office, providing at least 48 hours of notice for grading or footing excavation observations and testing. The observation of excavations during

the construction phase represents an opportunity by our firm to either confirm soil conditions estimated by the exploratory borings or to discover soil conditions which have not been addressed. When such undisclosed conditions are encountered, opinions and recommendations addressing these conditions will be rendered at that time.

This report is considered preliminary and no person should consider the recommendations or soil conditions described herein as conclusive. The recommendations and conclusions of this report are considered preliminary until all excavations have been observed during the construction phase, after which a final report will be issued stating that the grading and foundation works accomplished and installed are appropriate for the soil conditions encountered.

FIELD INVESTIGATION

15' 50'

The subsurface soil conditions were explored by two truck-mounted auger boring which was drilled to depths of up to 50 feet, supplemented by two field density tests. The location of the borings was selected as appropriate and representative. Representative relatively "undisturbed" tube soil samples were obtained during the drilling operation by the thin-walled sampling tube method (ASTM D-1587). Laboratory tests and analyses of representative soil samples, obtained during the drilling operation, were performed to estimate the engineering properties and determine the soil classification of earth materials encountered in accordance with UBC Standard Chapter 18. The location of the borings is shown on Plate 1. The boring log data is presented in Appendix A, "Field Investigation", while the results of the laboratory tests are provided in Appendix B, "Laboratory Tests".

SOIL CONDITIONS

1. No groundwater was encountered in the exploratory borings which extended to depths of up to 50 feet. It should be recognized that water table elevations, even seasonal perched water tables, might fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use, and climatic conditions, as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.
2. The soil profile consists of inter-bedded layers of silt and sand over the Sisquac shale. The Sisquac shale was encountered at a depth of 12 to 14 feet below the existing grade.
3. The supporting soils were found to have a very low potential for expansion.
4. The soil type per the Uniform Building Code Table 16-J is estimated to be S_D . The site is located in Seismic Zone 4 and is estimated to be within two kilometers of a Type B fault.

5. The potential for liquefaction is considered to be low.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

It is the opinion of this Laboratory the proposed construction is feasible from a soil-engineering perspective provided the recommendations contained in this soil engineering report are incorporated into the design and implemented during construction.

It is the understanding of this Laboratory the proposed east gate entrance will be a metal frame and masonry structure with a pile foundation. Based upon this understanding, we present the following preliminary recommendations:

FOUNDATIONS

1. All footings shall be designed as grade beams able to span between drilled and cast-in-place concrete piles.
2. All piles shall be drilled a minimum distance of 10 feet into the stiff shale layer, which was encountered at depths of approximately 12 to 14 feet below the present grade. A skin friction value of 1,000 psf may be assumed for that portion of the pile extending into the shale layer. An end bearing value of 3,000 psf at the pile tip may also be assumed. The minimum diameter shall be 18 inches.
3. A passive soil pressure--to resist lateral loads--of 500 pcf may be assumed up to a maximum value of 3,000 psf.
4. This Laboratory shall be requested to inspect the pile excavations prior to placement of steel and concrete.
5. The foundation shall be designed by a Civil or Structural Engineer.

ADJACENT LOADS

Where footings are placed at varying elevations, the effect of adjacent loads may be calculated using the widely published Formulas for Stresses in Semi-infinite Elastic Foundations or the Boussinesq figures and equations for both vertical and horizontal surcharge loads.

SETTLEMENT

It is the intent of the recommendations contained in this report to achieve angular distortions of approximately 1/480. A total settlement of approximately 1 inch or less is anticipated for foundations supported on the undisturbed native soil. The soil bearing values and estimated settlements contained in this report are preliminary and may need to be modified after the foundation plan is substantially complete.

CONSTRUCTION OBSERVATION

The owner or his agent shall request the Project Geotechnical Engineer to observe all excavations prior to placement of compacted soil, gravel backfill, or rebar and concrete.

PLAN REVIEW

We request the grading and foundation plans be submitted to our office for a general review to verify substantial compliance to the recommendations contained in this report.

CLOSURE

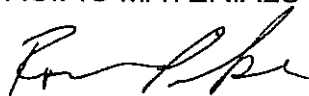
The recommendations contained herein are for the sole use of our client and are based upon this Laboratory's understanding of the project which has been described herein. If the project scope, location, or conceptual design is subsequently altered, this Laboratory shall be requested to modify, as necessary, the recommendations contained herein as is appropriate for the new development concept. If the recommendations of this report are not implemented within one year, we recommend an update and review of the contents of this report be performed by this Laboratory.

The recommendations contained herein are based upon the assumption that Pacific Materials Laboratory shall be requested to perform the testing and observation services which will be required during the grading and foundation operations in order to verify that the actual soil conditions encountered and the construction procedures are consistent with the recommendations contained herein. If this service is performed by others, only the technical correctness of the actual analytical soil tests described here is attested to by this Laboratory.

Thank you for the opportunity of providing this service. If you have any questions regarding this matter, please do not hesitate to call.

Respectfully submitted,

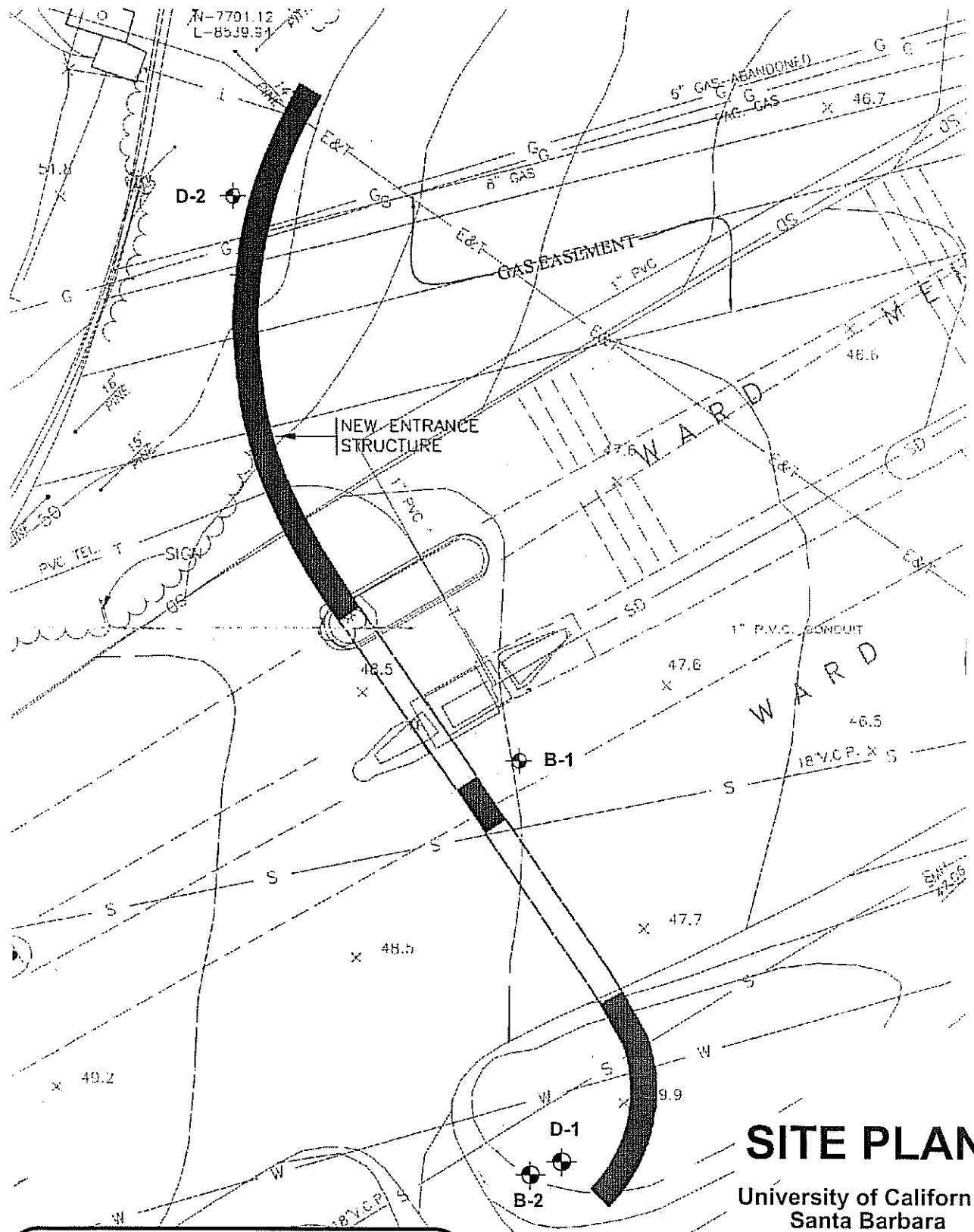
PACIFIC MATERIALS LABORATORY, INC.



Ronald J. Pike
Geotechnical Engineer, G. E. 2291

RJP:cm

cc: Addressee (3)



SITE PLAN

University of California
 Santa Barbara
 New East Gate Entrance

LEGEND

- ⊕ B-1 - BORING LOCATION
- ⊕ D-1 - FIELD DENSITY TEST LOCATION

Scale: none

Plate 1
 Lab No: 66426-2
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 December 1, 2005

APPENDIX A
FIELD INVESTIGATION

December 1, 2005

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-A.1-

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BORING LOG DATA

BORING NO. B-1

Drill Rig Operator: Kump/Kump

Date Drilled: 10/27/05

Dry Density (pcf)	Moisture Content (%)	Depth (ft)	Soil Log	Soil Description
		0		Light brown sandy SILT, moist and stiff
		1		
90.3	10.4	2		
		3		
96.2	8.7	4		White SAND, moist and dense
		5		
		6		Tan sandy SILT, moist
		7		
79.8	22.4	8		
		9		Orange sandy SILT
		10		Grey sandy SILT
		11		Grey silty SAND
72.3	32.5	12		Grey silty clayey SHALE, wet and stiff
		13		
		14		
70.0	49.6	15		

LEGEND
 - Thin-Walled Tube Sample
 ASTM D-1587

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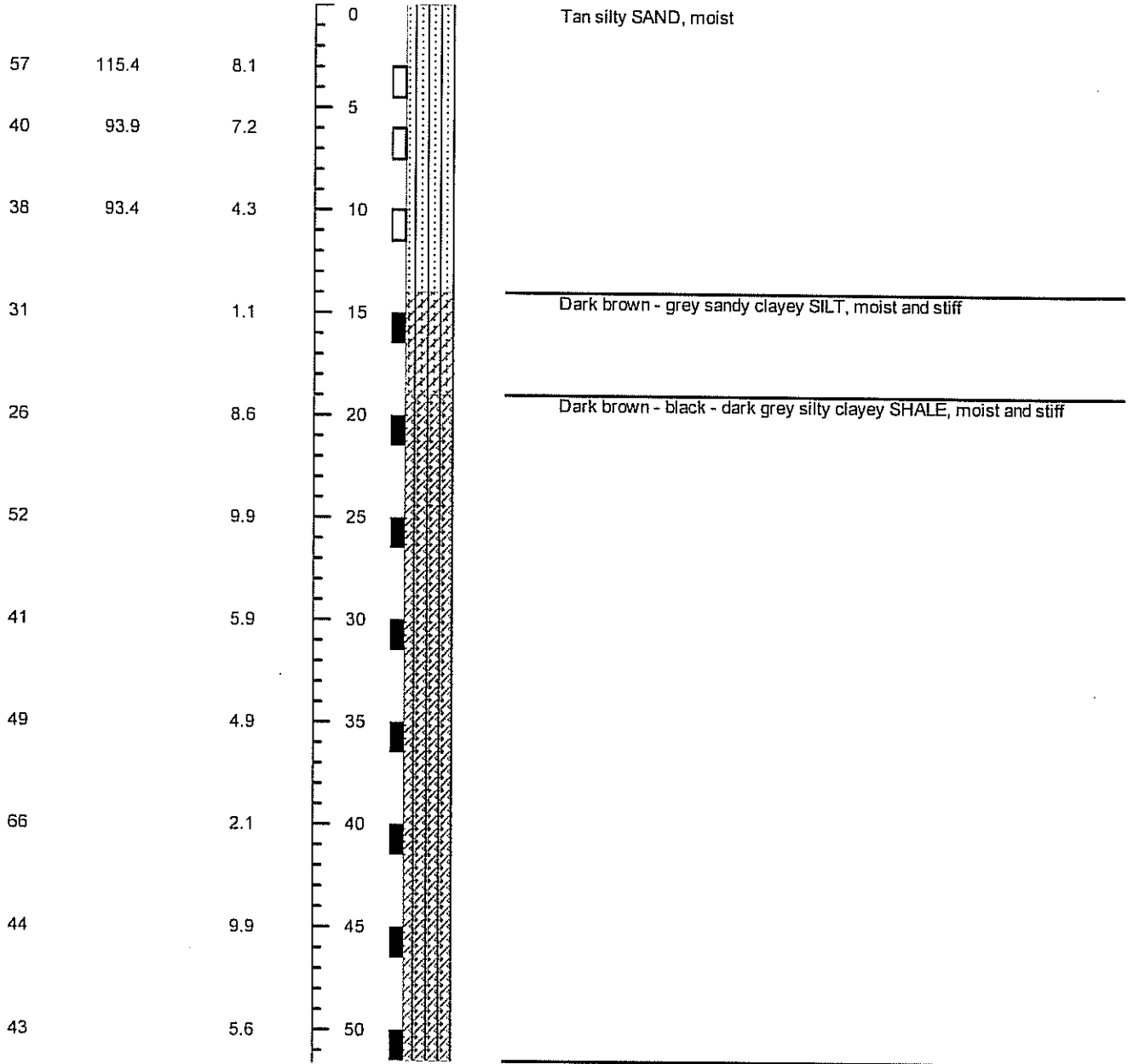
BORING LOG DATA

BORING NO. B-2

Drill Rig Operator: Kump/Kump

Date Drilled: 10/25/05

Blow Counts	Dry Density (pcf)	Moisture Content (%)	Depth (ft)	Soil Log	Soil Description
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LEGEND

- Standard Penetration Tube Sample ASTM D-1584
- Thin-Walled Tube Sample ASTM D-1587

APPENDIX B
LABORATORY TESTS

December 1, 2005

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MOISTURE DENSITY DETERMINATIONS (ASTM D-1557)

Maximum Density-Optimum Moisture data were determined in the laboratory from soil samples using the ASTM D-1557 Method of Compaction. The results of the Maximum Density-Optimum Moisture tests are tabulated below:

<u>SOIL TYPE</u>	<u>SOIL DESCRIPTION</u>	<u>MAXIMUM DRY DENSITY (pcf)</u>	<u>OPTIMUM MOISTURE (%)</u>
I	Brown SILT with organics	108.3	15.0
Curve Points: (105.2 @ 12.4) (108.3 @ 15.0) (105.7 @ 17.5)			
II	Brown silty SAND	109.3	14.5
Curve Points: (101.7 @ 18.3) (98.6 @ 20.8) (107.5 @ 15.8) (105.9 @ 12.5)			

FIELD DENSITY SUMMARY (Sand Cone Method ASTM D-1556)

<u>SAMPLE LOCATION</u>	<u>DEPTH (in.)</u>	<u>SOIL TYPE</u>	<u>FIELD MOIST. CONTENT (%)</u>	<u>DRY DENSITY (pcf)</u>	<u>% OF MAX. DRY DENSITY</u>
D-1	12	I	8.4	95.1	87.8
D-2	12	I	14.8	108.8	99.4

MECHANICAL ANALYSES (Values in Percent Passing ASTM D-422)

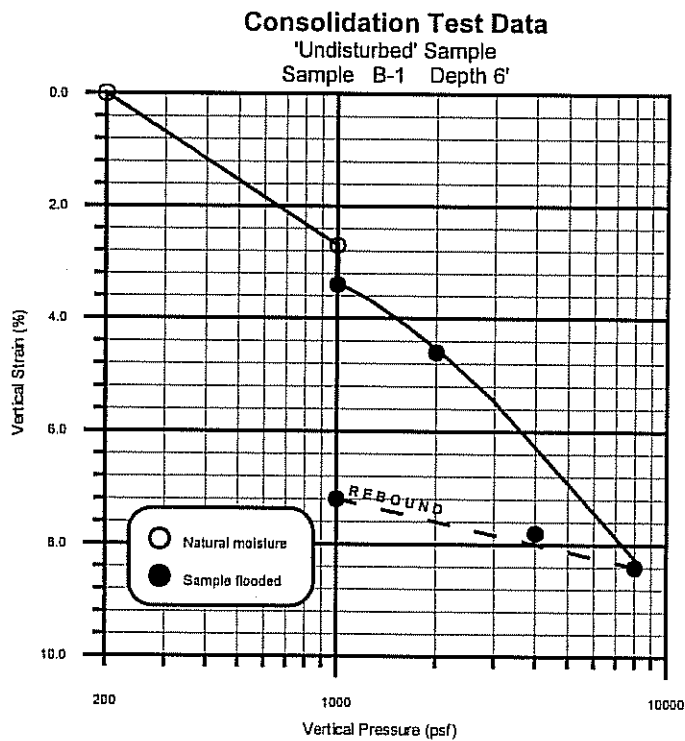
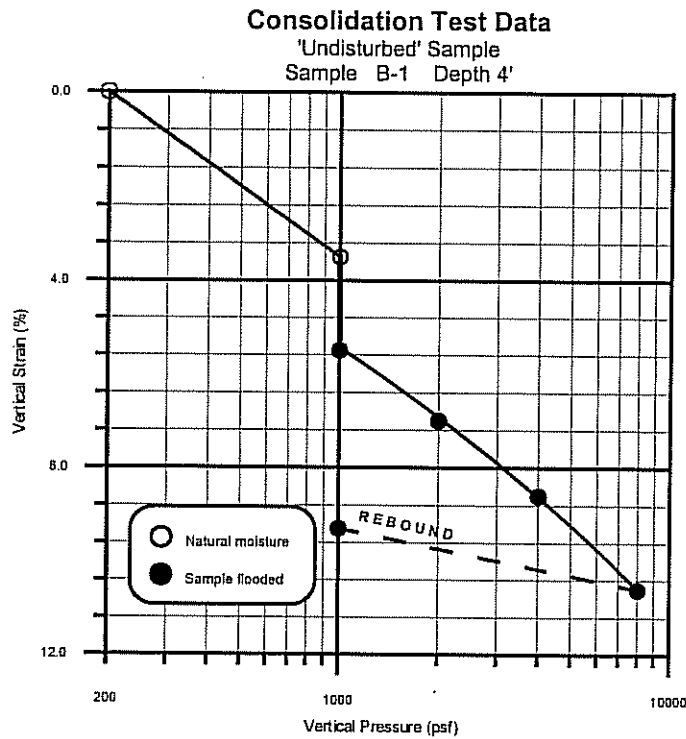
<u>SIEVE SIZE</u>	<u>B-1 @ 3'</u>
1/2 Inch	100.0
3/8 Inch	100.0
No. 4	97.4
No. 8	96.7
No. 16	89.2
No. 30	89.2
No. 50	87.4
No. 100	69.6
No. 200	36.2

SAND-SILT-CLAY (By Hydrometer ASTM D 422)

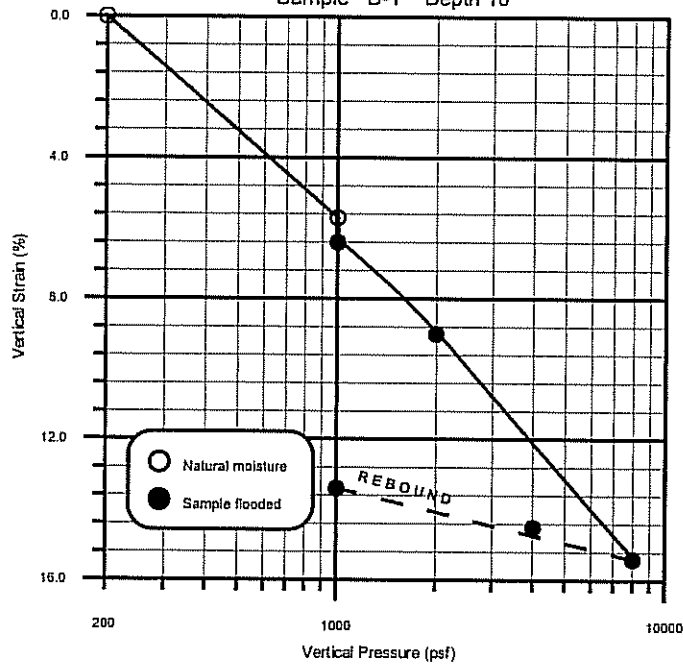
<u>SAMPLE LOCATION</u>	<u>DEPTH (ft.)</u>	<u>SAND %</u>	<u>SILT %</u>	<u>CLAY %</u>	<u>SOIL DESCRIPTION</u>
B-1	3	66	14	20	Clayey SAND

CONSOLIDATION TESTS (ASTM D-2435)

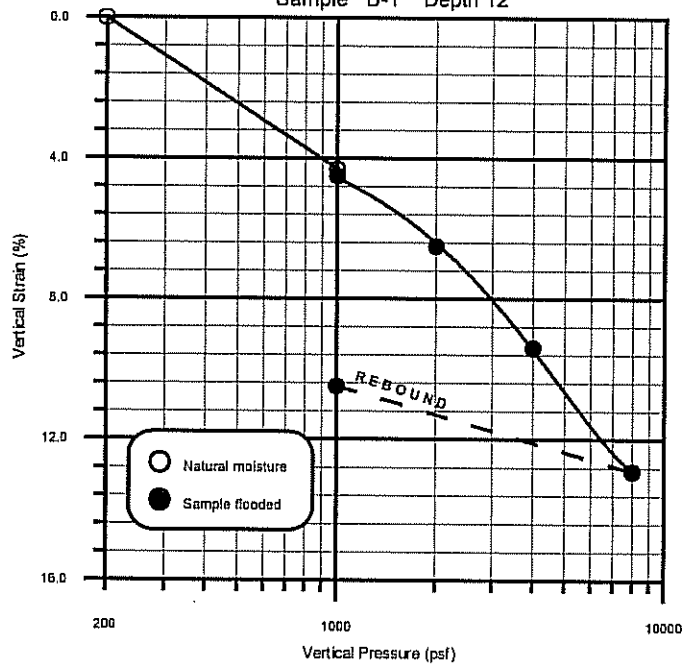
Four consolidation tests were performed on representative in-place tube soil samples in both the natural field and at increased moisture contents. The results of the consolidation tests are presented graphically below.



Consolidation Test Data
'Undisturbed' Sample
Sample B-1 Depth 10'



Consolidation Test Data
'Undisturbed' Sample
Sample B-1 Depth 12'



EXPANSION TESTS (UBC 18-2)

The Expansive Soil Index was determined by the present UBC 18-2 Expansion Determination Procedure. The results are tabulated below:

<u>SAMPLE LOCATION</u>	<u>DEPTH (ft.)</u>	<u>DRY DENSITY (pcf)</u>	<u>MOISTURE CONTENT (%)</u>	<u>EXPANSION INDEX</u>	<u>POTENTIAL FOR EXPANSION</u>
B-1	15	67.1	28.0	46	Low

DIRECT SHEAR TESTS (ASTM D-3080)

Two direct shear tests were performed on representative "undisturbed" soil samples which were 2.365 inches in diameter and 1 inch thick. The tests were performed under flooded conditions. The results are tabulated below:

<u>SAMPLE LOCATION</u>	<u>DEPTH (ft.)</u>	<u>INTERNAL ANGLE OF FRICTION (degrees)</u>	<u>COHESION (psf)</u>
B-1	3	33	0
B-1	6	33	520