CORRELATION OF FULLY SOFTENED SHEAR STRENGTH OF CLAY SOIL WITH INDEX PROPERTIES – PHASE I

By

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CORRELATION OF FULLY SOFTENED SHEAR STRENGTH OF CLAY SOIL WITH INDEX PROPERTIES – PHASE I

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CHAPTER I

INTRODUCTION

Shallow slope failure is one of the huge problems in the geotechnical engineering projects. These failures can cost millions of dollars every year. These failures can occur on embankments and cut slopes that lead to expensive repairs and affect budgets, traffic systems, environmental conditions and safety. Embankments and cut slopes often fail when the clay soils become fully softened due to shrink-swell action, wet-dry cycles and downhill creep.

Peak strength values of clay soils are usually available and can be tested economically in geotechnical engineering laboratories. On the other hand, fully-softened shear strength values require non-routine and costly procedures in the laboratory and are not very practical, especially for small and average size projects.

In this project, the model equation was developed to have a correlation between the peak strength values from standard laboratory tests and the fully-softened values which are likely to develop in the slopes over time.

Using peak shear strength from laboratory tests can lead to overestimation of factor of safety. On the other hand, using residual shear strength in the analysis can underestimate the factor of safety for first time slides. The best solution to this problem is to use the prediction of fully softened

shear strength values which can give accurate designs, long term stability, easy ways of repair, and can save construction cost.

It is important to know about all these data including the peak and fully softened strengths to help with stability analysis.

Residual strength is the strength of the soil after a slide surface has developed, which happens after failure. On the other hand, the fully softened strength is the strength of soil prior to actual failure. The residual strength can be determined by using the reversal direct shear test or ring shear test. The peak shear strength as used here means the peak strength value obtained from standard laboratory triaxial tests on either in situ condition soil specimens or recompacted soil specimens.

“The residual shear strength of cohesive soils is applicable to new and existing slopes that contain a pre-existing shear surface. A pre-existing shear surface, and thus a residual shear strength condition, is present in old landslides or soliflucted slopes, bedding shears in folded strata, in sheared joints or faults, and after an embankment failure .“ (Skempton 1985).

Fully softened shear strength of cohesive soils is a very important parameter to help in evaluating the stability of slopes that have not undergone previous sliding which can be defined as first time slides (Stark 2005).

In this project, the samples were overconsolidated clay that was obtained in the in situ condition in the field. Overconsolidated clay in the field has been subjected to greater stress in the past due to previous overburden that has eroded away. Normally consolidated clay in the field has never been under greater stress in the past than currently exists. Over consolidated clay with moisture

content well below the plastic limit has a dense structure and often has negative pore water pressure. The focus in this research was on the overconsolidated clay properties and the relationship between the peak shear strength and the fully softened shear strength.

It will be a good idea to include some field samples of normally consolidated clay in Phase II and check the results with the results of overconsolidated clay used in Phase I research.

The fully softened condition corresponds to the condition after which the over consolidated clay has absorbed as much water as it desires, has gone through shrink-swell cycles, and downhill creep and has reached equilibrium at a particular site (Stark 2005).

Skempton (1977) concludes that slopes that have not undergone previous sliding can be designed using fully softened shear strength. Investigations by Skempton et al. (1969) and Skempton (1977) indicate that softening of an overconsolidated clay reduces the effective stress cohesion component of the Mohr-Coulomb shear strength parameters, but doesn't cause orientation of clay particles or reduction in friction angle (Skempton 1970). However, later research by Stark, et al. (2005) indicated a modest reduction in friction angle of fully-softened laboratory specimens compared to laboratory test results on specimens of normally consolidated clay.

Skempton (1977) also suggests that the long-term shear strength available in overconsolidated clay that has not under gone previous sliding corresponds to the fully softened condition (Stark 2005).

Most of research indicates that the residual strength has a relationship with the type of clay mineral and quantity clay size particles. The type of clay mineralogy can be indicated by the liquid limit, and the clay-size fraction that can give the quantity of particles smaller than 0.002

mm. On the other hand, in this project the focus was on correlation of the fully softened strength with liquid limit, plastic limit and the entire fines fraction (percent passing number 200 sieve) rather than just on the clay size fraction.

Having high liquid limit corresponds to a high clay-size fraction which may lead to the wrong estimation of fully softened strength correlations in some clay soils. Therefore in this project the data were developed based on the liquid limit (LL), plastic limit (PL) percent passing the number 200 sieve (<200) and correlation with peak strength to lead to more accurate estimations of fully softened strength.

The soil samples in this research were overconsolidated as received from the field and the in situ test condition was on the overconsolidated specimens. However, after processing in the laboratory for fully softened condition, the specimens were normally consolidated during the remaining testing.

There was no need to find the residual strengths in this project because the research subject is fully softened strength in embankment and cut slopes that have not experienced previous slope failures. Prior to failure, it is important to know the peak and fully soften strengths, specially, for the embankment and slopes that may become fully softened. That may lead to failures in many cases because of an unstable situation.

Stability analysis depends mainly on the factor of safety, which can tell if the slope is stable or not stable. The factor of safety in a limit equilibrium analysis is the resistant forces divided by the driving forces. In other words, it is the available shear strength divided by the shear stress required for equilibrium of the slope.

Phase I of this research project has only one type of soil, which consists mostly of lean clay with a few samples that classify as fat clay. The soil is very similar because both the lean clay and fat clay are near the boundary of the classifications for these soils and are separated in most cases by only a few points in liquid limit. The project also included only undrained shear strengths. The correlation equation between standard shear strengths and the fully softened shear strength values provides an easy and rapid calculation of fully softened shear strength values of different clay samples from peak strength values and its index properties. Determination of peak strength values involves a routine and practical process that can be done in most standard geotechnical laboratories. On the other hand, determination of fully softened shear strength values in the laboratory is time consuming and expensive. It is not practical to determine fully softened shear strength by laboratory testing for most routine projects.

The Phase I project will make it easier to have more accurate designs of embankments and cut slopes by being able to estimate undrained fully softened shear strength from peak strength values and index properties. It also can save cost in repairing and stabilizing some slope failures. Definitely, shallow slope failures can be better understood and minimized because of being able to correlate peak strength values and fully softened strength values for routine projects.

Benefits

The results of this research allow rapid calculation of fully softened shear strength values from peak strength values and the index properties for the clay type and in situ conditions studied in this research.

The model equation will facilitate calculating the fully softened shear strength without the need of doing the triaxial tests on fully softened specimens. This also will facilitate having more accuracy, less expenses, designing new slopes, repairing, and stabilizing of existing slopes.

Report Format

The report format of this research includes the main body of the report, and an appendix that includes all the laboratory test results and a summary table of the model calculations. The body of the report has photographs and a large table that shows the soil properties and sample locations.

This report contains main headings and subheadings to make it easy for the reader to follow and understand it in a better way.

Research Funding

This research has been funded by two private industries (two firms at $5000 and $6000) and Oklahoma Department of Transportation (ODOT) funding ($5000). The total of Phase I funding was $16,000 for the public and private funding. The funding of this research was limited for Phase I so only one clay soil was used in the soil lab and only undrained shear strengths were performed.

Background

A preliminary equation for estimating fully-softened shear strength values of clay soils using the standard peak strength values and correlation with index properties and moisture content of the peak strength specimens at the time of testing has been previously developed (Gregory 2011). The equation is based on embankment fills consisting of clay soils. The equation appears to provide a good correlation, but is based on limited test data and only on fill soils. This research project included additional testing of clay samples using both undrained peak strength and undrained fully-softened strength test procedures on the same soil specimens to more accurately develop the coefficients in the equation for the particular soil type considered in this research. A proposed future research study (Phase II) will address four additional soil types and will include testing of soils in the in-situ condition, recompacted condition, and soil specimens prepared in the fully-softened condition. Phase II will also include undrained and drained shear strength testing. Phase II has not been funded or authorized at this time.

In the current research project, the use of soil properties is very important to better define an equation to calculate the fully-softened shear strength values from available peak values. These soil properties like the Atterberg limits (LL and PL) and percent passing the number 200 sieve do not change with the change of environment. On the other hand, soil parameters like shear strength, permeability, hydraulic conductivity and compressibility are not constant and can change with the change of the environment. For example, the shear strength goes down when the soil get wet, which will increase the compressibility. Once the index properties are determined for a particular clay soil, these values will remain constant and only routine peak strength testing for different conditions will be required to develop data for prediction of fully softened strength.

This research project includes different tests of clay samples using both the undrained peak strength and undrained fully softened strength processes to know and verify the coefficients in the equation which considers one clay soil type.

Objectives

The objective of this research is to find a correlation between peak strength values and fully-softened strength values by using the moisture content, Atterberg limits, and percent passing No. 200 sieve of all the soil samples tested.

This correlation can be found by formalizing an equation that can calculate the fully-softened strength from peak strength values and its index properties.

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CHAPTER II

SOIL DESCRIPTION AND PROPERTIES

Soil Sample Locations

The site location where the soil samples were collected is approximately four miles south of Cushing, Oklahoma. The site is southwest of the intersection of CR EW750 AND CR NS3510. This location is within Map index number 53 of the NRCS soil survey of Payne County, Oklahoma (1987) and is within the Stephenville fine sandy loam soil series. Geologically, the site is within the Vanoss-Ada Unit (Gregory 2011).

Soil Sample Depths and Diameter

The 18 samples were collected from different depths in ten boring locations, which have been performed by Terracon (Gregory 2011). The sample depth varies from one foot to 29 feet. Two samples were collected from the same boring in most cases.

The samples were obtained with a nominal 3-in OD thin-walled (Shelby) tube sampler, which gives 2.8 inch in diameter samples. A photograph of these samples before trimming can be seen in Figure 1.

Soil Classification

Most of the soil samples classified as lean clay (CL) in accordance to the Unified Soil Classification System (USCS). Only three soil samples were classified as fat clay (CH). Lean clay samples have a liquid limit less than 50; on the other hand, fat clay samples have liquid limit of 50 or greater (see Table 1).

Sample Selection and Identification

The selection of samples depends on having enough length and good visual shape, without any obvious cracks. The sample of each boring number was long enough to have two specimen of principal length. Most of the cases have one specimen from one sample.

Figure 1 – Soil Samples Prior to Trimming

Table 1-- Soil Properties and Sample Locations

No-Location,Depth	Classification	Visual Color	LL	PL	PI	%< 200
1- B-6, 3-5	Lean Clay (CL)	Dark Yellow Brown	33	14	19	83
2- B-11, 3-4	Lean Clay (CL)	Brown	37	12	25	84
3- B-11, 4-5	Lean Clay (CL)	Yellowish Brown	41	15	26	84
4- B-13, 1-3	Fat Clay (CH)	Brown	51	37	14	77
5- B-23, 1-3	Lean Clay (CL)	Dark Yellow Brown	39	13	26	73
6- B-23, 3-5	Lean Clay (CL)	Dark Yellow Brown	39	13	26	73
7- B-27, 8-9	Lean Clay (CL)	Dark Yellow Brown	35	12	23	81
8- B-28, 1-2	Sandy Lean Clay	Dark Brown	26	11	15	78
9- B-28, 3-5	Sandy Lean Clay	Dark Brown	26	11	15	78
10- B-31, 1-2	Lean Clay (CL)	V. DK. Grayish Brown	36	15	21	87
11- B-31, 6-7	Lean Clay (CL)	V. DK. Grayish Brown	36	15	21	87
12- B-31, 28-29	Lean Clay (CL)	DK. Yellowish Brown	30	11	19	80
13- B-32, 1-3	Lean Clay (CL)	DK. Yellowish Brown	38	12	26	83
14- B-32, 3-5	Lean Clay (CL)	DK. Yellowish Brown	38	12	26	83
15- B-34. 3-4	Lean Clay (CL)	DK. Yellowish Brown	39	12	27	86
16- B-34, 4-5	Lean Clay (CL)	DK. Yellowish Brown	39	12	27	86
17- B-38, 1-3	Fat Clay (CH)	Brown	50	12	38	82
18- B-38, 3-5	Fat Clay (CH)	DK. Grayish Brown	51	12	39	82

CHAPTER III

LABORATORY TESTING PROGRAM

All the procedures had been done in the civil engineering soil lab at Oklahoma State University. The program consisted of liquid and plastic limits tests (ASTM D 4318), Percent passing the number 200 sieve test (ASTM D 1140), Hydrometer tests (ASTM D 422), and Unconsolidated Undrained Trixial Tests (ASTM D 2850).

The hydrometer tests were done on two different samples of two different classifications of clay soil which were generally representative of all the soil samples. This hydrometer test is very beneficial because of its ability to provide the percentage of clay and the percentage of silt in the fine fraction. The liquid and plastic limits tests and percent passing the number 200 sieve were done to provide index properties.

The UU trixial tests were done to find the shear strength. Shear strength is equal the cohesion plus the normal stress times the tangent of the friction angle. Single specimen UU trixial tests always produce a friction angle of zero, so the shear stress equals the cohesion of the soil. The laboratory procedures are described in detail with some selected photographs.

Samples Preparation and Lab Procedures- In-Situ Condition

Eighteen samples were selected from different borings locations. These samples need to be trimmed by using laboratory miter box, which will produce planar ends that are perpendicular to the longitudinal axis of the samples.

The in-situ samples were also trimmed diameter with a height-to-diameter ratio of at least 2. The range of this ratio should be between 2 and 2.5 (Liu and Evett 1997).

The samples were trimmed in length that should be at least 4 inches and in diameter with at least 2 inches. All samples were trimmed to nominal 2-inch diameter in a hand operated soil lathe. Trimming the samples is very important and beneficial to remove the more disturbed outer side of the samples. The three minimum height measurements (120 degrees apart) and at least three diameter measurements at each of the quarter points of the height had been taken (Liu and Evett 1997). Some of these trimmed samples are illustrated in Figure 2.

Specimen shall be of uniform circular cross section perpendicular to the axis of the specimen. Where pebbles or crumbing results in excessive irregularity along the outside edges of the specimen or at the ends, soil from the trimming was packed in the irregularities to produce the desired surface (Liu and Evett 1997). The moist weight and the length and diameter dimensions had been taken after trimming has been done.

Slurry-processed specimen had been included in the project as well. By breaking the undisturbed samples in small pieces, the broke soil was remixed with water by using spatula to thick slurry and then put in zip locks bags to save the moisture content. Then reform the specimen by putting

it in the mold that has 1.4 inches of diameter and that produces a final length of at least 2.8 inches. Care was taken to avoid entrapping air in the specimen.

Compacted samples were not included in the project. Compacted samples require a compaction method consisting of compacting the material in multiple layers using a pressing or kneading action into a split mold of circular cross section. These types of compacted samples will be included in Phase II.

Figure 2 – Trimmed Samples in Length and Diameter

The trimmed dimensions, moisture content, and the dry unit weight density of the in-situ condition specimens are illustrated on the Triaxial Shear Test Reports, Plates UUIS.1 through UUIS.18, in the Appendix.

During the trimming of these samples, there were a lot of soil cuttings from the trimmed specimens that were used to determine the in-situ moisture content, liquid limit, plastic limit, and percent passing number 200 sieve. The results of these tests can also be found on Plates UUIS.1 through UUIS.18 in the Appendix.

The two hydrometer tests were done on two samples from boring B-6 between three and five feet, and from boring B-38 between three and five feet. The hydrometer tests show that the samples have about 55% silt and 28 % clay. All the fines with the clay and silt were included and determined. Having plastic fines in the soil can be a problem in some cases. That can lead to have very hard soil when it is dry and very soft soil when it is wet. The fully-softened soil of plastic fines can lead to a huge drop of the shear strength of the soil. However, some other researchers only used the clay fraction without considering the silt fraction. Specially, in the areas that just have small fractions of plastic silt. Oklahoma is one of the states that has both clay and plastic silt, which will lead to consideration of all the fines. Having a lot of clay and plastic silt can lead to shrink-swell problems, which may contribute to the fully softened condition.

Atterberg Limits Tests

There are four states of consistency for fine grained soils: liquid, plastic, semisolid, solid. The liquid limit is the dividing line between liquid and plastic states. The plastic limit is the dividing line between plastic and semisolid states. The plasticity index is the difference between the liquid limit and plastic limit.

Atterberg limits test were performed in general accordance with ASTM D 4318. The general procedure in the lab is as follows:

(1) Use 70 g of the sample in the liquid limit procedure for Method A as following:

- Place a portion of the prepared soil in the cup of the liquid limit device
- Squeeze it down and spread it into the cup to depth of 10 mm at its deepest point.
- Form a groove in the soil pat by drawing the grooving tool through the soil on a line connecting the highest point to the lowest point.
- Lift and drop the cup by turning the crank at a rate of 1.9 to 2.1 drops per second until the two halves of soil pat come in contact at the bottom of the groove of a distance of half inch.
- Record the number of drops required to close the groove.
- Repeat doing that until you get something between 20 and 30.
- Liquid limit is the water content when the groove is closed one-half inch in length. A small sample of the soil from the closed portion is obtained for over drying and determination of moisture content. The Liquid Limit is determined from this moisture content and a calculation using the number of drops of the Liquid Limit device required closing the groove by one-half inch in length.

(2) Use 30 g of the sample in the plastic limit procedure as follows:

- Roll the sample between the plates of the plastic limit device with just sufficient pressure to minimize its moisture content (this procedure is often done by hand rather than using the plastic limit device, but the plastic limit device was used in this research).
- Repeat until the mass turns into threads and reaches 1/8 inch in diameter and will no longer hold together in one piece and crumbles due to drying
- Gather the portions of the crumbled thread together and place in a weighed container.
- Put it in the oven for 24 hours and weigh it again to determine the moisture content. This moisture content is the plastic limit expressed as a percentage.

Percent Passing Number 200 Sieve Procedure

This test determines the percentages of soil particles that can pass number 200 sieve. Percent passing number 200 sieve test was performed in general accordance with ASTM D 1140. The general procedure in the lab is as follows:

(1) Take 50 g of soil and soak it in liquid dispersing agent for 24 hours.
(2) Start the procedure by using number 200 and number 40 sieves to determine how much soil is retained on these sieves.
(3) Put the retained soil in a tare dish and weigh it, then put it in the oven for 24 hours.

(4) Take it out of the oven and weigh it again to determine the dry weight.

(5) The percent passing the number 200 sieve is then determined by comparing the dry weight of the retained soil with the initial dry weight of the entire sample.

Hydrometer Test Procedure

The clay and silt particles are the soil particles that can pass sieve number 200. This test provides the percentages of clay and silt in the fines content (percent passing number 200). The Hydrometer tests were performed in general accordance with ASTM D 422. The procedure in the lab is generally as follows:

(1) Use 50 g of soil, a small amount of water and 125 ml of dispersing agent NaPO3.

(2) Mix in a high shear mixer for 2 minutes.

(3) Wait for 24 hours so the dispersing agent can go through soil

(4) Put the mix in the hydrometer cylinder and add water to get 1000 ml

(5) Then put the cap on it and shake it until it is homogenous.

(6) Then the test should be started.

(7) Put the hydrometer in the cylinder and wait until it settles down.

(8) Take the reading, then take out the hydrometer and close the cylinder with a glass plate.

(9) Continue taking the reading at different times during the 24 hours.

(10) Use the readings and the ASTM equation for the particular type of hydrometer to calculate the percent of silt and clay in the specimen.

UU- Triaxial Shear Testing—In-Situ Condition

The Triaxial compression test is similar to the unconfined compression test but the major difference is that triaxial tests are performed on cylindrical soil samples installed in rubber membranes with confining lateral pressure (σ_3). The lateral pressure is applied to all sides of the sample. This lateral pressure called minor principal stress. The test also applies a unit axial load (Deviator load) to the sample. The combination of the unit axial load plus minor stress gives the major principal stress (σ_1). The failure stress is equal to $\sigma_1 - \sigma_3$ at the maximum stress level.

The 2 inch diameter in-situ condition samples were tested by using the Unconsolidated Undrained (UU) Triaxial shear tests. These tests were performed with a special triaxial cell. The cell was made from aluminum cylinder instead of plastic cylinder for safety reasons, which allows air to be used in the aluminum cell instead of water. A plastic cell should not be used with air because in the event of a cylinder rupture particles of plastic will explode with high velocity. The UU Triaxial test of in-situ samples are shown in Figure 3.

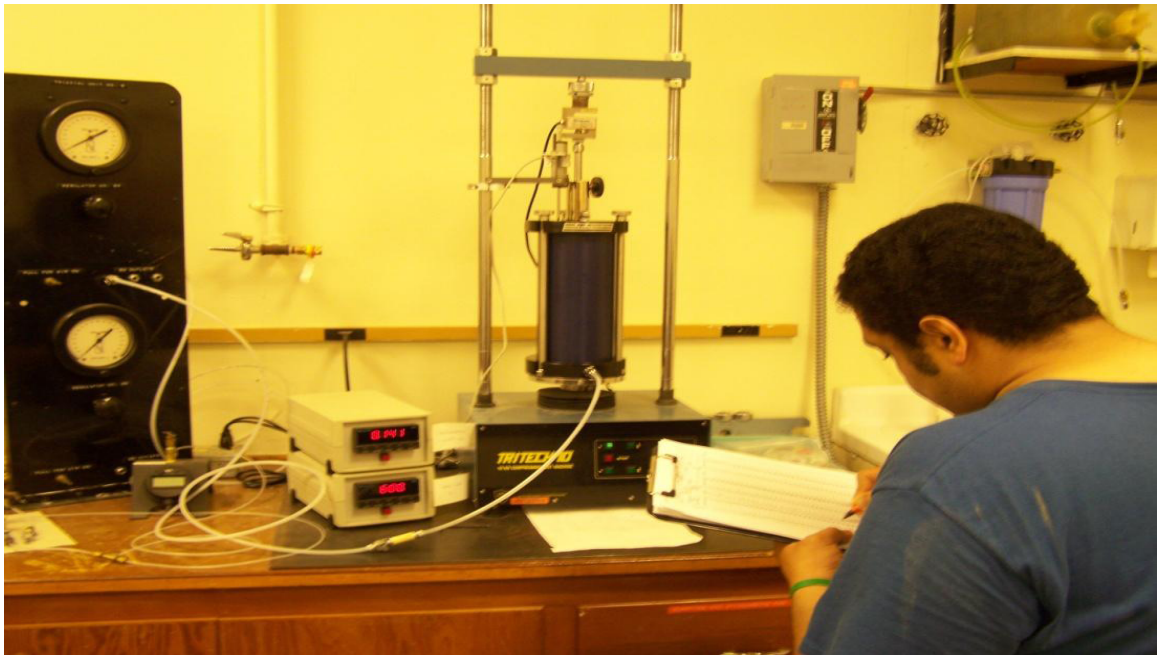

Figure 3--UU Triaxial Test of In-Situ Samples

A latex membrane was used in the test to isolate the sample from the cell fluid. The latex membrane was installed on all the samples and enough all-around air pressure was applied to produce 10 psi. There is no drainage in UU Triaxial shear test so, no need for drain lines in the cell. The strain rate was 0.03 inches per minute in the tests. As strain increases, the shear strength of soil typically reduces from a peak value to lower value, indicating failure. If failure does not occur prior to 15 percent strain, the test is typically terminated and the shear stress at 15 percent strain is taken as the failure stress.

No sample was consolidated before any test. The Undrained shear strength test results from the in-situ samples are shown on plates UUIS.1 through UUIS.18a in the Appendix.

UU triaxial tests are done by placing a sample in the chamber and giving it lateral pressure without letting the sample consolidate (drain) under confining pressure. The axial load is applied fairly rapidly without permitting drainage of the sample.

This test is done quickly because the sample is not required to consolidate under the confining pressure or drain during the application of axial load.

UU Triaxial shear test was performed in general accordance with ASTM D 2850. The procedure in the lab is generally as follows:

- Place the latex membrane around the sample and seal it at the cap and base with O-rings.
- Put the sample with its rubber membrane in the cell, then assemble the triaxial cell
- Place the cell in position in the triaxial loading device. Align and connect the axial loading device, the axial load-measuring device (transducer), the displacement transducer, and the triaxial cell in a manner that will prevent the application of lateral force to the piston.
- Attach the pressure source and pressure gauge and fill the chamber with the confining air pressure (10psi).
- Adjust the pressure to exactly 10 psi and make sure to set the two measurement devices to zero.
- Apply the axial load to produce axial strain at a rate of 0.03 inches per minute to achieve maximum deviator stress.
- Record load and deformation values at about each 0.01 inches of deformation.

- Take sufficient reading until the sample fails, indicated by reduction load cell reading over at least 3 reading or to 15 percent strain, whichever is first. One of the failed samples is shown in Figure 4.

Figure 4--In-Situ failed sample

- After completion of the test, remove the test sample from the chamber. Find the water content of the test sample by oven drying.

- Repeat all the previous steps with the other samples. All these samples after shear testing are shown in Figure 5.

Figure 5--The Eighteen In-Situ Samples after shear Testing

Sample Preparation- Fully-Softened Condition

The exact same individual specimens used in the in situ condition tests were used for the individual specimen preparation for the fully softened tests. This gave a direct comparison between in situ condition peak strength and fully softened strength on each individual specimen.

Each in-situ sample was chopped into small pieces using mortar and pestle in the lab. Then, the sample was mixed with distilled water by using spatula to turn the mix to slurry that looks like a thick milk-shake as shown in Figure 6.

Figure 6--Slurry Mixing of Sample

All these individual slurry samples were transferred to the zip-lock bags and given a minimum of 16 hours to be hydrated. Then, the samples were transferred to a special consolidation device containing a split mold, base with threaded rods and cross arms, porous stones, filter papers, a loading piston, weights, and a digital dial gauge.

All samples were consolidated under a load of 10 psi, which was the same as the cell pressure of triaxial tests. The sample goes through a normal consolidation condition which can be called a slurry-processed normally consolidated (SPNC) sample. The SPNC has a diameter of 1.4 inches, which is the diameter of the split mold. The length of the samples should not be less than about 4.25 inches, initially in order to result in a final length of at least 2.8 inches. One of the SPNC devices is shown in Figure 7.

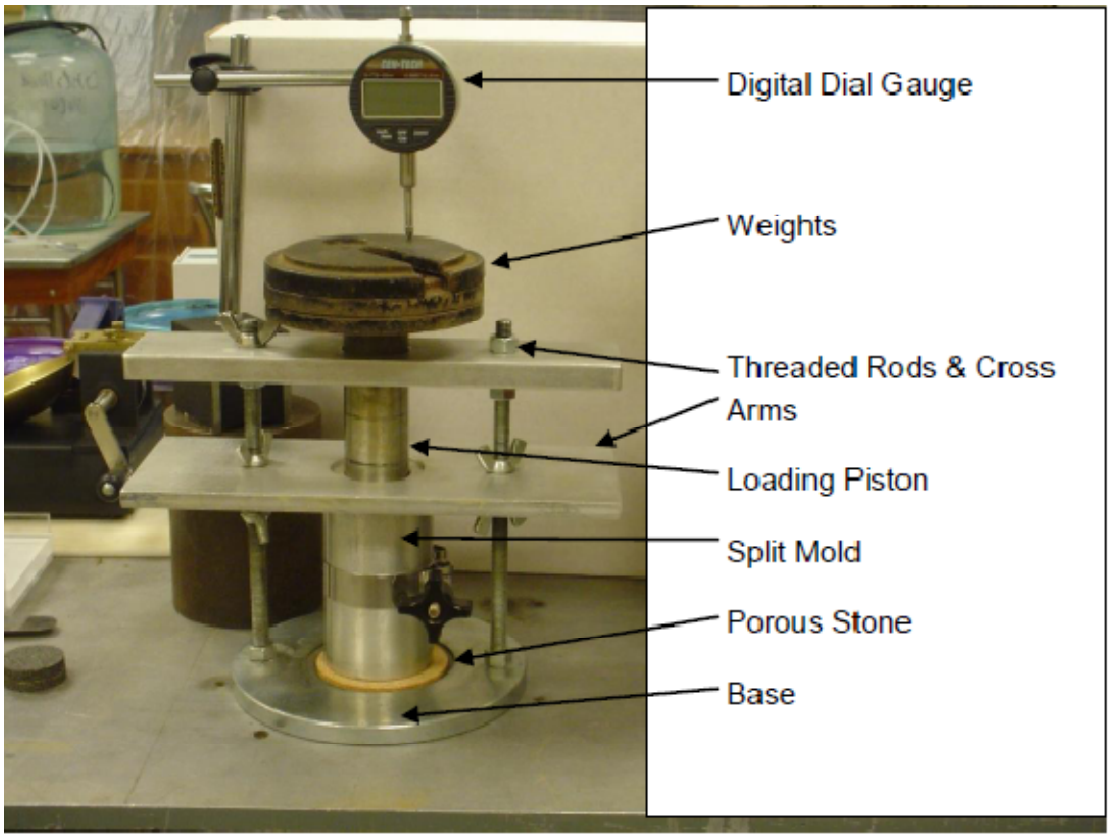

Figure 7--SPNC Device

All the samples had a minimum of 48 hours for consolidation. Consolidation was confirmed following the initial 48-hour period by observing no change in the dial gauge during three consecutive readings over four hours. Most specimens required 72 hours or more to reach the end of primary consolidation. Placing the slurry in the molds and letting them consolidate are shown in Figure 8 and Figure 9.

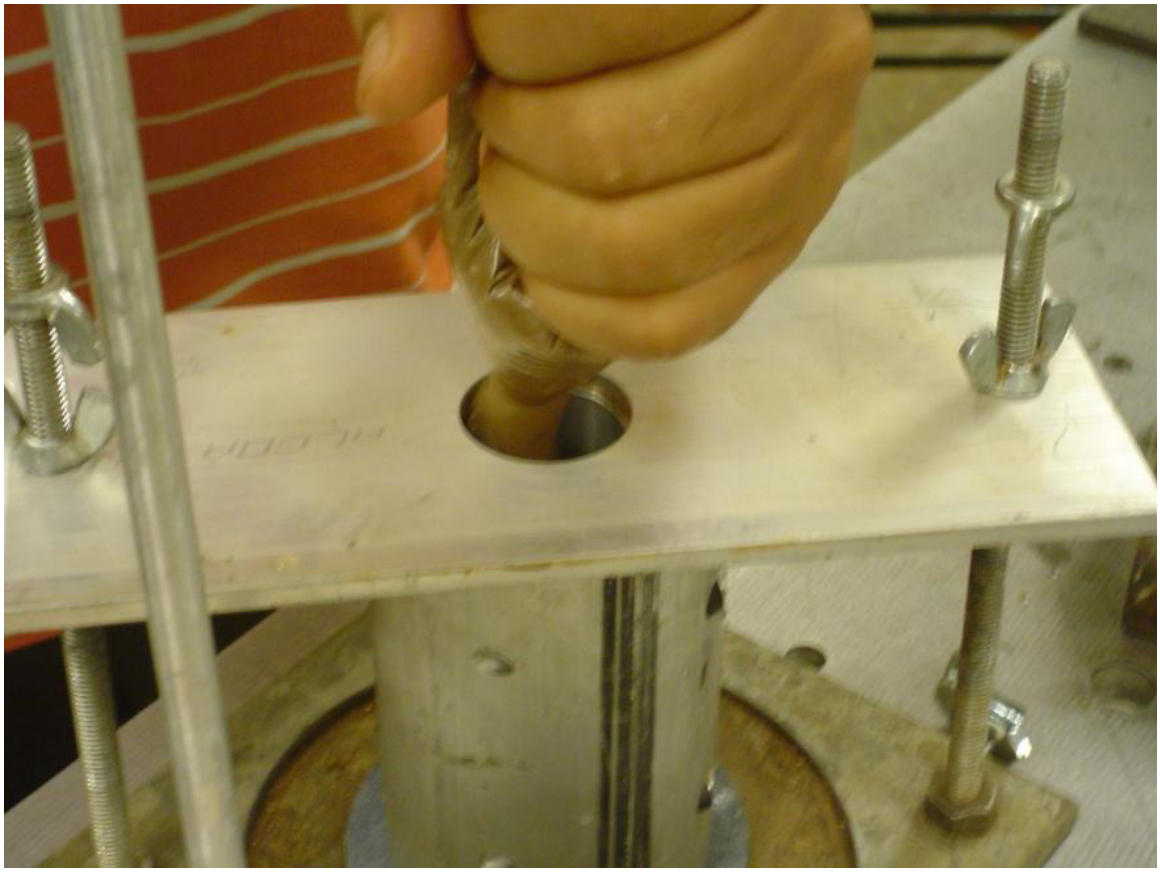

Figure 8—Putting Slurry inside the Mold

Figure 9—Consolidation with SPNC Devices

After being done with consolidation, all samples were extracted by loosening the split mold and take it out of the device. Next, invert the mold and extrude the samples by pushing the piston inside the mold. Then, the samples were double packaged in cling-wrap, labeled, and put in protective chest cooler until ready for testing.

UU-Triaxial Shear Testing—Fully-Softened Condition

The samples of fully softened condition have 1.4 inch diameter which were tested for undrained shear strength (Cu) in the same aluminum triaxial cell that had been used for in-situ samples. The triaxial tests were set at 10 psi cell pressure with a strain of 0.03 inches per minute.

These UU-Triaxial Shear tests have the same procedure as the in-situ UU-Triaxial test but the only difference is that the latex membrane has smaller diameter (1.4 in) than the in-situ latex membrane (2.8). These different sizes of latex membrane are required to fit the different two sizes of the samples. All the next Figures (10-15) show the different important steps of the fully-softened UU-Triaxial Shear tests.

Figure 10--Mounting sample on Triaxial Base

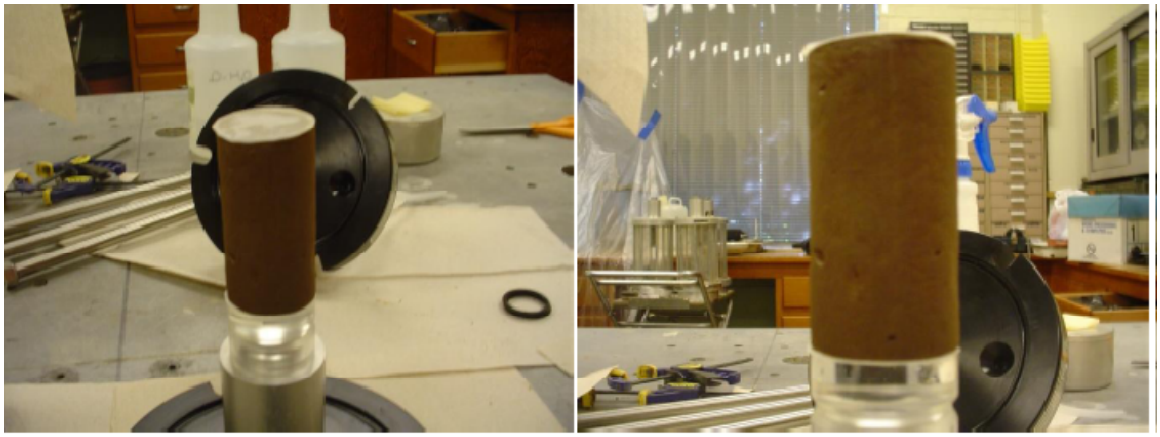

Figure 11--Samples on Trixial Base with Their Filters

Figure 12--Installing Membrane on Samples Using Vacuum Pump

Figure 13—Sample installed inside Membrane With Two O-Rings

Figure 14—Assembly of Triaxial Cell

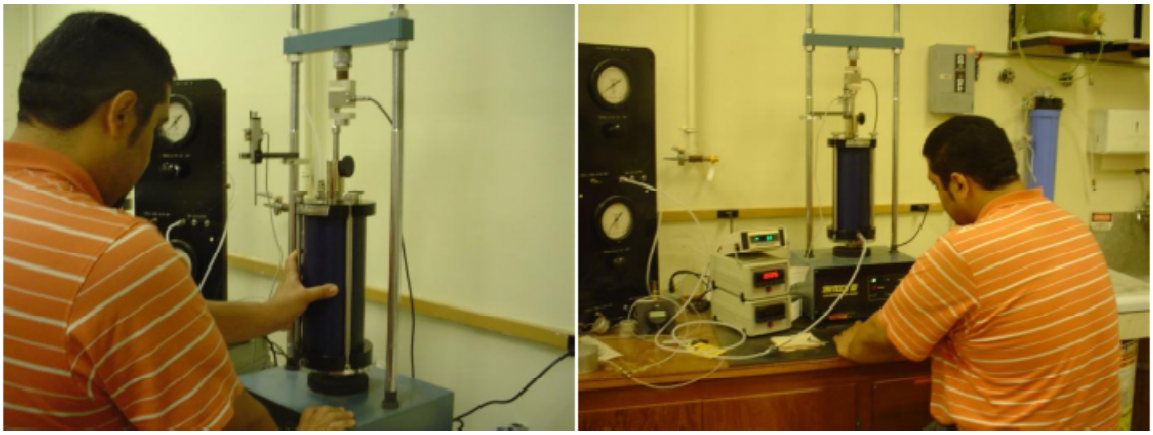

Figure 15--UU Triaxial Test of Fully Softened Samples

CHAPTER IV

DATA ANALYSIS AND MODEL DEVELOPMENT

Data Analysis

The data and results from the in-situ and fully-softened tests were analyzed statistically and mathematically to produce different equations that can result in a general equation for a relationship between peak strength of in-situ condition and the fully-softened shear strength.

There are different values that have been analyzed such as in-situ moisture content (w_i), fully-softened moisture content (w_f), liquid limit (LL), Plastic Limit (PL), Plasticity Index (PI), and percent passing the number 200 sieve (<200). Using these property values can help to determine parameters like cohesion index (CI) (Gregory 2008), Softening Index (I_s), the limit coefficient (α), and the basic reduction factor for moisture (RF_m).

These equations are as follows:

$$CI = \frac{(PI)(<200)}{100} \qquad (1)$$

Where:

CI = Cohesion Index

PI = Plasticity Index

<200 = Percent Passing No. 200 Sieve

$$I_s = \frac{wi}{\alpha(LL+PL)} \quad (2)$$

Where:

I_s = Softening Index

w_i = In-situ moisture content (moisture content at time of test of in situ condition specimens)

α = Limit Coefficient = $(w_f/(LL+PL)) \approx 0.5$ for shear strength correlation

w_f = Fully softened moisture content

LL = Liquid Limit

PL = Plastic Limit

$$RF_m = I_s^{\log(CI)} \quad (3)$$

Where:

RF_m= Basic Shear Strength Reduction Factor for moisture content

All these equations have been used to calculate the values in the spreadsheet presented in Table 2 in the Appendix. The table lists the minimum, maximum, and average values for each column. The average values were used in development of the model. The table also has a graph of in-situ undrained shear strength (C_u) values versus the calculated fully-softened (C_u) values.

Model Development

Using the average values and the three previous equations (1-3), a model equation for the clay type in Phase I research was developed. This model is an equation that can estimate the fully-softened undrained shear strength (C_{uf}) by using the peak undrained shear strength values of the in-situ condition (C_{uis}) samples and index properties of the clay soil.

Taking comparisons between in-situ and fully-softened shear strength tests can help in slope design. The model equation uses the basic reduction factor (RF_m) for moisture content at time of shear testing and a β factor which depends on the in situ moisture content and the softening index as defined below.

The density ratio in Table 2 is the ratio of fully-softened density to in-situ density. The β factor varies approximately between 1 and 10 based on previous studies and research (Gregory 2011). By knowing these parameters, the C_{uf} value can be determined by multiplying the known C_{uis} value times (RF_m/β). β is determined using the average wi and the average Is in Table 2 as shown in equation 4.

$$\beta = w_i \ln(1/I_s) \qquad (4)$$

Where:

w_i = In-situ moisture content

Is = Softening Index

$Ln(1/Is) \leq 1.0$

$\beta \geq 1.0$

When a clay soil is already fully softened in the field that means the fully softened shear strength will equal the in-situ shear strength. The softened index for fully softened soil is approximately equal 1.0, which means RF_m and β equal 1.0, using the above equations. Equation 5 shows that the fully softened shear strength is equal to the in-situ shear strength when β and RF_m both equal one.

Having the average of reduction factor for moisture content and the average β factor, results in the final proposed equation which is presented as equation 5.

$$C_{uf} = \frac{RF_m(C_{uis})}{\beta} \qquad (5)$$

Table 2 on the following page shows that the average of C_{uf} was 3.17 psi which is very close to the average of C_{uf} test values which was 3.04 psi. Figure 16 shows the consistency of the equation that gives a good consistent relationship between calculated C_{uf} and C_{uis}.

The data in figure 16 shows that R2 value of the power curve is approximately 0.74 which is considered acceptable for soils. The equation can be used as an interim predictor of C_{uf} values from C_{uis} test values and index properties but only for the clay type that considered in this research. The equation will be refined and modified for other clayey soil types in a future Phase II. However, it is anticipated that Equation 5 should be applicable for all clayey soils, but this must be verified in Phase II.

Table 2	Data Calculation and Correlation Summary														
Moisture Reduction Factors For Shear Strength										Test	Calc	Test			
α (Limit Coef)		0.538596								In-Situ	FS	FS	FS	In-Situ	
Location	wi	wf	LL	PL	PI	< 200	Is	CI	RFm	Cu(psi)	Cu(psi)	Cu(psi)	Density	Density	Density Ratio
1- B-6, 3-5	13.2	34.1	33	14	19	83	0.52145	15.77	0.458425	164.8	7.861399	1.3	85.2	120.7	0.705882353
2- B-11, 3-4	8.5	25.7	37	12	25	84	0.322077	21	0.22357	134.2	3.12206	3.3	97.3	117.7	0.826677995
3- B-11, 4-5	10.4	23.5	41	15	26	84	0.344812	21.84	0.240273	130.6	3.265297	2.6	100.1	117.1	0.854824936
4- B-13, 1-3	11.7	23.8	51	14	37	77	0.334202	28.49	0.203039	129.2	2.729709	4.1	100.3	110.6	0.906871609
5- B-23, 1-3	13.6	27.8	39	13	26	73	0.485593	18.98	0.397157	70.1	2.897044	1.1	91.6	109.2	0.838827839
6- B-23, 3-5	12.8	26.5	39	13	26	73	0.457028	18.98	0.367542	69.4	2.654241	3.1	96.6	113.6	0.850352113
7- B-27, 8-9	11.7	30.1	35	12	23	81	0.462194	18.63	0.375194	73.1	2.853958	1.5	94.7	114.9	0.824194952
8- B-28, 1-2	12.3	23.9	26	11	15	78	0.61722	11.7	0.597243	79.9	4.965603	3.5	98.1	108.3	0.905817175
9- B-28, 3-5	8.7	25.8	26	11	15	78	0.43657	11.7	0.412582	88.5	3.799517	1.9	98.4	118.7	0.828980623
10- B-31, 1-2	15.2	28.2	36	15	21	87	0.553363	18.27	0.473964	28.5	1.40561	2.5	93.9	100	0.939
11- B-31, 6-7	9.8	33.9	36	15	21	87	0.356773	18.27	0.272418	111.4	3.157881	1.5	91.8	123	0.746341463
12- B-31, 28-29	15.5	24.7	30	11	19	80	0.701915	15.2	0.658161	14.5	0.993058	3.3	97.5	105.2	0.926806084
13- B-32, 1-3	14.2	25.6	38	12	26	83	0.527296	21.58	0.425801	50.4	2.233118	5.9	98.6	114.6	0.860383944
14- B-32, 3-5	13.2	25.3	38	12	26	83	0.490163	21.58	0.386276	123.3	4.956049	4.2	99.8	111	0.899099099
15- B-34. 3-4	9.7	26.7	39	12	27	86	0.353133	23.22	0.241294	93	2.335087	3.6	98	119.5	0.820083682
16- B-34, 4-5	9.3	24.8	39	12	27	86	0.338571	23.22	0.227806	94.3	2.235382	2.8	97.9	116.9	0.837467921
17- B-38, 1-3	12.5	32.1	50	12	38	82	0.37433	31.16	0.23047	66.5	1.594816	3.2	93.4	113.3	0.824360106
18- B-38, 3-5	12.5	28.7	51	12	39	82	0.368388	31.98	0.222507	15.2	0.351934	5.3	96.1	107.5	0.893953488
Calc on average	11.93333	27.28889	38	12.66667	25.33333	81.5	0.446949	20.64278	0.356318	85.38333	3.165813	3.038889	96.07222	113.4333	0.849440299
β	9.610049														
Minimum	8.5	23.5	26	11	15	73	0.322077	11.7	0.203039	14.5	0.351934	1.1	85.2	100	0.705882353
Maximum	15.5	34.1	51	15	39	87	0.701915	31.98	0.658161	164.8	7.861399	5.9	100.3	123	0.939
Averages	11.93333	27.28889	38	12.66667	25.33333	81.5	0.446949	20.64278	0.356318	85.38333	3.165813	3.038889	96.07222	113.4333	0.849440299

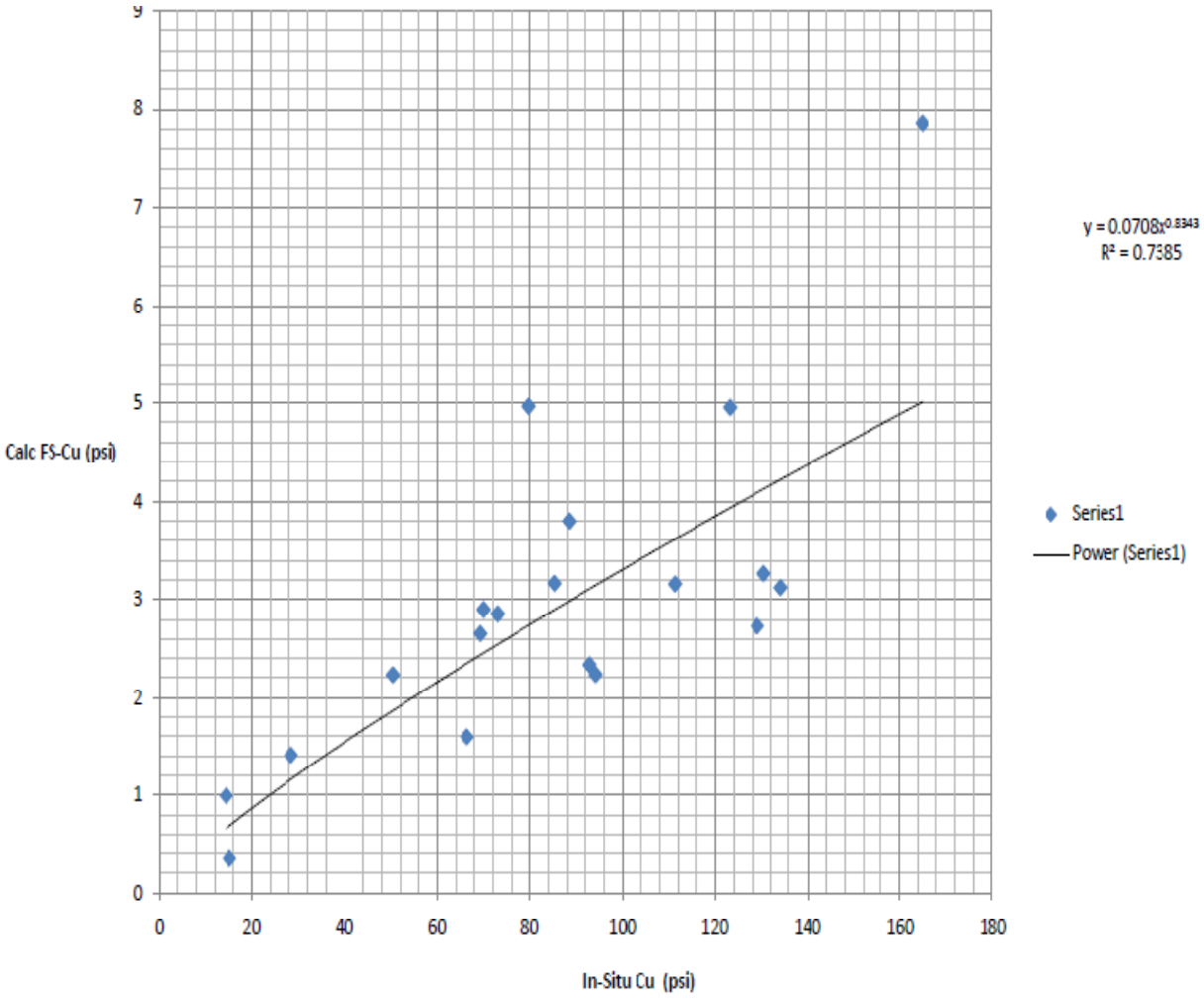

Figure 16-- Tested in situ Cu vs. Calculated FS-Cu

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Using the data in this research, a model equation has been developed to predict the fully softened undrained shear strength of clay soil which has a relationship with the in-situ condition peak undrained shear strength and the index properties. The equation was developed based only on the clay type used in this research project and must be verified for other clay soil types.

One of the advantages of using this equation is that the fully softened undrained shear strength can be calculated from peak strength and index properties without having to perform the time consuming and expensive fully softened tests in the laboratory. This equation can be used on an interim basis for predicting the fully softened undrained shear strength of similar clay soil types by applying UU Triaxial shear strength tests in the in-situ condition and performing other laboratory tests to determing the liquid limit, plastic limit, percent passing the number 200 sieve and unit dry weight.

It is also recommended to have a future Phase II research study for further developing and expanding the model in Phase I. The Phase II project should have at least four additional clay soil types. These additional clayey soil types will cover the full range of clay soils including clayey sand (SC).

The samples should be tested in the in-situ condition, laboratory recompacted condition, and fully softened condition. Phase II should consist of both the drained and undrained shear strength testing. Each clay soil type should have at least 18 samples (Gregory 2011).

Having all these samples will result in at least 216 samples for the undrained condition. It will be also recommended to have at least 6 drained tests (CU triaxial with pore pressure measurement or CD triaxial) to all different types of clay soil. That will lead to 72 drained tests to determine drained parameters. The Phase II project will require about 2 to 3 years to be completed.

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APPENDIX

Table 2

Moisture Reduction Factors For Shear Strength

α (Limit Coef)		0.538596								Test	Calc	Test			
										In-Situ	FS	FS	FS	In-Situ	
Location	wi	wf	LL	PL	PI	< 200	Is	CI	RFm	Cu(psi)	Cu(psi)	Cu(psi)	Density	Density	Density Ratio
1- B-6, 3-5	13.2	34.1	33	14	19	83	0.52145	15.77	0.458425	164.8	7.861399	1.3	85.2	120.7	0.705882353
2- B-11, 3-4	8.5	25.7	37	12	25	84	0.322077	21	0.22357	134.2	3.12206	3.3	97.3	117.7	0.826677995
3- B-11, 4-5	10.4	23.5	41	15	26	84	0.344812	21.84	0.240273	130.6	3.265297	2.6	100.1	117.1	0.854824936
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7- B-27, 8-9	11.7	30.1	35	12	23	81	0.462194	18.63	0.375194	73.1	2.853958	1.5	94.7	114.9	0.824194952
8- B-28, 1-2	12.3	23.9	26	11	15	78	0.61722	11.7	0.597243	79.9	4.965603	3.5	98.1	108.3	0.905817175
9- B-28, 3-5	8.7	25.8	26	11	15	78	0.43657	11.7	0.412582	88.5	3.799517	1.9	98.4	118.7	0.828980623
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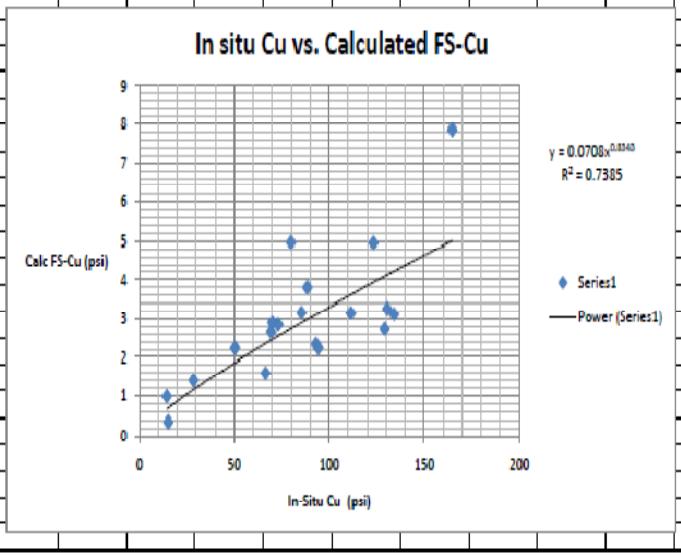
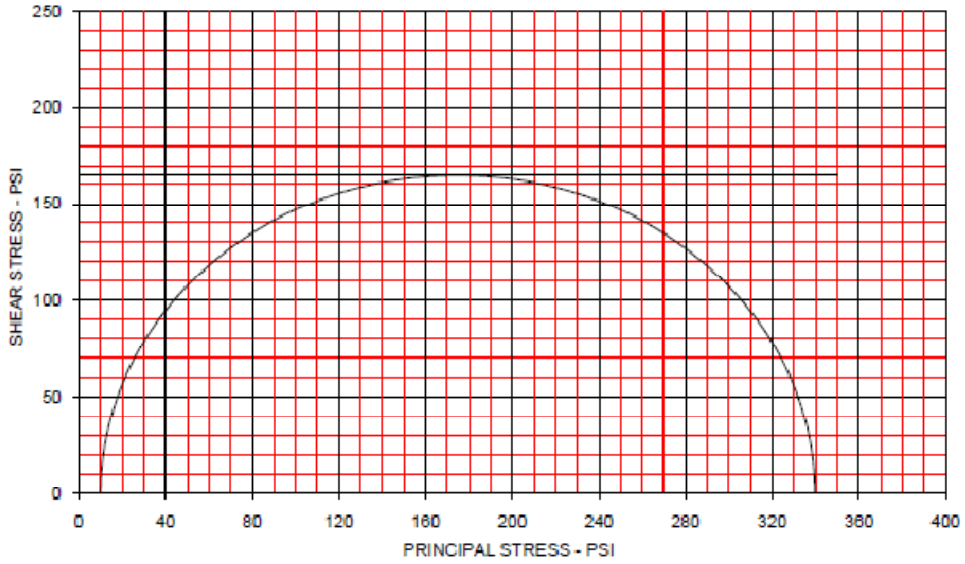
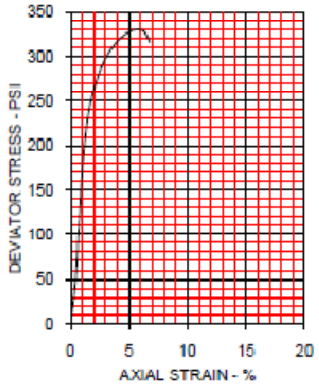
Calc on average	11.93333	27.28889	38	12.66667	25.33333	81.5	0.446949	20.64278	0.356318	85.38333	3.165813	3.038889	96.07222	113.4333	0.849440299
β	9.610049														
Minimum	8.5	23.5	26	11	15	73	0.322077	11.7	0.203039	14.5	0.351934	1.1	85.2	100	0.705882353
Maximum	15.5	34.1	51	15	39	87	0.701915	31.98	0.658161	164.8	7.861399	5.9	100.3	123	0.939
Averages	11.93333	27.28889	38	12.66667	25.33333	81.5	0.446949	20.64278	0.356318	85.38333	3.165813	3.038889	96.07222	113.4333	0.849440299



TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 164.8 psi			
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	13.2			
Dry Density - pcf	120.7			
Diameter - inches	1.98			
Height - inches	4.45			
AT TEST				
Final Moisture - %	13.2			
Dry Density - pcf	120.7			
Calculated Diameter (in.)	1.98			
Height - inches	4.45			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	329.61			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	5.6			
σ_1 Failure - psi	339.61			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-1
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-6, 3-5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 33 PL: 14 PI: 19 Percent -200: 83
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUIS.1

UUIS-1-AA533150-B-6 (3-5).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

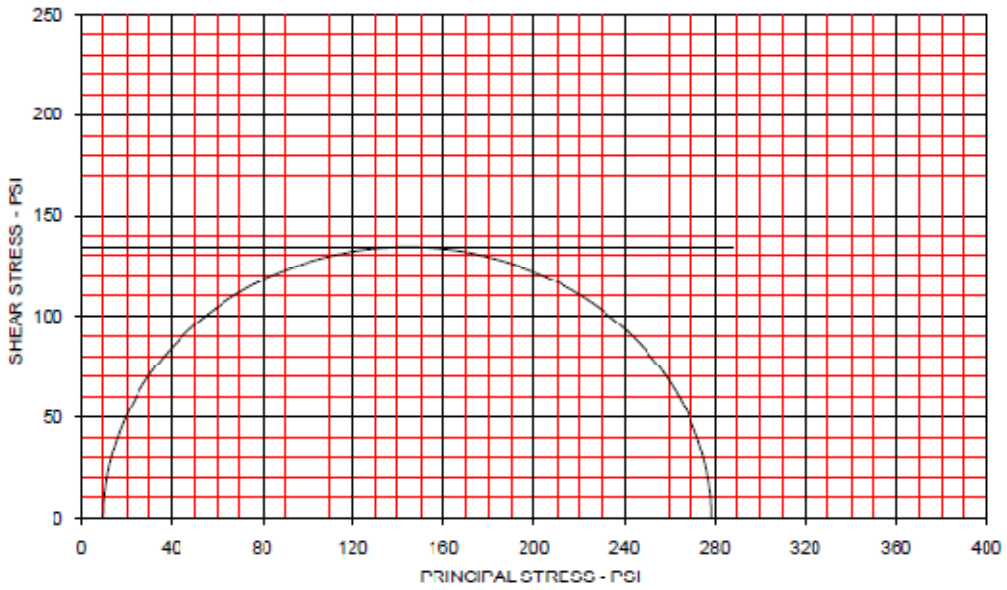
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : **10.0** psi

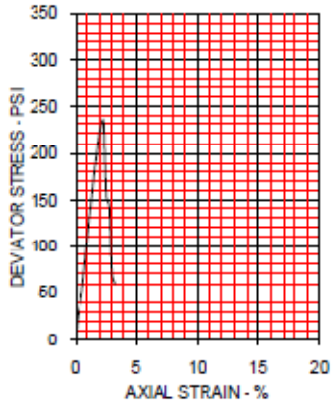
Dia. : 1.98 in Area: 3.067 in^2 Ht. : 4.45 in Weight : 488.9 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
		Data Input												
1	0.0000	12.00	0.00	0.00	0.00	0.0	0.0	3.067	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	83.00	0.00	0.00	71.00	0.002	0.22	3.074	23.10	10.00	33.10	3.310	21.55	11.55
3	0.0200	177.00	0.00	0.00	165.00	0.004	0.45	3.080	53.56	10.00	63.56	6.356	36.78	26.78
4	0.0300	328.00	0.00	0.00	316.00	0.007	0.67	3.087	102.35	10.00	112.35	11.235	61.17	51.17
5	0.0400	484.00	0.00	0.00	472.00	0.009	0.90	3.094	152.53	10.00	162.53	16.253	86.26	76.26
6	0.0500	609.00	0.00	0.00	597.00	0.011	1.12	3.102	192.49	10.00	202.49	20.249	106.24	96.24
7	0.0600	696.00	0.00	0.00	684.00	0.013	1.35	3.109	220.04	10.00	230.04	23.004	120.02	110.02
8	0.0700	759.00	0.00	0.00	747.00	0.016	1.57	3.116	239.75	10.00	249.75	24.975	129.88	119.88
9	0.0800	803.00	0.00	0.00	791.00	0.018	1.80	3.123	253.30	10.00	263.30	26.330	136.65	126.65
10	0.0900	841.00	0.00	0.00	829.00	0.020	2.02	3.130	264.86	10.00	274.86	27.486	142.43	132.43
11	0.1000	872.00	0.00	0.00	860.00	0.022	2.25	3.137	274.13	10.00	284.13	28.413	147.07	137.07
12	0.1100	903.00	0.00	0.00	891.00	0.025	2.47	3.144	283.36	10.00	293.36	29.336	151.68	141.68
13	0.1200	926.00	0.00	0.00	914.00	0.027	2.70	3.152	290.00	10.00	300.00	30.000	155.00	145.00
14	0.1300	949.00	0.00	0.00	937.00	0.029	2.92	3.159	296.61	10.00	306.61	30.661	158.31	148.31
15	0.1400	968.00	0.00	0.00	956.00	0.031	3.15	3.166	301.93	10.00	311.93	31.193	160.96	150.96
16	0.1500	984.00	0.00	0.00	972.00	0.034	3.37	3.174	306.27	10.00	316.27	31.627	163.13	153.13
17	0.1600	998.00	0.00	0.00	986.00	0.036	3.60	3.181	309.96	10.00	319.96	31.996	164.98	154.98
18	0.1700	1014.00	0.00	0.00	1002.00	0.038	3.82	3.189	314.25	10.00	324.25	32.425	167.13	157.13
19	0.1800	1026.00	0.00	0.00	1014.00	0.040	4.05	3.196	317.27	10.00	327.27	32.727	168.64	158.64
20	0.1900	1039.00	0.00	0.00	1027.00	0.043	4.27	3.203	320.59	10.00	330.59	33.059	170.29	160.29
21	0.2000	1048.00	0.00	0.00	1036.00	0.045	4.50	3.211	322.64	10.00	332.64	33.264	171.32	161.32
22	0.2100	1058.00	0.00	0.00	1046.00	0.047	4.72	3.219	324.98	10.00	334.98	33.498	172.49	162.49
23	0.2200	1065.00	0.00	0.00	1053.00	0.049	4.95	3.226	326.39	10.00	336.39	33.639	173.19	163.19
24	0.2300	1073.00	0.00	0.00	1061.00	0.052	5.17	3.234	328.09	10.00	338.09	33.809	174.04	164.04
25	0.2400	1079.00	0.00	0.00	1067.00	0.054	5.40	3.242	329.16	10.00	339.16	33.916	174.58	164.58
26	0.2500	1083.00	0.00	0.00	1071.00	0.056	5.62	3.249	329.61	10.00	339.61	33.961	174.81	164.81
27	0.2600	1085.00	0.00	0.00	1073.00	0.058	5.85	3.257	329.44	10.00	339.44	33.944	174.72	164.72
28	0.2700	1086.00	0.00	0.00	1074.00	0.061	6.07	3.265	328.96	10.00	338.96	33.896	174.48	164.48
29	0.2800	1083.00	0.00	0.00	1071.00	0.063	6.30	3.273	327.26	10.00	337.26	33.726	173.63	163.63
30	0.2900	1072.00	0.00	0.00	1060.00	0.065	6.52	3.281	323.12	10.00	333.12	33.312	171.56	161.56
31	0.3000	1050.00	0.00	0.00	1038.00	0.067	6.74	3.288	315.65	10.00	325.65	32.565	167.83	157.83

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 134.2 psi		



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	9.5			
Dry Density - pcf	117.7			
Diameter - inches	2.11			
Height - inches	4.35			
AT TEST				
Final Moisture - %	9.5			
Dry Density - pcf	117.7			
Calculated Diameter (in.)	2.11			
Height - inches	4.35			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	268.39			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	2.2			
σ_1 Failure - psi	278.39			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NC: UU Triaxial - UUIS-2
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL), brown
SAMPLE LOCATION: B-11-1, 3-4 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 37 PL: 12 PI: 25 Percent -200: 84
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL | PLATE: UUIS-2

UUIS-2-AA533150-B-11 (3-4)-1.xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

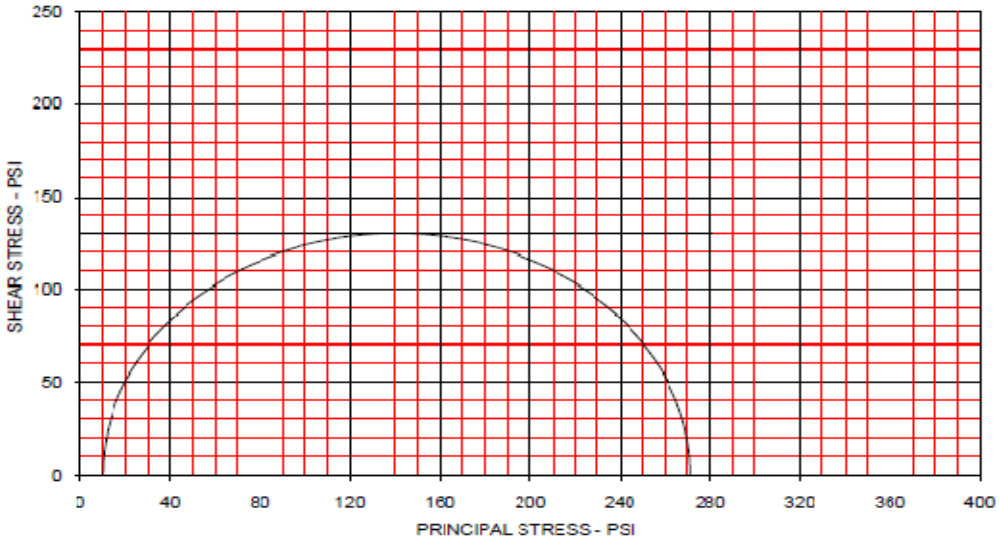
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

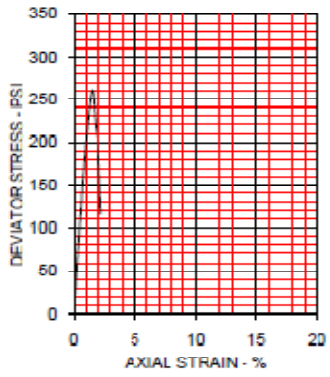
Dia. : 2.11 in Area: 3.487 in^2 Ht. : 4.35 in Weight : 508.0 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	13.00	0.00	0.00	0.00	0.0	0.0	3.487	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	113.00	0.00	0.00	100.00	0.002	0.23	3.495	28.61	10.00	38.61	3.861	24.31	14.31
3	0.0200	153.00	0.00	0.00	140.00	0.005	0.46	3.503	39.97	10.00	49.97	4.997	29.98	19.98
4	0.0300	239.00	0.00	0.00	226.00	0.007	0.69	3.511	64.37	10.00	74.37	7.437	42.18	32.18
5	0.0400	343.00	0.00	0.00	330.00	0.009	0.92	3.519	93.77	10.00	103.77	10.377	56.89	46.89
6	0.0500	452.00	0.00	0.00	439.00	0.012	1.15	3.527	124.46	10.00	134.46	13.446	72.23	62.23
7	0.0600	554.00	0.00	0.00	541.00	0.014	1.38	3.536	153.02	10.00	163.02	16.302	86.51	76.51
8	0.0700	655.00	0.00	0.00	642.00	0.016	1.61	3.544	181.16	10.00	191.16	19.116	100.58	90.58
9	0.0800	743.00	0.00	0.00	730.00	0.018	1.84	3.552	205.51	10.00	215.51	21.551	112.76	102.76
10	0.0900	818.00	0.00	0.00	805.00	0.021	2.07	3.560	226.09	10.00	236.09	23.609	123.05	113.05
11	0.1000	855.00	0.00	0.00	842.00	0.023	2.30	3.569	235.93	10.00	245.93	24.593	127.96	117.96
12	0.1100	565.00	0.00	0.00	552.00	0.025	2.53	3.577	154.31	10.00	164.31	16.431	87.15	77.15
13	0.1200	528.00	0.00	0.00	515.00	0.028	2.76	3.586	143.62	10.00	153.62	15.362	81.81	71.81
14	0.1300	264.00	0.00	0.00	251.00	0.030	2.99	3.594	69.83	10.00	79.83	7.983	44.92	34.92
15	0.1400	229.00	0.00	0.00	216.00	0.032	3.22	3.603	59.95	10.00	69.95	6.995	39.98	29.98

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 130.6 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	10.4			
Dry Density - pcf	117.1			
Diameter - inches	2.02			
Height - inches	4.04			
AT TEST				
Final Moisture - %	10.4			
Dry Density - pcf	117.1			
Calculated Diameter (in.)	2.02			
Height - inches	4.04			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	261.10			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	1.5			
σ_1 Failure - psi	271.10			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-3
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL), yellowish brown
SAMPLE LOCATION: B-11-2, 4-5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 41 PL: 15 PI: 41 Percent -200: 84
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU • CIVE • GEOTECHNICAL PLATE: UUIS.3

UUIS-3-AA533150-B-11 (4-5)-2.xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

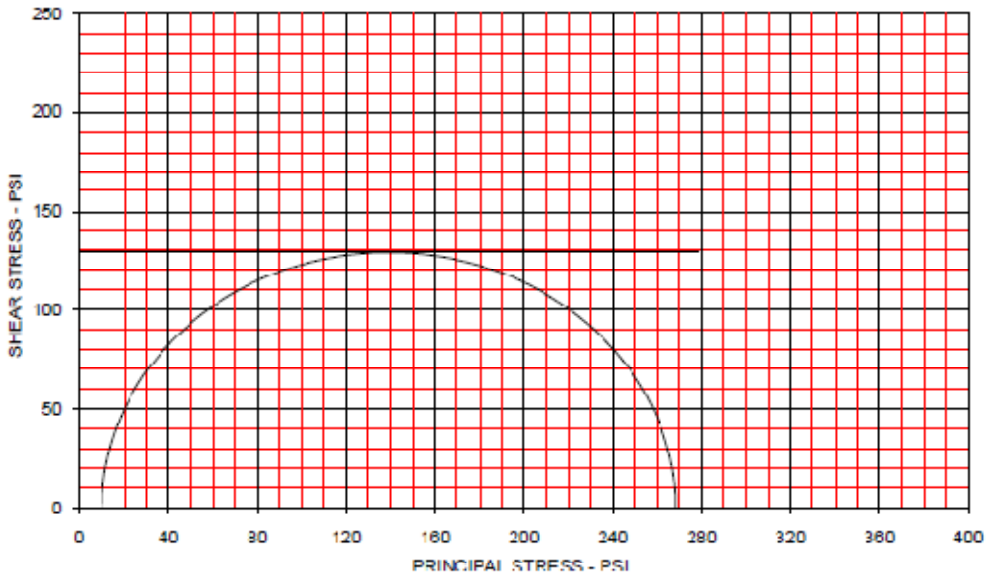
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

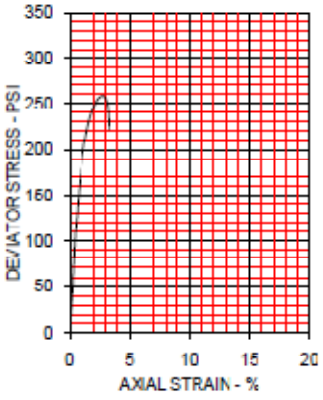
Dia. : 2.02 in Area: 3.219 in^2 Ht. : 4.04 in Weight : 442.0 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	$\sigma_1' : \sigma_3'$	p' (psi)	q (psi)
	Data Input													
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	3.219	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	81.00	0.00	0.00	71.00	0.002	0.25	3.226	22.01	10.00	32.01	3.201	21.00	11.00
3	0.0200	165.00	0.00	0.00	155.00	0.005	0.49	3.235	47.92	10.00	57.92	5.792	33.96	23.96
4	0.0300	253.00	0.00	0.00	243.00	0.007	0.74	3.243	74.94	10.00	84.94	8.494	47.47	37.47
5	0.0400	331.00	0.00	0.00	321.00	0.010	0.99	3.251	98.75	10.00	108.75	10.875	59.37	49.37
6	0.0500	393.00	0.00	0.00	383.00	0.012	1.24	3.259	117.53	10.00	127.53	12.753	68.76	58.76
7	0.0600	442.00	0.00	0.00	432.00	0.015	1.48	3.267	132.23	10.00	142.23	14.223	76.12	66.12
8	0.0700	488.00	0.00	0.00	478.00	0.017	1.73	3.275	145.95	10.00	155.95	15.595	82.97	72.97
9	0.0800	506.00	0.00	0.00	496.00	0.020	1.98	3.283	151.06	10.00	161.06	16.106	85.53	75.53
10	0.0900	520.00	0.00	0.00	510.00	0.022	2.23	3.292	154.93	10.00	164.93	16.493	87.47	77.47
11	0.1000	529.00	0.00	0.00	519.00	0.025	2.47	3.300	157.27	10.00	167.27	16.727	88.63	78.63

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 129.2 psi



SPECIMEN NO	1	2	3	4
INTIAL				
Moisture Content - %	11.7			
Dry Density - pcf	110.5			
Diameter - inches	1.99			
Height - inches	4.44			
AT TEST				
Final Moisture - %	11.7			
Dry Density - pcf	110.5			
Calculated Diameter (in.)	1.99			
Height - inches	4.44			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	268.32			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	2.7			
σ_1 Failure - psi	268.32			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-4
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: FAT CLAY (CH), brown
SAMPLE LOCATION: B-13, 1-3 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 51 PL: 37 PI: 41 Percent -200: 77
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-6-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU • CIVE • GEOTECHNICAL | PLATE: UUIS-4

UUIS-4-AA033150-B-13 (1-3).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

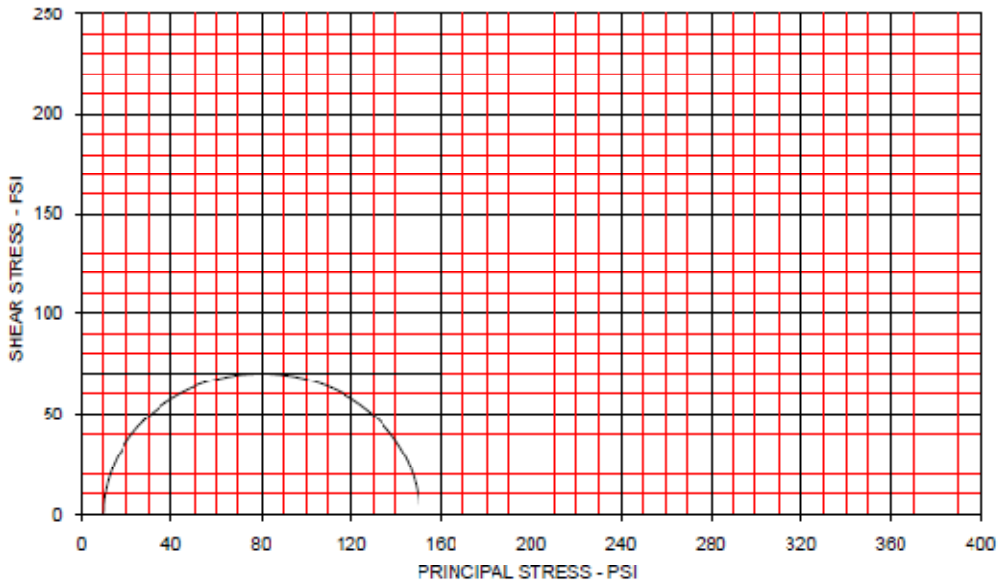
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : **10.0** psi

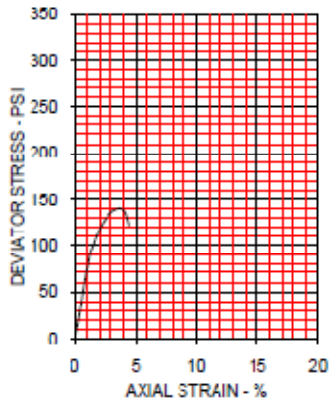
Dia. : 1.99 in Area: 3.100 in^2 Ht. : 4.44 in Weight : 446.0 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	18.00	0.00	0.00	0.00	0.0	0.0	3.100	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0050	87.00	0.00	0.00	69.00	0.001	0.11	3.103	22.23	10.00	32.23	3.223	21.12	11.12
3	0.0100	166.00	0.00	0.00	148.00	0.002	0.23	3.107	47.64	10.00	57.64	5.764	33.82	23.82
4	0.0150	266.00	0.00	0.00	248.00	0.003	0.34	3.110	79.73	10.00	89.73	8.973	49.87	39.87
5	0.0200	350.00	0.00	0.00	332.00	0.005	0.45	3.114	106.62	10.00	116.62	11.662	63.31	53.31
6	0.0250	400.00	0.00	0.00	382.00	0.006	0.56	3.117	122.54	10.00	132.54	13.254	71.27	61.27
7	0.0300	459.00	0.00	0.00	441.00	0.007	0.68	3.121	141.30	10.00	151.30	15.130	80.65	70.65
8	0.0350	515.00	0.00	0.00	497.00	0.008	0.79	3.124	159.07	10.00	169.07	16.907	89.53	79.53
9	0.0400	564.00	0.00	0.00	546.00	0.009	0.90	3.128	174.55	10.00	184.55	18.455	97.27	87.27
10	0.0450	602.00	0.00	0.00	584.00	0.010	1.01	3.132	186.49	10.00	196.49	19.649	103.24	93.24
11	0.0500	637.00	0.00	0.00	619.00	0.011	1.13	3.135	197.44	10.00	207.44	20.744	108.72	98.72
12	0.0550	669.00	0.00	0.00	651.00	0.012	1.24	3.139	207.41	10.00	217.41	21.741	113.70	103.70
13	0.0600	691.00	0.00	0.00	673.00	0.014	1.35	3.142	214.17	10.00	224.17	22.417	117.09	107.09
14	0.0650	716.00	0.00	0.00	698.00	0.015	1.46	3.146	221.87	10.00	231.87	23.187	120.94	110.94
15	0.0700	737.00	0.00	0.00	719.00	0.016	1.58	3.150	228.29	10.00	238.29	23.829	124.14	114.14
16	0.0750	757.00	0.00	0.00	739.00	0.017	1.69	3.153	234.37	10.00	244.37	24.437	127.18	117.18
17	0.0800	772.00	0.00	0.00	754.00	0.018	1.80	3.157	238.85	10.00	248.85	24.885	129.43	119.43
18	0.0850	787.00	0.00	0.00	769.00	0.019	1.92	3.160	243.32	10.00	253.32	25.332	131.66	121.66
19	0.0900	800.00	0.00	0.00	782.00	0.020	2.03	3.164	247.15	10.00	257.15	25.715	133.58	123.58
20	0.0950	811.00	0.00	0.00	793.00	0.021	2.14	3.168	250.34	10.00	260.34	26.034	135.17	125.17
21	0.1000	821.00	0.00	0.00	803.00	0.023	2.25	3.171	253.21	10.00	263.21	26.321	136.60	126.60
22	0.1050	828.00	0.00	0.00	810.00	0.024	2.37	3.175	255.12	10.00	265.12	26.512	137.56	127.56
23	0.1100	834.00	0.00	0.00	816.00	0.025	2.48	3.179	256.71	10.00	266.71	26.671	138.36	128.36
24	0.1150	838.00	0.00	0.00	820.00	0.026	2.59	3.182	257.67	10.00	267.67	26.767	138.84	128.84
25	0.1200	841.00	0.00	0.00	823.00	0.027	2.70	3.186	258.32	10.00	268.32	26.832	139.16	129.16
26	0.1250	841.00	0.00	0.00	823.00	0.028	2.82	3.190	258.02	10.00	268.02	26.802	139.01	129.01
27	0.1300	837.00	0.00	0.00	819.00	0.029	2.93	3.193	256.47	10.00	266.47	26.647	138.23	128.23
28	0.1350	825.00	0.00	0.00	807.00	0.030	3.04	3.197	252.41	10.00	262.41	26.241	136.21	126.21
29	0.1400	800.00	0.00	0.00	782.00	0.032	3.16	3.201	244.31	10.00	254.31	25.431	132.16	122.16
30	0.1450	731.00	0.00	0.00	713.00	0.033	3.27	3.205	222.49	10.00	232.49	23.249	121.25	111.25

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 70.1 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	13.6			
Dry Density - pcf	109.2			
Diameter - inches	1.93			
Height - inches	4.07			
AT TEST				
Final Moisture - %	13.6			
Dry Density pcf	100.2			
Calculated Diameter (in.)	1.93			
Height - inches	4.07			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	140.26			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/mn.	0.03000			
Failure Strain - %	3.7			
σ_1 Failure - psi	150.26			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UU-1
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL) dark yellowish brown
SAMPLE LOCATION: B-23-1, 1-3 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 39 PL: 13 PI: 26 Percent -200: 73
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-6-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUIS.5

UUIS 6 AA633150 B 23 1 (1 3).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

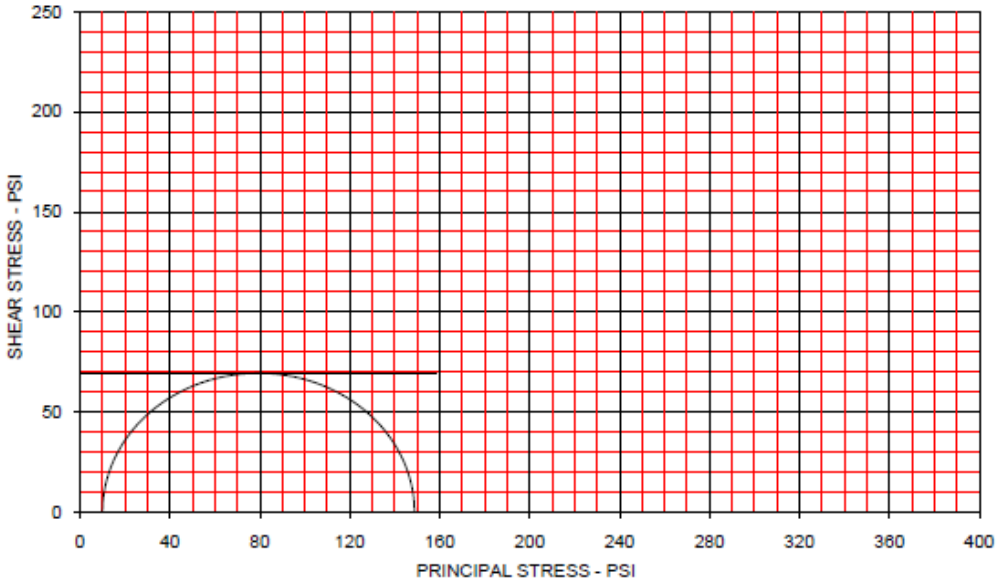
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : **10.0** psi

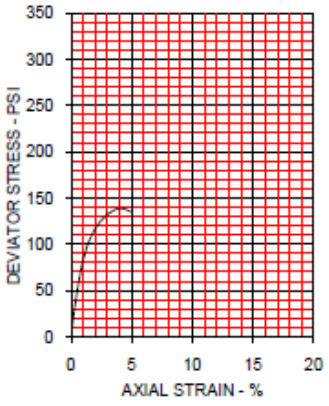
Dia. : 1.93 in Area: 2.918 in^2 Ht. : 4.07 in Weight : 387.2 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	2.918	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	56.00	0.00	0.00	46.00	0.002	0.25	2.926	15.72	10.00	25.72	2.572	17.86	7.86
3	0.0200	112.00	0.00	0.00	102.00	0.005	0.49	2.933	34.78	10.00	44.78	4.478	27.39	17.39
4	0.0300	174.00	0.00	0.00	164.00	0.007	0.74	2.940	55.78	10.00	65.78	6.578	37.89	27.89
5	0.0400	227.00	0.00	0.00	217.00	0.010	0.98	2.947	73.62	10.00	83.62	8.362	46.81	36.81
6	0.0500	280.00	0.00	0.00	270.00	0.012	1.23	2.955	91.38	10.00	101.38	10.138	55.69	45.69
7	0.0600	305.00	0.00	0.00	295.00	0.015	1.47	2.962	99.59	10.00	109.59	10.959	59.80	49.80
8	0.0700	335.00	0.00	0.00	325.00	0.017	1.72	2.970	109.45	10.00	119.45	11.945	64.72	54.72
9	0.0800	359.00	0.00	0.00	349.00	0.020	1.96	2.977	117.23	10.00	127.23	12.723	68.62	58.62
10	0.0900	379.00	0.00	0.00	369.00	0.022	2.21	2.984	123.64	10.00	133.64	13.364	71.82	61.82
11	0.1000	394.00	0.00	0.00	384.00	0.025	2.46	2.992	128.35	10.00	138.35	13.835	74.17	64.17
12	0.1100	407.00	0.00	0.00	397.00	0.027	2.70	2.999	132.36	10.00	142.36	14.236	76.18	66.18
13	0.1200	418.00	0.00	0.00	408.00	0.029	2.95	3.007	135.68	10.00	145.68	14.568	77.84	67.84
14	0.1300	426.00	0.00	0.00	416.00	0.032	3.19	3.015	137.99	10.00	147.99	14.799	79.00	69.00
15	0.1400	431.00	0.00	0.00	421.00	0.034	3.44	3.022	139.30	10.00	149.30	14.930	79.65	69.65
16	0.1500	435.00	0.00	0.00	425.00	0.037	3.68	3.030	140.26	10.00	150.26	15.026	80.13	70.13
17	0.1600	432.00	0.00	0.00	422.00	0.039	3.93	3.038	138.92	10.00	148.92	14.892	79.46	69.46
18	0.1700	418.00	0.00	0.00	408.00	0.042	4.17	3.046	133.96	10.00	143.96	14.396	76.98	66.98
19	0.1800	384.00	0.00	0.00	374.00	0.044	4.42	3.053	122.49	10.00	132.49	13.249	71.24	61.24

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 69.4 psi		



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	12.8			
Dry Density - pcf	113.6			
Diameter - inches	2.00			
Height - inches	4.47			
AT TEST				
Final Moisture - %	12.8			
Dry Density - pcf	113.6			
Calculated Diameter (in.)	2.00			
Height - inches	4.47			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	138.76			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	4.0			
σ_1 Failure - psi	148.76			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-6
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-23-2, 3-5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 39 PL: 13 PI: 26 Percent -200: 73
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUIS.6

UUIS-6-AA533150-B-23-2 (3-5).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

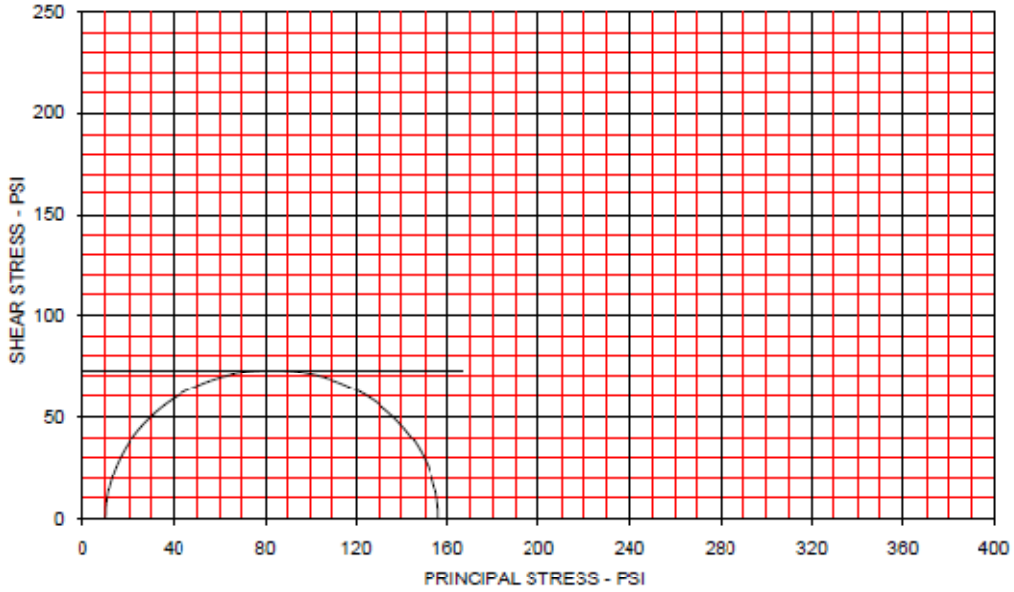
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

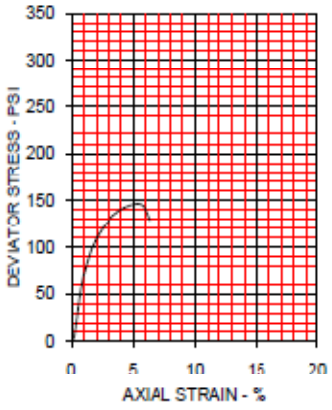
Dia. : 2.00 in Area: 3.147 in^2 Ht. : 4.47 in Weight : 472.7 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	3.147	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	86.00	0.00	0.00	76.00	0.002	0.22	3.154	24.10	10.00	34.10	3.410	22.05	12.05
3	0.0200	149.00	0.00	0.00	139.00	0.004	0.45	3.161	43.97	10.00	53.97	5.397	31.99	21.99
4	0.0300	206.00	0.00	0.00	196.00	0.007	0.67	3.168	61.87	10.00	71.87	7.187	40.93	30.93
5	0.0400	255.00	0.00	0.00	245.00	0.009	0.90	3.175	77.16	10.00	87.16	8.716	48.58	38.58
6	0.0500	291.00	0.00	0.00	281.00	0.011	1.12	3.182	88.30	10.00	98.30	9.830	54.15	44.15
7	0.0600	324.00	0.00	0.00	314.00	0.013	1.34	3.190	98.44	10.00	108.44	10.844	59.22	49.22
8	0.0700	348.00	0.00	0.00	338.00	0.016	1.57	3.197	105.73	10.00	115.73	11.573	62.86	52.86
9	0.0800	368.00	0.00	0.00	358.00	0.018	1.79	3.204	111.73	10.00	121.73	12.173	65.86	55.86
10	0.0900	387.00	0.00	0.00	377.00	0.020	2.02	3.212	117.39	10.00	127.39	12.739	68.69	58.69
11	0.1000	401.00	0.00	0.00	391.00	0.022	2.24	3.219	121.47	10.00	131.47	13.147	70.73	60.73
12	0.1100	414.00	0.00	0.00	404.00	0.025	2.46	3.226	125.22	10.00	135.22	13.522	72.61	62.61
13	0.1200	425.00	0.00	0.00	415.00	0.027	2.69	3.234	128.33	10.00	138.33	13.833	74.17	64.17
14	0.1300	435.00	0.00	0.00	425.00	0.029	2.91	3.241	131.12	10.00	141.12	14.112	75.56	65.56
15	0.1400	444.00	0.00	0.00	434.00	0.031	3.14	3.249	133.59	10.00	143.59	14.359	76.80	66.80
16	0.1500	450.00	0.00	0.00	440.00	0.034	3.36	3.256	135.13	10.00	145.13	14.513	77.56	67.56
17	0.1600	457.00	0.00	0.00	447.00	0.036	3.58	3.264	136.96	10.00	146.96	14.696	78.48	68.48
18	0.1700	462.00	0.00	0.00	452.00	0.038	3.81	3.271	138.17	10.00	148.17	14.817	79.08	69.08
19	0.1800	465.00	0.00	0.00	455.00	0.040	4.03	3.279	138.76	10.00	148.76	14.876	79.38	69.38
20	0.1900	465.00	0.00	0.00	455.00	0.043	4.26	3.287	138.44	10.00	148.44	14.844	79.22	69.22
21	0.2000	464.00	0.00	0.00	454.00	0.045	4.48	3.294	137.81	10.00	147.81	14.781	78.90	68.90
22	0.2100	461.00	0.00	0.00	451.00	0.047	4.70	3.302	136.58	10.00	146.58	14.658	78.29	68.29
23	0.2200	457.00	0.00	0.00	447.00	0.049	4.93	3.310	135.05	10.00	145.05	14.505	77.52	67.52

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 73.1 psi		



SPECIMEN NO.	1	2	3	4
	INITIAL			
Moisture Content - %	11.7			
Dry Density - pcf	114.9			
Diameter - inches	1.98			
Height - inches	4.45			
	AT TEST			
Final Moisture - %	11.7			
Dry Density - pcf	114.9			
Calculated Diameter (in.)	1.98			
Height - inches	4.45			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	146.13			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	3.4			
σ_1 Failure - psi	156.13			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUS-7
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL), dark yellowsh brown
SAMPLE LOCATION: B-27, 8-9 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 35 PL: 12 PI: 23 Percent -200: 81
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL | PLATE. UUIS.7

UUIS-7-AA533150-B-27 (8-9).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

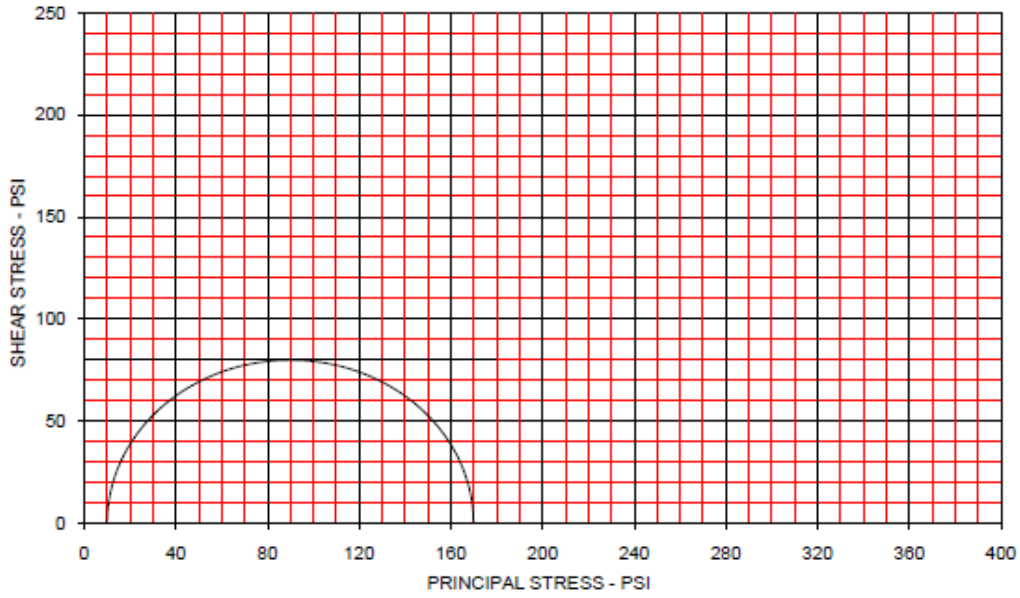
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : **10.0** psi

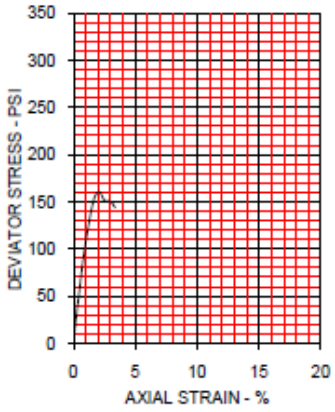
Dia. : 1.98 in Area: 3.069 in^2 Ht. : 4.45 in Weight : 459.8 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	3.069	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	23.00	0.00	0.00	13.00	0.002	0.22	3.076	4.23	10.00	14.23	1.423	12.11	2.11
3	0.0200	92.00	0.00	0.00	82.00	0.004	0.45	3.083	26.60	10.00	36.60	3.660	23.30	13.30
4	0.0300	160.00	0.00	0.00	150.00	0.007	0.67	3.090	48.55	10.00	58.55	5.855	34.28	24.28
5	0.0400	209.00	0.00	0.00	199.00	0.009	0.90	3.097	64.26	10.00	74.26	7.426	42.13	32.13
6	0.0500	253.00	0.00	0.00	243.00	0.011	1.12	3.104	78.30	10.00	88.30	8.830	49.15	39.15
7	0.0600	285.00	0.00	0.00	275.00	0.013	1.35	3.111	88.41	10.00	98.41	9.841	54.20	44.20
8	0.0700	314.00	0.00	0.00	304.00	0.016	1.57	3.118	97.51	10.00	107.51	10.751	58.75	48.75
9	0.0800	335.00	0.00	0.00	325.00	0.018	1.80	3.125	104.00	10.00	114.00	11.400	62.00	52.00
10	0.0900	356.00	0.00	0.00	346.00	0.020	2.02	3.132	110.47	10.00	120.47	12.047	65.23	55.23
11	0.1000	372.00	0.00	0.00	362.00	0.022	2.25	3.139	115.31	10.00	125.31	12.531	67.66	57.66
12	0.1100	387.00	0.00	0.00	377.00	0.025	2.47	3.147	119.81	10.00	129.81	12.981	69.91	59.91
13	0.1200	401.00	0.00	0.00	391.00	0.027	2.70	3.154	123.98	10.00	133.98	13.398	71.99	61.99
14	0.1300	414.00	0.00	0.00	404.00	0.029	2.92	3.161	127.80	10.00	137.80	13.780	73.90	63.90
15	0.1400	425.00	0.00	0.00	415.00	0.031	3.15	3.168	130.98	10.00	140.98	14.098	75.49	65.49
16	0.1500	435.00	0.00	0.00	425.00	0.034	3.37	3.176	133.82	10.00	143.82	14.382	76.91	66.91
17	0.1600	443.00	0.00	0.00	433.00	0.036	3.60	3.183	136.03	10.00	146.03	14.603	78.01	68.01
18	0.1700	452.00	0.00	0.00	442.00	0.038	3.82	3.191	138.53	10.00	148.53	14.853	79.26	69.26
19	0.1800	459.00	0.00	0.00	449.00	0.040	4.05	3.198	140.39	10.00	150.39	15.039	80.20	70.20
20	0.1900	465.00	0.00	0.00	455.00	0.043	4.27	3.206	141.94	10.00	151.94	15.194	80.97	70.97
21	0.2000	470.00	0.00	0.00	460.00	0.045	4.50	3.213	143.16	10.00	153.16	15.316	81.58	71.58
22	0.2100	475.00	0.00	0.00	465.00	0.047	4.72	3.221	144.37	10.00	154.37	15.437	82.19	72.19
23	0.2200	479.00	0.00	0.00	469.00	0.049	4.95	3.228	145.27	10.00	155.27	15.527	82.64	72.64
24	0.2300	482.00	0.00	0.00	472.00	0.052	5.17	3.236	145.86	10.00	155.86	15.586	82.93	72.93
25	0.2400	484.00	0.00	0.00	474.00	0.054	5.40	3.244	146.13	10.00	156.13	15.613	83.06	73.06
26	0.2500	483.00	0.00	0.00	473.00	0.056	5.62	3.251	145.47	10.00	155.47	15.547	82.74	72.74
27	0.2600	477.00	0.00	0.00	467.00	0.058	5.85	3.259	143.28	10.00	153.28	15.328	81.64	71.64
28	0.2700	456.00	0.00	0.00	446.00	0.061	6.07	3.267	136.51	10.00	146.51	14.651	78.26	68.26
29	0.2800	433.00	0.00	0.00	423.00	0.063	6.30	3.275	129.16	10.00	139.16	13.916	74.58	64.58

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 79.9 psi			
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	12.3			
Dry Density - pcf	108.3			
Diameter - inches	2.06			
Height - inches	4.15			
AT TEST				
Final Moisture - %	12.3			
Dry Density - pcf	108.3			
Calculated Diameter (in.)	2.06			
Height - inches	4.15			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	159.87			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	2.2			
σ_1 Failure - psi	169.87			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-8
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: SANDY LEAN CLAY (CL), dark brown
SAMPLE LOCATION: B-28-1, 1-3 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 26 PL: 11 PI: 15 Percent -200: 78
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL

PLATE: UUIS.8

UUIS-8-AA533150-B-28-1 (1-3).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

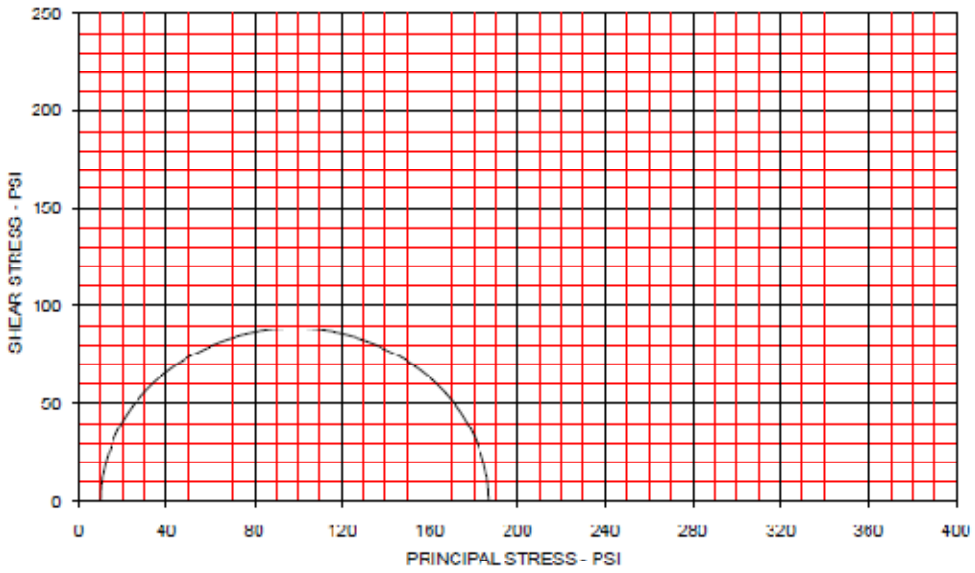
SPECIMEN NO: 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

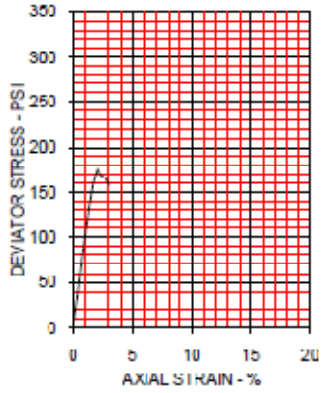
Dia. : 2.06 in Area: 3.335 in^2 Ht. : 4.15 in Weight : 442.7 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
		Data Input												
1	0.0000	11.00	0.00	0.00	0.00	0.0	0.0	3.335	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	113.00	0.00	0.00	102.00	0.002	0.24	3.343	30.51	10.00	40.51	4.051	25.26	15.26
3	0.0200	198.00	0.00	0.00	187.00	0.005	0.48	3.351	55.80	10.00	65.80	6.580	37.90	27.90
4	0.0300	289.00	0.00	0.00	278.00	0.007	0.72	3.359	82.75	10.00	92.75	9.275	51.38	41.38
5	0.0400	364.00	0.00	0.00	353.00	0.010	0.96	3.367	104.83	10.00	114.83	11.483	62.41	52.41
6	0.0500	430.00	0.00	0.00	419.00	0.012	1.20	3.376	124.12	10.00	134.12	13.412	72.06	62.06
7	0.0600	489.00	0.00	0.00	478.00	0.014	1.44	3.384	141.26	10.00	151.26	15.126	80.63	70.63
8	0.0700	533.00	0.00	0.00	522.00	0.017	1.68	3.392	153.88	10.00	163.88	16.388	86.94	76.94
9	0.0800	554.00	0.00	0.00	543.00	0.019	1.93	3.401	159.68	10.00	169.68	16.968	89.84	79.84
10	0.0900	556.00	0.00	0.00	545.00	0.022	2.17	3.409	159.87	10.00	169.87	16.987	89.94	79.94
11	0.1000	535.00	0.00	0.00	524.00	0.024	2.41	3.417	153.34	10.00	163.34	16.334	86.67	76.67
12	0.1100	524.00	0.00	0.00	513.00	0.026	2.65	3.426	149.75	10.00	159.75	15.975	84.87	74.87
13	0.1200	530.00	0.00	0.00	519.00	0.029	2.89	3.434	151.12	10.00	161.12	16.112	85.56	75.56
14	0.1300	522.00	0.00	0.00	511.00	0.031	3.13	3.443	148.43	10.00	158.43	15.843	84.21	74.21
15	0.1400	507.00	0.00	0.00	496.00	0.034	3.37	3.451	143.71	10.00	153.71	15.371	81.86	71.86

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 88.5 psi			
SPECIMEN NO.	1	2	3	4
INITIAL					
Moisture Content - %	8.7			
Dry Density - pcf	118.7			
Diameter - inches	1.99			
Height - inches	4.32			
AT TEST					
Final Moisture - %	8.7			
Dry Density - pcf	118.7			
Calculated Diameter (in.)	1.99			
Height - inches	4.32			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	176.97			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/mn.	0.03000			
Failure Strain - %	2.0			
σ_1 Failure - psi	186.97			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-9
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: SANDY LEAN CLAY (CL), dark brown
SAMPLE LOCATION: B 28 2, 3 5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 26 PL: 11 PI: 15 Percent -200: 70
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA 5 33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUIS.9

UUIS-9-AA533150-D-20-2 (3-5).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

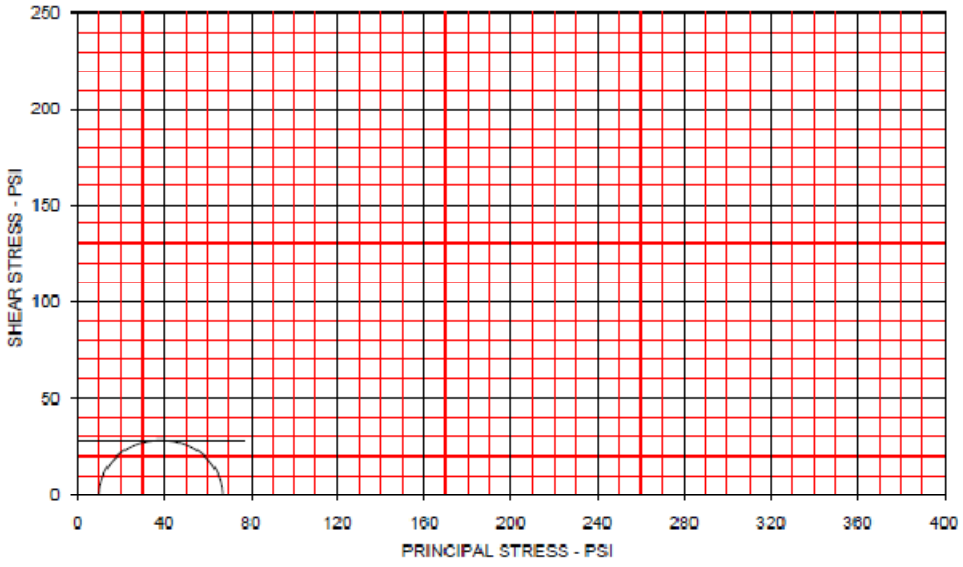
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : **10.0** psi

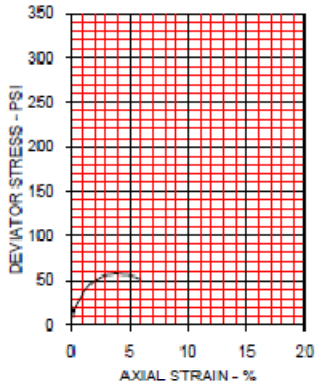
Dia. : 1.99 in Area: 3.121 in^2 Ht. : 4.32 in Weight : 456.9 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	3.121	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	72.00	0.00	0.00	62.00	0.002	0.23	3.128	19.82	10.00	29.82	2.982	19.91	9.91
3	0.0200	146.00	0.00	0.00	136.00	0.005	0.46	3.135	43.38	10.00	53.38	5.338	31.69	21.69
4	0.0300	235.00	0.00	0.00	225.00	0.007	0.69	3.142	71.60	10.00	81.60	8.160	45.80	35.80
5	0.0400	312.00	0.00	0.00	302.00	0.009	0.93	3.150	95.88	10.00	105.88	10.588	57.94	47.94
6	0.0500	386.00	0.00	0.00	376.00	0.012	1.16	3.157	119.09	10.00	129.09	12.909	69.55	59.55
7	0.0600	454.00	0.00	0.00	444.00	0.014	1.39	3.165	140.30	10.00	150.30	15.030	80.15	70.15
8	0.0700	512.00	0.00	0.00	502.00	0.016	1.62	3.172	158.26	10.00	168.26	16.826	89.13	79.13
9	0.0800	550.00	0.00	0.00	540.00	0.019	1.85	3.180	169.84	10.00	179.84	17.984	94.92	84.92
10	0.0900	574.00	0.00	0.00	564.00	0.021	2.08	3.187	176.97	10.00	186.97	18.697	98.48	88.48
11	0.1000	550.00	0.00	0.00	540.00	0.023	2.31	3.195	169.04	10.00	179.04	17.904	94.52	84.52
12	0.1100	544.00	0.00	0.00	534.00	0.025	2.54	3.202	166.76	10.00	176.76	17.676	93.38	83.38
13	0.1200	538.00	0.00	0.00	528.00	0.028	2.78	3.210	164.50	10.00	174.50	17.450	92.25	82.25
14	0.1300	517.00	0.00	0.00	507.00	0.030	3.01	3.217	157.58	10.00	167.58	16.758	88.79	78.79

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 28.5 psi



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	15.2			
Dry Density - pcf	100.0			
Diameter - inches	1.97			
Height - inches	4.48			
AT TEST				
Final Moisture - %	15.2			
Dry Density - pcf	100.0			
Calculated Diameter (in.)	1.97			
Height - inches	4.49			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	56.94			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	3.8			
σ_1 Failure - psi	66.94			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-10
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL), very dark grayish brown
SAMPLE LOCATION: B-31, 1-2 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 36 PL: 15 PI: 21 Percent -200: 87
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUIS.10

UUIS-10-AA533150-B-31-1 (1-2).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

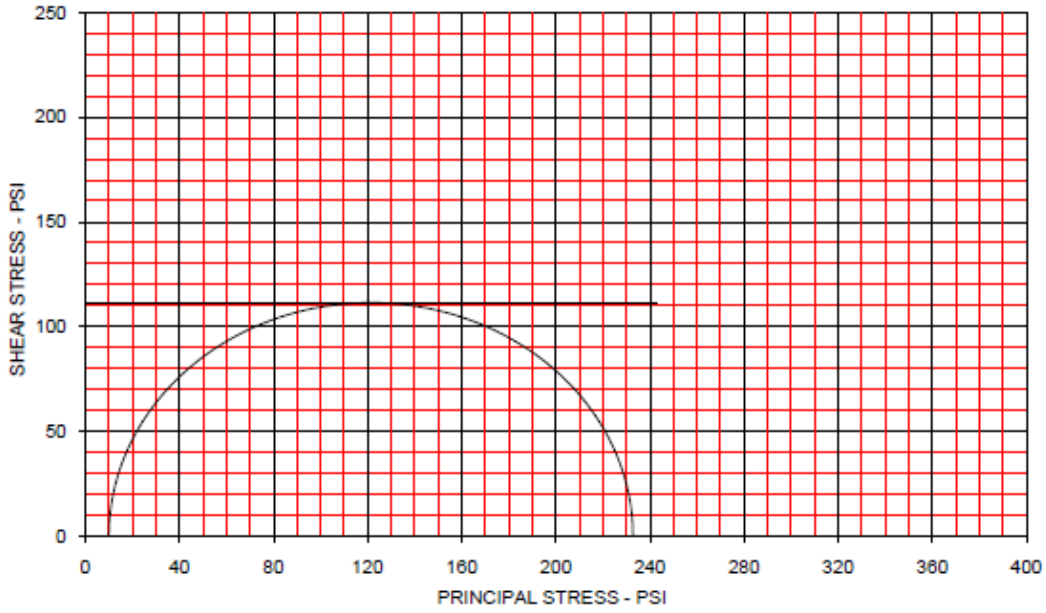
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : **10.0** psi

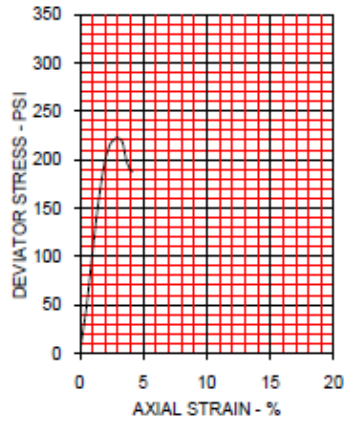
Dia. : 1.97 in Area: 3.058 in^2 Ht. : 4.49 in Weight : 414.7 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	3.058	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	58.00	0.00	0.00	48.00	0.002	0.22	3.065	15.66	10.00	25.66	2.566	17.83	7.83
3	0.0200	82.00	0.00	0.00	72.00	0.004	0.45	3.072	23.44	10.00	33.44	3.344	21.72	11.72
4	0.0300	97.00	0.00	0.00	87.00	0.007	0.67	3.079	28.26	10.00	38.26	3.826	24.13	14.13
5	0.0400	113.00	0.00	0.00	103.00	0.009	0.89	3.086	33.38	10.00	43.38	4.338	26.69	16.69
6	0.0500	126.00	0.00	0.00	116.00	0.011	1.11	3.093	37.51	10.00	47.51	4.751	28.75	18.75
7	0.0600	137.00	0.00	0.00	127.00	0.013	1.34	3.100	40.97	10.00	50.97	5.097	30.49	20.49
8	0.0700	148.00	0.00	0.00	138.00	0.016	1.56	3.107	44.42	10.00	54.42	5.442	32.21	22.21
9	0.0800	157.00	0.00	0.00	147.00	0.018	1.78	3.114	47.21	10.00	57.21	5.721	33.60	23.60
10	0.0900	165.00	0.00	0.00	155.00	0.020	2.01	3.121	49.66	10.00	59.66	5.966	34.83	24.83
11	0.1000	171.00	0.00	0.00	161.00	0.022	2.23	3.128	51.47	10.00	61.47	6.147	35.73	25.73
12	0.1100	176.00	0.00	0.00	166.00	0.025	2.45	3.135	52.95	10.00	62.95	6.295	36.47	26.47
13	0.1200	180.00	0.00	0.00	170.00	0.027	2.67	3.142	54.10	10.00	64.10	6.410	37.05	27.05
14	0.1300	184.00	0.00	0.00	174.00	0.029	2.90	3.150	55.24	10.00	65.24	6.524	37.62	27.62
15	0.1400	186.00	0.00	0.00	176.00	0.031	3.12	3.157	55.75	10.00	65.75	6.575	37.88	27.88
16	0.1500	188.00	0.00	0.00	178.00	0.033	3.34	3.164	56.26	10.00	66.26	6.626	38.13	28.13
17	0.1600	190.00	0.00	0.00	180.00	0.036	3.57	3.171	56.76	10.00	66.76	6.676	38.38	28.38
18	0.1700	191.00	0.00	0.00	181.00	0.038	3.79	3.179	56.94	10.00	66.94	6.694	38.47	28.47
19	0.1800	191.00	0.00	0.00	181.00	0.040	4.01	3.186	56.81	10.00	66.81	6.681	38.40	28.40
20	0.1900	191.00	0.00	0.00	181.00	0.042	4.23	3.194	56.68	10.00	66.68	6.668	38.34	28.34
21	0.2000	190.00	0.00	0.00	180.00	0.045	4.46	3.201	56.23	10.00	66.23	6.623	38.12	28.12
22	0.2100	190.00	0.00	0.00	180.00	0.047	4.68	3.209	56.10	10.00	66.10	6.610	38.05	28.05
23	0.2200	189.00	0.00	0.00	179.00	0.049	4.90	3.216	55.66	10.00	65.66	6.566	37.83	27.83
24	0.2300	187.00	0.00	0.00	177.00	0.051	5.13	3.224	54.91	10.00	64.91	6.491	37.45	27.45
25	0.2400	185.00	0.00	0.00	175.00	0.053	5.35	3.231	54.16	10.00	64.16	6.416	37.08	27.08
26	0.2500	183.00	0.00	0.00	173.00	0.056	5.57	3.239	53.41	10.00	63.41	6.341	36.71	26.71
27	0.2600	180.00	0.00	0.00	170.00	0.058	5.79	3.246	52.36	10.00	62.36	6.236	36.18	26.18
28	0.2700	178.00	0.00	0.00	168.00	0.060	6.02	3.254	51.63	10.00	61.63	6.163	35.81	25.81

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 111.4 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	9.8			
Dry Density - pcf	123.0			
Diameter - inches	1.92			
Height - inches	4.14			
AT TEST				
Final Moisture - %	9.8			
Dry Density - pcf	123.0			
Calculated Diameter (in.)	1.92			
Height - inches	4.14			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	222.78			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	2.9			
σ_1 Failure - psi	232.78			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-11
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL), very dark grayish brown
SAMPLE LOCATION: B-31-2, 6-7 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 36 PL: 15 PI: 21 Percent -200: 87
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL

PLATE: UUIS.11

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

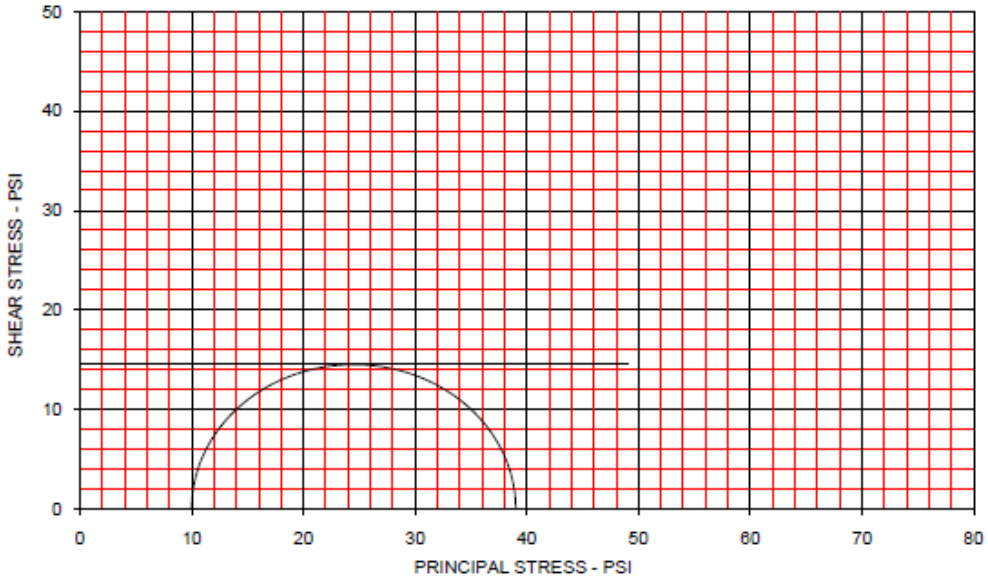
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : **10.0** psi

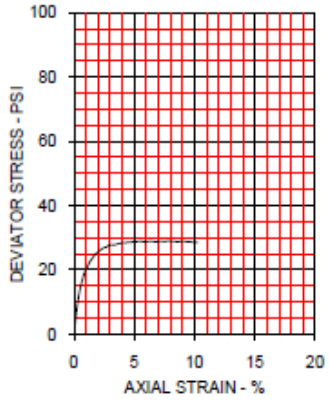
Dia. : 1.92 in Area: 2.885 in^2 Ht. : 4.14 in Weight : 422.7 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	2.885	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	73.00	0.00	0.00	63.00	0.002	0.24	2.892	21.78	10.00	31.78	3.178	20.89	10.89
3	0.0200	137.00	0.00	0.00	127.00	0.005	0.48	2.899	43.80	10.00	53.80	5.380	31.90	21.90
4	0.0300	217.00	0.00	0.00	207.00	0.007	0.73	2.906	71.22	10.00	81.22	8.122	45.61	35.61
5	0.0400	304.00	0.00	0.00	294.00	0.010	0.97	2.913	100.91	10.00	110.91	11.091	60.46	50.46
6	0.0500	388.00	0.00	0.00	378.00	0.012	1.21	2.921	129.43	10.00	139.43	13.943	74.71	64.71
7	0.0600	463.00	0.00	0.00	453.00	0.015	1.45	2.928	154.73	10.00	164.73	16.473	87.36	77.36
8	0.0700	530.00	0.00	0.00	520.00	0.017	1.69	2.935	177.18	10.00	187.18	18.718	98.59	88.59
9	0.0800	585.00	0.00	0.00	575.00	0.019	1.93	2.942	195.43	10.00	205.43	20.543	107.72	97.72
10	0.0900	624.00	0.00	0.00	614.00	0.022	2.18	2.949	208.17	10.00	218.17	21.817	114.09	104.09
11	0.1000	651.00	0.00	0.00	641.00	0.024	2.42	2.957	216.79	10.00	226.79	22.679	118.40	108.40
12	0.1100	663.00	0.00	0.00	653.00	0.027	2.66	2.964	220.30	10.00	230.30	23.030	120.15	110.15
13	0.1200	672.00	0.00	0.00	662.00	0.029	2.90	2.971	222.78	10.00	232.78	23.278	121.39	111.39
14	0.1300	670.00	0.00	0.00	660.00	0.031	3.14	2.979	221.56	10.00	231.56	23.156	120.78	110.78
15	0.1400	657.00	0.00	0.00	647.00	0.034	3.39	2.986	216.65	10.00	226.65	22.665	118.33	108.33
16	0.1500	612.00	0.00	0.00	602.00	0.036	3.63	2.994	201.08	10.00	211.08	21.108	110.54	100.54
17	0.1600	586.00	0.00	0.00	576.00	0.039	3.87	3.001	191.91	10.00	201.91	20.191	105.96	95.96
18	0.1700	573.00	0.00	0.00	563.00	0.041	4.11	3.009	187.11	10.00	197.11	19.711	103.55	93.55

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 14.5 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	15.5			
Dry Density - pcf	105.2			
Diameter - inches	2.05			
Height - inches	4.49			
AT TEST				
Final Moisture - %	15.5			
Dry Density - pcf	105.2			
Calculated Diameter (in.)	2.05			
Height - inches	4.49			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	29.01			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	7.8			
σ_1 Failure - psi	39.01			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-12
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-31, 28-29 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 30 PL: 11 PI: 19 Percent -200: 80
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUIS.12

UUIS-12-AA533150-B-31-3 (28-29).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

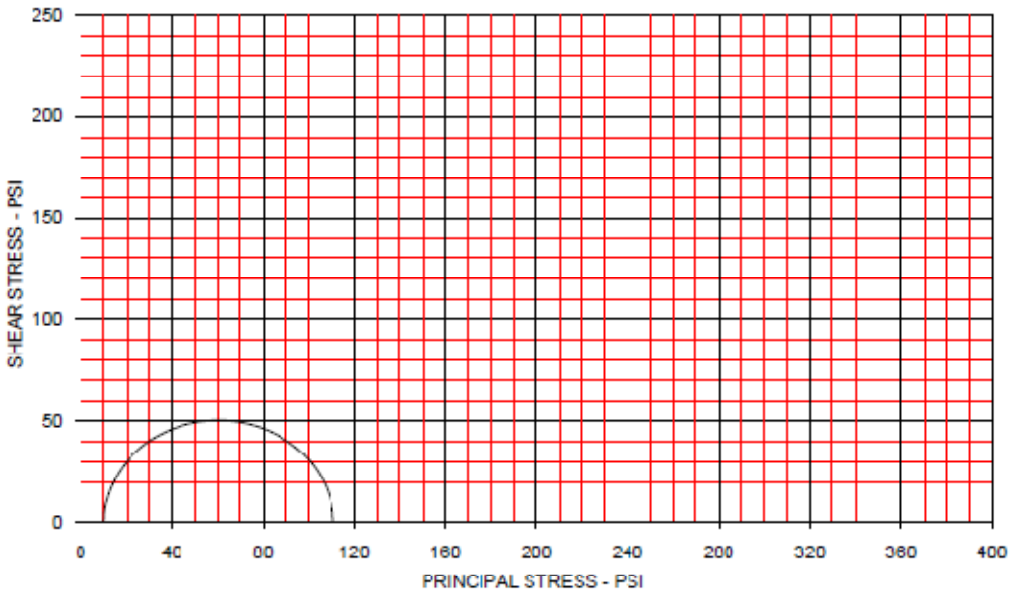
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

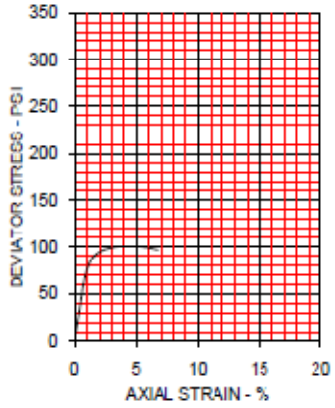
Dia. : 2.05 in Area: 3.306 in^2 Ht. : 4.49 in Weight : 473.8 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	$\sigma_1':\sigma_3'$	p' (psi)	q (psi)
	Data Input													
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	3.306	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	35.00	0.00	0.00	25.00	0.002	0.22	3.313	7.55	10.00	17.55	1.755	13.77	3.77
3	0.0200	53.00	0.00	0.00	43.00	0.004	0.45	3.321	12.95	10.00	22.95	2.295	16.47	6.47
4	0.0300	65.00	0.00	0.00	55.00	0.007	0.67	3.328	16.53	10.00	26.53	2.653	18.26	8.26
5	0.0400	74.00	0.00	0.00	64.00	0.009	0.89	3.336	19.19	10.00	29.19	2.919	19.59	9.59
6	0.0500	80.00	0.00	0.00	70.00	0.011	1.11	3.343	20.94	10.00	30.94	3.094	20.47	10.47
7	0.0600	86.00	0.00	0.00	76.00	0.013	1.34	3.351	22.68	10.00	32.68	3.268	21.34	11.34
8	0.0700	90.00	0.00	0.00	80.00	0.016	1.56	3.358	23.82	10.00	33.82	3.382	21.91	11.91
9	0.0800	94.00	0.00	0.00	84.00	0.018	1.78	3.366	24.96	10.00	34.96	3.496	22.48	12.48
10	0.0900	96.00	0.00	0.00	86.00	0.020	2.00	3.374	25.49	10.00	35.49	3.549	22.75	12.75
11	0.1000	99.00	0.00	0.00	89.00	0.022	2.23	3.381	26.32	10.00	36.32	3.632	23.16	13.16
12	0.1100	101.00	0.00	0.00	91.00	0.024	2.45	3.389	26.85	10.00	36.85	3.685	23.43	13.43
13	0.1200	102.00	0.00	0.00	92.00	0.027	2.67	3.397	27.08	10.00	37.08	3.708	23.54	13.54
14	0.1300	104.00	0.00	0.00	94.00	0.029	2.89	3.405	27.61	10.00	37.61	3.761	23.81	13.81
15	0.1400	105.00	0.00	0.00	95.00	0.031	3.12	3.412	27.84	10.00	37.84	3.784	23.92	13.92
16	0.1500	105.00	0.00	0.00	95.00	0.033	3.34	3.420	27.78	10.00	37.78	3.778	23.89	13.89
17	0.1600	106.00	0.00	0.00	96.00	0.036	3.56	3.428	28.00	10.00	38.00	3.800	24.00	14.00
18	0.1700	107.00	0.00	0.00	97.00	0.038	3.78	3.436	28.23	10.00	38.23	3.823	24.12	14.12
19	0.1800	108.00	0.00	0.00	98.00	0.040	4.01	3.444	28.46	10.00	38.46	3.846	24.23	14.23
20	0.1900	108.00	0.00	0.00	98.00	0.042	4.23	3.452	28.39	10.00	38.39	3.839	24.19	14.19
21	0.2000	109.00	0.00	0.00	99.00	0.045	4.45	3.460	28.61	10.00	38.61	3.861	24.31	14.31
22	0.2100	109.00	0.00	0.00	99.00	0.047	4.67	3.468	28.55	10.00	38.55	3.855	24.27	14.27
23	0.2200	110.00	0.00	0.00	100.00	0.049	4.90	3.476	28.77	10.00	38.77	3.877	24.38	14.38
24	0.2300	110.00	0.00	0.00	100.00	0.051	5.12	3.484	28.70	10.00	38.70	3.870	24.35	14.35
25	0.2400	111.00	0.00	0.00	101.00	0.053	5.34	3.493	28.92	10.00	38.92	3.892	24.46	14.46
26	0.2500	111.00	0.00	0.00	101.00	0.056	5.56	3.501	28.85	10.00	38.85	3.885	24.43	14.43
27	0.2600	111.00	0.00	0.00	101.00	0.058	5.79	3.509	28.78	10.00	38.78	3.878	24.39	14.39
28	0.2700	111.00	0.00	0.00	101.00	0.060	6.01	3.517	28.71	10.00	38.71	3.871	24.36	14.36
29	0.2800	112.00	0.00	0.00	102.00	0.062	6.23	3.526	28.93	10.00	38.93	3.893	24.47	14.47
30	0.2900	112.00	0.00	0.00	102.00	0.065	6.46	3.534	28.86	10.00	38.86	3.886	24.43	14.43
31	0.3000	112.00	0.00	0.00	102.00	0.067	6.68	3.543	28.79	10.00	38.79	3.879	24.40	14.40
32	0.3100	112.00	0.00	0.00	102.00	0.069	6.90	3.551	28.72	10.00	38.72	3.872	24.36	14.36
33	0.3200	113.00	0.00	0.00	103.00	0.071	7.12	3.560	28.94	10.00	38.94	3.894	24.47	14.47
34	0.3300	113.00	0.00	0.00	103.00	0.073	7.35	3.568	28.87	10.00	38.87	3.887	24.43	14.43
35	0.3400	113.00	0.00	0.00	103.00	0.076	7.57	3.577	28.80	10.00	38.80	3.880	24.40	14.40
36	0.3500	114.00	0.00	0.00	104.00	0.078	7.79	3.585	29.01	10.00	39.01	3.901	24.50	14.50
37	0.3600	114.00	0.00	0.00	104.00	0.080	8.01	3.594	28.94	10.00	38.94	3.894	24.47	14.47
38	0.3700	114.00	0.00	0.00	104.00	0.082	8.24	3.603	28.87	10.00	38.87	3.887	24.43	14.43
39	0.3800	114.00	0.00	0.00	104.00	0.085	8.46	3.611	28.80	10.00	38.80	3.880	24.40	14.40
40	0.3900	114.00	0.00	0.00	104.00	0.087	8.68	3.620	28.73	10.00	38.73	3.873	24.36	14.36
41	0.4000	115.00	0.00	0.00	105.00	0.089	8.90	3.629	28.93	10.00	38.93	3.893	24.47	14.47
42	0.4100	115.00	0.00	0.00	105.00	0.091	9.13	3.638	28.86	10.00	38.86	3.886	24.43	14.43
43	0.4200	115.00	0.00	0.00	105.00	0.093	9.35	3.647	28.79	10.00	38.79	3.879	24.40	14.40
44	0.4300	115.00	0.00	0.00	105.00	0.096	9.57	3.656	28.72	10.00	38.72	3.872	24.36	14.36
45	0.4400	115.00	0.00	0.00	105.00	0.098	9.79	3.665	28.65	10.00	38.65	3.865	24.32	14.32
46	0.4500	115.00	0.00	0.00	105.00	0.100	10.02	3.674	28.58	10.00	38.58	3.858	24.29	14.29
47	0.4600	115.00	0.00	0.00	105.00	0.102	10.24	3.683	28.51	10.00	38.51	3.851	24.25	14.25

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 50.4 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	14.2			
Dry Density - pcf	114.6			
Diameter - inches	2.11			
Height - inches	4.35			
AT TEST				
Final Moisture - %	14.2			
Dry Density - pcf	114.6			
Calculated Diameter (in.)	2.11			
Height - inches	4.35			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	100.73			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	5.1			
σ_1 Failure - psi	110.73			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-13
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-32, 1-3 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 38 PL: 12 PI: 26 Percent -200: 83
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-6-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUIS.13

UUIS-13-AA533150-B-32-1 (1-3).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

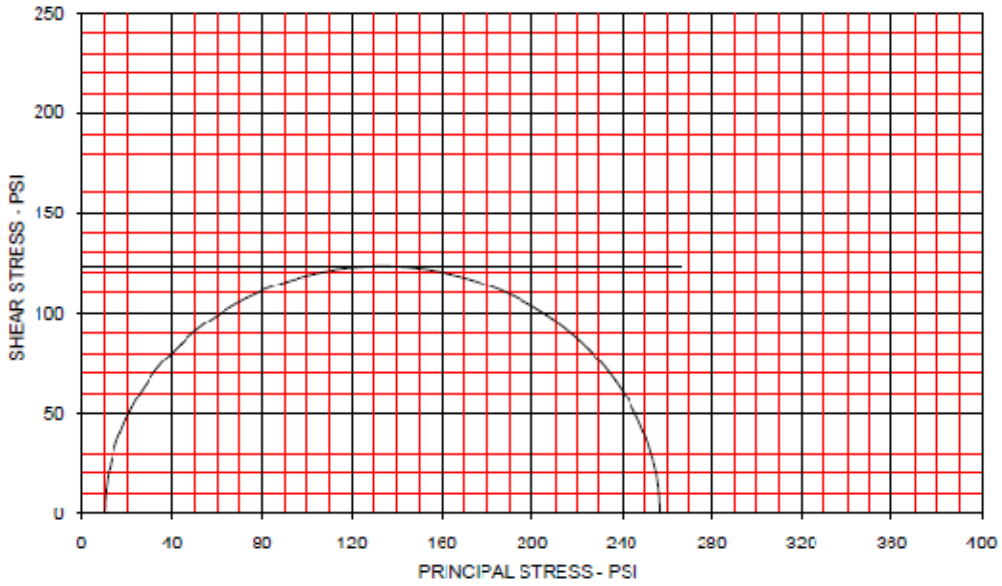
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

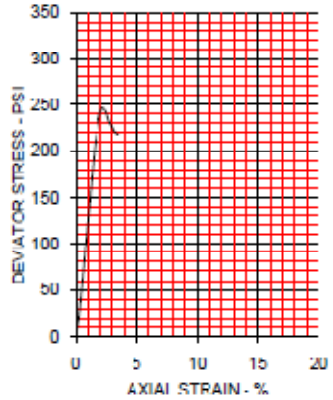
Dia. : 2.11 in Area: 3.497 in^2 Ht. : 4.35 in Weight : 522.2 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	3.497	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	80.00	0.00	0.00	70.00	0.002	0.23	3.505	19.97	10.00	29.97	2.997	19.99	9.99
3	0.0200	146.00	0.00	0.00	136.00	0.005	0.46	3.513	38.72	10.00	48.72	4.872	29.36	19.36
4	0.0300	220.00	0.00	0.00	210.00	0.007	0.69	3.521	59.64	10.00	69.64	6.964	39.82	29.82
5	0.0400	270.00	0.00	0.00	260.00	0.009	0.92	3.529	73.67	10.00	83.67	8.367	46.84	36.84
6	0.0500	301.00	0.00	0.00	291.00	0.012	1.15	3.537	82.26	10.00	92.26	9.226	51.13	41.13
7	0.0600	321.00	0.00	0.00	311.00	0.014	1.38	3.546	87.71	10.00	97.71	9.771	53.86	43.86
8	0.0700	334.00	0.00	0.00	324.00	0.016	1.61	3.554	91.17	10.00	101.17	10.117	55.58	45.58
9	0.0800	343.00	0.00	0.00	333.00	0.018	1.84	3.562	93.48	10.00	103.48	10.348	56.74	46.74
10	0.0900	351.00	0.00	0.00	341.00	0.021	2.07	3.571	95.50	10.00	105.50	10.550	57.75	47.75
11	0.1000	357.00	0.00	0.00	347.00	0.023	2.30	3.579	96.95	10.00	106.95	10.695	58.48	48.48
12	0.1100	361.00	0.00	0.00	351.00	0.025	2.53	3.587	97.84	10.00	107.84	10.784	58.92	48.92
13	0.1200	365.00	0.00	0.00	355.00	0.028	2.76	3.596	98.72	10.00	108.72	10.872	59.36	49.36
14	0.1300	368.00	0.00	0.00	358.00	0.030	2.99	3.605	99.32	10.00	109.32	10.932	59.66	49.66
15	0.1400	371.00	0.00	0.00	361.00	0.032	3.22	3.613	99.91	10.00	109.91	10.991	59.96	49.96
16	0.1500	373.00	0.00	0.00	363.00	0.035	3.45	3.622	100.23	10.00	110.23	11.023	60.11	50.11
17	0.1600	375.00	0.00	0.00	365.00	0.037	3.68	3.630	100.54	10.00	110.54	11.054	60.27	50.27
18	0.1700	376.00	0.00	0.00	366.00	0.039	3.91	3.639	100.58	10.00	110.58	11.058	60.29	50.29
19	0.1800	377.00	0.00	0.00	367.00	0.041	4.14	3.648	100.61	10.00	110.61	11.061	60.30	50.30
20	0.1900	378.00	0.00	0.00	368.00	0.044	4.37	3.657	100.64	10.00	110.64	11.064	60.32	50.32
21	0.2000	379.00	0.00	0.00	369.00	0.046	4.60	3.665	100.67	10.00	110.67	11.067	60.34	50.34
22	0.2100	380.00	0.00	0.00	370.00	0.048	4.83	3.674	100.70	10.00	110.70	11.070	60.35	50.35
23	0.2200	381.00	0.00	0.00	371.00	0.051	5.06	3.683	100.73	10.00	110.73	11.073	60.36	50.36
24	0.2300	381.00	0.00	0.00	371.00	0.053	5.29	3.692	100.48	10.00	110.48	11.048	60.24	50.24
25	0.2400	380.00	0.00	0.00	370.00	0.055	5.52	3.701	99.97	10.00	109.97	10.997	59.99	49.99
26	0.2500	380.00	0.00	0.00	370.00	0.058	5.75	3.710	99.73	10.00	109.73	10.973	59.86	49.86
27	0.2600	379.00	0.00	0.00	369.00	0.060	5.98	3.719	99.21	10.00	109.21	10.921	59.61	49.61
28	0.2700	377.00	0.00	0.00	367.00	0.062	6.21	3.728	98.43	10.00	108.43	10.843	59.22	49.22
29	0.2800	375.00	0.00	0.00	365.00	0.064	6.44	3.738	97.66	10.00	107.66	10.766	58.83	48.83
30	0.2900	373.00	0.00	0.00	363.00	0.067	6.67	3.747	96.88	10.00	106.88	10.688	58.44	48.44

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 123.3 psi		



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	13.2			
Dry Density - pcf	111.0			
Diameter - inches	2.00			
Heigh: - inches	4.07			
AT TEST				
Final Moisture - %	13.2			
Dry Density - pcf	111.0			
Calculated Diameter (in.)	2.00			
Heigh: - inches	4.07			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	246.64			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	2.2			
σ_1 Failure - psi	256.64			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-14
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-32, 3-5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 38 PL: 12 PI: 26 Percent -200: 83
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU • CIVE • GEOTECHNICAL | PLATE: UUIS.14

UUIS-14-AA533150-B-32-2 (3-5).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

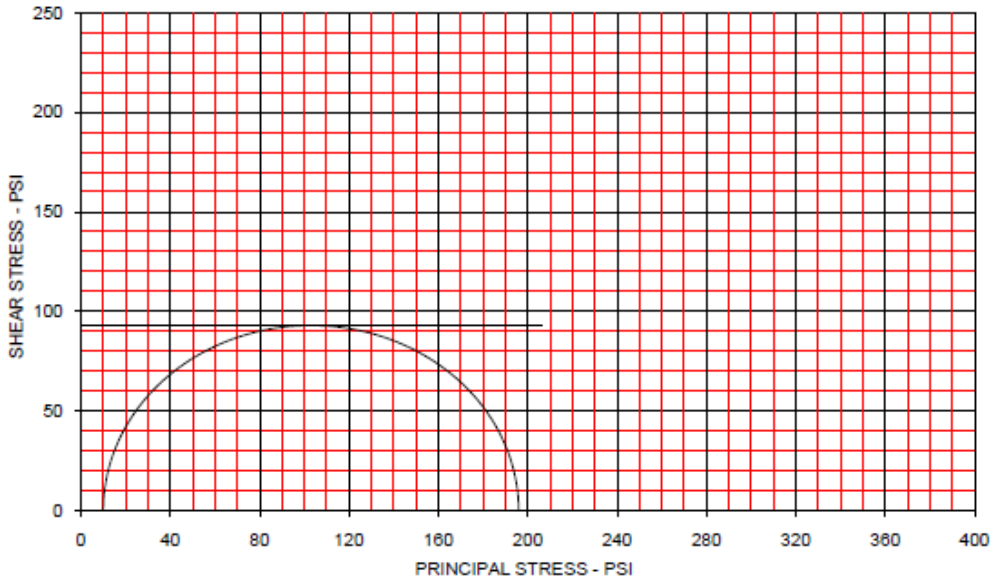
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

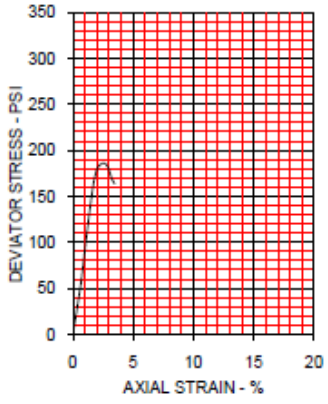
Dia. : 2.00 in Area: 3.152 in^2 Ht. : 4.07 in Weight : 423.1 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	3.152	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	81.00	0.00	0.00	71.00	0.002	0.25	3.160	22.47	10.00	32.47	3.247	21.23	11.23
3	0.0200	184.00	0.00	0.00	174.00	0.005	0.49	3.168	54.93	10.00	64.93	6.493	37.47	27.47
4	0.0300	300.00	0.00	0.00	290.00	0.007	0.74	3.175	91.32	10.00	101.32	10.132	55.66	45.66
5	0.0400	412.00	0.00	0.00	402.00	0.010	0.98	3.183	126.28	10.00	136.28	13.628	73.14	63.14
6	0.0500	530.00	0.00	0.00	520.00	0.012	1.23	3.191	162.94	10.00	172.94	17.294	91.47	81.47
7	0.0600	642.00	0.00	0.00	632.00	0.015	1.47	3.199	197.55	10.00	207.55	20.755	108.77	98.77
8	0.0700	723.00	0.00	0.00	713.00	0.017	1.72	3.207	222.31	10.00	232.31	23.231	121.15	111.15
9	0.0800	779.00	0.00	0.00	769.00	0.020	1.97	3.215	239.17	10.00	249.17	24.917	129.59	119.59
10	0.0900	805.00	0.00	0.00	795.00	0.022	2.21	3.223	246.64	10.00	256.64	25.664	133.32	123.32
11	0.1000	796.00	0.00	0.00	786.00	0.025	2.46	3.231	243.23	10.00	253.23	25.323	131.62	121.62
12	0.1100	766.00	0.00	0.00	756.00	0.027	2.70	3.240	233.36	10.00	243.36	24.336	126.68	116.68
13	0.1200	748.00	0.00	0.00	738.00	0.029	2.95	3.248	227.23	10.00	237.23	23.723	123.61	113.61
14	0.1300	730.00	0.00	0.00	720.00	0.032	3.19	3.256	221.12	10.00	231.12	23.112	120.56	110.56
15	0.1400	724.00	0.00	0.00	714.00	0.034	3.44	3.264	218.72	10.00	228.72	22.872	119.36	109.36

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 93.0 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	9.7			
Dry Density - pcf	119.5			
Diameter - inches	2.01			
Height - inches	4.05			
AT TEST				
Final Moisture - %	9.7			
Dry Density - pcf	119.5			
Calculated Diameter (in.)	2.01			
Height - inches	4.05			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	185.96			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	2.5			
σ_1 Failure - psi	195.96			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-15
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-34, 3-4 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 39 PL: 12 PI: 27 Percent -200: 86
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUIS.15

UUIS-15-AA533150-B-34-1 (3-5).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

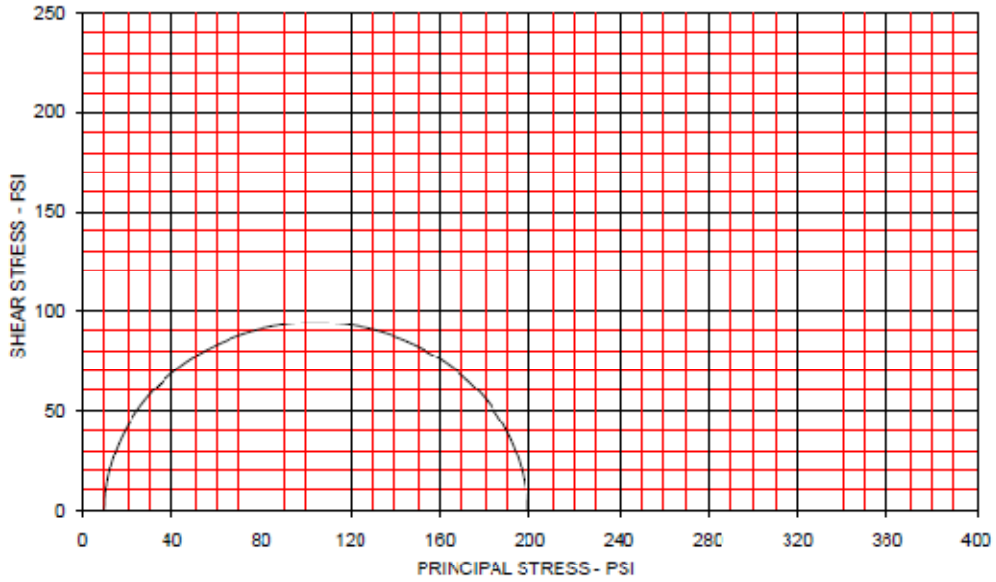
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

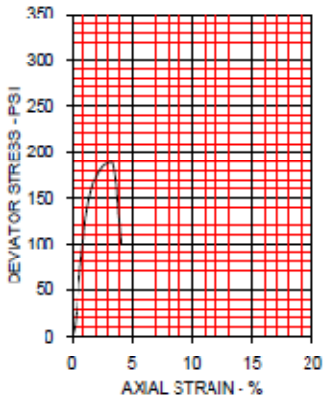
Dia. : 2.01 in Area: 3.173 in^2 Ht. : 4.05 in Weight : 442.7 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
		Data Input												
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	3.173	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	73.00	0.00	0.00	63.00	0.002	0.25	3.181	19.81	10.00	29.81	2.981	19.90	9.90
3	0.0200	139.00	0.00	0.00	129.00	0.005	0.49	3.189	40.45	10.00	50.45	5.045	30.23	20.23
4	0.0300	210.00	0.00	0.00	200.00	0.007	0.74	3.197	62.56	10.00	72.56	7.256	41.28	31.28
5	0.0400	300.00	0.00	0.00	290.00	0.010	0.99	3.205	90.49	10.00	100.49	10.049	55.25	45.25
6	0.0500	389.00	0.00	0.00	379.00	0.012	1.23	3.213	117.97	10.00	127.97	12.797	68.98	58.98
7	0.0600	471.00	0.00	0.00	461.00	0.015	1.48	3.221	143.13	10.00	153.13	15.313	81.57	71.57
8	0.0700	543.00	0.00	0.00	533.00	0.017	1.73	3.229	165.07	10.00	175.07	17.507	92.54	82.54
9	0.0800	588.00	0.00	0.00	578.00	0.020	1.97	3.237	178.56	10.00	188.56	18.856	99.28	89.28
10	0.0900	607.00	0.00	0.00	597.00	0.022	2.22	3.245	183.97	10.00	193.97	19.397	101.98	91.98
11	0.1000	615.00	0.00	0.00	605.00	0.025	2.47	3.253	185.96	10.00	195.96	19.596	102.98	92.98
12	0.1100	614.00	0.00	0.00	604.00	0.027	2.71	3.262	185.19	10.00	195.19	19.519	102.59	92.59
13	0.1200	598.00	0.00	0.00	588.00	0.030	2.96	3.270	179.82	10.00	189.82	18.982	99.91	89.91
14	0.1300	566.00	0.00	0.00	556.00	0.032	3.21	3.278	169.61	10.00	179.61	17.961	94.80	84.80
15	0.1400	548.00	0.00	0.00	538.00	0.035	3.45	3.287	163.70	10.00	173.70	17.370	91.85	81.85

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 94.3 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	9.3			
Dry Density - pcf	116.9			
Diameter - inches	1.95			
Height - inches	4.34			
AT TEST				
Final Moisture - %	9.3			
Dry Density - pcf	116.9			
Calculated Diameter (in.)	1.95			
Height - inches	4.34			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	188.59			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	3.2			
σ_1 Failure - psi	198.59			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO.: UU Triaxial - UUIS-10
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-34, 4-5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 30 PL: 12 PI: 27 Percent -200: 86
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL | PLATE: UUIS.16

UUIS 16 AA533150 B 34 2 (3 5).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

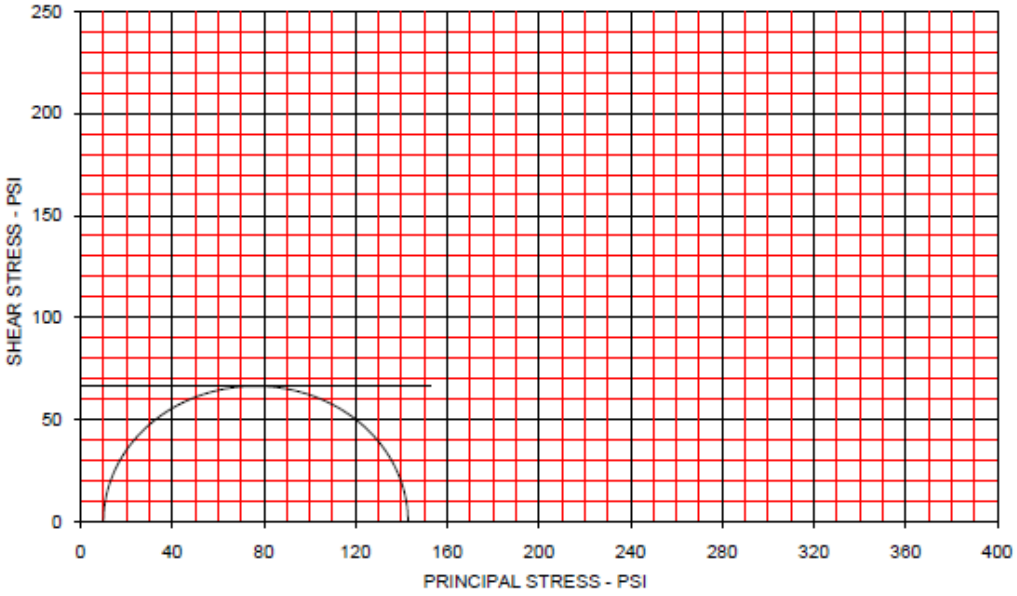
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

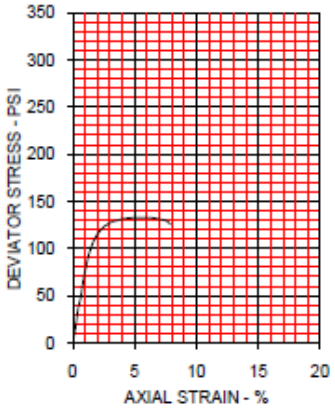
Dia. : 1.95 in Area: 2.986 in^2 Ht. : 4.34 in Weight : 434.4 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
		Data Input												
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	2.986	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	38.00	0.00	0.00	28.00	0.002	0.23	2.993	9.35	10.00	19.35	1.935	14.68	4.68
3	0.0200	116.00	0.00	0.00	106.00	0.005	0.46	3.000	35.33	10.00	45.33	4.533	27.66	17.66
4	0.0300	207.00	0.00	0.00	197.00	0.007	0.69	3.007	65.51	10.00	75.51	7.551	42.75	32.75
5	0.0400	300.00	0.00	0.00	290.00	0.009	0.92	3.014	96.21	10.00	106.21	10.621	58.10	48.10
6	0.0500	389.00	0.00	0.00	379.00	0.012	1.15	3.021	125.44	10.00	135.44	13.544	72.72	62.72
7	0.0600	448.00	0.00	0.00	438.00	0.014	1.38	3.028	144.63	10.00	154.63	15.463	82.32	72.32
8	0.0700	488.00	0.00	0.00	478.00	0.016	1.61	3.035	157.47	10.00	167.47	16.747	88.74	78.74
9	0.0800	519.00	0.00	0.00	509.00	0.018	1.84	3.043	167.29	10.00	177.29	17.729	93.65	83.65
10	0.0900	542.00	0.00	0.00	532.00	0.021	2.07	3.050	174.44	10.00	184.44	18.444	97.22	87.22
11	0.1000	560.00	0.00	0.00	550.00	0.023	2.31	3.057	179.92	10.00	189.92	18.992	99.96	89.96
12	0.1100	574.00	0.00	0.00	564.00	0.025	2.54	3.064	184.06	10.00	194.06	19.406	102.03	92.03
13	0.1200	583.00	0.00	0.00	573.00	0.028	2.77	3.071	186.56	10.00	196.56	19.656	103.28	93.28
14	0.1300	589.00	0.00	0.00	579.00	0.030	3.00	3.079	188.06	10.00	198.06	19.806	104.03	94.03
15	0.1400	592.00	0.00	0.00	582.00	0.032	3.23	3.086	188.59	10.00	198.59	19.859	104.29	94.29
16	0.1500	591.00	0.00	0.00	581.00	0.035	3.46	3.093	187.82	10.00	197.82	19.782	103.91	93.91
17	0.1600	540.00	0.00	0.00	530.00	0.037	3.69	3.101	170.92	10.00	180.92	18.092	95.46	85.46
18	0.1700	428.00	0.00	0.00	418.00	0.039	3.92	3.108	134.48	10.00	144.48	14.448	77.24	67.24
19	0.1800	327.00	0.00	0.00	317.00	0.041	4.15	3.116	101.74	10.00	111.74	11.174	60.87	50.87

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 66.5 psi



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	12.5			
Dry Density - pcf	113.3			
Diameter - inches	2.07			
Height - inches	4.69			
AT TEST				
Final Moisture - %	12.5			
Dry Density - pcf	113.3			
Calculated Diameter (in.)	2.07			
Height - inches	4.69			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	132.91			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	5.5			
σ_1 Failure - psi	142.91			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-17
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: FAT CLAY (CH), brown
SAMPLE LOCATION: B-38, 1-3 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 50 PL: 12 PI: 38 Percent -200: 82
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUIS.17

UUIS-17-AA533150-B-38-1 (1-3).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

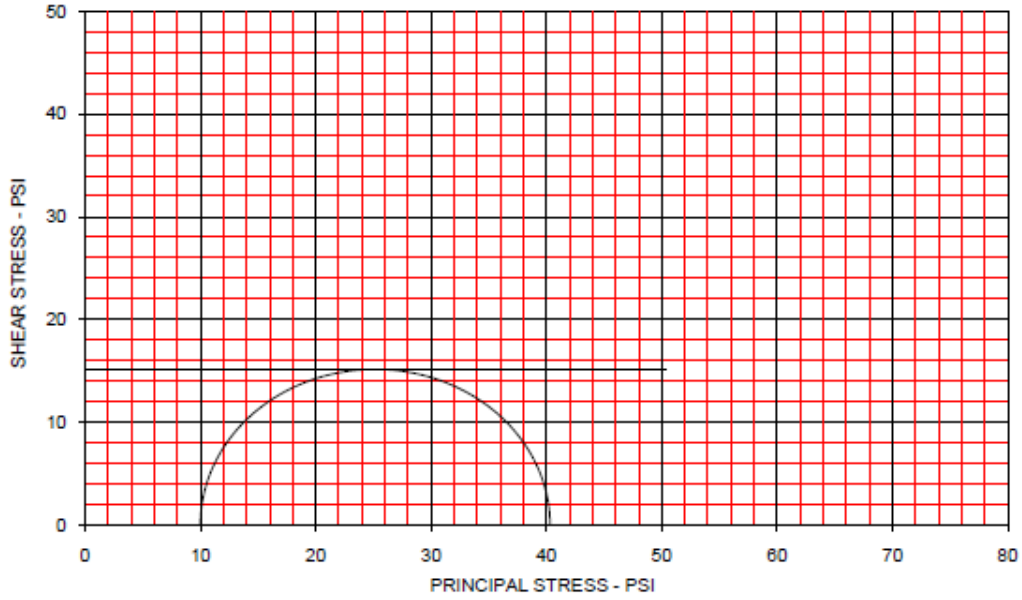
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

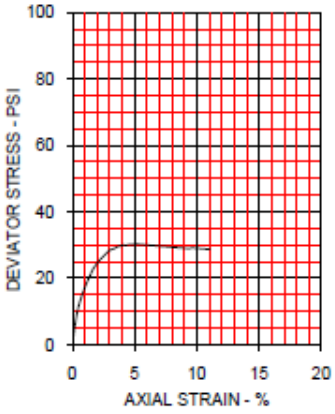
Dia. : 2.07 in Area: 3.355 in^2 Ht. : 4.69 in Weight : 526.8 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	3.355	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	62.00	0.00	0.00	52.00	0.002	0.21	3.362	15.47	10.00	25.47	2.547	17.73	7.73
3	0.0200	130.00	0.00	0.00	120.00	0.004	0.43	3.369	35.62	10.00	45.62	4.562	27.81	17.81
4	0.0300	171.00	0.00	0.00	161.00	0.006	0.64	3.376	47.69	10.00	57.69	5.769	33.84	23.84
5	0.0400	233.00	0.00	0.00	223.00	0.009	0.85	3.383	65.91	10.00	75.91	7.591	42.96	32.96
6	0.0500	281.00	0.00	0.00	271.00	0.011	1.07	3.391	79.93	10.00	89.93	8.993	49.96	39.96
7	0.0600	324.00	0.00	0.00	314.00	0.013	1.28	3.398	92.41	10.00	102.41	10.241	56.20	46.20
8	0.0700	355.00	0.00	0.00	345.00	0.015	1.49	3.405	101.31	10.00	111.31	11.131	60.66	50.66
9	0.0800	380.00	0.00	0.00	370.00	0.017	1.70	3.413	108.42	10.00	118.42	11.842	64.21	54.21
10	0.0900	398.00	0.00	0.00	388.00	0.019	1.92	3.420	113.45	10.00	123.45	12.345	66.72	56.72
11	0.1000	413.00	0.00	0.00	403.00	0.021	2.13	3.428	117.58	10.00	127.58	12.758	68.79	58.79
12	0.1100	425.00	0.00	0.00	415.00	0.023	2.34	3.435	120.81	10.00	130.81	13.081	70.41	60.41
13	0.1200	435.00	0.00	0.00	425.00	0.026	2.56	3.443	123.45	10.00	133.45	13.345	71.73	61.73
14	0.1300	442.00	0.00	0.00	432.00	0.028	2.77	3.450	125.21	10.00	135.21	13.521	72.61	62.61
15	0.1400	449.00	0.00	0.00	439.00	0.030	2.98	3.458	126.96	10.00	136.96	13.696	73.48	63.48
16	0.1500	455.00	0.00	0.00	445.00	0.032	3.20	3.465	128.42	10.00	138.42	13.842	74.21	64.21
17	0.1600	459.00	0.00	0.00	449.00	0.034	3.41	3.473	129.29	10.00	139.29	13.929	74.64	64.64
18	0.1700	462.00	0.00	0.00	452.00	0.036	3.62	3.481	129.86	10.00	139.86	13.986	74.93	64.93
19	0.1800	466.00	0.00	0.00	456.00	0.038	3.84	3.488	130.72	10.00	140.72	14.072	75.36	65.36
20	0.1900	469.00	0.00	0.00	459.00	0.040	4.05	3.496	131.29	10.00	141.29	14.129	75.64	65.64
21	0.2000	472.00	0.00	0.00	462.00	0.043	4.26	3.504	131.85	10.00	141.85	14.185	75.93	65.93
22	0.2100	474.00	0.00	0.00	464.00	0.045	4.48	3.512	132.13	10.00	142.13	14.213	76.07	66.07
23	0.2200	476.00	0.00	0.00	466.00	0.047	4.69	3.520	132.40	10.00	142.40	14.240	76.20	66.20
24	0.2300	478.00	0.00	0.00	468.00	0.049	4.90	3.527	132.67	10.00	142.67	14.267	76.34	66.34
25	0.2400	479.00	0.00	0.00	469.00	0.051	5.11	3.535	132.66	10.00	142.66	14.266	76.33	66.33
26	0.2500	480.00	0.00	0.00	470.00	0.053	5.33	3.543	132.64	10.00	142.64	14.264	76.32	66.32
27	0.2600	482.00	0.00	0.00	472.00	0.055	5.54	3.551	132.91	10.00	142.91	14.291	76.45	66.45
28	0.2700	483.00	0.00	0.00	473.00	0.058	5.75	3.559	132.89	10.00	142.89	14.289	76.45	66.45
29	0.2800	484.00	0.00	0.00	474.00	0.060	5.97	3.567	132.87	10.00	142.87	14.287	76.44	66.44
30	0.2900	485.00	0.00	0.00	475.00	0.062	6.18	3.575	132.85	10.00	142.85	14.285	76.42	66.42
31	0.3000	485.00	0.00	0.00	475.00	0.064	6.39	3.584	132.55	10.00	142.55	14.255	76.27	66.27
32	0.3100	485.00	0.00	0.00	475.00	0.066	6.61	3.592	132.25	10.00	142.25	14.225	76.12	66.12
33	0.3200	484.00	0.00	0.00	474.00	0.068	6.82	3.600	131.67	10.00	141.67	14.167	75.83	65.83
34	0.3300	483.00	0.00	0.00	473.00	0.070	7.03	3.608	131.09	10.00	141.09	14.109	75.54	65.54
35	0.3400	482.00	0.00	0.00	472.00	0.072	7.25	3.617	130.51	10.00	140.51	14.051	75.26	65.26
36	0.3500	482.00	0.00	0.00	472.00	0.075	7.46	3.625	130.21	10.00	140.21	14.021	75.11	65.11
37	0.3600	477.00	0.00	0.00	467.00	0.077	7.67	3.633	128.53	10.00	138.53	13.853	74.27	64.27
38	0.3700	468.00	0.00	0.00	458.00	0.079	7.88	3.642	125.77	10.00	135.77	13.577	72.88	62.88

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 15.2 psi		



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	12.5			
Dry Density - pcf	107.5			
Diameter - inches	1.96			
Height - inches	4.17			
AT TEST				
Final Moisture - %	12.5			
Dry Density - pcf	107.5			
Calculated Diameter (in.)	1.96			
Height - inches	4.17			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	30.32			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	5.0			
σ_1 Failure - psi	40.32			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUIS-18
SAMPLE TYPE: SHELBY TUBE
DESCRIPTION: FAT CLAY (CH), dark grayish brown
SAMPLE LOCATION: B-38, 3-5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 51 PL: 12 PI: 39 Percent -200: 82
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUIS.18

UUIS-18-AA533150-B-38-2 (3-5).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

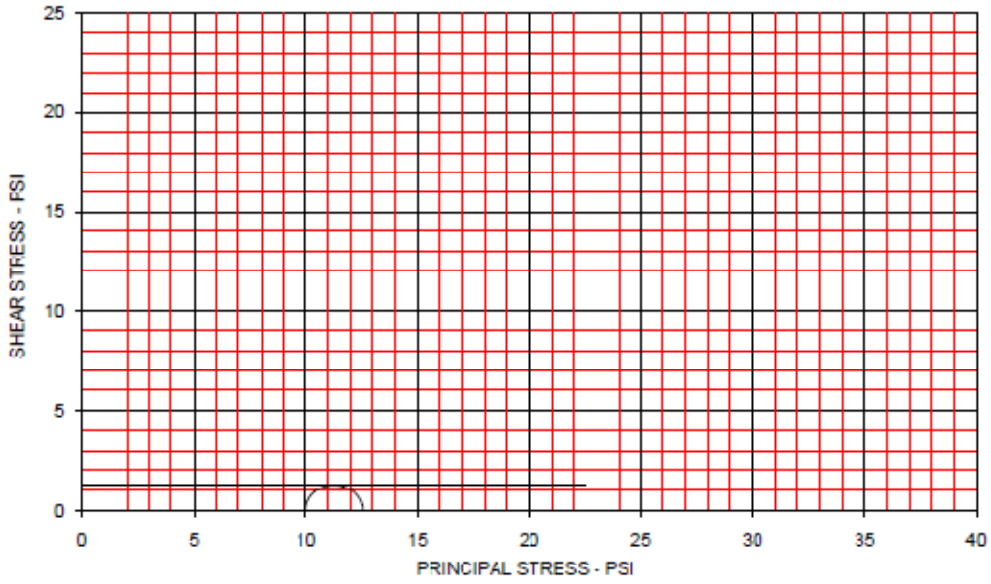
SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dk brown & dk gray w/dk brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

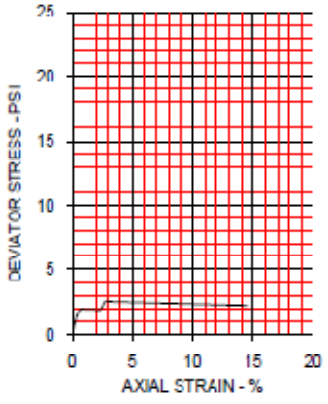
Dia. : 1.96 in Area: 3.007 in^2 Ht. : 4.17 in Weight : 397.7 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
		Data Input												
1	0.0000	10.00	0.00	0.00	0.00	0.0	0.0	3.007	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	30.00	0.00	0.00	20.00	0.002	0.24	3.014	6.64	10.00	16.64	1.664	13.32	3.32
3	0.0200	44.00	0.00	0.00	34.00	0.005	0.48	3.021	11.25	10.00	21.25	2.125	15.63	5.63
4	0.0300	53.00	0.00	0.00	43.00	0.007	0.72	3.029	14.20	10.00	24.20	2.420	17.10	7.10
5	0.0400	61.00	0.00	0.00	51.00	0.010	0.96	3.036	16.80	10.00	26.80	2.680	18.40	8.40
6	0.0500	68.00	0.00	0.00	58.00	0.012	1.20	3.043	19.06	10.00	29.06	2.906	19.53	9.53
7	0.0600	74.00	0.00	0.00	64.00	0.014	1.44	3.051	20.98	10.00	30.98	3.098	20.49	10.49
8	0.0700	80.00	0.00	0.00	70.00	0.017	1.68	3.058	22.89	10.00	32.89	3.289	21.44	11.44
9	0.0800	84.00	0.00	0.00	74.00	0.019	1.92	3.066	24.14	10.00	34.14	3.414	22.07	12.07
10	0.0900	88.00	0.00	0.00	78.00	0.022	2.16	3.073	25.38	10.00	35.38	3.538	22.69	12.69
11	0.1000	91.00	0.00	0.00	81.00	0.024	2.40	3.081	26.29	10.00	36.29	3.629	23.15	13.15
12	0.1100	94.00	0.00	0.00	84.00	0.026	2.64	3.088	27.20	10.00	37.20	3.720	23.60	13.60
13	0.1200	97.00	0.00	0.00	87.00	0.029	2.88	3.096	28.10	10.00	38.10	3.810	24.05	14.05
14	0.1300	99.00	0.00	0.00	89.00	0.031	3.12	3.104	28.67	10.00	38.67	3.867	24.34	14.34
15	0.1400	100.00	0.00	0.00	90.00	0.034	3.36	3.111	28.93	10.00	38.93	3.893	24.46	14.46
16	0.1500	102.00	0.00	0.00	92.00	0.036	3.60	3.119	29.49	10.00	39.49	3.949	24.75	14.75
17	0.1600	103.00	0.00	0.00	93.00	0.038	3.84	3.127	29.74	10.00	39.74	3.974	24.87	14.87
18	0.1700	104.00	0.00	0.00	94.00	0.041	4.08	3.135	29.99	10.00	39.99	3.999	24.99	14.99
19	0.1800	104.00	0.00	0.00	94.00	0.043	4.32	3.143	29.91	10.00	39.91	3.991	24.96	14.96
20	0.1900	105.00	0.00	0.00	95.00	0.046	4.56	3.151	30.15	10.00	40.15	4.015	25.08	15.08
21	0.2000	105.00	0.00	0.00	95.00	0.048	4.80	3.159	30.08	10.00	40.08	4.008	25.04	15.04
22	0.2100	106.00	0.00	0.00	96.00	0.050	5.04	3.167	30.32	10.00	40.32	4.032	25.16	15.16
23	0.2200	106.00	0.00	0.00	96.00	0.053	5.28	3.175	30.24	10.00	40.24	4.024	25.12	15.12
24	0.2300	106.00	0.00	0.00	96.00	0.055	5.52	3.183	30.16	10.00	40.16	4.016	25.08	15.08
25	0.2400	106.00	0.00	0.00	96.00	0.058	5.76	3.191	30.09	10.00	40.09	4.009	25.04	15.04
26	0.2500	106.00	0.00	0.00	96.00	0.060	6.00	3.199	30.01	10.00	40.01	4.001	25.01	15.01
27	0.2600	106.00	0.00	0.00	96.00	0.062	6.24	3.207	29.93	10.00	39.93	3.993	24.97	14.97
28	0.2700	106.00	0.00	0.00	96.00	0.065	6.48	3.215	29.86	10.00	39.86	3.986	24.93	14.93
29	0.2800	106.00	0.00	0.00	96.00	0.067	6.72	3.224	29.78	10.00	39.78	3.978	24.89	14.89
30	0.2900	106.00	0.00	0.00	96.00	0.070	6.96	3.232	29.70	10.00	39.70	3.970	24.85	14.85
31	0.3000	106.00	0.00	0.00	96.00	0.072	7.20	3.240	29.63	10.00	39.63	3.963	24.81	14.81
32	0.3100	106.00	0.00	0.00	96.00	0.074	7.44	3.249	29.55	10.00	39.55	3.955	24.78	14.78
33	0.3200	106.00	0.00	0.00	96.00	0.077	7.68	3.257	29.47	10.00	39.47	3.947	24.74	14.74
34	0.3300	106.00	0.00	0.00	96.00	0.079	7.92	3.266	29.40	10.00	39.40	3.940	24.70	14.70
35	0.3400	106.00	0.00	0.00	96.00	0.082	8.16	3.274	29.32	10.00	39.32	3.932	24.66	14.66
36	0.3500	106.00	0.00	0.00	96.00	0.084	8.40	3.283	29.24	10.00	39.24	3.924	24.62	14.62
37	0.3600	106.00	0.00	0.00	96.00	0.086	8.64	3.291	29.17	10.00	39.17	3.917	24.58	14.58
38	0.3700	106.00	0.00	0.00	96.00	0.089	8.88	3.300	29.09	10.00	39.09	3.909	24.55	14.55
39	0.3800	106.00	0.00	0.00	96.00	0.091	9.12	3.309	29.01	10.00	39.01	3.901	24.51	14.51
40	0.3900	106.00	0.00	0.00	96.00	0.094	9.36	3.317	28.94	10.00	38.94	3.894	24.47	14.47
41	0.4000	107.00	0.00	0.00	97.00	0.096	9.60	3.326	29.16	10.00	39.16	3.916	24.58	14.58
42	0.4100	107.00	0.00	0.00	97.00	0.098	9.84	3.335	29.08	10.00	39.08	3.908	24.54	14.54
43	0.4200	107.00	0.00	0.00	97.00	0.101	10.08	3.344	29.01	10.00	39.01	3.901	24.50	14.50
44	0.4300	107.00	0.00	0.00	97.00	0.103	10.32	3.353	28.93	10.00	38.93	3.893	24.46	14.46
45	0.4400	107.00	0.00	0.00	97.00	0.106	10.56	3.362	28.85	10.00	38.85	3.885	24.43	14.43
46	0.4500	107.00	0.00	0.00	97.00	0.108	10.80	3.371	28.77	10.00	38.77	3.877	24.39	14.39
47	0.4600	107.00	0.00	0.00	97.00	0.110	11.04	3.380	28.70	10.00	38.70	3.870	24.35	14.35

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 1.3 psi		



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	34.1			
Dry Density - pcf	85.2			
Diameter - inches	1.40			
Height - inches	2.65			
AT TEST				
Final Moisture - %	34.1			
Dry Density - pcf	85.2			
Calculated Diameter (in.)	1.40			
Height - inches	2.65			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	2.53			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	5.6			
σ_1 Failure - psi	12.53			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO.: UU Triaxial - UUFS-1
SAMPLE TYPE: SPNO
DESCRIPTION: LEAN CLAY (CL) dark yellowish brown
SAMPLE LOCATION: B-6, 3-5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 33 PL: 14 PI: 19 Percent -200: 83
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU · CIVE · GEOTECHNICAL PLATE: UUF-1

UUFS-1 AA533150 B-6 (3-5).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), dark yellowish brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.95 in Weight : 136.0 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	2.00	0.00	0.00	2.00	0.003	0.34	1.545	1.29	10.00	11.29	1.129	10.65	0.65
3	0.0200	3.00	0.00	0.00	3.00	0.007	0.68	1.550	1.94	10.00	11.94	1.194	10.97	0.97
4	0.0300	3.00	0.00	0.00	3.00	0.010	1.02	1.555	1.93	10.00	11.93	1.193	10.96	0.96
5	0.0400	3.00	0.00	0.00	3.00	0.014	1.36	1.561	1.92	10.00	11.92	1.192	10.96	0.96
6	0.0500	3.00	0.00	0.00	3.00	0.017	1.70	1.566	1.92	10.00	11.92	1.192	10.96	0.96
7	0.0600	3.00	0.00	0.00	3.00	0.020	2.04	1.571	1.91	10.00	11.91	1.191	10.95	0.95
8	0.0700	3.00	0.00	0.00	3.00	0.024	2.38	1.577	1.90	10.00	11.90	1.190	10.95	0.95
9	0.0800	4.00	0.00	0.00	4.00	0.027	2.72	1.582	2.53	10.00	12.53	1.253	11.26	1.26
10	0.0900	4.00	0.00	0.00	4.00	0.031	3.06	1.588	2.52	10.00	12.52	1.252	11.26	1.26
11	0.1000	4.00	0.00	0.00	4.00	0.034	3.40	1.593	2.51	10.00	12.51	1.251	11.26	1.26
12	0.1100	4.00	0.00	0.00	4.00	0.037	3.74	1.599	2.50	10.00	12.50	1.250	11.25	1.25
13	0.1200	4.00	0.00	0.00	4.00	0.041	4.07	1.605	2.49	10.00	12.49	1.249	11.25	1.25
14	0.1300	4.00	0.00	0.00	4.00	0.044	4.41	1.610	2.48	10.00	12.48	1.248	11.24	1.24
15	0.1400	4.00	0.00	0.00	4.00	0.048	4.75	1.616	2.47	10.00	12.47	1.247	11.24	1.24
16	0.1500	4.00	0.00	0.00	4.00	0.051	5.09	1.622	2.47	10.00	12.47	1.247	11.23	1.23
17	0.1600	4.00	0.00	0.00	4.00	0.054	5.43	1.628	2.46	10.00	12.46	1.246	11.23	1.23
18	0.1700	4.00	0.00	0.00	4.00	0.058	5.77	1.634	2.45	10.00	12.45	1.245	11.22	1.22
19	0.1800	4.00	0.00	0.00	4.00	0.061	6.11	1.640	2.44	10.00	12.44	1.244	11.22	1.22
20	0.1900	4.00	0.00	0.00	4.00	0.065	6.45	1.646	2.43	10.00	12.43	1.243	11.22	1.22
21	0.2000	4.00	0.00	0.00	4.00	0.068	6.79	1.652	2.42	10.00	12.42	1.242	11.21	1.21
22	0.2100	4.00	0.00	0.00	4.00	0.071	7.13	1.658	2.41	10.00	12.41	1.241	11.21	1.21
23	0.2200	4.00	0.00	0.00	4.00	0.075	7.47	1.664	2.40	10.00	12.40	1.240	11.20	1.20
24	0.2300	4.00	0.00	0.00	4.00	0.078	7.81	1.670	2.40	10.00	12.40	1.240	11.20	1.20
25	0.2400	4.00	0.00	0.00	4.00	0.081	8.15	1.676	2.39	10.00	12.39	1.239	11.19	1.19
26	0.2500	4.00	0.00	0.00	4.00	0.085	8.49	1.682	2.38	10.00	12.38	1.238	11.19	1.19
27	0.2600	4.00	0.00	0.00	4.00	0.088	8.83	1.688	2.37	10.00	12.37	1.237	11.18	1.18
28	0.2700	4.00	0.00	0.00	4.00	0.092	9.17	1.695	2.36	10.00	12.36	1.236	11.18	1.18
29	0.2800	4.00	0.00	0.00	4.00	0.095	9.51	1.701	2.35	10.00	12.35	1.235	11.18	1.18
30	0.2900	4.00	0.00	0.00	4.00	0.098	9.85	1.708	2.34	10.00	12.34	1.234	11.17	1.17
31	0.3000	4.00	0.00	0.00	4.00	0.102	10.19	1.714	2.33	10.00	12.33	1.233	11.17	1.17
32	0.3100	4.00	0.00	0.00	4.00	0.105	10.53	1.720	2.32	10.00	12.32	1.232	11.16	1.16
33	0.3200	4.00	0.00	0.00	4.00	0.109	10.87	1.727	2.32	10.00	12.32	1.232	11.16	1.16
34	0.3300	4.00	0.00	0.00	4.00	0.112	11.21	1.734	2.31	10.00	12.31	1.231	11.15	1.15
35	0.3400	4.00	0.00	0.00	4.00	0.115	11.54	1.740	2.30	10.00	12.30	1.230	11.15	1.15
36	0.3500	4.00	0.00	0.00	4.00	0.119	11.88	1.747	2.29	10.00	12.29	1.229	11.14	1.14
37	0.3600	4.00	0.00	0.00	4.00	0.122	12.22	1.754	2.28	10.00	12.28	1.228	11.14	1.14
38	0.3700	4.00	0.00	0.00	4.00	0.126	12.56	1.761	2.27	10.00	12.27	1.227	11.14	1.14
39	0.3800	4.00	0.00	0.00	4.00	0.129	12.90	1.767	2.26	10.00	12.26	1.226	11.13	1.13
40	0.3900	4.00	0.00	0.00	4.00	0.132	13.24	1.774	2.25	10.00	12.25	1.225	11.13	1.13
41	0.4000	4.00	0.00	0.00	4.00	0.136	13.58	1.781	2.25	10.00	12.25	1.225	11.12	1.12
42	0.4100	4.00	0.00	0.00	4.00	0.139	13.92	1.788	2.24	10.00	12.24	1.224	11.12	1.12
43	0.4200	4.00	0.00	0.00	4.00	0.143	14.26	1.795	2.23	10.00	12.23	1.223	11.11	1.11
44	0.4300	4.00	0.00	0.00	4.00	0.146	14.60	1.803	2.22	10.00	12.22	1.222	11.11	1.11
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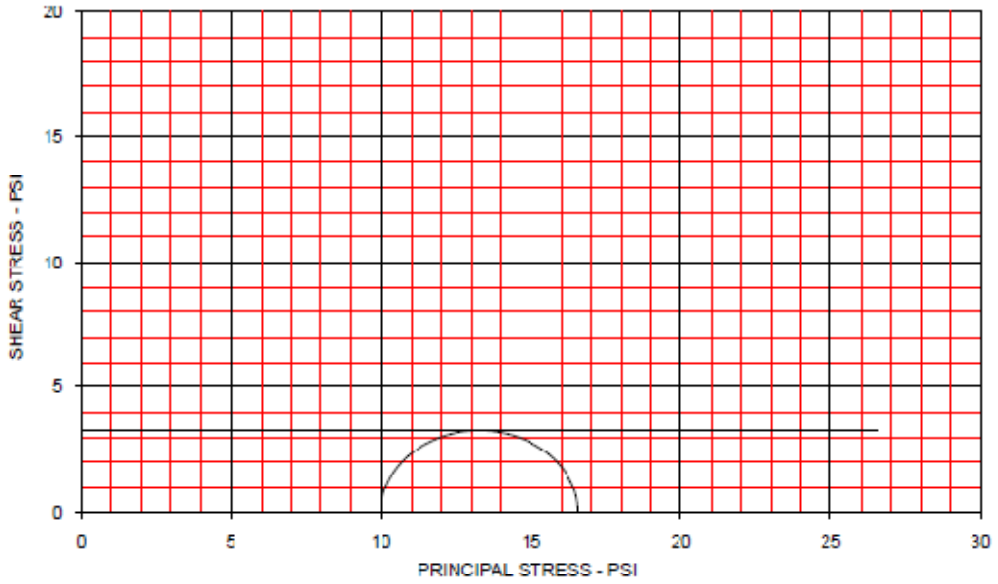
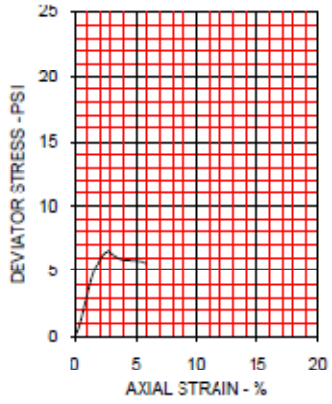
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 3.3 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	25.7			
Dry Density - pcf	97.3			
Diameter - inches	1.40			
Height - inches	2.86			
AT TEST				
Final Moisture - %	25.7			
Dry Density - pcf	97.3			
Calculated Diameter (in.)	1.40			
Height - inches	2.85			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	6.57			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	2.8			
σ_1 Failure - psi	16.57			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-2
SAMPLE TYPE: SPNC
DESCRIPTION: LEAN CLAY (CL) brown
SAMPLE LOCATION: B-11, 3-4 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 37 PL: 12 PI: 25 Percent -200: 84
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUF.2

UUFS-2-AA533150 -B-11 (3).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.85 in Weight : 140.8 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	1.10	0.00	0.00	1.10	0.004	0.35	1.545	0.71	10.00	10.71	1.071	10.36	0.36
3	0.0200	3.00	0.00	0.00	3.00	0.007	0.70	1.550	1.94	10.00	11.94	1.194	10.97	0.97
4	0.0300	5.30	0.00	0.00	5.30	0.011	1.05	1.556	3.41	10.00	13.41	1.341	11.70	1.70
5	0.0400	7.20	0.00	0.00	7.20	0.014	1.40	1.561	4.61	10.00	14.61	1.461	12.31	2.31
6	0.0500	8.50	0.00	0.00	8.50	0.018	1.75	1.567	5.42	10.00	15.42	1.542	12.71	2.71
7	0.0600	9.60	0.00	0.00	9.60	0.021	2.11	1.572	6.10	10.00	16.10	1.610	13.05	3.05
8	0.0700	10.20	0.00	0.00	10.20	0.025	2.46	1.578	6.46	10.00	16.46	1.646	13.23	3.23
9	0.0800	10.40	0.00	0.00	10.40	0.028	2.81	1.584	6.57	10.00	16.57	1.657	13.28	3.28
10	0.0900	10.00	0.00	0.00	10.00	0.032	3.16	1.590	6.29	10.00	16.29	1.629	13.15	3.15
11	0.1000	9.70	0.00	0.00	9.70	0.035	3.51	1.595	6.08	10.00	16.08	1.608	13.04	3.04
12	0.1100	9.50	0.00	0.00	9.50	0.039	3.86	1.601	5.93	10.00	15.93	1.593	12.97	2.97
13	0.1200	9.50	0.00	0.00	9.50	0.042	4.21	1.607	5.91	10.00	15.91	1.591	12.96	2.96
14	0.1300	9.50	0.00	0.00	9.50	0.046	4.56	1.613	5.89	10.00	15.89	1.589	12.94	2.94
15	0.1400	9.50	0.00	0.00	9.50	0.049	4.91	1.619	5.87	10.00	15.87	1.587	12.93	2.93
16	0.1500	9.50	0.00	0.00	9.50	0.053	5.26	1.625	5.85	10.00	15.85	1.585	12.92	2.92
17	0.1600	9.40	0.00	0.00	9.40	0.056	5.61	1.631	5.76	10.00	15.76	1.576	12.88	2.88
18	0.1700	9.30	0.00	0.00	9.30	0.060	5.96	1.637	5.68	10.00	15.68	1.568	12.84	2.84
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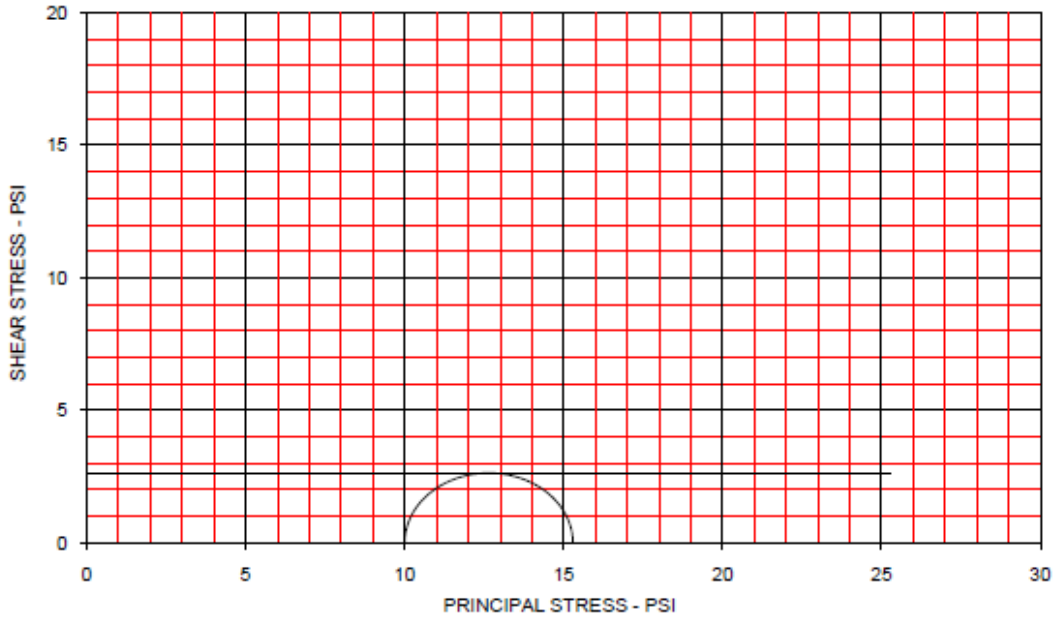
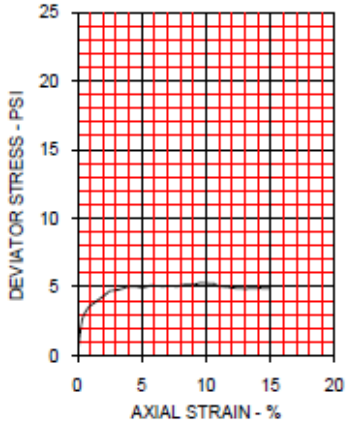
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 2.6 psi



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	23.5			
Dry Density - pcf	100.1			
Diameter - inches	1.40			
Height - inches	2.82			
AT TEST				
Final Moisture - %	23.5			
Dry Density - pcf	100.1			
Calculated Diameter (in.)	1.40			
Height - inches	2.82			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	5.29			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	9.6			
σ_1 Failure - psi	15.29			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-3
SAMPLE TYPE: SPNC
DESCRIPTION: LEAN CLAY (CL), yellowish brown
SAMPLE LOCATION: B-11, 4 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 41 PL: 15 PI: 26 Percent -200: 84
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL

PLATE: UUF.3

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), yellowish brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.82 in Weight : 141.0 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	3.90	0.00	0.00	3.90	0.004	0.35	1.545	2.52	10.00	12.52	1.252	11.26	1.26
3	0.0200	5.10	0.00	0.00	5.10	0.007	0.71	1.550	3.29	10.00	13.29	1.329	11.64	1.64
4	0.0300	5.70	0.00	0.00	5.70	0.011	1.06	1.556	3.66	10.00	13.66	1.366	11.83	1.83
5	0.0400	6.10	0.00	0.00	6.10	0.014	1.42	1.562	3.91	10.00	13.91	1.391	11.95	1.95
6	0.0500	6.50	0.00	0.00	6.50	0.018	1.77	1.567	4.15	10.00	14.15	1.415	12.07	2.07
7	0.0600	6.90	0.00	0.00	6.90	0.021	2.13	1.573	4.39	10.00	14.39	1.439	12.19	2.19
8	0.0700	7.40	0.00	0.00	7.40	0.025	2.48	1.579	4.69	10.00	14.69	1.469	12.34	2.34
9	0.0800	7.50	0.00	0.00	7.50	0.028	2.83	1.584	4.73	10.00	14.73	1.473	12.37	2.37
10	0.0900	7.60	0.00	0.00	7.60	0.032	3.19	1.590	4.78	10.00	14.78	1.478	12.39	2.39
11	0.1000	7.80	0.00	0.00	7.80	0.035	3.54	1.596	4.89	10.00	14.89	1.489	12.44	2.44
12	0.1100	8.00	0.00	0.00	8.00	0.039	3.90	1.602	4.99	10.00	14.99	1.499	12.50	2.50
13	0.1200	8.10	0.00	0.00	8.10	0.043	4.25	1.608	5.04	10.00	15.04	1.504	12.52	2.52
14	0.1300	8.10	0.00	0.00	8.10	0.046	4.61	1.614	5.02	10.00	15.02	1.502	12.51	2.51
15	0.1400	8.00	0.00	0.00	8.00	0.050	4.96	1.620	4.94	10.00	14.94	1.494	12.47	2.47
16	0.1500	8.10	0.00	0.00	8.10	0.053	5.31	1.626	4.98	10.00	14.98	1.498	12.49	2.49
17	0.1600	8.30	0.00	0.00	8.30	0.057	5.67	1.632	5.09	10.00	15.09	1.509	12.54	2.54
18	0.1700	8.30	0.00	0.00	8.30	0.060	6.02	1.638	5.07	10.00	15.07	1.507	12.53	2.53
19	0.1800	8.30	0.00	0.00	8.30	0.064	6.38	1.644	5.05	10.00	15.05	1.505	12.52	2.52
20	0.1900	8.30	0.00	0.00	8.30	0.067	6.73	1.650	5.03	10.00	15.03	1.503	12.51	2.51
21	0.2000	8.40	0.00	0.00	8.40	0.071	7.08	1.657	5.07	10.00	15.07	1.507	12.54	2.54
22	0.2100	8.40	0.00	0.00	8.40	0.074	7.44	1.663	5.05	10.00	15.05	1.505	12.53	2.53
23	0.2200	8.40	0.00	0.00	8.40	0.078	7.79	1.669	5.03	10.00	15.03	1.503	12.52	2.52
24	0.2300	8.60	0.00	0.00	8.60	0.081	8.15	1.676	5.13	10.00	15.13	1.513	12.57	2.57
25	0.2400	8.70	0.00	0.00	8.70	0.085	8.50	1.682	5.17	10.00	15.17	1.517	12.59	2.59
26	0.2500	8.70	0.00	0.00	8.70	0.089	8.86	1.689	5.15	10.00	15.15	1.515	12.58	2.58
27	0.2600	8.80	0.00	0.00	8.80	0.092	9.21	1.696	5.19	10.00	15.19	1.519	12.60	2.60
28	0.2700	9.00	0.00	0.00	9.00	0.096	9.56	1.702	5.29	10.00	15.29	1.529	12.64	2.64
29	0.2800	9.00	0.00	0.00	9.00	0.099	9.92	1.709	5.27	10.00	15.27	1.527	12.63	2.63
30	0.2900	9.00	0.00	0.00	9.00	0.103	10.27	1.716	5.25	10.00	15.25	1.525	12.62	2.62
31	0.3000	9.00	0.00	0.00	9.00	0.106	10.63	1.722	5.23	10.00	15.23	1.523	12.61	2.61
32	0.3100	8.70	0.00	0.00	8.70	0.110	10.98	1.729	5.03	10.00	15.03	1.503	12.52	2.52
33	0.3200	8.70	0.00	0.00	8.70	0.113	11.34	1.736	5.01	10.00	15.01	1.501	12.51	2.51
34	0.3300	8.70	0.00	0.00	8.70	0.117	11.69	1.743	4.99	10.00	14.99	1.499	12.50	2.50
35	0.3400	8.60	0.00	0.00	8.60	0.120	12.04	1.750	4.91	10.00	14.91	1.491	12.46	2.46
36	0.3500	8.60	0.00	0.00	8.60	0.124	12.40	1.757	4.89	10.00	14.89	1.489	12.45	2.45
37	0.3600	8.60	0.00	0.00	8.60	0.128	12.75	1.764	4.87	10.00	14.87	1.487	12.44	2.44
38	0.3700	8.60	0.00	0.00	8.60	0.131	13.11	1.772	4.85	10.00	14.85	1.485	12.43	2.43
39	0.3800	8.70	0.00	0.00	8.70	0.135	13.46	1.779	4.89	10.00	14.89	1.489	12.45	2.45
40	0.3900	8.70	0.00	0.00	8.70	0.138	13.82	1.786	4.87	10.00	14.87	1.487	12.44	2.44
41	0.4000	8.80	0.00	0.00	8.80	0.142	14.17	1.794	4.91	10.00	14.91	1.491	12.45	2.45
42	0.4100	8.80	0.00	0.00	8.80	0.145	14.52	1.801	4.89	10.00	14.89	1.489	12.44	2.44
43	0.4200	8.80	0.00	0.00	8.80	0.149	14.88	1.808	4.87	10.00	14.87	1.487	12.43	2.43
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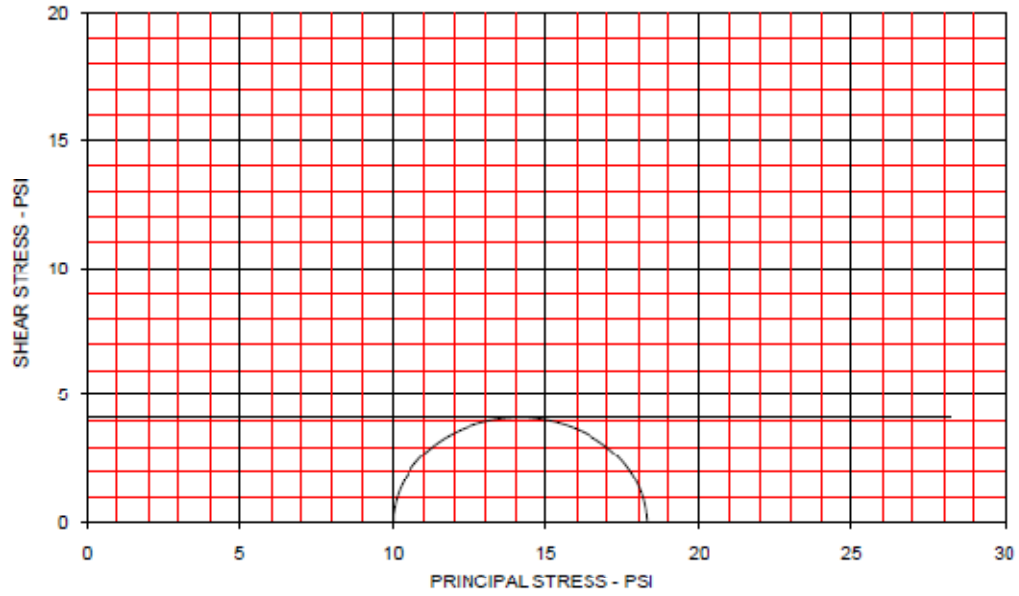
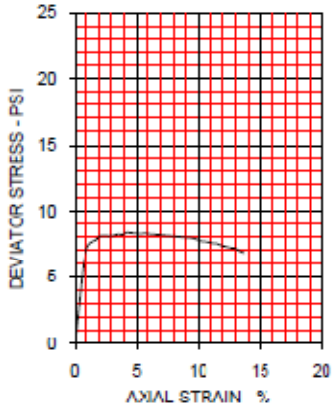
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 4.1 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	23.8			
Dry Density - pcf	100.3			
Diameter - inches	1.40			
Height - inches	2.36			
AT TEST				
Final Moisture - %	23.8			
Dry Density - pcf	100.3			
Calculated Diameter (in.)	1.40			
Height - inches	2.36			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	8.28			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	5.6			
σ_1 Failure - psi	18.28			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: FAT CLAY (CHi, brown
SAMPLE LOCATION: B-13, 1-3 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 51 PL: 14 PI: 37 Percent -200: 77
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUF.4

UUFS-4-AA533150 -B-13 (1-3).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.86 in Weight : 143.2 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	4.70	0.00	0.00	4.70	0.004	0.35	1.545	3.04	10.00	13.04	1.304	11.52	1.52
3	0.0200	9.30	0.00	0.00	9.30	0.007	0.70	1.550	6.00	10.00	16.00	1.600	13.00	3.00
4	0.0300	11.20	0.00	0.00	11.20	0.011	1.05	1.556	7.20	10.00	17.20	1.720	13.60	3.60
5	0.0400	11.90	0.00	0.00	11.90	0.014	1.40	1.561	7.62	10.00	17.62	1.762	13.81	3.81
6	0.0500	12.20	0.00	0.00	12.20	0.018	1.75	1.567	7.79	10.00	17.79	1.779	13.89	3.89
7	0.0600	12.70	0.00	0.00	12.70	0.021	2.10	1.572	8.08	10.00	18.08	1.808	14.04	4.04
8	0.0700	12.80	0.00	0.00	12.80	0.025	2.45	1.578	8.11	10.00	18.11	1.811	14.06	4.06
9	0.0800	12.80	0.00	0.00	12.80	0.028	2.80	1.584	8.08	10.00	18.08	1.808	14.04	4.04
10	0.0900	12.90	0.00	0.00	12.90	0.032	3.15	1.589	8.12	10.00	18.12	1.812	14.06	4.06
11	0.1000	13.10	0.00	0.00	13.10	0.035	3.50	1.595	8.21	10.00	18.21	1.821	14.11	4.11
12	0.1100	13.10	0.00	0.00	13.10	0.039	3.85	1.601	8.18	10.00	18.18	1.818	14.09	4.09
13	0.1200	13.40	0.00	0.00	13.40	0.042	4.20	1.607	8.34	10.00	18.34	1.834	14.17	4.17
14	0.1300	13.40	0.00	0.00	13.40	0.046	4.55	1.613	8.31	10.00	18.31	1.831	14.15	4.15
15	0.1400	13.40	0.00	0.00	13.40	0.049	4.90	1.619	8.28	10.00	18.28	1.828	14.14	4.14
16	0.1500	13.40	0.00	0.00	13.40	0.053	5.25	1.625	8.25	10.00	18.25	1.825	14.12	4.12
17	0.1600	13.50	0.00	0.00	13.50	0.056	5.60	1.631	8.28	10.00	18.28	1.828	14.14	4.14
18	0.1700	13.50	0.00	0.00	13.50	0.060	5.95	1.637	8.25	10.00	18.25	1.825	14.12	4.12
19	0.1800	13.50	0.00	0.00	13.50	0.063	6.30	1.643	8.22	10.00	18.22	1.822	14.11	4.11
20	0.1900	13.50	0.00	0.00	13.50	0.067	6.65	1.649	8.19	10.00	18.19	1.819	14.09	4.09
21	0.2000	13.50	0.00	0.00	13.50	0.070	7.01	1.655	8.16	10.00	18.16	1.816	14.08	4.08
22	0.2100	13.50	0.00	0.00	13.50	0.074	7.36	1.662	8.12	10.00	18.12	1.812	14.06	4.06
23	0.2200	13.50	0.00	0.00	13.50	0.077	7.71	1.668	8.09	10.00	18.09	1.809	14.05	4.05
24	0.2300	13.50	0.00	0.00	13.50	0.081	8.06	1.674	8.06	10.00	18.06	1.806	14.03	4.03
25	0.2400	13.50	0.00	0.00	13.50	0.084	8.41	1.681	8.03	10.00	18.03	1.803	14.02	4.02
26	0.2500	13.50	0.00	0.00	13.50	0.088	8.76	1.687	8.00	10.00	18.00	1.800	14.00	4.00
27	0.2600	13.50	0.00	0.00	13.50	0.091	9.11	1.694	7.97	10.00	17.97	1.797	13.99	3.99
28	0.2700	13.50	0.00	0.00	13.50	0.095	9.46	1.700	7.94	10.00	17.94	1.794	13.97	3.97
29	0.2800	13.40	0.00	0.00	13.40	0.098	9.81	1.707	7.85	10.00	17.85	1.785	13.93	3.93
30	0.2900	13.20	0.00	0.00	13.20	0.102	10.16	1.713	7.70	10.00	17.70	1.770	13.85	3.85
31	0.3000	13.20	0.00	0.00	13.20	0.105	10.51	1.720	7.67	10.00	17.67	1.767	13.84	3.84
32	0.3100	13.20	0.00	0.00	13.20	0.109	10.86	1.727	7.64	10.00	17.64	1.764	13.82	3.82
33	0.3200	13.10	0.00	0.00	13.10	0.112	11.21	1.734	7.56	10.00	17.56	1.756	13.78	3.78
34	0.3300	13.10	0.00	0.00	13.10	0.116	11.56	1.741	7.53	10.00	17.53	1.753	13.76	3.76
35	0.3400	12.90	0.00	0.00	12.90	0.119	11.91	1.747	7.38	10.00	17.38	1.738	13.69	3.69
36	0.3500	12.80	0.00	0.00	12.80	0.123	12.26	1.754	7.30	10.00	17.30	1.730	13.65	3.65
37	0.3600	12.70	0.00	0.00	12.70	0.126	12.61	1.761	7.21	10.00	17.21	1.721	13.60	3.60
38	0.3700	12.70	0.00	0.00	12.70	0.130	12.96	1.769	7.18	10.00	17.18	1.718	13.59	3.59
39	0.3800	12.40	0.00	0.00	12.40	0.133	13.31	1.776	6.98	10.00	16.98	1.698	13.49	3.49
40	0.3900	12.20	0.00	0.00	12.20	0.137	13.66	1.783	6.84	10.00	16.84	1.684	13.42	3.42
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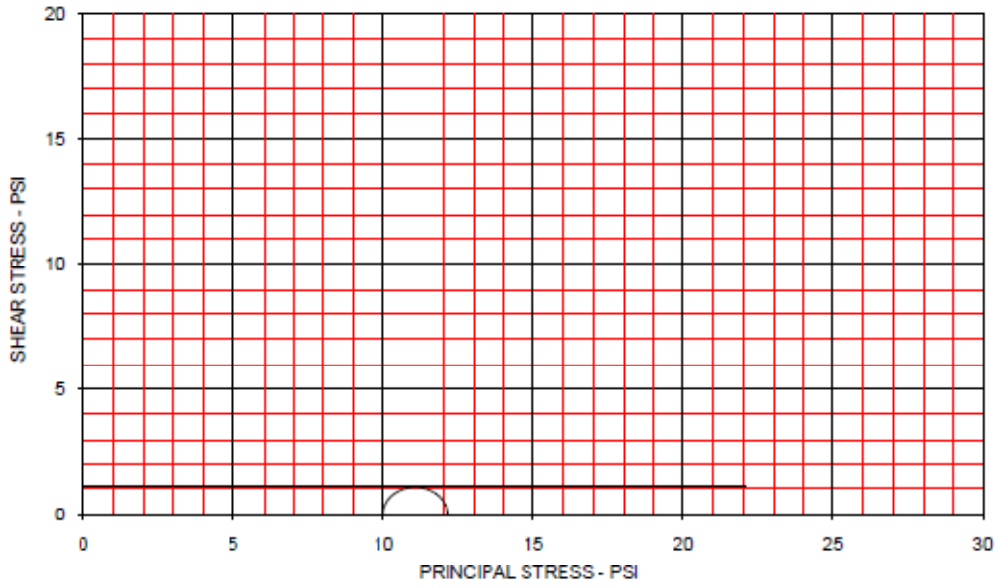
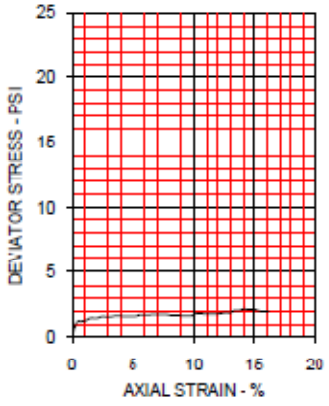
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 1.1 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	27.8			
Dry Density - pcf	91.6			
Diameter - inches	1.40			
Height - inches	2.85			
AT TEST				
Final Moisture - %	27.8			
Dry Density - pcf	91.6			
Calculated Diameter (in.)	1.40			
Height - inches	2.85			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	2.12			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	14.0			
σ_1 Failure - psi	12.12			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-23, 1-3 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 39 PL: 13 PI: 26 Percent -200: 73
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUF.5

UUFS-5-AA533150-B-23 (1-3).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), dark yellowish brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.85 in Weight : 134.9 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	1.80	0.00	0.00	1.80	0.004	0.35	1.545	1.17	10.00	11.17	1.117	10.58	0.58
3	0.0200	1.90	0.00	0.00	1.90	0.007	0.70	1.550	1.23	10.00	11.23	1.123	10.61	0.61
4	0.0300	2.00	0.00	0.00	2.00	0.011	1.05	1.556	1.29	10.00	11.29	1.129	10.64	0.64
5	0.0400	2.30	0.00	0.00	2.30	0.014	1.40	1.561	1.47	10.00	11.47	1.147	10.74	0.74
6	0.0500	2.30	0.00	0.00	2.30	0.018	1.75	1.567	1.47	10.00	11.47	1.147	10.73	0.73
7	0.0600	2.30	0.00	0.00	2.30	0.021	2.10	1.572	1.46	10.00	11.46	1.146	10.73	0.73
8	0.0700	2.50	0.00	0.00	2.50	0.025	2.46	1.578	1.58	10.00	11.58	1.158	10.79	0.79
9	0.0800	2.50	0.00	0.00	2.50	0.028	2.81	1.584	1.58	10.00	11.58	1.158	10.79	0.79
10	0.0900	2.50	0.00	0.00	2.50	0.032	3.16	1.590	1.57	10.00	11.57	1.157	10.79	0.79
11	0.1000	2.60	0.00	0.00	2.60	0.035	3.51	1.595	1.63	10.00	11.63	1.163	10.81	0.81
12	0.1100	2.60	0.00	0.00	2.60	0.039	3.86	1.601	1.62	10.00	11.62	1.162	10.81	0.81
13	0.1200	2.60	0.00	0.00	2.60	0.042	4.21	1.607	1.62	10.00	11.62	1.162	10.81	0.81
14	0.1300	2.60	0.00	0.00	2.60	0.046	4.56	1.613	1.61	10.00	11.61	1.161	10.81	0.81
15	0.1400	2.60	0.00	0.00	2.60	0.049	4.91	1.619	1.61	10.00	11.61	1.161	10.80	0.80
16	0.1500	2.60	0.00	0.00	2.60	0.053	5.26	1.625	1.60	10.00	11.60	1.160	10.80	0.80
17	0.1600	2.80	0.00	0.00	2.80	0.056	5.61	1.631	1.72	10.00	11.72	1.172	10.86	0.86
18	0.1700	2.80	0.00	0.00	2.80	0.060	5.96	1.637	1.71	10.00	11.71	1.171	10.86	0.86
19	0.1800	2.80	0.00	0.00	2.80	0.063	6.31	1.643	1.70	10.00	11.70	1.170	10.85	0.85
20	0.1900	2.90	0.00	0.00	2.90	0.067	6.66	1.649	1.76	10.00	11.76	1.176	10.88	0.88
21	0.2000	2.90	0.00	0.00	2.90	0.070	7.02	1.656	1.75	10.00	11.75	1.175	10.88	0.88
22	0.2100	2.90	0.00	0.00	2.90	0.074	7.37	1.662	1.75	10.00	11.75	1.175	10.87	0.87
23	0.2200	2.90	0.00	0.00	2.90	0.077	7.72	1.668	1.74	10.00	11.74	1.174	10.87	0.87
24	0.2300	2.80	0.00	0.00	2.80	0.081	8.07	1.674	1.67	10.00	11.67	1.167	10.84	0.84
25	0.2400	2.80	0.00	0.00	2.80	0.084	8.42	1.681	1.67	10.00	11.67	1.167	10.83	0.83
26	0.2500	2.80	0.00	0.00	2.80	0.088	8.77	1.687	1.66	10.00	11.66	1.166	10.83	0.83
27	0.2600	2.80	0.00	0.00	2.80	0.091	9.12	1.694	1.65	10.00	11.65	1.165	10.83	0.83
28	0.2700	2.80	0.00	0.00	2.80	0.095	9.47	1.700	1.65	10.00	11.65	1.165	10.82	0.82
29	0.2800	2.80	0.00	0.00	2.80	0.098	9.82	1.707	1.64	10.00	11.64	1.164	10.82	0.82
30	0.2900	3.10	0.00	0.00	3.10	0.102	10.17	1.714	1.81	10.00	11.81	1.181	10.90	0.90
31	0.3000	3.10	0.00	0.00	3.10	0.105	10.52	1.720	1.80	10.00	11.80	1.180	10.90	0.90
32	0.3100	3.10	0.00	0.00	3.10	0.109	10.87	1.727	1.79	10.00	11.79	1.179	10.90	0.90
33	0.3200	3.10	0.00	0.00	3.10	0.112	11.22	1.734	1.79	10.00	11.79	1.179	10.89	0.89
34	0.3300	3.10	0.00	0.00	3.10	0.116	11.57	1.741	1.78	10.00	11.78	1.178	10.89	0.89
35	0.3400	3.10	0.00	0.00	3.10	0.119	11.93	1.748	1.77	10.00	11.77	1.177	10.89	0.89
36	0.3500	3.20	0.00	0.00	3.20	0.123	12.28	1.755	1.82	10.00	11.82	1.182	10.91	0.91
37	0.3600	3.30	0.00	0.00	3.30	0.126	12.63	1.762	1.87	10.00	11.87	1.187	10.94	0.94
38	0.3700	3.30	0.00	0.00	3.30	0.130	12.98	1.769	1.87	10.00	11.87	1.187	10.93	0.93
39	0.3800	3.60	0.00	0.00	3.60	0.133	13.33	1.776	2.03	10.00	12.03	1.203	11.01	1.01
40	0.3900	3.60	0.00	0.00	3.60	0.137	13.68	1.783	2.02	10.00	12.02	1.202	11.01	1.01
41	0.4000	3.80	0.00	0.00	3.80	0.140	14.03	1.791	2.12	10.00	12.12	1.212	11.06	1.06
42	0.4100	3.80	0.00	0.00	3.80	0.144	14.38	1.798	2.11	10.00	12.11	1.211	11.06	1.06
43	0.4200	3.80	0.00	0.00	3.80	0.147	14.73	1.805	2.10	10.00	12.10	1.210	11.05	1.05
44	0.4300	3.80	0.00	0.00	3.80	0.151	15.08	1.813	2.10	10.00	12.10	1.210	11.05	1.05
45	0.4400	3.60	0.00	0.00	3.60	0.154	15.43	1.820	1.98	10.00	11.98	1.198	10.99	0.99
46	0.4500	3.60	0.00	0.00	3.60	0.158	15.78	1.828	1.97	10.00	11.97	1.197	10.98	0.98
47	0.4600	3.60	0.00	0.00	3.60	0.161	16.13	1.836	1.96	10.00	11.96	1.196	10.98	0.98
48														
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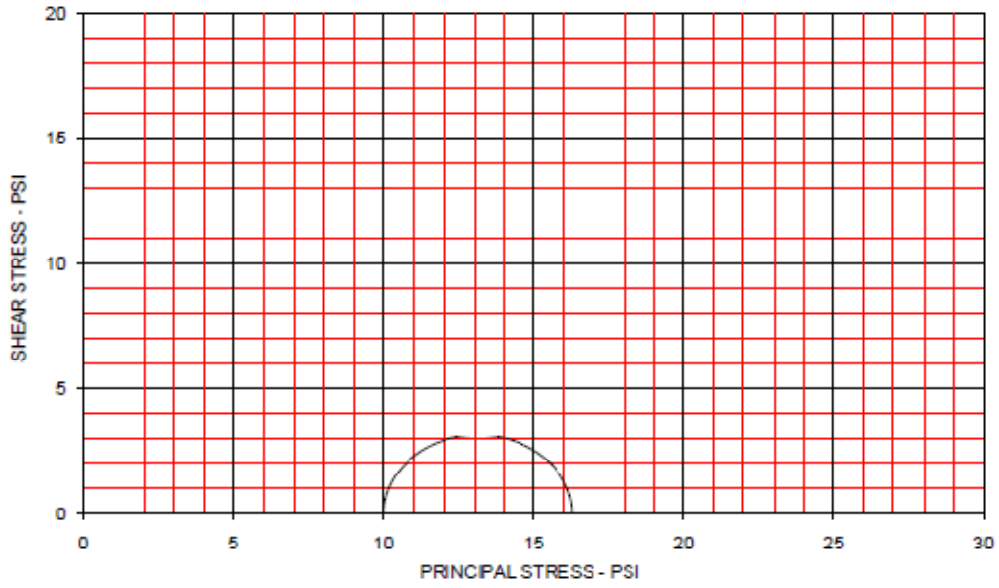
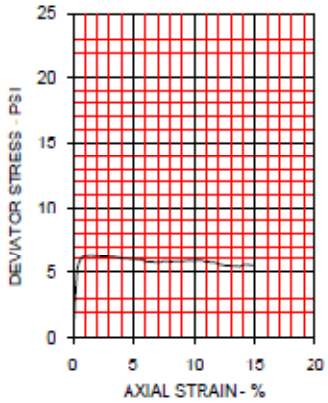
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 3.1 psi		
SPECIMEN NO.	1	2	3	4
INTIAL				
Moisture Content - %	26.5			
Dry Density pcf	96.6			
Diameter - inches	1.40			
Height - inches	2.82			
AT TEST				
Final Moisture - %	26.5			
Dry Density - pcf	96.6			
Calculated Diameter (in.)	1.40			
Height - inches	2.82			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	6.28			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	1.4			
σ_1 Failure - psi	16.28			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-23, 3-5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 39 PL: 13 PI: 26 Percent -200: 73
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUF.6

UUFS-6-AA533150 -B-23 (3-5).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), dark yellowish brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.82 in Weight : 139.2 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	8.10	0.00	0.00	8.10	0.004	0.35	1.545	5.24	10.00	15.24	1.524	12.62	2.62
3	0.0200	9.50	0.00	0.00	9.50	0.007	0.71	1.550	6.13	10.00	16.13	1.613	13.06	3.06
4	0.0300	9.70	0.00	0.00	9.70	0.011	1.06	1.556	6.23	10.00	16.23	1.623	13.12	3.12
5	0.0400	9.80	0.00	0.00	9.80	0.014	1.42	1.562	6.28	10.00	16.28	1.628	13.14	3.14
6	0.0500	9.80	0.00	0.00	9.80	0.018	1.77	1.567	6.25	10.00	16.25	1.625	13.13	3.13
7	0.0600	9.80	0.00	0.00	9.80	0.021	2.13	1.573	6.23	10.00	16.23	1.623	13.12	3.12
8	0.0700	9.80	0.00	0.00	9.80	0.025	2.48	1.579	6.21	10.00	16.21	1.621	13.10	3.10
9	0.0800	9.80	0.00	0.00	9.80	0.028	2.84	1.584	6.19	10.00	16.19	1.619	13.09	3.09
10	0.0900	9.80	0.00	0.00	9.80	0.032	3.19	1.590	6.16	10.00	16.16	1.616	13.08	3.08
11	0.1000	9.80	0.00	0.00	9.80	0.035	3.55	1.596	6.14	10.00	16.14	1.614	13.07	3.07
12	0.1100	9.70	0.00	0.00	9.70	0.039	3.90	1.602	6.06	10.00	16.06	1.606	13.03	3.03
13	0.1200	9.70	0.00	0.00	9.70	0.043	4.26	1.608	6.03	10.00	16.03	1.603	13.02	3.02
14	0.1300	9.70	0.00	0.00	9.70	0.046	4.61	1.614	6.01	10.00	16.01	1.601	13.01	3.01
15	0.1400	9.70	0.00	0.00	9.70	0.050	4.96	1.620	5.99	10.00	15.99	1.599	12.99	2.99
16	0.1500	9.70	0.00	0.00	9.70	0.053	5.32	1.626	5.97	10.00	15.97	1.597	12.98	2.98
17	0.1600	9.70	0.00	0.00	9.70	0.057	5.67	1.632	5.94	10.00	15.94	1.594	12.97	2.97
18	0.1700	9.50	0.00	0.00	9.50	0.060	6.03	1.638	5.80	10.00	15.80	1.580	12.90	2.90
19	0.1800	9.50	0.00	0.00	9.50	0.064	6.38	1.644	5.78	10.00	15.78	1.578	12.89	2.89
20	0.1900	9.50	0.00	0.00	9.50	0.067	6.74	1.651	5.76	10.00	15.76	1.576	12.88	2.88
21	0.2000	9.50	0.00	0.00	9.50	0.071	7.09	1.657	5.73	10.00	15.73	1.573	12.87	2.87
22	0.2100	9.70	0.00	0.00	9.70	0.074	7.45	1.663	5.83	10.00	15.83	1.583	12.92	2.92
23	0.2200	9.70	0.00	0.00	9.70	0.078	7.80	1.670	5.81	10.00	15.81	1.581	12.90	2.90
24	0.2300	9.70	0.00	0.00	9.70	0.082	8.16	1.676	5.79	10.00	15.79	1.579	12.89	2.89
25	0.2400	9.80	0.00	0.00	9.80	0.085	8.51	1.683	5.82	10.00	15.82	1.582	12.91	2.91
26	0.2500	9.80	0.00	0.00	9.80	0.089	8.87	1.689	5.80	10.00	15.80	1.580	12.90	2.90
27	0.2600	9.90	0.00	0.00	9.90	0.092	9.22	1.696	5.84	10.00	15.84	1.584	12.92	2.92
28	0.2700	10.00	0.00	0.00	10.00	0.096	9.57	1.702	5.87	10.00	15.87	1.587	12.94	2.94
29	0.2800	10.00	0.00	0.00	10.00	0.099	9.93	1.709	5.85	10.00	15.85	1.585	12.93	2.93
30	0.2900	10.10	0.00	0.00	10.10	0.103	10.28	1.716	5.89	10.00	15.89	1.589	12.94	2.94
31	0.3000	10.10	0.00	0.00	10.10	0.106	10.64	1.723	5.86	10.00	15.86	1.586	12.93	2.93
32	0.3100	10.00	0.00	0.00	10.00	0.110	10.99	1.730	5.78	10.00	15.78	1.578	12.89	2.89
33	0.3200	10.00	0.00	0.00	10.00	0.113	11.35	1.736	5.76	10.00	15.76	1.576	12.88	2.88
34	0.3300	10.00	0.00	0.00	10.00	0.117	11.70	1.743	5.74	10.00	15.74	1.574	12.87	2.87
35	0.3400	9.80	0.00	0.00	9.80	0.121	12.06	1.750	5.60	10.00	15.60	1.560	12.80	2.80
36	0.3500	9.70	0.00	0.00	9.70	0.124	12.41	1.758	5.52	10.00	15.52	1.552	12.76	2.76
37	0.3600	9.70	0.00	0.00	9.70	0.128	12.77	1.765	5.50	10.00	15.50	1.550	12.75	2.75
38	0.3700	9.70	0.00	0.00	9.70	0.131	13.12	1.772	5.47	10.00	15.47	1.547	12.74	2.74
39	0.3800	9.70	0.00	0.00	9.70	0.135	13.48	1.779	5.45	10.00	15.45	1.545	12.73	2.73
40	0.3900	9.70	0.00	0.00	9.70	0.138	13.83	1.786	5.43	10.00	15.43	1.543	12.71	2.71
41	0.4000	10.00	0.00	0.00	10.00	0.142	14.18	1.794	5.57	10.00	15.57	1.557	12.79	2.79
42	0.4100	10.00	0.00	0.00	10.00	0.145	14.54	1.801	5.55	10.00	15.55	1.555	12.78	2.78
43	0.4200	10.00	0.00	0.00	10.00	0.149	14.89	1.809	5.53	10.00	15.53	1.553	12.76	2.76
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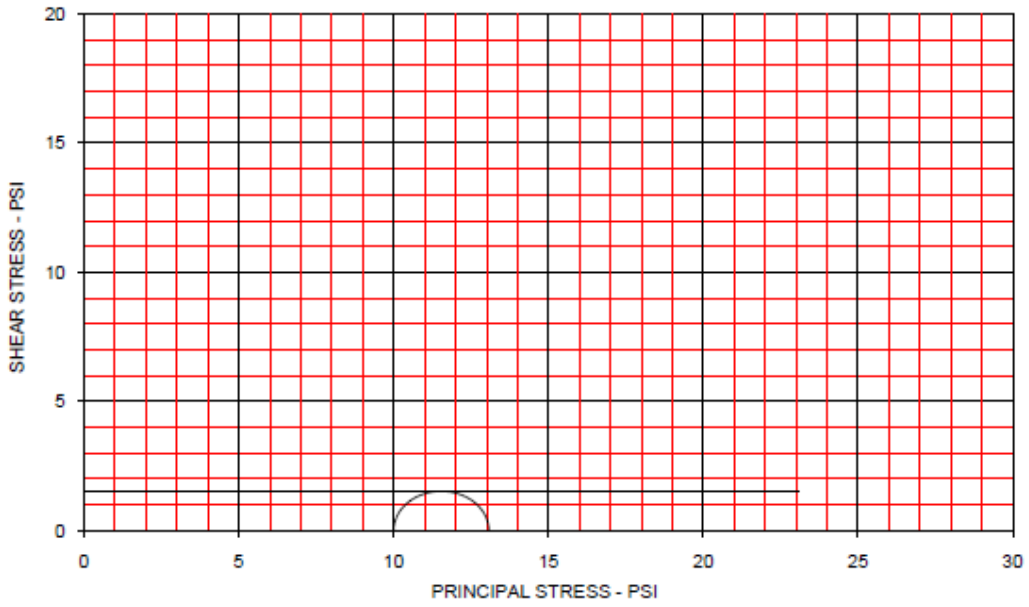
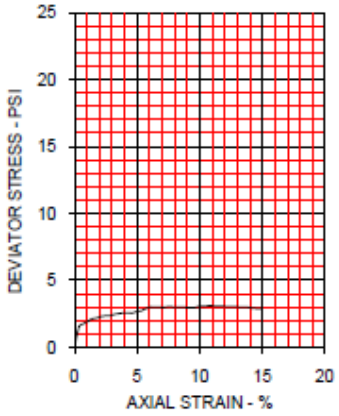
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 1.5 psi		



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	30.1			
Dry Density - pcf	94.7			
Diameter - inches	1.40			
Height - inches	2.81			
AT TEST				
Final Moisture - %	30.1			
Dry Density - pcf	94.7			
Calculated Diameter (in.)	1.40			
Height - inches	2.81			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	3.08			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	10.7			
σ_1 Failure - psi	13.08			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-27, 8-9 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 35 PL: 12 PI: 23 Percent -200: 81
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUF.7

UUFS-7-AA533150 -B-27 (8-9).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), dark yellowish brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.81 in Weight : 140.0 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
		Data Input												
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	2.30	0.00	0.00	2.30	0.004	0.36	1.545	1.49	10.00	11.49	1.149	10.74	0.74
3	0.0200	2.70	0.00	0.00	2.70	0.007	0.71	1.550	1.74	10.00	11.74	1.174	10.87	0.87
4	0.0300	3.00	0.00	0.00	3.00	0.011	1.07	1.556	1.93	10.00	11.93	1.193	10.96	0.96
5	0.0400	3.30	0.00	0.00	3.30	0.014	1.42	1.562	2.11	10.00	12.11	1.211	11.06	1.06
6	0.0500	3.40	0.00	0.00	3.40	0.018	1.78	1.567	2.17	10.00	12.17	1.217	11.08	1.08
7	0.0600	3.60	0.00	0.00	3.60	0.021	2.14	1.573	2.29	10.00	12.29	1.229	11.14	1.14
8	0.0700	3.70	0.00	0.00	3.70	0.025	2.49	1.579	2.34	10.00	12.34	1.234	11.17	1.17
9	0.0800	3.70	0.00	0.00	3.70	0.028	2.85	1.584	2.34	10.00	12.34	1.234	11.17	1.17
10	0.0900	3.90	0.00	0.00	3.90	0.032	3.20	1.590	2.45	10.00	12.45	1.245	11.23	1.23
11	0.1000	4.00	0.00	0.00	4.00	0.036	3.56	1.596	2.51	10.00	12.51	1.251	11.25	1.25
12	0.1100	4.10	0.00	0.00	4.10	0.039	3.91	1.602	2.56	10.00	12.56	1.256	11.28	1.28
13	0.1200	4.10	0.00	0.00	4.10	0.043	4.27	1.608	2.55	10.00	12.55	1.255	11.27	1.27
14	0.1300	4.10	0.00	0.00	4.10	0.046	4.63	1.614	2.54	10.00	12.54	1.254	11.27	1.27
15	0.1400	4.30	0.00	0.00	4.30	0.050	4.98	1.620	2.65	10.00	12.65	1.265	11.33	1.33
16	0.1500	4.40	0.00	0.00	4.40	0.053	5.34	1.626	2.71	10.00	12.71	1.271	11.35	1.35
17	0.1600	4.70	0.00	0.00	4.70	0.057	5.69	1.632	2.88	10.00	12.88	1.288	11.44	1.44
18	0.1700	4.90	0.00	0.00	4.90	0.060	6.05	1.639	2.99	10.00	12.99	1.299	11.50	1.50
19	0.1800	4.90	0.00	0.00	4.90	0.064	6.41	1.645	2.98	10.00	12.98	1.298	11.49	1.49
20	0.1900	4.90	0.00	0.00	4.90	0.068	6.76	1.651	2.97	10.00	12.97	1.297	11.48	1.48
21	0.2000	4.90	0.00	0.00	4.90	0.071	7.12	1.657	2.96	10.00	12.96	1.296	11.48	1.48
22	0.2100	5.00	0.00	0.00	5.00	0.075	7.47	1.664	3.01	10.00	13.01	1.301	11.50	1.50
23	0.2200	5.00	0.00	0.00	5.00	0.078	7.83	1.670	2.99	10.00	12.99	1.299	11.50	1.50
24	0.2300	5.00	0.00	0.00	5.00	0.082	8.19	1.677	2.98	10.00	12.98	1.298	11.49	1.49
25	0.2400	5.00	0.00	0.00	5.00	0.085	8.54	1.683	2.97	10.00	12.97	1.297	11.49	1.49
26	0.2500	5.00	0.00	0.00	5.00	0.089	8.90	1.690	2.96	10.00	12.96	1.296	11.48	1.48
27	0.2600	5.00	0.00	0.00	5.00	0.093	9.25	1.696	2.95	10.00	12.95	1.295	11.47	1.47
28	0.2700	5.00	0.00	0.00	5.00	0.096	9.61	1.703	2.94	10.00	12.94	1.294	11.47	1.47
29	0.2800	5.20	0.00	0.00	5.20	0.100	9.96	1.710	3.04	10.00	13.04	1.304	11.52	1.52
30	0.2900	5.20	0.00	0.00	5.20	0.103	10.32	1.717	3.03	10.00	13.03	1.303	11.51	1.51
31	0.3000	5.30	0.00	0.00	5.30	0.107	10.68	1.723	3.08	10.00	13.08	1.308	11.54	1.54
32	0.3100	5.30	0.00	0.00	5.30	0.110	11.03	1.730	3.06	10.00	13.06	1.306	11.53	1.53
33	0.3200	5.30	0.00	0.00	5.30	0.114	11.39	1.737	3.05	10.00	13.05	1.305	11.53	1.53
34	0.3300	5.30	0.00	0.00	5.30	0.117	11.74	1.744	3.04	10.00	13.04	1.304	11.52	1.52
35	0.3400	5.30	0.00	0.00	5.30	0.121	12.10	1.751	3.03	10.00	13.03	1.303	11.51	1.51
36	0.3500	5.30	0.00	0.00	5.30	0.125	12.46	1.758	3.01	10.00	13.01	1.301	11.51	1.51
37	0.3600	5.30	0.00	0.00	5.30	0.128	12.81	1.766	3.00	10.00	13.00	1.300	11.50	1.50
38	0.3700	5.30	0.00	0.00	5.30	0.132	13.17	1.773	2.99	10.00	12.99	1.299	11.49	1.49
39	0.3800	5.30	0.00	0.00	5.30	0.135	13.52	1.780	2.98	10.00	12.98	1.298	11.49	1.49
40	0.3900	5.30	0.00	0.00	5.30	0.139	13.88	1.787	2.97	10.00	12.97	1.297	11.48	1.48
41	0.4000	5.20	0.00	0.00	5.20	0.142	14.23	1.795	2.90	10.00	12.90	1.290	11.45	1.45
42	0.4100	5.20	0.00	0.00	5.20	0.146	14.59	1.802	2.89	10.00	12.89	1.289	11.44	1.44
43	0.4200	5.20	0.00	0.00	5.20	0.149	14.95	1.810	2.87	10.00	12.87	1.287	11.44	1.44
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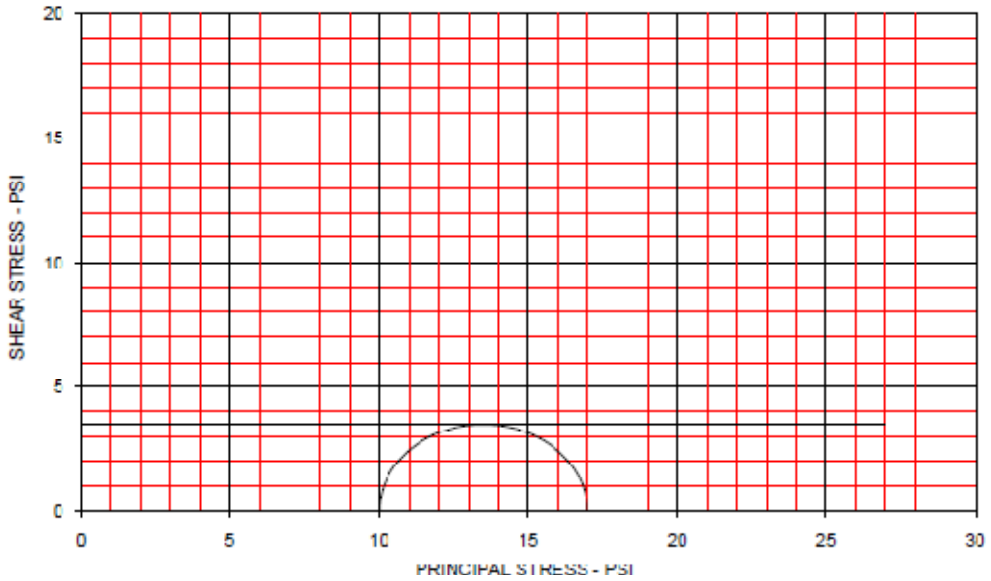
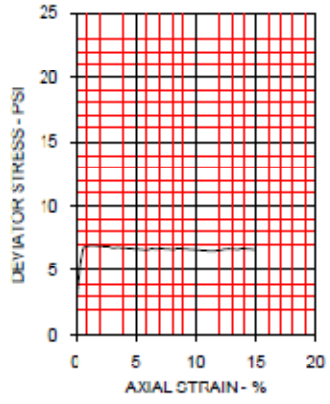
OSU-CIVE-GEOTECHNICAL UUFS-7-AA533150_-B-27_(8-9)[1].xlsx PLATE: UUFS.7a

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg		c = 3.5 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	23.9			
Dry Density - pcf	98.1			
Diameter - inches	1.40			
Height - inches	2.83			
AT TEST				
Final Moisture - %	23.9			
Dry Density - pcf	98.1			
Calculated Diameter (in.)	1.40			
Height - inches	2.83			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	6.98			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	1.4			
σ_1 Failure - psi	16.98			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: SANDY LEAN CLAY (CL), dark brown
SAMPLE LOCATION: B-28, 1-3 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 26 PL: 11 PI: 15 Percent -200: 78
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVIL - GEOTECHNICAL PLATE: UUF.8

UUFS-8-AA533150 -B-28 (1-3).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: SANDY LEAN CLAY (CL), dark brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.83 in Weight : 139.0 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	6.60	0.00	0.00	6.60	0.004	0.35	1.545	4.27	10.00	14.27	1.427	12.14	2.14
3	0.0200	10.40	0.00	0.00	10.40	0.007	0.71	1.550	6.71	10.00	16.71	1.671	13.35	3.35
4	0.0300	10.80	0.00	0.00	10.80	0.011	1.06	1.556	6.94	10.00	16.94	1.694	13.47	3.47
5	0.0400	10.90	0.00	0.00	10.90	0.014	1.41	1.561	6.98	10.00	16.98	1.698	13.49	3.49
6	0.0500	10.90	0.00	0.00	10.90	0.018	1.77	1.567	6.96	10.00	16.96	1.696	13.48	3.48
7	0.0600	10.90	0.00	0.00	10.90	0.021	2.12	1.573	6.93	10.00	16.93	1.693	13.47	3.47
8	0.0700	10.90	0.00	0.00	10.90	0.025	2.47	1.578	6.91	10.00	16.91	1.691	13.45	3.45
9	0.0800	10.90	0.00	0.00	10.90	0.028	2.83	1.584	6.88	10.00	16.88	1.688	13.44	3.44
10	0.0900	10.80	0.00	0.00	10.80	0.032	3.18	1.590	6.79	10.00	16.79	1.679	13.40	3.40
11	0.1000	10.90	0.00	0.00	10.90	0.035	3.53	1.596	6.83	10.00	16.83	1.683	13.42	3.42
12	0.1100	10.90	0.00	0.00	10.90	0.039	3.89	1.602	6.81	10.00	16.81	1.681	13.40	3.40
13	0.1200	10.90	0.00	0.00	10.90	0.042	4.24	1.608	6.78	10.00	16.78	1.678	13.39	3.39
14	0.1300	10.90	0.00	0.00	10.90	0.046	4.59	1.613	6.76	10.00	16.76	1.676	13.38	3.38
15	0.1400	10.90	0.00	0.00	10.90	0.049	4.95	1.619	6.73	10.00	16.73	1.673	13.37	3.37
16	0.1500	10.90	0.00	0.00	10.90	0.053	5.30	1.626	6.71	10.00	16.71	1.671	13.35	3.35
17	0.1600	10.90	0.00	0.00	10.90	0.057	5.65	1.632	6.68	10.00	16.68	1.668	13.34	3.34
18	0.1700	10.90	0.00	0.00	10.90	0.060	6.01	1.638	6.66	10.00	16.66	1.666	13.33	3.33
19	0.1800	11.10	0.00	0.00	11.10	0.064	6.36	1.644	6.75	10.00	16.75	1.675	13.38	3.38
20	0.1900	11.10	0.00	0.00	11.10	0.067	6.71	1.650	6.73	10.00	16.73	1.673	13.36	3.36
21	0.2000	11.20	0.00	0.00	11.20	0.071	7.07	1.656	6.76	10.00	16.76	1.676	13.38	3.38
22	0.2100	11.20	0.00	0.00	11.20	0.074	7.42	1.663	6.74	10.00	16.74	1.674	13.37	3.37
23	0.2200	11.20	0.00	0.00	11.20	0.078	7.77	1.669	6.71	10.00	16.71	1.671	13.36	3.36
24	0.2300	11.20	0.00	0.00	11.20	0.081	8.13	1.676	6.68	10.00	16.68	1.668	13.34	3.34
25	0.2400	11.40	0.00	0.00	11.40	0.085	8.48	1.682	6.78	10.00	16.78	1.678	13.39	3.39
26	0.2500	11.40	0.00	0.00	11.40	0.088	8.83	1.689	6.75	10.00	16.75	1.675	13.38	3.38
27	0.2600	11.40	0.00	0.00	11.40	0.092	9.19	1.695	6.73	10.00	16.73	1.673	13.36	3.36
28	0.2700	11.40	0.00	0.00	11.40	0.095	9.54	1.702	6.70	10.00	16.70	1.670	13.35	3.35
29	0.2800	11.40	0.00	0.00	11.40	0.099	9.89	1.708	6.67	10.00	16.67	1.667	13.34	3.34
30	0.2900	11.40	0.00	0.00	11.40	0.102	10.25	1.715	6.65	10.00	16.65	1.665	13.32	3.32
31	0.3000	11.40	0.00	0.00	11.40	0.106	10.60	1.722	6.62	10.00	16.62	1.662	13.31	3.31
32	0.3100	11.40	0.00	0.00	11.40	0.110	10.95	1.729	6.59	10.00	16.59	1.659	13.30	3.30
33	0.3200	11.40	0.00	0.00	11.40	0.113	11.31	1.736	6.57	10.00	16.57	1.657	13.28	3.28
34	0.3300	11.50	0.00	0.00	11.50	0.117	11.66	1.743	6.60	10.00	16.60	1.660	13.30	3.30
35	0.3400	11.60	0.00	0.00	11.60	0.120	12.01	1.750	6.63	10.00	16.63	1.663	13.32	3.32
36	0.3500	11.80	0.00	0.00	11.80	0.124	12.37	1.757	6.72	10.00	16.72	1.672	13.36	3.36
37	0.3600	11.90	0.00	0.00	11.90	0.127	12.72	1.764	6.75	10.00	16.75	1.675	13.37	3.37
38	0.3700	11.90	0.00	0.00	11.90	0.131	13.07	1.771	6.72	10.00	16.72	1.672	13.36	3.36
39	0.3800	11.90	0.00	0.00	11.90	0.134	13.43	1.778	6.69	10.00	16.69	1.669	13.35	3.35
40	0.3900	12.10	0.00	0.00	12.10	0.138	13.78	1.785	6.78	10.00	16.78	1.678	13.39	3.39
41	0.4000	12.10	0.00	0.00	12.10	0.141	14.13	1.793	6.75	10.00	16.75	1.675	13.37	3.37
42	0.4100	12.10	0.00	0.00	12.10	0.145	14.49	1.800	6.72	10.00	16.72	1.672	13.36	3.36
43	0.4200	12.10	0.00	0.00	12.10	0.148	14.84	1.808	6.69	10.00	16.69	1.669	13.35	3.35
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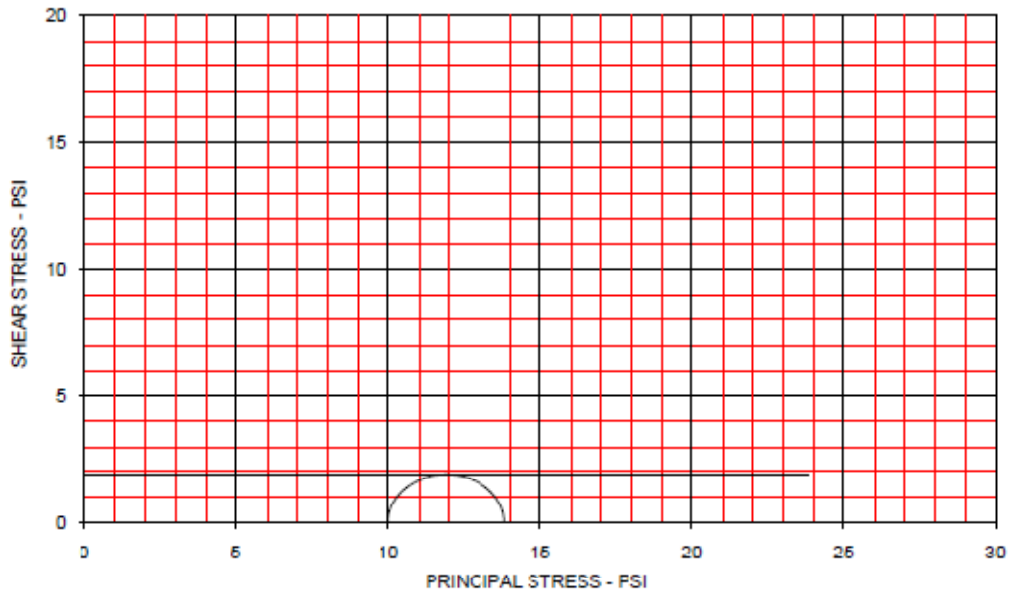
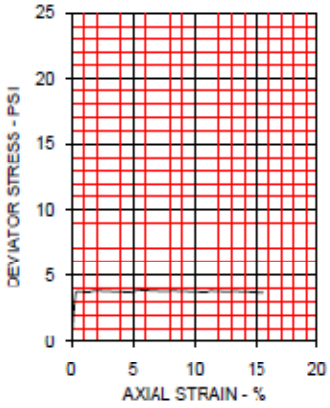
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 1.9 psi		



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	25.8			
Dry Density - pcf	98.4			
Diameter - inches	1.40			
Height - inches	2.82			
AT TEST				
Final Moisture - %	25.8			
Dry Density - pcf	98.4			
Calculated Diameter (in.)	1.40			
Height - inches	2.82			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	3.81			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	5.3			
σ_1 Failure - psi	13.81			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO. UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: SANDY LEAN CLAY (CL), dark brown
SAMPLE LOCATION: B-28, 3-5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 26 PL: 11 PI: 15 Percent -200: 78
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-6-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE: UUF.9

UUFS-6-AA533150 -B-28 (3-5).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: SANDY LEAN CLAY (CL), dark brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.82 in Weight : 141.0 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	$\sigma_1' : \sigma_3'$	p' (psi)	q (psi)
		Data Input												
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	5.60	0.00	0.00	5.60	0.004	0.35	1.545	3.62	10.00	13.62	1.362	11.81	1.81
3	0.0200	5.70	0.00	0.00	5.70	0.007	0.71	1.550	3.68	10.00	13.68	1.368	11.84	1.84
4	0.0300	5.70	0.00	0.00	5.70	0.011	1.06	1.556	3.66	10.00	13.66	1.366	11.83	1.83
5	0.0400	5.70	0.00	0.00	5.70	0.014	1.42	1.562	3.65	10.00	13.65	1.365	11.83	1.83
6	0.0500	5.90	0.00	0.00	5.90	0.018	1.77	1.567	3.76	10.00	13.76	1.376	11.88	1.88
7	0.0600	5.90	0.00	0.00	5.90	0.021	2.13	1.573	3.75	10.00	13.75	1.375	11.88	1.88
8	0.0700	5.90	0.00	0.00	5.90	0.025	2.48	1.579	3.74	10.00	13.74	1.374	11.87	1.87
9	0.0800	5.90	0.00	0.00	5.90	0.028	2.84	1.584	3.72	10.00	13.72	1.372	11.86	1.86
10	0.0900	5.90	0.00	0.00	5.90	0.032	3.19	1.590	3.71	10.00	13.71	1.371	11.86	1.86
11	0.1000	5.90	0.00	0.00	5.90	0.035	3.55	1.596	3.70	10.00	13.70	1.370	11.85	1.85
12	0.1100	5.90	0.00	0.00	5.90	0.039	3.90	1.602	3.68	10.00	13.68	1.368	11.84	1.84
13	0.1200	5.90	0.00	0.00	5.90	0.043	4.26	1.608	3.67	10.00	13.67	1.367	11.83	1.83
14	0.1300	5.90	0.00	0.00	5.90	0.046	4.61	1.614	3.66	10.00	13.66	1.366	11.83	1.83
15	0.1400	5.90	0.00	0.00	5.90	0.050	4.96	1.620	3.64	10.00	13.64	1.364	11.82	1.82
16	0.1500	6.20	0.00	0.00	6.20	0.053	5.32	1.626	3.81	10.00	13.81	1.381	11.91	1.91
17	0.1600	6.20	0.00	0.00	6.20	0.057	5.67	1.632	3.80	10.00	13.80	1.380	11.90	1.90
18	0.1700	6.20	0.00	0.00	6.20	0.060	6.03	1.638	3.78	10.00	13.78	1.378	11.89	1.89
19	0.1800	6.20	0.00	0.00	6.20	0.064	6.38	1.644	3.77	10.00	13.77	1.377	11.89	1.89
20	0.1900	6.20	0.00	0.00	6.20	0.067	6.74	1.651	3.76	10.00	13.76	1.376	11.88	1.88
21	0.2000	6.20	0.00	0.00	6.20	0.071	7.09	1.657	3.74	10.00	13.74	1.374	11.87	1.87
22	0.2100	6.20	0.00	0.00	6.20	0.074	7.45	1.663	3.73	10.00	13.73	1.373	11.86	1.86
23	0.2200	6.20	0.00	0.00	6.20	0.078	7.80	1.670	3.71	10.00	13.71	1.371	11.86	1.86
24	0.2300	6.30	0.00	0.00	6.30	0.082	8.16	1.676	3.76	10.00	13.76	1.376	11.88	1.88
25	0.2400	6.30	0.00	0.00	6.30	0.085	8.51	1.683	3.74	10.00	13.74	1.374	11.87	1.87
26	0.2500	6.30	0.00	0.00	6.30	0.089	8.87	1.689	3.73	10.00	13.73	1.373	11.86	1.86
27	0.2600	6.30	0.00	0.00	6.30	0.092	9.22	1.696	3.72	10.00	13.72	1.372	11.86	1.86
28	0.2700	6.30	0.00	0.00	6.30	0.096	9.57	1.702	3.70	10.00	13.70	1.370	11.85	1.85
29	0.2800	6.30	0.00	0.00	6.30	0.099	9.93	1.709	3.69	10.00	13.69	1.369	11.84	1.84
30	0.2900	6.30	0.00	0.00	6.30	0.103	10.28	1.716	3.67	10.00	13.67	1.367	11.84	1.84
31	0.3000	6.30	0.00	0.00	6.30	0.106	10.64	1.723	3.66	10.00	13.66	1.366	11.83	1.83
32	0.3100	6.30	0.00	0.00	6.30	0.110	10.99	1.730	3.64	10.00	13.64	1.364	11.82	1.82
33	0.3200	6.50	0.00	0.00	6.50	0.113	11.35	1.736	3.74	10.00	13.74	1.374	11.87	1.87
34	0.3300	6.50	0.00	0.00	6.50	0.117	11.70	1.743	3.73	10.00	13.73	1.373	11.86	1.86
35	0.3400	6.50	0.00	0.00	6.50	0.121	12.06	1.750	3.71	10.00	13.71	1.371	11.86	1.86
36	0.3500	6.50	0.00	0.00	6.50	0.124	12.41	1.758	3.70	10.00	13.70	1.370	11.85	1.85
37	0.3600	6.50	0.00	0.00	6.50	0.128	12.77	1.765	3.68	10.00	13.68	1.368	11.84	1.84
38	0.3700	6.60	0.00	0.00	6.60	0.131	13.12	1.772	3.72	10.00	13.72	1.372	11.86	1.86
39	0.3800	6.60	0.00	0.00	6.60	0.135	13.48	1.779	3.71	10.00	13.71	1.371	11.85	1.85
40	0.3900	6.60	0.00	0.00	6.60	0.138	13.83	1.786	3.69	10.00	13.69	1.369	11.85	1.85
41	0.4000	6.60	0.00	0.00	6.60	0.142	14.18	1.794	3.68	10.00	13.68	1.368	11.84	1.84
42	0.4100	6.60	0.00	0.00	6.60	0.145	14.54	1.801	3.66	10.00	13.66	1.366	11.83	1.83
43	0.4200	6.60	0.00	0.00	6.60	0.149	14.89	1.809	3.65	10.00	13.65	1.365	11.82	1.82
44	0.4300	6.60	0.00	0.00	6.60	0.152	15.25	1.816	3.63	10.00	13.63	1.363	11.82	1.82
45	0.4400	6.60	0.00	0.00	6.60	0.156	15.60	1.824	3.62	10.00	13.62	1.362	11.81	1.81
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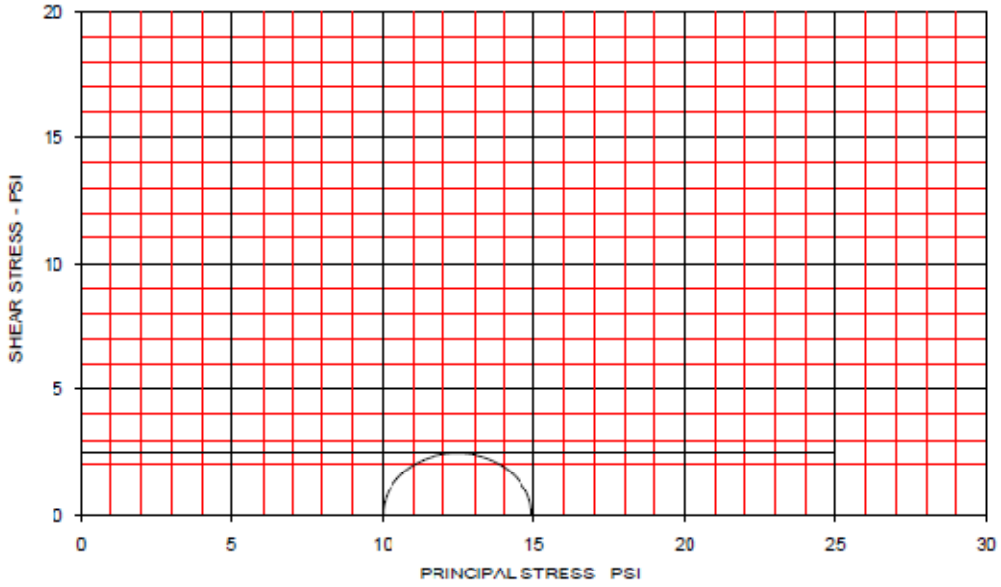
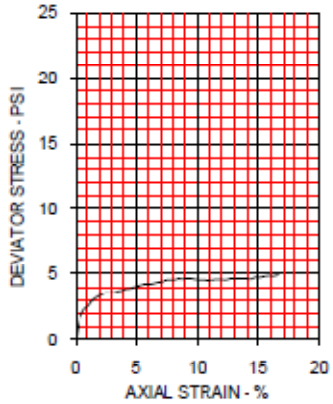
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 2.5 psi		



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	20.2			
Dry Density - pcf	93.9			
Diameter - inches	1.40			
Height - inches	2.83			
AT TEST				
Final Moisture - %	28.2			
Dry Density - pcf	93.9			
Calculated Diameter (in.)	1.40			
Height - inches	2.83			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	4.93			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	18.6			
σ_1 Failure - psi	14.93			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NC: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: LEAN CLAY (CL), very dark grayish brown
SAMPLE LOCATION: B-31, 1-2 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 36 PL: 15 PI: 21 Percent -200: 87
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE UUF-10

UUFS-10-AA533150 -B-31 (1-2).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

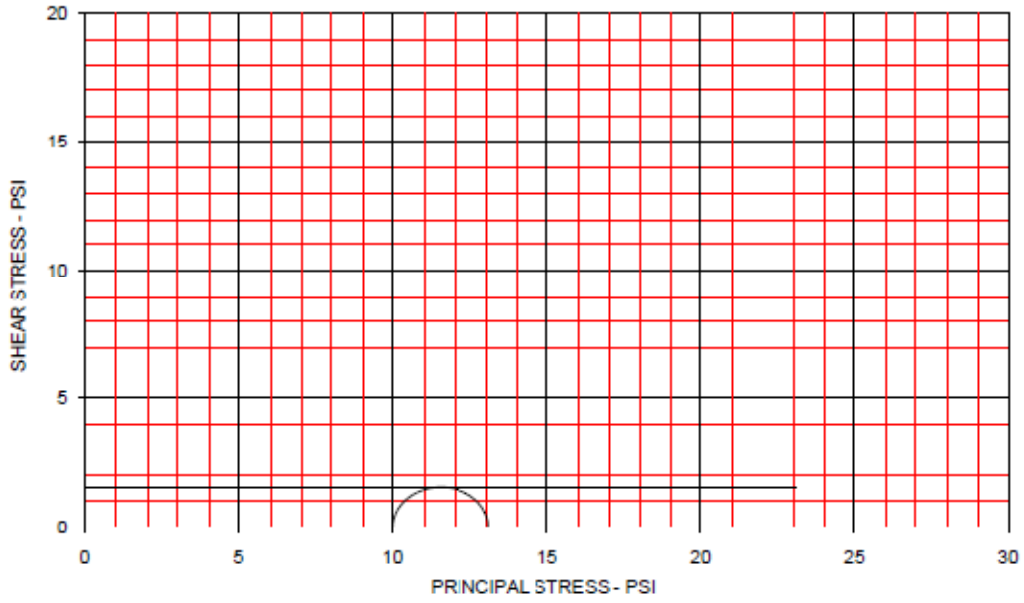
SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), very dark grayish brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

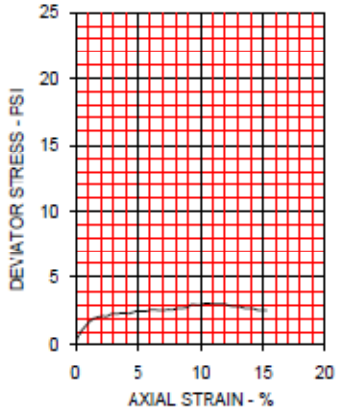
Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.83 in Weight : 137.6 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	2.30	0.00	0.00	2.30	0.004	0.35	1.545	1.49	10.00	11.49	1.149	10.74	0.74
3	0.0200	3.40	0.00	0.00	3.40	0.007	0.71	1.550	2.19	10.00	12.19	1.219	11.10	1.10
4	0.0300	3.90	0.00	0.00	3.90	0.011	1.06	1.556	2.51	10.00	12.51	1.251	11.25	1.25
5	0.0400	4.60	0.00	0.00	4.60	0.014	1.41	1.561	2.95	10.00	12.95	1.295	11.47	1.47
6	0.0500	5.00	0.00	0.00	5.00	0.018	1.77	1.567	3.19	10.00	13.19	1.319	11.60	1.60
7	0.0600	5.30	0.00	0.00	5.30	0.021	2.12	1.573	3.37	10.00	13.37	1.337	11.68	1.68
8	0.0700	5.60	0.00	0.00	5.60	0.025	2.47	1.578	3.55	10.00	13.55	1.355	11.77	1.77
9	0.0800	5.60	0.00	0.00	5.60	0.028	2.83	1.584	3.53	10.00	13.53	1.353	11.77	1.77
10	0.0900	5.70	0.00	0.00	5.70	0.032	3.18	1.590	3.59	10.00	13.59	1.359	11.79	1.79
11	0.1000	5.90	0.00	0.00	5.90	0.035	3.53	1.596	3.70	10.00	13.70	1.370	11.85	1.85
12	0.1100	6.00	0.00	0.00	6.00	0.039	3.89	1.602	3.75	10.00	13.75	1.375	11.87	1.87
13	0.1200	6.20	0.00	0.00	6.20	0.042	4.24	1.608	3.86	10.00	13.86	1.386	11.93	1.93
14	0.1300	6.30	0.00	0.00	6.30	0.046	4.59	1.613	3.90	10.00	13.90	1.390	11.95	1.95
15	0.1400	6.50	0.00	0.00	6.50	0.049	4.95	1.619	4.01	10.00	14.01	1.401	12.01	2.01
16	0.1500	6.70	0.00	0.00	6.70	0.053	5.30	1.626	4.12	10.00	14.12	1.412	12.06	2.06
17	0.1600	6.90	0.00	0.00	6.90	0.057	5.65	1.632	4.23	10.00	14.23	1.423	12.11	2.11
18	0.1700	6.90	0.00	0.00	6.90	0.060	6.01	1.638	4.21	10.00	14.21	1.421	12.11	2.11
19	0.1800	7.00	0.00	0.00	7.00	0.064	6.36	1.644	4.26	10.00	14.26	1.426	12.13	2.13
20	0.1900	7.20	0.00	0.00	7.20	0.067	6.71	1.650	4.36	10.00	14.36	1.436	12.18	2.18
21	0.2000	7.30	0.00	0.00	7.30	0.071	7.07	1.656	4.41	10.00	14.41	1.441	12.20	2.20
22	0.2100	7.50	0.00	0.00	7.50	0.074	7.42	1.663	4.51	10.00	14.51	1.451	12.26	2.26
23	0.2200	7.60	0.00	0.00	7.60	0.078	7.77	1.669	4.55	10.00	14.55	1.455	12.28	2.28
24	0.2300	7.60	0.00	0.00	7.60	0.081	8.13	1.676	4.54	10.00	14.54	1.454	12.27	2.27
25	0.2400	7.80	0.00	0.00	7.80	0.085	8.48	1.682	4.64	10.00	14.64	1.464	12.32	2.32
26	0.2500	7.80	0.00	0.00	7.80	0.088	8.83	1.689	4.62	10.00	14.62	1.462	12.31	2.31
27	0.2600	7.90	0.00	0.00	7.90	0.092	9.19	1.695	4.66	10.00	14.66	1.466	12.33	2.33
28	0.2700	7.90	0.00	0.00	7.90	0.095	9.54	1.702	4.64	10.00	14.64	1.464	12.32	2.32
29	0.2800	7.80	0.00	0.00	7.80	0.099	9.89	1.708	4.57	10.00	14.57	1.457	12.28	2.28
30	0.2900	7.80	0.00	0.00	7.80	0.102	10.25	1.715	4.55	10.00	14.55	1.455	12.27	2.27
31	0.3000	7.80	0.00	0.00	7.80	0.106	10.60	1.722	4.53	10.00	14.53	1.453	12.26	2.26
32	0.3100	7.80	0.00	0.00	7.80	0.110	10.95	1.729	4.51	10.00	14.51	1.451	12.26	2.26
33	0.3200	7.90	0.00	0.00	7.90	0.113	11.31	1.736	4.55	10.00	14.55	1.455	12.28	2.28
34	0.3300	8.00	0.00	0.00	8.00	0.117	11.66	1.743	4.59	10.00	14.59	1.459	12.30	2.30
35	0.3400	8.00	0.00	0.00	8.00	0.120	12.01	1.750	4.57	10.00	14.57	1.457	12.29	2.29
36	0.3500	8.00	0.00	0.00	8.00	0.124	12.37	1.757	4.55	10.00	14.55	1.455	12.28	2.28
37	0.3600	8.20	0.00	0.00	8.20	0.127	12.72	1.764	4.65	10.00	14.65	1.465	12.32	2.32
38	0.3700	8.20	0.00	0.00	8.20	0.131	13.07	1.771	4.63	10.00	14.63	1.463	12.32	2.32
39	0.3800	8.30	0.00	0.00	8.30	0.134	13.43	1.778	4.67	10.00	14.67	1.467	12.33	2.33
40	0.3900	8.30	0.00	0.00	8.30	0.138	13.78	1.785	4.65	10.00	14.65	1.465	12.32	2.32
41	0.4000	8.30	0.00	0.00	8.30	0.141	14.13	1.793	4.63	10.00	14.63	1.463	12.31	2.31
42	0.4100	8.30	0.00	0.00	8.30	0.145	14.49	1.800	4.61	10.00	14.61	1.461	12.31	2.31
43	0.4200	8.60	0.00	0.00	8.60	0.148	14.84	1.808	4.76	10.00	14.76	1.476	12.38	2.38
44	0.4300	8.60	0.00	0.00	8.60	0.152	15.19	1.815	4.74	10.00	14.74	1.474	12.37	2.37
45	0.4400	8.80	0.00	0.00	8.80	0.155	15.55	1.823	4.83	10.00	14.83	1.483	12.41	2.41
46	0.4500	8.90	0.00	0.00	8.90	0.159	15.90	1.830	4.86	10.00	14.86	1.486	12.43	2.43
47	0.4600	8.90	0.00	0.00	8.90	0.163	16.25	1.838	4.84	10.00	14.84	1.484	12.42	2.42
48	0.4700	9.10	0.00	0.00	9.10	0.166	16.61	1.846	4.93	10.00	14.93	1.493	12.46	2.46
49														
50														

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 1.5 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	33.9			
Dry Density - pcf	91.8			
Diameter - inches	1.40			
Heigh: - inches	2.82			
AT TEST				
Final Moisture - %	33.9			
Dry Density - pcf	91.8			
Calculated Diarreter (in.)	1.40			
Heigh: - inches	2.82			
Effect Cell Pressure - psi	10.0			
Failure Stress - psi	3.09			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	10.3			
σ_1 Failure - psi	13.09			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: LEAN CLAY (CL), very dark grayish brown
SAMPLE LOCATION: B-31, 6-7 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 36 PL: 15 PI: 21 Percent -200: 87
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE:UUF.11

UUFS-11-AA533150 -B-31 (6-7).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), very dark grayish brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.82 in Weight : 140.0 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	1.40	0.00	0.00	1.40	0.004	0.35	1.545	0.91	10.00	10.91	1.091	10.45	0.45
3	0.0200	2.10	0.00	0.00	2.10	0.007	0.71	1.550	1.35	10.00	11.35	1.135	10.68	0.68
4	0.0300	2.70	0.00	0.00	2.70	0.011	1.06	1.556	1.74	10.00	11.74	1.174	10.87	0.87
5	0.0400	3.10	0.00	0.00	3.10	0.014	1.42	1.562	1.99	10.00	11.99	1.199	10.99	0.99
6	0.0500	3.30	0.00	0.00	3.30	0.018	1.77	1.567	2.11	10.00	12.11	1.211	11.05	1.05
7	0.0600	3.40	0.00	0.00	3.40	0.021	2.13	1.573	2.16	10.00	12.16	1.216	11.08	1.08
8	0.0700	3.40	0.00	0.00	3.40	0.025	2.48	1.579	2.15	10.00	12.15	1.215	11.08	1.08
9	0.0800	3.70	0.00	0.00	3.70	0.028	2.84	1.584	2.34	10.00	12.34	1.234	11.17	1.17
10	0.0900	3.70	0.00	0.00	3.70	0.032	3.19	1.590	2.33	10.00	12.33	1.233	11.16	1.16
11	0.1000	3.80	0.00	0.00	3.80	0.035	3.55	1.596	2.38	10.00	12.38	1.238	11.19	1.19
12	0.1100	3.80	0.00	0.00	3.80	0.039	3.90	1.602	2.37	10.00	12.37	1.237	11.19	1.19
13	0.1200	3.80	0.00	0.00	3.80	0.043	4.26	1.608	2.36	10.00	12.36	1.236	11.18	1.18
14	0.1300	4.00	0.00	0.00	4.00	0.046	4.61	1.614	2.48	10.00	12.48	1.248	11.24	1.24
15	0.1400	4.10	0.00	0.00	4.10	0.050	4.97	1.620	2.53	10.00	12.53	1.253	11.27	1.27
16	0.1500	4.10	0.00	0.00	4.10	0.053	5.32	1.626	2.52	10.00	12.52	1.252	11.26	1.26
17	0.1600	4.10	0.00	0.00	4.10	0.057	5.68	1.632	2.51	10.00	12.51	1.251	11.26	1.26
18	0.1700	4.30	0.00	0.00	4.30	0.060	6.03	1.638	2.62	10.00	12.62	1.262	11.31	1.31
19	0.1800	4.30	0.00	0.00	4.30	0.064	6.39	1.644	2.61	10.00	12.61	1.261	11.31	1.31
20	0.1900	4.30	0.00	0.00	4.30	0.067	6.74	1.651	2.61	10.00	12.61	1.261	11.30	1.30
21	0.2000	4.30	0.00	0.00	4.30	0.071	7.09	1.657	2.60	10.00	12.60	1.260	11.30	1.30
22	0.2100	4.40	0.00	0.00	4.40	0.074	7.45	1.663	2.65	10.00	12.65	1.265	11.32	1.32
23	0.2200	4.40	0.00	0.00	4.40	0.078	7.80	1.670	2.64	10.00	12.64	1.264	11.32	1.32
24	0.2300	4.60	0.00	0.00	4.60	0.082	8.16	1.676	2.74	10.00	12.74	1.274	11.37	1.37
25	0.2400	4.60	0.00	0.00	4.60	0.085	8.51	1.683	2.73	10.00	12.73	1.273	11.37	1.37
26	0.2500	4.70	0.00	0.00	4.70	0.089	8.87	1.689	2.78	10.00	12.78	1.278	11.39	1.39
27	0.2600	5.10	0.00	0.00	5.10	0.092	9.22	1.696	3.01	10.00	13.01	1.301	11.50	1.50
28	0.2700	5.10	0.00	0.00	5.10	0.096	9.58	1.702	3.00	10.00	13.00	1.300	11.50	1.50
29	0.2800	5.10	0.00	0.00	5.10	0.099	9.93	1.709	2.98	10.00	12.98	1.298	11.49	1.49
30	0.2900	5.30	0.00	0.00	5.30	0.103	10.29	1.716	3.09	10.00	13.09	1.309	11.54	1.54
31	0.3000	5.30	0.00	0.00	5.30	0.106	10.64	1.723	3.08	10.00	13.08	1.308	11.54	1.54
32	0.3100	5.30	0.00	0.00	5.30	0.110	11.00	1.730	3.06	10.00	13.06	1.306	11.53	1.53
33	0.3200	5.30	0.00	0.00	5.30	0.114	11.35	1.736	3.05	10.00	13.05	1.305	11.53	1.53
34	0.3300	5.30	0.00	0.00	5.30	0.117	11.71	1.743	3.04	10.00	13.04	1.304	11.52	1.52
35	0.3400	5.30	0.00	0.00	5.30	0.121	12.06	1.751	3.03	10.00	13.03	1.303	11.51	1.51
36	0.3500	5.10	0.00	0.00	5.10	0.124	12.42	1.758	2.90	10.00	12.90	1.290	11.45	1.45
37	0.3600	5.10	0.00	0.00	5.10	0.128	12.77	1.765	2.89	10.00	12.89	1.289	11.44	1.44
38	0.3700	5.10	0.00	0.00	5.10	0.131	13.13	1.772	2.88	10.00	12.88	1.288	11.44	1.44
39	0.3800	4.90	0.00	0.00	4.90	0.135	13.48	1.779	2.75	10.00	12.75	1.275	11.38	1.38
40	0.3900	4.90	0.00	0.00	4.90	0.138	13.83	1.787	2.74	10.00	12.74	1.274	11.37	1.37
41	0.4000	4.90	0.00	0.00	4.90	0.142	14.19	1.794	2.73	10.00	12.73	1.273	11.37	1.37
42	0.4100	4.70	0.00	0.00	4.70	0.145	14.54	1.801	2.61	10.00	12.61	1.261	11.30	1.30
43	0.4200	4.70	0.00	0.00	4.70	0.149	14.90	1.809	2.60	10.00	12.60	1.260	11.30	1.30
44	0.4300	4.70	0.00	0.00	4.70	0.153	15.25	1.816	2.59	10.00	12.59	1.259	11.29	1.29
45														
46														
47														
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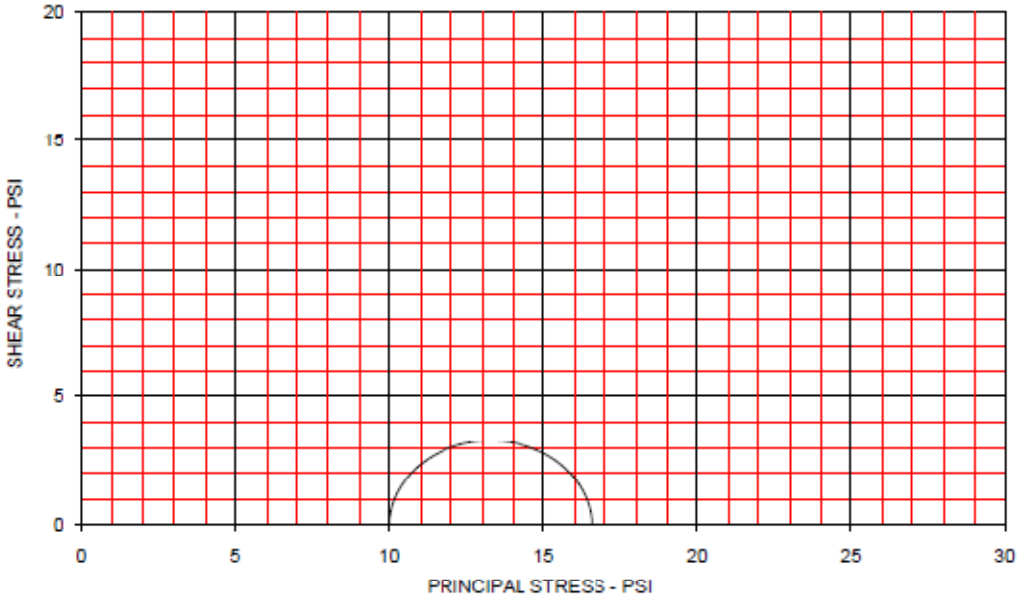
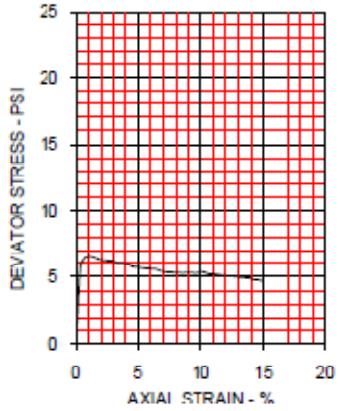
49														
50														

TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 3.3 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	24.7			
Dry Density - pcf	97.5			
Diameter - inches	1.40			
Height - inches	2.81			
AT TEST				
Final Moisture - %	24.7			
Dry Density - pcf	97.5			
Calculated Diameter (in.)	1.40			
Height - inches	2.81			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	6.56			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	1.1			
σ_1 Failure - psi	16.56			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NC: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-31, 28-29 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 30 PL: 11 PI: 19 Percent -200: 80
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-6-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL

PLATE:UUF.12

UUFS-12-AA533150 -B-31 (28-29).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), dark yellowish brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.81 in Weight : 138.0 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	8.90	0.00	0.00	8.90	0.004	0.36	1.545	5.76	10.00	15.76	1.576	12.88	2.88
3	0.0200	10.00	0.00	0.00	10.00	0.007	0.71	1.550	6.45	10.00	16.45	1.645	13.22	3.22
4	0.0300	10.20	0.00	0.00	10.20	0.011	1.07	1.556	6.56	10.00	16.56	1.656	13.28	3.28
5	0.0400	10.10	0.00	0.00	10.10	0.014	1.42	1.562	6.47	10.00	16.47	1.647	13.23	3.23
6	0.0500	9.90	0.00	0.00	9.90	0.018	1.78	1.567	6.32	10.00	16.32	1.632	13.16	3.16
7	0.0600	9.80	0.00	0.00	9.80	0.021	2.14	1.573	6.23	10.00	16.23	1.623	13.12	3.12
8	0.0700	9.80	0.00	0.00	9.80	0.025	2.49	1.579	6.21	10.00	16.21	1.621	13.10	3.10
9	0.0800	9.80	0.00	0.00	9.80	0.028	2.85	1.584	6.18	10.00	16.18	1.618	13.09	3.09
10	0.0900	9.60	0.00	0.00	9.60	0.032	3.20	1.590	6.04	10.00	16.04	1.604	13.02	3.02
11	0.1000	9.60	0.00	0.00	9.60	0.036	3.56	1.596	6.01	10.00	16.01	1.601	13.01	3.01
12	0.1100	9.60	0.00	0.00	9.60	0.039	3.91	1.602	5.99	10.00	15.99	1.599	13.00	3.00
13	0.1200	9.50	0.00	0.00	9.50	0.043	4.27	1.608	5.91	10.00	15.91	1.591	12.95	2.95
14	0.1300	9.30	0.00	0.00	9.30	0.046	4.63	1.614	5.76	10.00	15.76	1.576	12.88	2.88
15	0.1400	9.30	0.00	0.00	9.30	0.050	4.98	1.620	5.74	10.00	15.74	1.574	12.87	2.87
16	0.1500	9.20	0.00	0.00	9.20	0.053	5.34	1.626	5.66	10.00	15.66	1.566	12.83	2.83
17	0.1600	9.20	0.00	0.00	9.20	0.057	5.69	1.632	5.64	10.00	15.64	1.564	12.82	2.82
18	0.1700	9.20	0.00	0.00	9.20	0.060	6.05	1.639	5.61	10.00	15.61	1.561	12.81	2.81
19	0.1800	9.20	0.00	0.00	9.20	0.064	6.41	1.645	5.59	10.00	15.59	1.559	12.80	2.80
20	0.1900	9.00	0.00	0.00	9.00	0.068	6.76	1.651	5.45	10.00	15.45	1.545	12.73	2.73
21	0.2000	8.90	0.00	0.00	8.90	0.071	7.12	1.657	5.37	10.00	15.37	1.537	12.69	2.69
22	0.2100	8.90	0.00	0.00	8.90	0.075	7.47	1.664	5.35	10.00	15.35	1.535	12.67	2.67
23	0.2200	8.90	0.00	0.00	8.90	0.078	7.83	1.670	5.33	10.00	15.33	1.533	12.66	2.66
24	0.2300	8.90	0.00	0.00	8.90	0.082	8.19	1.677	5.31	10.00	15.31	1.531	12.65	2.65
25	0.2400	8.90	0.00	0.00	8.90	0.085	8.54	1.683	5.29	10.00	15.29	1.529	12.64	2.64
26	0.2500	9.00	0.00	0.00	9.00	0.089	8.90	1.690	5.33	10.00	15.33	1.533	12.66	2.66
27	0.2600	9.00	0.00	0.00	9.00	0.093	9.25	1.696	5.31	10.00	15.31	1.531	12.65	2.65
28	0.2700	9.00	0.00	0.00	9.00	0.096	9.61	1.703	5.28	10.00	15.28	1.528	12.64	2.64
29	0.2800	9.20	0.00	0.00	9.20	0.100	9.96	1.710	5.38	10.00	15.38	1.538	12.69	2.69
30	0.2900	9.20	0.00	0.00	9.20	0.103	10.32	1.717	5.36	10.00	15.36	1.536	12.68	2.68
31	0.3000	9.00	0.00	0.00	9.00	0.107	10.68	1.723	5.22	10.00	15.22	1.522	12.61	2.61
32	0.3100	9.00	0.00	0.00	9.00	0.110	11.03	1.730	5.20	10.00	15.20	1.520	12.60	2.60
33	0.3200	9.00	0.00	0.00	9.00	0.114	11.39	1.737	5.18	10.00	15.18	1.518	12.59	2.59
34	0.3300	8.90	0.00	0.00	8.90	0.117	11.74	1.744	5.10	10.00	15.10	1.510	12.55	2.55
35	0.3400	8.90	0.00	0.00	8.90	0.121	12.10	1.751	5.08	10.00	15.08	1.508	12.54	2.54
36	0.3500	8.90	0.00	0.00	8.90	0.125	12.46	1.758	5.06	10.00	15.06	1.506	12.53	2.53
37	0.3600	8.90	0.00	0.00	8.90	0.128	12.81	1.766	5.04	10.00	15.04	1.504	12.52	2.52
38	0.3700	8.80	0.00	0.00	8.80	0.132	13.17	1.773	4.96	10.00	14.96	1.496	12.48	2.48
39	0.3800	8.80	0.00	0.00	8.80	0.135	13.52	1.780	4.94	10.00	14.94	1.494	12.47	2.47
40	0.3900	8.80	0.00	0.00	8.80	0.139	13.88	1.787	4.92	10.00	14.92	1.492	12.46	2.46
41	0.4000	8.60	0.00	0.00	8.60	0.142	14.23	1.795	4.79	10.00	14.79	1.479	12.40	2.40
42	0.4100	8.60	0.00	0.00	8.60	0.146	14.59	1.802	4.77	10.00	14.77	1.477	12.39	2.39
43	0.4200	8.50	0.00	0.00	8.50	0.149	14.95	1.810	4.70	10.00	14.70	1.470	12.35	2.35
44														
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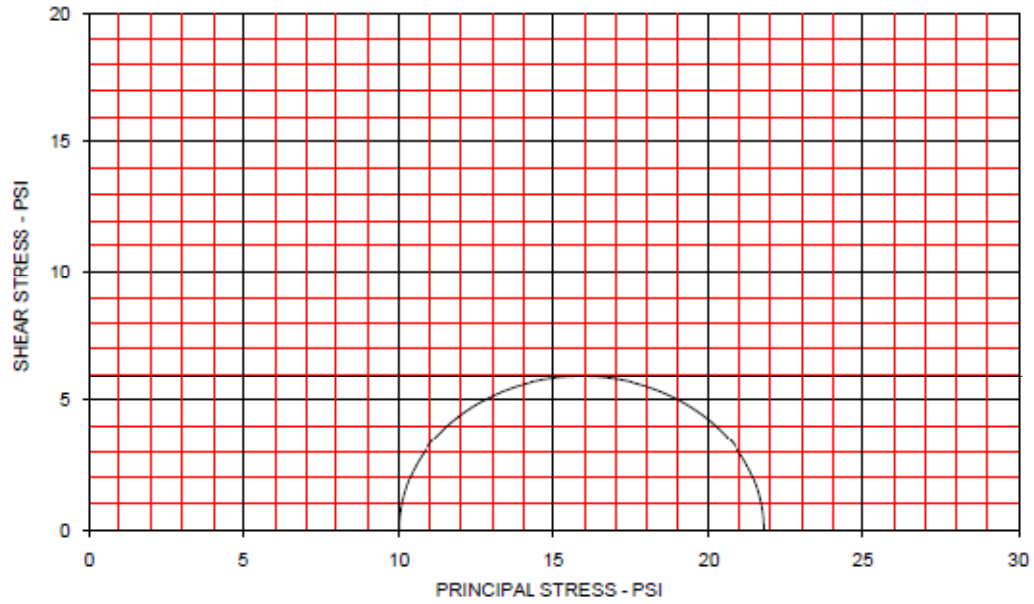
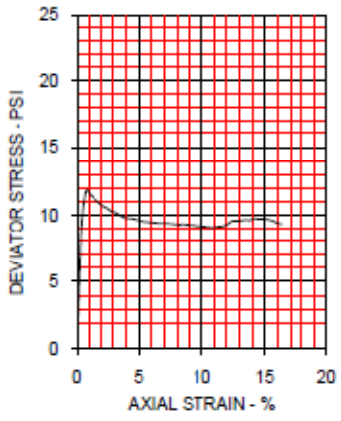
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 5.9 psi



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	25.6			
Dry Density - pcf	98.6			
Diameter - inches	1.40			
Height - inches	2.82			
AT TEST				
Final Moisture - %	25.6			
Dry Density - pcf	98.6			
Calculated Diameter (in)	1.40			
Height - inches	2.82			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	11.80			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	0.7			
σ_1 Failure - ps	21.80			
σ_3 Failure - ps	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-32, 1-3 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 38 PL: 12 PI: 26 Percent -200: 83
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE:UUF.13

UUFS-13-AA533150 -B-32 (1-3).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), dark yellowish brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.82 in Weight : 141.1 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	14.20	0.00	0.00	14.20	0.004	0.35	1.545	9.19	10.00	19.19	1.919	14.60	4.60
3	0.0200	18.30	0.00	0.00	18.30	0.007	0.71	1.550	11.80	10.00	21.80	2.180	15.90	5.90
4	0.0300	17.90	0.00	0.00	17.90	0.011	1.06	1.556	11.50	10.00	21.50	2.150	15.75	5.75
5	0.0400	17.50	0.00	0.00	17.50	0.014	1.42	1.562	11.21	10.00	21.21	2.121	15.60	5.60
6	0.0500	17.20	0.00	0.00	17.20	0.018	1.77	1.567	10.98	10.00	20.98	2.098	15.49	5.49
7	0.0600	16.80	0.00	0.00	16.80	0.021	2.13	1.573	10.68	10.00	20.68	2.068	15.34	5.34
8	0.0700	16.60	0.00	0.00	16.60	0.025	2.48	1.579	10.52	10.00	20.52	2.052	15.26	5.26
9	0.0800	16.30	0.00	0.00	16.30	0.028	2.84	1.584	10.29	10.00	20.29	2.029	15.14	5.14
10	0.0900	16.20	0.00	0.00	16.20	0.032	3.19	1.590	10.19	10.00	20.19	2.019	15.09	5.09
11	0.1000	15.90	0.00	0.00	15.90	0.035	3.55	1.596	9.96	10.00	19.96	1.996	14.98	4.98
12	0.1100	15.70	0.00	0.00	15.70	0.039	3.90	1.602	9.80	10.00	19.80	1.980	14.90	4.90
13	0.1200	15.70	0.00	0.00	15.70	0.043	4.26	1.608	9.76	10.00	19.76	1.976	14.88	4.88
14	0.1300	15.70	0.00	0.00	15.70	0.046	4.61	1.614	9.73	10.00	19.73	1.973	14.86	4.86
15	0.1400	15.60	0.00	0.00	15.60	0.050	4.97	1.620	9.63	10.00	19.63	1.963	14.82	4.82
16	0.1500	15.50	0.00	0.00	15.50	0.053	5.32	1.626	9.53	10.00	19.53	1.953	14.77	4.77
17	0.1600	15.50	0.00	0.00	15.50	0.057	5.68	1.632	9.50	10.00	19.50	1.950	14.75	4.75
18	0.1700	15.50	0.00	0.00	15.50	0.060	6.03	1.638	9.46	10.00	19.46	1.946	14.73	4.73
19	0.1800	15.50	0.00	0.00	15.50	0.064	6.39	1.644	9.43	10.00	19.43	1.943	14.71	4.71
20	0.1900	15.50	0.00	0.00	15.50	0.067	6.74	1.651	9.39	10.00	19.39	1.939	14.70	4.70
21	0.2000	15.60	0.00	0.00	15.60	0.071	7.09	1.657	9.41	10.00	19.41	1.941	14.71	4.71
22	0.2100	15.60	0.00	0.00	15.60	0.074	7.45	1.663	9.38	10.00	19.38	1.938	14.69	4.69
23	0.2200	15.60	0.00	0.00	15.60	0.078	7.80	1.670	9.34	10.00	19.34	1.934	14.67	4.67
24	0.2300	15.60	0.00	0.00	15.60	0.082	8.16	1.676	9.31	10.00	19.31	1.931	14.65	4.65
25	0.2400	15.70	0.00	0.00	15.70	0.085	8.51	1.683	9.33	10.00	19.33	1.933	14.67	4.67
26	0.2500	15.70	0.00	0.00	15.70	0.089	8.87	1.689	9.29	10.00	19.29	1.929	14.65	4.65
27	0.2600	15.70	0.00	0.00	15.70	0.092	9.22	1.696	9.26	10.00	19.26	1.926	14.63	4.63
28	0.2700	15.70	0.00	0.00	15.70	0.096	9.58	1.702	9.22	10.00	19.22	1.922	14.61	4.61
29	0.2800	15.70	0.00	0.00	15.70	0.099	9.93	1.709	9.19	10.00	19.19	1.919	14.59	4.59
30	0.2900	15.70	0.00	0.00	15.70	0.103	10.29	1.716	9.15	10.00	19.15	1.915	14.57	4.57
31	0.3000	15.70	0.00	0.00	15.70	0.106	10.64	1.723	9.11	10.00	19.11	1.911	14.56	4.56
32	0.3100	15.70	0.00	0.00	15.70	0.110	11.00	1.730	9.08	10.00	19.08	1.908	14.54	4.54
33	0.3200	15.90	0.00	0.00	15.90	0.114	11.35	1.736	9.16	10.00	19.16	1.916	14.58	4.58
34	0.3300	16.00	0.00	0.00	16.00	0.117	11.71	1.743	9.18	10.00	19.18	1.918	14.59	4.59
35	0.3400	16.30	0.00	0.00	16.30	0.121	12.06	1.751	9.31	10.00	19.31	1.931	14.66	4.66
36	0.3500	16.80	0.00	0.00	16.80	0.124	12.42	1.758	9.56	10.00	19.56	1.956	14.78	4.78
37	0.3600	16.90	0.00	0.00	16.90	0.128	12.77	1.765	9.58	10.00	19.58	1.958	14.79	4.79
38	0.3700	17.00	0.00	0.00	17.00	0.131	13.13	1.772	9.59	10.00	19.59	1.959	14.80	4.80
39	0.3800	17.20	0.00	0.00	17.20	0.135	13.48	1.779	9.67	10.00	19.67	1.967	14.83	4.83
40	0.3900	17.20	0.00	0.00	17.20	0.138	13.83	1.787	9.63	10.00	19.63	1.963	14.81	4.81
41	0.4000	17.50	0.00	0.00	17.50	0.142	14.19	1.794	9.76	10.00	19.76	1.976	14.88	4.88
42	0.4100	17.50	0.00	0.00	17.50	0.145	14.54	1.801	9.71	10.00	19.71	1.971	14.86	4.86
43	0.4200	17.60	0.00	0.00	17.60	0.149	14.90	1.809	9.73	10.00	19.73	1.973	14.86	4.86
44	0.4300	17.60	0.00	0.00	17.60	0.153	15.25	1.816	9.69	10.00	19.69	1.969	14.84	4.84
45	0.4400	17.50	0.00	0.00	17.50	0.156	15.61	1.824	9.59	10.00	19.59	1.959	14.80	4.80
46	0.4500	17.30	0.00	0.00	17.30	0.160	15.96	1.832	9.44	10.00	19.44	1.944	14.72	4.72
47	0.4600	17.20	0.00	0.00	17.20	0.163	16.32	1.840	9.35	10.00	19.35	1.935	14.68	4.68
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49														
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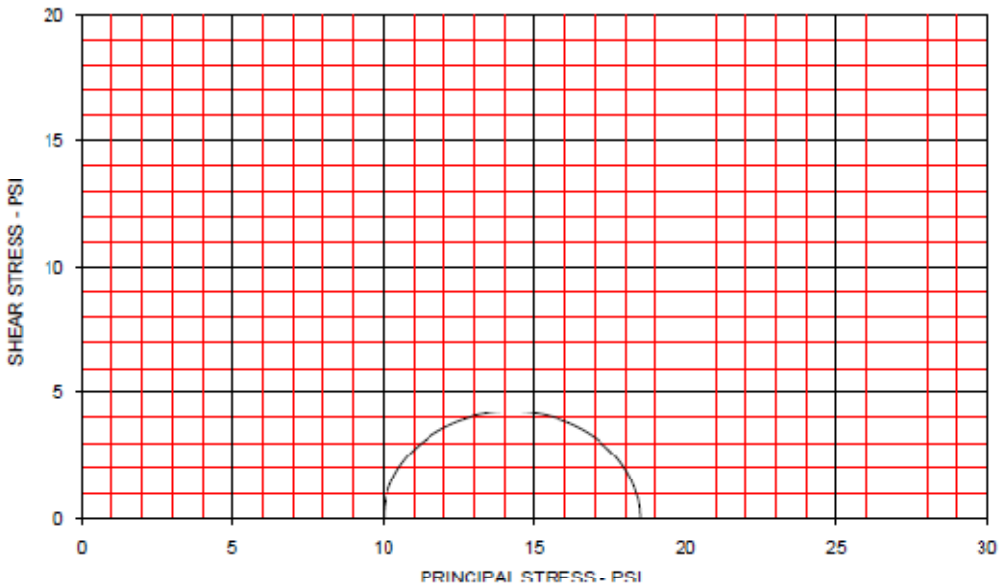
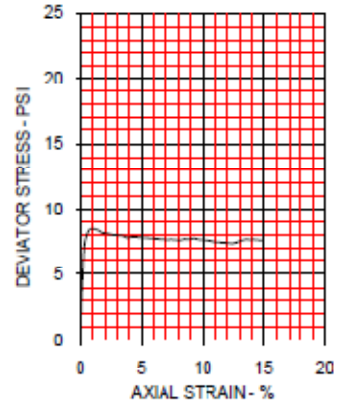
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 4.2 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	25.3			
Dry Density - pcf	99.8			
Diameter - inches	1.40			
Height - inches	2.82			
AT TEST				
Final Moisture - %	25.3			
Dry Density - pcf	99.8			
Calculated Diameter (in.)	1.40			
Height - inches	2.82			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	8.40			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	1.1			
σ_1 Failure - psi	18.48			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-32, 3-5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 38 PL: 12 PI: 26 Percent -200: 83
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE:UUF.14

UUFS-14-AA533150 -B-32 (3-5).dsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), dark yellowish brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.82 in Weight : 142.4 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	11.10	0.00	0.00	11.10	0.004	0.35	1.545	7.19	10.00	17.19	1.719	13.59	3.59
3	0.0200	13.00	0.00	0.00	13.00	0.007	0.71	1.550	8.39	10.00	18.39	1.839	14.19	4.19
4	0.0300	13.20	0.00	0.00	13.20	0.011	1.06	1.556	8.48	10.00	18.48	1.848	14.24	4.24
5	0.0400	13.10	0.00	0.00	13.10	0.014	1.42	1.562	8.39	10.00	18.39	1.839	14.19	4.19
6	0.0500	12.80	0.00	0.00	12.80	0.018	1.77	1.567	8.17	10.00	18.17	1.817	14.08	4.08
7	0.0600	12.80	0.00	0.00	12.80	0.021	2.13	1.573	8.14	10.00	18.14	1.814	14.07	4.07
8	0.0700	12.70	0.00	0.00	12.70	0.025	2.48	1.579	8.05	10.00	18.05	1.805	14.02	4.02
9	0.0800	12.70	0.00	0.00	12.70	0.028	2.84	1.584	8.02	10.00	18.02	1.802	14.01	4.01
10	0.0900	12.70	0.00	0.00	12.70	0.032	3.19	1.590	7.99	10.00	17.99	1.799	13.99	3.99
11	0.1000	12.70	0.00	0.00	12.70	0.035	3.55	1.596	7.96	10.00	17.96	1.796	13.98	3.98
12	0.1100	12.50	0.00	0.00	12.50	0.039	3.90	1.602	7.80	10.00	17.80	1.780	13.90	3.90
13	0.1200	12.70	0.00	0.00	12.70	0.043	4.26	1.608	7.90	10.00	17.90	1.790	13.95	3.95
14	0.1300	12.70	0.00	0.00	12.70	0.046	4.61	1.614	7.87	10.00	17.87	1.787	13.93	3.93
15	0.1400	12.70	0.00	0.00	12.70	0.050	4.97	1.620	7.84	10.00	17.84	1.784	13.92	3.92
16	0.1500	12.70	0.00	0.00	12.70	0.053	5.32	1.626	7.81	10.00	17.81	1.781	13.91	3.91
17	0.1600	12.70	0.00	0.00	12.70	0.057	5.68	1.632	7.78	10.00	17.78	1.778	13.89	3.89
18	0.1700	12.70	0.00	0.00	12.70	0.060	6.03	1.638	7.75	10.00	17.75	1.775	13.88	3.88
19	0.1800	12.70	0.00	0.00	12.70	0.064	6.39	1.644	7.72	10.00	17.72	1.772	13.86	3.86
20	0.1900	12.70	0.00	0.00	12.70	0.067	6.74	1.651	7.69	10.00	17.69	1.769	13.85	3.85
21	0.2000	12.70	0.00	0.00	12.70	0.071	7.09	1.657	7.66	10.00	17.66	1.766	13.83	3.83
22	0.2100	12.80	0.00	0.00	12.80	0.074	7.45	1.663	7.70	10.00	17.70	1.770	13.85	3.85
23	0.2200	12.80	0.00	0.00	12.80	0.078	7.80	1.670	7.67	10.00	17.67	1.767	13.83	3.83
24	0.2300	12.80	0.00	0.00	12.80	0.082	8.16	1.676	7.64	10.00	17.64	1.764	13.82	3.82
25	0.2400	13.00	0.00	0.00	13.00	0.085	8.51	1.683	7.73	10.00	17.73	1.773	13.86	3.86
26	0.2500	13.00	0.00	0.00	13.00	0.089	8.87	1.689	7.70	10.00	17.70	1.770	13.85	3.85
27	0.2600	13.20	0.00	0.00	13.20	0.092	9.22	1.696	7.78	10.00	17.78	1.778	13.89	3.89
28	0.2700	13.10	0.00	0.00	13.10	0.096	9.58	1.702	7.69	10.00	17.69	1.769	13.85	3.85
29	0.2800	13.10	0.00	0.00	13.10	0.099	9.93	1.709	7.66	10.00	17.66	1.766	13.83	3.83
30	0.2900	13.10	0.00	0.00	13.10	0.103	10.29	1.716	7.63	10.00	17.63	1.763	13.82	3.82
31	0.3000	13.10	0.00	0.00	13.10	0.106	10.64	1.723	7.60	10.00	17.60	1.760	13.80	3.80
32	0.3100	13.00	0.00	0.00	13.00	0.110	11.00	1.730	7.52	10.00	17.52	1.752	13.76	3.76
33	0.3200	13.00	0.00	0.00	13.00	0.114	11.35	1.736	7.49	10.00	17.49	1.749	13.74	3.74
34	0.3300	13.00	0.00	0.00	13.00	0.117	11.71	1.743	7.46	10.00	17.46	1.746	13.73	3.73
35	0.3400	13.00	0.00	0.00	13.00	0.121	12.06	1.751	7.43	10.00	17.43	1.743	13.71	3.71
36	0.3500	13.00	0.00	0.00	13.00	0.124	12.42	1.758	7.40	10.00	17.40	1.740	13.70	3.70
37	0.3600	13.20	0.00	0.00	13.20	0.128	12.77	1.765	7.48	10.00	17.48	1.748	13.74	3.74
38	0.3700	13.50	0.00	0.00	13.50	0.131	13.13	1.772	7.62	10.00	17.62	1.762	13.81	3.81
39	0.3800	13.70	0.00	0.00	13.70	0.135	13.48	1.779	7.70	10.00	17.70	1.770	13.85	3.85
40	0.3900	13.70	0.00	0.00	13.70	0.138	13.83	1.787	7.67	10.00	17.67	1.767	13.83	3.83
41	0.4000	13.80	0.00	0.00	13.80	0.142	14.19	1.794	7.69	10.00	17.69	1.769	13.85	3.85
42	0.4100	13.80	0.00	0.00	13.80	0.145	14.54	1.801	7.66	10.00	17.66	1.766	13.83	3.83
43	0.4200	13.80	0.00	0.00	13.80	0.149	14.90	1.809	7.63	10.00	17.63	1.763	13.81	3.81
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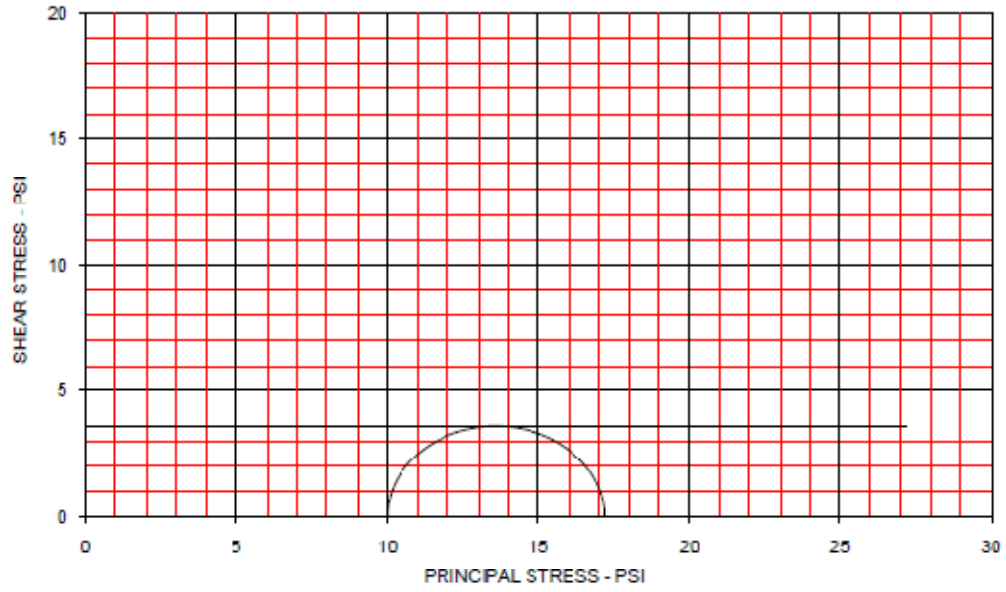
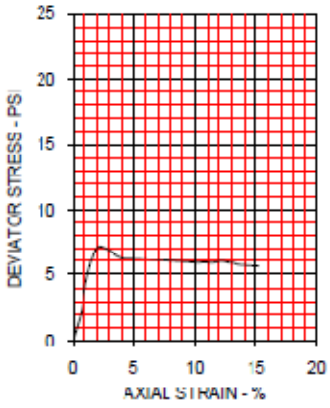
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 3.6 psi		
SPECIMEN NO.	1	2	3	4
	INITIAL			
Moisture Content - %	26.7			
Dry Density - pcf	96.0			
Diameter - inches	1.40			
Height - inches	2.32			
	AT TEST			
Final Moisture - %	26.7			
Dry Density - pcf	96.0			
Calculated Diameter (in.)	1.40			
Height - inches	2.32			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	7.18			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	2.1			
σ_1 Failure - psi	17.18			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: LEAN CLAY (CL), dark yellowish brown
SAMPLE LOCATION: B-34, 3-4 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 39 PL: 12 PI: 27 Percent -200: 86
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE:UUF.15

UUFS-15-AA533150 -E-34 (3-5).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), dark yellowish brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.82 in Weight : 141.5 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	1.70	0.00	0.00	1.70	0.004	0.35	1.545	1.10	10.00	11.10	1.110	10.55	0.55
3	0.0200	3.50	0.00	0.00	3.50	0.007	0.71	1.550	2.26	10.00	12.26	1.226	11.13	1.13
4	0.0300	6.60	0.00	0.00	6.60	0.011	1.06	1.556	4.24	10.00	14.24	1.424	12.12	2.12
5	0.0400	8.80	0.00	0.00	8.80	0.014	1.42	1.562	5.64	10.00	15.64	1.564	12.82	2.82
6	0.0500	10.50	0.00	0.00	10.50	0.018	1.77	1.567	6.70	10.00	16.70	1.670	13.35	3.35
7	0.0600	11.30	0.00	0.00	11.30	0.021	2.13	1.573	7.18	10.00	17.18	1.718	13.59	3.59
8	0.0700	11.30	0.00	0.00	11.30	0.025	2.48	1.579	7.16	10.00	17.16	1.716	13.58	3.58
9	0.0800	11.10	0.00	0.00	11.10	0.028	2.84	1.584	7.01	10.00	17.01	1.701	13.50	3.50
10	0.0900	10.80	0.00	0.00	10.80	0.032	3.19	1.590	6.79	10.00	16.79	1.679	13.40	3.40
11	0.1000	10.40	0.00	0.00	10.40	0.035	3.55	1.596	6.52	10.00	16.52	1.652	13.26	3.26
12	0.1100	10.20	0.00	0.00	10.20	0.039	3.90	1.602	6.37	10.00	16.37	1.637	13.18	3.18
13	0.1200	10.10	0.00	0.00	10.10	0.043	4.26	1.608	6.28	10.00	16.28	1.628	13.14	3.14
14	0.1300	10.20	0.00	0.00	10.20	0.046	4.61	1.614	6.32	10.00	16.32	1.632	13.16	3.16
15	0.1400	10.20	0.00	0.00	10.20	0.050	4.97	1.620	6.30	10.00	16.30	1.630	13.15	3.15
16	0.1500	10.20	0.00	0.00	10.20	0.053	5.32	1.626	6.27	10.00	16.27	1.627	13.14	3.14
17	0.1600	10.20	0.00	0.00	10.20	0.057	5.68	1.632	6.25	10.00	16.25	1.625	13.12	3.12
18	0.1700	10.20	0.00	0.00	10.20	0.060	6.03	1.638	6.23	10.00	16.23	1.623	13.11	3.11
19	0.1800	10.10	0.00	0.00	10.10	0.064	6.39	1.644	6.14	10.00	16.14	1.614	13.07	3.07
20	0.1900	10.10	0.00	0.00	10.10	0.067	6.74	1.651	6.12	10.00	16.12	1.612	13.06	3.06
21	0.2000	10.10	0.00	0.00	10.10	0.071	7.09	1.657	6.10	10.00	16.10	1.610	13.05	3.05
22	0.2100	10.10	0.00	0.00	10.10	0.074	7.45	1.663	6.07	10.00	16.07	1.607	13.04	3.04
23	0.2200	10.10	0.00	0.00	10.10	0.078	7.80	1.670	6.05	10.00	16.05	1.605	13.02	3.02
24	0.2300	10.10	0.00	0.00	10.10	0.082	8.16	1.676	6.03	10.00	16.03	1.603	13.01	3.01
25	0.2400	10.10	0.00	0.00	10.10	0.085	8.51	1.683	6.00	10.00	16.00	1.600	13.00	3.00
26	0.2500	10.10	0.00	0.00	10.10	0.089	8.87	1.689	5.98	10.00	15.98	1.598	12.99	2.99
27	0.2600	10.10	0.00	0.00	10.10	0.092	9.22	1.696	5.96	10.00	15.96	1.596	12.98	2.98
28	0.2700	10.10	0.00	0.00	10.10	0.096	9.58	1.702	5.93	10.00	15.93	1.593	12.97	2.97
29	0.2800	10.10	0.00	0.00	10.10	0.099	9.93	1.709	5.91	10.00	15.91	1.591	12.95	2.95
30	0.2900	10.10	0.00	0.00	10.10	0.103	10.29	1.716	5.89	10.00	15.89	1.589	12.94	2.94
31	0.3000	10.20	0.00	0.00	10.20	0.106	10.64	1.723	5.92	10.00	15.92	1.592	12.96	2.96
32	0.3100	10.20	0.00	0.00	10.20	0.110	11.00	1.730	5.90	10.00	15.90	1.590	12.95	2.95
33	0.3200	10.20	0.00	0.00	10.20	0.114	11.35	1.736	5.87	10.00	15.87	1.587	12.94	2.94
34	0.3300	10.30	0.00	0.00	10.30	0.117	11.71	1.743	5.91	10.00	15.91	1.591	12.95	2.95
35	0.3400	10.50	0.00	0.00	10.50	0.121	12.06	1.751	6.00	10.00	16.00	1.600	13.00	3.00
36	0.3500	10.50	0.00	0.00	10.50	0.124	12.42	1.758	5.97	10.00	15.97	1.597	12.99	2.99
37	0.3600	10.40	0.00	0.00	10.40	0.128	12.77	1.765	5.89	10.00	15.89	1.589	12.95	2.95
38	0.3700	10.40	0.00	0.00	10.40	0.131	13.13	1.772	5.87	10.00	15.87	1.587	12.93	2.93
39	0.3800	10.20	0.00	0.00	10.20	0.135	13.48	1.779	5.73	10.00	15.73	1.573	12.87	2.87
40	0.3900	10.20	0.00	0.00	10.20	0.138	13.83	1.787	5.71	10.00	15.71	1.571	12.85	2.85
41	0.4000	10.20	0.00	0.00	10.20	0.142	14.19	1.794	5.69	10.00	15.69	1.569	12.84	2.84
42	0.4100	10.20	0.00	0.00	10.20	0.145	14.54	1.801	5.66	10.00	15.66	1.566	12.83	2.83
43	0.4200	10.20	0.00	0.00	10.20	0.149	14.90	1.809	5.64	10.00	15.64	1.564	12.82	2.82
44	0.4300	10.20	0.00	0.00	10.20	0.153	15.25	1.816	5.62	10.00	15.62	1.562	12.81	2.81
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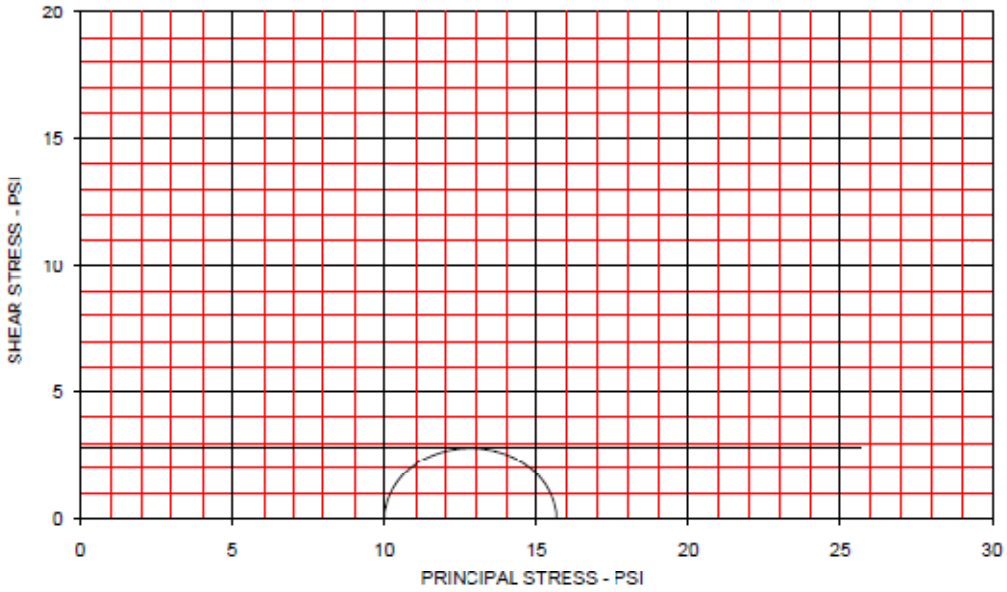
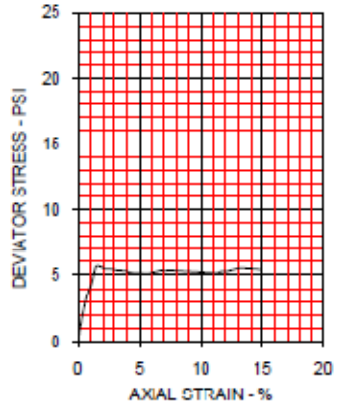
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg		c = 2.8 psi		
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	24.8			
Dry Density - pcf	97.9			
Diameter - inches	1.40			
Height - inches	2.82			
AT TEST				
Final Moisture - %	24.8			
Dry Density - pcf	97.9			
Calculated Diameter (in.)	1.40			
Height - inches	2.82			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	5.64			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	1.4			
σ_1 Failure - psi	15.64			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: LEAN CLAY (CL), dark brown
SAMPLE LOCATION: B-34, 4-5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 39 PL: 12 PI: 27 Percent -200: 86
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE:UUF.16

UUFS-16-AA533150 -B-34 (4-5).dsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: LEAN CLAY (CL), dark brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.82 in Weight : 139.0 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	3.00	0.00	0.00	3.00	0.004	0.36	1.545	1.94	10.00	11.94	1.194	10.97	0.97
3	0.0200	5.30	0.00	0.00	5.30	0.007	0.71	1.550	3.42	10.00	13.42	1.342	11.71	1.71
4	0.0300	6.80	0.00	0.00	6.80	0.011	1.07	1.556	4.37	10.00	14.37	1.437	12.19	2.19
5	0.0400	8.80	0.00	0.00	8.80	0.014	1.42	1.562	5.64	10.00	15.64	1.564	12.82	2.82
6	0.0500	8.80	0.00	0.00	8.80	0.018	1.78	1.567	5.62	10.00	15.62	1.562	12.81	2.81
7	0.0600	8.60	0.00	0.00	8.60	0.021	2.13	1.573	5.47	10.00	15.47	1.547	12.73	2.73
8	0.0700	8.60	0.00	0.00	8.60	0.025	2.49	1.579	5.45	10.00	15.45	1.545	12.72	2.72
9	0.0800	8.60	0.00	0.00	8.60	0.028	2.84	1.584	5.43	10.00	15.43	1.543	12.71	2.71
10	0.0900	8.50	0.00	0.00	8.50	0.032	3.20	1.590	5.35	10.00	15.35	1.535	12.67	2.67
11	0.1000	8.50	0.00	0.00	8.50	0.036	3.55	1.596	5.33	10.00	15.33	1.533	12.66	2.66
12	0.1100	8.50	0.00	0.00	8.50	0.039	3.91	1.602	5.31	10.00	15.31	1.531	12.65	2.65
13	0.1200	8.30	0.00	0.00	8.30	0.043	4.26	1.608	5.16	10.00	15.16	1.516	12.58	2.58
14	0.1300	8.30	0.00	0.00	8.30	0.046	4.62	1.614	5.14	10.00	15.14	1.514	12.57	2.57
15	0.1400	8.30	0.00	0.00	8.30	0.050	4.97	1.620	5.12	10.00	15.12	1.512	12.56	2.56
16	0.1500	8.30	0.00	0.00	8.30	0.053	5.33	1.626	5.10	10.00	15.10	1.510	12.55	2.55
17	0.1600	8.30	0.00	0.00	8.30	0.057	5.68	1.632	5.09	10.00	15.09	1.509	12.54	2.54
18	0.1700	8.50	0.00	0.00	8.50	0.060	6.04	1.638	5.19	10.00	15.19	1.519	12.59	2.59
19	0.1800	8.60	0.00	0.00	8.60	0.064	6.39	1.645	5.23	10.00	15.23	1.523	12.61	2.61
20	0.1900	8.80	0.00	0.00	8.80	0.067	6.75	1.651	5.33	10.00	15.33	1.533	12.67	2.67
21	0.2000	8.80	0.00	0.00	8.80	0.071	7.10	1.657	5.31	10.00	15.31	1.531	12.66	2.66
22	0.2100	8.90	0.00	0.00	8.90	0.075	7.46	1.663	5.35	10.00	15.35	1.535	12.68	2.68
23	0.2200	8.90	0.00	0.00	8.90	0.078	7.82	1.670	5.33	10.00	15.33	1.533	12.66	2.66
24	0.2300	8.90	0.00	0.00	8.90	0.082	8.17	1.676	5.31	10.00	15.31	1.531	12.65	2.65
25	0.2400	8.90	0.00	0.00	8.90	0.085	8.53	1.683	5.29	10.00	15.29	1.529	12.64	2.64
26	0.2500	8.90	0.00	0.00	8.90	0.089	8.88	1.689	5.27	10.00	15.27	1.527	12.63	2.63
27	0.2600	8.90	0.00	0.00	8.90	0.092	9.24	1.696	5.25	10.00	15.25	1.525	12.62	2.62
28	0.2700	8.90	0.00	0.00	8.90	0.096	9.59	1.703	5.23	10.00	15.23	1.523	12.61	2.61
29	0.2800	8.90	0.00	0.00	8.90	0.099	9.95	1.709	5.21	10.00	15.21	1.521	12.60	2.60
30	0.2900	8.90	0.00	0.00	8.90	0.103	10.30	1.716	5.19	10.00	15.19	1.519	12.59	2.59
31	0.3000	8.90	0.00	0.00	8.90	0.107	10.66	1.723	5.17	10.00	15.17	1.517	12.58	2.58
32	0.3100	8.90	0.00	0.00	8.90	0.110	11.01	1.730	5.14	10.00	15.14	1.514	12.57	2.57
33	0.3200	8.90	0.00	0.00	8.90	0.114	11.37	1.737	5.12	10.00	15.12	1.512	12.56	2.56
34	0.3300	9.20	0.00	0.00	9.20	0.117	11.72	1.744	5.28	10.00	15.28	1.528	12.64	2.64
35	0.3400	9.20	0.00	0.00	9.20	0.121	12.08	1.751	5.25	10.00	15.25	1.525	12.63	2.63
36	0.3500	9.40	0.00	0.00	9.40	0.124	12.43	1.758	5.35	10.00	15.35	1.535	12.67	2.67
37	0.3600	9.60	0.00	0.00	9.60	0.128	12.79	1.765	5.44	10.00	15.44	1.544	12.72	2.72
38	0.3700	9.80	0.00	0.00	9.80	0.131	13.14	1.772	5.53	10.00	15.53	1.553	12.76	2.76
39	0.3800	9.80	0.00	0.00	9.80	0.135	13.50	1.780	5.51	10.00	15.51	1.551	12.75	2.75
40	0.3900	9.80	0.00	0.00	9.80	0.139	13.85	1.787	5.48	10.00	15.48	1.548	12.74	2.74
41	0.4000	9.80	0.00	0.00	9.80	0.142	14.21	1.794	5.46	10.00	15.46	1.546	12.73	2.73
42	0.4100	9.80	0.00	0.00	9.80	0.146	14.56	1.802	5.44	10.00	15.44	1.544	12.72	2.72
43	0.4200	9.80	0.00	0.00	9.80	0.149	14.92	1.809	5.42	10.00	15.42	1.542	12.71	2.71
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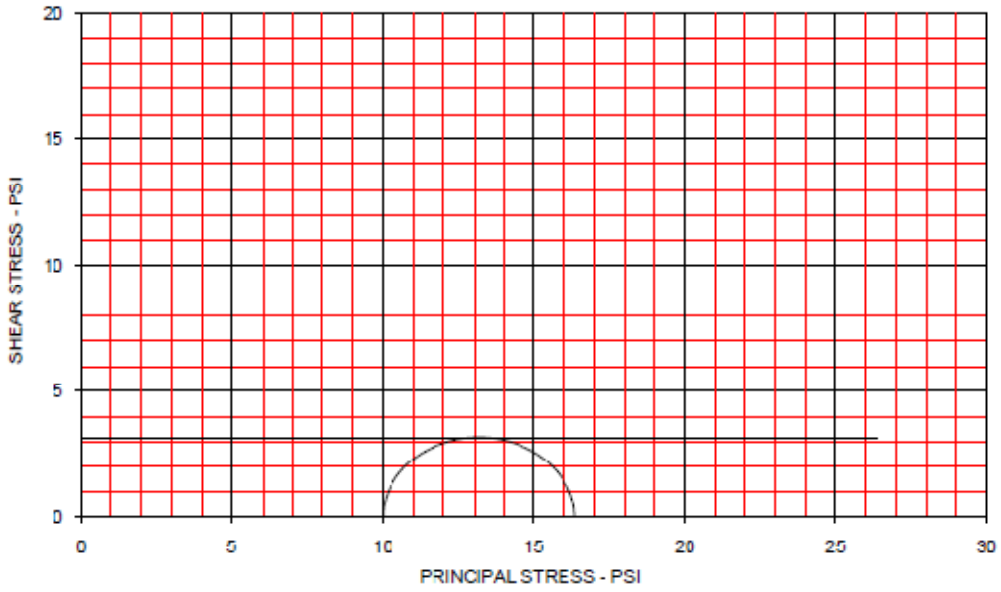
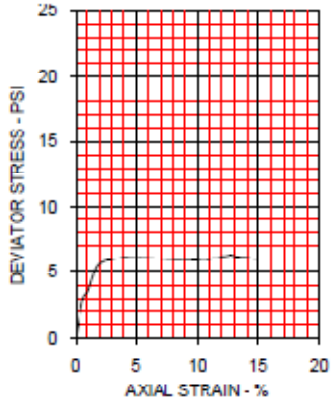
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 3.2 psi			
SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	32.1			
Dry Density - pcf	93.4			
Diameter - inches	1.40			
Height - inches	2.82			
AT TEST				
Final Moisture - %	32.1			
Dry Density - pcf	93.4			
Calculated Diameter (in.)	1.40			
Height - inches	2.82			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	6.35			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	12.8			
σ_1 Failure - psi	16.35			
σ_3 Failure - psi	10.00			



TEST DESCRIPTION

TYPE OF TEST & NC: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: FAT CLAY (CH), brown
SAMPLE LOCATION: B-38, 1-3 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 50 PL: 12 PI: 38 Percent -200: 82
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE:UUF.17

UUFS-17-AA533150 -B-38 (1-3).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.82 in Weight : 140.5 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	2.40	0.00	0.00	2.40	0.004	0.35	1.545	1.55	10.00	11.55	1.155	10.78	0.78
3	0.0200	4.70	0.00	0.00	4.70	0.007	0.71	1.550	3.03	10.00	13.03	1.303	11.52	1.52
4	0.0300	5.50	0.00	0.00	5.50	0.011	1.06	1.556	3.53	10.00	13.53	1.353	11.77	1.77
5	0.0400	7.10	0.00	0.00	7.10	0.014	1.42	1.562	4.55	10.00	14.55	1.455	12.27	2.27
6	0.0500	8.40	0.00	0.00	8.40	0.018	1.77	1.567	5.36	10.00	15.36	1.536	12.68	2.68
7	0.0600	9.00	0.00	0.00	9.00	0.021	2.13	1.573	5.72	10.00	15.72	1.572	12.86	2.86
8	0.0700	9.30	0.00	0.00	9.30	0.025	2.48	1.579	5.89	10.00	15.89	1.589	12.95	2.95
9	0.0800	9.40	0.00	0.00	9.40	0.028	2.84	1.584	5.93	10.00	15.93	1.593	12.97	2.97
10	0.0900	9.60	0.00	0.00	9.60	0.032	3.19	1.590	6.04	10.00	16.04	1.604	13.02	3.02
11	0.1000	9.70	0.00	0.00	9.70	0.035	3.55	1.596	6.08	10.00	16.08	1.608	13.04	3.04
12	0.1100	9.90	0.00	0.00	9.90	0.039	3.90	1.602	6.18	10.00	16.18	1.618	13.09	3.09
13	0.1200	9.90	0.00	0.00	9.90	0.043	4.26	1.608	6.16	10.00	16.16	1.616	13.08	3.08
14	0.1300	9.90	0.00	0.00	9.90	0.046	4.61	1.614	6.13	10.00	16.13	1.613	13.07	3.07
15	0.1400	9.90	0.00	0.00	9.90	0.050	4.96	1.620	6.11	10.00	16.11	1.611	13.06	3.06
16	0.1500	10.00	0.00	0.00	10.00	0.053	5.32	1.626	6.15	10.00	16.15	1.615	13.08	3.08
17	0.1600	10.00	0.00	0.00	10.00	0.057	5.67	1.632	6.13	10.00	16.13	1.613	13.06	3.06
18	0.1700	10.00	0.00	0.00	10.00	0.060	6.03	1.638	6.10	10.00	16.10	1.610	13.05	3.05
19	0.1800	10.00	0.00	0.00	10.00	0.064	6.38	1.644	6.08	10.00	16.08	1.608	13.04	3.04
20	0.1900	10.00	0.00	0.00	10.00	0.067	6.74	1.651	6.06	10.00	16.06	1.606	13.03	3.03
21	0.2000	10.00	0.00	0.00	10.00	0.071	7.09	1.657	6.04	10.00	16.04	1.604	13.02	3.02
22	0.2100	10.00	0.00	0.00	10.00	0.074	7.45	1.663	6.01	10.00	16.01	1.601	13.01	3.01
23	0.2200	10.00	0.00	0.00	10.00	0.078	7.80	1.670	5.99	10.00	15.99	1.599	12.99	2.99
24	0.2300	10.00	0.00	0.00	10.00	0.082	8.16	1.676	5.97	10.00	15.97	1.597	12.98	2.98
25	0.2400	10.00	0.00	0.00	10.00	0.085	8.51	1.683	5.94	10.00	15.94	1.594	12.97	2.97
26	0.2500	10.10	0.00	0.00	10.10	0.089	8.87	1.689	5.98	10.00	15.98	1.598	12.99	2.99
27	0.2600	10.10	0.00	0.00	10.10	0.092	9.22	1.696	5.96	10.00	15.96	1.596	12.98	2.98
28	0.2700	10.10	0.00	0.00	10.10	0.096	9.57	1.702	5.93	10.00	15.93	1.593	12.97	2.97
29	0.2800	10.10	0.00	0.00	10.10	0.099	9.93	1.709	5.91	10.00	15.91	1.591	12.95	2.95
30	0.2900	10.30	0.00	0.00	10.30	0.103	10.28	1.716	6.00	10.00	16.00	1.600	13.00	3.00
31	0.3000	10.30	0.00	0.00	10.30	0.106	10.64	1.723	5.98	10.00	15.98	1.598	12.99	2.99
32	0.3100	10.30	0.00	0.00	10.30	0.110	10.99	1.730	5.96	10.00	15.96	1.596	12.98	2.98
33	0.3200	10.60	0.00	0.00	10.60	0.113	11.35	1.736	6.10	10.00	16.10	1.610	13.05	3.05
34	0.3300	10.60	0.00	0.00	10.60	0.117	11.70	1.743	6.08	10.00	16.08	1.608	13.04	3.04
35	0.3400	10.90	0.00	0.00	10.90	0.121	12.06	1.750	6.23	10.00	16.23	1.623	13.11	3.11
36	0.3500	11.00	0.00	0.00	11.00	0.124	12.41	1.758	6.26	10.00	16.26	1.626	13.13	3.13
37	0.3600	11.20	0.00	0.00	11.20	0.128	12.77	1.765	6.35	10.00	16.35	1.635	13.17	3.17
38	0.3700	11.00	0.00	0.00	11.00	0.131	13.12	1.772	6.21	10.00	16.21	1.621	13.10	3.10
39	0.3800	11.00	0.00	0.00	11.00	0.135	13.48	1.779	6.18	10.00	16.18	1.618	13.09	3.09
40	0.3900	11.00	0.00	0.00	11.00	0.138	13.83	1.786	6.16	10.00	16.16	1.616	13.08	3.08
41	0.4000	11.00	0.00	0.00	11.00	0.142	14.18	1.794	6.13	10.00	16.13	1.613	13.07	3.07
42	0.4100	10.90	0.00	0.00	10.90	0.145	14.54	1.801	6.05	10.00	16.05	1.605	13.03	3.03
43	0.4200	10.90	0.00	0.00	10.90	0.149	14.89	1.809	6.03	10.00	16.03	1.603	13.01	3.01
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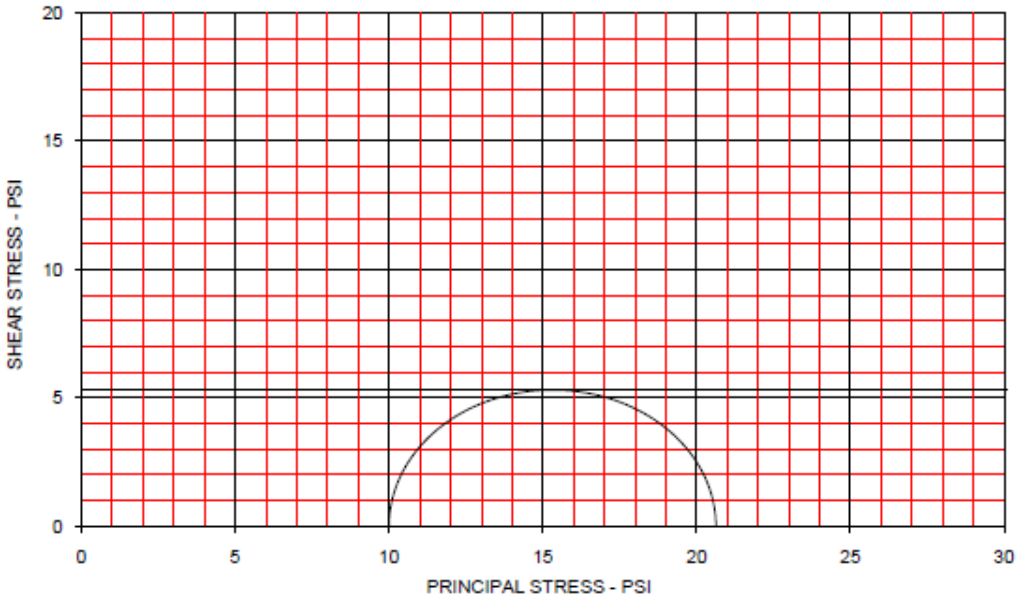
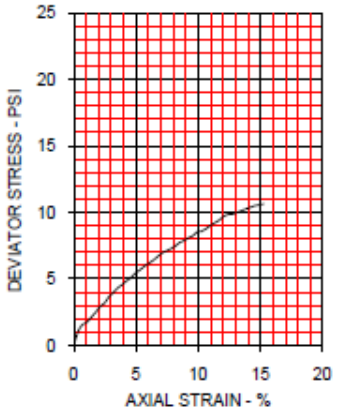
TRIAXIAL SHEAR TEST REPORT



TOTAL STRESS PARAMETERS	ϕ = 0.0 deg	c = 5.3 psi



SPECIMEN NO.	1	2	3	4
INITIAL				
Moisture Content - %	28.7			
Dry Density - pcf	96.1			
Diameter - inches	1.40			
Height - inches	2.82			
AT TEST				
Final Moisture - %	28.7			
Dry Density - pcf	96.1			
Calculated Diameter (in.)	1.40			
Height - inches	2.82			
Effect. Cell Pressure - psi	10.0			
Failure Stress - psi	10.63			
Total Pore Pressure - psi	10.0			
Strain Rate - inches/min.	0.03000			
Failure Strain - %	15.3			
σ_1 Failure - psi	20.63			
σ_3 Failure - psi	10.00			

TEST DESCRIPTION

TYPE OF TEST & NO: UU Triaxial - UUFS-4
SAMPLE TYPE: SPNC
DESCRIPTION: FAT CLAY (CH), dark grayish brown
SAMPLE LOCATION: B-38, 3-5 ft
ASSUMED SPECIFIC GRAVITY: 2.70
LL: 51 PL: 12 PI: 39 Percent -200: 82
REMARKS:

PROJECT INFORMATION

PROJECT: Fully-Softened Clay Research
LOCATION: Stillwater, OK
PROJECT NO: AA-5-33150
CLIENT: ODOT
DATE: 10/20/2010

OSU - CIVE - GEOTECHNICAL PLATE:UUF.18

UUFS-18-AA533150 -B-38 (3-5).xlsx

PROJECT NO: AA-5-33150 PROJECT: Fully-Softened Clay Research CLIENT: ODOT

SPECIMEN NO. 1 DESCRIPTION: FAT CLAY (CH), dark grayish brown

Cell Pressure : 10.0 psi Back Pressure : 0.0 psi Eff. Stress : 10.0 psi

Dia. : 1.40 in Area: 1.539 in^2 Ht. : 2.82 in Weight : 141.0 g

No.	Def. (in)	Load Dial	U (psi)	ΔU (psi)	Load (lbs)	ε (in/in)	ε %	Corr. Area (in^2)	Δσ (psi)	σ_3' (psi)	σ_1' (psi)	σ_1': σ_3'	p' (psi)	q (psi)
	Data Input													
1	0.0000	0.00	0.00	0.00	0.00	0.0	0.0	1.539	0.00	10.00	10.00	1.000	10.00	0.00
2	0.0100	1.60	0.00	0.00	1.60	0.004	0.35	1.545	1.04	10.00	11.04	1.104	10.52	0.52
3	0.0200	2.40	0.00	0.00	2.40	0.007	0.71	1.550	1.55	10.00	11.55	1.155	10.77	0.77
4	0.0300	2.70	0.00	0.00	2.70	0.011	1.06	1.556	1.74	10.00	11.74	1.174	10.87	0.87
5	0.0400	3.30	0.00	0.00	3.30	0.014	1.42	1.562	2.11	10.00	12.11	1.211	11.06	1.06
6	0.0500	3.90	0.00	0.00	3.90	0.018	1.77	1.567	2.49	10.00	12.49	1.249	11.24	1.24
7	0.0600	4.60	0.00	0.00	4.60	0.021	2.13	1.573	2.92	10.00	12.92	1.292	11.46	1.46
8	0.0700	5.00	0.00	0.00	5.00	0.025	2.48	1.579	3.17	10.00	13.17	1.317	11.58	1.58
9	0.0800	5.80	0.00	0.00	5.80	0.028	2.84	1.584	3.66	10.00	13.66	1.366	11.83	1.83
10	0.0900	6.30	0.00	0.00	6.30	0.032	3.19	1.590	3.96	10.00	13.96	1.396	11.98	1.98
11	0.1000	6.90	0.00	0.00	6.90	0.035	3.55	1.596	4.32	10.00	14.32	1.432	12.16	2.16
12	0.1100	7.30	0.00	0.00	7.30	0.039	3.90	1.602	4.56	10.00	14.56	1.456	12.28	2.28
13	0.1200	7.80	0.00	0.00	7.80	0.043	4.26	1.608	4.85	10.00	14.85	1.485	12.43	2.43
14	0.1300	8.20	0.00	0.00	8.20	0.046	4.61	1.614	5.08	10.00	15.08	1.508	12.54	2.54
15	0.1400	8.80	0.00	0.00	8.80	0.050	4.96	1.620	5.43	10.00	15.43	1.543	12.72	2.72
16	0.1500	9.20	0.00	0.00	9.20	0.053	5.32	1.626	5.66	10.00	15.66	1.566	12.83	2.83
17	0.1600	9.70	0.00	0.00	9.70	0.057	5.67	1.632	5.94	10.00	15.94	1.594	12.97	2.97
18	0.1700	10.10	0.00	0.00	10.10	0.060	6.03	1.638	6.17	10.00	16.17	1.617	13.08	3.08
19	0.1800	10.50	0.00	0.00	10.50	0.064	6.38	1.644	6.39	10.00	16.39	1.639	13.19	3.19
20	0.1900	11.00	0.00	0.00	11.00	0.067	6.74	1.651	6.66	10.00	16.66	1.666	13.33	3.33
21	0.2000	11.50	0.00	0.00	11.50	0.071	7.09	1.657	6.94	10.00	16.94	1.694	13.47	3.47
22	0.2100	11.80	0.00	0.00	11.80	0.074	7.45	1.663	7.09	10.00	17.09	1.709	13.55	3.55
23	0.2200	12.10	0.00	0.00	12.10	0.078	7.80	1.670	7.25	10.00	17.25	1.725	13.62	3.62
24	0.2300	12.50	0.00	0.00	12.50	0.082	8.16	1.676	7.46	10.00	17.46	1.746	13.73	3.73
25	0.2400	13.00	0.00	0.00	13.00	0.085	8.51	1.683	7.73	10.00	17.73	1.773	13.86	3.86
26	0.2500	13.30	0.00	0.00	13.30	0.089	8.87	1.689	7.87	10.00	17.87	1.787	13.94	3.94
27	0.2600	13.70	0.00	0.00	13.70	0.092	9.22	1.696	8.08	10.00	18.08	1.808	14.04	4.04
28	0.2700	14.00	0.00	0.00	14.00	0.096	9.57	1.702	8.22	10.00	18.22	1.822	14.11	4.11
29	0.2800	14.60	0.00	0.00	14.60	0.099	9.93	1.709	8.54	10.00	18.54	1.854	14.27	4.27
30	0.2900	14.70	0.00	0.00	14.70	0.103	10.28	1.716	8.57	10.00	18.57	1.857	14.28	4.28
31	0.3000	15.10	0.00	0.00	15.10	0.106	10.64	1.723	8.77	10.00	18.77	1.877	14.38	4.38
32	0.3100	15.60	0.00	0.00	15.60	0.110	10.99	1.730	9.02	10.00	19.02	1.902	14.51	4.51
33	0.3200	16.00	0.00	0.00	16.00	0.113	11.35	1.736	9.21	10.00	19.21	1.921	14.61	4.61
34	0.3300	16.40	0.00	0.00	16.40	0.117	11.70	1.743	9.41	10.00	19.41	1.941	14.70	4.70
35	0.3400	17.00	0.00	0.00	17.00	0.121	12.06	1.750	9.71	10.00	19.71	1.971	14.86	4.86
36	0.3500	17.30	0.00	0.00	17.30	0.124	12.41	1.758	9.84	10.00	19.84	1.984	14.92	4.92
37	0.3600	17.40	0.00	0.00	17.40	0.128	12.77	1.765	9.86	10.00	19.86	1.986	14.93	4.93
38	0.3700	17.70	0.00	0.00	17.70	0.131	13.12	1.772	9.99	10.00	19.99	1.999	14.99	4.99
39	0.3800	18.00	0.00	0.00	18.00	0.135	13.48	1.779	10.12	10.00	20.12	2.012	15.06	5.06
40	0.3900	18.30	0.00	0.00	18.30	0.138	13.83	1.786	10.24	10.00	20.24	2.024	15.12	5.12
41	0.4000	18.60	0.00	0.00	18.60	0.142	14.18	1.794	10.37	10.00	20.37	2.037	15.18	5.18
42	0.4100	18.90	0.00	0.00	18.90	0.145	14.54	1.801	10.49	10.00	20.49	2.049	15.25	5.25
43	0.4200	19.10	0.00	0.00	19.10	0.149	14.89	1.809	10.56	10.00	20.56	2.056	15.28	5.28
44	0.4300	19.30	0.00	0.00	19.30	0.152	15.25	1.816	10.63	10.00	20.63	2.063	15.31	5.31
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VITA

AZMI NURI BARYUN

Candidate for the Degree of

Master of Science

Thesis: CORRELATION OF FULLY SOFTENED SHEAR STRENGTH OF CLAY SOIL WITH INDEX PROPERTIES- PHASE I

Major Field: Civil Engineering

Biographical:

Education:

Completed the requirements for the Master of Science in Civil Engineering at Oklahoma State University, Stillwater, Oklahoma in May, 2011.

Completed the requirements for the Bachelor of Science in Civil Engineering at OSU, Stillwater, Oklahoma/ USA in 2006.

Experience: Two years of engineering experience with Oklahoma Department of Transportation following the completion of B.S.C.E
Passed EIT test on 2010

Name: AZMI NURI BARYUN Date of Degree: May, 2011

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: CORRELATION OF FULLY SOFTENED SHEAR STRENGTH OF CLAY SOIL WITH INDEX PROPERTIES- PHASE I

Pages in Study: 116 Candidate for the Degree of Master of Science

Major Field: Civil Engineering

Scope and Method of Study: Geotechnical engineering

Findings and Conclusions: Equation model to determine fully softened shear strength using the peak strengths and index properties.

Shallow slope failure is one of the huge problems in the geotechnical engineering projects. These failures can cost millions of dollars every year. These failures can occur on embankments and cut slopes that lead to expensive repairs and affect our budgets, traffic systems, environmental conditions and safety.

Embankments and cut slopes often fail when the clay soils become a fully softened due to shrink-swell action, wet-dry cycles and downhill creep.

In this project, the model equation was developed to have a correlation between the peak strength values from standard laboratory tests and the fully-softened values which are likely to develop in the slopes over time.

ADVISER'S APPROVAL: Dr. Garry Gregory