WSRC-TR--95-0057-Vol.

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Volume 6

Laboratory Test Results - Phase II *Volume 2 of 2*

In-Tank Precipitation Facility (ITP) and H-Tank Farm (HTF) Geotechnical Report (U) WSRC-TR-95-0057, Rev. 0

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LAW

ENGINEERING AND ENVIRONMENTAL SERVICES

February 21, 1994

Westinghouse Savannah River Company
P.O. Box 616
Aiken, South Carolina 29808

Attention: Sujit Samaddar
Subcontract No. AB08525N

Subject: **Final Report**
Geotechnical Testing Services
WSRC-ITP Project
Law Engineering Project No. 5810535301

Dear Mr. Samaddar:

Law Engineering has completed the assigned testing for Westinghouse Savannah River Company (WSRC) Subcontract No. AB08525N, ITP Geotechnical Services. In accordance with the Contract Engineering Document Requirements, we are transmitting ten bound copies of our final report included in two volumes.

Volume 1 contains laboratory test results of 70 undisturbed soil tubes collected by WSRC at the Savannah River Site (SRS) ITP site. These soil samples were tested for index (classification) properties, volumetrics, and static and dynamic properties. The results presented in Volume 1 were tested by LAW in our Atlanta, Georgia laboratory. These results are presented in boring and depth numerical order. Each undisturbed tube sample was logged by a soils technician on an Undisturbed Sample Log (blue copy). Following each sample log are the test results for samples removed from that tube in the following general order:

- Tube and/or Sample Densities
- Grain Size Analysis (includes hydrometer and Atterberg limits)
- Static Triaxial Tests (UU, CU, and CD)
- Dynamic Triaxial Tests (Resonant Column, RC, Strain Controlled Cyclic, SCC)
- Consolidation

In addition, a summary of the classification testing is presented. The summary includes specific gravity, Atterberg limits and a Unified Soil classification, when applicable.

Volume 2 contains laboratory test results of 14 undisturbed soil tubes (piston samples only). The results presented in Volume 2 were tested by LAW's subcontractor, Dr. Michael Riemer and the University of California, Berkeley. The index testing, however, was performed by LAW in Atlanta on split portions of each specimen following the completed physical testing in Berkeley.

LAW ENGINEERING, INC.

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ONE OF THE LAW COMPANIES

The testing under this WSRC subcontract was performed in accordance with applicable American Society for Testing and Materials (ASTM) test standards, SRS Specifications K-SPC-H-00003, K-SPC-G-00001, and K-SPC-G-00003, and Technical Procedures developed by LAW under the technical review and acceptance of WSRC. These Technical Procedures (TP) consist of TP-1, TP-2, TP-3, TP-4, TP-4A, TP-5 and TP-5A.

We appreciated the opportunity to provide our services to you on this very important geotechnical study. If you have any questions pertaining to this final report, please do not hesitate to call us.

Sincerely,

LAW ENGINEERING, INC.

Richard L. Boudreau, P.E.
Senior Engineer

Harry E. Johnson
Senior Laboratory Technician

cc: Bradley Diehm (without test results)

rib\ltp\finalrpt.ltr

Law Engineering, Inc.
396 Plasters Avenue, NE
Atlanta, GA 30324

October 11, 1993

Attn: Bill Wright

Final Report on Mineralogical Analyses
of Soil Specimens from the ITP (Savannah River) Site

Ladies/Gentlemen:

This letter report summarizes the results of the mineralogical analyses performed on soil specimens sampled from the Savannah River ITP site, in conjunction with Law Job No. 5810535301. The laboratory testing was performed by Dr. Salah Sadek under my supervision, and involved identification of the predominant minerals by X-ray diffraction techniques. Results of the testing indicate that while most of the specimens tested were composed primarily of quartz and kaolinite, several of the specimens (described as belonging to the Santee formation) contained significant quantities of both carbonates and smectites.

Ten of the ITP specimens which had been previously tested in cyclic triaxial loading were selected by the Technical Oversight for mineralogical analysis using X-ray diffraction techniques. These ten specimens are listed in Table 1, and will be referred to throughout this report by the following convention: (Boring No.)-(Sample No.)(Location w/in Tube). Thus "B2-P6M" refers to the *Middle* specimen extruded from sample PS-6, taken from H-Bor-2. The specimens have been placed in four groups within Table 1 based on the results of mineralogical testing, as described below.

Procedures

As outlined in the approved procedure developed for this project, **One Powder Sample** (pulverized air dried material) and **Three Oriented Samples** were prepared and tested for each of the ten soil specimens. The oriented samples were prepared using the < 2 micron fraction of the soil (separated by centrifugation of a suspension), by depositing drops of the suspension on glass slides and allowing it to dry at ambient temperature and humidity overnight. One oriented sample was tested by X-ray diffraction in this "air dried" state without further treatment, another was placed in a 500 °C oven for 24 hours prior to testing, and the third was placed in an ethylene glycol vapor saturated environment at 60 °C for 24 hours prior to testing. Variations in the output from such samples extracted from the same specimen but treated under different conditions can aid in identifying certain minerals.

The output of the X-ray diffraction tests as produced on the Rigaku diffractometer consist of a long, strip-chart type recording of the intensity of the radiation directed toward a receiver as a function of the angle at which the sample is rotated in reference to this receiver. Different minerals produce different patterns depending on the spacing of the crystallographic planes, and can therefore be identified by this procedure. While the quantification of specific percentages of various constituents cannot be made by this technique, the relative abundance of two minerals can be qualitatively observed by an experienced interpreter by comparing the strengths of the

received signals. Because of their large and awkward size, the individual chart recordings are not attached to this report, but can be provided on request. The analysis and interpretations that follow herein were performed using the *X-ray Diffraction Interpretation* procedure (attached to this report) as a guideline.

Results

The ten specimens tested could be divided into four distinct groups based on their mineralogical composition. Within each group the minerals identified and their relative abundance are essentially the same among all the specimens. The results of the X-ray diffraction runs were uniformly consistent with the conclusions described below.

Group 1: Samples B2-P4T, B2-P5M, B2-P6M, B23-P2M, B23-P3T and B23.1-P1T

The non-clay fraction of these samples consist almost exclusively of quartz, although some mica is also present. The clay fraction is formed by Kaolinite and very small traces of Illite.

Group 2: Sample B12-P7M

The non-clay fraction is formed of quartz and traces of mica as in the case of the specimens in Group 1. The clay fraction is formed of predominantly Kaolinite with some Illite. However in this case the relative amount of Illite is greater than that found in the samples of Group 1, and is about a third of the amount of Kaolinite present as inferred from the X-ray diffraction patterns.

Group 3: Sample B23-P4M

The non-clay fraction of this soil is almost exclusively composed of Quartz. The clay was identified as predominantly smectite from the variations that occurred in response to the different treatments of the oriented samples. Small traces of Kaolinite and Illite clay could also be identified.

Group 4: Samples B2-P13M and B2-P14T (Santee formation)

This soil is composed of quartz and traces of feldspar and a significant amount of carbonates, in addition to a smectite clay. The type of carbonate present was identified using its characteristic peaks as a Calcium Carbonate Phosphate Fluoride (or Carbonate-Hydroxylpatite, $\text{Ca}(\text{PO}_4)_5\text{CO}_3(\text{OH})\text{F}$). The presence of carbonates was reinforced when "fizzing" of the coarse fraction was observed when exposed to a 2N HCl solution.

I hope this information regarding the mineralogy of the soils retrieved and tested as part of the ITP evaluation will prove useful to you. If I can be of any further assistance regarding the results of these tests, please contact me at (510) 548-4727, or at the above address. Thank you for the opportunity to contribute to this project.

Sincerely yours,

Dr. Michael F. Riemer

MFR/mfr

Attachments:

Table 1: Summary of X-ray Diffraction Testing for Mineralogy
X-ray Diffraction Interpretation Procedure

Table 1: Summary of X-ray Diffraction Testing for Mineralogy

Group No.	Boring	Sample No.	Location within Tube	Depth (ft.)	Predominant Minerals
Group 1	H-Bor-2	PS-4	Top	91.2	Quartz and kaolinite (with traces of mica and illite)
	H-Bor-2	PS-5	Middle	94.7	
	H-Bor-2	PS-6	Middle	97.6	
	H-Bor-23	PS-2	Middle	33.9	
	H-Bor-23	PS-3	Top	40.2	
	H-Bor-23.1	PS-1	Top	28.9	
Group 2	H-Bor-12	PS-7	Middle	93.4	Quartz, kaolinite and illite (with traces of mica)
Group 3	H-Bor-23	PS-4	Middle	84.4	Quartz and smectite (with traces of kaolinite, illite)
Group 4	H-Bor-2	PS-13	Middle	175.7	Quartz, carbonate and smectite (with traces of feldspar)
	H-Bor-2	PS-14	Top	178	

X-RAY DIFFRACTION INTERPRETATION

The following principles need to be considered when interpreting x-ray diffraction records:

1. Only those crystallographic planes that are oriented parallel to the glass slide will be detected and displayed on the diffraction record. All other planes will be ignored. Therefore, a powder sample of randomly oriented particles will display the spacings of all crystallographic planes (e.g. 020, 011 and 210 planes as well as the 001 and 002 planes) of each crystalline species present. Conversely, an oriented film sample will only display the spacings of basal planes and their higher orders (i.e. 001, 002, etc.) for the plate-shaped clay minerals. However, if any bulky shaped minerals are present in the oriented film (quartz, feldspar, etc.) all of their crystallographic planes will be registered on the record.
2. Every peak in a diffraction record corresponds to some crystalline species. Likewise, if a particular species is indeed present in significant quantity then all of the major peaks associated with that species should be present on the diffraction record of a powder sample.
3. Special sample treatments - glycolation, heating, etc. - have different effects on the various clay minerals.

The following procedure is suggested for the semi-quantitative analysis of x-ray diffraction records of clay samples:

1. Compute the d-spacing of each peak of every record and write it on the record beside the peak. Use the table in Appendix C.
2. List the d-spacings of the peaks and an indication of their intensities in a table, such as on page 17. The list should be in order of d-spacings.
3. Analyze the air-dried powder results first:
 - a. Using the table on page 1 of Appendix D, write the possible mineral(s) beside each peak on the list. Unidentified peaks are dealt with in (d), below.
 - b. For each of the identified possible minerals, refer to a detailed description of its x-ray diffraction pattern (tables in Appendix D or in many of the references, Appendix A). If a particular mineral is present, each of its major peaks should appear on the diffraction record of the powder sample. The basal spacings (001) of clay minerals will require special attention, section 4 below.
 - c. Double-check for the presence of non-platey clay minerals - attapulgite, sepiolite, and halloysite - by referring to their tables in Appendix D.

- d. If any major peaks on the air-dried powder record remain unidentified, check the references in Appendix A for information on less common minerals.

4. Having analyzed the air-dried powder record, you will know the types of non-clay and non-platey clay minerals that are present. Furthermore, you will have a preliminary identification of the possible platey clay minerals that are present. A final determination of these mineral types and a rough estimate of their relative quantities can be made by analyzing the oriented samples, both treated and untreated. The following interpretation scheme is adapted from that used by the Concrete Technology Division of the U.S. Army Engineers Waterways Experiment Station:

a. The basal spacings commonly seen on air-dry oriented patterns are:

1. 7-7.2 A: If a 14 A spacing is not present, the 7A peak is interpreted as a Kaolin-group mineral other than hydrated halloysite, which can have a basal spacing of 10+ A. If a 14 A peak is present, the 7 A peak might be its second-order peak. In this case, positive identification is given by: 1) disappearance of the 7 A peak upon heating to 500°C and 2) no shifting of the 7 A peak upon glycolation.
2. 9.8 - 10 A: If the reflection is sharp and higher orders are present, this is interpreted as clay mica (illite or clay-size mica or both). If so, this peak should remain unshifted upon heating to 500°C and upon glycolation. If it disappears upon heating, then halloysite is indicated.
3. 10.1 - 10.2 A: Additional tests needed, probably attapulgite or hydrated halloysite. Analysis of the air-dried powder record can be used to identify either, and disappearance of the peak upon heating indicates halloysite.
4. 12 A: Sepiolite or mixed layer clay, additional tests needed.
5. 14 - 15.5 A. Smectite, vermiculite, or chlorite. Examine the pattern carefully for a kaolin-group mineral indicated by natural resolution of the 7 or 3.5 A peaks into two components or by the presence of a peak at about 37.5° 2 (003 of kaolin group), or both.

b. If a 14.0 - 14.2 A peak is present, check the glycol treated, oriented sample. A shift of the 14 A peak to 17 - 19 A indicates the presence of smectite.

c. If expansion is not produced by the glycol treatment, or if there is still a 14 A peak as well as one at 17 - 19 A, check the oriented sample heated to 500°C. If the position of the 14 A peak is relatively unchanged, then chlorite is indicated. The powder sample results should be double-checked to verify this. A final determination of chlorite can be made by preparing an HCl treated, oriented sample in which all chlorite will have been destroyed.

- d. If air-dry samples have basal spacings other than 7 - 7.2, 9.8 - 10, and 14 - 14.2 Å (or in addition to these spacings), then glycerol treatment and heat treatments at 450 and 575 C for 1 hr are used; it may also be desirable to heat at 700 C for 1 - 3 hr. An X-ray trace is made of the slide or slides after each treatment. If a peak around 8.5 Å is found, check the material passing No. 325 sieve that settles in 4 min - the coarse silt - for amphibole by microscope. Complex mixtures apparently containing nonclay minerals in the sizes finer than 2 μ are usually checked by microscope for adequacy of particle size control. The procedures for identifying mixed-layer clays characterized by spacings larger than 14 Å or by intermediate spacings, are not detailed here. Refer to appropriate literature.

X-RAY DIFFRACTION DATA FOR CLAY MINERALS
AND COMMON NON-CLAY MINERALS

Italics: (001) spacing

d(Å)	Mineral
14	<i>Mont. (VS) Chl., Verm. (VS)</i>
12	<i>Sepiolite, heated corrensite</i>
10	<i>Illite, Mica(S)</i>
9.23	Heated Verm.
7	<i>Kaol. (S), Sept., Chl.</i>
6.90	<i>Chlorite</i>
6.44	<i>Attapulgit</i>
6.39	<i>Feldspar</i>
4.90-5.00	<i>10Å (2nd)</i>
4.70-4.79	<i>Chlorite (S)</i>
4.60	<i>Sepiol, Verm. (S)</i>
4.45-4.50	<i>Illite (VS)</i>
4.46	<i>Kaol.</i>
4.36	<i>Kaol.</i>
4.26	<i>Quartz (s)</i>
4.18	<i>Kaol.</i>
4.02-4.04	<i>Felds(s)</i>
3.85-3.90	<i>Felds</i>
3.82	<i>Sepiol.</i>
3.78	<i>Felds</i>
3.67	<i>Felds</i>
3.58	<i>Carbonate, Chlor.</i>
3.57	<i>Kaol. (VS), Chlor.</i>
3.54-3.56	<i>Verm.</i>
3.50	<i>Felds, Chlor.</i>
3.40	<i>Carb.</i>
3.34	<i>Quartz (vs)</i>
3.32-3.35	<i>Illite (VS)</i>
3.30	<i>Carb.</i>
3.23	<i>Attapulgit</i>
3.21	<i>Felds</i>
3.20	<i>Mica</i>
3.19	<i>Felds (vs)</i>
3.05	<i>Mont.</i>
3.04	<i>Carb. (VS)</i>
3.02	<i>Felds</i>
3.00	<i>Heated Verm.</i>
2.98	<i>Mica (S)</i>
2.93-3.00	<i>Felds</i>
2.89-2.90	<i>Carb.</i>
2.86	<i>Felds</i>
2.84	<i>Carb. Chlorite</i>
2.84-2.87	<i>Chlorite</i>
2.73	<i>Carb.</i>
2.61	<i>Attapulgit</i>

d(Å)	Mineral
2.60	<i>Verm., Sepiol.</i>
2.56	<i>Illite (VS), Kaol.</i>
2.53-2.56	<i>Chlor., Felds., Mont.</i>
2.49	<i>Kaol. (VS)</i>
2.46	<i>Quartz, heated Verm.</i>
2.43-2.46	<i>Chlorite</i>
2.39	<i>Vermic., Illite</i>
2.38	<i>Kaolinite</i>
2.34	<i>Kaolinite (VS)</i>
2.29	<i>Kaolinite (VS)</i>
2.28	<i>Quartz, Sepiol.</i>
2.23	<i>Illite, Chlorite</i>
2.13	<i>Quartz, Mica</i>
2.05-2.06	<i>Kaol. (WK)</i>
1.99-2.00	<i>Mica, Illite(s), Kaol. Chlor.</i>
1.90	<i>Kaol.</i>
1.83	<i>Carb.</i>
1.82	<i>Quartz</i>
1.79	<i>Kaol.</i>
1.68	<i>Quartz</i>
1.66	<i>Kaolin</i>
1.62	<i>Kaolin</i>
1.54B	<i>Verm(s), Quartz</i>
1.55	<i>Quartz</i>
1.58	<i>Chlorite, Septch.</i>
1.53	<i>Verm, Illite (Trioctahed)</i>
1.50	<i>Illite(s), Kaol.</i>
1.48-1.50	<i>Kaolin (VS), Mont.</i>
1.45B	<i>Kaolin</i>
1.38	<i>Quartz, Chlor.</i>
1.31-1.34-1.36	<i>Kaolin(B)</i>

Quartz

NBS Circular 539 Vol. III pp. 25, 26

<u>2θ, deg.</u> <u>$\lambda = 1.54050$</u>	<u>d, Angstroms</u>	<u>Intensity</u>	<u>2θ, deg.</u> <u>$\lambda = 1.54050$</u>	<u>d, Angstroms</u>	<u>Intensity</u>
20.83	4.26	35	81.48	1.1802	4
26.64	3.343	100	83.83	1.1530	2
36.52	2.458	12	84.94	1.1408	1
39.45	2.282	12	87.45	1.1144	1
40.28	2.237	6	90.82	1.0816	4
42.44	2.128	9	92.80	1.0636	1
45.79	1.980	6	94.64	1.0477	2
50.16	1.817	17	95.12	1.0437	2
50.64	1.801	<1	96.23	1.0346	2
54.86	1.672	7	98.74	1.0149	2
55.33	1.659	3			
57.24	1.608	<1			
59.98	1.541	15			
64.02	1.453	3			
65.80	1.418	<1			
67.74	1.382	7			
68.14	1.375	11			
68.30	1.372	9			
73.46	1.288	3			
75.65	1.256	4			
77.70	1.228	2			
79.89	1.1997	5			
80.08	1.1973	2			
81.18	1.1838	4			

+ 28 lines to .7952 Å^o

DYNAMIC TESTING OF SOILS FROM THE SRS/TFP FACILITY

by

Michael E. Riemer

and

Raymond B. Seed

**Final Report on Testing Sponsored by LAW Engineering
through Service to Industry Projects #ES-2054 and #ES-2055**

Geotechnical Engineering Report No. UCB/GT/94-02

February 1994

**GEOTECHNICAL ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
UNIVERSITY OF CALIFORNIA • BERKELEY**

DYNAMIC TESTING OF SOILS FROM THE SRS/ITP FACILITY

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**Final Report on Testing Sponsored by LAW Engineering
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Geotechnical Engineering Report No. UCB/GT/94-02

February 1994

Section 1: Introduction

The SRS/TTP Soil Evaluation Testing Program was developed and performed to investigate the behavior of the soil deposits at the Savannah River Site's In-Tank Precipitation facility under dynamic loading. There were two distinct soil deposits involved in the current testing program: the Tobacco Road formation (sampled at depths between 28 and 100 feet at the site) and the Santee formation (sampled from depths between 170 and 180 feet). The Tobacco Road samples consisted of clayey sands (typically "SC" by the Unified Soil Classification System), yellow to reddish-brown in color with fine to medium sized sand particles. The Santee samples were also clayey sands, but nearly white in color.

The two types of cyclic triaxial tests performed at the U.C. Berkeley Geotechnical Laboratories as part of this testing program were (a) traditional liquefaction tests and (b) low-amplitude cyclic tests designed to provide information on threshold strains for these specimens. This report describes the results of both the liquefaction testing component of the study, which was limited to the soils from the Tobacco Road formation, and the low-amplitude testing of both Tobacco Road and Santee specimens. Additional information was obtained from some of the specimens by (a) measuring the volumetric strains of many of the specimens when drainage (and reconsolidation) was permitted following liquefaction, or (b) determining the residual stress-strain behavior of other specimens subjected to monotonic loading immediately following liquefaction.

Sections 2 and 3 of this report describe the preparation and testing procedures which were common to both types of cyclic loading tests. Section 4 summarizes the results of the cyclic testing, and Sections 5 and 6 present the results of the post-liquefaction volumetric and stress-strain tests, respectively. Finally, Section 7 summarizes the index testing and mineralogical analyses performed on these specimens as part of other research. Detailed plots of the individual test results, as well as the tube sample and density logs, are presented in appendices which follow the main text of this report.

Section 2: Tube Measurements and Densities

Undisturbed samples (nominally 3 inches in diameter) were taken at the site and transported to the U.C. Berkeley Geotechnical Laboratory in accordance with a procedure (TP-1-ITP) specifically developed to minimize sample volume changes or other disturbance during travel. The 35 specimens tested were selected from a total of 14 sample tubes, each nominally 30 inches in length. The individual tube numbers, the borings from which they were obtained, their depths, and the resulting sample numbers are presented in Tables 1 and 2, in addition to calculated values of the water content, and wet and dry densities of the soil within each tube prior to extrusion. Table 1 summarizes these values for the 24 specimens tested for liquefaction resistance, while Table 2 summarizes similar values for the 11 specimens tested under low-amplitude cyclic loads. The density and water content

**Table 1: SRS/ITP Liquefaction Testing:
Tube Depths, Soil Densities, and Average Water Contents**

Boring No.	Tube No.	Depth (ft)	Wet Density (lb/ft ³)	Water Content (%)	Dry Density (lb/ft ³)	Sample No.
H-Bor-2	PS-4	91.2-93.2	128.6	21.3	106.0	B2P4T B2P4M
H-Bor-2	PS-5	94.1-96.1	125.0	24.9	100.1	B2P5T B2P5M B2P5B
H-Bor-2	PS-6	97.0-98.9	125.6	23.3	101.8	B2P6T B2P6M B2P6B
H-Bor-12	PS-5	70.7-72.5	127.5	21.4	105.0	B12P5T B12P5M B12P5B
H-Bor-12	PS-7	92.8-94.6	126.5	24.0	102.0	B12P7T B12P7M B12P7B
H-Bor-23	PS-2	33.3-35.1	126.2	21.6	103.8	B23P2T B23P2M B23P2B
H-Bor-23	PS-3	40.2-42.1	127.5	20.7	105.6	B23P3T B23P3M B23P3B
H-Bor-23	PS-4	83.8-85.7	121.7	25.0	97.4	B23P4T B23P4M B23P4B
H-Bor-29	PS-2	53.7-55.5	121.8	20.7	100.9	B29P2T

**Table 2: SRS/ITP Low-Amplitude Testing:
Tube Depths, Soil Densities, and Average Water Contents**

Boring No.	Tube No.	Depth (ft)	Wet Density (lb/ft³)	Water Content (%)	Dry Density (lb/ft³)	Sample No.
H-Bor-23.1	PS-1	28-9-30.8	129.4	20.2	107.7	B23.1P1T
H-Bor-2	PS-13	175-177	110.9	38.2	80.2	B2P13T B2P13M B2P13B
H-Bor-2	PS-14	178-180	108.0	64.8	65.5	B2P14T B2P14M B2P14B
H-Bor-2	PS-11	169.8-171.2	116.3	48.7	78.2	B2P11B
H-Bor-29	PS-7	90.5-92.3	128.6	22.1	105.4	B29P7T B29P7M B29P7B

values were calculated in accordance with TP-4-ITP, a technical procedure written to document this process, which describes how the weight and volume of the soil within the tubes were to be determined. The individual measurements required for these calculations were recorded on tube density forms titled "Unit Weight of Thin Wall Tube Samples". The completed forms for the unit weights of the 14 tubes used in this testing program are included in Appendix A. In addition, "Undisturbed Sample Logs," which show the relative location of each specimen within its tube, were completed during the preparation process and are compiled in Appendix B. The soil description of the specimens on these logs were performed after testing, when a more representative view of the specimens could be obtained by cutting them in half lengthwise.

The specimens were extruded and readied for testing according to procedure TP-5-ITP, which describes the preparation process in detail. After cutting the tube, trimming and extruding, each specimen was placed between lucite end caps and encapsulated with a latex membrane sealed by O-rings at the caps, and the moist weight was measured and recorded. A vacuum of nearly one full atmosphere was then applied to the interior of the sample through drainage lines in the caps. Measurements of the sample's height and diameter were taken under this confining stress, and recorded. The data sheets for the individual specimens, which include these initial values, are presented along with the results of each test in their appropriate appendices.

Section 3: Sample Preparation and Testing Procedures

Equipment

Both types of cyclic testing were performed using the CKC e/p pneumatic loader, under the control of the *Georobot* software (version 5.2). Two such testing systems (nominally identical) were used in performing the tests, and are referred to as System #1 and System #2 throughout this report. The low-amplitude cyclic tests utilized LVDT's with a smaller range and greater sensitivity than those used in liquefaction testing, in order to measure the small deformations associated with the low-amplitude loading more accurately. Apart from this substitution, the instrumentation remained the same for both portions of the testing program.

All of the instrumentation and other components of the systems, including the software, were carefully calibrated, and accepted by Quality Assurance personnel. The overall calibration of each testing apparatus was verified by performing a "check test"; an undrained cyclic liquefaction test using standard Monterey 0 sand. The results of three such check tests are shown in Figure 1, which is a plot showing the range of the number of cycles a sample at 60% relative density should take to liquefy, depending on the stress ratio at which it is tested (according to the Corps of Engineers Testing Manual). Tests 1D, 2B and 2-2A all fall within the acceptable region, indicating that the systems were appropriately calibrated. The third test, 2-2A, was required to assure that the system remained calibrated following a hiatus of several months in testing.

Figure 1: Results of check tests performed to verify equipment calibration.

Saturation and Consolidation

After extrusion, a triaxial cell was assembled around each sample, the cell was filled with de-aired water, the sample was mounted on a loading frame of the CKC system, and the testing software was initiated. The internal vacuum was removed and replaced by chamber pressure, after which the sample was back-pressure saturated at an effective stress of approximately two-thirds of the estimated overburden stress in the field, to minimize disruption of the soil fabric caused by swelling of the clay fraction under very low stresses. This resulted in shifting some of the "consolidation" volume changes to the "saturation" portion of the test (as they are noted on the data sheets). Changes in height and volume of the specimens were monitored and recorded throughout the preparation process. Radial deformations during saturation were estimated following the method used in the Corps of Engineers Manual EM 1110-2-1906, Appendix XA.

The specimens were then consolidated to the desired isotropic effective confining stress. Specimen saturation was monitored both before consolidation and immediately prior to cyclic testing by determining the "B value". Saturation during cyclic testing was ensured by obtaining "B values" of 0.95 or greater immediately prior to liquefaction testing.

Cyclic Loading

Both the liquefaction and low-amplitude loading tests consisted of uniform, stress-controlled cyclic testing under undrained conditions at a

frequency of 1 cycle/second. The cyclic stress ratios (CSR's) applied were chosen by the project TO based on previous testing experience with similar materials. Throughout this report, the cyclic stress ratio is defined as the peak cyclic deviatoric stress divided by two times the effective consolidation stress:

$$CSR = \frac{\sigma_{dc}}{2\sigma_{con}}$$

The primary distinction between the liquefaction tests and the low-amplitude tests lay in the values of CSR at which the tests were run: in the liquefaction tests, relatively large CSR's were chosen to identify how rapidly the specimens would generate large pore pressures during large seismic events; a limited number of cycles at smaller CSR's were assigned, thus resulting in a lower amplitude of both stresses and strains, in order to evaluate the threshold level above which residual pore pressures were generated. Two of the low-amplitude test specimens (B23.1P1T and B2P13T) were subjected to a sequence, or "suite", of tests, with each successive loading, or "phase" of the test at a larger CSR. Any residual pore pressures developed during one phase of such a test were allowed to dissipate (in reconsolidation) prior to the next phase in the sequence.

Regardless of the type of cyclic test, data was recorded by the software at a rate of 30 readings each second, and included measurements of (a) the cell pressure, (b) the effective confining pressure, (c) the deviatoric load, and (d) the axial strain of the sample.

Section 4: Results of Cyclic Testing

Liquefaction Testing

Individual plots of the variation of effective confinement (σ'_3), axial strain (ϵ), and deviatoric stress ($q = \sigma'_1 - \sigma'_3$) with time (and therefore with the number of cycles, N , at 1 Hz) are presented for each of the liquefaction specimens (along with the appropriate Specimen Data Sheet) in Appendix C. The sign convention applied throughout the program states that compressive stresses and strains are positive, while extensive ones are negative.

The data from the 24 liquefaction tests are summarized in Table 3, in which the cyclic stress ratio (CSR) is tabulated with the number of cycles required to reach each of three definitions of "liquefaction", where applicable. These are: (i) "initial liquefaction" defined as the achievement of a pore pressure ratio of $r_u = \Delta u / \sigma'_{con} = 100\%$, (ii) achievement of a double-amplitude cyclic strain of $\epsilon_{da} = 5\%$, and (iii) achievement of $\epsilon_{da} = 10\%$. Each sample's consolidation stress (σ'_{con}) and B value prior to cyclic testing are also included. The values of cyclic stress ratio versus the number of cycles to "initial liquefaction" are plotted for each test in Figure 2, along with approximate upper and lower bounds based on these data. It should be noted that no adjustment of the data has been attempted herein to reflect the effects of overburden stress (K_G) on the liquefaction resistance: rather, the data is plotted strictly as it was recorded in terms of the CSR and the number of cycles to liquefaction.

Table 3: Results of Liquefaction Testing of SRS/ITP Soils

Test	Initial Conditions		Initial Liquefaction		$\epsilon_{da} = 5 \%$		$\epsilon_{da} = 10 \%$	
	σ'_{con} (kPa)	B-value	N (cycles)	CSR	N (cycles)	CSR	N (cycles)	CSR
B2P4T	500	0.97	>450	.134	N/A	N/A	N/A	N/A
B2P4M	500	0.99	39	.207	70	.203	N/A	N/A
B2P5T	500	0.97	6	.229	10	.230	15	.234
B2P5M	500	0.98	20	.207	27	.208	N/A	N/A
B2P5B	500	0.98	5	.250	7	.252	10	.254
B2P6T	750	0.95	4	.223	4	.223	N/A	N/A
B2P6M	743	0.97	6	.214	6	.214	8	.214
B2P6B	725	0.98	9	.196	10	.196	N/A	N/A
B12P5T	300	0.96	7	.246	26	.246	N/A	N/A
B12P5M	300	0.96	18	.220	N/A	N/A	N/A	N/A
B12P5B	300	0.95	78	.215	N/A	N/A	N/A	N/A
B12P7T	375	0.98	8	.173	12	.173	N/A	N/A
B12P7M	375	0.96	20	.152	24	.152	35	.152
B12P7B	375	0.96	8	.196	9	.196	15	.196
B23P2T	400	0.97	24	.171	33	.175	39	.175
B23P2M	400	0.98	9	.212	9	.212	N/A	N/A
B23P2B	400	0.97	4	.232	3	.232	5	.232
B23P3T	200	0.99	7	.225	12	.225	17	.228
B23P3M	200	0.96	19	.185	24	.185	N/A	N/A
B23P3B	200	0.98	39	.168	56	.172	67	.175
B23P4T	750	0.98	11	.177	17	.177	N/A	N/A
B23P4M	700	0.96	6	.215	3	.215	5	.215
B23P4B	750	0.98	11	.147	9	.145	11	.147
B29P2T	750	0.97	16	.167	17	.167	N/A	N/A

Figure 2: Cycles to Initial Liquefaction in ITP Triaxial Liquefaction Testing.

Low-Amplitude Testing

Plots of the measured effective confinement (σ'_3), axial strain (ϵ), and deviatoric stress ($q = \sigma'_1 - \sigma'_3$) with time are presented for each of the 11 low-amplitude tests in Appendix D. These results are summarized in Table 4. While this table contains a large amount of information, careful examination reveals the most relevant aspects of the data, and since this is not a standard test, inclusion of intermediate stages of the data reduction seems appropriate.

The aim of the low-amplitude cyclic testing was to establish the relationship between shear strain (γ) and pore pressure ratio ($r_u = \Delta u / \sigma'_{3con}$) at small strain levels. Because the triaxial testing systems have been designed as relatively large strain testing devices, they have a significant degree of compliance, particularly for samples at high confining stresses. This means that a substantial fraction of the measured deformation at small loads is actually due to deformations of the loading system, rather than the soil specimen. In order to evaluate the strain in the soil, therefore, it is necessary to calibrate each system to establish its compliance.

For the ITP testing program, this was done by recording the deformations measured during the cyclic loading of a stiff aluminum sample of known modulus over a series of different load magnitudes, and comparing the measurements with the expected deformations. In this manner, compliance curves were developed relating the peak-to-peak deviatoric stress (σ_{pp}) to the fictitious portion of the axial strain that would be included in the measurement of a soil specimen of typical dimensions subjected to that load. The compliance curves for Systems #1 and #2 are shown in Figure 3.

Table 4: Results of SRS/ITP Low-Amplitude Cyclic Loading Tests

Test #	Sample #	System #	CSR (target)	N (cycles)	σ_{pp} (kPa)	ϵ_{pp} (meas) $\times 10^{-3}$ %	Compliance $\times 10^{-3}$ %	ϵ_{pp} (corr) $\times 10^{-3}$ %	γ (corr) $\times 10^{-3}$ %	σ'_{3i} (kPa)	σ'_{3f} (kPa)	Δu (kPa)	r_u	$(\Delta V)/V$ %
1	B23.1P1T	2	0.025	10	16.5	7	4.4	2.6	2	198	198	0	0.00	
			0.05	10	38	18	10	8	6	200	196	4	0.02	
			0.075	10	57.5	31	15.5	15.5	12	200	189	11	0.06	
			0.1	10	78	46	21	25	19	200	181	19	0.10	
			0.125	10	99	67	27	40	30	200	171	29	0.15	
			0.135	10	106	73	28.5	44.5	33	200	172	28	0.14	
			0.18	10	144	144	39	105	79	199	140	59	0.30	NA
2	B2P13T	2	0.01	4	23	4.3	6	0	0	750	750	0	0.00	
			0.02	4	53	14	14	0	0	749	749	0	0.00	
			0.025	4	66	19	17.7	1.3	1	748	748	0	0.00	
			0.05	4	144	50	39	11	8	750	745	5	0.01	
			0.08	4	240	98	64.5	33.5	25	750	730	20	0.03	
			0.11	4	335	164	85	79	59	750	695	55	0.07	
			0.14	4	427	240	103	137	103	750	635	115	0.15	
			0.18	4	552	408	127	281	211	750	515	235	0.31	NA
3	B2P13M	1	0.07	10	212	69	41	28	21	747	716	31	0.04	
				20	212	69	41	28	21	747	706	41	0.05	NA
4	B2P13B	2	0.15	10	462	700	110	590	443	744	230	514	0.69	
				20	462	1700	110	1590	1193	744	72	672	0.90	NA
5	B2P14T	1	0.1	10	305	123	59	64	48	750	602	148	0.20	
				20	305	126	59	67	50	750	562	188	0.25	0.24
6	B2P14M	2	0.12	10	348	210	87	123	92	749	622	127	0.17	
				20	348	220	87	133	100	749	590	159	0.21	0.31
7	B2P14B	2	0.1	10	146	94	39	55	41	373	321	52	0.14	
				20	146	96	39	57	43	373	308	65	0.17	0.11
8	B2P11B	2	0.07	10	97	40	26	14	11	373	353	20	0.05	
				20	97	40	26	14	11	373	344	29	0.08	NA
9	B29P7T	2	0.1	10	177	88	48	40	30	450	398	52	0.12	
				20	177	88	48	40	30	450	390	60	0.13	0.06
10	B29P7M	2	0.06	10	100	43	27	16	12	450	438	12	0.03	
				20	100	43	27	16	12	450	435	15	0.03	NA
11	B29P7B	2	0.15	10	270	147	72	75	56	450	330	120	0.27	
				20	270	150	72	78	59	450	310	140	0.31	0.18

Compliance Calibration -- Apparatus #1

Compliance Calibration -- Apparatus #2.

Figure 3: Compliance curves for Systems #1 and #2

The "corrected" peak-to-peak axial strain (ϵ_{pp}) is therefore calculated by subtracting the compliance from the measured axial strain during the test. The shear strain can then be calculated as $\gamma = (1+\mu)(\epsilon_{pp}/2)$, where μ is Poisson's ratio, taken as 0.5 for an undrained test. The pore pressure response is then assessed by dividing the residual pore pressure generated (if any) by the initial consolidation stress to obtain r_u . Because of the substantial clay fraction in the ITP soils, there was some concern that pore pressures recorded during the tests would reflect only the pore pressure tendencies near the caps, rather than the average over the whole sample. This possibility was evaluated by monitoring the change in measured pore pressure over time following the completion of loading, and in most cases such changes were found to be minor, suggesting that the samples were able to equilibrate pore pressures throughout the samples quite rapidly.

Low-amplitude tests #1 and #2 were actually suites of tests performed on individual specimens, as explained earlier, and thus results are reported for each phase of loading. Tests #3 through #11 were of the single test type, with 20 uniform cycles of loading, but results are reported for both the 10-cycle and 20-cycle points in the test. The larger strain levels and pore pressure ratios associated with the 20 cycle readings for some specimens indicate that the soil is softening under the cyclic loading. All the values of γ vs. r_u which are shown in Table 4 have been compiled graphically in Figure 4, to illustrate the relationship between small levels of shear strain and the development of pore pressures in the ITP soils tested.

Figure 4: Results of Low-Amplitude Cyclic Loading Tests.

Section 5: Volumetric Strain Testing

Volumetric Strain tests were included in the testing program to assist in evaluating the magnitude and rate of volume change due to reconsolidation that might be expected following pore pressure generation within these materials. The tests were performed on samples immediately after either liquefaction or low-amplitude cyclic loading was completed, and simply involved restoring free drainage to the samples and recording the subsequent changes in volume and height under the applied isotropic confining stress as a function of time. Details of the test procedure are described in TP-2-ITP.

A total of 27 Volumetric Strain tests were performed (22 on liquefaction specimens and 5 on low-amplitude cyclic specimens), and plots of the volumetric strain versus the logarithm of elapsed time are presented for each test in Appendix E. Data was recorded automatically by the computer at ten second intervals throughout the test. Because of the large and relatively sudden increase in effective stress at the onset of this test, the rate of volume change during the initial 15 seconds of the test cannot be reliably determined. This is the reason for the unusual shape of many of the curves in Appendix E. The cumulative magnitude of the volumetric strains beyond the first minute are not affected by these difficulties, however.

A review of the Volumetric Strain test results indicates that following liquefaction, the Tobacco Road material consistently exhibited between 2% and 4% volumetric strain (compression) before the curves flattened out. The time

required to conclude this "primary" portion of reconsolidation varied significantly, from less than 4 minutes to over an hour. The volume changes which took place during the reconsolidation of the low-amplitude specimens was much smaller, in keeping with the fact that there was considerably less pore pressure to be dissipated from these samples, and their structure had not been completely broken by the large strains to which the liquefied samples were subjected. In addition, the low-amplitude specimens tended to complete any sort of primary reconsolidation very rapidly, often within the period during which accurate volume changes could not be solidly established. The magnitudes of the volumetric strains experienced by the low-amplitude specimens are included in the extreme right column of Table 4.

Section 6: Residual Strength Testing

Two post-liquefaction undrained residual strength tests were performed as part of this study, on samples B23P2M and B23P2B, to assess the stress-strain characteristics of the Tobacco Road soils after they have been liquefied. The tests consisted of monotonic, axial compressive loading under undrained conditions, and the tests were performed immediately after the samples had been liquefied *without allowing the pore pressures that had developed under cyclic loading to dissipate*. As a result, the undrained residual strength tests begin at very low effective confining stresses (σ'_3) and deviatoric stress (q).

The results of the residual strength tests are presented in Appendix F, with plots of the variation of (σ'_3) and (q) with axial strain (ϵ) for each test. Both specimens show similar stress-strain behavior: a gradual increase in deviatoric stress corresponding with an increase in effective stress, followed by a steeper increase in both deviatoric and effective confining stresses as the dilative tendencies of the materials increase at strains of up to about 8%. Beyond this point, the increases in strength continue at slower rates, and none of the samples reached their full undrained residual strength at less than 14% axial strain. The biggest distinction between the tests is that the specimen subjected to smaller levels of cyclic strain (B23P2M) during the liquefaction portion of the test shows a more rapid increase in strength during the subsequent monotonic loading. This suggests that larger cyclic strains serve to "soften" the specimen over a wider range of displacements following the end of cyclic loading

Section 7: Index Testing and Mineralogical Analyses

As described in the introduction, the specimens tested at U.C. Berkeley for their cyclic and post-cyclic behavior were also analyzed for other characteristics by other researchers. In the interests of providing a more complete view of these soil specimens, the results of those studies are briefly summarized here. Index properties including the gradation curves, specific gravity, and Atterberg Limits of both the -#40 and -#200 fractions of each

specimen (when possible) were performed by Law Engineering. These results have been compiled in Table 5. The index tests suggest that nearly all the specimens classify as a clayey sand (SC) with high-plasticity fines (PI values of the - #200 fraction as high as 200).

Mineralogical analyses were performed on ten selected specimens by Drs. Salah Sadek and Michael Riemer using X-ray diffraction techniques. These studies indicated that the coarse fraction of both the Tobacco Road and Santee soils are predominantly quartz, though the Santee does possess a significant amount of carbonates (probably in the form of $\text{Ca}(\text{PO}_4)_5\text{CO}_3(\text{OH})\text{F}$). Of the finer fraction of the soil, Smectite clays were observed in only 3 of the 10 specimens, with the remaining 7 showing various proportions of Kaolinite and Illite. Because of the nature of the X-ray diffraction technique, it should be remembered that amorphous silicates will not be detected, since they lack the regular basal spacing necessary to diffract strongly.

SUMMARY OF CLASSIFICATION TEST RESULTS (Performed at LAW-Atlanta)
STRESS-CONTROLLED CYCLIC TRIAXIAL TESTS (Performed at UC Berkeley)

WSRC Subcontract No. AB08525N

LAW Project No. 5810535301

January 7, 1994

Sample Location	Sample Type-No.	Tube Location *	Depth (ft.)	Specific Gravity	Atterberg Limits						USCS	Grain Size Fig. No.
					Minus #200 Fraction			Minus #40 Fraction				
					LL	PL	PI	LL	PL	PI		
H-Bor-2	PS-4	T	91.2	2.67	125	43	82	49	16	33	SC	1
H-Bor-2	PS-4	M	91.8	2.68	123	41	82	47	16	31	SC	2
H-Bor-2	PS-5	T	94.1	2.65	151	46	105	45	17	28	SC	3
H-Bor-2	PS-5	M	94.7	2.70	187	35	152	52	21	31	SC	4
H-Bor-2	PS-5	B	95.2	2.63	179	43	136	51	17	34	SC	5
H-Bor-2	PS-6	T	97.0	2.66	186	42	144	46	18	28	SC	6
H-Bor-2	PS-6	M	97.6	2.64	182	54	128	48	19	29	SC	7
H-Bor-2	PS-6	B	98.2	2.67	192	36	156	51	20	31	SC	8
H-Bor-2	PS-11	B	170.4	2.71	104	38	66	47	18	29	SC	8b
H-Bor-2	PS-13	T	175.1	2.72	97	41	56	47	24	23	SC	9
H-Bor-2	PS-13	M	175.7	2.73	115	41	74	48	24	24	SM	10
H-Bor-2	PS-13	B	176.3	2.74	110	46	64	47	32	15	SM	11
H-Bor-2	PS-14	T	178.1	2.67	169	41	128	45	25	20	SC	12
H-Bor-2	PS-14	M	178.7	2.72	180	51	129	90	31	59	SC	13
H-Bor-2	PS-14	B	179.5	2.62	insufficient sample size			57	20	37	SC	13b
H-Bor-12	PS-5	T	70.8	2.69	119	38	81	53	23	30	SC	14
H-Bor-12	PS-5	M	71.4	2.70	172	42	130	51	24	27	SC	15
H-Bor-12	PS-5	B	72.0	2.71	180	41	139	48	22	26	SC	16
H-Bor-12	PS-7	T	92.8	2.66	152	40	112	39	15	24	SC	17
H-Bor-12	PS-7	M	93.4	2.68	173	41	132	39	24	15	SC	18
H-Bor-12	PS-7	B	94.0	2.69	174	39	135	39	23	16	SC	19
H-Bor-23	PS-2	T	33.3	2.63	124	46	78	47	16	31	SC	20
H-Bor-23	PS-2	M	33.9	2.70	117	44	73	49	23	26	SC	21
H-Bor-23	PS-2	B	34.5	2.71	115	41	74	44	18	26	SC	22
H-Bor-23	PS-3	T	40.2	2.63	163	38	125	44	24	20	SC	23
H-Bor-23	PS-3	M	40.8	2.65	191	39	152	46	17	29	SC	24
H-Bor-23	PS-3	B	41.4	2.68	178	33	145	50	24	26	SC	25
H-Bor-23	PS-4	T	83.8	2.71	201	38	163	90	20	70	SC	26
H-Bor-23	PS-4	M	84.5	2.74	193	48	145	90	20	70	SC	27
H-Bor-23	PS-4	B	85.0	2.64	229	29	200	61	15	46	SP-SC	28
H-Bor-23.1	PS-1	T	28.9	2.61	128	38	90	42	19	23	SC	29
H-Bor-29	PS-2	T	53.7	2.69	162	40	122	101	29	72	SC	30
H-Bor-29	PS-7	T	90.5	2.68	106	40	66	49	19	30	SC	31
H-Bor-29	PS-7	M	91.1	2.63	121	37	84	48	18	30	SC	32
H-Bor-29	PS-7	B	91.7	2.65	106	40	66	47	20	27	SC	33

* T=Top, M=Middle, B=Bottom

USCS - Unified Soil Classification System

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
1	0.0	0.0	66.8	9.6	23.6

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
49	33	0.60	0.14	0.10	0.047				

MATERIAL DESCRIPTION	USCS	AASHTO
Light Brown Silty Clayey Medium to Fine Sand	SC	A-2-7 (4.1)

Project No.: 5810535301

Project: SRS ITP

Location: H-Bor-2 PS-⁴ @ 91.2 Ft. Top

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Remarks:

Tested by: *CLG*Reviewed by: *RLB*

Atterberg Limits -200

LL=125 PL=43 PI=82

Figure No. 1

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
2	0.0	0.0	66.0	10.5	23.5

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
47	31	0.84	0.18	0.11	0.050				

MATERIAL DESCRIPTION	USCS	AASHTO
Light Brown Silty Clayey Medium to Fine Sand	SC	A-2-7 (4.0)

Project No.: 5810535301

Project: SRS ITP

Location: H-Bor-2 PS-4 @ 91.8 Ft. Middle

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Remarks:

Tested by: CCG

Reviewed by: RLB

Atterberg Limits -200

LL=123 PL=41 PI= 82

Figure No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 4	0.0	0.0	70.4	2.6	27.0

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 52	31	0.32	0.15	0.13	0.074				

MATERIAL DESCRIPTION	USCS	AASHTO
• Light Brown Silty Clayey Medium to Fine Sand	SC	A-2-7 (3.2)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-2 PS-5 @ 94.7 Ft. ~~Top~~ middle

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Remarks:

Tested by: *CLG*

Reviewed by: *RLB*

Atterberg Limits -200

LL=187 PL=35 PI=152

Figure No. 4

GRAIN SIZE DISTRIBUTION TEST REPORT

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 6	0.0	0.0	77.6	4.2	18.2

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 46	28	0.62	0.21	0.16	0.093				

MATERIAL DESCRIPTION	USCS	AASHTO
• Light Brown Silty Clayey Medium to Fine Sand	SC	A-2-7 (1.3)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-2 PS-6 @ 97.0 Ft. Top

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Remarks:

Tested by: *CCG*Reviewed by: *RLB*

Atterberg Limits -200

LL=186 PL=42 PI=144

Figure No. 6

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
7	0.0	0.0	79.9	1.4	18.7

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
48	29	0.72	0.28	0.19	0.113	0.0013			

MATERIAL DESCRIPTION	USCS	AASHTO
Red Brown Clayey Medium to Fine Sand	SC	A-2-7 (1.0)

Project No.: 5810535301

Project: SRS ITP

Location: H-Bor-2 PS-6 @ 97.6 Ft. Middle

Date: September 20, 1993

Remarks:

Tested by: *CLB*Reviewed by: *RLB*

Atterberg Limits -200

LL=182 PL=54 PI=128

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Figure No. 7

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 8	0.0	0.0	81.1	2.0	16.9

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 51	31	0.73	0.30	0.20	0.117				

MATERIAL DESCRIPTION	USCS	AASHTO
• Red Brown Clayey Medium to Fine Sand	SC	A-2-7 (0.8)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-2 PS-6 @ 98.2 Ft. Bottom

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Remarks:

Tested by: *CLG*Reviewed by: *RLB*

Atterberg Limits -200

LL=192 PI=36 PI=156

Figure No. 8

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 6	0.0	0.0	77.4	4.8	17.8

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 47	29	0.48	0.29	0.24	0.129	0.0021			

MATERIAL DESCRIPTION	USCS	AASHTO
• Grey Brown Clayey Sand	SC	A-2-7 (1.5)

Project No.: 5810535301

Project: SRS-ITP

• Location: H-Bor-2 PS-11 @ 170.5 Ft. Bottom

Date: January 5, 1994

Remarks:

Tested by: *DAF*Reviewed by: *RLB*

Atterberg Limits -200

LL=104 Pl=38 PI=66

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Figure No. 8b

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 5	0.0	0.7	59.3	4.1	35.9

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 47	23	0.39	0.21	0.16	0.003				

MATERIAL DESCRIPTION	USCS	AASHTO
• Tan & White Silty Clayey Medium to Fine Sand	SC	A-7-6 (4.4)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-2 PS-13 @ 175.1 Ft. Top

Date: September 27, 1993

Remarks:

Tested by: JRR

Reviewed by: RLB

Atterberg Limits -200

LL=97 PL=41 PI=56

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Figure No. 9

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 15	0.0	0.0	79.3	1.3	19.4

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 48	24	0.42	0.29	0.26	0.140	0.0020			

MATERIAL DESCRIPTION	USCS	AASHTO
• Tan Clayey Medium to Fine Sand	SC	A-2-7 (0.8)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-2 PS-13 @ 175.7 Ft. Middle

Date: September 27, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Remarks:

Tested By: JRR

Reviewed By: RLB

Atterberg Limits -200

LL=115 PL=41 PI=74

Figure No. 10

GRAIN SIZE DISTRIBUTION TEST REPORT

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
4	0.0	0.0	79.0	1.6	19.4

[illegible]

MATERIAL DESCRIPTION	USCS	AASHTO
● Light Tan Clayey Medium to Fine Sand	SC	A-2-7 (0.6)

Project No.: 5810535301
Project: SRS ITP
◆ Location: H-Bor-2 PS-14 @ 178 Ft. Top

Date: September 27, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Remarks:
Tested by: JRR
Reviewed by: RLB
Atterberg Limits -200
LL=169 PL=41 PI=128

Figure No. 12

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
2	0.0	4.8	52.9	3.7	38.6

[illegible]

MATERIAL DESCRIPTION	USCS	AASHTO
• Light Tan with White Clayey Coarse to Fine Sandn	SC	A-7-5 (16.4)

Project No.: 5810535301

Project: SRS ITP

● Location: H-Bor-2 PS-14 @ 178 Ft. Middle

Date: September 27, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Remarks:

Tested by: JRR

Reviewed by: *RUB*

Atterberg Limits -200

LL=180 PL=51 PI=129

Figure No. 13

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 10	0.0	0.0	78.9	3.3	17.8

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 57	37	0.41	0.26	0.22	0.136				

MATERIAL DESCRIPTION	USCS	AASHTO
• Tan Clayey Sand	SC	A-2-7 (1.6)

Project No.: 5810535301

Project: SRS-IIP

• Location: H-Bor-2 PS-14 @ 179.5 Ft. Bottom

Date: January 5, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Remarks:

Tested by: DAF

Reviewed by: RLB

Atterberg Limits -200

Not Enough Material

Figure No. 13b

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 7	0.0	0.5	77.2	6.1	16.2

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 53	30	1.23	0.46	0.30	0.110	0.0022			

MATERIAL DESCRIPTION	USCS	AASHTO
• Yellow Brown Silty Clayey Medium to Fine Sand	SC	A-2-7 (1.4)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-12 PS-5 @ 70.7 Ft. Top

Date: October 25, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Remarks:

Tested by: JRR

Reviewed by: RUB

Atterberg Limits -200

LL=119 PL=38 PI=81

Figure No. 14

GRAIN SIZE DISTRIBUTION TEST REPORT

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 13	0.0	0.0	73.0	5.3	21.7

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 48	26	0.56	0.16	0.13	0.080				

MATERIAL DESCRIPTION	USCS	AASHTO
• Brown Silty Clayey Medium to Fine Sand	SC	A-2-7 (1.9)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-12 PS-5 @ 17.9 Ft. Bottom

Date: October 25, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Remarks:

Tested by: *JRR*Reviewed by: *RLB*

Atterberg Limits -200

LL=180 PL=41 PI=139

Figure No.

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
● 9	0.0	0.0	84.3	0.3	15.4

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
● 39	24	0.55	0.33	0.28	0.166	0.0032			

MATERIAL DESCRIPTION	USCS	AASHTO
● Red Brown Clayey Medium to Fine Sand	SC	A-2-6 (0.1)

Project No.: 5810535301

Project: SRS ITP

● Location: H-Bor-12 PS-7-@ 92.8 Ft. Top

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Remarks:

Tested by: CCG

Reviewed by: RLB

Atterberg Limits -200

LL=152 PL=40 PI=112

Figure No. 17

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 10	0.0	0.0	83.0	0.3	16.7

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 39	15	0.52	0.31	0.27	0.156				

MATERIAL DESCRIPTION	USCS	AASHTO
• Red Brown Clayey Medium to Fine Sand	SC	A-2-6 (0.1)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-12 PS-7 @ 93.4 Ft. Middle

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Remarks:

Tested by: *CCG*

Reviewed by: *RLB*

Atterberg Limits -200

LL=173 PL=41 PI=132

Figure No. 18

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
● 11	0.0	0.0	84.3	1.1	14.6

[illegible]

MATERIAL DESCRIPTION	USCS	AASHTO
● Red Brown Clayey Medium to Fine Sand	SC	A-2-6 (0.1)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-12 PS-7 @ 94.0 Ft. Bottom

Date: September 20, 1993

Remarks:

Tested by: CCF

Reviewed by: *RUB*

Atterberg Limits -200

LL=174 PL=39 PI=135

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Figure No. 19

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
12	0.0	0.3	67.1	8.5	24.1

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
47	31	0.60	0.13	0.10	0.040				

MATERIAL DESCRIPTION	USCS	AASHTO
Tan-White Silty Clayey Medium to Fine Sand	SC	A-2-793.8)

Project No.: 5810535301

Project: SRS ITP

Location: H-Bor-23 PS-2 @ 33.3 Ft. Top

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Remarks:

Tested by: *CCG*Reviewed by: *RUB*

Atterberg Limits -200

LL=124 PI=46 PI=78

Figure No. 20

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 13	0.0	0.0	64.4	10.7	24.9

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 49	26	0.49	0.11	0.09	0.032				

MATERIAL DESCRIPTION	USCS	AASHTO
• Tan-White Silty Clayey Medium to Fine Sand	SC	A-7-6 (3.6)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-23 PS-2 @ 33.9 Ft. Middle

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Remarks:

Tested by: *ECG*

Reviewed by: *RUB*

Atterberg Limits -200

LL=117 PL=44 PI=73

Figure No. 21

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 14	0.0	0.3	66.0	10.3	23.4

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 44	26	0.60	0.12	0.10	0.047				

MATERIAL DESCRIPTION	USCS	AASHTO
• Tan-White Silty Clayey Medium to Fine Sand	SC	A-2-7 (3.0)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-23 PS-2 @ 34.5 Ft. Bottom

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Remarks:

Tested by: *CCB*

Reviewed by: *RLB*

Atterberg Limits -200

LL=115 PL=41 PI=74

Figure No. 22

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 15	0.0	0.0	79.5	2.6	17.9

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 44	20	0.71	0.23	0.17	0.102				

MATERIAL DESCRIPTION	USCS	AASHTO
• Tan Brown Clayey Medium to Fine Sand	SC	A-2-7 (0.5)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-23 PS-3 @ 40.2 Ft. Top

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Remarks:

Tested by: *CLG*

Reviewed by: *RLB*

Atterberg Limits -200

LL=163 PL=38 PI=125

Figure No. 23

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 16	0.0	0.2	81.3	1.8	16.7

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 46	29	0.82	0.32	0.22	0.127	0.0015			

MATERIAL DESCRIPTION	USCS	AASHTO
• Red Brown Clayey Medium to Fine Sand	SC	A-2-7 (0.6)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-23 PS-3 @ 40.8 Ft. Middle

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Remarks:

Tested by: *CC6*Reviewed by: *RLB*

Atterberg Limits -200

LL=191 PL=39 PI=152

Figure No. 24

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 17	0.0	0.7	82.7	2.3	14.3

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 50	26	0.92	0.34	0.22	0.122	0.0154			

MATERIAL DESCRIPTION	USCS	AASHTO
• Red Brown Clayey Medium to Fine Sand	SC	A-2-7 (0.3)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-23 PS-3 @ 41.4 Ft. Bottom

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Remarks:

Tested by: *CCG*Reviewed by: *RLB*

Atterberg Limits -200

LL=178 PI=33 PI=145

Figure No. 25

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 18	0.0	0.0	72.0	5.9	22.1

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 90	70	0.74	0.44	0.35	0.124				

MATERIAL DESCRIPTION	USCS	AASHTO
• Yellow Brown Silty Clayey Medium to Fine Sand	SC	A-2-7 (7.8)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-23 PS-4 @ 83.8 Ft. Top

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Remarks:

Tested by: *CLB*Reviewed by: *RLB*

Atterberg Limits -200

LL=201 PL=38 PI=163

Figure No. 26

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 20	0.0	0.0	83.5	2.0	14.5

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 90	70	0.78	0.51	0.42	0.268	0.0078			

MATERIAL DESCRIPTION	USCS	AASHTO
• Yellow-Brown Clayey Medium to Fine Sand	SC	A-2-7 (0.6)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-23 PS-4 @ 84.4 Ft. Middle

Date: September 20, 1993

Remarks:

Tested by: *CCG*

Reviewed by: *NLD*

Atterberg Limits -200

LL=193 PL=48 PI=145

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Figure No. 27

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 19	0.0	0.0	88.6	1.4	10.0

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 61	46	0.77	0.48	0.40	0.264	0.1450	0.0046	31.15	103.9

MATERIAL DESCRIPTION	USCS	AASHTO
• Yellow Clayey Medium to Fine Sand	SP-SC	A-2-7 (0.0)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-23 PS-4 @ 85.0 Ft. Bottom

Date: September 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Remarks:

Tested by *CLG*

Reviewed by: *RLB*

Atterberg Limits -200

LL=229 PL=29 PI=200

Figure No. 28

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 5	0.0	0.0	75.7	5.2	19.1

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 42	23	0.73	0.24	0.17	0.092				

MATERIAL DESCRIPTION	USCS	AASHTO
• Tan & Purple Silty Clayey Medium to Fine Sand	SC	A-2-7 (1.2)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-23.1 PS-1 28.9 Ft. Top

Date: September 27, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Remarks:

Tested by: *JRK*Reviewed by: *RLB*

Atterberg Limits -200

LL=128 PL=38 PI=90

Figure No. 29

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 5	0.0	0.0	75.7	5.2	19.1

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 42	23	0.73	0.24	0.17	0.092				

MATERIAL DESCRIPTION	USCS	AASHTO
• Tan & Purple Silty Clayey Medium to Fine Sand	SC	A-2-7 (1.2)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-23.1 PS-1 28.9 Ft. Top

Date: September 27, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Remarks:

Tested by: JRR

Reviewed by: RUB

Atterberg Limits -200

LL=128 PL=38 PI=90

Figure No. 29

GRAIN SIZE DISTRIBUTION TEST REPORT

Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 9	0.0	0.7	76.3	4.9	18.1

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 101	72	1.58	0.84	0.67	0.295	0.0017			

MATERIAL DESCRIPTION	USCS	AASHTO
• Purple Silty Clayey Coarse to Fine Sand	SC	A-2-7 (5.0)

Project No.: 5810535301

Project: SRS ITP

• Location: H-Bor-29 PS-2 @ 53.7 Ft. Top

Date: October 25, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Remarks:

Tested by: JRR

Reviewed by: RUB

Atterberg Limits -200

LL=162 PL=40 PI=122

Figure No. 30

GRAIN SIZE DISTRIBUTION TEST REPORT

GRAIN SIZE DISTRIBUTION TEST REPORT

APPENDIX A:
UNIT WEIGHTS OF TUBE SAMPLES

Attachment 1

Tested by: M-R Reviewed by: ML Law Job No.: _____
 Date: 7/23/93 Date: 10/23/93 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H-BOR-2, PS-4

MEASUREMENTS: FROM TOP
OF TUBE

	PACKER (inches)	SOIL (inches)
1.	<u>5 $\frac{22}{32}$</u>	<u>5 $\frac{30}{32}$</u>
2.	<u>5 $\frac{24}{32}$</u>	<u>6 $\frac{1}{32}$</u>
3.	<u>5 $\frac{25}{32}$</u>	<u>6 $\frac{1}{32}$</u>
Ave:	<u>5.74</u>	<u>6.00</u>

FROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)
	<u>24/32</u>	<u>1 $\frac{14}{32}$</u>
	<u>28/32</u>	<u>1 $\frac{12}{32}$</u>
	<u>26/32</u>	<u>1 $\frac{15}{32}$</u>
	<u>0.81</u>	<u>1.43</u>

SOIL
VOLUME

147.1 in³

TOTAL WT. OF TUBE + PAKERS + SOIL =

7123.6 gm.

TOTAL WT. OF PACKERS =

149.4 gm.

TUBE WEIGHT (Supplied by WSRI) =

~~2009~~ gm.
2009

Moist Soil Weight = 4965.
= 10.95

DIAMETER OF
TUBE
(inches)

LENGTH OF
TUBE
(inches)

SOIL DENSITY
(in Tube)

1.	<u>2.885</u>	<u>29 $\frac{30}{32}$</u>
2.	<u>2.887</u>	<u>29 $\frac{30}{32}$</u>
3.	<u>2.884</u>	<u>29 $\frac{30}{32}$</u>
Ave:	<u>2.8853</u>	<u>29.94</u>

Wet Density: 128.6 pcf.

Dry Density: 106.0 pcf.

Area = 6.538

LENGTH OF CUT
TUBE SECTION
(inches)

WT. OF CUT
TUBE SECTION
(GRAMS)

MOISTURE CONTENT

1.	<u>6.729</u>	<u>465</u> gm.
2.	<u>6.723</u>	<u>456.5</u>
3.	<u>6.726</u>	
Ave.	<u>6.726</u>	Wt. per inch: <u>67.87</u> gm

Top Specimen	<u>21.6</u>
Middle Specimen	<u>20.9</u>
Bottom Specimen	<u>—</u>
Average	<u>21.3</u>

length

Attachment 1

Tested by: M-R Reviewed by: MR Law Job No.: _____
 Date: 7/26/93 Date: 10/23/93 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H-BOR-2, PS-5

MEASUREMENTS: FROM TOP
OF TUBE

	PACKER (inches)	SOIL (inches)
1.	<u>5 ²⁷/₃₂</u>	<u>6 ⁷/₃₂</u>
2.	<u>5 ²⁸/₃₂</u>	<u>6 ⁸/₃₂</u>
3.	<u>5 ²⁸/₃₂</u>	<u>6 ⁵/₃₂</u>
Ave:	<u>5.86</u>	<u>6.21</u>

FROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)
	<u>22/32</u>	<u>1 ¹²/₃₂</u>
	<u>25/32</u>	<u>1 ¹⁶/₃₂</u>
	<u>28/32</u>	<u>1 ¹⁵/₃₂</u>
	<u>0.78</u>	<u>1.45</u>

SOIL
VOLUME

144.1 in³

TOTAL WT. OF TUBE + PACKERS + SOIL = 6921.3 gm.

TOTAL WT. OF PACKERS = 154.2 gm.

TUBE WEIGHT (Supplied by WSRI) = 2039.2 gm.

Moist Soil Weight = 4727
= 10.43

DIAMETER OF
TUBE
(inches)

LENGTH OF
TUBE
(inches)

SOIL DENSITY
(in Tube)

1.	<u>2.870</u>	<u>29 ³⁰/₃₂</u>
2.	<u>2.867</u>	<u>29 ³⁰/₃₂</u>
3.	<u>2.873</u>	<u>29 ²⁹/₃₂</u>
Ave:	<u>2.870</u>	<u>29.93</u>

Wet Density: 125.0 pcf.

Dry Density: 100.1 pcf.

Area = 6.469

LENGTH OF CUT
TUBE SECTION
(inches)

WT. OF CUT
TUBE SECTION
(GRAMS)

MOISTURE CONTENT

1.	<u>6.747</u>	<u>464.2</u> gm.
2.	<u>6.743</u>	
3.	<u>6.760</u>	
Ave.	<u>6.750</u>	Wt. per inch: <u>68.77</u> gm

Top Specimen	<u>22.0</u>
Middle Specimen	<u>27.4</u>
Bottom Specimen	<u>25.2</u>
Average	<u>24.9</u>

length

Attachment 1

Tested by: MFR Reviewed by: MP Law Job No.: _____
 Date: 8/05/93 Date: 10/23/93 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H-BOR-2 ; PS-6

MEASUREMENTS: FROM TOP
OF TUBE

FROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)	PACKER (inches)	SOIL (inches)	SOIL VOLUME
1.	<u>6 $\frac{24}{32}$</u>	<u>7 $\frac{1}{32}$</u>	<u>$\frac{28}{32}$</u>	<u>1 $\frac{15}{32}$</u>	
2.	<u>6 $\frac{23}{32}$</u>	<u>7 $\frac{3}{32}$</u>	<u>$\frac{25}{32}$</u>	<u>1 $\frac{14}{32}$</u>	
3.	<u>6 $\frac{23}{32}$</u>	<u>7 $\frac{3}{32}$</u>	<u>$\frac{26}{32}$</u>	<u>1 $\frac{15}{32}$</u>	
Ave:	<u>6.73</u>	<u>7.10</u>	<u>0.82</u>	<u>1.46</u>	<u>137.8 in³</u>

TOTAL WT. OF TUBE + PACKERS + SOIL = 6884.4 gm.

TOTAL WT. OF PACKERS = 154.4 gm.

TUBE WEIGHT (Supplied by WSRI) = 2189.5 gm.

Moist Soil Weight = 4540
= 10.01

	DIAMETER OF TUBE (inches)	LENGTH OF TUBE (inches)	SOIL DENSITY (in Tube)
1.	<u>2.879</u>	<u>29 $\frac{24}{32}$</u>	Wet Density: <u>125.6</u> pcf.
2.	<u>2.874</u>	<u>29 $\frac{24}{32}$</u>	Dry Density: <u>101.8</u> pcf.
3.	<u>2.878</u>	<u>29 $\frac{24}{32}$</u>	
Ave:	<u>2.877</u>	<u>29.75</u>	
Area = <u>6.501 in²</u>			

	LENGTH OF CUT TUBE SECTION (inches)	WT. OF CUT TUBE SECTION (GRAMS)	MOISTURE CONTENT
1.	<u>7.103</u>	<u>525.5 gm.</u>	Top Specimen <u>25.6</u>
2.	<u>7.061</u>		Middle Specimen <u>22.8</u>
3.	<u>7.108</u>		Bottom Specimen <u>21.6</u>
Ave. length	<u>7.091</u>	Wt. per inch: <u>74.11 gm</u>	Average <u>23.3</u>

Attachment 1

Tested by: M-R Reviewed by: MR Law Job No.: _____
 Date: 8/31/93 Date: 10/23/93 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H-BOR-12 ; PS-5

MEASUREMENTS: FROM TOP
OF TUBE

FROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)	PACKER (inches)	SOIL (inches)	SOIL VOLUME
1.	<u>8 ¹³/₃₂</u>	<u>8 ²⁴/₃₂</u>	<u>1 ⁹/₃₂</u>	<u>1 ¹¹/₃₂</u>	
2.	<u>8 ¹³/₃₂</u>	<u>8 ²⁴/₃₂</u>	<u>2 ⁴/₃₂</u>	<u>1 ⁷/₃₂</u>	
3.	<u>8 ¹⁵/₃₂</u>	<u>8 ²⁵/₃₂</u>	<u>2 ³/₃₂</u>	<u>1 ¹¹/₃₂</u>	
Ave:	<u>8.43</u>	<u>8.76</u>	<u>0.69</u>	<u>1.30</u>	<u>128.8 in³</u>

TOTAL WT. OF TUBE + PACKERS + SOIL = 6926.0 gm. Moist soil weight = 4310.7
 TOTAL WT. OF PACKERS = 152.8 gm. = 9.507 l
 TUBE WEIGHT (Supplied by WSRI) = 2462.5 gm.

	DIAMETER OF TUBE (inches)	LENGTH OF TUBE (inches)	SOIL DENSITY (in Tube)
1.	<u>2.865</u>	<u>29 ³¹/₃₂</u>	Wet Density: <u>127.5</u> pcf.
2.	<u>2.871</u>	<u>29 ³¹/₃₂</u>	Dry Density: <u>105.0</u> pcf.
3.	<u>2.872</u>	<u>30 ⁹/₃₂</u>	
Ave:	<u>2.869</u>	<u>29.98</u>	

Area = 6.466

	LENGTH OF CUT TUBE SECTION (inches)	WT. OF CUT TUBE SECTION (GRAMS)	MOISTURE CONTENT
1.	<u>6.292</u>	<u>519.0</u> gm.	Top Specimen <u>19.6</u>
2.	<u>6.267</u>		Middle Specimen <u>19.6</u>
3.	<u>6.281</u>		Bottom Specimen <u>25.0</u>
Ave.	<u>6.280</u>	Wt. per inch: <u>82.64</u> gm	Average <u>21.4</u>

length

Attachment 1

Tested by: MFR Reviewed by: MP Law Job No.: _____
 Date: 8/02/93 Date: 10/23/93 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H-BOR-12; PS-7

MEASUREMENTS: FROM TOP
OF TUBE

	PACKER (inches)	SOIL (inches)
1.	<u>7 ²⁸/₃₂</u>	<u>8 ⁶/₃₂</u>
2.	<u>7 ³⁰/₃₂</u>	<u>8 ⁸/₃₂</u>
3.	<u>7 ²⁹/₃₂</u>	<u>8 ⁷/₃₂</u>
Ave:	<u>7.91</u>	<u>8.22</u>

FROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)
	<u>23 ³/₃₂</u>	<u>1 ¹⁵/₃₂</u>
	<u>30 ⁰/₃₂</u>	<u>1 ¹¹/₃₂</u>
	<u>24 ¹/₃₂</u>	<u>1 ¹⁷/₃₂</u>
	<u>0.80</u>	<u>1.45</u>

SOIL
VOLUME131.2 in³TOTAL WT. OF TUBE + PAKERS + SOIL = 6962.2 gm.TOTAL WT. OF PAKERS = 150.8 gm.TUBE WEIGHT (Supplied by WSRI) = 2457.7 gm.

Moist soil weight = 4353.7
 = 9.60 l

DIAMETER OF
TUBE
(inches)LENGTH OF
TUBE
(inches)SOIL DENSITY
(in Tube)

1.	<u>2.866</u>	<u>29 ³¹/₃₂</u>
2.	<u>2.866</u>	<u>30 ⁰/₃₂</u>
3.	<u>2.868</u>	<u>30 ⁰/₃₂</u>
Ave:	<u>2.867</u>	<u>29.99</u>

Wet Density: 126.5 pcf.Dry Density: 102.0 pcf.Area = 6.456 in²LENGTH OF CUT
TUBE SECTION
(inches)WT. OF CUT
TUBE SECTION
(GRAMS)

MOISTURE CONTENT

1.	<u>6.468</u>	<u>534.0</u> gm.
2.	<u>6.503</u>	
3.	<u>6.511</u>	
Ave.	<u>6.494</u>	Wt. per inch: <u>82.23</u> gm

length

Top Specimen	<u>23.5</u>
Middle Specimen	<u>24.1</u>
Bottom Specimen	<u>24.3</u>
Average	<u>24.0</u>

Attachment 1

Tested by: MFR Reviewed by: MP Law Job No.: _____
 Date: 7/29/93 Date: 10/23/93 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H-Bar-23, PS-2

MEASUREMENTS: FROM TOP
OF TUBE

	PACKER (inches)	SOIL (inches)
1.	<u>7 ²¹/₃₂</u>	<u>7 ³¹/₃₂</u>
2.	<u>7 ²¹/₃₂</u>	<u>7 ³¹/₃₂</u>
3.	<u>7 ²²/₃₂</u>	<u>7 ³⁰/₃₂</u>
Ave:	<u>7.67</u>	<u>7.96</u>

FROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)
	<u>2 ¹/₃₂</u>	<u>1 ¹¹/₃₂</u>
	<u>2 ⁵/₃₂</u>	<u>1 ¹²/₃₂</u>
	<u>2 ⁴/₃₂</u>	<u>1 ¹²/₃₂</u>
	<u>0.76</u>	<u>1.36</u>

SOIL
VOLUME

133.9 in³

TOTAL WT. OF TUBE + PAKERS + SOIL =

6846.0 gm.

Moist Soil Weight = 4434.9

TOTAL WT. OF PAKERS =

154.8 gm.

= 9.78 ii

TUBE WEIGHT (Supplied by WSRI) =

2256.3 gm.

DIAMETER OF
TUBE
(inches)

LENGTH OF
TUBE
(inches)

SOIL DENSITY
(in Tube)

1.	<u>2.873</u>	<u>29 ³⁰/₃₂</u>
2.	<u>2.878</u>	<u>29 ³⁰/₃₂</u>
3.	<u>2.877</u>	<u>29 ³⁰/₃₂</u>
Ave:	<u>2.876</u>	<u>29.94</u>

Wet Density: 126.2 pcf.

Dry Density: 103.8 pcf.

Area = 6.496 in²

LENGTH OF CUT
TUBE SECTION
(inches)

WT. OF CUT
TUBE SECTION
(GRAMS)

MOISTURE CONTENT

1.	<u>6.426</u>	<u>488.7</u> gm.
2.	<u>6.419</u>	
3.	<u>6.453</u>	
Ave.	<u>6.433</u>	Wt. per inch: <u>75.97</u> gm

length

Top Specimen	<u>20.8</u>
Middle Specimen	<u>21.7</u>
Bottom Specimen	<u>22.2</u>
Average	<u>21.6</u>

Attachment 1

Tested by: M. Riemer Reviewed by: MR Law Job No.: _____
 Date: 7/28/93 Date: 10/24/93 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H-Bor-23; PS-3

MEASUREMENTS: FROM TOP
OF TUBE

	PACKER (inches)	SOIL (inches)
1.	<u>6 ²⁵/₃₂</u>	<u>7 ³/₃₂</u>
2.	<u>6 ²¹/₃₂</u>	<u>7 ²/₃₂</u>
3.	<u>6 ²³/₃₂</u>	<u>7 ¹/₃₂</u>
Ave:	<u>6.75</u>	<u>7.06</u>

FROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)
	<u>26 ¹/₃₂</u>	<u>1 ¹³/₃₂</u>
	<u>30 ¹/₃₂</u>	<u>1 ¹⁷/₃₂</u>
	<u>27 ¹/₃₂</u>	<u>1 ¹⁴/₃₂</u>
	<u>0.86</u>	<u>1.46</u>

SOIL
VOLUME

137.4 in³

TOTAL WT. OF TUBE + PAKERS + SOIL = 6730.4 gm.

TOTAL WT. OF PAKERS = 155.0 gm.

TUBE WEIGHT (Supplied by WSRI) = 1976.9 gm.

Moist Soil Weight = 4598.5
 = 10.14 !!

DIAMETER OF
TUBE
(inches)

LENGTH OF
TUBE
(inches)

SOIL DENSITY
(in Tube)

1.	<u>2.862</u>	<u>29 ²⁹/₃₂</u>
2.	<u>2.863</u>	<u>29 ²⁹/₃₂</u>
3.	<u>2.856</u>	<u>29 ²⁹/₃₂</u>
Ave:	<u>2.860</u>	<u>29.91</u>

Wet Density: 127.5 pcf.

Dry Density: 105.6 pcf.

Area = 6.426

LENGTH OF CUT
TUBE SECTION
(inches)

WT. OF CUT
TUBE SECTION
(GRAMS)

MOISTURE CONTENT

1.	<u>6.784</u>	<u>451.6</u> gm.
2.	<u>6.776</u>	
3.	<u>6.787</u>	
Ave.	<u>6.782</u>	Wt. per inch: <u>66.59</u> gm

length

Top Specimen	<u>20.5</u>
Middle Specimen	<u>20.2</u>
Bottom Specimen	<u>21.5</u>
Average	<u>20.7</u>

Attachment 1

Tested by: MFR Reviewed by: MR Law Job No.: _____
 Date: 8/3/93 Date: 10/24/93 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H-Bor-23, PS-4

MEASUREMENTS: FROM TOP
OF TUBE

	PACKER (inches)	SOIL (inches)
1.	<u>8 ¹/₃₂</u>	<u>8 ¹³/₃₂</u>
2.	<u>8 ³/₃₂</u>	<u>8 ¹³/₃₂</u>
3.	<u>8 ¹/₃₂</u>	<u>8 ¹¹/₃₂</u>
Ave:	<u>8.083</u>	<u>8.39</u>

FROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)
	<u>27 ¹/₃₂</u>	<u>1 ¹²/₃₂</u>
	<u>28 ¹/₃₂</u>	<u>1 ¹⁴/₃₂</u>
	<u>30 ¹/₃₂</u>	<u>1 ¹⁶/₃₂</u>
	<u>0.89</u>	<u>1.44</u>

SOIL
VOLUME

131.2 in³

TOTAL WT. OF TUBE + PACKERS + SOIL = 6422.7 gm.

TOTAL WT. OF PACKERS = 148.9 gm.

TUBE WEIGHT (Supplied by WSRI) = 2083.2 gm.

Moist Soil Weight = 4190.6
= 9.242

DIAMETER OF
TUBE
(inches)

LENGTH OF
TUBE
(inches)

SOIL DENSITY
(in Tube)

1.	<u>2.882</u>	<u>29 ³⁰/₃₂</u>
2.	<u>2.883</u>	<u>29 ³⁰/₃₂</u>
3.	<u>2.882</u>	<u>29 ³⁰/₃₂</u>
Ave:	<u>2.882</u>	<u>29.94</u>

Wet Density: 121.7 pcf.

Dry Density: 97.4 pcf.

Area = 6.525

LENGTH OF CUT
TUBE SECTION
(inches)

WT. OF CUT
TUBE SECTION
(GRAMS)

MOISTURE CONTENT

1.	<u>7.369</u>	<u>517.1</u> gm.
2.	<u>7.382</u>	
3.	<u>7.393</u>	
Ave.	<u>7.381</u>	length

Wt. per inch: 70.06 gm

Top Specimen	<u>N/A</u>
Middle Specimen	<u>24.7</u>
Bottom Specimen	<u>25.2</u>
Average	<u>25.0</u>

Attachment 1

Tested by: MFR Reviewed by: MR Law Job No.: _____
 Date: 9/1/93 Date: 10/24/93 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H-BOR-29; PS-2

MEASUREMENTS: FROM TOP
OF TUBE

FROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)	PACKER (inches)	SOIL (inches)	SOIL VOLUME
1.	<u>$7 \frac{1}{32}$</u>	<u>$7 \frac{11}{32}$</u>	<u>$3 \frac{1}{32}$</u>	<u>$1 \frac{13}{32}$</u>	
2.	<u>$7 \frac{1}{32}$</u>	<u>$7 \frac{12}{32}$</u>	<u>$2 \frac{4}{32}$</u>	<u>$1 \frac{17}{32}$</u>	
3.	<u>$7 \frac{1}{32}$</u>	<u>$7 \frac{14}{32}$</u>	<u>$2 \frac{2}{32}$</u>	<u>$1 \frac{12}{32}$</u>	
Ave:	<u>7.125</u>	<u>7.385</u>	<u>0.80</u>	<u>1.44</u>	<u>138.05 in³</u>

TOTAL WT. OF TUBE + PAKERS + SOIL = 6604.9 gm.

TOTAL WT. OF PAKERS =

153.7 gm.

TUBE WEIGHT (Supplied by WSRI) =

NA gm.

Estimated as $(68.9 \text{ in} \times 29.99 \text{ in})$
= 2039 g

Height = 21.16 in
 Area = 6.523 in²

Soil Weight = 4412 g
= 9.73 lb

	DIAMETER OF TUBE (inches)	LENGTH OF TUBE (inches)	SOIL DENSITY (in Tube)
1.	<u>2.882</u>	<u>$29 \frac{31}{32}$</u>	Wet Density: <u>121.8</u> pcf.
2.	<u>2.879</u>	<u>$30 \frac{9}{32}$</u>	Dry Density: <u>100.9</u> pcf.
3.	<u>2.885</u>	<u>$30 \frac{9}{32}$</u>	
Ave:	<u>2.882</u>	<u>29.99</u>	

Area = 6.523 in²

	LENGTH OF CUT TUBE SECTION (inches)	WT. OF CUT TUBE SECTION (GRAMS)
1.	<u>7.832</u>	<u>533</u> gm.
2.	<u>7.845</u>	
3.	<u>7.840</u>	
Ave.	<u>7.839</u>	Wt. per inch: <u>68.0</u> gm

MOISTURE CONTENT

Top Specimen	<u>20.7</u>	} Not Extruded
Middle Specimen	<u>NA</u>	
Bottom Specimen	<u>NA</u>	
Average	<u>20.7</u>	

Attachment 1

Tested by: MFR Reviewed by: M2 Law Job No.: _____
 Date: 8/12/93 Date: 10/24/93 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H-BOR-23.1; PS-1

MEASUREMENTS: FROM TOP
OF TUBE

	PACKER (inches)	SOIL (inches)
1.	<u>7 7/32</u>	<u>7 7/32</u>
2.	<u>6 31/32</u>	<u>7 7/32</u>
3.	<u>7 7/32</u>	<u>7 7/32</u>
Ave:	<u>6.99</u>	<u>7.25</u>

FROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)
	<u>0 24/32</u>	<u>1 12/32</u>
	<u>0 24/32</u>	<u>1 14/32</u>
	<u>0 24/32</u>	<u>1 12/32</u>
	<u>0.77</u>	<u>1.40</u>

SOIL
VOLUME

136.17 in³

TOTAL WT. OF TUBE + PAKERS + SOIL = 7219.8 gm.

TOTAL WT. OF PAKERS = 153.6 gm.

TUBE WEIGHT (Supplied by WSRI) = 2438.0 gm.

SOIL WT. 4628.2g
10.2076

DIAMETER OF
TUBE
(inches)

LENGTH OF
TUBE
(inches)

SOIL DENSITY
(in Tube)

1.	<u>2.860</u>
2.	<u>2.870</u>
3.	<u>2.868</u>
Ave:	<u>2.866</u>

<u>29 24/32</u>
<u>29 24/32</u>
<u>29 24/32</u>
<u>29.75</u>

Wet Density: 129.4 pcf.

Dry Density: 107.7 pcf.

Area = 6.454 in²

LENGTH OF CUT
TUBE SECTION
(inches)

WT. OF CUT
TUBE SECTION
(GRAMS)

MOISTURE CONTENT

1.	<u>7.023</u>
2.	<u>7.080</u>
3.	<u>7.097</u>
Ave.	<u>7.067</u>

576.1 gm.

Top Specimen 20.2
 Middle Specimen N/A
 Bottom Specimen N/A

Average 20.2

length

Wt. per inch: 81.52 gm

Attachment 1

Tested by: MR Reviewed by: MZ Law Job No.: _____
 Date: 8/16/93 Date: 10/24/93 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H - BOR 2, PS - 13

MEASUREMENTS: FROM TOP
OF TUBEFROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)	PACKER (inches)	SOIL (inches)	SOIL VOLUME
1.	<u>7 ¹⁶/₃₂</u>	<u>7 ²⁴/₃₂</u>	<u>1 ⁵/₃₂</u>	<u>1 ²⁵/₃₂</u>	
2.	<u>7 ¹⁴/₃₂</u>	<u>7 ²⁴/₃₂</u>	<u>1 ⁰/₃₂</u>	<u>1 ¹⁸/₃₂</u>	
3.	<u>7 ¹⁵/₃₂</u>	<u>7 ²³/₃₂</u>	<u>1 ⁶/₃₂</u>	<u>1 ²⁵/₃₂</u>	
Ave:	<u>7.47</u>	<u>7.74</u>	<u>1.11</u>	<u>1.71</u>	<u>131.32 in³</u>

TOTAL WT. OF TUBE + PACKERS + SOIL = 6021.3 gm.

TOTAL WT. OF PACKERS = 148.1 gm.

TUBE WEIGHT (Supplied by WSRI) = 2052.3 gm.

WT. SOIL 8.4216

DIAMETER OF
TUBE
(inches)LENGTH OF
TUBE
(inches)SOIL DENSITY
(in Tube)

1.	<u>2.861</u>	<u>29 ⁵⁰/₃₂</u>
2.	<u>2.857</u>	<u>29 ²⁹/₃₂</u>
3.	<u>2.855</u>	<u>29 ²⁵/₃₂</u>
Ave:	<u>2.858</u>	<u>29.92</u>

Wet Density: 110.9 pcf.

Dry Density: 80.2 pcf.

Area = 6.415

LENGTH OF CUT
TUBE SECTION
(inches)WT. OF CUT
TUBE SECTION
(GRAMS)

MOISTURE CONTENT

1.	<u>6.493</u>	<u>448.7</u> gm.
2.	<u>6.473</u>	
3.	<u>6.493</u>	
Ave. length	<u>6.486</u>	Wt. per inch: <u>69.18</u> gm

Top Specimen	<u>36.5</u>
Middle Specimen	<u>31.6</u>
Bottom Specimen	<u>46.5</u>
Average	<u>38.2</u>

Attachment 1

Tested by: HFR Reviewed by: MR Law Job No.: _____
 Date: 2/7/92 Date: 10/24/93 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H-BOR-2 PS-14

MEASUREMENTS: FROM TOP
OF TUBEFROM BOTTOM
OF TUBE

TOP
Packer
Not flat
in tube

	PACKER (inches)	SOIL (inches)	PACKER (inches)	SOIL (inches)	SOIL VOLUME
1.	<u>6 8/32</u>	<u>6 19/32</u>	<u>1 9/32</u>	<u>1 21/32</u>	
2.	<u>6 10/32</u>	<u>6 21/32</u>	<u>1 3/32</u>	<u>1 29/32</u>	
3.	<u>6 6/32</u>	<u>6 18/32</u>	<u>1 4/32</u>	<u>1 21/32</u>	
Ave:	<u>6.25</u>	<u>6.60</u>	<u>1.04</u>	<u>1.65</u>	<u>140.06 in³</u>

TOTAL WT. OF TUBE + PAKERS + SOIL = 6717.9 gm.

TOTAL WT. OF PAKERS = 150.6 gm.

TUBE WEIGHT (Supplied by WSRI) = 2598.1 gm.

WT SOIL 8.75 lb

	DIAMETER OF TUBE (inches)	LENGTH OF TUBE (inches)
1.	<u>2.866</u>	<u>29 31/32</u>
2.	<u>2.863</u>	<u>30 9/32</u>
3.	<u>2.867</u>	<u>29 39/32</u>
Ave:	<u>2.865</u>	<u>29.97</u>

SOIL DENSITY
(in Tube)

Wet Density: 108.0 pcf.

Dry Density: 65.5 pcf.

Area = 6.448

	LENGTH OF CUT TUBE SECTION (inches)	WT. OF CUT TUBE SECTION (GRAMS)
1.	<u>6.838</u>	<u>596.9</u> gm.
2.	<u>6.837</u>	
3.	<u>6.843</u>	
Ave. length	<u>6.839</u>	Wt. per inch: <u>87.27</u> gm

MOISTURE CONTENT

Top Specimen	<u>49.3</u>
Middle Specimen	<u>80.3</u>
Bottom Specimen	<u> </u>
Average	<u>64.8</u>

Attachment 1

Tested by: MR Reviewed by: MZ Law Job No.: _____
 Date: 12/6/93 Date: 1/5/94 Job Name: SRS/ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: H-BOR-2; PS-11

MEASUREMENTS: FROM TOP
OF TUBE

	PACKER (inches)	SOIL (inches)
1.	<u>14 ¹³/₃₂</u>	<u>14 ²³/₃₂</u>
2.	<u>14 ¹⁴/₃₂</u>	<u>14 ²²/₃₂</u>
3.	<u>14 ¹⁴/₃₂</u>	<u>14 ²²/₃₂</u>
Ave:	<u>14.43</u>	<u>14.70</u>

FROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)
	<u>24 ¹/₃₂</u>	<u>1 ⁸/₃₂</u>
	<u>24 ¹/₃₂</u>	<u>1 ¹¹/₃₂</u>
	<u>24 ¹/₃₂</u>	<u>1 ¹¹/₃₂</u>
	<u>0.75</u>	<u>1.31</u>

SOIL
VOLUME90.5 in³TOTAL WT. OF TUBE + PAKERS + SOIL = 4905.0 gm.TOTAL WT. OF PACKERS = 152.0 gm.TUBE WEIGHT (Supplied by WSRI) = 1992.2 gm.

Height = 13.91 in
 Area = 6.505 in²

Soil Weight = 2760.8 g
 = 6.09 lb

DIAMETER OF
TUBE
(inches)LENGTH OF
TUBE
(inches)SOIL DENSITY
(in Tube)

1.	<u>2.877</u>	<u>29.92</u>
2.	<u>2.876</u>	<u>29.92</u>
3.	<u>2.881</u>	<u>29.92</u>
Ave:	<u>2.878</u>	<u>29.92</u>

Wet Density: 116.3 pcf.Dry Density: 78.2 pcf.LENGTH OF CUT
TUBE SECTION
(inches)WT. OF CUT
TUBE SECTION
(GRAMS)

MOISTURE CONTENT

1.	<u>6.44</u>	<u>433.4</u> gm.
2.	<u>6.45</u>	
3.	<u>6.46</u>	
Ave.	<u>6.45</u>	length

Wt. per inch: 67.19 gm

Top Specimen	<u>—</u>
Middle Specimen	<u>—</u>
Bottom Specimen	<u>48.7</u>
Average	<u>48.7</u>

Attachment 1

Tested by: MFR Reviewed by: MR Law Job No.: 1
 Date: 12/8/93 Date: 1/5/94 Job Name: ITP

UNIT WEIGHT OF THIN WALL TUBE SAMPLES

Sample I.D.: HBOR29 PS-7

MEASUREMENTS: FROM TOP
OF TUBE

	PACKER (inches)	SOIL (inches)
1.	<u>7 22/32</u>	<u>8 2/32</u>
2.	<u>7 22/32</u>	<u>8 6/32</u>
3.	<u>7 24/32</u>	<u>8 4/32</u>
Ave:	<u>7.71</u>	<u>8.125</u>

FROM BOTTOM
OF TUBE

	PACKER (inches)	SOIL (inches)
	<u>28/32</u>	<u>1 15/32</u>
	<u>30/32</u>	<u>1 14/32</u>
	<u>28/32</u>	<u>1 16/32</u>
	<u>0.90</u>	<u>1.47</u>

SOIL
VOLUME

131.4 in³

TOTAL WT. OF TUBE + PACKERS + SOIL = 7082.7 gm.

TOTAL WT. OF PACKERS = 1704 gm.

TUBE WEIGHT (Supplied by WSRI) = N.A. gm.

Estimated as = $(82.66 \text{ g/in}) (29.99 \text{ in})$
= 2479 g

Height = 20.395 in
 Area = 6.441 in²

Soil Weight = 4433.3
= 9.78

DIAMETER OF
TUBE
(inches)

LENGTH OF
TUBE
(inches)

SOIL DENSITY
(in Tube)

1.	<u>2.865</u>	<u>30"</u>
2.	<u>2.865</u>	<u>29 31/32</u>
3.	<u>2.861</u>	<u>30"</u>
Ave:	<u>2.864</u>	<u>29.99</u>

Wet Density: 128.6 pcf.

Dry Density: 105.4 pcf.

Area = 6.441

LENGTH OF CUT
TUBE SECTION
(inches)

WT. OF CUT
TUBE SECTION
(GRAMS)

MOISTURE CONTENT

1.	<u>6.83</u>	<u>565.1</u> gm.
2.	<u>6.84</u>	
3.	<u>6.84</u>	
Ave.	<u>6.837</u>	Wt. per inch: <u>82.66</u> gm

Top Specimen	<u>23.3</u>
Middle Specimen	<u>22.3</u>
Bottom Specimen	<u>20.6</u>
Average	<u>22.1</u>

length

APPENDIX B:
UNDISTURBED SAMPLE LOGS

UNDISTURBED SAMPLE LOG

SHEET 1 OF 1

FILE No. _____

Project SRS/ITP

SUBCODE _____

TUBE O.D. = 3 in. Thickness = _____ in.

Material ☐ Brass ☒ Steel ☐ Stainless Steel

Boring No. H-BOR-2 Sample No. PS-4

Depth 91'2" to 93'2" rec = _____ in.
push = _____ in.

DEPTH FT.	top	SOIL DESCRIPTION & REMARKS	PERFORMED BY	TARE DATE	TARE No.	ω %	TEST TYPE	TEST VALUE
--------------	-----	----------------------------	-----------------	--------------	-------------	--------	--------------	---------------

B2P4T

Tan to brown clayey sand (SC)
w/mottled white zones

CKC

7/23/93

215

21.6

B2P4M

Tan to brown clayey sand (SC)
w/horizontal white streaks

MFR

7/26/93

168

20.9

bottom of tube

ω, %

Length

Average Water Content = 21.3 %

Boring No. _____

Sample No. _____

MR 1/5/94

772 1/5/94

UNDISTURBED SAMPLE LOG

SHEET 1 OF 1

FILE NO. _____

SUBCODE _____

Project SRS-ITP

TUBE O.D. = 3 in. Thickness = in.

Material ☐ Brass ☒ Steel ☐ Stainless Steel

Boring No. H-BOR-2 **Sample No.** PS-6

Depth 97'0" to 98.9' rec = _____ in.
push = _____ in.

DEPTH FT.	top	SOIL DESCRIPTION & REMARKS	PERFORMED BY	TARE No.	w %	TEST TYPE	TEST VALUE
--------------	-----	----------------------------	-----------------	-------------	--------	--------------	---------------

B2P6T	Orange to brown silty clayey sand (SC/SM)	MFR	8/05/93	22	25.6	
B2P6M	Reddish orange clayey fine sand (SC) trace of white layering	MFR	8/06/93	215	22.8	
B2P6B	Reddish brown fine sand-w/clay, silt-(SW-SC) thin white layers	MFR	8/09/93	280	21.6	

bottom of tube

 $\omega, \%$

Length

Average Water Content = 23.3 %

Boring No._____

Sample No. _____

MR 1/5/94

UNDISTURBED SAMPLE LOG

SHEET 1 OF 1

FILE NO. _____

Project SRS/ITP

SUBCODE _____

TUBE O.D. = 3 in. Thickness = in.

Material ☒ Brass ☐ Steel ☐ Stainless Steel

Boring No. H-BOR-12 **Sample No.** PS-5

Depth 70.7' to 72.5' rec = _____ in.
push = _____ in.

DEPTH FT.	top	SOIL DESCRIPTION & REMARKS	PERFORMED BY	TARE No.	w %	TEST TYPE	TEST VALUE
--------------	-----	----------------------------	-----------------	-------------	--------	--------------	---------------

Tube Scale: 1 div = 1.5h

B12P5T	Tan to orange clayey sand (SC) w/finely textured white streaks (medium to coarse sand)	MFR	8/31/93	219	19.6	
B12P5M	Tan to orange clayey silty sand (SC/SM) w/mottled white zones of soapy clay (fine to medium sand)	MFR	8/31/93	219	19.6	
B12P5B	Tan to orange, clayey silty sand (SC/SM) w/mottled white zones of clay Sand fraction fine to medium	MFR	9/1/93	31	25.0	

bottom of tube

 $\omega, \%$

Length

72 1/5/94

Average Water Content = 21.4 %

Boring No._____

Sample Ala

UNDISTURBED SAMPLE LOG

SHEET 1 OF 1

FILE NO. _____

Project SRS-ITP

SUBCODE _____

TUBE O.D. = 3 in. Thickness = in.

Material ☒ Brass ☐ Steel ☐ Stainless Steel

Boring No. H-BOR-12 **Sample No.** PS-7

Depth 92' 10" to 94' 8.32" rec = _____ in.
push = _____ in.

DEPTH FT.	top	SOIL DESCRIPTION & REMARKS	PERFORMED BY	TARE No.	w %	TEST TYPE	TEST VALUE
--------------	-----	----------------------------	-----------------	-------------	--------	--------------	---------------

B12P7T	Dark red to brown fine to medium sand w/silt (SP-SM)	MFR	8/02/93	45	23.5	
B12P7M	Dark red to brown fine to medium sand w/silt (SP-SM) w/brighter red horz. bands	MFR	8/02/93	365	24.1	
B12P7B	Reddish to orange brown fine to medium sand w/silt (SP-SM) w/bands of red and orange	MFR	8/03/93	96	24.3	

bottom of tube

ω, %

Length

Average Water Content = 24.0 %

Boring No._____

Sample No

SHEET 1 OF 1

FILE No. _____

SUBCODE _____

Project SRS/ITP

Boring No. H-BOR-23 Sample No. PS-2

Depth 33.3' to 35.1' rec = _____ in.
push = _____ in.

TUBE O.D. = 3 in. Thickness = in.

Material ☐ Brass ☒ Steel ☐ Stainless Steel

DEPTH FT.	top	SOIL DESCRIPTION & REMARKS	PERFORMED BY	TARE No.	w %	TEST TYPE	TEST VALUE
--------------	-----	----------------------------	-----------------	-------------	--------	--------------	---------------

soil						
B23P2T	Tan to brown					
	clayey sand (SC)					
	white mottling	MFR	7/29/93	155	20.8	
B23P2M	Tan to brown					
	clayey sand (SC)	MFR	7/30/93	324	21.7	
	significant mottling					
B23P2B	Tan to brown					
	clayey sand w/trace gravel (SC)	MFR	7/30/93	153	22.2	
	abundant white layering					

bottom of tube

ω, %

Length

Average Water Content = _____ %

Boring No. _____

Sample A1a

721/5/94

UNDISTURBED SAMPLE LOG

SHEET 1 OF 1

FILE No. _____

Project SRS/ITP

SUBCODE _____

TUBE O.D. = 3 in. Thickness = in.

Material ☐ Brass ☒ Steel ☐ Stainless Steel

Boring No. H-BOR-23 **Sample No.** PS-3

Depth 40'2" to 42'1" rec = _____ in.
push = _____ in.

DEPTH FT.	top	SOIL DESCRIPTION & REMARKS	PERFORMED BY	TARE DATE	No.	w %	TEST TYPE	TEST VALUE
--------------	-----	----------------------------	-----------------	--------------	-----	--------	--------------	---------------

B23P3T	Tan to reddish brown fine to medium sand (SP-SC) with clay some mottling of white layers	MFR	7/28/93	233	20.5	
B23P3M	Tan to reddish brown fine to medium sand (SP-SC) trace of layering	MFR	7/28/93	169	20.2	
B23P3B	Reddish brown fine to medium sand (SP-SC) - some white layering	MFR	7/29/93	83	21.5	- - - - -

bottom of tube

ω, %

Length

772 115/94

Average Water Content = 20.7 %

Boring No. _____

Sample No. _____

UNDISTURBED SAMPLE LOG

SHEET 1 OF 1

FILE NO. _____

Project SRS/ITP

SUBCODE _____

TUBE O.D. = 3 in. Thickness = in.

Material ☐ Brass ☒ Steel ☐ Stainless Steel

Boring No. H-BOR-23 Sample No. PS-4

Depth 83'9" to 85'8" rec = _____ in.
push = _____ in.

DEPTH FT.	top	SOIL DESCRIPTION & REMARKS	PERFORMED BY	TARE DATE	No.	w %	TEST TYPE	TEST VALUE
--------------	-----	----------------------------	-----------------	--------------	-----	--------	--------------	---------------

B23P4T	Tan to brown fine to medium sand (SP-SM) w/silt no layering	MFR	8/03/93	33	N.A.	
B23P4M	Tan and grayish brown fine to medium sand (SP-SC) w/clay and silt	MFR	8/04/93	18	24.7	
B23P4B	Tan to brown fine to medium sand (SP-SC) w/silt and clay trace of grayish clay	MFR	8/05/93	52	25.2	

bottom of tube

ω, %

Length

Average Water Content = 25.0 %

Boring No._____

Sample No._____

Tube Scale: 1 div = 1 inch

UNDISTURBED SAMPLE LOG

SHEET 1 OF 1

FILE NO. _____

Project SRS/ITP

SUBCODE _____

TUBE O.D. = 3 in. Thickness = in.

Material ☐ Brass ☒ Steel ☐ Stainless Steel

Boring No. H-BOR-29 Sample No. PS-2

Depth 53.6' to 55.5' rec = _____ in.
push = _____ in.

DEPTH

FT. top

SOIL DESCRIPTION & REMARKS

PERFORMED TARE

BY DATE

TARE

No.

W

%

TEST

TYPE

TEST

VALUE

Tube Scale: 1 div = 1 ch

Gravel
(removed)

0

B29P2T

Gravel
(removed)

Dark red w/orange clayey sand (SC)

Medium to coarse sand

MFR

9/01/93

146

20.7

(clear, subangular to angular)

w/traces of gravel

and clay binder (soapy texture)

bottom of tube

ω, %

Length

Average Water Content = 20.7 %

Boring No. _____

Sample No.

UNDISTURBED SAMPLE LOG

SHEET 1 OF 1

FILE NO. _____

Project SRS/ITP

SUBCODE _____

TUBE O.D. = 3 in. Thickness = in.

Material ☒ Brass ☐ Steel ☐ Stainless Steel

Boring No. H-BOR-23.1 **Sample No.** PS-1

Depth 28'-11" to 30'-9" rec = _____ in.
push = _____ in.

DEPTH FT.	top	SOIL DESCRIPTION & REMARKS	PERFORMED BY	TARE No.	ω %	TEST TYPE	TEST VALUE
--------------	-----	----------------------------	-----------------	-------------	---------------	--------------	---------------

Tube Scale: 1 div = 1.5h

Multi-colored zones: reddish
purple to orange

B231P1T	<u>All zones are clayey sand w/silt mostly fine sand (SC)</u>
---------	---

MFR	8/12/93	100	20.2
-----	---------	-----	------

bottom of tube

ω, %

Length

Average Water Content = 20.2 %

Boring No. _____
Sample No. _____

MR 1/22/94

UNDISTURBED SAMPLE LOG

SHEET 1 OF 1

FILE NO. _____

SUBCODE _____

Project SRS/ITP

TUBE O.D. = 3 in. Thickness = _____ in.

Material ☐ Brass ☒ Steel ☐ Stainless Steel

Boring No. H-BOR-2 Sample No. PS-13

Depth 175' to 177' rec = _____ in.
push = _____ in.

DEPTH FT.	top	SOIL DESCRIPTION & REMARKS	PERFORMED BY	TARE DATE	TARE No.	ω %	TEST TYPE	TEST VALUE
--------------	-----	----------------------------	-----------------	--------------	-------------	--------	--------------	---------------

B2P13T

Lt. gray to white fine silty
sand w/clay & occasional black
angular particles, feels
"slippery" (like talc)
a few zones of tan to brown
coarser sand (SC)

MFR 8/16/93 312 36.5

B2P13M

Gray medium to fine sand w/clay
layers of brownish gray, coarse sand
Occasional streaks of dark
brown to black (SC)

MFR 8/16/93 5 31.6

B2P13B

Lt. gray to white silty sand w/clay
apparently lightly cemented,
angular center zone is whiter,
finer (SC)
Top 1/2" is tan to brown,
clean fine to medium sand

MFR 8/17/93 88 46.5

bottom of tube

ω, %

Length

Average Water Content = 38.2 %

Boring No. _____

Sample No. _____

M2 1/21/94

Tube Scale: 1 div = 1 inch

UNDISTURBED SAMPLE LOG

SHEET 1 OF 1

FILE No. _____

Project SRS/ITP

SUBCODE _____

TUBE O.D. = 3 in. Thickness = _____ in.

Material ☒ Brass ☐ Steel ☐ Stainless Steel

Boring No. H-BOR-2 Sample No. PS-14

Depth 178' to 180' rec = _____ in.
push = _____ in.

DEPTH FT. top	SOIL DESCRIPTION & REMARKS	PERFORMED BY	TARE DATE	ω No. %	TEST TYPE	TEST VALUE
------------------	----------------------------	-----------------	--------------	------------	--------------	---------------

B2P14T

Gray fine silty sand with some black grains (SM)

Upper third is white w/orange cleavage surfaces, clayey sand w/large aggregations of angular, loosely cemented particles

MFR

8/17/93

333

49.3

B2P14M

Gray to white silty sand w/clay large aggregations of lightly cemented angular particles, break down to "slippery" powder (SC)
Very light weight!

MFR

8/18/93

247

80.3

B2P14B

Gray to white clayey sand (SC)
Zone of cleaner, tan sand in center
Sand is generally fine & angular, w/occasional large grains
Little if any apparent cementation

MFR

12/6/93

None

bottom of tube

ω, %

Length

Average Water Content = 64.8 %

Boring No. _____

Sample No. _____

MT 1/22/94

UNDISTURBED SAMPLE LOG

SHEET _____ OF _____

FILE No. _____

Project SRS/ITP

SUBCODE _____

TUBE O.D. = 3 in. Thickness = in.

Material ☐ Brass ☒ Steel ☐ Stainless Steel

Boring No. H-BOR-2 **Sample No.** PS-11

Depth 169'10" to 171'2" rec = _____ in.
push = _____ in.

DEPTH FT.	top	SOIL DESCRIPTION & REMARKS	PERFORMED BY	TARE DATE	w No. %	TEST TYPE	TEST VALUE
--------------	-----	----------------------------	-----------------	--------------	------------	--------------	---------------

[illegible]

bottom of tube

$\omega, \%$

Length

Average Water Content = %

Boring No.

Sample No. _____

UNDISTURBED SAMPLE LOG

SHEET _____ OF _____

FILE NO. _____

Project SRS/RTF

SUBCODE _____

TUBE O.D. = 3 in. Thickness = in.

Material ☒ **Brass** ☐ **Steel** ☐ **Stainless Steel**

Boring No. H-BOR-29 **Sample No.** PS-7

Depth 90'6" to 92'3" rec = _____ in.
push = _____ in.

DEPTH FT.	top	SOIL DESCRIPTION & REMARKS	PERFORMED BY	TARE DATE	ω No.	TEST %	TEST TYPE	TEST VALUE
--------------	-----	----------------------------	-----------------	--------------	----------	-----------	--------------	---------------

B29P7T	Yellow-orange, clayey, fine sand (SC) with horizontal streaks (~1/8" thick) of white clay	MFR	12/8/93	155	23.3	
B29P7M	Yellow-orange, clayey, fine sand (SC) with horizontal streaks (~1/8" thick) of white clay	MFR	12/9/93	275	22.3	
B29P7B	Yellow-orange, clayey coarse-to-med grained, angular sand (SC) w/horizontal streaks (~1/8" thick) of white clay	MFR	12/10/93	419	20.6	

bottom of tube

ω, %

Length

MR 1/22/94

Average Water Content = 22.1 %

Boring No. _____

Sample No. _____

APPENDIX C:
LIQUEFACTION TEST DATA

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 7/23/93	
Project: SRS / ITP				Boring No. H-Bor-2			Depth : 91.2 ft.		
Sample No. PS-4		Test No. 2/4/T		Apparatus # 1		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.913	Center (in)	2.913	Bottom (in)	2.91	Avg Diameter (cm)		7.40	
Membrane thickness, T (cm)			0.029		Sample Diameter (w/o membrane)			7.34	
Area, Ao (sq. cm)		42.30							
Height (At full vacuum), Ho (cm)			15.619		Volume, Vo (cc)		660.63		
Initial wet weight of soil +Tare (g)			1675.6	WTare (g)	333.6	Wgt of wet Sample, W(g)		1342	
Initial moisture content (from trimmings)					Can#	215	Wcan (g)	65	
Wcan+soil(g)	168.7	W can+dry soil(g)		150.3	w (%)	21.57	γ_d (pcf)	104.27	
Conditions of Specimen after Saturation and Consolidation									
After Saturation					After Consolidation				
Change in Height, ΔH_{sat} (cm)		0.094		Change in Height, ΔH_c (cm)		0.04			
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		15.53		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		15.49			
Area, Asat (sq. cm)		41.79		Volumetric Strain ϵ_v (%)		0.64			
Volume, Vsat (cc)		648.75		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		644.52			
Dry Density, γ_{ds} (pcf)		106.18		Area, $A_c=(V_c/H_c)$ (sq. cm)		41.62			
				Dry Density, γ_{dc} (pcf)		106.87			
B-value (after saturation)		0.95		B-value (after consolidation)		0.97			
Consolidation Pressure, σ_{3c} (kPa)		500		Steady Pressure (kPa)		190			
Desired CSR		0.13	$\sigma_{dc}=(2\sigma_{3c}).CSR$		130	$\sigma_{dc}(p-p)=2.\sigma_{dc}$		260	
After Test Results									
	N	$\sigma_{dc}=(\sigma_c+\sigma_e)/2$		$\pm - (\sigma_{dc}/2\sigma_{3c})$		NOTES Sample did not liquefy through 450 cycles			
$u = \sigma_3'$	>450	134		.134					
$\epsilon_{da} = 5 \%$	N/A	N/A		N/A					
$\epsilon_{da} = 10 \%$	N/A	N/A		N/A					

Reviewed by: *ML* 10/19/93

No. B2P4T

07-24-1993 13:20:00

N vs. σ_3'

DATA FILE NAME: B2P4TCYC.DAT
TOTAL NUMBER OF DATA POINTS: 4502
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 4502
SMOOTHING LEVEL: 0

Comments:

Cycles 1-150

No. B2P4T

N vs. q

07-24-1993 13:22:19

DATA FILE NAME: B2P4TCYC.DAT
TOTAL NUMBER OF DATA POINTS: 4502
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 4502
SMOOTHING LEVEL: 0

Comments:

Cycles 1-150

No. B2P4 T
N vs. E

07-24-1993 13:31:17

DATA FILE NAME: B2P4TCYC.DAT
TOTAL NUMBER OF DATA POINTS: 4502
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 4502
SMOOTHING LEVEL: 0

Comments:

Cycles 1-150

No. B2P4T

N w. 03'

07-24-1993 13:35:07

DATA FILE NAME: B2P4TCV2.DAT
TOTAL NUMBER OF DATA POINTS: 4502
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 4502
SMOOTHING LEVEL: 0

Comments:

Cycles 151-300

No. B2P4 T

N vs. g

07-24-1993 13:37:15

DATA FILE NAME: B2P4TCY2.DAT
TOTAL NUMBER OF DATA POINTS: 4502
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 4502
SMOOTHING LEVEL: 0

Comments:

Cycles 151-300

No. B2P4T

07-24-1993 13:39:14

N vs E

DATA FILE NAME: B2P4TCY2.DAT
TOTAL NUMBER OF DATA POINTS: 4502
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 4502
SMOOTHING LEVEL: 0

Comments:

Cycles 151-300

No. B2P4 T

N vs. σ_3'

07-24-1993 13:42:47

DATA FILE NAME: B2P4TCY3.DAT
TOTAL NUMBER OF DATA POINTS: 4503
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 4503
SMOOTHING LEVEL: 0

Comments:

Cycles 301-450

No. B2P4 T
N vs. q

07-24-1993 13:46:14

DATA FILE NAME: B2P4TCY3.DAT
TOTAL NUMBER OF DATA POINTS: 4503
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 4503
SMOOTHING LEVEL: 0

Comments:

Cycles 301-450

No. B2P4 T
N vs. E

07-24-1993 13:49:25

DATA FILE NAME: B2P4TCY3.DAI
TOTAL NUMBER OF DATA POINTS: 4503
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 4503
SMOOTHING LEVEL: 0

Comments:

Cycles 301-450

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 7/26/93	
Project: SRS / ITP				Boring No. H-Bor-2				Depth : 91.8 ft.	
Sample No. PS-4		Test No. 2/4/M		Apparatus # 1		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.912	Center (in)	2.912	Bottom (in)	2.911	Avg Diameter (cm)		7.40	
Membrane thickness, T (cm)			0.032		Sample Diameter (w/o membrane)			7.33	
Area, Ao (sq. cm)		42.22							
Height (At full vacuum), Ho (cm)			14.147		Volume, Vo (cc)			597.25	
Initial wet weight of soil +Tare (g)			1560.2		WTare (g)		329.1		Wgt of wet Sample, W(g) 1231.1
Initial moisture content (from trimmings)					Can#		168		Wcan (g) 64.4
Wcan+soil(g)	172.5	W can+dry soil(g)		153.8	w (%)	20.92	γd (pcf)	106.37	
Conditions of Specimen after Saturation and Consolidation									
After Saturation					After Consolidation				
Change in Height, ΔHsat (cm)		0.085			Change in Height, ΔHc (cm)			0.025	
Sample Height, Hsat=(Ho- ΔHsat)		14.06			Sample Height, Hc= (Hsat - ΔHc)			14.04	
Area, Asat (sq. cm)		41.71			Volumetric Strain εv (%)			0.52	
Volume, Vsat (cc)		586.53			Volume, Vc=(Vsat - ΔV) (cc)			583.42	
Dry Density, γds (pcf)		108.32			Area, Ac =(Vc/Hc) (sq. cm)			41.56	
					Dry Density, γdc (pcf)			108.89	
B-value (after saturation)		0.97			B-value (after consolidation)			0.99	
Consolidation Pressure, σ3c (kPa)		500			Steady Pressure (kPa)			260	
Desired CSR		0.2	σdc=(2σ3c).CSR		200	σdc (p-p) =2.σdc		400	
After Test Results									
	N	σdc=(σC+σE) /2		+/- (σdc/2σ3c)		NOTES			
u = σ3'	39	207		.207					
εda = 5 %	70	203		.203					
εda = 10 %	N/A	N/A		N/A					

Reviewed by: *MR* 10/19/93

No. B2P4M

07-27-1993 13:16:04

N vs. σ_3'

DATA FILE NAME: B2P4MCYC.DAT
TOTAL NUMBER OF DATA POINTS: 2577
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 2577
SMOOTHING LEVEL: 0

Comments:

No. B2P4M

07-27-1993 13:18:39

N vs. q

DATA FILE NAME: B2P4MCYC.DAT
TOTAL NUMBER OF DATA POINTS: 2577
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 2577
SMOOTHING LEVEL: 0

Comments:

No. B2P4 M

07-27-1993 13:23:12

N vs. E

DATA FILE NAME: B2P4MCYC.DAT
TOTAL NUMBER OF DATA POINTS: 2577
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 2577
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 7/26/93	
Project: SRS / ITP			Boring No. H-Bor-2			Depth : 94.1 ft.	
Sample No. PS-5		Test No. 2/5/T		Apparatus # 2		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.9	Center (in)	2.905	Bottom (in)	2.904	Avg Diameter (cm)	7.37
Membrane thickness, T (cm)			0.029		Sample Diameter (w/o membrane)		7.32
Area, Ao (sq. cm)		42.03					
Height (At full vacuum), Ho (cm)			15.044		Volume, Vo (cc)		632.35
Initial wet weight of soil +Tare (g)			1613.8	WTare (g)	333.2	Wgt of wet Sample, W(g)	1280.6
Initial moisture content (from trimmings)					Can#	211	Wcan (g) 64.9
Wcan+soil(g)	182.6	W can+dry soil(g)		161.4	w (%)	21.97	γ_d (pcf) 103.61
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.105		Change in Height, ΔH_c (cm)		0.034	
Sample Height, $H_{sat}=(H_o- \Delta H_{sat})$		14.94		Sample Height, $H_c=(H_{sat}- \Delta H_c)$		14.91	
Area, A_{sat} (sq. cm)		41.45		Volumetric Strain ϵ_v (%)		0.49	
Volume, V_{sat} (cc)		619.17		Volume, $V_c=(V_{sat}-\Delta V)$ (cc)		616.07	
Dry Density, γ_{ds} (pcf)		105.81		Area, $A_c=(V_c/H_c)$ (sq. cm)		41.33	
				Dry Density, γ_{dc} (pcf)		106.35	
B-value (after saturation)		0.952		B-value (after consolidation)		0.97	
Consolidation Pressure, σ_{3c} (kPa)		500		Steady Pressure (kPa)		280	
Desired CSR		0.22	$\sigma_{dc}=(2\sigma_{3c}).CSR$		220	$\sigma_{dc}(p-p)=2.\sigma_{dc}$ 440	
After Test Results							
	N	$\sigma_{dc}=(\sigma_C+\sigma_E)/2$		$\pm (\sigma_{dc}/2\sigma_{3c})$		NOTES	
$u = \sigma_3'$	6	229		.229			
$\epsilon_{da} = 5 \%$	10	230		.230			
$\epsilon_{da} = 10 \%$	15	234		.234			

Reviewed by: *MR* 10/19/93

B2P5 T
N vs. σ_3'

DATA FILE NAME: B2P5TCYC.DAT
TOTAL NUMBER OF DATA POINTS: 550
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 550
SMOOTHING LEVEL: 0

Comments:

No. B2P5T

07-26-1993 17:34:10

N vs. q.

DATA FILE NAME: B2P5TCYC.DAT
TOTAL NUMBER OF DATA POINTS: 550
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 550
SMOOTHING LEVEL: 0

Comments:

No. B2P5

07-26-1993 17:36:31

N vs. E

DATA FILE NAME: B2P5TCYC.DAT
TOTAL NUMBER OF DATA POINTS: 550
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 550
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 7/27/93	
Project: SRS / ITP			Boring No. H-Bor-2			Depth : 94.7 ft.			
Sample No. PS-5		Test No. 2/5/M		Apparatus # 1		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.903	Center (in)	2.908	Bottom (in)	2.906	Avg Diameter (cm)	7.38		
Membrane thickness, T (cm)			0.032		Sample Diameter (w/o membrane)			7.32	
Area, Ao (sq. cm)		42.04							
Height (At full vacuum), Ho (cm)			14.772		Volume, Vo (cc)			621.05	
Initial wet weight of soil +Tare (g)			1544.3	WTare (g)	329.9	Wgt of wet Sample, W(g)		1214.4	
Initial moisture content (from trimmings)					Can#	182	Wcan (g)	64.4	
Wcan+soil(g)	164.8	W can+dry soil(g)		143.2	w (%)	27.41	γ_d (pcf)	95.77	
Conditions of Specimen after Saturation and Consolidation									
After Saturation					After Consolidation				
Change in Height, ΔH_{sat} (cm)			0.075		Change in Height, ΔH_c (cm)			0.031	
Sample Height, $H_{sat}=(H_o- \Delta H_{sat})$			14.70		Sample Height, $H_c=(H_{sat}- \Delta H_c)$			14.67	
Area, Asat (sq. cm)			41.62		Volumetric Strain ϵ_v (%)			0.57	
Volume, Vsat (cc)			611.62		Volume, $V_c=(V_{sat}- \Delta V)$ (cc)			608.08	
Dry Density, γ_{ds} (pcf)			97.24		Area, $A_c=(V_c/H_c)$ (sq. cm)			41.46	
					Dry Density, γ_{dc} (pcf)			97.81	
B-value (after saturation)			0.95		B-value (after consolidation)			0.98	
Consolidation Pressure, σ_{3c} (kPa)			500		Steady Pressure (kPa)			260	
Desired CSR		0.2	$\sigma_{dc}=(2\sigma_{3c}).CSR$		200	$\sigma_{dc}(p-p)=2.\sigma_{dc}$		400	
After Test Results									
	N	$\sigma_{dc}=(\sigma_C+\sigma_E)/2$		$\pm (\sigma_{dc}/2\sigma_{3c})$		NOTES			
$u = \sigma_3'$	20	207		.207					
$\epsilon_{da} = 5 \%$	27	208		.208					
$\epsilon_{da} = 10 \%$	N/A	N/A		N/A					

Reviewed by: *MR* 10/19/93

No. B2P5M
N vs. σ_3'

07-28-1993 11:30:24

DATA FILE NAME: B2P5MCYC.DAT
TOTAL NUMBER OF DATA POINTS: 956
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 956
SMOOTHING LEVEL: 0

Comments:

No. B2P5 M

07-28-1993 11:32:19

N vs. g

DATA FILE NAME: B2P5MCYC.DAT
TOTAL NUMBER OF DATA POINTS: 956
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 956
SMOOTHING LEVEL: 0

Comments:

No. B2P5 M

07-28-1993 11:34:24

N vs. E

DATA FILE NAME: B2P5MCYC.DAT
TOTAL NUMBER OF DATA POINTS: 956
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 956
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 7/27/93	
Project: SRS / ITP				Boring No.H-Bor-2			Depth : 95.2 ft.		
Sample No. PS-5		Test No. 2/5/B		Apparatus # 2		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.902	Center (in)	2.907	Bottom (in)	2.908	Avg Diameter (cm)		7.38	
Membrane thickness, T (cm)			0.029		Sample Diameter (w/o membrane)			7.32	
Area, Ao (sq. cm)		42.11							
Height (At full vacuum), Ho (cm)			16.663		Volume, Vo (cc)		701.70		
Initial wet weight of soil +Tare (g)			1627.8		WTare (g)		334.2		Wgt of wet Sample,W(g) 1293.6
Initial moisture content (from trimmings)					Can#		44		Wcan (g) 64.8
Wcan+soil(g)	132.3	W can+dry soil(g)		118.7	w (%)	25.23	γ_d (pcf)		91.86
Conditions of Specimen after Saturation and Consolidation									
After Saturation					After Consolidation				
Change in Height, ΔH_{sat} (cm)			0.057		Change in Height, ΔH_c (cm)			0.022	
Sample Height, $H_{sat}=(H_o- \Delta H_{sat})$			16.61		Sample Height, $H_c=(H_{sat} - \Delta H_c)$			16.58	
Area, A_{sat} (sq. cm)			41.82		Volumetric Strain ϵ_v (%)			0.46	
Volume, V_{sat} (cc)			694.51		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)			691.28	
Dry Density, γ_{ds} (pcf)			92.81		Area, $A_c=(V_c/H_c)$ (sq. cm)			41.68	
					Dry Density, γ_{dc} (pcf)			93.24	
B-value (after saturation)			0.915		B-value (after consolidation)			0.98	
Consolidation Pressure, σ_{3c} (kPa)			500		Steady Pressure (kPa)			300	
Desired CSR		0.24	$\sigma_{dc}=(2\sigma_{3c}).CSR$		240	$\sigma_{dc}(p-p)=2.\sigma_{dc}$		480	
After Test Results									
	N	$\sigma_{dc}=(\sigma_C+\sigma_E)/2$		$\pm - (\sigma_{dc}/2\sigma_{3c})$		NOTES			
$u = \sigma_3'$	5	250		.250					
$\epsilon_{da} = 5 \%$	7	252		.252					
$\epsilon_{da} = 10 \%$	10	254		.254					

Reviewed by: *MP* 10/19/93

No. B2P5B
N vs. σ_3'

07-27-1993 17:43:40

DATA FILE NAME: B2P5BCYC.DAT
TOTAL NUMBER OF DATA POINTS: 369
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 369
SMOOTHING LEVEL: 0

Comments:

No. B2P5 B

07-27-1993 18:00:54

N vs. q

DATA FILE NAME: B2P5BCYC.DAT
TOTAL NUMBER OF DATA POINTS: 369
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 369
SMOOTHING LEVEL: 0

Comments:

No. B2P5 B

07-27-1993 18:03:21

N vs. E

DATA FILE NAME: B2P5BCYC.DAT
TOTAL NUMBER OF DATA POINTS: 369
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 369
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)

Date : 8/05/93

Project: SRS / ITP

Boring No. H-Bor-2

Depth : 97.0 ft.

Sample No. PS-6

Test No. 2/6/T

Apparatus # 1

Method of specimen preparation
UNDISTURBED

Initial Condition of Specimen

Diameter (At full Vacuum), D_o

Top (in)	2.898	Center (in)	2.899	Bottom (in)	2.902	Avg Diameter (cm)	7.37
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Membrane thickness, T (cm)	0.031	Sample Diameter (w/o membrane)	7.30
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Area, A_o (sq. cm)	41.89
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Height (At full vacuum), H_o (cm)	15.671	Volume, V_o (cc)	656.46
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Initial wet weight of soil +Tare (g)	1639.6	WTare (g)	329.5	Wgt of wet Sample, $W(g)$	1310.1
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Initial moisture content (from trimmings)		Can#	22	Wcan (g)	64.3
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Wcan+soil(g)	179.7	W can+dry soil(g)	156.2	w (%)	25.57	γ_d (pcf)	99.17
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Conditions of Specimen after Saturation and Consolidation

After Saturation

After Consolidation

Change in Height, ΔH_{sat} (cm)	0.062	Change in Height, ΔH_c (cm)	0.085
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Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$	15.61	Sample Height, $H_c=(H_{sat} - \Delta H_c)$	15.52
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Area, A_{sat} (sq. cm)	41.56	Volumetric Strain ϵ_v (%)	1.56
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Volume, V_{sat} (cc)	648.69	Volume, $V_c=(V_{sat} - \Delta V)$ (cc)	638.45
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Dry Density, γ_{ds} (pcf)	100.36	Area, $A_c=(V_c/H_c)$ (sq. cm)	41.13
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	Dry Density, γ_{dc} (pcf)	101.97
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B-value (after saturation)	0.954	B-value (after consolidation)	0.95
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Consolidation Pressure, σ_{3c} (kPa)	750	Steady Pressure (kPa)	370
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Desired CSR	0.21	$\sigma_{dc}=(2\sigma_{3c}).CSR$	315	$\sigma_{dc}(p-p)=2.\sigma_{dc}$	630
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After Test Results

	N	$\sigma_{dc}=(\sigma_C+\sigma_E)/2$	+/- ($\sigma_{dc}/2\sigma_{3c}$)	NOTES
$u = \sigma_3'$	4	335	.223	
$\epsilon_{da} = 5 \%$	4	335	.223	
$\epsilon_{da} = 10 \%$	N/A	N/A	N/A	

Reviewed by: *MR* 10/20/93

No. B2PGT

08-06-1993 12:50:40

N vs. σ_3'

DATA FILE NAME: B2P6TCYC.DAT
TOTAL NUMBER OF DATA POINTS: 147
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 147
SMOOTHING LEVEL: 0

Comments:

No. B2PGT
N vs. q

08-06-1993 12:53:21

DATA FILE NAME: B2P6TCYC.DAT
TOTAL NUMBER OF DATA POINTS: 147
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 147
SMOOTHING LEVEL: 0

Comments:

No. B2P6T
N vs. E

08-06-1993 13:16:44

DATA FILE NAME: B2P6TCYC.DAT
TOTAL NUMBER OF DATA POINTS: 147
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 147
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering							
CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date :8/6/93	
Project: SRS / ITP			Boring No. H-Bor-2			Depth : 97.6 ft.	
Sample No. PS-6		Test No. 2/6/M		Apparatus # 1		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.9	Center (in)	2.905	Bottom (in)	2.901	Avg Diameter (cm)	7.37
Membrane thickness, T (cm)			0.031		Sample Diameter (w/o membrane)		7.31
Area, Ao (sq. cm)		41.96					
Height (At full vacuum), Ho (cm)			15.228		Volume, Vo (cc)		638.94
Initial wet weight of soil +Tare (g)			1625.2	WTare (g)	334	Wgt of wet Sample, W(g)	1291.2
Initial moisture content (from trimmings)					Can#	215	Wcan (g) 64.9
Wcan+soil(g)	158.2	W can+dry soil(g)		140.9	w (%)	22.76	γ_d (pcf) 102.72
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.04		Change in Height, ΔH_c (cm)		0.061	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		15.19		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		15.13	
Area, A_{sat} (sq. cm)		41.74		Volumetric Strain ϵ_v (%)		1.36	
Volume, V_{sat} (cc)		633.91		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		625.22	
Dry Density, γ_{ds} (pcf)		103.53		Area, $A_c=(V_c/H_c)$ (sq. cm)		41.33	
				Dry Density, γ_{dc} (pcf)		104.97	
B-value (after saturation)		0.983		B-value (after consolidation)		0.97	
Consolidation Pressure, σ_{3c} (kPa)		743		Steady Pressure (kPa)		350	
Desired CSR		0.2	$\sigma_{dc}=(2\sigma_{3c}).CSR$		297.2	$\sigma_{dc}(p-p)=2.\sigma_{dc}$ 594.4	
After Test Results							
	N	$\sigma_{dc}=(\sigma_C+\sigma_E)/2$		$\pm (\sigma_{dc}/2\sigma_{3c})$		NOTES	
$u = \sigma_3'$	6	318		.214			
$\epsilon_{da} = 5 \%$	6	318		.214			
$\epsilon_{da} = 10 \%$	8	320		.214			

Reviewed by: *MR* 10/20/93

No. B2PGM
N vs. σ_3'

08-09-1993 12:33:17

DATA FILE NAME: B2P6MCY.DAT
TOTAL NUMBER OF DATA POINTS: 265
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 265
SMOOTHING LEVEL: 0

Comments:

No. B2P6M

N vs. q.

08-09-1993 12:35:22

DATA FILE NAME: B2P6MCY.DAT
TOTAL NUMBER OF DATA POINTS: 265
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 265
SMOOTHING LEVEL: 0

Comments:

No. B2PGM

08-09-1993 12:37:26

N v. E

DATA FILE NAME: B2P6MCY.DAT
TOTAL NUMBER OF DATA POINTS: 265
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 265
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 8/09/93	
Project: SRS / ITP			Boring No. H-Bor-2			Depth : 98.2 ft.	
Sample No. PS-6		Test No. 2/6/B		Apparatus # 2		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.895	Center (in)	2.895	Bottom (in)	2.897	Avg Diameter (cm)	7.35
Membrane thickness, T (cm)			0.032		Sample Diameter (w/o membrane)		7.29
Area, Ao (sq. cm)		41.75					
Height (At full vacuum), Ho (cm)			15.648		Volume, Vo (cc)		653.31
Initial wet weight of soil +Tare (g)			1659.4	WTare (g)	329.2	Wgt of wet Sample, W(g)	1330.2
Initial moisture content (from trimmings)					Can#	280	Wcan (g)
							64.3
Wcan+soil(g)	166.9	W can+dry soil(g)		148.7	w (%)	21.56	γ_d (pcf)
							104.51
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.045		Change in Height, ΔH_c (cm)		0.058	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		15.60		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		15.55	
Area, A_{sat} (sq. cm)		41.51		Volumetric Strain ϵ_v (%)		0.99	
Volume, V_{sat} (cc)		647.69		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		641.22	
Dry Density, γ_{ds} (pcf)		105.42		Area, $A_c=(V_c/H_c)$ (sq. cm)		41.25	
				Dry Density, γ_{dc} (pcf)		106.49	
B-value (after saturation)		0.951		B-value (after consolidation)		0.98	
Consolidation Pressure, σ_{3c} (kPa)		725		Steady Pressure (kPa)		320	
Desired CSR		0.185	$\sigma_{dc}=(2\sigma_{3c}).CSR$		268.25	$\sigma_{dc} (p-p) =2.\sigma_{dc}$	
						536.5	
After Test Results							
	N	$\sigma_{dc}=(\sigma_c+\sigma_e)/2$		$\pm - (\sigma_{dc}/2\sigma_{3c})$		NOTES	
$u = \sigma_3'$	9	284		.196			
$e_{da} = 5 \%$	10	284		.196			
$e_{da} = 10 \%$	N/A	N/A		N/A			

Reviewed by: *MR* 10/20/93

NO. B2P6 B
N vs. σ_3'

08-10-1993 13:16:14

DATA FILE NAME: B2P6BCY.DAT
TOTAL NUMBER OF DATA POINTS: 371
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 371
SMOOTHING LEVEL: 0

Comments:

No. B2PG B

08-10-1993 13:18:10

N vs. q

DATA FILE NAME: B2P6BCY.DAT
TOTAL NUMBER OF DATA POINTS: 371
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 371
SMOOTHING LEVEL: 0

Comments:

No. B2P6 B

N vs. E

08-10-1993 13:20:29

DATA FILE NAME: B2P6BCY.DAT
TOTAL NUMBER OF DATA POINTS: 371
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 371
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 8/31/93	
Project: SRS / ITP			Boring No. H-Bor-12			Depth : 70.8 ft.	
Sample No. PS-5		Test No. 12/5/T		Apparatus # 1		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.886	Center (in)	2.894	Bottom (in)	2.897	Avg Diameter (cm)	7.35
Membrane thickness, T (cm)			0.0315		Sample Diameter (w/o membrane)		7.28
Area, Ao (sq. cm)		41.67					
Height (At full vacuum), Ho (cm)			14.873		Volume, Vo (cc)		619.69
Initial wet weight of soil + Tare (g)			1669.4	WTare (g)	329.7	Wgt of wet Sample, W(g)	1339.7
Initial moisture content (from trimmings)					Can#	219	Wcan (g) 63.9
Wcan+soil(g)	151.6	W can+dry soil(g)		137.2	w (%)	19.65	γ_d (pcf) 112.75
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.054		Change in Height, ΔH_c (cm)		0.036	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		14.82		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		14.78	
Area, A_{sat} (sq. cm)		41.36		Volumetric Strain ϵ_v (%)		0.55	
Volume, V_{sat} (cc)		612.95		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		609.54	
Dry Density, γ_{ds} (pcf)		113.99		Area, $A_c=(V_c/H_c)$ (sq. cm)		41.23	
				Dry Density, γ_{dc} (pcf)		114.63	
B-value (after saturation)		0.952		B-value (after consolidation)		0.96	
Consolidation Pressure, σ_{3c} (kPa)		300		Steady Pressure (kPa)		200	
Desired CSR		0.24	$\sigma_{dc}=(2\sigma_{3c}).CSR$		144	$\sigma_{dc}(p-p)=2.\sigma_{dc}$ 288	
After Test Results							
	N	$\sigma_{dc}=(\sigma_c + \sigma_e) / 2$		$\pm (\sigma_{dc} / 2\sigma_{3c})$		NOTES Water content is combined with 12/5/M	
$u = \sigma_3'$	7	148		.246			
$\epsilon_{da} = 5 \%$	26	148		.246			
$\epsilon_{da} = 10 \%$	N/A	N/A		N/A			

Reviewed by:

MR 10/21/93

No. B12 P5 T
N vs. σ_3

08-29-1993 17:53:14

DATA FILE NAME: B12P5TCY.DAT
TOTAL NUMBER OF DATA POINTS: 1232
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 1232
SMOOTHING LEVEL: 0

Comments:

No. B12 P5 T

08-29-1993 17:57:27

N vs. q

DATA FILE NAME: B12P5TCY.DAT
TOTAL NUMBER OF DATA POINTS: 1232
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 1232
SMOOTHING LEVEL: 0

Comments:

No. B12 P5 T

Nva. E

08-29-1993 17:55:28

DATA FILE NAME: B12P5TCY.DAT
TOTAL NUMBER OF DATA POINTS: 1232
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 1232
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 8/31/93	
Project: SRS / ITP			Boring No. H-Bor-12			Depth : 71.4 ft.	
Sample No. PS-5		Test No. 12/5/M		Apparatus # 2		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), D_o							
Top (in)	2.892	Center (in)	2.89	Bottom (in)	2.886	Avg Diameter (cm)	7.34
Membrane thickness, T (cm)			0.031		Sample Diameter (w/o membrane)		7.28
Area, A_o (sq. cm)		41.59					
Height (At full vacuum), H_o (cm)			15.21		Volume, V_o (cc)		632.58
Initial wet weight of soil +Tare (g)			1610.1	WTare (g)	333.7	Wgt of wet Sample, W(g)	1276.4
Initial moisture content (from trimmings)					Can#	219	Wcan (g) 63.9
Wcan+soil(g)	151.6	W can+dry soil(g)		137.2	w (%)	19.65	γ_d (pcf) 105.24
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.057		Change in Height, ΔH_c (cm)		0.023	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		15.15		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		15.13	
Area, A_{sat} (sq. cm)		41.28		Volumetric Strain ϵ_v (%)		0.32	
Volume, V_{sat} (cc)		625.48		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		623.46	
Dry Density, γ_{ds} (pcf)		106.43		Area, $A_c=(V_c/H_c)$ (sq. cm)		41.21	
				Dry Density, γ_{dc} (pcf)		106.77	
B-value (after saturation)		0.952		B-value (after consolidation)		0.96	
Consolidation Pressure, σ_{3c} (kPa)		300		Steady Pressure (kPa)		190	
Desired CSR		0.22	$\sigma_{dc}=(2\sigma_{3c}).CSR$		132	$\sigma_{dc}(p-p)=2.\sigma_{dc}$ 264	
After Test Results							
	N	$\sigma_{dc}=(\sigma_C + \sigma_E) / 2$		$\pm - (\sigma_{dc} / 2\sigma_{3c})$		NOTES Water content is combined with 12/5/T	
$u = \sigma_3'$	18	132		.22			
$\epsilon_{da} = 5 \%$	N/A	N/A		N/A			
$\epsilon_{da} = 10 \%$	N/A	N/A		N/A			

Reviewed by: *mc* 1/22/94

No. B12 P5 M

N vs. σ_3'

09-01-1993 16:28:02

DATA FILE NAME: B12P5M0Y.DAT

TOTAL NUMBER OF DATA POINTS: 1804

BEGINNING DATA POINT NUMBER: 1

ENDING DATA POINT NUMBER: 1804

SMOOTHING LEVEL: 0

Comments:

No. B12 P5 M

09-01-1993 16:56:31

N. w. g

DATA FILE NAME: B12P5MCY.DAT
TOTAL NUMBER OF DATA POINTS: 1804
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 1804
SMOOTHING LEVEL: 0

Comments:

No. B12 P5 M

Nwa.E

09-01-1993 16:58:06

DATA FILE NAME: B12P5M0Y.DAT
TOTAL NUMBER OF DATA POINTS: 1804
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 1804
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 9/1/93	
Project: SRS / ITP				Boring No. H-Bor-12			Depth : 72.0 ft.		
Sample No. PS-5		Test No. 12/5/B		Apparatus # 1		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.892	Center (in)	2.893	Bottom (in)	2.895	Avg Diameter (cm)		7.35	
Membrane thickness, T (cm)			0.031		Sample Diameter (w/o membrane)			7.29	
Area, Ao (sq. cm)		41.71							
Height (At full vacuum), Ho (cm)			15.634		Volume, Vo (cc)		652.03		
Initial wet weight of soil +Tare (g)			1634.4		WTare (g)		330.1		Wgt of wet Sample, W(g) 1304.3
Initial moisture content (from trimmings)					Can#		31		Wcan (g) 64.5
Wcan+soil(g)	176.4	W can+dry soil(g)		154	w (%)	25.03	γd (pcf)		99.84
Conditions of Specimen after Saturation and Consolidation									
After Saturation				After Consolidation					
Change in Height, ΔHsat (cm)		0.034		Change in Height, ΔHc (cm)			0.005		
Sample Height, Hsat=(Ho- ΔHsat)		15.60		Sample Height, Hc= (Hsat - ΔHc)			15.60		
Area, Asat (sq. cm)		41.52		Volumetric Strain εv (%)			0.16		
Volume, Vsat (cc)		647.78		Volume, Vc=(Vsat - ΔV) (cc)			646.74		
Dry Density, γds (pcf)		100.49		Area, Ac =(Vc/Hc) (sq. cm)			41.47		
				Dry Density, γdc (pcf)			100.65		
B-value (after saturation)		0.954		B-value (after consolidation)			0.95		
Consolidation Pressure, σ3c (kPa)		300		Steady Pressure (kPa)			180		
Desired CSR		0.21	σdc=(2σ3c).CSR		126	σdc (p-p) =2.σdc		252	
After Test Results									
	N	σdc=(σC+σE) /2		+/- (σdc/2σ3c)		NOTES			
u = σ3'	78	129		215					
εda = 5 %	N/A	N/A		N/A					
εda = 10 %	N/A	N/A		N/A					

Reviewed by: *MR* 1/22/94

No. B12 P5 B

08-30-1993 17:31:03

N vs. σ_3'

DATA FILE NAME: B12P5BCY.DAT
TOTAL NUMBER OF DATA POINTS: 4503
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 4503
SMOOTHING LEVEL: 0

Comments:

No. B12 P5 B

08-30-1993 17:34:16

Nvs.g

DATA FILE NAME: B12P5BCY.DAT
TOTAL NUMBER OF DATA POINTS: 4503
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 4503
SMOOTHING LEVEL: 0

Comments:

No. B12P5B

08-30-1993 17:36:13

N vs. E

DATA FILE NAME: B12P5BCY.DAT
TOTAL NUMBER OF DATA POINTS: 4503
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 4503
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 8/02/93	
Project: SRS / ITP			Boring No. H-Bor-12			Depth : 92.8 ft.	
Sample No. PS-7		Test No. 12/7/T		Apparatus # 1		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.885	Center (in)	2.89	Bottom (in)	2.892	Avg Diameter (cm)	7.34
Membrane thickness, T (cm)		0.032		Sample Diameter (w/o membrane)		7.27	
Area, Ao (sq. cm)		41.56					
Height (At full vacuum), Ho (cm)		14.703		Volume, Vo (cc)		611.01	
Initial wet weight of soil +Tare (g)		1566.2	WTare (g)	329.1	Wgt of wet Sample, W(g)		1237.1
Initial moisture content (from trimmings)				Can#	45	Wcan (g)	64.3
Wcan+soil(g)	167.8	W can+dry soil(g)	148.1	w (%)	23.51	γ_d (pcf)	102.29
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.035		Change in Height, ΔH_c (cm)		0.016	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		14.67		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		14.65	
Area, A_{sat} (sq. cm)		41.36		Volumetric Strain ϵ_v (%)		0.29	
Volume, V_{sat} (cc)		606.66		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		604.88	
Dry Density, γ_{ds} (pcf)		103.03		Area, $A_c=(V_c/H_c)$ (sq. cm)		41.28	
				Dry Density, γ_{dc} (pcf)		103.33	
B-value (after saturation)		0.97		B-value (after consolidation)		0.98	
Consolidation Pressure, σ_{3c} (kPa)		375		Steady Pressure (kPa)		180	
Desired CSR		0.17	$\sigma_{dc}=(2\sigma_{3c}).CSR$	127.5	$\sigma_{dc}(p-p)=2.\sigma_{dc}$		255
After Test Results							
	N	$\sigma_{dc}=(\sigma_C + \sigma_E) / 2$	$\pm (\sigma_{dc} / 2\sigma_{3c})$	NOTES			
$u = \sigma_3'$	8	130	.173				
$e_{da} = 5 \%$	12	130	.173				
$e_{da} = 10 \%$	N/A	N/A	N/A				

Reviewed by:

MR 10/20/93

No. B12 P7 T

08-03-1993 10:19:18

N vs. σ_3'

DATA FILE NAME: B12P7TCY.DAT
TOTAL NUMBER OF DATA POINTS: 505
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 505
SMOOTHING LEVEL: 0

Comments:

No. B12P7 T

08-03-1993 10:21:46

N vs. q

DATA FILE NAME: B12P7TCY.DAT
TOTAL NUMBER OF DATA POINTS: 505
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 505
SMOOTHING LEVEL: 0

Comments:

No. B12P7 T
N v. E

08-03-1993 10:24:05

DATA FILE NAME: B12P7TCY.DAT
TOTAL NUMBER OF DATA POINTS: 505
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 505
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 8/02/93	
Project: SRS / ITP			Boring No. H-Bor-12			Depth : 93.4 ft.	
Sample No. PS-7		Test No. 12/7/M		Apparatus # 2		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.891	Center (in)	2.891	Bottom (in)	2.894	Avg Diameter (cm)	7.35
Membrane thickness, T (cm)			0.031		Sample Diameter (w/o membrane)		7.28
Area, Ao (sq. cm)		41.67					
Height (At full vacuum), Ho (cm)			14.884		Volume, Vo (cc)		620.17
Initial wet weight of soil +Tare (g)			1583.9	WTare (g)	334.1	Wgt of wet Sample, W(g)	1249.8
Initial moisture content (from trimmings)					Can#	365	Wcan (g) 64
Wcan+soil(g)	149.6	W can+dry soil(g)		133	w (%)	24.06	γd (pcf) 101.37
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔHsat (cm)			0.078		Change in Height, ΔHc (cm)		0.027
Sample Height, Hsat=(Ho- ΔHsat)			14.81		Sample Height, Hc=(Hsat - ΔHc)		14.78
Area, Asat (sq. cm)			41.23		Volumetric Strain εv (%)		0.4
Volume, Vsat (cc)			610.45		Volume, Vc=(Vsat - ΔV) (cc)		607.97
Dry Density, γds (pcf)			102.98		Area, Ac =(Vc/Hc) (sq. cm)		41.14
				Dry Density, γdc (pcf)		103.40	
B-value (after saturation)			0.98		B-value (after consolidation)		0.96
Consolidation Pressure, σ3c (kPa)			375		Steady Pressure (kPa)		170
Desired CSR		0.15	σdc=(2σ3c).CSR		112.5	σdc (p-p) =2.σdc 225	
After Test Results							
	N	σdc=(σC+σE) /2		+/- (σdc/2σ3c)		NOTES	
u = σ3'	20	114		.152			
Eda = 5 %	24	114		.152			
Eda = 10 %	35	114		.152			

Reviewed by: *MR* 10/20/93

NO. B12P7M

08-03-1993 11:46:46

N vs. σ_3'

DATA FILE NAME: B12P7MCY.DAT

TOTAL NUMBER OF DATA POINTS: 1361

BEGINNING DATA POINT NUMBER: 1

ENDING DATA POINT NUMBER: 1361

SMOOTHING LEVEL: 0

Comments:

No. B12P7 M

N vs. q

08-03-1993 11:48:48

DATA FILE NAME: B12P7MCY.DAT
TOTAL NUMBER OF DATA POINTS: 1361
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 1361
SMOOTHING LEVEL: 0

Comments:

No. B12P7M

08-03-1993 11:50:34

N vs. E

DATA FILE NAME: B12P7MDY.DAT
TOTAL NUMBER OF DATA POINTS: 1361
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 1361
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 8/03/93	
Project: SRS / ITP			Boring No. H-Bor-12			Depth : 94.0 ft.			
Sample No. PS-7		Test No. 12/7/B		Apparatus # 1		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.89	Center (in)	2.892	Bottom (in)	2.892	Avg Diameter (cm)		7.34	
Membrane thickness, T (cm)			0.031		Sample Diameter (w/o membrane)			7.28	
Area, Ao (sq. cm)		41.65							
Height (At full vacuum), Ho (cm)			15.07		Volume, Vo (cc)			627.63	
Initial wet weight of soil +Tare (g)			1581	WTare (g)	330.1	Wgt of wet Sample, W(g)		1250.9	
Initial moisture content (from trimmings)					Can#	96	Wcan (g)	64.1	
Wcan+soil(g)	158.6	W can+dry soil(g)		140.1	w (%)	24.34	γd (pcf)	100.02	
Conditions of Specimen after Saturation and Consolidation									
After Saturation					After Consolidation				
Change in Height, ΔHsat (cm)			0.046		Change in Height, ΔHc (cm)			0.018	
Sample Height, Hsat=(Ho- ΔHsat)			15.02		Sample Height, Hc= (Hsat - ΔHc)			15.01	
Area, Asat (sq. cm)			41.39		Volumetric Strain εv (%)			0.27	
Volume, Vsat (cc)			621.89		Volume, Vc=(Vsat - ΔV) (cc)			620.20	
Dry Density, γds (pcf)			100.94		Area, Ac =(Vc/Hc) (sq. cm)			41.33	
					Dry Density, γdc (pcf)			101.22	
B-value (after saturation)			0.956		B-value (after consolidation)			0.96	
Consolidation Pressure, σ3c (kPa)			375		Steady Pressure (kPa)			200	
Desired CSR		0.19	σdc=(2σ3c).CSR		142.5	σdc (p-p) =2.σdc		285	
After Test Results									
	N	σdc=(σC+σE) /2		+/- (σdc/2σ3c)		NOTES			
u = σ3'	8	147		.196					
εda = 5 %	9	147		.196					
εda = 10 %	15	147		.196					

Reviewed by:

MR 10/20/93

No. B12P7B
N vs. σ_3'

08-03-1993 17:37:38

DATA FILE NAME: B12P7BCY.DAT
TOTAL NUMBER OF DATA POINTS: 624
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 624
SMOOTHING LEVEL: 0

Comments:

No. B12P7B

08-03-1993 17:39:43

N vs. q

DATA FILE NAME: B12P7BCY.DAT
TOTAL NUMBER OF DATA POINTS: 624
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 624
SMOOTHING LEVEL: 0

Comments:

No. B12 P7 B

N 2 E

08-03-1993 17:42:19

DATA FILE NAME: B12P7BCY.DAT
TOTAL NUMBER OF DATA POINTS: 624
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 624
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 7/29/93	
Project: SRS / ITP			Boring No. H-Bor-23			Depth : 33.3 ft.			
Sample No. PS-2		Test No. 23/2/T		Apparatus # 2		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.89	Center (in)	2.895	Bottom (in)	2.892	Avg Diameter (cm)		7.35	
Membrane thickness, T (cm)			0.028		Sample Diameter (w/o membrane)			7.29	
Area, Ao (sq. cm)		41.75							
Height (At full vacuum), Ho (cm)			14.64		Volume, Vo (cc)		611.15		
Initial wet weight of soil +Tare (g)			1570.7	WTare (g)	333.8	Wgt of wet Sample, W(g)		1236.9	
Initial moisture content (from trimmings)					Can#	155	Wcan (g)	64.1	
Wcan+soil(g)	181	W can+dry soil(g)		160.9	w (%)	20.76	γd (pcf)	104.58	
Conditions of Specimen after Saturation and Consolidation									
After Saturation					After Consolidation				
Change in Height, ΔHsat (cm)			0.009		Change in Height, ΔHc (cm)			0.079	
Sample Height, Hsat=(Ho- ΔHsat)			14.63		Sample Height, Hc= (Hsat - ΔHc)			14.55	
Area, Asat (sq. cm)			41.69		Volumetric Strain εv (%)			1.71	
Volume, Vsat (cc)			610.02		Volume, Vc=(Vsat - ΔV) (cc)			599.57	
Dry Density, γds (pcf)			104.77		Area, Ac =(Vc/Hc) (sq. cm)			41.20	
					Dry Density, γdc (pcf)			106.60	
B-value (after saturation)			0.96		B-value (after consolidation)			0.97	
Consolidation Pressure, σ3c (kPa)			400		Steady Pressure (kPa)			190	
Desired CSR		0.17	σdc=(2σ3c).CSR		136	σdc (p-p) =2.σdc		272	
After Test Results									
	N	σdc=(σC+σE) /2		+/- (σdc/2σ3c)		NOTES			
u = σ3'	24	137		.171					
εda = 5 %	33	140		.175					
εda = 10 %	39	140		.175					

Reviewed by: *M2* 10/21/93

No. B23 P2 T

07-28-1993 18:49:35

N vs. σ_3'

DATA FILE NAME: B23P2TCY.DAT
TOTAL NUMBER OF DATA POINTS: 1272
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 1272
SMOOTHING LEVEL: 0

Comments:

No. B23 P2 T

07-28-1993 18:51:18

N vs. q

DATA FILE NAME: B23P2TCY.DAT
TOTAL NUMBER OF DATA POINTS: 1272
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 1272
SMOOTHING LEVEL: 0

Comments:

No. B23 P2 T

N vs. E

07-28-1993 18:53:10

DATA FILE NAME: B23P2TCY.DAT
TOTAL NUMBER OF DATA POINTS: 1272
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 1272
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 7/30/93	
Project: SRS / ITP			Boring No. H-Bor-23			Depth : 33.9 ft.	
Sample No. PS-2		Test No. 23/2/M		Apparatus # 1		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.894	Center (in)	2.899	Bottom (in)	2.895	Avg Diameter (cm)	7.36
Membrane thickness, T (cm)			0.031		Sample Diameter (w/o membrane)		7.29
Area, Ao (sq. cm)		41.78					
Height (At full vacuum), Ho (cm)			15.014		Volume, Vo (cc)		627.33
Initial wet weight of soil +Tare (g)			1591	WTare (g)	330.1	Wgt of wet Sample, W(g)	1260.9
Initial moisture content (from trimmings)				Can#	324	Wcan (g)	64.8
Wcan+soil(g)	147.3	W can+dry soil(g)		132.6	w (%)	21.68	γ_d (pcf) 103.07
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.031		Change in Height, ΔH_c (cm)		0.029	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		14.98		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		14.95	
Area, A_{sat} (sq. cm)		41.61		Volumetric Strain ϵ_v (%)		0.82	
Volume, V_{sat} (cc)		623.45		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		618.31	
Dry Density, γ_{ds} (pcf)		103.71		Area, $A_c=(V_c/H_c)$ (sq. cm)		41.35	
				Dry Density, γ_{dc} (pcf)		104.58	
B-value (after saturation)		0.98		B-value (after consolidation)		0.98	
Consolidation Pressure, σ_{3c} (kPa)		400		Steady Pressure (kPa)		220	
Desired CSR	0.2	$\sigma_{dc}=(2\sigma_{3c}).CSR$		160	$\sigma_{dc}(p-p)=2.\sigma_{dc}$		320
After Test Results							
	N	$\sigma_{dc}=(\sigma_C+\sigma_E)/2$		$\pm (\sigma_{dc}/2\sigma_{3c})$		NOTES	
$u = \sigma_3'$	9	170		.212			
$\epsilon_{da} = 5 \%$	9	170		.212			
$\epsilon_{da} = 10 \%$	N/A	N/A		N/A			

Reviewed by:

MR 10/21/93

B23 P2 M

 N vs. σ_3'

DATA FILE NAME: B23P2MCY.DAT
TOTAL NUMBER OF DATA POINTS: 296
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 296
SMOOTHING LEVEL: 0

Comments:

B23 P2 M

N vs. q

DATA FILE NAME: B23P2M0Y.DAT
TOTAL NUMBER OF DATA POINTS: 296
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 296
SMOOTHING LEVEL: 0

Comments:

B23 P2 M

N vs. E

DATA FILE NAME: B23P2M0Y.DAT
TOTAL NUMBER OF DATA POINTS: 296
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 296
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 7/30/93	
Project: SRS / ITP			Boring No. H-Bor-23			Depth : 34.5 ft.			
Sample No. PS-2		Test No.23/2/B		Apparatus # 2		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.898	Center (in)	2.899	Bottom (in)	2.892	Avg Diameter (cm)		7.36	
Membrane thickness, T (cm)			0.028		Sample Diameter (w/o membrane)			7.30	
Area, Ao (sq. cm)		41.86							
Height (At full vacuum), Ho (cm)			15.213		Volume, Vo (cc)			636.84	
Initial wet weight of soil +Tare (g)			1586.7	WTare (g)	334.5	Wgt of wet Sample, W(g)		1252.2	
Initial moisture content (from trimmings)					Can#	153	Wcan (g)	64.7	
Wcan+soil(g)	158.8	W can+dry soil(g)		141.7	w (%)	22.21	γ_d (pcf)	100.40	
Conditions of Specimen after Saturation and Consolidation									
After Saturation					After Consolidation				
Change in Height, ΔH_{sat} (cm)			0.048		Change in Height, ΔH_c (cm)			0.02	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$			15.17		Sample Height, $H_c=(H_{sat} - \Delta H_c)$			15.15	
Area, A_{sat} (sq. cm)			41.60		Volumetric Strain ϵ_v (%)			0.65	
Volume, V_{sat} (cc)			630.83		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)			626.69	
Dry Density, γ_{ds} (pcf)			101.36		Area, $A_c=(V_c/H_c)$ (sq. cm)			41.38	
					Dry Density, γ_{dc} (pcf)			102.03	
B-value (after saturation)			0.951		B-value (after consolidation)			0.97	
Consolidation Pressure, σ_{3c} (kPa)			400		Steady Pressure (kPa)			230	
Desired CSR		0.22	$\sigma_{dc}=(2\sigma_{3c}).CSR$		176	$\sigma_{dc} (p-p) = 2.\sigma_{dc}$		352	
After Test Results									
	N	$\sigma_{dc}=(\sigma_C + \sigma_E) / 2$		$\pm - (\sigma_{dc} / 2\sigma_{3c})$		NOTES			
$u = \sigma_3'$	4	186		.232					
$\epsilon_{da} = 5 \%$	3	186		.232					
$\epsilon_{da} = 10 \%$	5	189		.232					

Reviewed by:

MR 1/22/94

NO. B23 P2 B

07-30-1993 17:39:24

N vs. σ_3'

DATA FILE NAME: B23P2BCY.DAT
TOTAL NUMBER OF DATA POINTS: 161
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 161
SMOOTHING LEVEL: 0

Comments:

No. B23 P2 B

07-30-1993 17:41:28

N vs. q

DATA FILE NAME: B23P2BCY.DAT
TOTAL NUMBER OF DATA POINTS: 161
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 161
SMOOTHING LEVEL: 0

Comments:

No. B23 P2 B
N vs. E

07-30-1993 17:44:25

DATA FILE NAME: B23P2BCY.DAT
TOTAL NUMBER OF DATA POINTS: 161
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 161
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 7/28/93	
Project: SRS / ITP			Boring No. H-Bor-23			Depth : 40.2 ft.	
Sample No. PS-3		Test No. 23/3/T		Apparatus # 1		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.888	Center (in)	2.89	Bottom (in)	2.896	Avg Diameter (cm)	7.34
Membrane thickness, T (cm)			0.031		Sample Diameter (w/o membrane)		7.28
Area, Ao (sq. cm)		41.65					
Height (At full vacuum), Ho (cm)			15.541		Volume, Vo (cc)		647.24
Initial wet weight of soil +Tare (g)			1642.5	WTare (g)	329.9	Wgt of wet Sample, W(g)	1312.6
Initial moisture content (from trimmings)					Can#	233	Wcan (g)
							28.2
Wcan+soil(g)	116.5	W can+dry soil(g)	101.5	w (%)	20.46	γ_d (pcf)	105.05
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.018		Change in Height, ΔH_c (cm)		0.019	
Sample Height, $H_{sat} = (H_o - \Delta H_{sat})$		15.52		Sample Height, $H_c = (H_{sat} - \Delta H_c)$		15.50	
Area, A_{sat} (sq. cm)		41.55		Volumetric Strain ϵ_v (%)		0.42	
Volume, V_{sat} (cc)		645.00		Volume, $V_c = (V_{sat} - \Delta V)$ (cc)		642.28	
Dry Density, γ_{ds} (pcf)		105.41		Area, $A_c = (V_c / H_c)$ (sq. cm)		41.43	
				Dry Density, γ_{dc} (pcf)		105.86	
B-value (after saturation)		0.982		B-value (after consolidation)		0.99	
Consolidation Pressure, σ_{3c} (kPa)		200		Steady Pressure (kPa)		150	
Desired CSR		0.22	$\sigma_{dc} = (2\sigma_{3c}) \cdot CSR$		88	$\sigma_{dc} (p-p) = 2 \cdot \sigma_{dc}$	
						176	
After Test Results							
	N	$\sigma_{dc} = (\sigma_c + \sigma_e) / 2$		$\pm (\sigma_{dc} / 2\sigma_{3c})$		NOTES	
$u = \sigma_3'$	7	90		.225			
$\epsilon_{da} = 5\%$	12	90		.225			
$\epsilon_{da} = 10\%$	17	91		.228			

Reviewed by:

MC 10/21/93

No. B23 P3 T

07-29-1993 10:53:44

N vs. σ'_s

DATA FILE NAME: B23P3TCY.DAT
TOTAL NUMBER OF DATA POINTS: 685
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 685
SMOOTHING LEVEL: 0

Comments:

No. B23 P3 M

N vs. q

07-29-1993 10:56:45

DATA FILE NAME: B23P3TCY.DAT
TOTAL NUMBER OF DATA POINTS: 685
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 685
SMOOTHING LEVEL: 0

Comments:

No. B23 P3 T
N vs. E

07-29-1993 10:58:36

DATA FILE NAME: B23P3TCY.DAT
TOTAL NUMBER OF DATA POINTS: 685
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 685
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 7/28/93	
Project: SRS / ITP			Boring No. H-Bor-23			Depth : 40.8 ft.	
Sample No. PS-3		Test No. 23/3/M		Apparatus # 2		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.895	Center (in)	2.888	Bottom (in)	2.897	Avg Diameter (cm)	7.35
Membrane thickness, T (cm)			0.029		Sample Diameter (w/o membrane)		7.29
Area, Ao (sq. cm)		41.75					
Height (At full vacuum), Ho (cm)			15.257		Volume, Vo (cc)		637.00
Initial wet weight of soil +Tare (g)			1617.7	WTare (g)	339.9	Wgt of wet Sample, W(g)	1277.8
Initial moisture content (from trimmings)					Can#	169	Wcan (g) 64.3
Wcan+soil(g)	156.4	W can+dry soil(g)		140.9	w (%)	20.23	γ_d (pcf) 104.11
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.011		Change in Height, ΔH_c (cm)		0.013	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		15.25		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		15.23	
Area, A_{sat} (sq. cm)		41.69		Volumetric Strain ϵ_v (%)		0.38	
Volume, V_{sat} (cc)		635.63		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		633.20	
Dry Density, γ_{ds} (pcf)		104.33		Area, $A_c=(V_c/H_c)$ (sq. cm)		41.57	
				Dry Density, γ_{dc} (pcf)		104.73	
B-value (after saturation)		0.962		B-value (after consolidation)		0.96	
Consolidation Pressure, σ_{3c} (kPa)		200		Steady Pressure (kPa)		150	
Desired CSR		0.19	$\sigma_{dc}=(2\sigma_{3c}).CSR$		76	$\sigma_{dc}(p-p)=2.\sigma_{dc}$ 152	
After Test Results							
	N	$\sigma_{dc}=(\sigma_C+\sigma_E)/2$		$\pm (\sigma_{dc}/2\sigma_{3c})$		NOTES	
$u = \sigma_3'$	19	74		.185			
$\epsilon_{da} = 5 \%$	24	74		.185			
$\epsilon_{da} = 10 \%$	N/A	N/A		N/A			

Reviewed by: *MR 10/21/93*

No. B23 P3 M

$N \rightarrow \sigma_3'$

07-28-1993 11:10:27

DATA FILE NAME: B23P3MCDY.DAT
TOTAL NUMBER OF DATA POINTS: 911
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 911
SMOOTHING LEVEL: 0

Comments:

No. B23 P3 M

07-28-1993 11:12:54

N m. q

DATA FILE NAME: B23P3MCY.DAT
TOTAL NUMBER OF DATA POINTS: 911
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 911
SMOOTHING LEVEL: 0

Comments:

No. B23P3 M
N vs. E

07-28-1993 11:15:24

DATA FILE NAME: B23P3M0Y.DAT
TOTAL NUMBER OF DATA POINTS: 911
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 911
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date :7/29/93	
Project: SRS / ITP			Boring No. H-Bor-23			Depth : 41.4 ft.			
Sample No. PS-3		Test No. 23/3/B		Apparatus # 1		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.895	Center (in)	2.895	Bottom (in)	2.9	Avg Diameter (cm)		7.36	
Membrane thickness, T (cm)			0.031		Sample Diameter (w/o membrane)			7.30	
Area, Ao (sq. cm)		41.80							
Height (At full vacuum), Ho (cm)			15.482		Volume, Vo (cc)		647.19		
Initial wet weight of soil +Tare (g)			1633.6	WTare (g)	329.9	Wgt of wet Sample, W(g)		1303.7	
Initial moisture content (from trimmings)					Can#	83	Wcan (g)		63.6
Wcan+soil(g)	177.3	W can+dry soil(g)		157.2	w (%)	21.47	γ_d (pcf)	103.48	
Conditions of Specimen after Saturation and Consolidation									
After Saturation					After Consolidation				
Change in Height, ΔH_{sat} (cm)			0.014		Change in Height, ΔH_c (cm)			0.022	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$			15.47		Sample Height, $H_c=(H_{sat} - \Delta H_c)$			15.45	
Area, A_{sat} (sq. cm)			41.73		Volumetric Strain ϵ_v (%)			0.54	
Volume, V_{sat} (cc)			645.43		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)			641.94	
Dry Density, γ_{ds} (pcf)			103.76		Area, $A_c=(V_c/H_c)$ (sq. cm)			41.56	
					Dry Density, γ_{dc} (pcf)			104.32	
B-value (after saturation)			0.984		B-value (after consolidation)			0.98	
Consolidation Pressure, σ_{3c} (kPa)			200		Steady Pressure (kPa)			130	
Desired CSR		0.17	$\sigma_{dc}=(2\sigma_{3c}).CSR$		68	$\sigma_{dc}(p-p)=2.\sigma_{dc}$		136	
After Test Results									
	N	$\sigma_{dc}=(\sigma_C+\sigma_E)/2$		$\pm - (\sigma_{dc}/2\sigma_{3c})$		NOTES			
$u = \sigma_3'$	39	67		.168					
$\epsilon_{da} = 5 \%$	56	69		.172					
$\epsilon_{da} = 10 \%$	67	70		.175					

Reviewed by: *MR* 10/21/93

No. B23P3 B
N vs. σ_3'

07-29-1993 17:28:38

DATA FILE NAME: B23P3BCY.DAT
TOTAL NUMBER OF DATA POINTS: 2279
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 2279
SMOOTHING LEVEL: 0

Comments:

No. B23 P3 B

07-29-1993 17:33:54

N vs. q

DATA FILE NAME: B23P3BCY.DAT
TOTAL NUMBER OF DATA POINTS: 2279
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 2279
SMOOTHING LEVEL: 0

Comments:

No. B23 P3 B
N vs. E

07-29-1993 17:36:47

DATA FILE NAME: B23P3BCY.DAT
TOTAL NUMBER OF DATA POINTS: 2279
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 2279
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 8/03/93	
Project: SRS / ITP			Boring No. H-Bor-23			Depth : 83.8 ft.			
Sample No. PS-4		Test No. 23/4/T		Apparatus # 2		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.9	Center (in)	2.909	Bottom (in)	2.914	Avg Diameter (cm)		7.39	
Membrane thickness, T (cm)			0.031		Sample Diameter (w/o membrane)			7.32	
Area, Ao (sq. cm)		42.12							
Height (At full vacuum), Ho (cm)			15.112		Volume, Vo (cc)		636.57		
Initial wet weight of soil +Tare (g)			1583.9	WTare (g)	334.5	Wgt of wet Sample, W(g)		1249.4	
Initial moisture content (from trimmings)					Can#	N/A	Wcan (g)	N/A	
Wcan+soil(g)	N/A	W can+dry soil(g)		N/A	w (%)	N/A	γ_d (pcf)	N/A	
Conditions of Specimen after Saturation and Consolidation									
After Saturation					After Consolidation				
Change in Height, ΔH_{sat} (cm)			0.168		Change in Height, ΔH_c (cm)			0.053	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$			14.94		Sample Height, $H_c=(H_{sat} - \Delta H_c)$			14.89	
Area, A_{sat} (sq. cm)			41.19		Volumetric Strain ϵ_v (%)			0.89	
Volume, V_{sat} (cc)			615.50		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)			609.83	
Dry Density, γ_{ds} (pcf)			N/A		Area, $A_c=(V_c/H_c)$ (sq. cm)			40.95	
					Dry Density, γ_{dc} (pcf)			N/A	
B-value (after saturation)			0.944		B-value (after consolidation)			0.98	
Consolidation Pressure, σ_{3c} (kPa)			750		Steady Pressure (kPa)			310	
Desired CSR		0.17	$\sigma_{dc}=(2\sigma_{3c}).CSR$		255	$\sigma_{dc}(p-p)=2.\sigma_{dc}$		510	
After Test Results									
	N	$\sigma_{dc}=(\sigma_C+\sigma_E)/2$		$\pm (\sigma_{dc}/2\sigma_{3c})$		NOTES Insufficient trimmings for water content (see M,B)			
$u = \sigma_3'$	11	266		.177					
$\epsilon_{da} = 5 \%$	17	266		.177					
$\epsilon_{da} = 10 \%$	N/A	N/A		N/A					

Reviewed by:

MR 10/21/93

No. B23 P4 T
N vs. σ_3'

08-04-1993 18:03:46

DATA FILE NAME: B23P4TCY.DAT
TOTAL NUMBER OF DATA POINTS: 703
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 703
SMOOTHING LEVEL: 0

Comments:

No. B23 P4 T

08-04-1993 18:05:23

N vs. q

DATA FILE NAME: B23P4TCY.DAT
TOTAL NUMBER OF DATA POINTS: 703
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 703
SMOOTHING LEVEL: 0

Comments:

No. B23 P4 T

N vs. E

08-04-1993 18:07:18

DATA FILE NAME: B23P4TCY.DAT
TOTAL NUMBER OF DATA POINTS: 703
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 703
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 8/04/93	
Project: SRS / ITP			Boring No. H-Bor-23			Depth : 84.5 ft.	
Sample No. PS-4		Test No. 23/4/M		Apparatus # 1		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.911	Center (in)	2.904	Bottom (in)	2.907	Avg Diameter (cm)	7.38
Membrane thickness, T (cm)			0.031		Sample Diameter (w/o membrane)		7.32
Area, Ao (sq. cm)		42.11					
Height (At full vacuum), Ho (cm)			14.968		Volume, Vo (cc)		630.36
Initial wet weight of soil +Tare (g)			1542.6	WTare (g)	329.5	Wgt of wet Sample, W(g)	1213.1
Initial moisture content (from trimmings)				Can#	18	Wcan (g)	64.5
Wcan+soil(g)	150.9	W can+dry soil(g)		133.8	w (%)	24.68	γd (pcf) 96.32
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔHsat (cm)		0.031		Change in Height, ΔHc (cm)		0.105	
Sample Height, Hsat=(Ho- ΔHsat)		14.94		Sample Height, Hc= (Hsat - ΔHc)		14.83	
Area, Asat (sq. cm)		41.94		Volumetric Strain εv (%)		1.9	
Volume, Vsat (cc)		626.45		Volume, Vc=(Vsat - ΔV) (cc)		614.47	
Dry Density, γds (pcf)		96.92		Area, Ac=(Vc/Hc) (sq. cm)		41.43	
				Dry Density, γdc (pcf)		98.81	
B-value (after saturation)		0.915		B-value (after consolidation)		0.96	
Consolidation Pressure, σ3c (kPa)		700		Steady Pressure (kPa)		340	
Desired CSR		0.2	σdc=(2σ3c).CSR		280	σdc (p-p) =2.σdc 560	
After Test Results							
	N	σdc=(σC+σE) /2		+/- (σdc/2σ3c)		NOTES * Estimated from previous 5 cycles	
u = σ3'	6 *	301		.215			
eda = 5 %	3	301		.215			
eda = 10 %	5	301		.215			

Reviewed by:

MR 10/21/93

No. B23 P4 M

08-05-1993 13:34:38

N vs. σ_3'

DATA FILE NAME: B23P4MCY.DAT
TOTAL NUMBER OF DATA POINTS: 145
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 145
SMOOTHING LEVEL: 0

Comments:

No. B23 P4 M
N vs. q

08-05-1993 13:36:57

DATA FILE NAME: B23P4M.DAT
TOTAL NUMBER OF DATA POINTS: 145
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 145
SMOOTHING LEVEL: 0

Comments:

No. B23 P4 M
N vs. E

08-05-1993 13:39:02

DATA FILE NAME: B23P4MCY.DAT
TOTAL NUMBER OF DATA POINTS: 145
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 145
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 8/05/93		
Project: SRS / ITP			Boring No. H-Bor-23			Depth : 85.0 ft.		
Sample No. PS-4		Test No. 23/4/B		Apparatus # 2		Method of specimen preparation UNDISTURBED		
Initial Condition of Specimen								
Diameter (At full Vacuum), Do								
Top (in)	2.902	Center (in)	2.898	Bottom (in)	2.904	Avg Diameter (cm)	7.37	
Membrane thickness, T (cm)			0.031		Sample Diameter (w/o membrane)		7.31	
Area, Ao (sq. cm)		41.94						
Height (At full vacuum), Ho (cm)			15.194		Volume, Vo (cc)		637.22	
Initial wet weight of soil + Tare (g)			1496.8	WTare (g)	334.4	Wgt of wet Sample, W(g)	1162.4	
Initial moisture content (from trimmings)					Can#	52	Wcan (g)	64.7
Wcan+soil(g)	136.3	W can+dry soil(g)		121.9	w (%)	25.17	γ_d (pcf)	90.94
Conditions of Specimen after Saturation and Consolidation								
After Saturation				After Consolidation				
Change in Height, ΔH_{sat} (cm)		0.03		Change in Height, ΔH_c (cm)		0.068		
Sample Height, $H_{sat} = (H_o - \Delta H_{sat})$		15.16		Sample Height, $H_c = (H_{sat} - \Delta H_c)$		15.10		
Area, A_{sat} (sq. cm)		41.77		Volumetric Strain ϵ_v (%)		1.49		
Volume, V_{sat} (cc)		633.45		Volume, $V_c = (V_{sat} - \Delta V)$ (cc)		623.95		
Dry Density, γ_{ds} (pcf)		91.48		Area, $A_c = (V_c / H_c)$ (sq. cm)		41.33		
				Dry Density, γ_{dc} (pcf)		92.87		
B-value (after saturation)		0.958		B-value (after consolidation)		0.98		
Consolidation Pressure, σ_{3c} (kPa)		750		Steady Pressure (kPa)		270		
Desired CSR		0.14	$\sigma_{dc} = (2\sigma_{3c}) \cdot CSR$		210	$\sigma_{dc} (p-p) = 2 \cdot \sigma_{dc}$		420
After Test Results								
	N	$\sigma_{dc} = (\sigma_c + \sigma_e) / 2$		$\pm (\sigma_{dc} / 2\sigma_{3c})$		NOTES		
$u = \sigma_3'$	11	220		.147				
$e_{da} = 5\%$	9	217		.145				
$e_{da} = 10\%$	11	220		.147				

Reviewed by:

MR 10/21/93

NO. B23 P4 B

08-05-1993 16:30:07

N vs. σ'_3

DATA FILE NAME: B23P4BCY.DAT
TOTAL NUMBER OF DATA POINTS: 398
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 398
SMOOTHING LEVEL: 0

Comments:

No. B23 P4 B

08-05-1993 16:32:31

N vs. q

DATA FILE NAME: B23P4BCY.DAT
TOTAL NUMBER OF DATA POINTS: 398
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 398
SMOOTHING LEVEL: 0

Comments:

No. B23 P4 B

N vt. E

08-05-1993 16:35:17

DATA FILE NAME: B23P4BCY.DAT
TOTAL NUMBER OF DATA POINTS: 398
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 398
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 9/1/93	
Project: SRS / ITP				Boring No. H-Bor-29				Depth : 53.7 ft.	
Sample No. PS-2		Test No. 29/2/T		Apparatus # 2		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.895	Center (in)	2.9	Bottom (in)	2.901	Avg Diameter (cm)		7.36	
Membrane thickness, T (cm)			0.029		Sample Diameter (w/o membrane)			7.30	
Area, Ao (sq. cm)		41.91							
Height (At full vacuum), Ho (cm)			15.263		Volume, Vo (cc)			639.62	
Initial wet weight of soil +Tare (g)			1605.5	WTare (g)	334.7	Wgt of wet Sample, W(g)		1270.8	
Initial moisture content (from trimmings)					Can#	146	Wcan (g)	64.1	
Wcan+soil(g)	223.2	W can+dry soil(g)		195.9	w (%)	20.71	γ_d (pcf)	102.70	
Conditions of Specimen after Saturation and Consolidation									
After Saturation				After Consolidation					
Change in Height, ΔH_{sat} (cm)		0.058		Change in Height, ΔH_c (cm)			0.119		
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		15.21		Sample Height, $H_c=(H_{sat} - \Delta H_c)$			15.09		
Area, A_{sat} (sq. cm)		41.59		Volumetric Strain ϵ_v (%)			2.24		
Volume, V_{sat} (cc)		632.35		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)			618.02		
Dry Density, γ_{ds} (pcf)		103.88		Area, $A_c=(V_c/H_c)$ (sq. cm)			40.97		
				Dry Density, γ_{dc} (pcf)			106.29		
B-value (after saturation)		0.957		B-value (after consolidation)			0.97		
Consolidation Pressure, σ_{3c} (kPa)		750		Steady Pressure (kPa)			290		
Desired CSR		0.16	$\sigma_{dc}=(2\sigma_{3c}).CSR$		240	$\sigma_{dc}(p-p)=2.\sigma_{dc}$		480	
After Test Results									
	N	$\sigma_{dc}=(\sigma_C+\sigma_E)/2$		$\pm (\sigma_{dc}/2\sigma_{3c})$		NOTES took out lg. gravel from bottom of sample and patched hole ~ 1/8" deep			
$u = \sigma_3'$	16	250		.167					
$e_{da} = 5 \%$	17	250		.167					
$e_{da} = 10 \%$	N/A	N/A		N/A					

Reviewed by:

MR 10/21/93

No. B29 P2 T
N vs. σ_3'

09-02-1993 10:22:46

DATA FILE NAME: B29P2TCY.DAT
TOTAL NUMBER OF DATA POINTS: 552
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 552
SMOOTHING LEVEL: 0

Comments:

No. B29 P2 T

N vs. q

09-02-1993 10:24:22

DATA FILE NAME: B29P2TCY.DAT
TOTAL NUMBER OF DATA POINTS: 552
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 552
SMOOTHING LEVEL: 0

Comments:

No. B29 P2 T
N vs. E

09-02-1993 10:26:17

DATA FILE NAME: B29P2TCY.DAT
TOTAL NUMBER OF DATA POINTS: 552
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 552
SMOOTHING LEVEL: 0

Comments:

APPENDIX D:

LOW-AMPLITUDE CYCLIC TEST DATA

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 8/12/93	
Project: SRS / ITP			Boring No. H-Bor-23.1			Depth : 28.9 ft.			
Sample No. PS-1		Test No. 23.1/1/T		Apparatus # 2		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.884	Center (in)	2.885	Bottom (in)	2.883	Avg Diameter (cm)		7.33	
Membrane thickness, T (cm)			0.029		Sample Diameter (w/o membrane)			7.27	
Area, Ao (sq. cm)		41.48							
Height (At full vacuum), Ho (cm)			15.003		Volume, Vo (cc)			622.33	
Initial wet weight of soil +Tare (g)			1629		WTare (g)		332.8		Wgt of wet Sample, W(g) 1296.2
Initial moisture content (from trimmings)					Can#		100		Wcan (g) 64
Wcan+soil(g)	230.3	W can+dry soil(g)		202.3	w (%)	20.25	γ_d (pcf)	108.08	
Conditions of Specimen after Saturation and Consolidation									
After Saturation					After Consolidation				
Change in Height, ΔH_{sat} (cm)			0.013		Change in Height, ΔH_c (cm)			0.019	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$			14.99		Sample Height, $H_c=(H_{sat} - \Delta H_c)$			14.97	
Area, Asat (sq. cm)			41.41		Volumetric Strain, ϵ_v (%)			0.34	
Volume, Vsat (cc)			620.71		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)			618.60	
Dry Density, γ_{ds} (pcf)			108.37		Area, $A_c=(V_c/H_c)$ (sq. cm)			41.32	
					Dry Density, γ_{dc} (pcf)			108.74	
B-value (after saturation)			0.961		B-value (after consolidation)			0.970	
Consolidation Pressure, σ_{3c} (kPa)			200		Steady Pressure (kPa)			Various	
Desired CSR	N	σ_{dc} (p-p) (kPa)		ϵ meas.(p-p)(.001%)		NOTES TS #: 1			
.025	10	16.5		7					
.05	10	38		18					
.075	10	57.5		31					
.1	10	78		46					
.125	10	99		67					
.135	10	106		73					
.18	10	144		144					

Reviewed by:

MR 2/7/94

No. 1TS025

01-07-1994 16:55:23

DATA FILE NAME: 1TS025.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1TS025

01-07-1994 16:57:45

DATA FILE NAME: 1TS025.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1TS025

08-23-1993 16:11:33

DATA FILE NAME: 1TS025.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1TS050

01-07-1994 17:00:36

DATA FILE NAME: 1TS050.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1TS050

01-07-1994 17:02:30

DATA FILE NAME: 1TS050.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1TS050

08-23-1993 16:27:06

DATA FILE NAME: 1TS050.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1TS075

01-07-1994 17:06:11

DATA FILE NAME: 1TS075.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1TS075

01-07-1994 17:10:46

DATA FILE NAME: 1TS075.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1TS075

08-23-1993 16:31:40

DATA FILE NAME: 1TS075.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1TS100

01-07-1994 17:15:21

DATA FILE NAME: 1TS100.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1TS100

01-07-1994 17:17:46

DATA FILE NAME: 1TS100
TOTAL NUMBER OF DATA POINTS: 1000
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 1000
SMOOTHING LEVEL: 1

Comments:

No. 1TS100

08-23-1993 16:35:31

DATA FILE NAME: 1TS100.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

1TS125

01-07-1994 17:20:11

DATA FILE NAME: 1TS125.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1 TS 125

01-07-1994 17:22:55

DATA FILE NAME: 1TS125.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1TS125

08-23-1993 16:39:28

DATA FILE NAME: 1TS125.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1TS135

01-07-1994 17:34:28

DATA FILE NAME: 1TS135.DAT
TOTAL NUMBER OF DATA POINTS: 304
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 304
SMOOTHING LEVEL: 0

Comments:

No. 1 TS 135

01-07-1994 17:37:19

DATA FILE NAME: 1TS135.DAT
TOTAL NUMBER OF DATA POINTS: 304
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 304
SMOOTHING LEVEL: 0

Comments:

No. 1 TS135

08-23-1993 16:43:23

DATA FILE NAME: 1TS135.DAT
TOTAL NUMBER OF DATA POINTS: 304
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 304
SMOOTHING LEVEL: 0

Comments:

No. 1TS180

01-07-1994 17:40:53

DATA FILE NAME: 1TS180.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1 TS180

01-07-1994 17:44:35

DATA FILE NAME: 1TS180.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

No. 1 TS180

08-23-1993 16:47:27

DATA FILE NAME: 1TS180.DAT
TOTAL NUMBER OF DATA POINTS: 303
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 303
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering							
CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 8/16/93	
Project: SRS / ITP			Boring No. H-Bor-2			Depth : 175.1 ft.	
Sample No. PS-13	Test No. 2/13/T		Apparatus # 2		Method of specimen preparation UNDISTURBED		
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.875	Center (in)	2.864	Bottom (in)	2.868	Avg Diameter (cm)	7.29
Membrane thickness, T (cm)			0.029		Sample Diameter (w/o membrane)		7.23
Area, Ao (sq. cm)		41.05					
Height (At full vacuum), Ho (cm)			15.139		Volume, Vo (cc)		621.41
Initial wet weight of soil +Tare (g)			1381.9	WTare (g)	324.3	Wgt of wet Sample, W(g)	1057.6
Initial moisture content (from trimmings)					Can#	312	Wcan (g) 63.9
Wcan+soil(g)	157.1	W can+dry soil(g)		132.2	w (%)	36.46	γ_d (pcf) 77.83
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.373		Change in Height, ΔH_c (cm)		0.23	
Sample Height, $H_{sat} = (H_o - \Delta H_{sat})$		14.77		Sample Height, $H_c = (H_{sat} - \Delta H_c)$		14.54	
Area, Asat (sq. cm)		39.02		Volumetric Strain, ϵ_v (%)		3.6	
Volume, Vsat (cc)		576.23		Volume, $V_c = (V_{sat} - \Delta V)$ (cc)		553.86	
Dry Density, γ_{ds} (pcf)		83.93		Area, $A_c = (V_c / H_c)$ (sq. cm)		38.10	
				Dry Density, γ_{dc} (pcf)		87.32	
B-value (after saturation)		0.936		B-value (after consolidation)		0.960	
Consolidation Pressure, σ_{3c} (kPa)		750		Steady Pressure (kPa)		Various	
Desired CSR	N	σ_{dc} (p-p) (kPa)		ϵ meas.(p-p)(.001%)		NOTES TS #: 2	
.01	4	23		4.3			
.02	4	53		14			
.025	4	66		19			
.05	4	144		50			
.08	4	240		98			
.11	4	335		164			
.14	4	427		240			
.18	4	552		408			

Reviewed by: *MR* 2/7/94

No. 2TS01

01-12-1994 18:03:52

DATA FILE NAME: 2TS01.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS01

01-12-1994 18:05:47

DATA FILE NAME: 2TS01.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS01

08-25-1993 17:00:39

DATA FILE NAME: 2TS01.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS02

01-12-1994 18:08:03

DATA FILE NAME: 2TS02.DAT
TOTAL NUMBER OF DATA POINTS: 124
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 124
SMOOTHING LEVEL: 0

Comments:

No. 2TS02

01-12-1994 18:11:05

DATA FILE NAME: 2TS02.DAT
TOTAL NUMBER OF DATA POINTS: 124
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 124
SMOOTHING LEVEL: 0

Comments:

No. 2TS02

08-25-1993 17:03:58

DATA FILE NAME: 2TS02.DAT
TOTAL NUMBER OF DATA POINTS: 124
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 124
SMOOTHING LEVEL: 0

Comments:

No. 2TS025

01-12-1994 18:14:25

DATA FILE NAME:
TOTAL NUMBER OF DATA POINTS:
SAMPLING RATE:
ENDING TIME (sec):
SAMPLING TIME (sec):

Comments:

2TS025

15:16:47

DATA FILE NAME: 2TS025.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS025

08-25-1993 17:07:44

DATA FILE NAME: 2TS025.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2 TS05

01-12-1994 18:18:54

DATA FILE NAME:
TOTAL NUMBER OF DATA POINTS: 124
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 124
SMOOTHING LEVEL: 0

Comments:

No. 2TS05

01-12-1994 18:22:30

DATA FILE NAME: 2TS05.DAT
TOTAL NUMBER OF DATA POINTS: 124
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 124
SMOOTHING LEVEL: 0

Comments:

No. 2TS05

08-25-1993 17:09:34

DATA FILE NAME: 2TS05.DAT
TOTAL NUMBER OF DATA POINTS: 124
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 124
SMOOTHING LEVEL: 0

Comments:

No. 2TS08

01-12-1994 18:26:52

DATA FILE NAME: 2TS08.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS08

01-12-1994 18:30:30

DATA FILE NAME: 2TS08.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS08

08-25-1993 17:11:48

DATA FILE NAME: 2TS08.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS11

01-12-1994 18:32:37

DATA FILE NAME: 2TS11.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS11

01-12-1994 18:36:04

DATA FILE NAME: 2TS11.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2 TS11

08-25-1993 17:13:39

DATA FILE NAME: 2TS11.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS14

01-12-1994 18:40:45

DATA FILE NAME: 2TS14.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS14

01-12-1994 18:45:29

DATA FILE NAME: 2TS14.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. ZTS 14

08-25-1993 17:16:12

DATA FILE NAME: ZTS14.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS18

01-12-1994 18:49:15

DATA FILE NAME: 2TS18.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS18

01-12-1994 18:52:53

DATA FILE NAME: 2TS18.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

No. 2TS18

08-25-1993 17:18:43

DATA FILE NAME: 2TS18.DAT
TOTAL NUMBER OF DATA POINTS: 123
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 123
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering								
CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 8/16/93		
Project: SRS / ITP			Boring No. H-Bor-2			Depth : 175.7 ft.		
Sample No. PS-13	Test No. 2/13/M		Apparatus # 1		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen								
Diameter (At full Vacuum), Do								
Top (in)	2.87	Center (in)	2.875	Bottom (in)	2.883	Avg Diameter (cm)	7.31	
Membrane thickness, T (cm)			0.029		Sample Diameter (w/o membrane)		7.25	
Area, Ao (sq. cm)		41.25						
Height (At full vacuum), Ho (cm)			15.495		Volume, Vo (cc)		639.15	
Initial wet weight of soil +Tare (g)			1520.9	WTare (g)	318.6	Wgt of wet Sample, W(g)	1202.3	
Initial moisture content (from trimmings)					Can#	5	Wcan (g)	64.1
Wcan+soil(g)	159	W can+dry soil(g)		136.2	w (%)	31.62	γ_d (pcf)	89.18
Conditions of Specimen after Saturation and Consolidation								
After Saturation				After Consolidation				
Change in Height, ΔH_{sat} (cm)		0.3		Change in Height, ΔH_c (cm)		0.16		
Sample Height, $H_{sat} = (H_o - \Delta H_{sat})$		15.20		Sample Height, $H_c = (H_{sat} - \Delta H_c)$		15.04		
Area, A_{sat} (sq. cm)		39.65		Volumetric Strain, ϵ_v (%)		2.2		
Volume, V_{sat} (cc)		602.51		Volume, $V_c = (V_{sat} - \Delta V)$ (cc)		588.44		
Dry Density, γ_{ds} (pcf)		94.60		Area, $A_c = (V_c / H_c)$ (sq. cm)		39.14		
				Dry Density, γ_{dc} (pcf)		96.86		
B-value (after saturation)		0.953		B-value (after consolidation)		0.970		
Consolidation Pressure, σ_{3c} (kPa)		750		Steady Pressure (kPa)		Various		
Desired CSR	N	σ_{dc} (p-p) (kPa)		ϵ meas.(p-p)(.001%)		NOTES		
.07	10	212		69				
	20	212		69				
						TS #: 3		

Reviewed by: *MZ* 2/7/94

No. 3TS07

01-12-1994 19:10:14

DATA FILE NAME: 3TS07.DAT
TOTAL NUMBER OF DATA POINTS: 604
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 604
SMOOTHING LEVEL: 0

Comments:

No. 3TS07

01-12-1994 19:03:23

DATA FILE NAME: 3TS07.DAT
TOTAL NUMBER OF DATA POINTS: 604
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 604
SMOOTHING LEVEL: 0

Comments:

No. 3TS07

08-17-1993 14:34:56

DATA FILE NAME: 3TS07.DAT
TOTAL NUMBER OF DATA POINTS: 604
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 604
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 8/17/93	
Project: SRS / ITP			Boring No. H-Bor-2			Depth : 176.3 ft	
Sample No. PS-13	Test No. 2/13/B	Apparatus # 2		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen							
Diameter (At full Vacuum), D_o							
Top (in)	2.875	Center (in)	2.865	Bottom (in)	2.874	Avg Diameter (cm)	7.29
Membrane thickness, T (cm)			0.029		Sample Diameter (w/o membrane)		7.24
Area, A_o (sq. cm)		41.11					
Height (At full vacuum), H_o (cm)			15.64		Volume, V_o (cc)		643.02
Initial wet weight of soil +Tare (g)			1434.4	WTare (g)	334.7	Wgt of wet Sample, W(g)	1099.7
Initial moisture content (from trimmings)					Can#	88	Wcan (g) 63.9
Wcan+soil(g)	160.9	W can+dry soil(g)	130.1	w (%)	46.53	γ_d (pcf)	72.83
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.377		Change in Height, ΔH_c (cm)		0.197	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		15.26		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		15.07	
Area, A_{sat} (sq. cm)		39.13		Volumetric Strain, ϵ_v (%)		2.47	
Volume, V_{sat} (cc)		597.27		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		581.39	
Dry Density, γ_{ds} (pcf)		78.41		Area, $A_c=(V_c/H_c)$ (sq. cm)		38.59	
				Dry Density, γ_{dc} (pcf)		80.55	
B-value (after saturation)		0.931		B-value (after consolidation)		0.965	
Consolidation Pressure, σ_{3c} (kPa)		750		Steady Pressure (kPa)		Various	
Desired CSR	N	σ_{dc} (p-p) (kPa)		ϵ meas.(p-p)(.001%)		NOTES Extra compliance at connection estimated from stress-strain curve.	
.15	10	462		700			
	20	462		1700			
						TS #: 4	

Reviewed by:

MR 2/7/94

No. 4 TS15

01-12-1994 19:12:23

DATA FILE NAME:
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

No. 4 TS15

01-12-1994 19:25:33

DATA FILE NAME: 4TS15.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

No. 4TS15

08-17-1993 10:05:03

DATA FILE NAME: 4TS15.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 8/17/93	
Project: SRS / ITP			Boring No. H-Bor-2			Depth : 178.1 ft.	
Sample No. PS-14		Test No. 2/14/T		Apparatus # 1		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.841	Center (in)	2.835	Bottom (in)	2.831	Avg Diameter (cm)	7.20
Membrane thickness, T (cm)			0.03		Sample Diameter (w/o membrane)		7.14
Area, Ao (sq. cm)		40.07					
Height (At full vacuum), Ho (cm)			15.278		Volume, Vo (cc)		612.16
Initial wet weight of soil +Tare (g)			1439.1	WTare (g)	329.3	Wgt of wet Sample, W(g)	1109.8
Initial moisture content (from trimmings)					Can#	333	Wcan (g)
							64.2
Wcan+soil(g)	155	W can+dry soil(g)		125	w (%)	49.34	γ_d (pcf)
							75.75
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.078		Change in Height, ΔH_c (cm)		0.127	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		15.20		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		15.07	
Area, A_{sat} (sq. cm)		39.66		Volumetric Strain, ϵ_v (%)		2.14	
Volume, V_{sat} (cc)		602.82		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		589.72	
Dry Density, γ_{ds} (pcf)		76.92		Area, $A_c=(V_c/H_c)$ (sq. cm)		39.12	
				Dry Density, γ_{dc} (pcf)		78.63	
B-value (after saturation)		0.955		B-value (after consolidation)		0.966	
Consolidation Pressure, σ_{3c} (kPa)		750		Steady Pressure (kPa)		200	
Desired CSR	N	σ_{dc} (p-p) (kPa)		ϵ meas.(p-p)(.001%)		NOTES	
.10	10	305		123			
	20	305		126			
						TS #: 5	

Reviewed by:

MZ 2/7/94

No. 5TS10

01-12-1994 19:17:06

DATA FILE NAME: 5TS10.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

No. 5TS10

01-12-1994 19:19:51

DATA FILE NAME: 5TS10.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

No. 5TS10

08-19-1993 09:33:57

DATA FILE NAME: 5TS10.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 8/18/93	
Project: SRS / ITP			Boring No. H-Bor-2			Depth : 178.7 ft.	
Sample No. PS-14	Test No. 2/14/M		Apparatus # 2		Method of specimen preparation UNDISTURBED		
Initial Condition of Specimen							
Diameter (At full Vacuum), D_o							
Top (in)	2.864	Center (in)	2.875	Bottom (in)	2.873	Avg Diameter (cm)	7.29
Membrane thickness, T (cm)		0.03		Sample Diameter (w/o membrane)		7.23	
Area, A_o (sq. cm)		41.07					
Height (At full vacuum), H_o (cm)		15.086		Volume, V_o (cc)		619.61	
Initial wet weight of soil + Tare (g)		1301	WTare (g)	334.7	Wgt of wet Sample, W(g)		966.3
Initial moisture content (from trimmings)				Can#	247	Wcan (g)	64.2
Wcan+soil(g)	142.1	W can+dry soil(g)	107.4	w (%)	80.32	γ_d (pcf)	53.97
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.608		Change in Height, ΔH_c (cm)		0.287	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		14.48		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		14.19	
Area, A_{sat} (sq. cm)		37.76		Volumetric Strain, ϵ_v (%)		4.91	
Volume, V_{sat} (cc)		546.71		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		516.29	
Dry Density, γ_{ds} (pcf)		61.16		Area, $A_c=(V_c/H_c)$ (sq. cm)		36.38	
				Dry Density, γ_{dc} (pcf)		64.77	
B-value (after saturation)		0.983		B-value (after consolidation)		0.967	
Consolidation Pressure, σ_{3c} (kPa)		750		Steady Pressure (kPa)		210	
Desired CSR	N	σ_{dc} (p-p) (kPa)		ϵ meas.(p-p)(.001%)		NOTES	
.12	10	348		210			
	20	348		220			
						TS #: 6	

Reviewed by:

MR 2/7/94

No. 6TS12

08-19-1993 10:20:22

DATA FILE NAME: B:6TS12.DAT
TOTAL NUMBER OF DATA POINTS: 604
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 604
SMOOTHING LEVEL: 0

Comments:

No. 6TS12

01-12-1994 19:48:35

DATA FILE NAME: 6TS12.DAT
TOTAL NUMBER OF DATA POINTS: 604
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 604
SMOOTHING LEVEL: 0

Comments:

No. 6TS12

08-19-1993 10:22:15

DATA FILE NAME: B:6TS12.DAT
TOTAL NUMBER OF DATA POINTS: 604
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 604
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 12/6/93	
Project: SRS / ITP			Boring No. H-Bor-2			Depth : 179.5'	
Sample No. PS-14		Test No. 2/14/B		Apparatus # 2		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.881	Center (in)	2.872	Bottom (in)	2.876	Avg Diameter (cm)	7.31
Membrane thickness, T (cm)			0.032		Sample Diameter (w/o membrane)		7.24
Area, Ao (sq. cm)		41.19					
Height (At full vacuum), Ho (cm)			14.982		Volume, Vo (cc)		617.11
Initial wet weight of soil +Tare (g)			1423.6	WTare (g)	334.8	Wgt of wet Sample, W(g)	1088.8
Initial moisture content (from trimmings)					Can#	N.A.	Wcan (g) N.A.
Wcan+soil(g)	N.A.	W can+dry soil(g)	N.A.	w (%)		γ_d (pcf)	
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.078		Change in Height, ΔH_c (cm)		0.057	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		14.90		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		14.85	
Area, A_{sat} (sq. cm)		40.76		Volumetric Strain, ϵ_v (%)		1.35	
Volume, V_{sat} (cc)		607.51		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		599.17	
Dry Density, γ_{ds} (pcf)		N.A.		Area, $A_c=(V_c/H_c)$ (sq. cm)		40.36	
				Dry Density, γ_{dc} (pcf)		N.A.	
B-value (after saturation)		0.973		B-value (after consolidation)		0.985	
Consolidation Pressure, σ_{3c} (kPa)		375		Steady Pressure (kPa)		130	
Desired CSR	N	σ_{dc} (p-p) (kPa)		ϵ meas.(p-p)(.001%)		NOTES insufficient sample for moisture content determination	
.1	10	146		94			
	20	146		96			
						TS #: 7	

Reviewed by:

MZ 2/7/94

No. 7TS10

12-06-1993 17:47:18

DATA FILE NAME: B2F14DCY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

No. 7TS10

12-06-1993 17:49:08

DATA FILE NAME: D2P14BCY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

No. 7TS10

12-06-1993 17:51:01

DATA FILE NAME: E2F14BCY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 12/7/93	
Project: SRS / ITP			Boring No. H-Bor-2			Depth : 170.4 ft.	
Sample No. PS-11		Test No. 2/11/B		Apparatus # 2		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), Do							
Top (in)	2.902	Center (in)	2.908	Bottom (in)	2.907	Avg Diameter (cm)	7.38
Membrane thickness, T (cm)			0.032		Sample Diameter (w/o membrane)		7.32
Area, Ao (sq. cm)		42.04					
Height (At full vacuum), Ho (cm)			15.419		Volume, Vo (cc)		648.25
Initial wet weight of soil +Tare (g)			1552	WTare (g)	335.6	Wgt of wet Sample, W(g)	1216.4
Initial moisture content (from trimmings)					Can#	219	Wcan (g) 63.8
Wcan+soil(g)	103.2	W can+dry soil(g)		90.3	w (%)	48.68	γ_d (pcf) 78.75
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.048		Change in Height, ΔH_c (cm)		0.018	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		15.37		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		15.35	
Area, Asat (sq. cm)		41.78		Volumetric Strain, ϵ_v (%)		0.38	
Volume, Vsat (cc)		642.21		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		639.74	
Dry Density, γ_{ds} (pcf)		79.49		Area, $A_c=(V_c/H_c)$ (sq. cm)		41.67	
				Dry Density, γ_{dc} (pcf)		79.80	
B-value (after saturation)		0.956		B-value (after consolidation)		0.965	
Consolidation Pressure, σ_{3c} (kPa)		375		Steady Pressure (kPa)		110	
Desired CSR	N	σ_{dc} (p-p) (kPa)		ϵ meas.(p-p)(.001%)		NOTES	
.07	10	97		40			
	20	97		40			
						TS #: 8	

Reviewed by: *MR* 2/7/94

No. 8TS07

12-11-1993 14:15:35

DATA FILE NAME: D2F11BCY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

No. 8TS07

12-11-1993 14:20:20

DATA FILE NAME: D2P11BCY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

No. 8TS07

12-11-1993 14:22:13

DATA FILE NAME: B2F11BCY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 12/8/93	
Project: SRS / ITP				Boring No. H-Bor-29			Depth : 90.5 ft.		
Sample No. PS-7		Test No. 29/7/T		Apparatus # 2		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), Do									
Top (in)	2.896	Center (in)	2.894	Bottom (in)	2.899	Avg Diameter (cm)		7.36	
Membrane thickness, T (cm)			0.032		Sample Diameter (w/o membrane)			7.29	
Area, Ao (sq. cm)		41.77							
Height (At full vacuum), Ho (cm)			15.443		Volume, Vo (cc)			645.05	
Initial wet weight of soil +Tare (g)			1652.1		WTare (g)	335.4	Wgt of wet Sample, W(g)	1316.7	
Initial moisture content (from trimmings)					Can#	155	Wcan (g)	64.4	
Wcan+soil(g)	194.4	W can+dry soil(g)		169.8	w (%)	23.34	γ_d (pcf)	103.27	
Conditions of Specimen after Saturation and Consolidation									
After Saturation					After Consolidation				
Change in Height, ΔH_{sat} (cm)			0.059		Change in Height, ΔH_c (cm)			0.032	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$			15.38		Sample Height, $H_c=(H_{sat} - \Delta H_c)$			15.35	
Area, Asat (sq. cm)			41.45		Volumetric Strain, ϵ_v (%)			0.51	
Volume, Vsat (cc)			637.68		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)			634.39	
Dry Density, γ_{ds} (pcf)			104.46		Area, $A_c=(V_c/H_c)$ (sq. cm)			41.32	
					Dry Density, γ_{dc} (pcf)			105.01	
B-value (after saturation)			0.942		B-value (after consolidation)			0.962	
Consolidation Pressure, σ_{3c} (kPa)			450		Steady Pressure (kPa)			150	
Desired CSR	N	σ_{dc} (p-p) (kPa)		ϵ meas.(p-p)(.001%)		NOTES			
.1	10	177		88					
	20	177		88					
						TS #: 9			

Reviewed by: *MR* 2/7/94

No. 9TS10

12-11-1993 14:11:43

DATA FILE NAME: B29F71CY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

No. 9TS10

12-11-1993 14:09:46

DATA FILE NAME: E29P71CY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

No. 9TS10

12-11-1993 14:13:30

DATA FILE NAME: R29P7TCY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 12/9/93	
Project: SRS / ITP			Boring No. H-Bor-29		Depth : 91.1 ft.		
Sample No. PS-7		Test No. 29/7/M		Apparatus # 2		Method of specimen preparation UNDISTURBED	
Initial Condition of Specimen							
Diameter (At full Vacuum), D_o							
Top (in)	2.89	Center (in)	2.895	Bottom (in)	2.894	Avg Diameter (cm)	7.35
Membrane thickness, T (cm)			0.032		Sample Diameter (w/o membrane)		7.28
Area, A_o (sq. cm)		41.67					
Height (At full vacuum), H_o (cm)			16.528		Volume, V_o (cc)		688.77
Initial wet weight of soil +Tare (g)			1755.9	WTare (g)	335.5	Wgt of wet Sample, W(g)	1420.4
Initial moisture content (from trimmings)					Can#	275	Wcan (g)
Wcan+soil(g)	133.1	W can+dry soil(g)		120.6	w (%)	22.28	γ_d (pcf)
Conditions of Specimen after Saturation and Consolidation							
After Saturation				After Consolidation			
Change in Height, ΔH_{sat} (cm)		0.075		Change in Height, ΔH_c (cm)		0.046	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$		16.45		Sample Height, $H_c=(H_{sat} - \Delta H_c)$		16.41	
Area, A_{sat} (sq. cm)		41.29		Volumetric Strain, ϵ_v (%)		0.72	
Volume, V_{sat} (cc)		679.43		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)		674.47	
Dry Density, γ_{ds} (pcf)		106.68		Area, $A_c=(V_c/H_c)$ (sq. cm)		41.11	
				Dry Density, γ_{dc} (pcf)		107.47	
B-value (after saturation)		0.958		B-value (after consolidation)		0.978	
Consolidation Pressure, σ_{3c} (kPa)		450		Steady Pressure (kPa)		110	
Desired CSR	N	σ_{dc} (p-p) (kPa)		ϵ meas.(p-p)(.001%)		NOTES	
.06	10	100		43			
	20	100		43			
						TS #: 10	

Reviewed by:

MR

2/7/94

DATA FILE NAME: B29P7MCY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

DATA FILE NAME: B29P7M0Y.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)						Date : 12/10/93		
Project: SRS / ITP			Boring No. H-Bor-29			Depth : 91.7 ft.		
Sample No. PS-7		Test No. 29/7/B		Apparatus # 2		Method of specimen preparation UNDISTURBED		
Initial Condition of Specimen								
Diameter (At full Vacuum), Do								
Top (in)	2.893	Center (in)	2.892	Bottom (in)	2.893	Avg Diameter (cm)	7.35	
Membrane thickness, T (cm)			0.032		Sample Diameter (w/o membrane)		7.28	
Area, Ao (sq. cm)		41.66						
Height (At full vacuum), Ho (cm)			15.204		Volume, Vo (cc)		633.45	
Initial wet weight of soil +Tare (g)			1056.5	WTare (g)	336.1	Wgt of wet Sample, W(g)	720.4	
Initial moisture content (from trimmings)					Can#	419	Wcan (g)	64.4
Wcan+soil(g)	106.5	W can+dry soil(g)	99.3	w (%)	20.63	γ_d (pcf)	58.83	
Conditions of Specimen after Saturation and Consolidation								
After Saturation				After Consolidation				
Change in Height, ΔH_{sat} (cm)		0.065		Change in Height, ΔH_c (cm)		0.03		
Sample Height, $H_{sat} = (H_o - \Delta H_{sat})$		15.14		Sample Height, $H_c = (H_{sat} - \Delta H_c)$		15.11		
Area, A_{sat} (sq. cm)		41.31		Volumetric Strain, ϵ_v (%)		0.61		
Volume, V_{sat} (cc)		625.35		Volume, $V_c = (V_{sat} - \Delta V)$ (cc)		621.49		
Dry Density, γ_{ds} (pcf)		59.59		Area, $A_c = (V_c / H_c)$ (sq. cm)		41.13		
				Dry Density, γ_{dc} (pcf)		59.96		
B-value (after saturation)		0.956		B-value (after consolidation)		0.965		
Consolidation Pressure, σ_{3c} (kPa)		450		Steady Pressure (kPa)		190		
Desired CSR	N	σ_{dc} (p-p) (kPa)		ϵ meas.(p-p)(.001%)		NOTES		
.15	10	270		147				
	20	270		150				
						TS #: 11		

Reviewed by:

MR 2/7/94

No. 11TS15

12-10-1993 16:31:36

DATA FILE NAME: B27P7BCY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

No. 11 TS 15

12-10-1993 16:33:44

DATA FILE NAME: I29P7BCY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

No. 11 TS15

12-10-1993 16:36:05

DATA FILE NAME: B29P7BCY.DAT
TOTAL NUMBER OF DATA POINTS: 603
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 603
SMOOTHING LEVEL: 0

Comments:

APPENDIX E:
POST-CYCLIC VOLUMETRIC STRAIN DATA

No. _____

08-24-1993 17:25:16

DATA FILE NAME: B2P4TVS.DAT
TOTAL NUMBER OF DATA POINTS: 193
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 193
SMOOTHING LEVEL: 0

Comments: _____

No. _____

08-24-1993 17:27:27

DATA FILE NAME: B2P4MVS.DAT
TOTAL NUMBER OF DATA POINTS: 585
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 585
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:29:50

DATA FILE NAME: B2P5TVS.DAT
TOTAL NUMBER OF DATA POINTS: 452
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 452
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:32:18

DATA FILE NAME: B2P5MVS.DAT
TOTAL NUMBER OF DATA POINTS: 529
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 529
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:34:35

DATA FILE NAME: B2F5BVS.DAT
TOTAL NUMBER OF DATA POINTS: 418
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 418
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:36:51

DATA FILE NAME: B2P6TVS.DAT
TOTAL NUMBER OF DATA POINTS: 455
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 455
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:39:09

DATA FILE NAME: B2P6MVS.DAT
TOTAL NUMBER OF DATA POINTS: 445
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 445
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:41:22

DATA FILE NAME: B2P6BVS.DAT
TOTAL NUMBER OF DATA POINTS: 310
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 310
SMOOTHING LEVEL: 0

Comments:

No. _____

01-17-1994 05:45:10

DATA FILE NAME: B12P5TVS.DAT
TOTAL NUMBER OF DATA POINTS: 273
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 273
SMOOTHING LEVEL: 0

Comments:

No. _____

01-17-1994 05:47:49

DATA FILE NAME: B12P5MVS.DAT
TOTAL NUMBER OF DATA POINTS: 451
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 451
SMOOTHING LEVEL: 0

Comments:

No. _____

01-17-1994 05:50:53

DATA FILE NAME: B12P5BVS.DAT
TOTAL NUMBER OF DATA POINTS: 222
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 222
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:43:56

DATA FILE NAME: B12F7TVS.DAT
TOTAL NUMBER OF DATA POINTS: 153
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 153
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:46:07

DATA FILE NAME: B12F7MVS.DAT
TOTAL NUMBER OF DATA POINTS: 458
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 458
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:48:51

DATA FILE NAME: B12P7BVS.DAT
TOTAL NUMBER OF DATA POINTS: 267
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 267
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:50:53

DATA FILE NAME: B23P2TVS.DAT
TOTAL NUMBER OF DATA POINTS: 511
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 511
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:52:59

DATA FILE NAME: B23P3TVS.DAT
TOTAL NUMBER OF DATA POINTS: 221
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 221
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:55:06

DATA FILE NAME: B23P3MVS.DAT
TOTAL NUMBER OF DATA POINTS: 153
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 153
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:57:23

DATA FILE NAME: B23P3BVS.DAT
TOTAL NUMBER OF DATA POINTS: 349
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 349
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 18:23:12

DATA FILE NAME: B23P4TV5.DAT
TOTAL NUMBER OF DATA POINTS: 620
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 620
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 18:17:52

DATA FILE NAME: B23P4MVS.DAT
TOTAL NUMBER OF DATA POINTS: 416
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 416
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 18:19:55

DATA FILE NAME: B23P4BVS.DAT
TOTAL NUMBER OF DATA POINTS: 32
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 32
SMOOTHING LEVEL: 0

Comments: _____

No. _____

01-17-1994 05:54:58

DATA FILE NAME: B29P2TVS.DAT
TOTAL NUMBER OF DATA POINTS: 41
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 41
SMOOTHING LEVEL: 0

Comments:

No. _____

08-24-1993 17:13:27

DATA FILE NAME: STSVST.DAT
TOTAL NUMBER OF DATA POINTS: 103
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 103
SMOOTHING LEVEL: 0

Comments: _____

No. _____

08-24-1993 17:18:48

DATA FILE NAME: 6TSVST.DAT
TOTAL NUMBER OF DATA POINTS: 175
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 175
SMOOTHING LEVEL: 0

Comments:

No. _____

01-17-1994 06:04:25

DATA FILE NAME: 7TSVST.DAT
TOTAL NUMBER OF DATA POINTS: 38
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 38
SMOOTHING LEVEL: 0

Comments:

No. _____

01-17-1994 06:07:06

DATA FILE NAME: 9TSVST.DAT
TOTAL NUMBER OF DATA POINTS: 61
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 61
SMOOTHING LEVEL: 0

Comments:

No. _____

01-17-1994 06:09:57

DATA FILE NAME: 11TSVST.DAT
TOTAL NUMBER OF DATA POINTS: 194
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 194
SMOOTHING LEVEL: 0

Comments:

APPENDIX F:
POST-CYCLIC STRESS-STRAIN DATA

No. _____

01-17-1994 05:58:16

DATA FILE NAME: B23P2MSS.DAT
TOTAL NUMBER OF DATA POINTS: 301
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 301
SMOOTHING LEVEL: 0

Comments:

No. _____

02-17-1994 07:19:45

DATA FILE NAME: B23P2MSS.DAT
TOTAL NUMBER OF DATA POINTS: 301
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 301
SMOOTHING LEVEL: 0

Comments:

No. _____

01-17-1994 06:01:08

DATA FILE NAME: B23P2BSS.DAT
TOTAL NUMBER OF DATA POINTS: 300
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 300
SMOOTHING LEVEL: 0

Comments:

No. _____

02-17-1994 07:22:17

DATA FILE NAME: B23P2BSS.DAT
TOTAL NUMBER OF DATA POINTS: 300
BEGINNING DATA POINT NUMBER: 1
ENDING DATA POINT NUMBER: 300
SMOOTHING LEVEL: 0

Comments:

LAW

ENGINEERING AND ENVIRONMENTAL SERVICES

August 12, 1994

Westinghouse Savannah River Company
P.O. Box 616
Aiken, South Carolina 29808

Attention: Sujit Samaddar
Subcontract No. AB08525N

Subject: **Documentation of Non-Conformance**
Revision to Final Report Dated Feb. 21, 1994
Volume 2 of 2
Geotechnical Testing Services for ITP
Law Engineering Project No. 5810535301

Dear Mr. Samaddar:

Law Engineering was recently made aware of an inconsistent test result pertaining to the density of a particular soil sample tested under the ITP contract. This letter serves as documentation of a non-conforming item, our investigation of the non-conformance, and the corrective action taken to resolve the non-conformance.

The problem encountered centers around the dry density, γ_d (pcf), reported for test specimen H-Bor-29, PS-7, bottom portion, at a depth of 91.7 feet. The number reported on the final report (refer to Final Report, Appendix D: Low-Amplitude Cyclic Test Data) was 58.83. Our Subcontractor, UC Berkeley under the direction of Dr. Michael Riemer, provided an investigation of the questionable data. His findings are presented in the attached three page letter dated August 2, 1994, and summarized as follows:

- the dry densities from the top and middle portions of this same tube were 103.27 pcf and 105.23 pcf, respectively,
- the tube dry density containing each of the three test specimen was reported in Appendix A of Volume 2 of the Final Report as 105.4 pcf, rendering the 58.83 pcf result questionable and improbable,
- the *Initial wet weight of soil + Tare (g)* on the reported data sheet for the questionable specimen indicated 1056.5,
- the *Initial wet weight of soil + Tare (g)* on the original test data sheet for the same specimen was written as 1056.5, ruling out a simple typographical data entry error,
- the test specimen in question was split vertically following the cyclic testing,
- each split was immediately placed in a plastic bag and sealed. One split portion was sent to LAW in Atlanta for index testing, the other remained at UC Berkeley for remnant storage,
- the wet weight of the split portion remaining in Berkeley was measured at 830.8 grams, indicating the number reported as 1056.5 grams on the data sheet for the total sample to appear unlikely,

LAW ENGINEERING, INC.

396 PLASTERS AVENUE, N.E. • ATLANTA, GA 30324
(404) 873-4761 • FAX (404) 881-0508

- the volume of the split portion remaining at Berkeley was measured to be approximately 0.015 cubic feet,
- the calculated wet density of the split portion remaining at Berkeley is calculated to be approximately 120 pcf,
- the moisture content of the sample was measured at 20.63 percent,
- the calculated dry density of the split portion remaining at Berkeley is calculated to be approximately 99 pcf, and
- the measured volume of the split portion, although reasonable, is an over estimate of the actual volume; thus, the resulting density is a slight under estimate.

We consider the steps taken by Dr. Riemer to be reasonable and logical. The wet and dry densities estimated by us (slightly under estimated) have been struck and corrected by us on the Appendix D test data sheet. If this change is acceptable to you, we have included ten copies of this letter and attachments for your distribution and inclusion to our Final Report.

If you have any questions pertaining to these test results or require additional information, please do not hesitate to call us.

Sincerely,

LAW ENGINEERING, INC.

Richard L. Boudreau, P.E.
Senior Engineer

John E. Lynch
Quality Assurance Manager

attachments: as noted

cc: Mr. Bradley Diehm

rlb\srs\nonconf.ltr

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Dr. Michael F. Riemer
Geotechnical Engineering
Department of Civil Engineering
440 Davis Hall
Berkeley, California 94720

Phone: (510) 642-1262
FAX: (510) 642-7476

August 2, 1994

Mr. Richard Boudreau
LAW Engineering, INC.
396 Plasters Avenue, NE
Atlanta, GA 30324

Dear Rick,

I have received your FAX regarding the questions surrounding the density of ITP test specimen B29P7B, which was the bottom specimen from the sample tube PS-7 from H-Bor-29. Having examined the original data forms, and the remaining portions of the ITP specimens which are still here in Berkeley, it seems nearly certain that the value reported as the dry density for that specimen, $\gamma_d = 58.83$ pounds per cubic foot (pcf), was incorrect, and that the source of the error was an erroneous reading of the "initial wet weight of soil + Tare (g)", as you suspected. The extremely low value of the density would normally raise concern during initial review of the data, had not other tube samples (such as H-Bor-2, PS-14) from the same project exhibited similarly low, yet verified dry densities. The precision with which an accurate estimate of the density can be back-calculated now will depend on the available data obtained from the portion of the specimen shipped to your laboratory, as explained below.

As you mentioned in your correspondence, it does seem likely that the dry density of this specimen would have been approximately 105 pcf, since similar values were obtained for the tube as a whole, and for both of the other specimens taken from this sample (B29P7T and B29P7M). Since nearly all of the soil within the tube was utilized to obtain the three specimens (approximately 90% by volume), the bottom portion must have had a similar dry density. This is further supported by the nearly identical appearance of the three specimens, both as recorded on the sample logs and as viewed from the remaining portions at this time.

Obviously, the simplest resolution of this question would occur if the error had simply been a typographical error in entering the data on the final version of the "Specimen Data" form: however, a review of the original form, on which the appropriate values were manually recorded during the performance of the test, shows a value of "1056.5" in agreement with the final form.

While there is no way of going back and directly measuring the exact weight of the moist specimen at this time, it may be possible to obtain a good estimate. There are two methods by which this may be done: (1) by estimating the dry weight of the specimen, if measurements were taken of the portions during later stages of testing, and (2) estimating the moist density of the remaining portion of the specimen here in Berkeley, which has remained essentially undisturbed in a sealed plastic bag since the sample was split in December of last year. Each of these approaches will be addressed below.

Estimating the dry density by summing the known weights of the portions of the specimen requires that data was recorded for all such portions of the specimen. The photograph taken of the divided specimen shows that this specimen split very cleanly into two pieces, rather than crumbling into many fragments. This suggests that nearly all of the initial soil was placed into the two plastic bags, one of which was then sent to your facility in Atlanta. The portion that was kept here in Berkeley has a moist weight of 830.8 grams, and is presumably still at approximately the same moisture content as when the triaxial test was completed, since the specimens were sealed immediately after splitting and examination. Note that this weight alone exceeds the value of the "Wgt. of wet Sample, W (g)" on the data form, supporting the idea that the moist weight recorded was incorrect. The water content and/or dry weight of the Berkeley portion can be easily checked, if you would like us to do so. It would be useful if you could review whatever data you may have concerning the moist or dry weights of the portions of this specimen which you tested at your labs. If we are convinced that we can account for essentially all of the portions of the specimen, we can simply divide the total dry weight by the measured volume (633.45 cm^3) to obtain the dry density prior to saturation, and by the calculated volume after consolidation, $V_c = 621.49 \text{ cm}^3$, to obtain the dry density as tested -- there will be no effects of the error in measured mass on any of the volume calculations.

Because the portion of the specimen remaining here in Berkeley has remained essentially untouched and sealed since testing, it may be possible to estimate its density (after testing), and back-calculate the density prior to testing. Since the sample was divided approximately vertically, and since the Berkeley portion consists of well over one half of the original specimen, it is reasonable to assume that its density is representative of the overall specimen. As mentioned above, the moist weight of this portion is 830.8 grams. Measuring the volume of an irregularly shaped soil specimen is not nearly as straightforward, unfortunately.

At this stage, I have only performed a non-destructive (reversible) method of estimating the density, so that if better methods are proposed, the moist sample will still be intact at its current moisture content. This estimate was obtained by sealing the specimen in a thin plastic bag, using a vacuum to extract the air from the bag, and measuring the displaced volume of water when the bag is then submerged. Since it is not possible to remove *all* the air from around the irregular pores of the specimen, this method will overestimate the volume of soil, and therefore underestimate the density, but

using a flexible plastic and a good seal, a reasonable estimate can be obtained. By using this technique, a moist density of 120 pcf was measured for the portion of the specimen in its current state. If the volume changes recorded throughout the test are assumed to correlate directly to the expulsion of water, this measurement implies an initial dry density of the specimen, *as extruded at full vacuum*, of 99 pcf. For the reasons explained above, this should be considered a lower bound on the density.

To summarize, then, it appears nearly certain that the recorded and reported values of the moist weight (and therefore the dry density, γ_d) of ITP specimen B29P7B were incorrect. By estimating the density of the existing portion of the specimen here at Berkeley, a lower bound estimate of $\gamma_d = 99$ pcf has been made for the original specimen. By examining the dry densities of the entire tube sample, and those of the other specimens taken from that tube, it seems likely that the dry density would have been on the order of 105 pcf. A more accurate determination of that density will be possible if data is available on the weight of the portion shipped to your lab in Atlanta, or if you decide it is prudent to determine the weight of solids and moisture content of the remaining portion here in Berkeley.

We are concerned about the occurrence of this error, and interested in mitigating its effects by determining as accurately as possible the value of the density of this specimen prior to testing. We look forward to any further information you may have concerning this specimen which will allow us to improve the estimates presented herein. Thank you for bringing this matter to our attention.

Sincerely,

Dr. Michael F. Riemer
Manager of the Geotechnical Laboratories

cc: Prof. R.B. Seed
MFR/mfr

U.C. Berkeley Geotechnical Engineering

CYCLIC TRIAXIAL TEST (SPECIMEN DATA)								Date : 12/10/93	
Project: SRS / ITP			Boring No. H-Bor-29			Depth : 91.7 ft.			
Sample No. PS-7		Test No. 29/7/B		Apparatus # 2		Method of specimen preparation UNDISTURBED			
Initial Condition of Specimen									
Diameter (At full Vacuum), D_o									
Top (in)	2.893	Center (in)	2.892	Bottom (in)	2.893	Avg Diameter (cm)		7.35	
Membrane thickness, T (cm)			0.032		Sample Diameter (w/o membrane)			7.28	
Area, A_o (sq. cm)		41.66							
Height (At full vacuum), H_o (cm)			15.204		Volume, V_o (cc)			633.45	
Initial wet weight of soil +Tare (g)			1056.5		Wtare (g)		336.1	Wgt of wet Sample, W(g)	
Initial moisture content (from trimmings)					Can#		419	Wcan (g)	
Wcan+soil(g)			106.5		W can+dry soil(g)		99.3	w (%)	
							20.63	γ_d (pcf)	
								58.83	
Conditions of Specimen after Saturation and Consolidation									
After Saturation					After Consolidation				
Change in Height, ΔH_{sat} (cm)			0.065		Change in Height, ΔH_c (cm)			0.03	
Sample Height, $H_{sat}=(H_o - \Delta H_{sat})$			15.14		Sample Height, $H_c=(H_{sat} - \Delta H_c)$			15.11	
Area, A_{sat} (sq. cm)			41.31		Volumetric Strain, ϵ_v (%)			0.61	
Volume, V_{sat} (cc)			625.35		Volume, $V_c=(V_{sat} - \Delta V)$ (cc)			621.49	
Dry Density, γ_{ds} (pcf)			100.28		Area, $A_c=(V_c/H_c)$ (sq. cm)			41.13	
					Dry Density, γ_{dc} (pcf)			59.96	
B-value (after saturation)			0.956		B-value (after consolidation)			0.965	
Consolidation Pressure, σ_{3c} (kPa)			450		Steady Pressure (kPa)			190	
Desired CSR	N	σ_{dc} (p-p) (kPa)		$\epsilon_{meas.}(p-p)$ (.001%)		NOTES			
.15	10	270		147					
	20	270		150					
						TS #: 11			

Reviewed by:

MR 2/7/94

error

RLB 8/12

99 pcf

RLB 8/12

100.91