IN-DELTA STORAGE PROGRAM
STATE FEASIBILITY STUDY

RESULTS OF LABORATORY TESTING PROGRAM

January 2003

Department of Water Resources
Division of Engineering
Civil Engineering Branch
Dams and Canals Section

M e m o r a n d u m

Date : January 28, 2003

To : Pal Sandhu

From : Mike Driller, Senior Engineer
Department of Water Resources

Subject : In Delta Storage Program: Results of Laboratory Testing Program

---

Introduction

Geologic explorations were conducted on Bacon Island and Webb Tract for the purpose of mapping potential borrow sources and for obtaining samples to be tested in the laboratory. Several Cone Penetration Tests (CPTs) were conducted to delineate the sandy materials to be used as borrow material. Then four boreholes, one for each integrated facility location, were drilled to obtain samples for laboratory testing. The borehole locations and the boring logs, which show the frequency and locations of sampling, can be found in CDWR (2002a). Results of evaluating borrow sources was summarized in two memos from Tim Wehling to myself dated October 7 (CDWR 2002b) and October 10 (CDWR 2002c).

This memo summarizes the laboratory testing that was conducted on samples from the integrated facility locations. During drilling, Standard Penetration Tests (SPTs) and bag samples provided disturbed samples, and Shelby tube sampling provided undisturbed samples. All samples were sent to the DWR Bryte Soils Laboratory for the following tests: soil classification (particle size distribution and Atterberg limits), organic content determination, consolidation, and consolidated undrained triaxial tests with pore pressure measurements. Based on the geology logs, soils were classified into three primary groups: clay, silty sand, and organic soils. Attempts were made to test samples from each of these groups from varying depths. Table 1 shows a complete list of all the samples that were tested and includes the soil classifications as they were determined in the laboratory.

Soil Classification

All of the soil samples in Table 1 were classified in accordance with the ASTM Standard Classification of Soils for Engineering Purposes (ASTM D 2487) and the ASTM Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D 4318). The prior test standard, modeled after the Unified Soil Classification System (USCS) originally developed by A. Casagrande in 1948, determines the particle size distribution of the minus 3-inch material. The latter test standard determines the plasticity characteristics of the minus No. 40 sieve material. More details regarding the laboratory procedures of these test methods are presented in Appendix A.

Table 1: Summary of Laboratory Tests Performed on Selected Samples

Borehole Name	Sample Name	Sample No.	Sample Depth (ft)	Tests Performed	Notes	Classification
WTS-2	S-3	1384	30-32	CUe Triaxial Classification	Post failure load cell limitation	SP-SM – Poorly graded sand with silt
BIS-1	S-10	1292	60-62	CUe Triaxial Classification		CL – Lean clay
BIS-2	S-6	1317	40-42	CUe Triaxial Classification		CH – Fat clay
BIS-1	S-7	1289	30-32	CUe Triaxial Classification	Post failure load cell limitation	SP – Poorly graded sand
WTS-1	S-2	1339	15-17	Consolidation Classification Organic Content		SM – Silty sand
WTS-2	S-2	1383	20-22	Consolidation Classification Organic Content	8% - 30% organics. See gradation notes.	Highly organic clay with sand
BIS-1	S-4	1286	15-17	Consolidation Classification Organic Content		CL – Sandy lean clay
BIS-2	S-2	1313	15-17	Consolidation Classification Organic Content		SP – Poorly graded sand
BIS-2	S-4	1315	25-27	Consolidation Classification Organic Content		CH – Fat clay with sand
WTS-1	B-12	1361	82-83.5	Classification		SM – Silty sand
WTS-2	B-10	1401	62-63.5	Classification		SP – Poorly graded sand
BIS-1	B-15	1311	98.5-100	Classification		CH – Fat clay

The results from the laboratory classification tests can be summarized by describing the soils as belonging to three main soil groups: lean to fat clay, sand (including poorly graded sand and silty sand), and organic clay. The clays typically contained less than 10% sand with plasticity indices (PIs) of approximately 10 to 15 for the lean clay and 40 to 50 for the fat clay. The poorly graded sands were non-plastic and contained less than 10% silt, while the two silty sand samples contained 22% to 50% silt. There was only one organic clay sample, which contained 8% to 30% organics.

Organic Content

The organic content is determined in accordance with the Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils (ASTM D2974). In this test method an oven-dried organic soil sample is placed in a furnace, where the organic particles are turned to ash. Then the ashed soil sample can be expressed in terms of organic content, as a fraction of the oven-dried mass. More details regarding

this standard laboratory test procedure are presented along with the soil classification data in Appendix A.

Consolidation

Consolidation tests were performed on 5 undisturbed samples in accordance with the Standard Test Method for One-Dimensional Consolidation Properties of Soils (ASTM D2435). The procedure for all five samples was identical, where the applied loads (i.e., pressures) were doubled at each load change up to 8 ksc and the rebounded back to 0.25 ksc. Deformation-time readings were taken following each load application. Further details of this test procedure are provided along with complete data results in Appendix B.

Semi-log plots of void ratio (e) versus vertical effective stress (σ'_v) for each sample are shown in Appendix B. From these plots, values of recompression index (c_r), compression index (c_c), and maximum past pressure (σ'_p) were calculated. These consolidation characteristics are summarized below in Table 2. Additionally, Taylor's square root of time method (Taylor 1948) was used to evaluate the coefficient of consolidation (c_v) for each load increment applied to each sample. These results are also shown in Appendix B.

Table 2: Summary of Consolidation Settlement Characteristics

Sample No.	Soil Type	C_c	C_r	σ'_p (ksc)	Apparent Disturbance
1315	clay	0.25	0.029	2.67	very low
1286	clayey silt	0.17	0.004	1.37	low
1339	silty sand	0.26	0.012	1.47	moderate
1383	organic clay	0.55	0.059	1.00	N/A
1313	sand	0.06	0.005	1.7	high

Notice that the clay sample (Sample 1315 in Appendix B) was the only one to provide a sharp bend in the e-log(σ'_v) plot between the initial recompression portion and the compression portion. This consolidation curve clearly shows the compression index, recompression index, and maximum past pressure of the sample. The other samples do not show these properties as clearly due to apparent sample disturbance encountered during sampling and handling. Note that even with the most experienced personnel and the greatest care for the samples, higher disturbance is typical for coarser grained soils (e.g., sands and sandy silts) since obtaining undisturbed samples of sandy material is very difficult. This is reflected in the e-log(σ'_v) plot of the sand sample (Sample 1313 in Appendix B), which does not show a clear σ'_p, but one was calculated for this sample anyway. Figure 1 shows a conceptual drawing of the effect that sample disturbance has on a consolidation curve for typical soils. Holts and

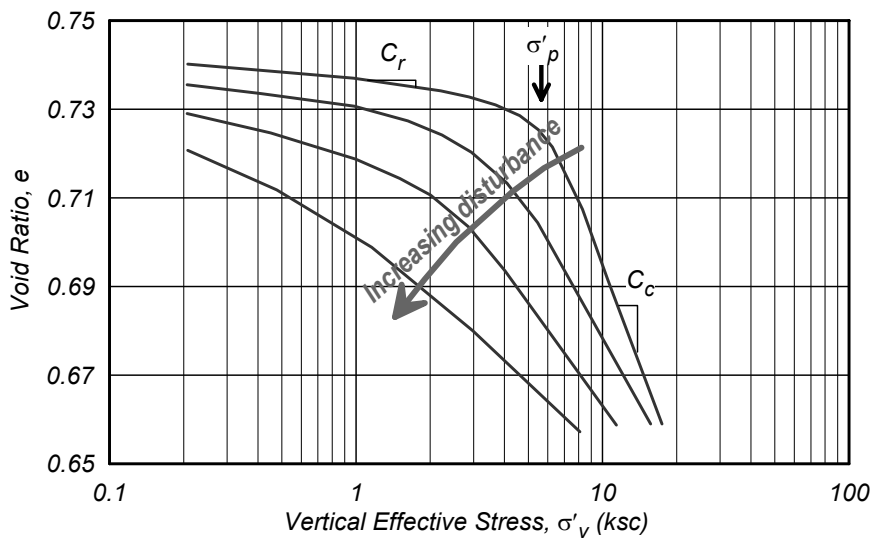


Figure 1: Effect of Sample Disturbance on Consolidation Measurements

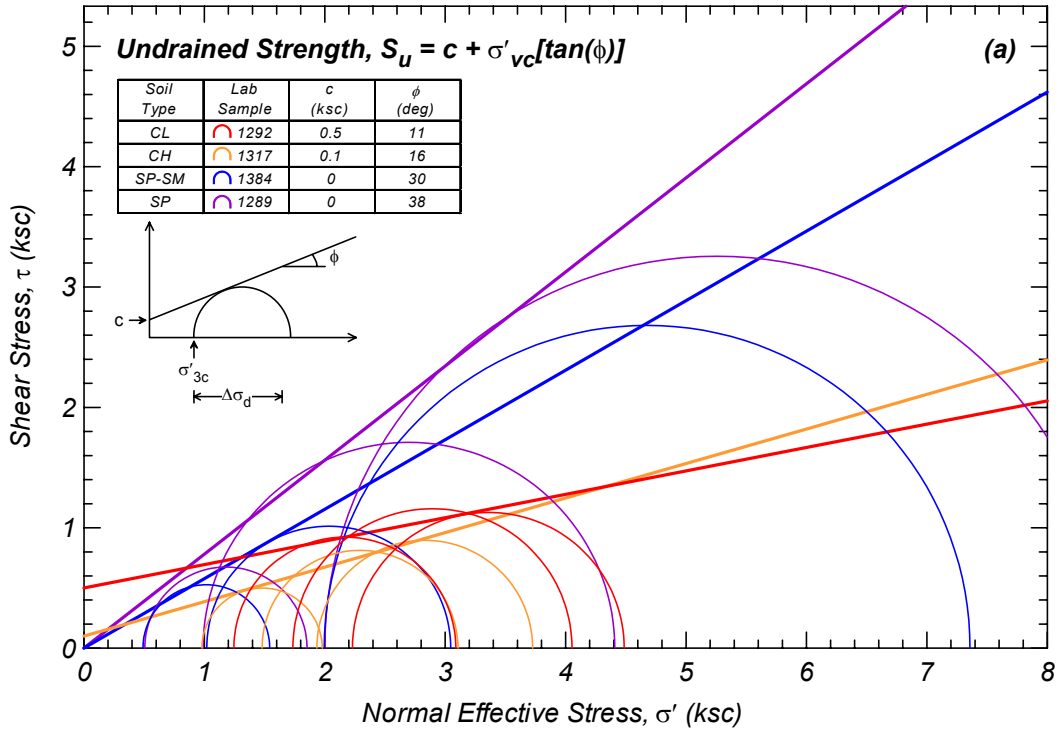
Kovacs (1981) also explain that silts typically lack a break in the e-log(σ'_v) curve, making determination of the maximum past pressure difficult. Furthermore, they continue by showing that highly organic soils can even have concave upward compression curves (e.g., Newfoundland peat), also making the determination of the maximum past pressure difficult. Nonetheless, organic soils will typically have large primary consolidation settlements as well as significant secondary consolidation settlements. Fortunately, the ratio of secondary compression index (C_α) to compression index (C_C) has a very small range (0.05 ± 0.01) for highly organic plastic clays (Mesri and Castro 1987).

CUe Triaxial Test Results

Strength tests were performed on 4 undisturbed samples in general accordance with the Standard Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils (ASTM D4767 – 95). These tests are commonly abbreviated “CUe” since the samples are first allowed to consolidate and are then sheared undrained while recording stress, strain, and excess pore pressure measurements. The measured data from each test are presented in tabular and graphical format in Appendix C, along with more detailed laboratory procedures.

For each test (i.e., for each sample), three specimens are isotropically consolidated to different consolidation stresses in the triaxial device. Following consolidation, the samples are loaded undrained up to an axial strain of 15%. From each specimen, a Mohr circle is plotted on a shear stress (τ) versus normal stress (σ) graph to represent the stresses on the specimen at failure. Then a line is fitted tangent to the three circles, and this represents the failure envelope for one sample. Failure envelopes are then drawn for drained and undrained strengths, resulting in the summary data in Figure 2.

CUe Triaxial Test Results



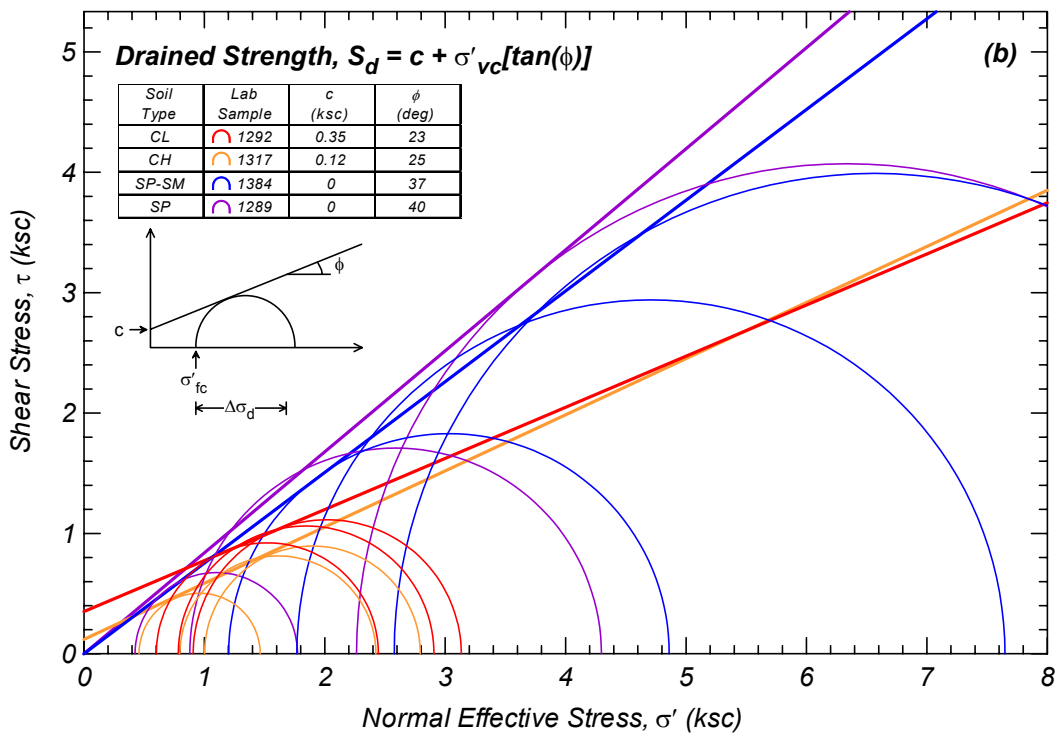


Figure 2: Summary of Consolidated Undrained Triaxial Tests Results Showing (a) Undrained and (b) Drained Strengths

The undrained strengths are estimated from plotting Mohr circles having diameters equal to σ_1-σ_3 measured at the point of "failure," which is defined below. For these tests, σ_1 is the total axial stress on the sample, and σ_3 is the total radial stress, or simply the chamber pressure, acting on the sample. The minimum value of σ that the circle passes through is the effective consolidation stress (σ'_{3c}).

- Undrained failure occurs at the first onset of the following conditions:
  - Maximum ($\sigma_1 - \sigma_3$)
  - ($\sigma_1 - \sigma_3$) at 10% axial strain
  - ($\sigma_1 - \sigma_3$) at excess pore pressure less than zero

The drained strengths are estimated from plotting Mohr circles having diameters equal to σ_1-σ_3 measured at a different definition of failure, usually sooner, as outlined below. The circle is then shifted along the abscissa by an amount equal to the excess pore pressure measured at the point of failure. Therefore, the minimum value of σ that the circle passes through is the effective radial stress at the time of failure (σ'_{3f}).

- Drained failure occurs at the first onset of the following conditions:
  - ($\sigma_1 - \sigma_3$) at maximum (σ'_1/σ'_3)
  - ($\sigma_1 - \sigma_3$) at 5% axial strain

These strength criteria listed above are fairly standard, with the addition of limiting negative excess pore pressures for the undrained strengths. This third criterion was included for the following reasons. It is common practice (ASTM D4767) to increase the back pressure and chamber pressure applied to the sample before consolidation to drive the pore air into solution and thus saturate the sample. By doing so, the effective stress that the sample feels is unchanged, and therefore, the inherent strength of the soil sample is not directly affected. However, the artificially high initial pore pressure (u_i) (e.g., u_i = 4.0 ksc) allows the sample to develop very large negative excess pore pressures (Δu) as shearing and dilation progress. By definition, Δu is the pore pressure measured during the test (u) minus the initial pore pressure (u_i) at the start of shearing. The highly negative values of Δu measured in the laboratory would be impossible in the field because cavitation would occur first. In other words, the soil in the field would begin at a smaller u_i (e.g., u_i = 1.0 ksc) and then would have a smaller range of pore pressure before it reached minus one atmosphere, where the pore fluid cannot sustain anymore suction and tears apart (i.e., cavitation).

It should be noted here that the triaxial testing procedures and the measurements recorded during triaxial testing were not erroneous in any way. The point of this discussion is that higher total stresses were applied in the laboratory than can occur at the sampling depths in the field. The high back pressure and total stress conditions in the laboratory would represent a ground water table approximately 100 feet above the ground surface at these sample locations. It is obvious that this will never be the case at Webb Tract or Bacon Island, and therefore, we cannot rely on these negative excess pore pressures in the field. Thus, the strengths of the poorly graded sands (which dilate

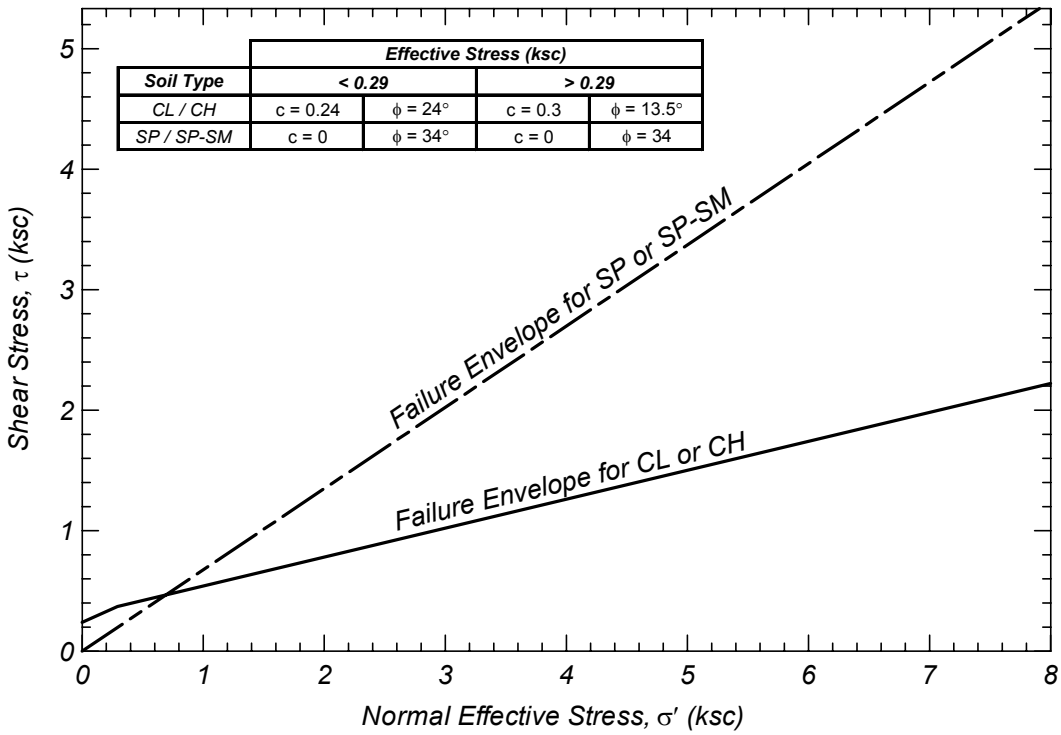


Figure 3: The Minimum of Average Drained and Average Undrained Failure Envelopes for Two General Soil Types

and generate negative pore pressures) were limited in the laboratory by defining failure when the excess pore pressures became negative.

The triaxial test results shown in Figure 2 are summarized by the two strength envelopes in Figure 3. One envelope represents average strengths of the two low and high plasticity clay samples, and the other envelope shows average strengths of the two poorly graded sand samples. Both of these envelopes were drawn as the lower of the drained and undrained strength envelopes for each of the two general soil types. For the clay samples, this results in what is commonly called a bilinear strength envelope, as shown in Figure 3. For the sand samples, the result is a straight line through the origin since no cohesion was measured for the drained or undrained failure envelopes.

References

ASTM (1998). “D 2487-93 – Standard classification of soils for engineering purposes (Unified Soil Classification System).” *Annual Book of ASTM Standards*, American Society for Testing and Materials, Philadelphia, PA.

ASTM (1998). “D 2974-87 (Reapproved 1995) – Standard test methods for moisture, ash, and organic matter of peat and other organic soils.” *Annual Book of ASTM Standards*, American Society for Testing and Materials, Philadelphia, PA.

ASTM (1998). “D 2435-96 – Standard test method for one-dimensional consolidation properties of soils.” *Annual Book of ASTM Standards*, American Society for Testing and Materials, Philadelphia, PA.

ASTM (1998) “D 4318-00 – Standard test methods for liquid limit, plastic limit, and plasticity index of soils.” *Annual Book of ASTM Standards*, American Society for Testing and Materials, Philadelphia, PA.

ASTM (1998). “D4767-95 – Standard test method for consolidated undrained triaxial compression test for cohesive soils.” *Annual Book of ASTM Standards*, American Society for Testing and Materials, Philadelphia, PA.

CDWR (2002a). “In Delta Storage Program: Results of Geologic Exploration Program,” Project Geology Report 94-00-20, Department of Water Resources, Water Resources Agency, State of California.

CDWR (2002b). “In Delta Storage Program – Peat Strengths Based on CPT Data from Bacon Island and Webb Tract,” Memorandum to Mike Driller, Department of Water Resources, Water Resources Agency, State of California, October 7th.

CDWR (2002c). “In Delta Storage Program – Soil Profiles Based on CPT Data from Bacon Island and Webb Tract,” Memorandum to Mike Driller, Department of Water Resources, Water Resources Agency, State of California, October 10th.

Holtz, Robert D., and Kovacs, William D. (1981). *An Introduction to Geotechnical Engineering*, Prentice-Hall, Inc., New Jersey, 733 pp.

Mesri, G., and Castro, A. (1987). “C_α/C_C concept and K_0 during secondary compression.” *Journal of Geotechnical Engineering, ASCE*, 113(3), 230-245.

Taylor, D. W. (1948). *Fundamentals of Soil Mechanics*, John Wiley & Sons, Inc., New York, 700 pp.

Appendix A: Soil Classification Results – Particle Size Distribution, Atterberg Limits, and Organic Contents

This appendix describes the laboratory soil classification and organic content procedures in more detail and presents the complete set of laboratory results. The particle size distribution was determined using the stack of sieves listed in Table 3. The laboratory procedure began by obtaining approximately 500 g of air dried soil and screening off the plus No. 4 material. The minus No. 4 material was dried for 24 hrs and its weight recorded. This weight was added to the weight of the screened-off gravel and is the total weight of the sample. The dry 500 g of soil was split repeatedly until approximately 65 g of soil smaller than the No. 4 sieve remained. Then, 120 mL of a dispersing agent (sodium hexametaphosphate) was added to the 65 g of soil to help release the fines from the sand particles. After soaking overnight, this portion was then rinsed over a No. 200 sieve to wash the fines out to the sample. The remaining plus No. 200 sieve material was dried overnight, and its weight was recorded. Finally, the soil between the No. 4 and No. 200 sieves was shaken through the stack of sieves (Table 3) for 10 minutes and the weight of soil remaining on each sieve was recorded.

Table 3: Sieve Sizes Used for Particle Size Distribution

Sieve No.	Opening Size (mm)
4	4.75
8	2.36
16	1.18
30	0.600
50	0.300
100	0.150
200	0.075

The soil used for the Atterberg limits was taken from the same 500 g of soil that was prepared for the particle size distribution described above. When the soil was split repeatedly, approximately 300 g was set aside to be used for liquid limit and plastic limit determinations. The soil was then screened through a No. 40 sieve, and the minus No. 40 sieve material was prepared for the Atterberg limits. A portion of the minus No. 40 sieve material was moisture conditioned to the wet side of the plastic limit, and another portion was moisture conditioned to beyond its liquid limit.

The plastic limit test involves rolling the moistened soil into $^{1}/_{8}$-in diameter worms. The worm is then remolded and rolled out again to the same diameter. Each time the soil is rolled out it will lose some moisture. The plastic limit occurs when the soil can no longer

be rolled out into a $^{1}/_{8}$-in worm without the soil crumbling. At this point the water content is determined and recorded as the plastic limit.

The liquid limit test also begins with soil wetter than the target moisture content, and moisture is removed during the test. The soil is smeared onto a small brass bowl, and then a standard grooving tool is used to create a 2-mm wide groove down the center of the soil smear. The brass bowl is then raised 10 mm and dropped at a rate to two drops per second. The number of blows required to close 0.5 inches of the groove's length is recorded, along with the moisture content of the soil. The remaining soil is then allowed to dry somewhat and then the above process is repeated two more times, providing two more pairs of moisture content and blows required to close 0.5 inches of the groove. By linear interpolation between these three pairs of data the liquid limit is defined as the water content corresponding to 25 blows.

The organic content is determined by following the ASTM D2974 test standard. First, the moisture content is obtained by drying the sample in an oven at 105 °C. After recording the dry weight of the sample, it is placed in a muffle furnace at 440 °C (Method C) until all organic matter has turned to ash. Then the sample is weighed and this weight is called the ash weight. The ash content is then the ratio of the ash weight to the oven-dried weight, expressed in a percentage. Finally, the organic content is equal to 100% minus the ash content, which assumes that the ash is relatively weightless compared to the mineral particles. Organic content determinations are shown along with soil classifications in this appendix.

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

CLASSIFICATION TEST SUMMARY

DIVISION OF ENGINEERING
CIVIL ENGINEERING
DAMS AND CANALS SECTION

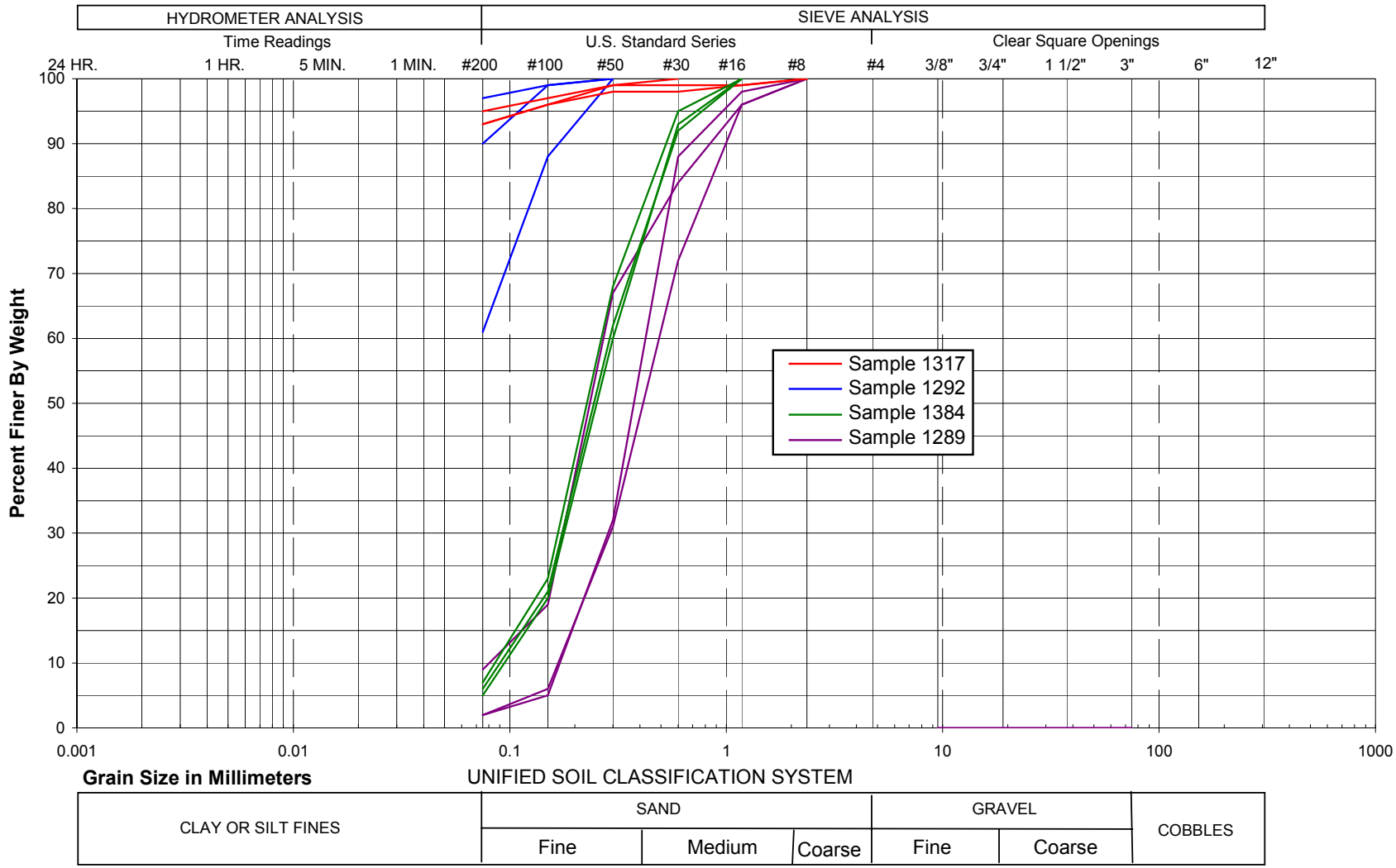
PROJECT: In-Delta Storage **FEATURE:** Webb Tract and Bacon Island

LAB. NO.	HOLE NO.	F.S. NO.	DEPTH (feet)	PERCENT FINER: MECHANICAL ANALYSIS: GRAVEL 9.0" 75 mm	6.0" 37.5 mm	3.0" 19 mm	1.0" 9.5 mm	4 4.75 mm	SAND 8 2.36 mm	16 1.18 mm	30 0.6 mm	50 0.3 mm	100 0.15 mm	200 0.075 mm	HYDROMETER: SILT & CLAY 5M 0.005 mm	2M 0.002 mm	1M 0.001 mm	ATTERBERG LIMITS L.L.	P.I.	ORGANIC CONTENT %	SPECIFIC GRAVITY	GROUP SYMBOL	CLASSIFICATION GROUP NAME
02-1289 A	BIS-1	S7	30.0-32.0						100	96	84	67	19	9					NP		2.69	SP-SM	Poorly graded sand with silt
02-1289 B	"	"	"						100	96	72	31	6	2					NP		2.67	SP	Poorly graded sand
02-1289 C	"	"	"						100	98	88	32	5	2					NP		2.70	SP	Poorly graded sand
02-1292 A	BIS-1	S10	60.0-62.0									100	99	97				43	22		2.74	CL	Lean clay
02-1292 B	"	"	"									100	88	61				31	12		2.74	CL	Sandy lean clay
02-1292 C	"	"	"									100	99	90				41	21		2.75	CL	Lean clay
02-1317 A	BIS-2	S6	40.0-42.0						100	99	98	98	96	93				76	55		2.76	CH	Fat clay
02-1317 B	"	"	"								100	99	97	95				72	50		2.76	CH	Fat clay
02-1317 C	"	"	"						100	99	99	99	96	93				71	49		2.77	CH	Sandy fat clay
02-1384 A	WTS-2	S3	30.0-32.0							100	92	62	21	6					NP		2.68	SP-SM	Poorly graded sand with silt
02-1384 B	"	"	"							100	93	60	20	5					NP		2.69	SP-SM	Poorly graded sand with silt
02-1384 C	"	"	"							100	95	68	23	7					NP			SP-SM	Poorly graded sand with silt

DATE: 1/9/2003
INITIAL: djn
REQUEST NO.: 2002-33

REMARKS: ***These test samples are from the Triaxial Test Specimens.***

IM - INSUFFICIENT MATERIAL
NP - NON-PLASTIC
NG - NO GOOD


HYDROMETER ANALYSIS
SIEVE ANALYSIS
Time Readings
U.S. Standard Series
Clear Square Openings
24 HR.
1 HR.
5 MIN.
1 MIN.
#200
#100
#50
#30
#16
#8
#4
3/8"
3/4"
1 1/2"
3"
6"
12"
Percent Finer By Weight
100
90
80
70
60
50
40
30
20
10
0
Sample 1317
Sample 1292
Sample 1384
Sample 1289
0.001
0.01
0.1
1
10
100
1000
Grain Size in Millimeters
UNIFIED SOIL CLASSIFICATION SYSTEM
CLAY OR SILT FINES
SAND
Fine
Medium
Coarse
GRAVEL
Fine
Coarse
COBBLES

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

CLASSIFICATION TEST SUMMARY

DIVISION OF ENGINEERING
CIVIL ENGINEERING
DAMS AND CANALS SECTION

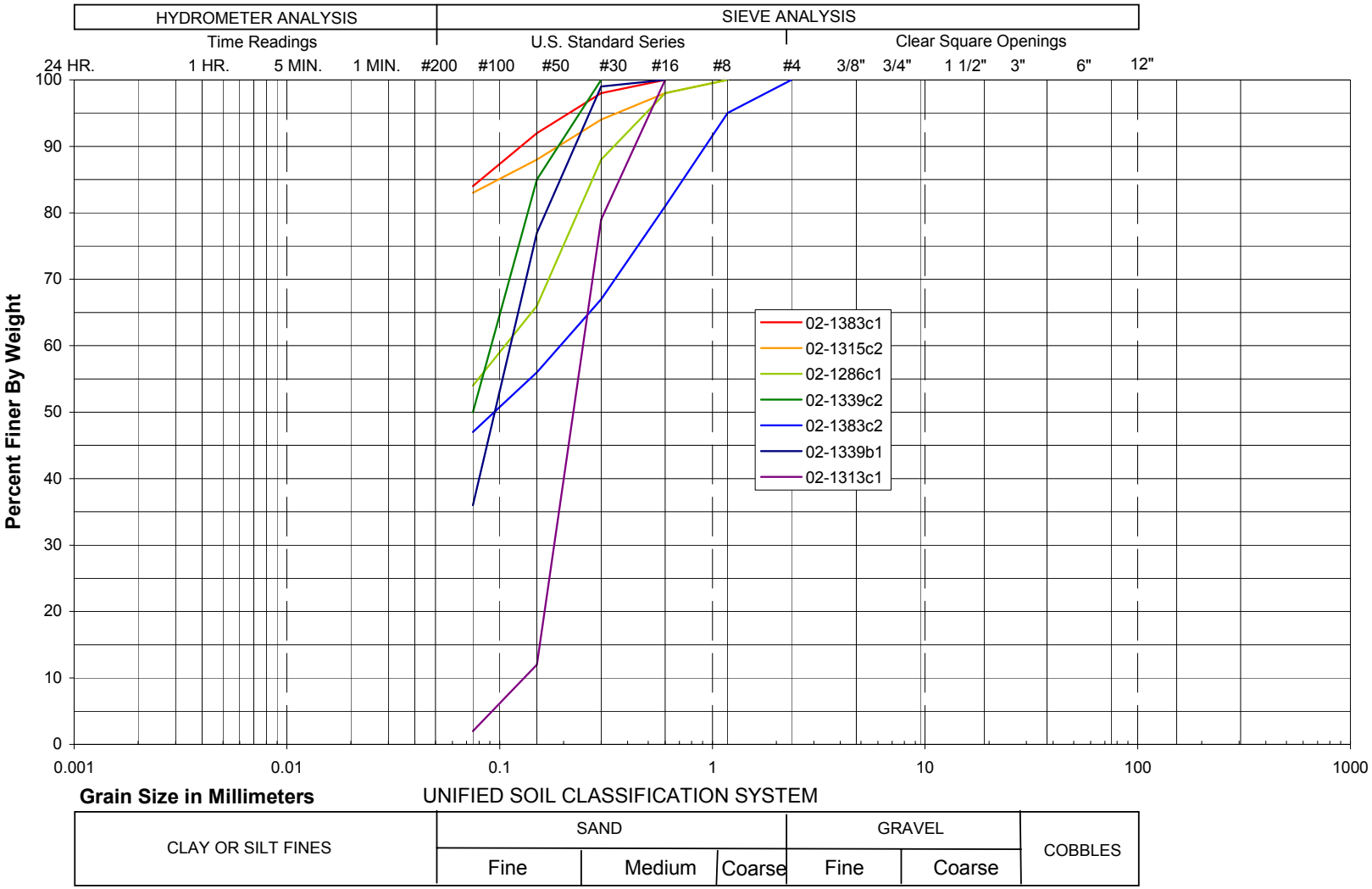
PROJECT: In-Delta Storage **FEATURE:** Webb Tract and Bacon Island

LAB. NO.	HOLE NO.	F.S. NO.	DEPTH (feet)	PERCENT FINER: MECHANICAL ANALYSIS: GRAVEL 9.0" 75 mm	6.0" 37.5 mm	3.0" 19 mm	1.0" 9.5 mm	SAND 4 4.75 mm	8 2.36 mm	16 1.18 mm	30 0.6 mm	50 0.3 mm	100 0.15 mm	200 0.075 mm	HYDROMETER: SILT & CLAY 5M 0.005 mm	2M 0.002 mm	1M 0.001 mm	ATTERBERG LIMITS L.L.	P.I.	ORGANIC CONTENT %	SPECIFIC GRAVITY	GROUP SYMBOL	CLASSIFICATION GROUP NAME
02-1286c1	BIS-1	S4	15.0-17.0							100	98	88	66	54				27	12	0.9	2.71	CL	Sandy lean clay
02-1313c1	BIS-2	S2	15.0-17.0								100	79	12	2					NP	0.5	2.70	SP	Poorly graded sand
02-1315c2	BIS-2	S4	25.0-27.0							100	98	94	88	83				55	39	1.8	2.74	CH	Fat clay with sand
02-1339b1	WTS-1	S2	15.0-17.0								100	99	77	36				30	4	2.1	2.72	SM	Silty sand
02-1339c2	WTS-1	S2	15.0-17.0									100	85	50				---	---	---	2.71	SM	Silty sand
02-1383c1	WTS-2	S2	20.0-22.0								100	98	92	84				65	38	7.6	2.62	OH	Organic clay with sand
02-1383c2	WTS-2	S2	20.0-22.0						100	95	81	67	56	47				---	---	29.4	2.10	PT	Peat (see note below) Plus #200 shown in the sieve analysis are organic particles.

DATE: 1/9/2003
INITIAL: djn
REQUEST NO.: 2002-33

REMARKS: ***These test samples are from the Consolidation Test Specimens.***

IM - INSUFFICIENT MATERIAL
NP - NON-PLASTIC
NG - NO GOOD


HYDROMETER ANALYSIS
SIEVE ANALYSIS
Time Readings
U.S. Standard Series
Clear Square Openings
24 HR.
1 HR.
5 MIN.
1 MIN.
#200
#100
#50
#30
#16
#8
#4
3/8"
3/4"
1 1/2"
3"
6"
12"
Percent Finer By Weight
100
90
80
70
60
50
40
30
20
10
0
0.001
0.01
0.1
1
10
100
1000
02-1383c1
02-1315c2
02-1286c1
02-1339c2
02-1383c2
02-1339b1
02-1313c1
Grain Size in Millimeters
UNIFIED SOIL CLASSIFICATION SYSTEM
CLAY OR SILT FINES
SAND
Fine
Medium
Coarse
GRAVEL
Fine
Coarse
COBBLES

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

CLASSIFICATION TEST SUMMARY

DIVISION OF ENGINEERING
CIVIL ENGINEERING
DAMS AND CANALS SECTION

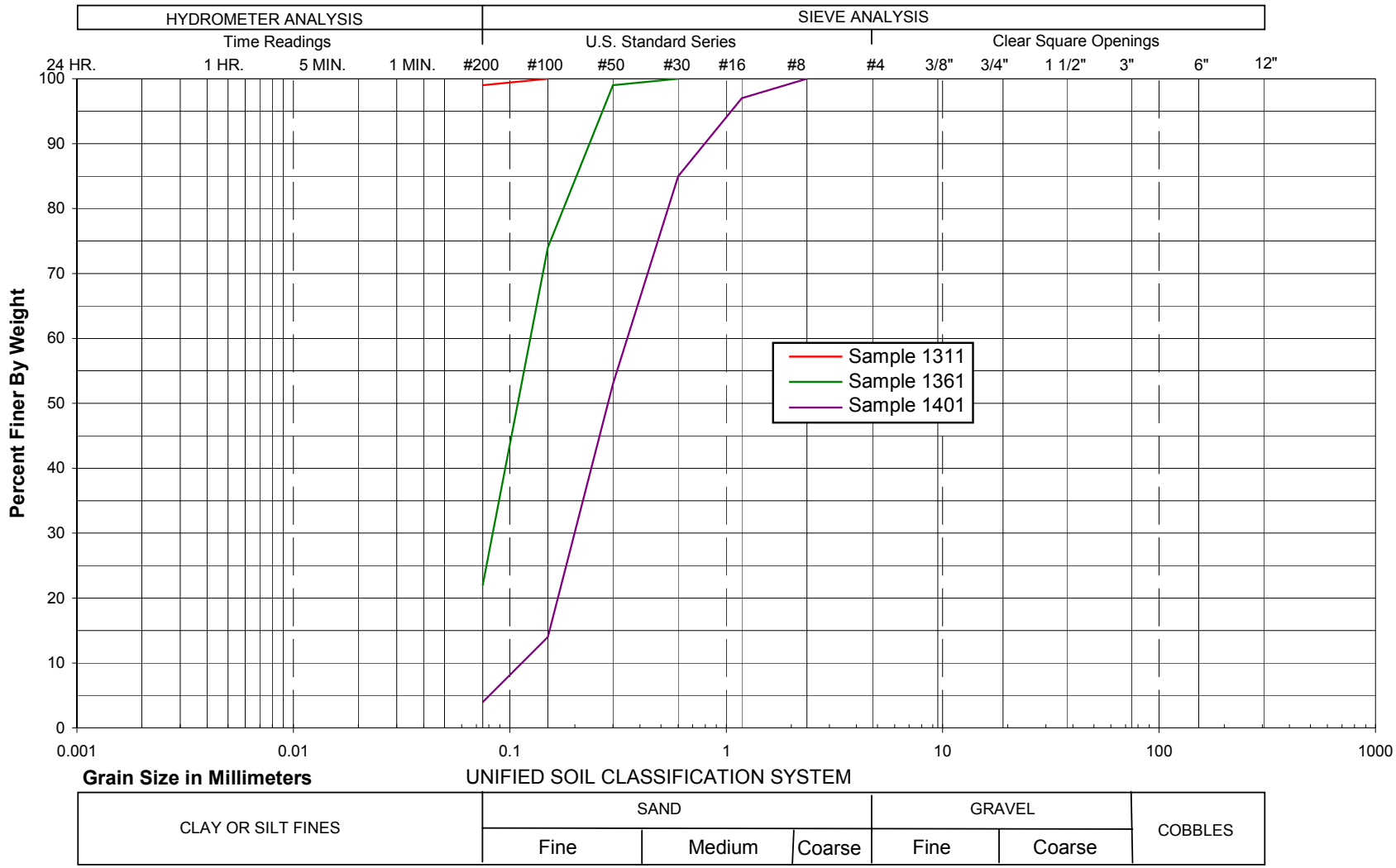
PROJECT: In-Delta Storage **FEATURE:** Webb Tract and Bacon Island

LAB. NO.	HOLE NO.	F.S. NO.	DEPTH (feet)	PERCENT FINER: MECHANICAL ANALYSIS: GRAVEL 9.0" 75 mm	6.0" 37.5 mm	3.0" 19 mm	1.0" 9.5 mm	SAND 4 4.75 mm	8 2.36 mm	16 1.18 mm	30 0.6 mm	50 0.3 mm	100 0.15 mm	200 0.075 mm	HYDROMETER: SILT & CLAY 5M 0.005 mm	2M 0.002 mm	1M 0.001 mm	ATTERBERG LIMITS L.L.	P.I.	MOISTURE CONTENT %	PERCENT ORGANICS	GROUP SYMBOL	CLASSIFICATION GROUP NAME
02-1361	WTS-1	B-12	82 - 83.5								100	99	74	22				NP				SM	Silty sand
02-1401	WTS-2	B-10	62 - 63.5						100	97	85	53	14	4				NP				SP	Poorly graded sand
02-1311	BIS-1	B-15	98.5 - 100										100	99				52	24			CH	Fat clay

DATE: 11/19/2002
INITIAL: djn
REQUEST NO.: 2002-33

REMARKS: ***These test samples are miscellaneous classification samples.***

IM - INSUFFICIENT MATERIAL
NP - NON-PLASTIC
NG - NO GOOD


HYDROMETER ANALYSIS
SIEVE ANALYSIS
Time Readings
U.S. Standard Series
Clear Square Openings
24 HR.
1 HR.
5 MIN.
1 MIN.
#200
#100
#50
#30
#16
#8
#4
3/8"
3/4"
1 1/2"
3"
6"
12"
Percent Finer By Weight
100
90
80
70
60
50
40
30
20
10
0
Sample 1311
Sample 1361
Sample 1401
0.001
0.01
0.1
1
10
100
1000
Grain Size in Millimeters
UNIFIED SOIL CLASSIFICATION SYSTEM
CLAY OR SILT FINES
SAND
GRAVEL
COBBLES
Fine
Medium
Coarse
Fine
Coarse

Appendix B: Consolidation Results

This appendix describes in more detail the ASTM D2435 procedures that were followed in the laboratory and presents the complete results for the consolidation testing. The test procedure for all five samples was identical. The first load (i.e., pressure) applied to each sample was 0.25 ksc. Deformation-time readings were taken to evaluate the rate of consolidation. Allowing sufficient time for the sample to reach the end of primary consolidation, the loading was doubled at each load increment. The last load increment along the normal consolidation line was at 8.0 ksc. Then the sample was rebounded to 4.0 ksc and 1.0 ksc to develop the recompression line. Deformation-time readings were taken immediately following each change in loading.

Two summary sheets are shown in this appendix for each of the 5 consolidation samples. The first sheet shows both *rate of consolidation* information and *total consolidation* information. The second sheet shows the e-log(σ'_v) plots for total consolidation.

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

LOCATION: Bacon Island
REQUEST NO. 02-33
LAB SAMPLE 02-1315c2
HOLE NO. BIS-2
F.S. NO. S-4
DEPTH 25.0 - 27.0
VISUAL DESCRIPTION: Clay (weathered shale)

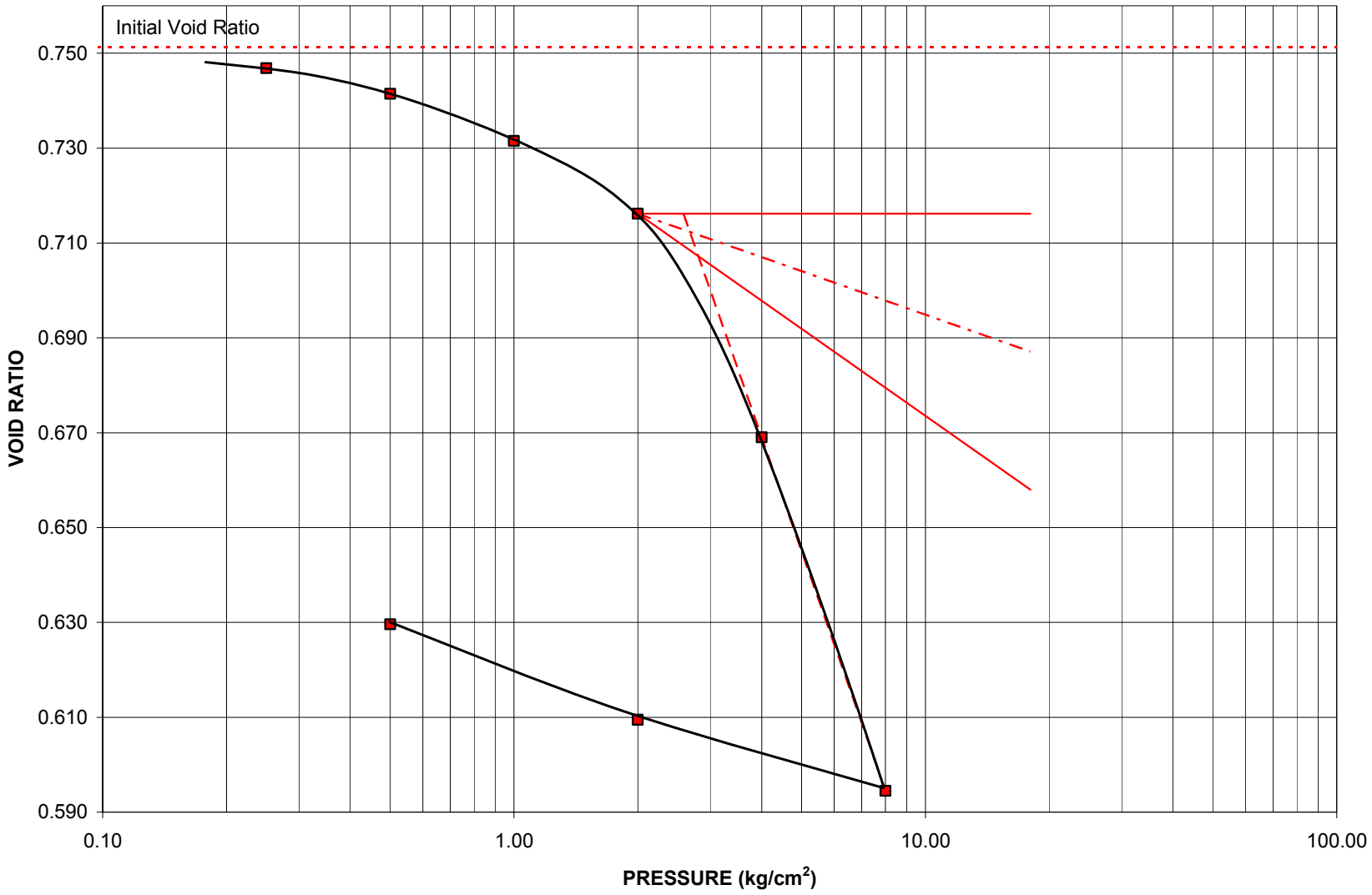
SAMPLE LT. cm	2.32
SAMPLE DIA. cm	6.34
SAMPLE AREA, cm2	31.62
SAMPLE VOL. cm3	73.33
COMPRESS INDEX	0.25
RECOMP. INDEX	0.029
HT. of SOLIDS, cm	1.3243
SPECIFIC GRAV.	2.74
VOID RATIO, init.	0.751
PRECONSOLIDATION PRESSURE (σ'_p), ksc	2.67

	START	END
WT. CONT. + WET SOIL, gms	675.6	674.40
WT. CONT. + DRY SOIL, gms	647.1	647.13
WT. of WATER, gms	28.5	27.27
WT. of CONTAINER, gms	532.4	532.40
WT of DRY SOIL, gms	114.7	114.73
WATER CONTENT, %	24.8	23.8
WET DENSITY, gms/cm3	1.953	2.046
DRY DENSITY, gms/cm3	1.565	1.653
WET DENSITY, lbs/ft3	121.9	127.7
DRY DENSITY, lbs/ft3	97.6	103.1
w for 100% SATURATION	27.4	24.0
% SATURATION	90.5	99.0

Frame: C

APPLIED PRESSURE (ksc)	DIAL READING (inches)	CORR. FACTOR APPLIED	DIAL READING (cm)	SPECIMEN HEIGHT (cm)	SETTLEMENT (percent)	VOID HEIGHT (cm)	VOID RATIO	log fit t50 (sec)	square t90 (sec)	Av (cm2/kg)	log fit Cv (cm2/sec)	square Cv (cm2/sec)	log fit PERM RATE (cm/sec)	square PERM RATE (cm/sec)
0.00	0.0003	0.0000	0.0008	2.3185	0.03	0.9942	0.7508							
									46	0.8614		0.0249		1.22E-05
0.25	0.0050	0.0026	0.0060	2.3133	0.26	0.9890	0.7468							
									74	0.2154		0.0152		1.88E-06
0.50	0.0094	0.0042	0.0131	2.3062	0.56	0.9819	0.7415							
									40	0.1077		0.0281		1.74E-06
1.00	0.0169	0.0066	0.0262	2.2931	1.13	0.9688	0.7315							
									48	0.0538		0.0231		7.19E-07
2.00	0.0279	0.0096	0.0466	2.2727	2.01	0.9484	0.7162							
									69	0.0269		0.0155		2.43E-07
4.00	0.0556	0.0126	0.1090	2.2103	4.70	0.8860	0.6690							
									558	0.0135		0.0018		1.43E-08
8.00	0.0977	0.0159	0.2077	2.1116	8.95	0.7873	0.5945							
2.00	0.0859	0.0119	0.1879	2.1314	8.10	0.8071	0.6095							
0.50	0.0712	0.0077	0.1612	2.1581	6.95	0.8338	0.6296							
0.00	0.0530	0.0041	0.1241	2.1952	5.35	0.8709	0.6576							

CONSOLIDATION TEST
REQUEST NO. 02-33 LAB NO. 02-1315c2



State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

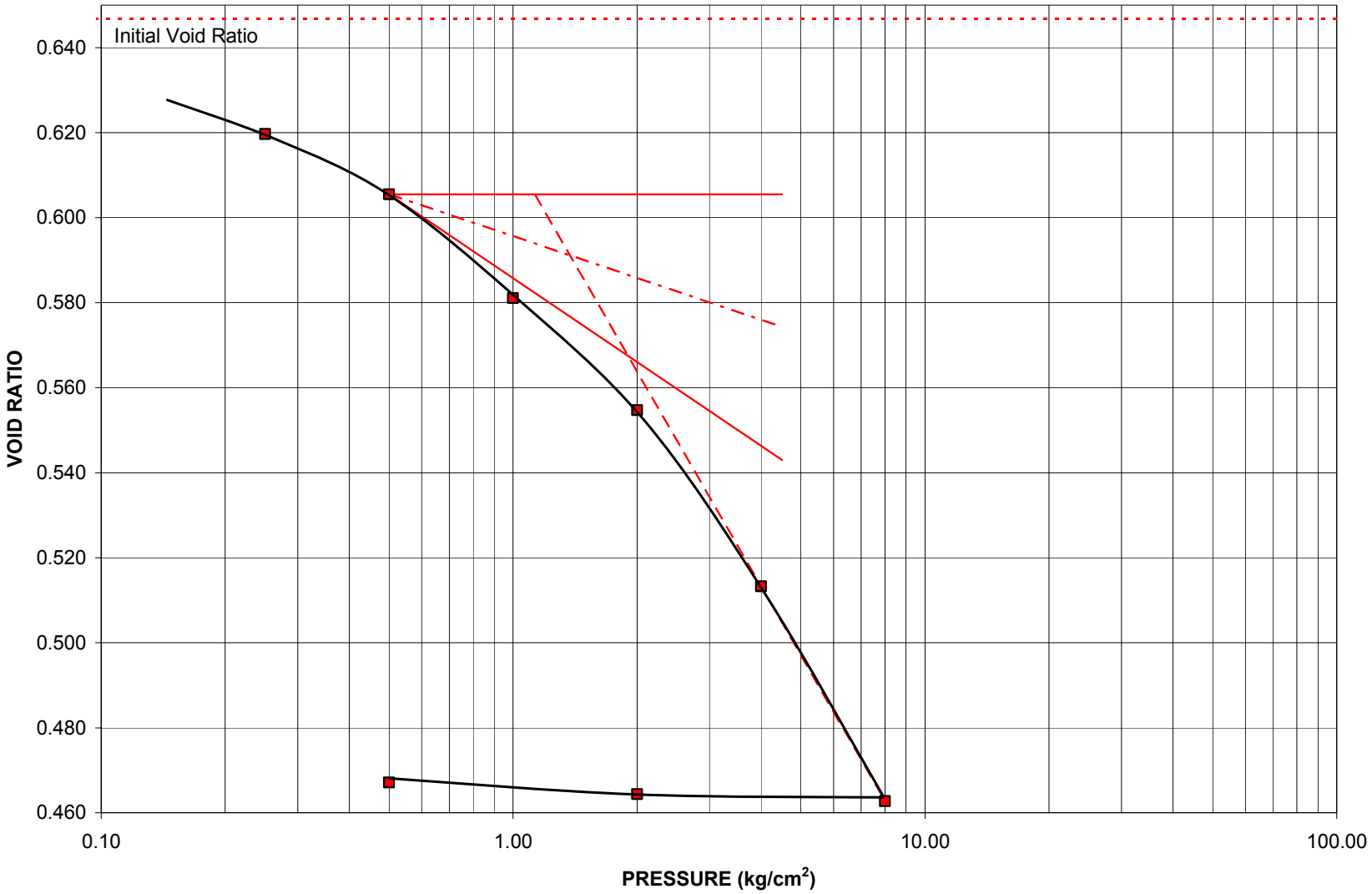
LOCATION: Bacon Island
REQUEST NO. 02-33
LAB SAMPLE 02-1286c1
HOLE NO. BIS-1
F.S. NO. S-4
DEPTH 15.0 - 17.0
VISUAL DESCRIPTION: Clayey, Sandy Silt

			START	END
SAMPLE LT. cm	2.30	WT. CONT. + WET SOIL, gms	678.7	673.90
SAMPLE DIA. cm	6.34	WT. CONT. + DRY SOIL, gms	652.2	652.17
SAMPLE AREA, cm2	31.62	WT. of WATER, gms	26.5	21.73
SAMPLE VOL. cm3	72.78	WT. of CONTAINER, gms	532.4	532.40
COMPRESS INDEX	0.17	WT of DRY SOIL, gms	119.8	119.77
RECOMP. INDEX	0.004	WATER CONTENT, %	22.2	18.1
HT. of SOLIDS, cm	1.3978	WET DENSITY, gms/cm3	2.010	2.158
SPECIFIC GRAV.	2.71	DRY DENSITY, gms/cm3	1.646	1.827
VOID RATIO, init.	0.647	WET DENSITY, lbs/ft3	125.4	134.7
		DRY DENSITY, lbs/ft3	102.7	114.0
PRECONSOLIDATION		w for 100% SATURATION	23.9	17.8
PRESSURE (σ'_p), ksc	1.37	% SATURATION	92.8	101.7

Frame: C

APPLIED PRESSURE (ksc)	DIAL READING (inches)	CORR. FACTOR APPLIED	DIAL READING (cm)	SPECIMEN HEIGHT (cm)	SETTLEMENT (percent)	VOID HEIGHT (cm)	VOID RATIO	log fit t50 (sec)	square t90 (sec)	Av (cm2/kg)	log fit Cv (cm2/sec)	square Cv (cm2/sec)	log fit PERM RATE (cm/sec)	square PERM RATE (cm/sec)
0.00	0.0020	0.0000	0.0051	2.2967	0.22	0.8989	0.6431							
									40	0.5840		0.0273		9.70E-06
0.25	0.0175	0.0026	0.0378	2.2640	1.64	0.8662	0.6197							
									53	0.1460		0.0202		1.82E-06
0.50	0.0269	0.0042	0.0577	2.2441	2.50	0.8464	0.6055							
									46	0.0730		0.0231		1.05E-06
1.00	0.0427	0.0066	0.0918	2.2100	3.99	0.8122	0.5811							
									61	0.0365		0.0166		3.84E-07
2.00	0.0602	0.0096	0.1286	2.1732	5.59	0.7754	0.5547							
									47	0.0182		0.0209		2.45E-07
4.00	0.0861	0.0126	0.1866	2.1152	8.11	0.7174	0.5133							
									50	0.0091		0.0183		1.11E-07
8.00	0.1172	0.0159	0.2572	2.0446	11.17	0.6468	0.4627							
2.00	0.1123	0.0119	0.2549	2.0469	11.08	0.6491	0.4644							
0.50	0.1066	0.0077	0.2511	2.0507	10.91	0.6529	0.4671							
0.00	0.0939	0.0041	0.2280	2.0738	9.91	0.6760	0.4836							

CONSOLIDATION TEST
REQUEST NO. 02-33 LAB NO. 02-1286c1



State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

LOCATION: Webb Tract
REQUEST NO. 02-33
LAB SAMPLE 02-1339c2
HOLE NO. WTS-1
F.S. NO. S-2
DEPTH 15.0 - 17.0
VISUAL DESCRIPTION: Sandy silt (with organics)

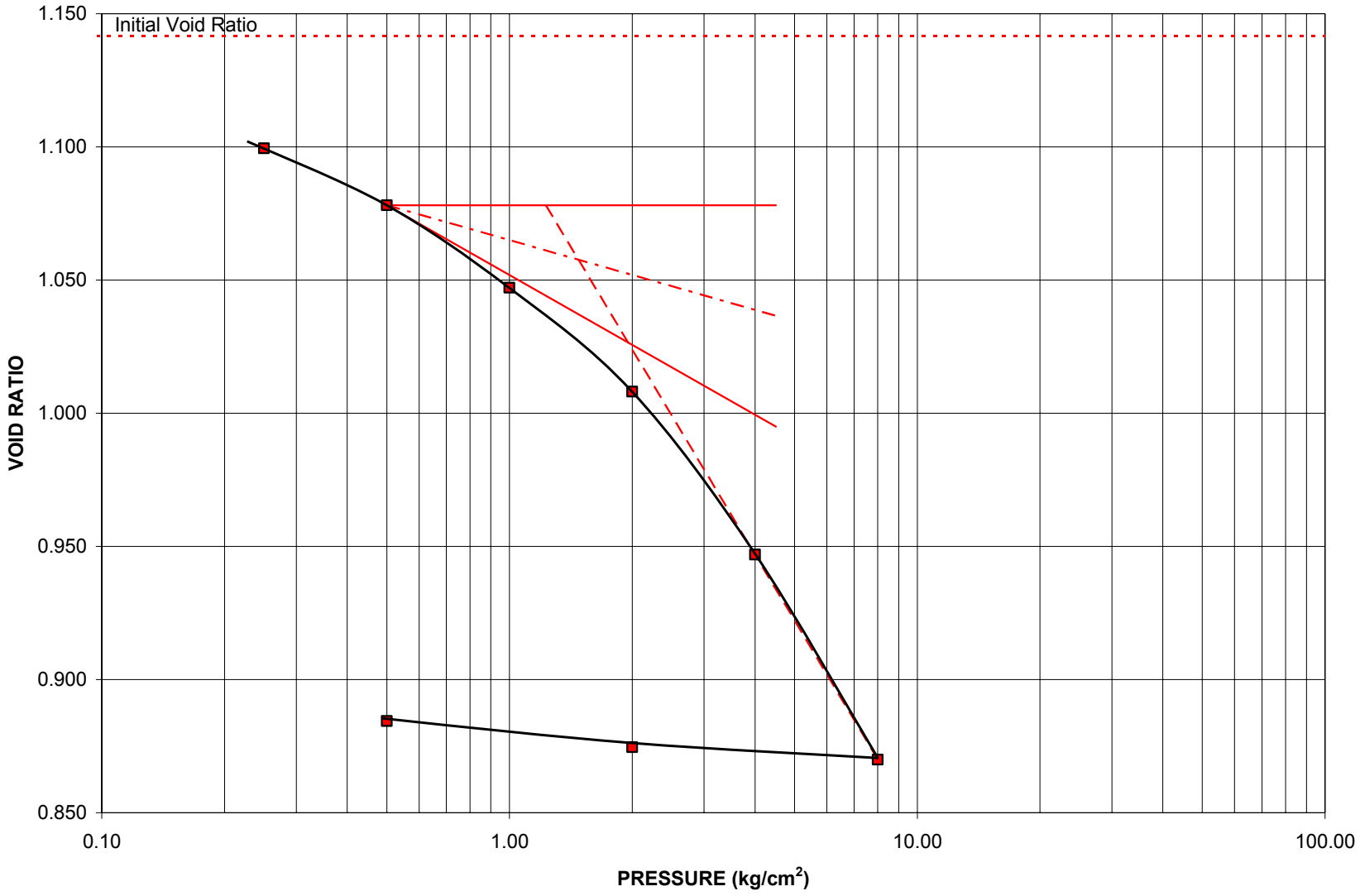
SAMPLE LT. cm	2.29
SAMPLE DIA. cm	6.34
SAMPLE AREA, cm2	31.55
SAMPLE VOL. cm3	72.25
COMPRESS INDEX	0.26
RECOMP. INDEX	0.012
HT. of SOLIDS, cm	1.0691
SPECIFIC GRAV.	2.71
VOID RATIO, init.	1.142
PRECONSOLIDATION PRESSURE (σ'_p), ksc	1.47

	START	END
WT. CONT. + WET SOIL, gms	652.6	648.40
WT. CONT. + DRY SOIL, gms	615.4	615.42
WT. of WATER, gms	37.2	32.98
WT. of CONTAINER, gms	524.0	524.00
WT of DRY SOIL, gms	91.4	91.42
WATER CONTENT, %	40.7	36.1
WET DENSITY, gms/cm3	1.780	1.914
DRY DENSITY, gms/cm3	1.265	1.407
WET DENSITY, lbs/ft3	111.1	119.5
DRY DENSITY, lbs/ft3	79.0	87.8
w for 100% SATURATION	42.1	34.2
% SATURATION	96.5	105.5

Frame: A

APPLIED PRESSURE (ksc)	DIAL READING (inches)	CORR. FACTOR APPLIED	DIAL READING (cm)	SPECIMEN HEIGHT (cm)	SETTLEMENT (percent)	VOID HEIGHT (cm)	VOID RATIO	log fit t50 (sec)	square t90 (sec)	Av (cm2/kg)	log fit Cv (cm2/sec)	square Cv (cm2/sec)	log fit PERM RATE (cm/sec)	square PERM RATE (cm/sec)
0.00	0.0034	0.0000	0.0086	2.2812	0.38	1.2120	1.1336							
									43	0.8889		0.0254		1.06E-05
0.25	0.0195	0.0017	0.0452	2.2446	1.97	1.1754	1.0994							
									60	0.2222		0.0175		1.86E-06
0.50	0.0296	0.0028	0.0681	2.2217	2.97	1.1526	1.0780							
									83	0.1111		0.0124		6.61E-07
1.00	0.0464	0.0066	0.1012	2.1886	4.42	1.1195	1.0471							
									52	0.0556		0.0193		5.24E-07
2.00	0.0653	0.0091	0.1428	2.1470	6.24	1.0778	1.0081							
									66	0.0278		0.0144		2.00E-07
4.00	0.0935	0.0115	0.2083	2.0815	9.10	1.0124	0.9469							
									66	0.0139		0.0134		9.57E-08
8.00	0.1285	0.0141	0.2905	1.9993	12.69	0.9302	0.8700							
2.00	0.1237	0.0113	0.2855	2.0043	12.47	0.9352	0.8747							
0.50	0.1172	0.0089	0.2751	2.0147	12.01	0.9456	0.8844							
0.00	0.0965	0.0058	0.2303	2.0595	10.06	0.9904	0.9263							

CONSOLIDATION TEST
REQUEST NO. 02-33 LAB NO. 02-1339c2



State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

LOCATION: Webb Tract
REQUEST NO. 02-33
LAB SAMPLE 02-1383c1
HOLE NO. WTS-2
F.S. NO. S-2
DEPTH 20.0 - 22.0
VISUAL DESCRIPTION: Highly Organic (Peat)

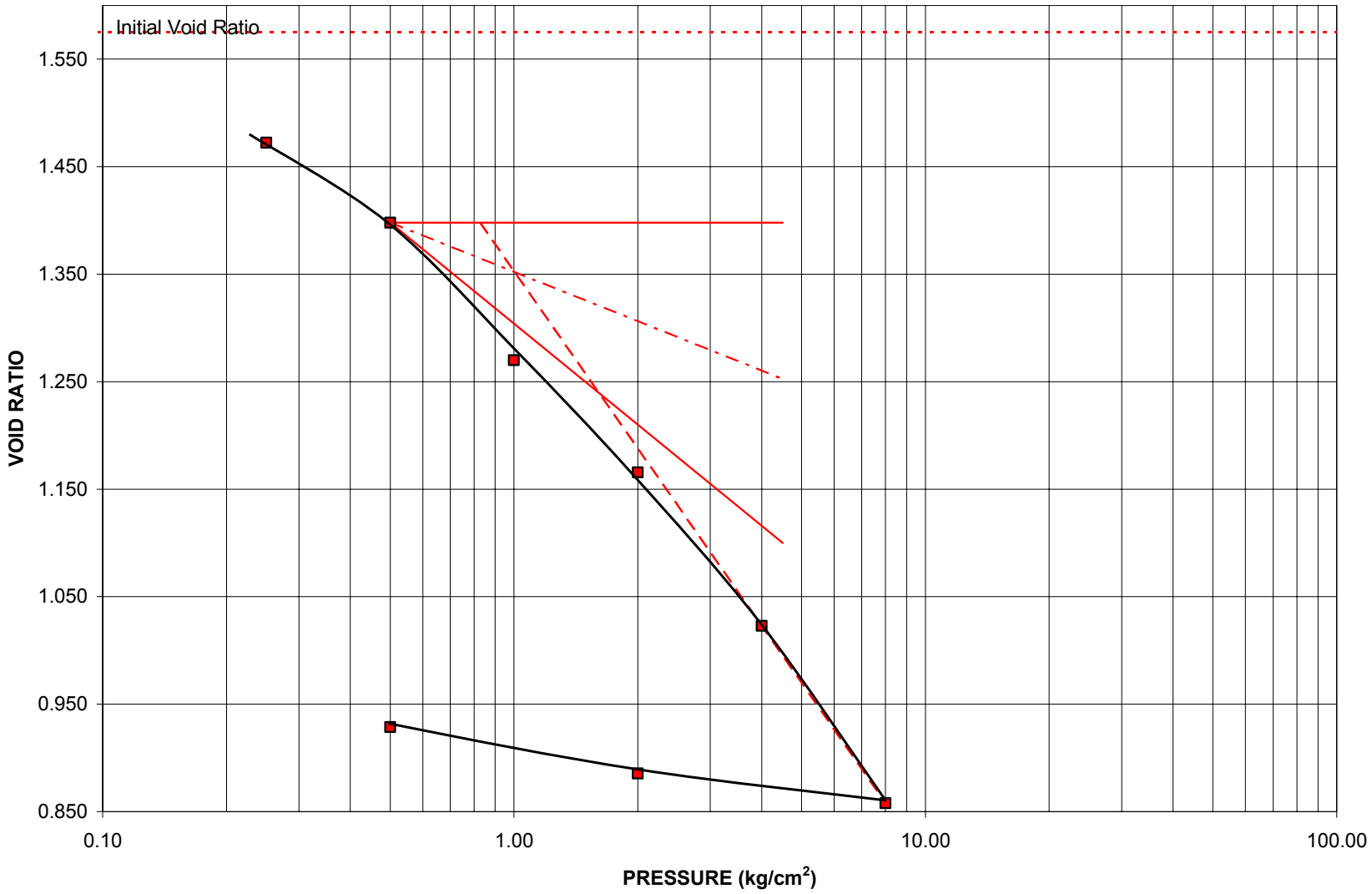
SAMPLE LT. cm	2.31
SAMPLE DIA. cm	6.35
SAMPLE AREA, cm2	31.65
SAMPLE VOL. cm3	73.05
COMPRESS INDEX	0.55
RECOMP. INDEX	0.059
HT. of SOLIDS, cm	0.8964
SPECIFIC GRAV.	2.62
VOID RATIO, init.	1.575
PRECONSOLIDATION PRESSURE (σ'_p), ksc	1.00

	START	END
WT. CONT. + WET SOIL, gms	651.8	640.30
WT. CONT. + DRY SOIL, gms	608.5	608.52
WT. of WATER, gms	43.3	31.78
WT. of CONTAINER, gms	534.2	534.20
WT of DRY SOIL, gms	74.3	74.32
WATER CONTENT, %	58.2	42.8
WET DENSITY, gms/cm3	1.610	1.880
DRY DENSITY, gms/cm3	1.017	1.317
WET DENSITY, lbs/ft3	100.5	117.3
DRY DENSITY, lbs/ft3	63.5	82.2
w for 100% SATURATION	60.1	37.8
% SATURATION	96.9	113.2

Frame: B

APPLIED PRESSURE (ksc)	DIAL READING (inches)	CORR. FACTOR APPLIED	DIAL READING (cm)	SPECIMEN HEIGHT (cm)	SETTLEMENT (percent)	VOID HEIGHT (cm)	VOID RATIO	log fit t50 (sec)	square t90 (sec)	Av (cm2/kg)	log fit Cv (cm2/sec)	square Cv (cm2/sec)	log fit PERM RATE (cm/sec)	square PERM RATE (cm/sec)
0.00	0.0029	0.0000	0.0074	2.3008	0.32	1.4045	1.5669							
									284	1.9065		0.0038		2.83E-06
0.25	0.0389	0.0026	0.0921	2.2161	3.99	1.3197	1.4723							
									3112	0.4766		0.0003		6.26E-08
0.50	0.0665	0.0040	0.1588	2.1495	6.88	1.2531	1.3980							
									2626	0.2383		0.0004		3.51E-08
1.00	0.1135	0.0058	0.2735	2.0347	11.85	1.1384	1.2700							
									2507	0.1192		0.0003		1.75E-08
2.00	0.1524	0.0079	0.3670	1.9412	15.90	1.0448	1.1656							
									3366	0.0596		0.0002		6.11E-09
4.00	0.2051	0.0102	0.4950	1.8132	21.45	0.9168	1.0228							
									3134	0.0298		0.0002		3.01E-09
8.00	0.2657	0.0126	0.6429	1.6653	27.85	0.7690	0.8579							
2.00	0.2535	0.0102	0.6181	1.6901	26.78	0.7938	0.8856							
0.50	0.2358	0.0077	0.5794	1.7288	25.10	0.8325	0.9287							
0.00	0.2108	0.0041	0.5249	1.7833	22.74	0.8869	0.9895							

CONSOLIDATION TEST
REQUEST NO. 02-33 LAB NO. 02-1383c1



State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

LOCATION: Bacon Island
REQUEST NO. 02-33
LAB SAMPLE 02-1313c1
HOLE NO. BIS-2
F.S. NO. S-2
DEPTH 15.0 - 17.0
VISUAL DESCRIPTION: Sand

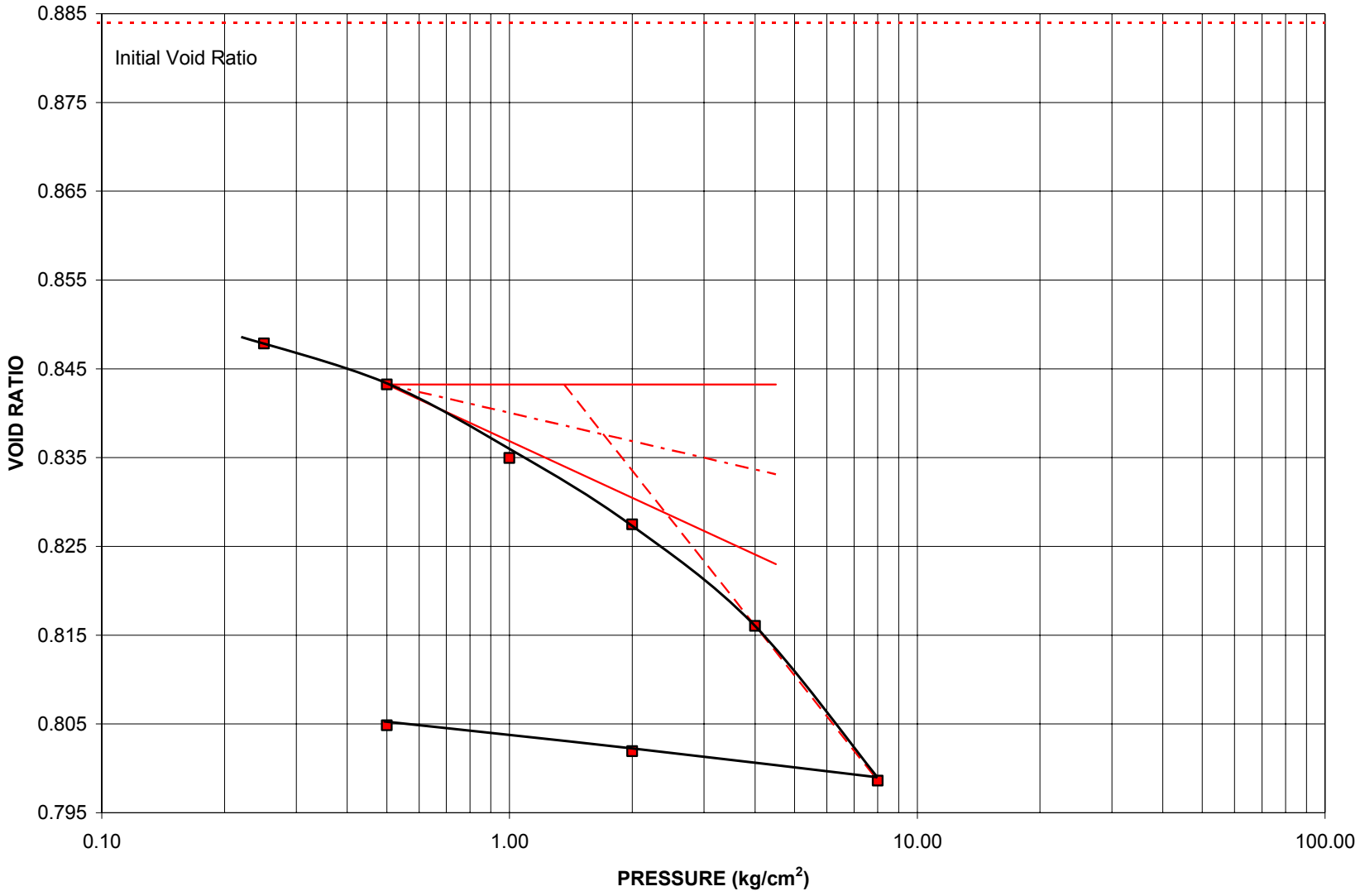
SAMPLE LT. cm	2.30
SAMPLE DIA. cm	6.35
SAMPLE AREA, cm2	31.66
SAMPLE VOL. cm3	72.91
COMPRESS INDEX	0.06
RECOMP. INDEX	0.005
HT. of SOLIDS, cm	1.2225
SPECIFIC GRAV.	2.70
VOID RATIO, init.	0.884
PRECONSOLIDATION PRESSURE (σ'_p), ksc	1.70

	START	END
WT. CONT. + WET SOIL, gms	670.6	674.51
WT. CONT. + DRY SOIL, gms	638.9	638.89
WT. of WATER, gms	31.7	35.62
WT. of CONTAINER, gms	534.4	534.40
WT of DRY SOIL, gms	104.5	104.49
WATER CONTENT, %	30.3	34.1
WET DENSITY, gms/cm3	1.868	1.999
DRY DENSITY, gms/cm3	1.433	1.491
WET DENSITY, lbs/ft3	116.6	124.7
DRY DENSITY, lbs/ft3	89.4	93.0
w for 100% SATURATION	32.7	30.0
% SATURATION	92.7	113.5

Frame: D

APPLIED PRESSURE (ksc)	DIAL READING (inches)	CORR. FACTOR APPLIED	DIAL READING (cm)	SPECIMEN HEIGHT (cm)	SETTLEMENT (percent)	VOID HEIGHT (cm)	VOID RATIO	log fit t50 (sec)	square t90 (sec)	Av (cm2/kg)	log fit Cv (cm2/sec)	square Cv (cm2/sec)	log fit PERM RATE (cm/sec)	square PERM RATE (cm/sec)
0.00	0.0123	0.0000	0.0312	2.2720	1.36	1.0495	0.8584							
									42	0.2018		0.0261		2.83E-06
0.25	0.0213	0.0039	0.0442	2.2590	1.92	1.0365	0.8478							
									45	0.0504		0.0238		6.51E-07
0.50	0.0253	0.0057	0.0498	2.2534	2.16	1.0309	0.8432							
									56	0.0252		0.0193		2.64E-07
1.00	0.0314	0.0078	0.0599	2.2433	2.60	1.0207	0.8350							
									46	0.0126		0.0233		1.60E-07
2.00	0.0374	0.0102	0.0691	2.2341	3.00	1.0116	0.8275							
									50	0.0063		0.0209		7.21E-08
4.00	0.0457	0.0130	0.0831	2.2201	3.61	0.9976	0.8161							
									68	0.0032		0.0153		2.66E-08
8.00	0.0568	0.0157	0.1044	2.1988	4.53	0.9763	0.7986							
2.00	0.0523	0.0128	0.1003	2.2029	4.36	0.9804	0.8019							
0.50	0.0481	0.0100	0.0968	2.2064	4.20	0.9839	0.8048							
0.00	0.0413	0.0062	0.0892	2.2140	3.87	0.9915	0.8111							

CONSOLIDATION TEST
REQUEST NO. 02-33 LAB NO. 02-1313c1



Appendix C: Triaxial Test Data

Laboratory procedures and test results are shown in this appendix for the ASTM D4767 strength tests. For each test (i.e., for each sample), three specimens are isotropically consolidated to different consolidation stresses. Following primary consolidation, the drain lines are closed and the samples are loaded in the triaxial device at a constant strain rate slow enough for excess pore pressures to distribute evenly throughout the sample during shearing. From each specimen, a Mohr circle is plotted on a τ-σ graph to represent the stresses on the specimen at failure. Then a failure envelope is fitted tangent to the three circles representing one sample. A failure envelope for each sample is then developed for drained and undrained strengths

The results of the consolidated undrained triaxial test data are presented in tabular and graphical form for these four samples. For easy reference, the sample number of each test is shown in the header on the right side of each page.

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF ENGINEERING
CIVIL DESIGN BRANCH
BRYTE SOILS AND CONCRETE LAB

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

DATE: 12/6/02 TIME: 7:29AM

SPECIMEN:			MEMBRANE and FILTER STRIPS:			EQUIPMENT:		
New Length *:	14.473	(cm)	Thickness (mem):	0.024	(cm)	Frame No.	87900	
New Diameter *:	7.199	(cm)	E Modulus (mem):	14.0	(kg/cm2)	Load Cell #:	A96356	
New Area, A_o *:	40.70	(cm^2)	K_{fp} (fs)	0.196	(kg/cm)	Initial σ_3' (ksc)		
B-Value:	95.6%		P_{fp} (fs) @:	10.0	(cm)	Axial Strain Rate:	0.003	(in. / min)
(* After consolidation)			(@ Perimeter length of filter strips)					

Displacement ΔH (cm)	Axial Strain ε (%)	Axial Load P (kg-f)	Chamber Pressure σ_{3T} (ksc)	Top Pore Pressure u_T (ksc)	Bottom Pore Pressure u_B (ksc)	Corrected Area $A_o/(1-e)$ (cm^2)	Membrane Correction $\Delta(\sigma_1 - \sigma_3)$ (ksc)	Pore Pressure Δu (ksc)	Effective Confining Stress σ_3' (ksc)	Stress Ratio σ_1'/σ_3'	Deviator Stress $(\sigma_1 - \sigma_3)$ (ksc)
0.000	0.0	0.20	3.25	1.95	2.06	40.70	0.00	0.00	1.24	1.00	0.00
0.020	0.2	0.27	3.25	1.95	2.06	40.76	0.00	0.00	1.24	1.01	0.01
0.030	0.2	0.27	3.25	1.95	2.06	40.79	0.00	0.00	1.24	1.01	0.01
0.048	0.3	0.27	3.25	1.95	2.06	40.83	0.00	0.00	1.24	1.00	0.01
0.061	0.4	0.27	3.25	1.95	2.06	40.87	0.00	0.00	1.24	1.00	0.01
0.074	0.5	3.36	3.26	1.99	2.10	40.91	0.00	0.04	1.21	1.07	0.08
0.089	0.6	10.02	3.25	2.07	2.19	40.95	0.00	0.13	1.12	1.22	0.24
0.104	0.7	17.28	3.26	2.18	2.28	41.00	0.00	0.22	1.03	1.41	0.42
0.117	0.8	27.35	3.26	2.31	2.41	41.04	0.00	0.36	0.89	1.74	0.66
0.135	0.9	32.52	3.26	2.37	2.46	41.08	0.00	0.41	0.84	1.94	0.79
0.145	1.0	33.48	3.25	2.38	2.48	41.12	0.00	0.43	0.82	2.00	0.81
0.290	2.0	62.82	3.26	2.62	2.71	41.53	0.00	0.66	0.59	3.55	1.51
0.434	3.0	75.11	3.26	2.63	2.73	41.96	-0.01	0.68	0.57	4.11	1.78
0.584	4.0	78.15	3.26	2.62	2.72	42.41	-0.01	0.66	0.59	4.13	1.84
0.724	5.0	79.38	3.26	2.60	2.71	42.84	-0.01	0.65	0.60	4.07	1.84
0.871	6.0	80.10	3.26	2.59	2.69	43.31	-0.01	0.64	0.62	3.99	1.84
1.016	7.0	80.69	3.26	2.59	2.69	43.78	-0.01	0.63	0.62	3.96	1.83
1.161	8.0	80.97	3.26	2.59	2.69	44.25	-0.01	0.64	0.62	3.95	1.82
1.308	9.0	81.42	3.26	2.59	2.69	44.74	-0.02	0.64	0.62	3.93	1.80
1.450	10.0	81.78	3.26	2.59	2.69	45.23	-0.02	0.64	0.62	3.91	1.79
1.595	11.0	81.96	3.26	2.59	2.70	45.74	-0.02	0.64	0.61	3.90	1.77
1.737	12.0	82.46	3.26	2.59	2.70	46.25	-0.02	0.64	0.61	3.90	1.76
1.885	13.0	82.46	3.26	2.59	2.70	46.80	-0.02	0.64	0.61	3.86	1.74
2.029	14.0	82.83	3.25	2.59	2.71	47.33	-0.02	0.65	0.60	3.89	1.73
2.174	15.0	83.01	3.26	2.60	2.71	47.89	-0.03	0.65	0.60	3.84	1.71

Remarks: Undisturbed Sample (2.8" diameter), Hole No. BIS-1, S-10, Depth: 60.0' - 62.0'
Effective Confining Pressure Requested - 1.25 ksc
Sample condition may be disturbed. After extruding sample, noticed an horizontal crack
1 1/2" from the top of the sample.

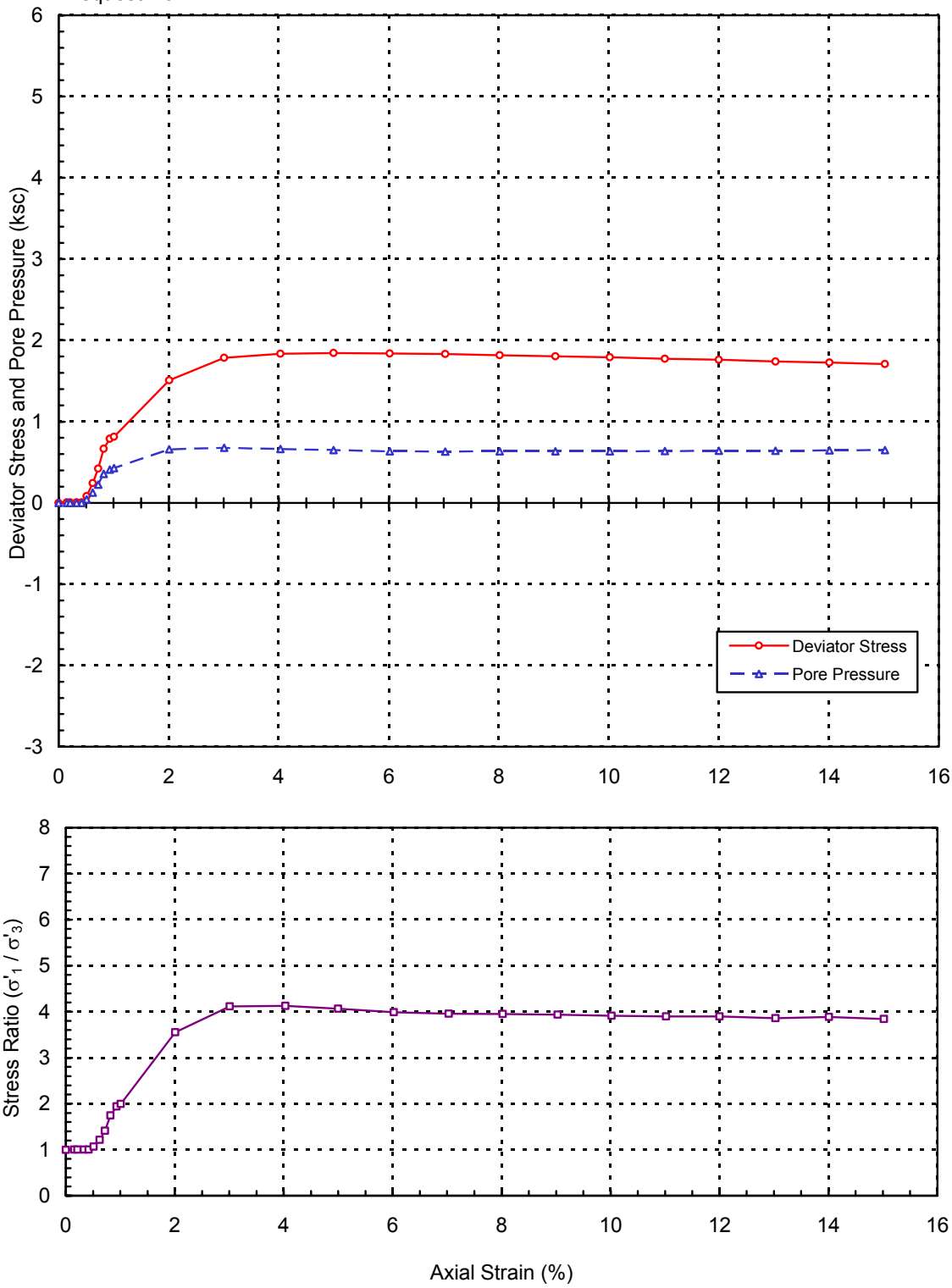
Request #: 2002-33
Lab #: 02-1292A

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

Pore Pressure, Deviator Stress, and Stress Ratio versus Axial Strain

Request No.: 2002-33 Lab No.: 02-1292A Test Date: 12/6/02



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF ENGINEERING
CIVIL DESIGN BRANCH
BRYTE SOILS AND CONCRETE LAB

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

DATE: 12/9/02 TIME: 8:50

SPECIMEN:
New Length *: 15.710 (cm)
New Diameter *: 7.262 (cm)
New Area, A_o *: 41.42 (cm^2)
B-Value: 95.9%
(* After consolidation)

MEMBRANE and FILTER STRIPS:
Thickness (mem): 0.024 (cm)
E Modulus (mem): 14.0 (kg/cm2)
K_{fp} (fs) 0.196 (kg/cm)
P_{fp} (fs) @: 10.0 (cm)
(@ Perimeter length of filter strips)

EQUIPMENT:
Frame No. 87899
Load Cell #: A96370
Initial σ_3' (ksc) 1.74
Axial Strain Rate: 0.004 (in. / min)

Displacement ΔH (cm)	Axial Strain ε (%)	Axial Load P (kg-f)	Chamber Pressure σ_{3T} (ksc)	Top Pore Pressure u_T (ksc)	Bottom Pore Pressure u_B (ksc)	Corrected Area $A_o/(1-e)$ (cm^2)	Membrane Correction $\Delta(\sigma_1 - \sigma_3)$ (ksc)	Pore Pressure Δu (ksc)	Effective Confining Stress σ_3' (ksc)	Stress Ratio σ_1'/σ_3'	Deviator Stress $(\sigma_1 - \sigma_3)$ (ksc)
0.000	0.0	0.20	6.25	4.50	4.53	41.42	0.00	0.00	1.74	1.00	0.00
0.020	0.1	0.27	6.26	4.50	4.53	41.47	0.00	0.00	1.74	1.00	0.01
0.038	0.2	0.86	6.26	4.50	4.53	41.52	0.00	0.00	1.74	1.01	0.02
0.048	0.3	2.31	6.25	4.52	4.56	41.54	0.00	0.02	1.71	1.03	0.06
0.069	0.4	3.81	6.26	4.53	4.57	41.60	0.00	0.04	1.70	1.05	0.09
0.079	0.5	5.90	6.26	4.56	4.60	41.63	0.00	0.07	1.68	1.08	0.14
0.097	0.6	15.92	6.26	4.68	4.72	41.67	0.00	0.19	1.56	1.24	0.38
0.109	0.7	22.86	6.26	4.77	4.80	41.71	0.00	0.27	1.47	1.37	0.55
0.132	0.8	31.89	6.26	4.89	4.92	41.77	0.00	0.39	1.35	1.56	0.76
0.142	0.9	37.83	6.25	4.98	5.01	41.80	0.00	0.48	1.26	1.72	0.90
0.160	1.0	44.27	6.26	5.06	5.10	41.85	0.00	0.56	1.18	1.90	1.06
0.318	2.0	71.40	6.26	5.36	5.41	42.27	0.00	0.87	0.87	2.93	1.69
0.472	3.0	81.47	6.26	5.43	5.46	42.71	-0.01	0.93	0.81	3.34	1.90
0.630	4.0	88.77	6.25	5.44	5.48	43.15	-0.01	0.95	0.79	3.60	2.05
0.787	5.0	92.94	6.26	5.45	5.50	43.60	-0.01	0.96	0.78	3.71	2.12
0.945	6.0	97.25	6.25	5.45	5.49	44.07	-0.01	0.95	0.78	3.81	2.20
1.100	7.0	101.06	6.25	5.43	5.48	44.54	-0.01	0.94	0.80	3.83	2.26
1.262	8.0	103.65	6.26	5.42	5.47	45.04	-0.01	0.93	0.81	3.82	2.29
1.417	9.0	105.82	6.26	5.42	5.47	45.53	-0.02	0.93	0.81	3.84	2.31
1.572	10.0	107.50	6.26	5.41	5.46	46.03	-0.02	0.92	0.83	3.81	2.32
1.730	11.0	109.45	6.26	5.40	5.46	46.55	-0.02	0.91	0.83	3.81	2.33
1.890	12.0	110.95	6.26	5.39	5.45	47.08	-0.02	0.91	0.84	3.79	2.34
2.047	13.0	111.95	6.26	5.38	5.44	47.63	-0.02	0.90	0.85	3.75	2.33
2.200	14.0	113.08	6.26	5.37	5.43	48.16	-0.02	0.88	0.86	3.71	2.32
2.357	15.0	112.72	6.26	5.36	5.42	48.73	-0.03	0.88	0.86	3.65	2.29

Remarks: Undisturbed Sample (2.8" diameter), Hole No. BIS-1, S-10, Depth: 60.0' - 62.0'
Effective Confining Pressure Requested - 1.75 ksc

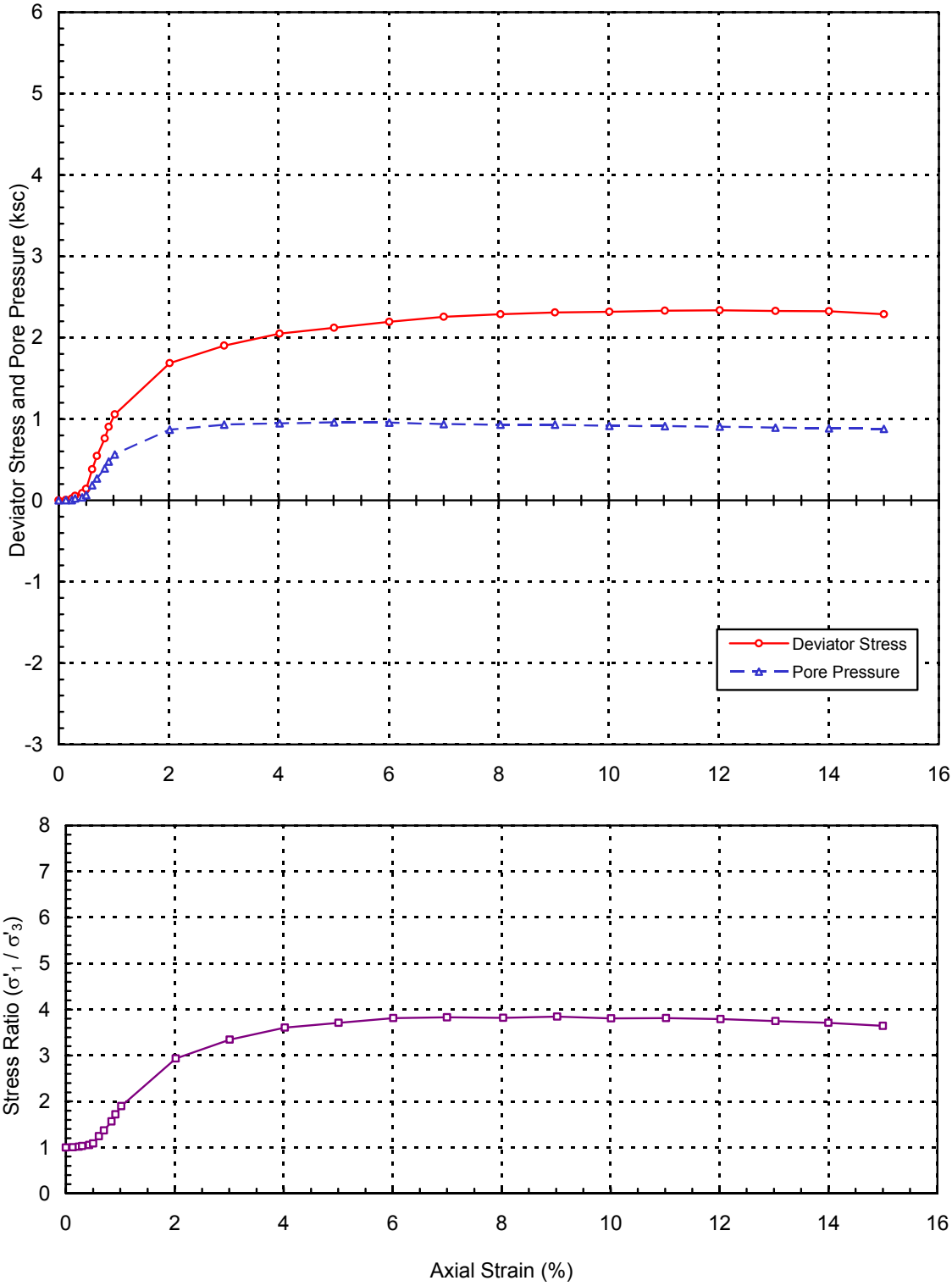
Request #: 2002-33
Lab #: 02-1292B

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

Pore Pressure, Deviator Stress, and Stress Ratio versus Axial Strain

Request No.: 2002-33 Lab No.: 02-1292B Test Date: 12/9/02



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF ENGINEERING
CIVIL DESIGN BRANCH
BRYTE SOILS AND CONCRETE LAB

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

DATE: 12/3/02 TIME: 7:50AM

SPECIMEN:			MEMBRANE and FILTER STRIPS:			EQUIPMENT:		
New Length *:	16.619	(cm)	Thickness (mem):	0.024	(cm)	Frame No.	87900	
New Diameter *:	7.217	(cm)	E Modulus (mem):	14.0	(kg/cm2)	Load Cell #:	A96356	
New Area, A_o *:	40.91	(cm^2)	K_{fp} (fs)	0.196	(kg/cm)	Initial σ_3' (ksc)	2.23	
B-Value:	95.6%		P_{fp} (fs) @:	10.0	(cm)	Axial Strain Rate:	0.003	(in. / min)
(* After consolidation)			(@ Perimeter length of filter strips)					

Displacement ΔH (cm)	Axial Strain ε (%)	Axial Load P (kg-f)	Chamber Pressure σ_{3T} (ksc)	Top Pore Pressure u_T (ksc)	Bottom Pore Pressure u_B (ksc)	Corrected Area $A_o/(1-e)$ (cm^2)	Membrane Correction $\Delta(\sigma_1 - \sigma_3)$ (ksc)	Pore Pressure Δu (ksc)	Effective Confining Stress σ_3' (ksc)	Stress Ratio σ_1'/σ_3'	Deviator Stress $(\sigma_1 - \sigma_3)$ (ksc)
0.000	0.0	0.20	4.25	1.97	2.07	40.91	0.00	0.00	2.23	1.00	0.00
0.018	0.1	1.32	4.25	1.98	2.08	40.95	0.00	0.01	2.22	1.01	0.03
0.046	0.3	5.94	4.25	2.03	2.14	41.02	0.00	0.06	2.17	1.07	0.14
0.051	0.3	16.74	4.25	2.17	2.26	41.03	0.00	0.19	2.04	1.20	0.41
0.069	0.4	24.81	4.25	2.26	2.37	41.08	0.00	0.30	1.94	1.31	0.60
0.089	0.5	42.27	4.25	2.50	2.60	41.13	0.00	0.53	1.70	1.60	1.03
0.099	0.6	43.50	4.25	2.52	2.62	41.16	0.00	0.55	1.68	1.63	1.06
0.124	0.8	49.44	4.25	2.59	2.70	41.22	0.00	0.62	1.61	1.74	1.20
0.137	0.8	54.66	4.25	2.65	2.76	41.25	0.00	0.69	1.55	1.86	1.32
0.152	0.9	63.68	4.25	2.76	2.88	41.29	0.00	0.80	1.43	2.07	1.54
0.168	1.0	68.22	4.25	2.82	2.93	41.33	0.00	0.86	1.38	2.20	1.65
0.335	2.0	91.67	4.25	3.08	3.20	41.75	0.00	1.12	1.11	2.97	2.19
0.500	3.0	95.48	4.25	3.20	3.31	42.18	-0.01	1.24	1.00	3.26	2.26
0.665	4.0	96.48	4.25	3.25	3.36	42.62	-0.01	1.28	0.94	3.40	2.26
0.838	5.0	96.30	4.25	3.30	3.40	43.08	-0.01	1.33	0.91	3.45	2.23
0.998	6.0	96.12	4.25	3.33	3.43	43.53	-0.01	1.36	0.88	3.51	2.20
1.163	7.0	95.66	4.25	3.35	3.45	43.99	-0.01	1.38	0.86	3.52	2.16
1.331	8.0	94.80	4.25	3.37	3.46	44.47	-0.01	1.39	0.84	3.52	2.12
1.499	9.0	94.26	4.25	3.38	3.48	44.96	-0.02	1.41	0.82	3.55	2.08
1.664	10.0	93.71	4.25	3.40	3.49	45.46	-0.02	1.43	0.81	3.53	2.04
1.842	11.1	92.94	4.25	3.40	3.49	46.01	-0.02	1.43	0.81	3.49	2.00
1.996	12.0	91.94	4.25	3.41	3.51	46.49	-0.02	1.44	0.79	3.46	1.96
2.162	13.0	91.08	4.25	3.42	3.52	47.03	-0.02	1.45	0.79	3.43	1.91
2.329	14.0	89.58	4.25	3.43	3.53	47.58	-0.02	1.46	0.77	3.40	1.86
2.494	15.0	89.31	4.25	3.45	3.55	48.14	-0.03	1.48	0.76	3.42	1.83

Remarks: Undisturbed Sample (2.8" diameter), Hole No. BIS-1, S-10, Depth: 60.0' - 62.0'
Effective Confining Pressure Requested - 2.25 ksc

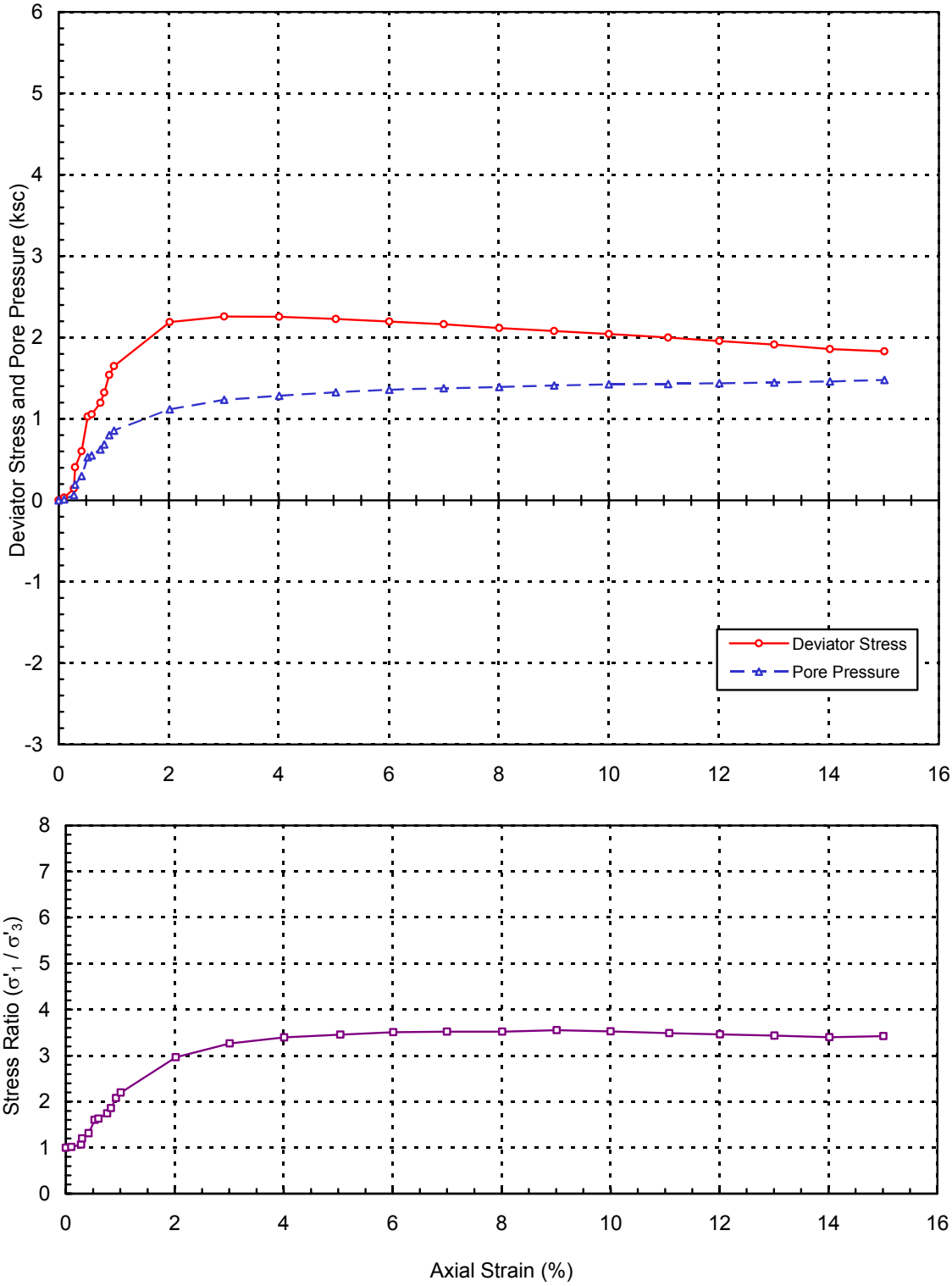
Request #: 2002-33
Lab #: 02-1292C

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

Pore Pressure, Deviator Stress, and Stress Ratio versus Axial Strain

Request No.: 2002-33 Lab No.: 02-1292C Test Date: 12/3/02



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF ENGINEERING
CIVIL DESIGN BRANCH
BRYTE SOILS AND CONCRETE LAB

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

DATE: 12/13/02 TIME: 8:01AM

SPECIMEN:			MEMBRANE and FILTER STRIPS:			EQUIPMENT:		
New Length *:	16.155	(cm)	Thickness (mem):	0.024	(cm)	Frame No.	87900	
New Diameter *:	7.224	(cm)	E Modulus (mem):	14.0	(kg/cm2)	Load Cell #:	A96356	
New Area, A_o *:	40.99	(cm^2)	K_{fp} (fs)	0.196	(kg/cm)	Initial σ_3' (ksc)	0.98	
B-Value:	95.4%		P_{fp} (fs) @:	10.0	(cm)	Axial Strain Rate:	0.004	(in. / min)
(* After consolidation)			(@ Perimeter length of filter strips)					

Displacement ΔH (cm)	Axial Strain ε (%)	Axial Load P (kg-f)	Chamber Pressure σ_{3T} (ksc)	Top Pore Pressure u_T (ksc)	Bottom Pore Pressure u_B (ksc)	Corrected Area $A_o/(1-e)$ (cm^2)	Membrane Correction $\Delta(\sigma_1 - \sigma_3)$ (ksc)	Pore Pressure Δu (ksc)	Effective Confining Stress σ_3' (ksc)	Stress Ratio σ_1'/σ_3'	Deviator Stress $(\sigma_1 - \sigma_3)$ (ksc)
0.000	0.0	0.20	3.00	1.98	2.06	40.99	0.00	0.00	0.98	1.00	0.00
0.018	0.1	0.54	3.00	1.98	2.06	41.04	0.00	0.00	0.98	1.01	0.01
0.033	0.2	0.95	3.00	1.98	2.07	41.08	0.00	0.00	0.98	1.02	0.02
0.056	0.3	1.32	3.00	1.98	2.07	41.13	0.00	0.01	0.97	1.03	0.03
0.066	0.4	1.77	3.01	1.99	2.08	41.16	0.00	0.02	0.97	1.04	0.04
0.084	0.5	2.04	3.01	2.00	2.09	41.20	0.00	0.02	0.97	1.05	0.05
0.102	0.6	5.94	3.00	2.04	2.12	41.25	0.00	0.06	0.92	1.16	0.14
0.119	0.7	14.24	3.00	2.14	2.21	41.30	0.00	0.16	0.83	1.42	0.34
0.140	0.9	21.45	3.01	2.24	2.28	41.35	0.00	0.24	0.75	1.69	0.52
0.152	0.9	21.95	3.01	2.24	2.29	41.38	0.00	0.25	0.74	1.71	0.53
0.163	1.0	24.00	3.00	2.27	2.31	41.40	0.00	0.27	0.71	1.81	0.58
0.323	2.0	38.65	3.00	2.47	2.50	41.83	0.00	0.47	0.51	2.79	0.92
0.485	3.0	41.91	3.00	2.52	2.55	42.26	-0.01	0.51	0.47	3.11	0.99
0.648	4.0	43.14	3.00	2.52	2.57	42.70	-0.01	0.53	0.45	3.21	1.00
0.813	5.0	43.86	3.01	2.52	2.58	43.16	-0.01	0.53	0.46	3.20	1.01
0.970	6.0	44.36	3.00	2.52	2.58	43.61	-0.01	0.53	0.45	3.22	1.01
1.133	7.0	44.91	3.01	2.52	2.59	44.08	-0.01	0.53	0.46	3.20	1.01
1.295	8.0	45.36	3.00	2.52	2.59	44.56	-0.01	0.53	0.45	3.23	1.00
1.453	9.0	45.63	3.01	2.52	2.59	45.04	-0.02	0.54	0.45	3.20	1.00
1.623	10.1	46.31	3.00	2.50	2.59	45.57	-0.02	0.53	0.46	3.19	1.00
1.778	11.0	47.13	3.00	2.50	2.59	46.06	-0.02	0.52	0.46	3.18	1.00
1.941	12.0	47.94	3.01	2.50	2.58	46.59	-0.02	0.52	0.47	3.14	1.01
2.106	13.0	48.72	3.00	2.48	2.57	47.14	-0.02	0.50	0.48	3.11	1.01
2.268	14.0	49.62	3.00	2.47	2.55	47.68	-0.02	0.49	0.49	3.07	1.02
2.426	15.0	50.48	3.00	2.45	2.54	48.23	-0.03	0.48	0.51	3.02	1.02

Remarks: Undisturbed Sample (2.8" diameter), Hole No. BIS-2, S-6, Depth: 40.0' - 42.0'
Effective Confining Pressure Requested - 1.0 ksc

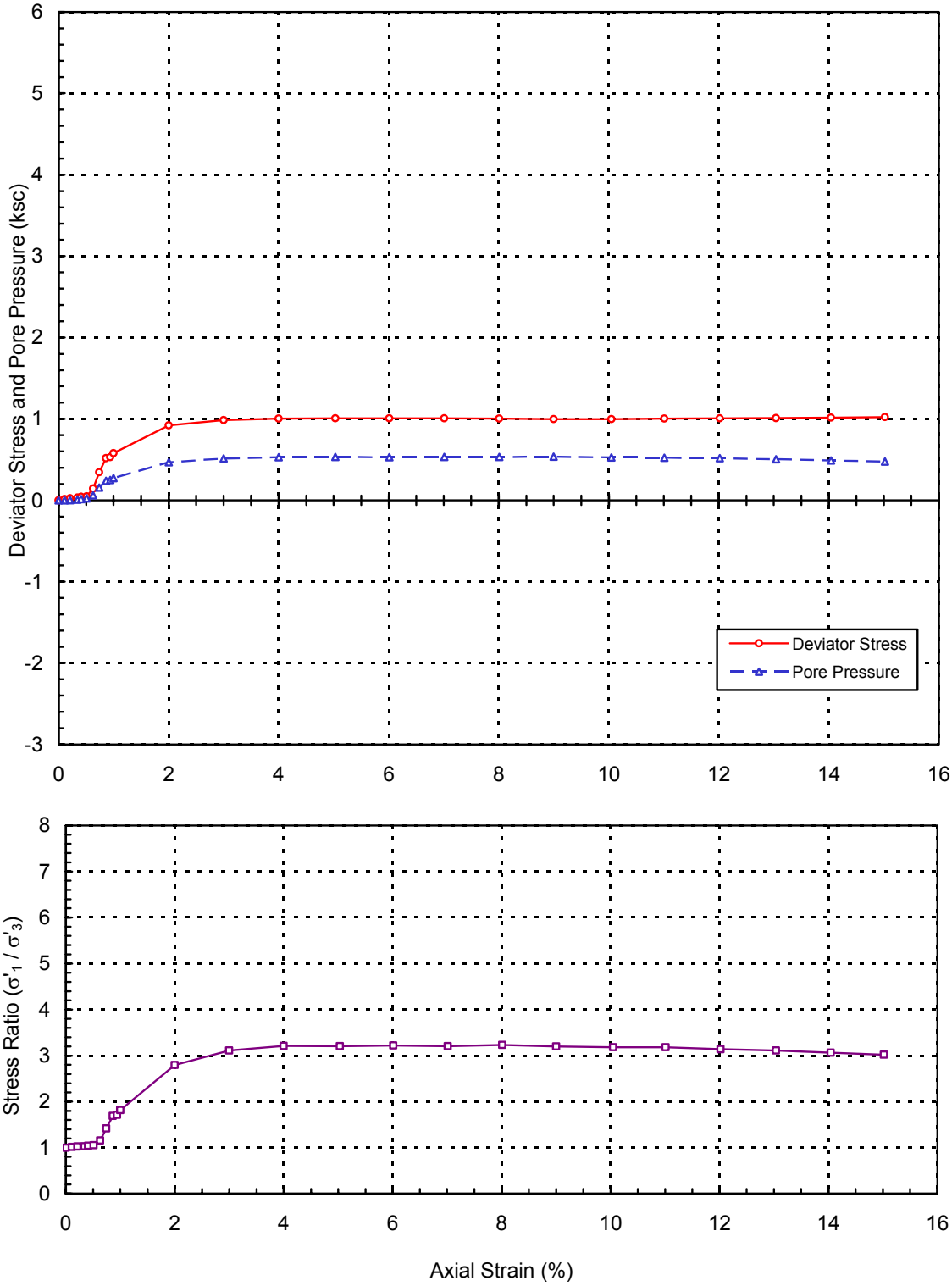
Request #: 2002-33
Lab #: 02-1317A

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

Pore Pressure, Deviator Stress, and Stress Ratio versus Axial Strain

Request No.: 2002-33 Lab No.: 02-1317A Test Date: 12/13/02



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF ENGINEERING
CIVIL DESIGN BRANCH
BRYTE SOILS AND CONCRETE LAB

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

DATE: 12/12/02 TIME: 7:03AM

SPECIMEN:
New Length *: 16.264 (cm)
New Diameter *: 7.273 (cm)
New Area, A_o *: 41.55 (cm^2)
B-Value: 95.6%
(* After consolidation)

MEMBRANE and FILTER STRIPS:
Thickness (mem): 0.024 (cm)
E Modulus (mem): 14.0 (kg/cm2)
K_{fp} (fs) 0.196 (kg/cm)
P_{fp} (fs) @: 10.0 (cm)
(@ Perimeter length of filter strips)

EQUIPMENT:
Frame No. 87899
Load Cell #: A96370
Initial σ_3' (ksc) 1.48
Axial Strain Rate: 0.004 (in. / min)

Displacement ΔH (cm)	Axial Strain ε (%)	Axial Load P (kg-f)	Chamber Pressure σ_{3T} (ksc)	Top Pore Pressure u_T (ksc)	Bottom Pore Pressure u_B (ksc)	Corrected Area $A_o/(1-e)$ (cm^2)	Membrane Correction $\Delta(\sigma_1 - \sigma_3)$ (ksc)	Pore Pressure Δu (ksc)	Effective Confining Stress σ_3' (ksc)	Stress Ratio σ_1'/σ_3'	Deviator Stress $(\sigma_1 - \sigma_3)$ (ksc)
0.000	0.0	0.00	4.01	2.52	2.54	41.55	0.00	0.00	1.48	1.00	0.00
0.020	0.1	-0.09	4.01	2.52	2.54	41.60	0.00	0.00	1.48	1.00	0.00
0.038	0.2	0.09	4.01	2.52	2.54	41.65	0.00	0.00	1.48	1.00	0.00
0.051	0.3	0.27	4.01	2.52	2.54	41.68	0.00	0.00	1.48	1.00	0.01
0.066	0.4	6.99	4.01	2.59	2.61	41.72	0.00	0.07	1.41	1.12	0.17
0.086	0.5	16.33	4.01	2.69	2.71	41.77	0.00	0.17	1.31	1.30	0.39
0.099	0.6	22.36	4.01	2.76	2.78	41.81	0.00	0.24	1.24	1.43	0.53
0.114	0.7	32.52	4.01	2.87	2.90	41.85	0.00	0.36	1.12	1.69	0.78
0.132	0.8	41.69	4.01	2.97	3.02	41.89	0.00	0.47	1.01	1.98	0.99
0.147	0.9	44.27	4.01	3.00	3.04	41.93	0.00	0.49	0.99	2.07	1.05
0.168	1.0	46.40	4.01	3.02	3.07	41.98	0.00	0.51	0.96	2.15	1.10
0.325	2.0	65.54	4.01	3.20	3.23	42.40	0.00	0.69	0.79	2.95	1.54
0.490	3.0	69.90	4.01	3.20	3.22	42.84	-0.01	0.68	0.80	3.04	1.63
0.653	4.0	69.90	4.01	3.18	3.18	43.29	-0.01	0.65	0.83	2.93	1.61
0.818	5.0	69.63	4.01	3.15	3.16	43.75	-0.01	0.63	0.86	2.84	1.58
0.978	6.0	68.90	4.01	3.12	3.14	44.21	-0.01	0.60	0.89	2.75	1.55
1.140	7.0	68.31	4.01	3.10	3.11	44.69	-0.01	0.57	0.90	2.68	1.52
1.303	8.0	67.77	4.01	3.09	3.09	45.16	-0.01	0.56	0.92	2.62	1.49
1.466	9.0	67.22	4.01	3.07	3.08	45.66	-0.02	0.55	0.94	2.55	1.46
1.631	10.0	66.77	4.01	3.05	3.06	46.18	-0.02	0.52	0.96	2.49	1.43
1.791	11.0	65.73	4.01	3.04	3.04	46.69	-0.02	0.51	0.96	2.44	1.39
1.958	12.0	64.77	4.01	3.02	3.03	47.24	-0.02	0.50	0.99	2.37	1.35
2.116	13.0	63.96	4.01	3.01	3.02	47.76	-0.02	0.48	0.99	2.32	1.32
2.281	14.0	63.50	4.01	2.99	3.00	48.33	-0.02	0.46	1.02	2.27	1.29
2.441	15.0	62.55	4.01	2.99	2.99	48.89	-0.03	0.46	1.02	2.23	1.25

Remarks: Undisturbed Sample (2.8" diameter), Hole No. BIS-2, S-6, Depth: 40.0' - 42.0'
Effective Confining Pressure Requested - 1.5 ksc

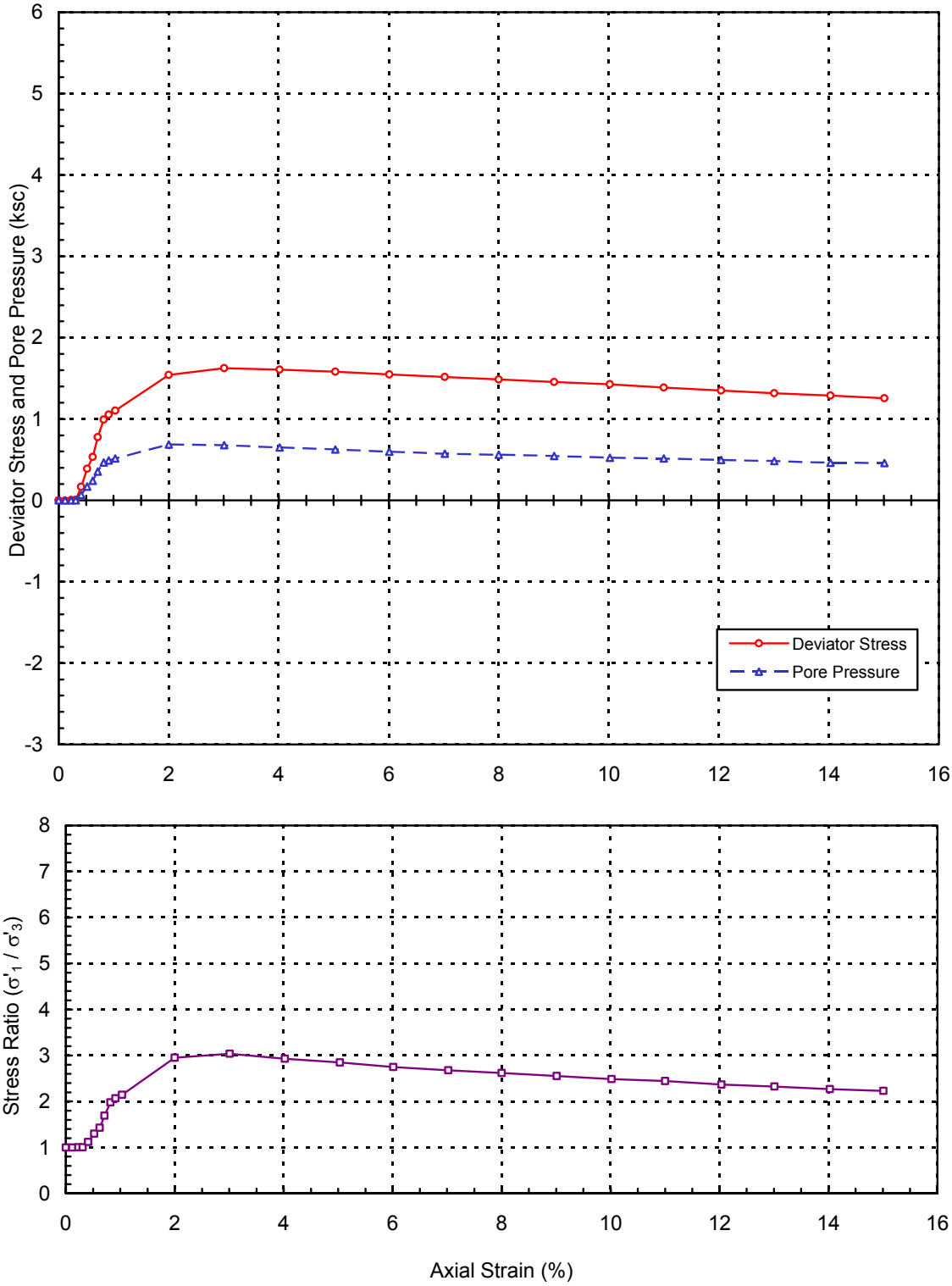
Request #: 2002-33
Lab #: 02-1317B

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

Pore Pressure, Deviator Stress, and Stress Ratio versus Axial Strain

Request No.: 2002-33 Lab No.: 02-1317B Test Date: 12/12/02



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF ENGINEERING
CIVIL DESIGN BRANCH
BRYTE SOILS AND CONCRETE LAB

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

DATE: 12/10/02 TIME: 7:09AM

SPECIMEN:
New Length *: 16.718 (cm)
New Diameter *: 7.261 (cm)
New Area, A_o *: 41.41 (cm^2)
B-Value: 95.6%
(* After consolidation)

MEMBRANE and FILTER STRIPS:
Thickness (mem): 0.024 (cm)
E Modulus (mem): 14.0 (kg/cm2)
K_{fp} (fs) 0.196 (kg/cm)
P_{fp} (fs) @: 10.0 (cm)
(@ Perimeter length of filter strips)

EQUIPMENT:
Frame No. 87900
Load Cell #: A96356
Initial σ_3' (ksc) 1.93
Axial Strain Rate: 0.003 (in. / min)

Displacement ΔH (cm)	Axial Strain ε (%)	Axial Load P (kg-f)	Chamber Pressure σ_{3T} (ksc)	Top Pore Pressure u_T (ksc)	Bottom Pore Pressure u_B (ksc)	Corrected Area $A_o/(1-e)$ (cm^2)	Membrane Correction $\Delta(\sigma_1 - \sigma_3)$ (ksc)	Pore Pressure Δu (ksc)	Effective Confining Stress σ_3' (ksc)	Stress Ratio σ_1'/σ_3'	Deviator Stress $(\sigma_1 - \sigma_3)$ (ksc)
0.000	0.0	0.90	4.51	2.49	2.66	41.41	0.00	0.00	1.93	1.00	0.00
0.018	0.1	1.32	4.51	2.56	2.66	41.45	0.00	0.04	1.90	1.02	0.03
0.038	0.2	10.98	4.51	2.66	2.77	41.51	0.00	0.14	1.80	1.15	0.26
0.051	0.3	21.09	4.51	2.77	2.88	41.54	0.00	0.25	1.68	1.30	0.51
0.069	0.4	28.08	4.51	2.85	2.97	41.58	0.00	0.34	1.60	1.42	0.67
0.084	0.5	32.98	4.51	2.91	3.04	41.62	0.00	0.40	1.53	1.52	0.79
0.102	0.6	41.37	4.51	3.02	3.15	41.66	0.00	0.51	1.42	1.70	0.99
0.117	0.7	45.36	4.51	3.07	3.20	41.71	0.00	0.56	1.38	1.79	1.09
0.135	0.8	50.48	4.51	3.13	3.27	41.75	0.00	0.62	1.31	1.92	1.21
0.152	0.9	54.11	4.51	3.17	3.32	41.79	0.00	0.67	1.27	2.02	1.29
0.175	1.0	55.79	4.51	3.20	3.34	41.85	0.00	0.69	1.24	2.07	1.33
0.335	2.0	72.30	4.51	3.40	3.54	42.26	0.00	0.90	1.03	2.65	1.71
0.503	3.0	76.70	4.51	3.45	3.56	42.69	-0.01	0.93	1.00	2.79	1.79
0.673	4.0	77.07	4.51	3.43	3.55	43.14	-0.01	0.92	1.02	2.75	1.78
0.838	5.0	74.75	4.51	3.40	3.51	43.59	-0.01	0.88	1.05	2.62	1.71
1.003	6.0	72.39	4.51	3.36	3.47	44.06	-0.01	0.84	1.09	2.50	1.63
1.171	7.0	71.58	4.51	3.35	3.46	44.53	-0.01	0.83	1.10	2.44	1.60
1.339	8.0	71.21	4.51	3.34	3.45	45.01	-0.01	0.82	1.11	2.41	1.57
1.506	9.0	71.12	4.50	3.33	3.45	45.51	-0.02	0.81	1.11	2.39	1.55
1.674	10.0	71.30	4.51	3.33	3.43	46.02	-0.02	0.80	1.13	2.36	1.53
1.839	11.0	71.12	4.51	3.32	3.43	46.53	-0.02	0.80	1.13	2.33	1.51
2.007	12.0	70.85	4.51	3.31	3.42	47.06	-0.02	0.79	1.14	2.30	1.48
2.174	13.0	70.53	4.50	3.31	3.42	47.60	-0.02	0.79	1.14	2.29	1.46
2.352	14.1	70.62	4.51	3.30	3.41	48.19	-0.02	0.78	1.15	2.25	1.44
2.507	15.0	70.44	4.51	3.30	3.40	48.72	-0.03	0.78	1.16	2.23	1.42

Remarks: Undisturbed Sample (2.8" diameter), Hole No. BIS-2, S-6, Depth: 40.0' - 42.0'
Effective Confining Pressure Requested - 2.0 ksc

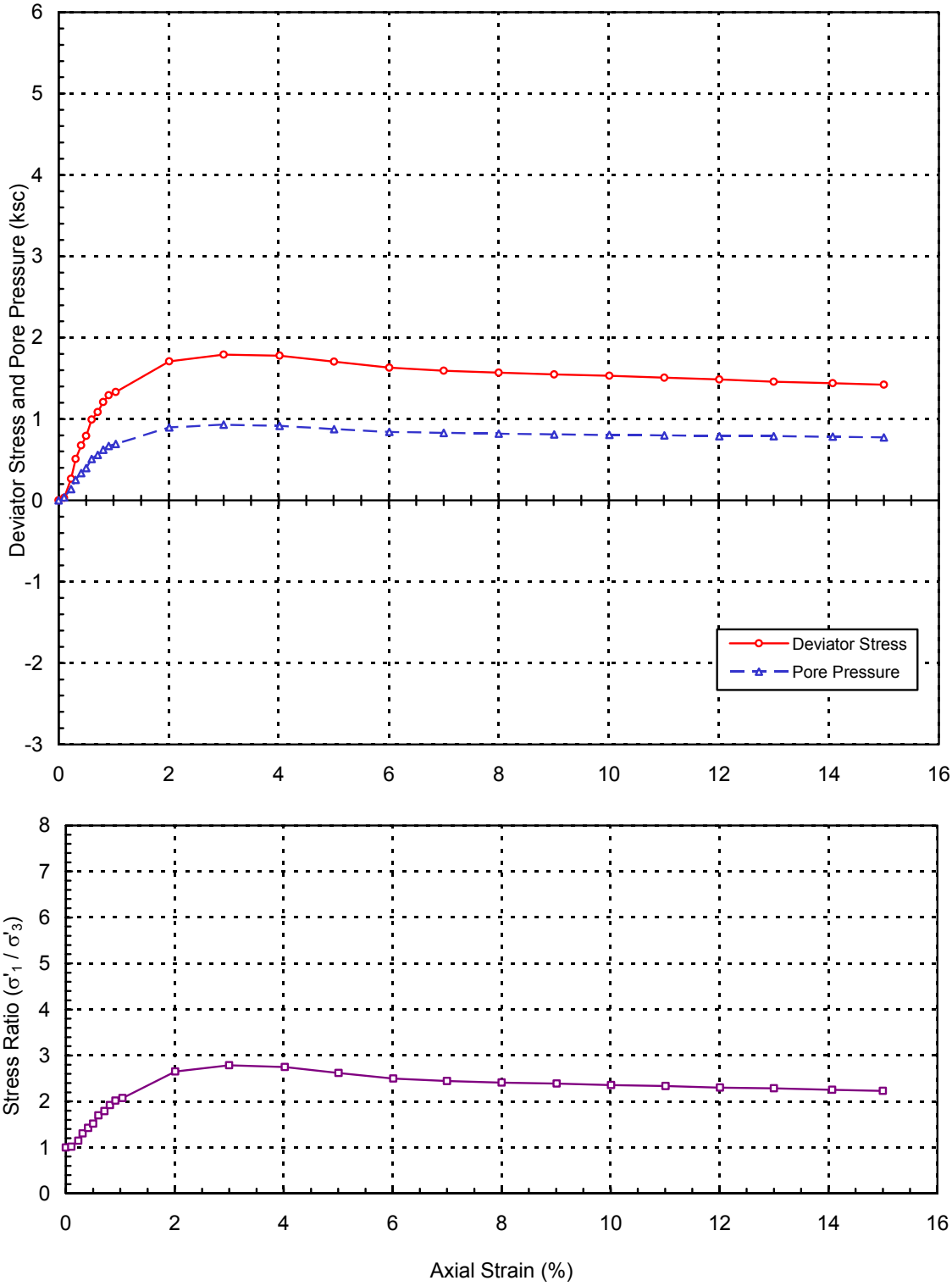
Request #: 2002-33
Lab #: 02-1317C

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

Pore Pressure, Deviator Stress, and Stress Ratio versus Axial Strain

Request No.: 2002-33 Lab No.: 02-1317C Test Date: 12/10/02



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF ENGINEERING
CIVIL DESIGN BRANCH
BRYTE SOILS AND CONCRETE LAB

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

DATE: 1/6/03 TIME: 7:20AM

SPECIMEN:
New Length *: 15.867 (cm)
New Diameter *: 7.257 (cm)
New Area, A_o *: 41.36 (cm^2)
B-Value: 97.6%
(* After consolidation)

MEMBRANE and FILTER STRIPS:
Thickness (mem): 0.024 (cm)
E Modulus (mem): 14.0 (kg/cm2)
K_{fp} (fs) 0.196 (kg/cm)
P_{fp} (fs) @: 10.0 (cm)
(@ Perimeter length of filter strips)

EQUIPMENT:
Frame No. 87899
Load Cell #: A96370
Initial σ_3' (ksc) 0.5
Axial Strain Rate: 0.005 (in. / min)

Displacement ΔH (cm)	Axial Strain ε (%)	Axial Load P (kg-f)	Chamber Pressure σ_{3T} (ksc)	Top Pore Pressure u_T (ksc)	Bottom Pore Pressure u_B (ksc)	Corrected Area $A_o/(1-e)$ (cm^2)	Membrane Correction $\Delta(\sigma_1 - \sigma_3)$ (ksc)	Pore Pressure Δu (ksc)	Effective Confining Stress σ_3' (ksc)	Stress Ratio σ_1'/σ_3'	Deviator Stress $(\sigma_1 - \sigma_3)$ (ksc)
0.000	0.0	0.00	5.00	4.48	4.51	41.36	0.00	0.00	0.50	1.00	0.00
0.018	0.1	0.00	5.00	4.48	4.51	41.41	0.00	0.00	0.51	1.00	0.00
0.033	0.2	0.09	5.00	4.48	4.51	41.45	0.00	0.00	0.51	1.00	0.00
0.048	0.3	0.36	5.00	4.48	4.51	41.48	0.00	0.00	0.50	1.02	0.01
0.066	0.4	0.86	5.00	4.49	4.51	41.53	0.00	0.00	0.50	1.04	0.02
0.084	0.5	1.68	5.00	4.49	4.51	41.58	0.00	0.00	0.50	1.08	0.04
0.102	0.6	14.24	5.00	4.58	4.61	41.63	0.00	0.10	0.40	1.84	0.34
0.114	0.7	17.92	5.00	4.63	4.66	41.66	0.00	0.15	0.35	2.22	0.43
0.132	0.8	18.46	5.00	4.64	4.67	41.71	0.00	0.16	0.34	2.28	0.44
0.152	1.0	20.32	4.99	4.67	4.70	41.76	0.00	0.19	0.31	2.57	0.48
0.163	1.0	22.18	4.99	4.70	4.72	41.79	0.00	0.21	0.28	2.86	0.53
0.325	2.1	28.80	4.99	4.72	4.75	42.23	0.00	0.24	0.26	3.64	0.68
0.485	3.1	36.56	4.99	4.70	4.72	42.66	-0.01	0.21	0.28	3.99	0.85
0.648	4.1	48.85	5.00	4.62	4.65	43.12	-0.01	0.14	0.36	4.11	1.13
0.800	5.0	59.10	5.00	4.56	4.58	43.55	-0.01	0.08	0.43	4.17	1.35
0.955	6.0	73.75	5.00	4.46	4.49	44.00	-0.01	-0.02	0.53	4.16	1.67
1.110	7.0	89.95	4.99	4.35	4.38	44.47	-0.01	-0.13	0.63	4.21	2.01
1.270	8.0	106.10	5.00	4.25	4.27	44.96	-0.01	-0.23	0.73	4.19	2.35
1.438	9.1	124.92	5.00	4.12	4.15	45.49	-0.02	-0.36	0.86	4.16	2.73
1.593	10.0	145.33	5.00	3.98	4.01	45.97	-0.02	-0.50	1.01	4.13	3.14
1.748	11.0	167.51	5.00	3.83	3.86	46.48	-0.02	-0.65	1.15	4.11	3.58
1.905	12.0	188.01	5.00	3.70	3.71	47.01	-0.02	-0.79	1.29	4.08	3.98
2.065	13.0	214.96	5.00	3.50	3.53	47.55	-0.02	-0.98	1.48	4.03	4.50
2.225	14.0	251.15	5.00	3.25	3.27	48.11	-0.02	-1.24	1.74	3.99	5.20
2.383	15.0	286.85	5.00	3.00	3.02	48.66	-0.03	-1.48	1.99	3.95	5.87

Remarks: Undisturbed Sample, (2.8" diameter), Hole No. BIS-1, S-7, Depth: 30.0' - 32.0'
Effective Confining Pressure Requested - 0.5 ksc

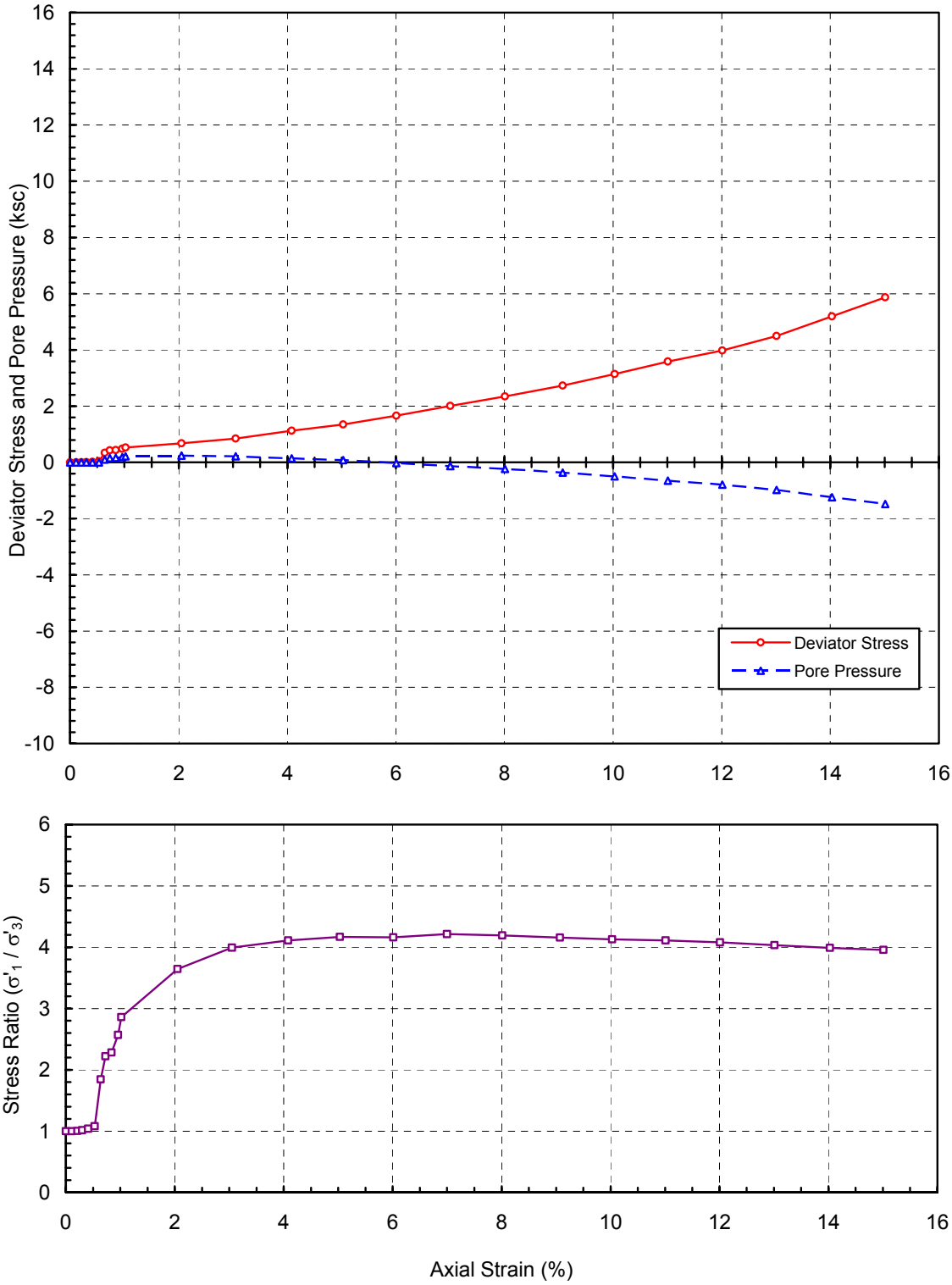
Request #: 2002-33
Lab #: 02-1289A

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

Pore Pressure, Deviator Stress, and Stress Ratio versus Axial Strain

Request No.: 2002-33 Lab No.: 02-1289A Test Date: 1/6/03



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF ENGINEERING
CIVIL DESIGN BRANCH
BRYTE SOILS AND CONCRETE LAB

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

DATE: 12/24/02 TIME: 8:04AM

SPECIMEN:
New Length *: 16.452 (cm)
New Diameter *: 7.279 (cm)
New Area, A_o *: 41.61 (cm^2)
B-Value: 94.9%
(* After consolidation)

MEMBRANE and FILTER STRIPS:
Thickness (mem): 0.024 (cm)
E Modulus (mem): 14.0 (kg/cm2)
K_{fp} (fs) 0.196 (kg/cm)
P_{fp} (fs) @: 10.0 (cm)
(@ Perimeter length of filter strips)

EQUIPMENT:
Frame No. 87900
Load Cell #: A96350
Initial σ_3' (ksc) 0.98
Axial Strain Rate: 0.003 (in. / min)

Displacement ΔH (cm)	Axial Strain ε (%)	Axial Load P (kg-f)	Chamber Pressure σ_{3T} (ksc)	Top Pore Pressure u_T (ksc)	Bottom Pore Pressure u_B (ksc)	Corrected Area $A_o/(1-e)$ (cm^2)	Membrane Correction $\Delta(\sigma_1 - \sigma_3)$ (ksc)	Pore Pressure Δu (ksc)	Effective Confining Stress σ_3' (ksc)	Stress Ratio σ_1'/σ_3'	Deviator Stress $(\sigma_1 - \sigma_3)$ (ksc)
0.000	0.0	0.20	5.01	3.96	4.08	41.61	0.00	0.00	0.98	1.00	0.00
0.018	0.1	1.32	5.01	3.97	4.08	41.66	0.00	0.01	0.98	1.03	0.03
0.033	0.2	1.95	5.01	3.98	4.08	41.70	0.00	0.01	0.97	1.05	0.05
0.053	0.3	2.31	5.01	3.98	4.09	41.74	0.00	0.02	0.97	1.06	0.05
0.066	0.4	4.08	5.01	3.99	4.10	41.78	0.00	0.02	0.96	1.10	0.10
0.086	0.5	17.37	5.01	4.08	4.20	41.83	0.00	0.12	0.86	1.48	0.41
0.099	0.6	31.43	5.01	4.23	4.34	41.87	0.00	0.27	0.72	2.04	0.75
0.117	0.7	38.28	5.01	4.31	4.42	41.90	0.00	0.34	0.64	2.42	0.91
0.132	0.8	45.99	5.01	4.37	4.49	41.95	0.00	0.41	0.58	2.90	1.10
0.155	0.9	50.94	5.01	4.41	4.51	42.00	0.00	0.44	0.54	3.22	1.21
0.168	1.0	53.61	5.01	4.42	4.53	42.04	0.00	0.45	0.53	3.38	1.27
0.333	2.0	94.71	5.01	4.34	4.44	42.47	0.00	0.37	0.62	4.62	2.23
0.495	3.0	146.87	5.00	4.06	4.18	42.90	-0.01	0.10	0.88	4.89	3.42
0.660	4.0	217.23	4.99	3.65	3.75	43.35	-0.01	-0.32	1.29	4.88	5.00
0.823	5.0	305.99	4.99	3.09	3.20	43.80	-0.01	-0.87	1.85	4.78	6.98
0.991	6.0	392.90	4.99	2.50	2.60	44.28	-0.01	-1.47	2.44	4.63	8.86
1.153	7.0	468.38	4.99	1.96	2.07	44.75	-0.01	-2.00	2.97	4.52	10.45
1.321	8.0	543.31	4.99	1.43	1.54	45.24	-0.01	-2.53	3.50	4.42	11.99
1.483	9.0	600.83	4.99	1.02	1.12	45.73	-0.02	-2.95	3.92	4.35	13.12
1.648	10.0	645.19	4.99	0.72	0.82	46.25	-0.02	-3.25	4.22	4.30	13.93
1.811	11.0	673.45	4.99	0.54	0.64	46.76	-0.02	-3.43	4.40	4.27	14.38
1.979	12.0	697.63	4.98	0.39	0.49	47.30	-0.02	-3.58	4.55	4.24	14.73
2.141	13.0	712.00	4.99	0.29	0.38	47.83	-0.02	-3.69	4.66	4.19	14.86
2.311	14.1	717.76	4.99	0.23	0.32	48.41	-0.02	-3.75	4.72	4.14	14.80
2.479	15.1	717.67	4.99	0.18	0.27	48.99	-0.03	-3.79	4.76	4.07	14.62

Remarks: Undisturbed Sample, (2.8" diameter), Hole No. BIS-1, S-7, Depth: 30.0' - 32.0'
Effective Confining Pressure Requested - 1.0 ksc

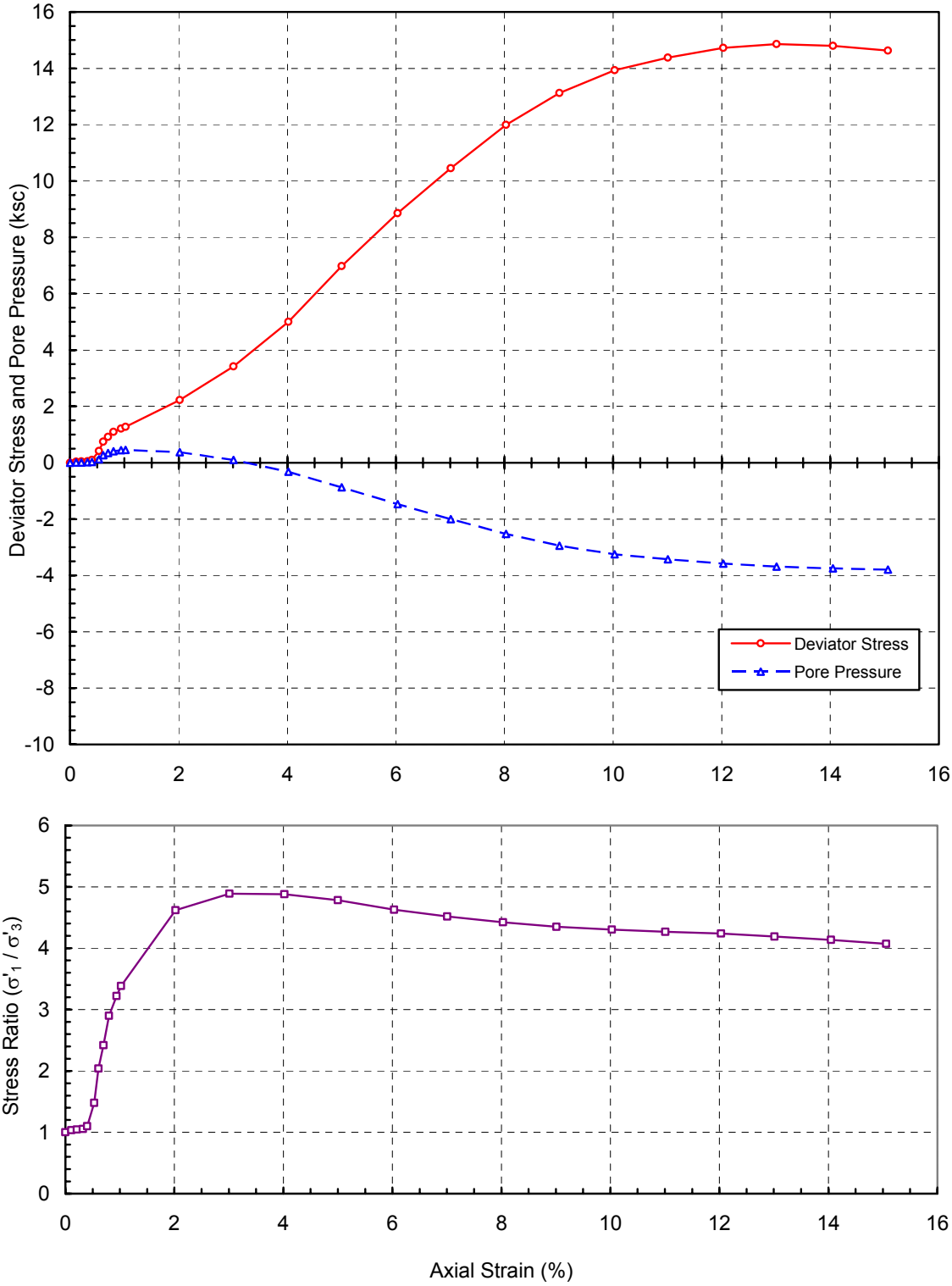
Request #: 2002-33
Lab #: 02-1289B

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

Pore Pressure, Deviator Stress, and Stress Ratio versus Axial Strain

Request No.: 2002-33 Lab No.: 02-1289B Test Date: 12/24/02



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF ENGINEERING
CIVIL DESIGN BRANCH
BRYTE SOILS AND CONCRETE LAB

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

DATE: 12/20/02 TIME: 8:11AM

SPECIMEN:
New Length *: 16.172 (cm)
New Diameter *: 7.279 (cm)
New Area, A_o *: 41.61 (cm^2)
B-Value: 97.5%
(* After consolidation)

MEMBRANE and FILTER STRIPS:
Thickness (mem): 0.024 (cm)
E Modulus (mem): 14.0 (kg/cm2)
K_{fp} (fs) 0.196 (kg/cm)
P_{fp} (fs) @: 10.0 (cm)
(@ Perimeter length of filter strips)

EQUIPMENT:
Frame No. 87899
Load Cell #: A96370
Initial σ_3' (ksc) 2.0
Axial Strain Rate: 0.004 (in. / min)

Displacement ΔH (cm)	Axial Strain ε (%)	Axial Load P (kg-f)	Chamber Pressure σ_{3T} (ksc)	Top Pore Pressure u_T (ksc)	Bottom Pore Pressure u_B (ksc)	Corrected Area $A_o/(1-e)$ (cm^2)	Membrane Correction $\Delta(\sigma_1 - \sigma_3)$ (ksc)	Pore Pressure Δu (ksc)	Effective Confining Stress σ_3' (ksc)	Stress Ratio σ_1'/σ_3'	Deviator Stress $(\sigma_1 - \sigma_3)$ (ksc)
0.000	0.0	0.00	5.51	3.50	3.52	41.61	0.00	0.00	2.00	1.00	0.00
0.015	0.1	1.41	5.51	3.51	3.53	41.65	0.00	0.01	1.99	1.02	0.03
0.033	0.2	2.40	5.51	3.51	3.53	41.69	0.00	0.01	1.99	1.03	0.06
0.051	0.3	2.49	5.51	3.52	3.53	41.74	0.00	0.01	1.98	1.03	0.06
0.069	0.4	3.18	5.51	3.52	3.53	41.79	0.00	0.01	1.98	1.04	0.08
0.081	0.5	3.63	5.51	3.52	3.54	41.82	0.00	0.02	1.98	1.04	0.09
0.099	0.6	4.49	5.51	3.53	3.54	41.86	0.00	0.03	1.97	1.05	0.11
0.114	0.7	10.61	5.51	3.56	3.59	41.91	0.00	0.07	1.93	1.13	0.25
0.135	0.8	29.35	5.51	3.70	3.71	41.96	0.00	0.20	1.80	1.39	0.70
0.147	0.9	50.08	5.51	3.86	3.88	41.99	0.00	0.36	1.63	1.73	1.19
0.163	1.0	66.45	5.51	4.00	4.02	42.03	0.00	0.50	1.49	2.06	1.58
0.325	2.0	134.81	5.51	4.32	4.33	42.47	0.00	0.81	1.18	3.68	3.17
0.485	3.0	207.70	5.51	4.07	4.09	42.90	-0.01	0.57	1.42	4.40	4.84
0.648	4.0	282.54	5.51	3.68	3.69	43.34	-0.01	0.17	1.82	4.58	6.51
0.810	5.0	357.07	5.51	3.23	3.25	43.81	-0.01	-0.27	2.26	4.60	8.14
0.970	6.0	438.44	5.51	2.71	2.73	44.27	-0.01	-0.79	2.79	4.55	9.89
1.133	7.0	513.83	5.51	2.21	2.21	44.75	-0.01	-1.30	3.30	4.47	11.47
1.295	8.0	585.36	5.51	1.69	1.70	45.23	-0.01	-1.81	3.81	4.40	12.93
1.458	9.0	588.90	5.51	1.19	1.20	45.73	-0.02	-2.32	4.32	3.98	12.86
1.626	10.1	588.90	5.51	0.79	0.79	46.26	-0.02	-2.72	4.72	3.69	12.71
1.783	11.0	588.90	5.51	0.45	0.46	46.76	-0.02	-3.06	5.06	3.49	12.57
1.941	12.0	588.90	5.51	0.24	0.23	47.28	-0.02	-3.27	5.28	3.36	12.43
2.106	13.0	588.90	5.51	0.11	0.11	47.83	-0.02	-3.40	5.41	3.27	12.29
2.271	14.0	588.90	5.51	0.01	0.01	48.41	-0.02	-3.50	5.50	3.21	12.14
2.433	15.0	588.90	5.51	-0.04	-0.04	48.98	-0.03	-3.55	5.55	3.16	12.00

Load cell maxed out.

Remarks: Undisturbed Sample (2.8" diameter), Hole No. BIS-1, S-7, Depth: 30.0' - 32.0'
Effective Confining Pressure Requested - 2.0 ksc

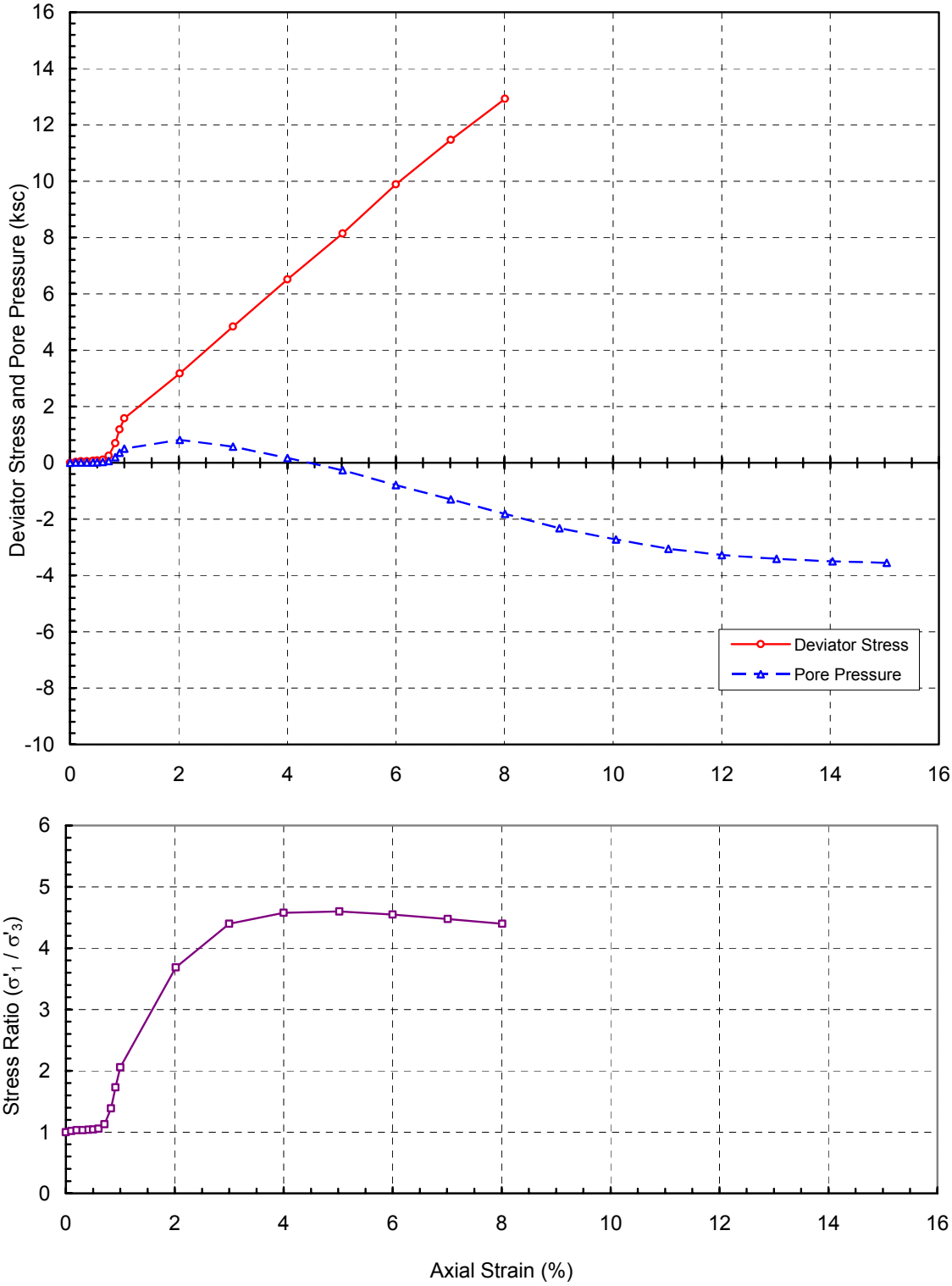
Request #: 2002-33
Lab #: 02-1289C

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

Pore Pressure, Deviator Stress, and Stress Ratio versus Axial Strain

Request No.: 2002-33 Lab No.: 02-1289C Test Date: 12/20/02



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF ENGINEERING
CIVIL DESIGN BRANCH
BRYTE SOILS AND CONCRETE LAB

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

DATE: 11/27/02 TIME: 8:09AM

SPECIMEN:
New Length *: 16.419 (cm)
New Diameter *: 7.288 (cm)
New Area, A_o *: 41.72 (cm^2)
B-Value: 97.1%
(* After consolidation)

MEMBRANE and FILTER STRIPS:
Thickness (mem): 0.024 (cm)
E Modulus (mem): 14.0 (kg/cm2)
K_{fp} (fs) 0.196 (kg/cm)
P_{fp} (fs) @: 10.0 (cm)
(@ Perimeter length of filter strips)

EQUIPMENT:
Frame No. 87899
Load Cell #: A96370
Initial σ_3' (ksc) 0.49
Axial Strain Rate: 0.003 (in. / min)

Displacement ΔH (cm)	Axial Strain ε (%)	Axial Load P (kg-f)	Chamber Pressure σ_{3T} (ksc)	Top Pore Pressure u_T (ksc)	Bottom Pore Pressure u_B (ksc)	Corrected Area $A_o/(1-e)$ (cm^2)	Membrane Correction $\Delta(\sigma_1 - \sigma_3)$ (ksc)	Pore Pressure Δu (ksc)	Effective Confining Stress σ_3' (ksc)	Stress Ratio σ_1'/σ_3'	Deviator Stress $(\sigma_1 - \sigma_3)$ (ksc)
0.000	0.0	0.10	5.00	4.49	4.53	41.72	0.00	0.00	0.49	1.00	0.00
0.018	0.1	1.95	5.01	4.50	4.53	41.77	0.00	0.00	0.49	1.09	0.05
0.036	0.2	11.66	5.01	4.53	4.56	41.81	0.00	0.04	0.46	1.60	0.28
0.051	0.3	22.45	5.01	4.58	4.61	41.85	0.00	0.08	0.41	2.30	0.54
0.066	0.4	27.85	5.01	4.59	4.63	41.89	0.00	0.10	0.40	2.67	0.66
0.086	0.5	32.16	5.01	4.60	4.63	41.94	0.00	0.11	0.39	2.96	0.77
0.099	0.6	34.70	5.01	4.59	4.63	41.97	0.00	0.10	0.40	3.08	0.83
0.114	0.7	37.74	5.01	4.58	4.62	42.01	0.00	0.09	0.40	3.22	0.90
0.135	0.8	40.01	5.00	4.58	4.61	42.06	0.00	0.08	0.40	3.35	0.95
0.157	1.0	42.05	5.01	4.57	4.61	42.12	0.00	0.08	0.42	3.38	1.00
0.165	1.0	44.45	5.01	4.56	4.60	42.14	0.00	0.07	0.43	3.48	1.05
0.333	2.0	72.35	5.00	4.39	4.43	42.58	0.00	-0.10	0.59	3.89	1.70
0.495	3.0	111.22	5.00	4.13	4.16	43.01	-0.01	-0.36	0.85	4.03	2.58
0.658	4.0	159.30	5.00	3.78	3.81	43.46	-0.01	-0.71	1.20	4.04	3.66
0.820	5.0	209.92	5.00	3.40	3.43	43.92	-0.01	-1.10	1.59	4.01	4.77
0.986	6.0	258.32	5.01	3.04	3.07	44.38	-0.01	-1.46	1.95	3.98	5.81
1.151	7.0	312.57	5.00	2.62	2.65	44.87	-0.01	-1.88	2.37	3.94	6.95
1.316	8.0	357.43	5.00	2.27	2.30	45.35	-0.01	-2.23	2.71	3.90	7.87
1.478	9.0	407.64	5.00	1.87	1.90	45.85	-0.02	-2.63	3.11	3.85	8.87
1.643	10.0	446.83	5.01	1.56	1.58	46.36	-0.02	-2.94	3.43	3.80	9.62
1.808	11.0	486.70	5.01	1.22	1.25	46.88	-0.02	-3.27	3.77	3.75	10.36
1.979	12.1	511.79	5.01	1.01	1.04	47.44	-0.02	-3.48	3.98	3.71	10.77
2.136	13.0	536.69	5.01	0.80	0.82	47.97	-0.02	-3.70	4.19	3.66	11.17
2.301	14.0	545.90	5.01	0.72	0.74	48.52	-0.02	-3.78	4.28	3.62	11.23
2.464	15.0	556.29	5.01	0.59	0.61	49.08	-0.03	-3.91	4.40	3.57	11.31

Remarks: Undisturbed Sample (2.8" diameter), Hole No. WTS-2, S-3, Depth: 30.0' - 32.0'
Effective Confining Pressure Requested - 0.5 ksc

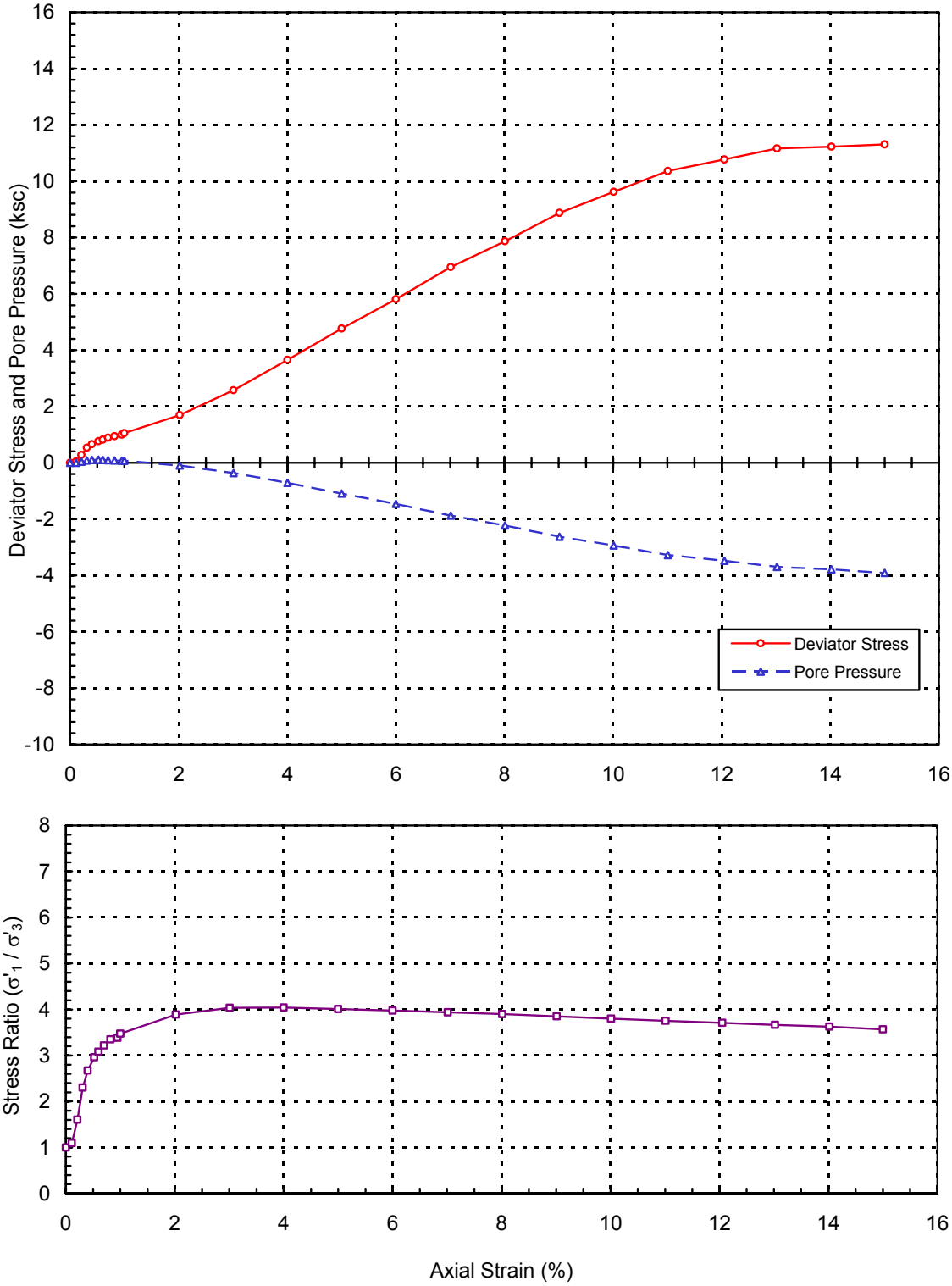
Request #: 2002-33
Lab #: 02-1384A

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

Pore Pressure, Deviator Stress, and Stress Ratio versus Axial Strain

Request No.: 2002-33 Lab No.: 02-1384A Test Date: 11/27/02



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF ENGINEERING
CIVIL DESIGN BRANCH
BRYTE SOILS AND CONCRETE LAB

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

DATE: 11/26/02 TIME: 7:56AM

SPECIMEN:			MEMBRANE and FILTER STRIPS:			EQUIPMENT:		
New Length *:	16.055	(cm)	Thickness (mem):	0.024	(cm)	Frame No.	87900	
New Diameter *:	7.254	(cm)	E Modulus (mem):	14.0	(kg/cm2)	Load Cell #:	A96356	
New Area, A_o *:	41.33	(cm^2)	K_{fp} (fs)	0.196	(kg/cm)	Initial σ_3' (ksc)	1.02	
B-Value:	96.1%		P_{fp} (fs) @:	10.0	(cm)	Axial Strain Rate:	0.003	(in. / min)
(* After consolidation)			(@ Perimeter length of filter strips)					

Displacement ΔH (cm)	Axial Strain ε (%)	Axial Load P (kg-f)	Chamber Pressure σ_{3T} (ksc)	Top Pore Pressure u_T (ksc)	Bottom Pore Pressure u_B (ksc)	Corrected Area $A_o/(1-e)$ (cm^2)	Membrane Correction $\Delta(\sigma_1 - \sigma_3)$ (ksc)	Pore Pressure Δu (ksc)	Effective Confining Stress σ_3' (ksc)	Stress Ratio σ_1'/σ_3'	Deviator Stress $(\sigma_1 - \sigma_3)$ (ksc)
0.000	0.0	0.10	4.02	2.94	3.06	41.33	0.00	0.00	1.02	1.00	0.00
0.020	0.1	1.86	4.03	2.95	3.07	41.38	0.00	0.01	1.02	1.04	0.04
0.033	0.2	6.40	4.03	2.96	3.09	41.42	0.00	0.02	1.01	1.15	0.15
0.053	0.3	18.69	4.02	3.02	3.14	41.46	0.00	0.08	0.94	1.48	0.45
0.071	0.4	38.46	4.02	3.12	3.25	41.51	0.00	0.18	0.84	2.11	0.93
0.084	0.5	48.99	4.02	3.17	3.30	41.55	0.00	0.24	0.78	2.50	1.18
0.097	0.6	55.02	4.02	3.20	3.32	41.58	0.00	0.26	0.76	2.73	1.32
0.114	0.7	66.72	4.02	3.21	3.34	41.63	0.00	0.28	0.75	3.15	1.60
0.130	0.8	72.57	4.02	3.21	3.33	41.66	0.00	0.27	0.75	3.32	1.74
0.145	0.9	77.97	4.03	3.20	3.33	41.71	0.00	0.26	0.77	3.44	1.87
0.163	1.0	84.69	4.03	3.18	3.31	41.75	0.00	0.25	0.78	3.60	2.03
0.323	2.0	157.26	4.02	2.80	2.93	42.18	0.00	-0.13	1.16	4.22	3.72
0.485	3.0	250.79	4.03	2.19	2.33	42.61	-0.01	-0.74	1.77	4.33	5.88
0.643	4.0	352.31	4.03	1.49	1.62	43.05	-0.01	-1.44	2.47	4.31	8.18
0.803	5.0	456.22	4.02	0.74	0.88	43.51	-0.01	-2.19	3.21	4.26	10.48
0.963	6.0	510.11	4.02	0.34	0.46	43.97	-0.01	-2.60	3.62	4.20	11.59
1.125	7.0	603.01	4.01	-0.22	-0.10	44.44	-0.01	-3.16	4.18	4.25	13.56
1.285	8.0	607.18	4.02	-0.22	-0.10	44.93	-0.01	-3.16	4.18	4.23	13.50
1.448	9.0	638.02	4.02	-0.33	-0.21	45.43	-0.02	-3.27	4.29	4.27	14.03
1.605	10.0	639.43	4.02	-0.41	-0.29	45.92	-0.02	-3.35	4.37	4.18	13.91
1.770	11.0	643.42	4.02	-0.43	-0.32	46.45	-0.02	-3.37	4.39	4.15	13.83
1.930	12.0	639.88	4.02	-0.48	-0.37	46.98	-0.02	-3.42	4.44	4.06	13.60
2.088	13.0	617.11	4.03	-0.52	-0.41	47.51	-0.02	-3.47	4.50	3.88	12.97
2.248	14.0	565.36	4.04	-0.55	-0.44	48.06	-0.02	-3.49	4.53	3.59	11.74
2.408	15.0	544.04	4.03	-0.55	-0.44	48.63	-0.03	-3.50	4.52	3.47	11.16

Remarks: Undisturbed Sample (2.8" diameter), Hole No. WTS-2, S-3, Depth: 30.0' - 32.0'
Effective Confining Pressure Requested - 1.0 ksc

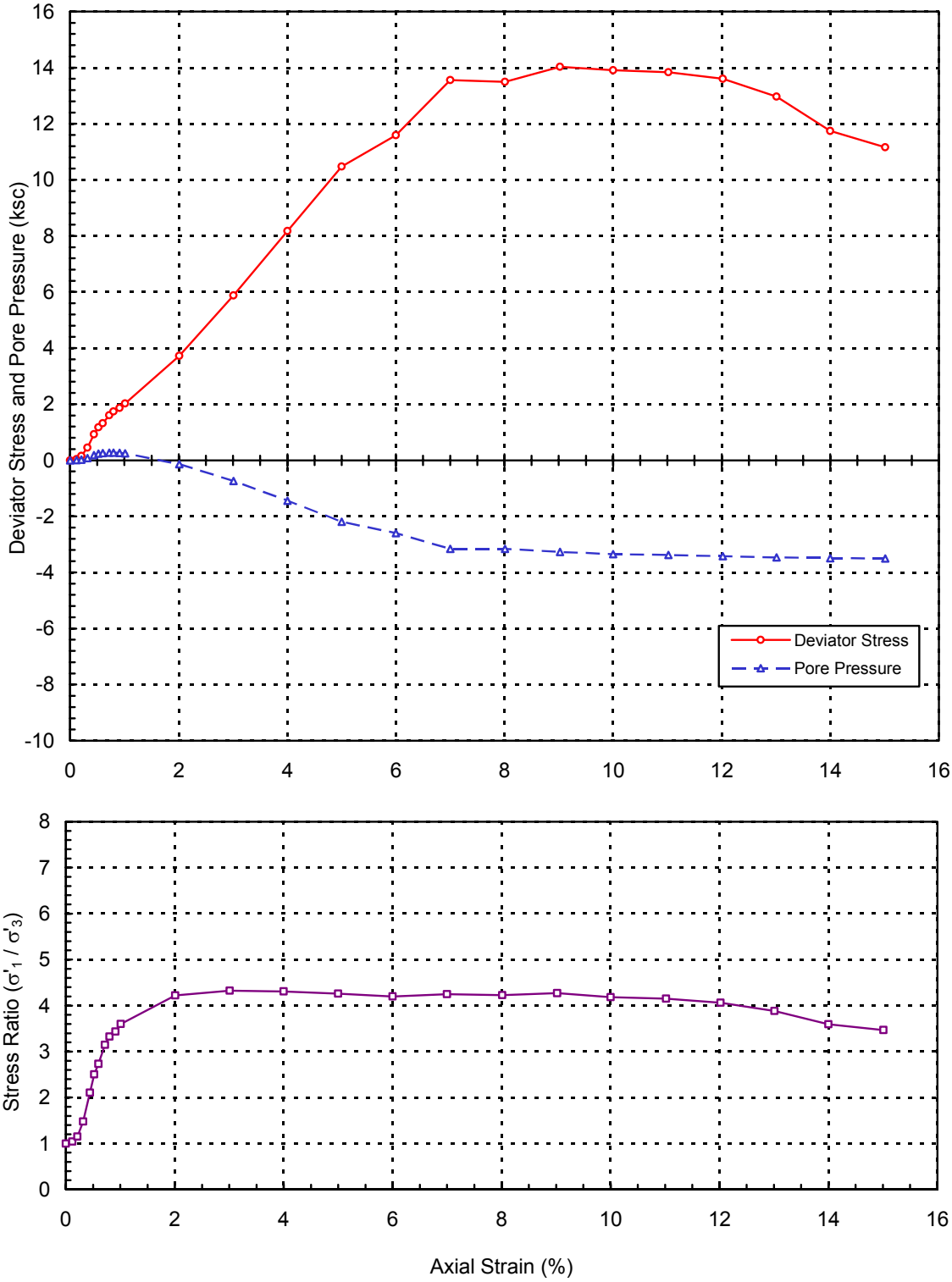
Request #: 2002-33
Lab #: 02-1384B

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

Pore Pressure, Deviator Stress, and Stress Ratio versus Axial Strain

Request No.: 2002-33 Lab No.: 02-1384B Test Date: 11/26/02



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

DIVISION OF ENGINEERING
CIVIL DESIGN BRANCH
BRYTE SOILS AND CONCRETE LAB

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

DATE: 11-18-02 TIME: 7:53AM

SPECIMEN:
New Length *: 16.632 (cm)
New Diameter *: 7.242 (cm)
New Area, A_o *: 41.19 (cm^2)
B-Value: 94.9%
(* After consolidation)

MEMBRANE and FILTER STRIPS:
Thickness (mem): 0.024 (cm)
E Modulus (mem): 14.0 (kg/cm2)
K_{fp} (fs) 0.196 (kg/cm)
P_{fp} (fs) @: 10.0 (cm)
(@ Perimeter length of filter strips)

EQUIPMENT:
Frame No.
Load Cell #:
Initial σ_3' (ksc) 2.0
Axial Strain Rate: 0.002 (in. / min)

Displacement ΔH (cm)	Axial Strain ε (%)	Axial Load P (kg-f)	Chamber Pressure σ_{3T} (ksc)	Top Pore Pressure u_T (ksc)	Bottom Pore Pressure u_B (ksc)	Corrected Area $A_o/(1-e)$ (cm^2)	Membrane Correction $\Delta(\sigma_1 - \sigma_3)$ (ksc)	Pore Pressure Δu (ksc)	Effective Confining Stress σ_3' (ksc)	Stress Ratio σ_1'/σ_3'	Deviator Stress $(\sigma_1 - \sigma_3)$ (ksc)
0.000	0.0	0.30	5.00	3.02	2.99	41.19	0.00	0.00	1.99	1.00	0.00
0.018	0.1	0.41	5.00	3.03	3.00	41.23	0.00	0.01	1.99	1.00	0.01
0.036	0.2	6.62	5.00	3.07	3.03	41.28	0.00	0.04	1.95	1.08	0.16
0.051	0.3	34.88	5.01	3.26	3.22	41.31	0.00	0.23	1.77	1.48	0.84
0.066	0.4	52.98	5.00	3.40	3.36	41.36	0.00	0.37	1.62	1.79	1.28
0.084	0.5	64.91	5.00	3.49	3.45	41.40	0.00	0.46	1.53	2.02	1.57
0.102	0.6	88.09	5.00	3.62	3.59	41.44	0.00	0.60	1.40	2.52	2.12
0.117	0.7	99.11	5.00	3.66	3.63	41.48	0.00	0.64	1.35	2.76	2.39
0.135	0.8	110.18	5.00	3.68	3.65	41.53	0.00	0.66	1.33	2.99	2.65
0.155	0.9	118.21	5.00	3.68	3.64	41.58	0.00	0.66	1.34	3.13	2.84
0.168	1.0	125.51	5.00	3.67	3.63	41.61	0.00	0.65	1.35	3.24	3.01
0.333	2.0	225.57	5.00	3.21	3.17	42.03	0.00	0.18	1.81	3.96	5.36
0.500	3.0	339.15	5.00	2.44	2.40	42.47	-0.01	-0.58	2.58	4.10	7.98
0.665	4.0	386.46	4.99	1.58	1.55	42.91	-0.01	-1.44	3.43	3.63	9.00
0.833	5.0	386.46	5.00	0.78	0.75	43.36	-0.01	-2.24	4.24	3.10	8.90
1.003	6.0	386.46	5.00	0.15	0.12	43.83	-0.01	-2.87	4.86	2.81	8.81
1.166	7.0	386.46	5.00	-0.46	-0.51	44.29	-0.01	-3.49	5.48	2.59	8.71

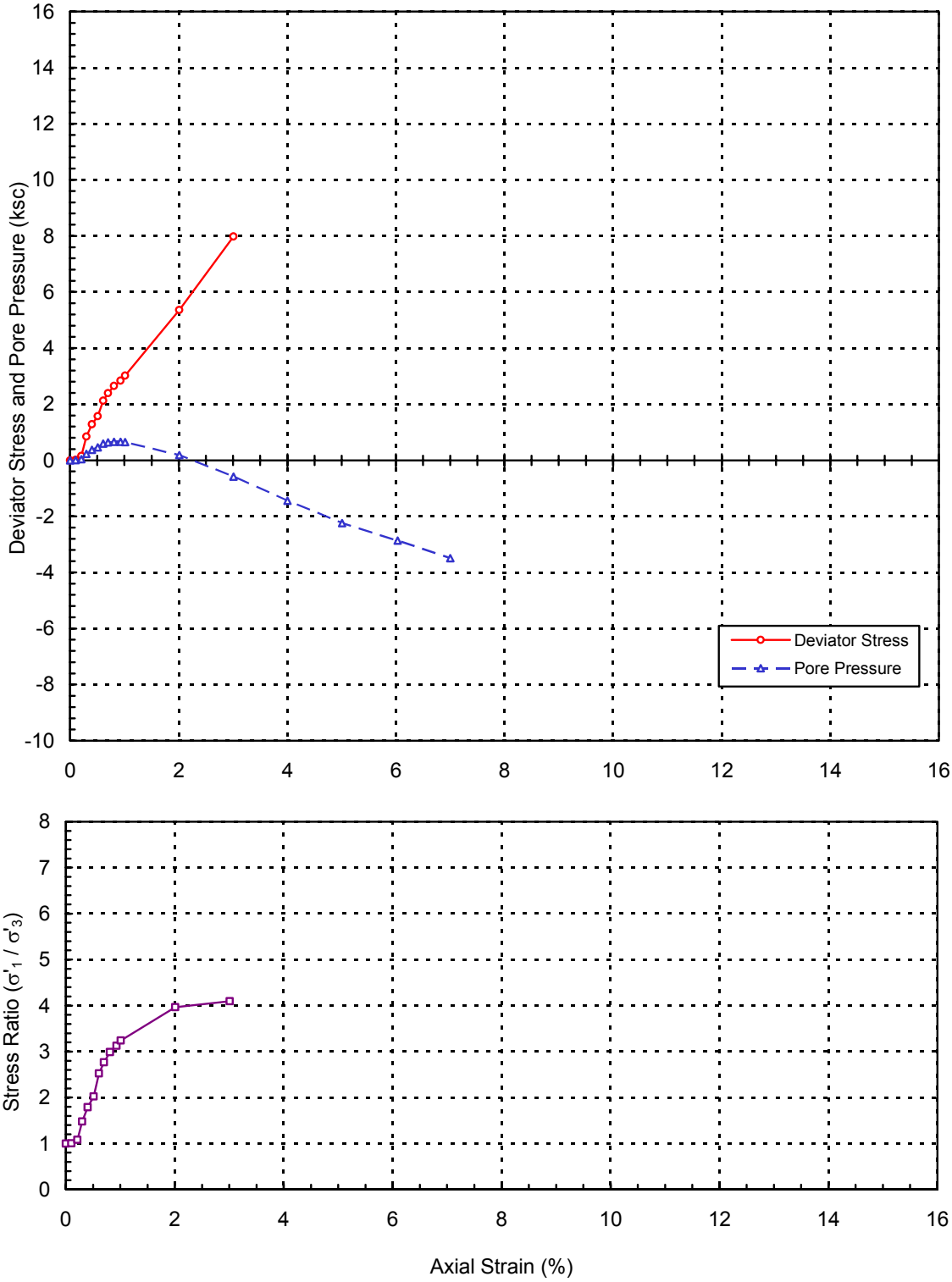
LOAD CELL MAXED OUT.

Remarks: Undisturbed Sample (2.8" diameter), Hole No. WTS-2 , S-3, Depth: 30.0' - 32.0 '
Effective Confining Pressure Requested - 2.0 ksc
Load cell topped out at 852 lbs.

Request #: 2002-33
Lab #: 02-1384C

TRIAXIAL COMPRESSION

ASTM 4767 : Consolidated-Undrained Triaxial Compression Test on Cohesive Soils

Pore Pressure, Deviator Stress, and Stress Ratio versus Axial Strain

Request No.: 2002-33 Lab No.: 02-1384C Test Date: 11-18-02